

COMMONWEALTH OF MASSACHUSETTS



**CONTRACT DOCUMENTS
AND SPECIAL PROVISIONS**

PROPOSAL NO.	606517-125780
P.V. =	\$8,577,000.00
PLANS	YES

FOR

**Federal Aid Project No. FAP No. STP/TAP-0032(040)
Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of
Welcome Road (1.1 Miles – Phase I)**

in the Town of

WEST BROOKFIELD

In accordance with the STANDARD SPECIFICATIONS
for HIGHWAYS and BRIDGES dated 2024

This Proposal to be opened and read:

TUESDAY, MAY 21, 2024 at 2:00 P.M.

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DOCUMENT 00104

**NOTICE TO CONTRACTORS**

Electronic proposals for the following project will be received through the internet using Bid Express 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 Bid Express.

TUESDAY, MAY 21, 2024 at 2:00 P.M. **

WEST BROOKFIELD

Federal Aid Project No. STP/TAP-0032(040)

**Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of
Welcome Road (1.1 Miles – Phase I)**

****Date Subject to Change**

PROJECT VALUE = \$8,577,000.00

Bidders must be pre-qualified by the Department in the HIGHWAY - 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.

Plans will be on display and information will be available at the MassDOT Boston Office and at the District Office in NORTHAMPTON.

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 \$637.50 per ton, Portland cement \$425.53 per ton, diesel fuel \$3.155 per gallon, and gasoline \$2.695 per gallon, and Steel Base Price Index 420.3 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: Monica G. Tibbits-Nutt, Secretary and CEO, MassDOT
Jonathan L. Gulliver, Administrator, MassDOT Highway Division
SATURDAY, APRIL 13, 2024

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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.

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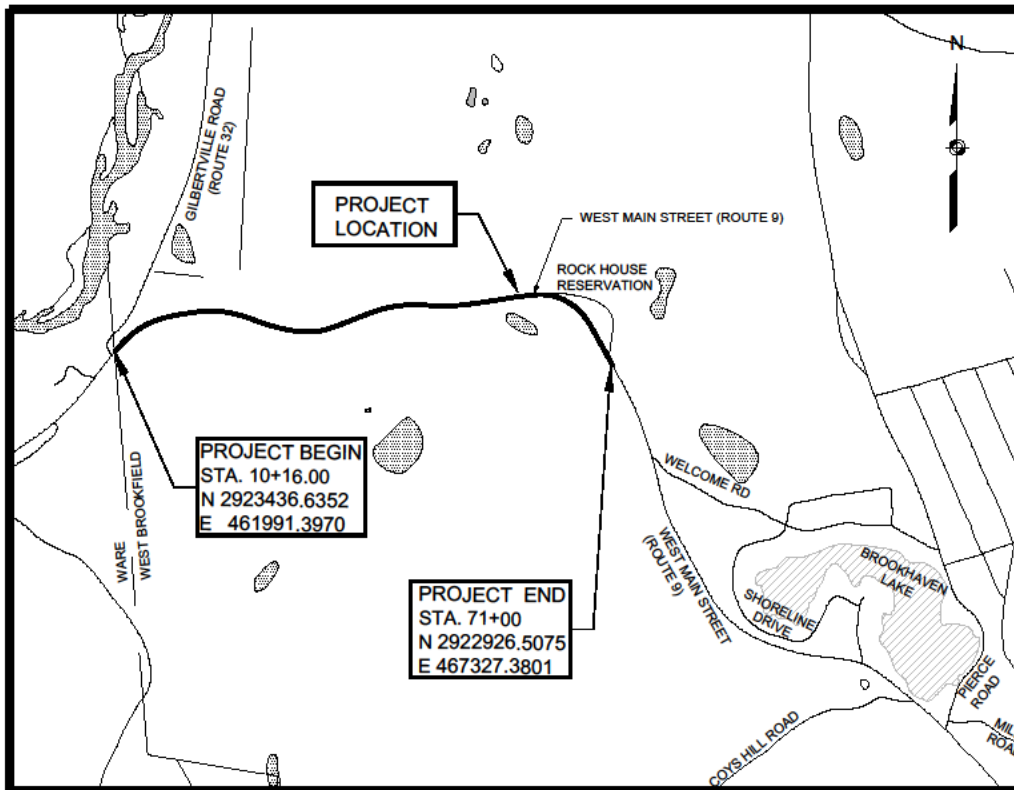
DOCUMENT 00331

LOCUS MAP

WEST BROOKFIELD

Federal Aid Project No. STP/TAP-0032(040)

Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road
(1.1 Miles – Phase I)



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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): _____



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: _____

DOCUMENT 00710
GENERAL CONTRACT PROVISIONS
Revised: 02/14/24

NOTICE OF AVAILABILITY

The STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES dated 2024, the 1996 METRIC CONSTRUCTION AND TRAFFIC STANDARD DETAILS, the 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS; the 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING and the 2017 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 00719

(Revised September 14, 2023 – for all Federally Aided Projects)

**SPECIAL PROVISIONS FOR PARTICIPATION BY
DISADVANTAGED BUSINESS ENTERPRISES**
(IMPLEMENTING TITLE 49 OF THE CODE OF FEDERAL REGULATIONS, PART 26)

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POLICY

The Massachusetts Department of Transportation (MassDOT) receives Federal financial assistance from the Federal Highway Administration (FHWA), United States Department of Transportation (U.S. DOT), and as a condition of receiving this assistance, has signed an assurance that it will comply with 49 CFR Part 26 (Participation By Disadvantaged Business Enterprises In Department Of Transportation Financial Assistance Programs). The U.S. DOT Disadvantaged Business Enterprise Program is authorized by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (“SAFETEA-LU”), as amended, at Title 23, United States Code, § 1101.

Accordingly, MassDOT has established a Disadvantaged Business Enterprise (DBE) Program in accordance with 49 CFR Part 26. It is the policy of MassDOT to ensure that DBEs have an equal opportunity to receive and participate in U.S. DOT assisted Contracts, without regard to race, color, national origin, or sex. To this end, MassDOT shall not directly, or through contractual or other arrangements, use criteria or methods of administration that have the effect of defeating or substantially impairing accomplishment of the program objectives stated below:

- ◆ To ensure nondiscrimination in the award and administration of U.S. DOT assisted Contracts;
- ◆ To create a level playing field on which DBEs can compete fairly for U.S. DOT assisted Contracts;
- ◆ To ensure that the DBE Program is narrowly tailored in accordance with applicable law;
- ◆ To ensure that only firms that fully meet 49 CFR Part 26 eligibility standards are permitted to participate as DBEs;
- ◆ To help remove barriers to the participation of DBEs in U.S. DOT assisted Contracts; and
- ◆ To assist the development of firms that can compete successfully in the market place outside the DBE Program.

The Director of Civil Rights of MassDOT has been designated as the DBE Liaison Officer. The DBE Liaison Officer is responsible for implementing all aspects of the DBE Program. Other MassDOT employees are responsible for assisting the Office of Civil Rights in carrying out this obligation. Implementation of the DBE Program is accorded the same priority as compliance with all other legal obligations incurred by MassDOT in its financial assistance agreements with each operating administration of the U.S. DOT. Information on the Federal requirements and MassDOT’s policies and information can be found at:

<i>Type of Info</i>	<i>Website</i>	<i>Description</i>
MassDOT Highway Division Policies and Info	https://www.mass.gov/disadvantaged-business-enterprise-goals-2019-2022	MassDOT– Highway Div’n Page
For copies of the Code of Federal Regulations	http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR	FDsys – US Gov’t Printing Office
For information about the U.S.DOT DBE Program	https://www.transportation.gov/civil-rights/disadvantaged-business-enterprise	U.S. DOT/ FHWA page

1. DEFINITIONS

As used in these provisions, the terms set out below are defined as follows:

“Broker”, for purposes of these provisions, shall mean a DBE Entity that has entered into a legally binding relationship to provide goods or services delivered or performed by a third party. A broker may be a DBE Entity that arranges or expedites transactions but performs no work or installation services.

“Contractor”, “General” or “Prime” Contractor, “Bidder,” and “DB Entity” shall mean a person, firm, or other entity that has contracted directly with MassDOT to provide contracted work or services.

“Contract” shall mean the Contract for work between the Contractor and MassDOT.

“DBB” or “Design-Bid-Build” shall mean the traditional design, bid and project delivery method consisting of separate contracts between awarding authority and a designer resulting in a fully designed project; and a separate bidding process and Contract with a construction Contractor or Bidder.

“DB” or “Design-Build” shall mean an accelerated design, bid and project delivery method consisting of a single contract between the awarding authority and a DB Entity, consisting of design and construction companies that will bring a project to full design and construction.

“Disadvantaged Business Enterprise” or “DBE” shall mean a for-profit, small business concern:

- (a) that is at least fifty-one (51%) percent owned by one or more individuals who are both socially and economically disadvantaged, or, in the case of any corporation, in which at least fifty-one (51%) percent of the stock is owned by one or more such individuals; and
- (b) where the management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

“FHWA” shall mean the Federal Highway Administration,” an agency within U.S. DOT that supports State and local governments in the design, and maintenance of the Nation’s highway system (Federal Aid Highway Program).

“Good faith efforts” shall mean efforts to achieve a DBE participation goal or other requirement of these Special Provisions that, by their scope, intensity, and appropriateness to the objective, can reasonably be expected to fulfill the program requirement. Such efforts must be deemed acceptable by MassDOT.

“Joint Venture” shall mean an association of a DBE firm and one or more other firms to carry out a single, for-profit business enterprise, for which the parties combine their property, capital, efforts, skills and knowledge, and in which the DBE is responsible for a distinct, clearly defined portion of the work of the Contract and whose share in the capital contribution, control, management, risks, and profits of the joint venture are commensurate with its ownership interest.

“Approved Joint Venture” shall mean a joint venture, as defined above, which has been approved by MassDOT’s Prequalification Office and Office of Civil Rights for DBE participation on a particular Contract.

"Manufacturer" shall mean a firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles or equipment required under the contract and of the general character described by the specifications.

"Regular Dealer" shall mean a DBE firm that owns, operates, or maintains a store, warehouse, or other establishment in which materials, supplies, articles or equipment of the general character described by the specifications and required under the Contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business.

- (a) To be a regular dealer, the firm must be an established, regular business that engages, as its principal business, and under its own name, in the purchase and sale of the products in question.
- (b) A person may be a regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business as provided above if the person both owns and operates distribution equipment for the products. Any supplementing of regular dealers' own distribution equipment shall be by long term lease agreement and not on an ad hoc or contract by contract basis.
- (c) Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not regular dealers within the meaning of this definition.

"Responsive" and "Responsible" refers to the bidder's submittal meeting all of the requirements of the advertised request for proposal. The term responsible refers to the ability of the Contractor to perform the work. This ability can be determined prior to bid invitations.

"Small Business or Small Business Concern" shall mean a small business concern or company as defined in Section 3 of the Small Business Act and SBA regulations implementing it (13 CFR Part 121); and is a business that does not exceed the cap on annual average gross receipts established by the U.S. Secretary of Transportation pursuant to 49 CFR Part 26.65; see also 49 CFR Part 26.39.

"SDO" shall mean the Massachusetts Supplier Diversity Office, formerly known as the State Office of Minority and Women Business Assistance (SOMWBA). In 2010, SOMWBA was abolished and the SDO was established. *See* St. 2010, c. 56. The SDO has assumed all the functions of SOWMBA. SDO is an agency within the Commonwealth of Massachusetts Executive office of Administration and Finance (ANF) Operational Services Division (OSD). The SDO mandate is to help promote the development of business enterprises and non-profit organizations owned and operated by minorities and women.

"Socially and economically disadvantaged individuals" shall mean individuals who are citizens of the United States (or lawfully admitted permanent residents) and who are:

- (a) Individuals found by SDO to be socially and economically disadvantaged individuals on a case by case basis.
- (b) Individuals in the following groups, members of which are rebuttably presumed to be socially and economically disadvantaged:

- (1) "Black Americans" which includes persons having origin in any of the Black racial groups of Africa;
- (2) "Hispanic Americans" which include persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race;
- (3) "Native Americans" which include persons who are American Indians, Eskimos, Aleuts, or Native Hawaiians;
- (4) "Asian Pacific Americans" which includes persons whose origins are from Japan, China, Taiwan, Korea, Burma (Myanmar), Vietnam, Laos, Cambodia (Kampuchea), Thailand, Malaysia, Indonesia, the Philippines, Brunei, Samoa, Guam, the U.S. Trust Territories of the Pacific Islands (Republic of Palau), the Commonwealth of the Northern Marianas Islands, Macao, Fiji, Tonga, Kiribati, Tuvalu, Nauru, Federated States of Micronesia, or Hong Kong;
- (5) "Subcontinent Asian Americans" which includes persons whose origins are from India, Pakistan, Bangladesh, Bhutan, the Maldives Islands, Nepal or Sri Lanka;
- (6) Women; or
- (7) Any additional groups whose members are designated as socially and economically disadvantaged by the Small Business Administration (SBA), at such time as the SBA designation becomes effective.

Other terms and definitions applicable to the U.S. DOT DBE Program may be found at 49 CFR Part 26 and related appendices and guidance pages.

2. DBE PARTICIPATION

a. Goal

On this Contract, MassDOT has established the following goal(s) for participation by firms owned and controlled by socially and economically disadvantaged persons. At least half of the goal must be met in the form of DBE Subcontractor construction activity as opposed to material supplies or other services. The applicable goal remains in effect throughout the life of the contract regardless of whether pre-identified DBE Subcontractors remain on the Project or under Contract.

Design-Bid-Build Projects: DBE Participation Goal 16 %
(One half of this goal shall be met in the form of Subcontractor construction activity)

Design-Build Projects: DBE Design Participation Goal ____ % and DBE Construction Participation Goal ____ %
(One half of the Construction Goal shall be met in the form of Subcontractor construction activity)

b. Bidders List

Pursuant to the provisions of 49 CFR Part 26.11(c), Recipients such as MassDOT, must collect from all Bidders who seek work on Federally assisted Contracts the firm full company name(s), addresses and telephone numbers of all firms that have submitted bids or quotes to the Bidders in connection with this Project. All bidders should refer to the Special Provision Document "A00801" of the Project proposal for this requirement.

In addition, MassDOT must provide to U.S. DOT, information concerning contractors firm status as a DBE or non-DBE, the age of the firm, and the annual gross receipts of the firm within a series of brackets (e.g., less than \$500,000; \$500,000–\$1 million; \$1–2 million; \$2–5 million, etc.). The status, firm age, and annual gross receipt information will be sought by MassDOT regularly prior to setting its DBE participation goal for submission to U.S. DOT. MassDOT will survey each individual firm for this information directly.

Failure to comply with a written request for this information within fifteen (15) business days may result in the suspension of bidding privileges or other such sanctions, as provided for in Section 9 of this provision, until the information is received.

3. CONTRACTOR ASSURANCES

No Contractor or any Subcontractor shall 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 in all respects and as applicable prior to, or subsequent to, award of U.S. DOT assisted Contracts. The Contractor agrees to affirmatively seek out and consider DBE firms as Contractors, Subcontractors, and/or suppliers of materials and services for this Contract. No Contract will be approved until MassDOT has reviewed Bidders'/Contractors' affirmative actions concerning DBEs. Failure to carry out these requirements is a material breach of this Contract which may result in the termination of the Contract or such other remedy as MassDOT or FHWA deem appropriate.

4. REQUIRED SUBCONTRACT PROVISIONS

The Prime Contractor shall include the provisions of Section 3 above in every subcontract, making those provisions binding on each Subcontractor; in addition, the Prime Contractor shall include a copy of this Special Provision, in its entirety, in every subcontract with a DBE firm which is, or may be, submitted for credit toward the Contract participation goal.

5. ELIGIBILITY OF DBES

Only firms that have been certified by SDO and confirmed by MassDOT as eligible in accordance with 49 CFR Part 26 to participate as DBEs on federally aided MassDOT Contracts may be used on this Contract for credit toward the DBE participation goal.

a. Massachusetts DBE Directory

MassDOT makes available to all bidders the most current Massachusetts Disadvantaged Business Enterprise Directory. This directory is made available for Contractors' convenience and is informational only. The Directory lists those firms that have been certified as eligible in accordance with the criteria of 49 CFR Part 26 to participate as DBEs on federally aided MassDOT contracts. The Directory also lists the kinds of work each firm is certified to perform but does not constitute an endorsement of the quality of performance of any business and does not represent MassDOT Subcontractor approval.

Contractors are encouraged to make use of the DBE Directory maintained by SDO on the Internet.

This listing is updated daily and may be accessed at the SDO's website at:

<https://www.diversitycertification.mass.gov/BusinessDirectory/BusinessDirectorySearch.aspx>

b. DBE Certification

A firm must apply to SDO, currently acting as certification agent for MassDOT, for DBE certification to participate on federally aided MassDOT Contracts. A DBE application may be made in conjunction with a firm's application to SDO for certification to participate in state-funded minority and women business enterprise programs or may be for DBE certification only. An applicant for DBE certification must identify the area(s) of work it seeks to perform on U.S. DOT funded projects.

c. Joint Venture Approval

To obtain recognition as an approved DBE Joint Venture, the parties to the joint venture must provide to MassDOT's Office of Civil Rights and Prequalification Office, at least fourteen (14) business days before the bid opening date, an Affidavit of DBE/Non-DBE Joint Venture in the form attached hereto, and including, but not limited to the following:

1. a copy of the Joint Venture Agreement;
2. a description of the distinct, clearly defined portion of the contract work that the DBE will perform with its own forces; and,
3. all such additional information as may be requested by MassDOT for the purpose of determining whether the joint venture is eligible.

6. COUNTING DBE PARTICIPATION TOWARDS DBE PARTICIPATION GOALS

In order for DBE participation to count toward the Contract participation goal, the DBE(s) must have served a commercially useful function in the performance of the Contract and must have been paid in full for acceptable performance.

a. Commercially Useful Function

- (1) In general, a DBE performs a commercially useful function when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. With respect to materials and supplies used on the Contract, the DBE must be responsible for negotiating price, determining quality and quantity, ordering the material, installing (where applicable) and paying for the material itself.
- (2) To determine whether a DBE is performing a commercially useful function, MassDOT will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the Contract is commensurate with the work it is actually performing and the DBE credit claimed for its performance of the work, and other relevant factors.
- (3) A DBE does not perform a commercially useful function if its role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of DBE participation. In determining whether a DBE is such an extra participant, MassDOT will examine similar transactions, particularly those in which DBEs do not participate.

b. Counting Participation Toward The Contract Participation Goal

DBE participation which serves a commercially useful function shall be counted toward the DBE participation goal in accordance with the Provisions of 49 CFR Part 26.55(a) to (h), as follows:

- (1) When a DBE participates in a construction Contract, MassDOT will count the value of the work performed by the DBE's own forces. MassDOT will count the cost of supplies and materials obtained by the DBE for the work of its contract, including supplies purchased or equipment leased by the DBE. Supplies, labor, or equipment the DBE Subcontractor uses, purchases, or leases from the Prime Contractor or any affiliate of the Prime Contractor will not be counted.

- (2) MassDOT will count the entire amount of fees or commissions charged by a DBE firm for providing bona fide services, such as professional, technical, consultant, or managerial services, or for providing bonds or insurance specifically required for the performance of a U.S. DOT assisted Contract, toward DBE participation goals, provided it is determined that the fee is reasonable and not excessive as compared with fees customarily allowed for similar services.
- (3) When a DBE performs as a participant in a joint venture, MassDOT will count toward DBE participation goals a portion of the total dollar value of the contract that is equal to the distinct, clearly defined portion of the work of the Contract that the DBE performs with its own forces.
- (4) MassDOT will use the following factors in determining whether a DBE trucking company is performing a commercially useful function:
 - (i) the DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract; there cannot be a contrived arrangement for the purpose of meeting DBE participation goals.
 - (ii) the DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the Contract.
 - (iii) the Contractor will receive DBE credit for the total value of the transportation services the DBE provides on the Contract using trucks owned, insured, and operated by the DBE itself and using drivers the DBE employs alone.
 - (iv) the DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The Contractor who has a contract with a DBE who leases trucks from another DBE will receive credit for the total value of the transportation services of the lease.
 - (v) the DBE may also lease trucks from a non-DBE firm, including an owner-operator. The Contractor who has a Contract with a DBE who leases trucks from a non-DBE is entitled to credit for the total value of the transportation services provided by non-DBE lessees not to exceed the value of transportation services provided by DBE-owned trucks on the Contract. Additional participation by non-DBE lessees receives credit only for the fee or commission it receives as a result of the lease arrangement, fee or commission it receives as a result of the lease arrangement. The DBE does not receive credit for the total value of the transportation services provided by the lessee, since these services are not provided by a DBE.
 - (vi) the lease must indicate that the DBE has exclusive use of, and control over, the truck. This does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the name and identification number of the DBE.

- (5) MassDOT will count the Prime Contractor's expenditures with DBEs for materials or supplies toward DBE participation goals as follows:
- (i) if the materials or supplies are obtained from a DBE manufacturer, as defined in Section 1 above, MassDOT will count one hundred (100%) percent of the cost of the materials or supplies toward DBE participation goals, provided the DBE meets the other requirements of the regulations.
 - (ii) if the materials or supplies are purchased from a DBE regular dealer, as defined in Section 1 above, MassDOT will count sixty (60%) percent of the cost of the materials or supplies toward the Contract participation goal, provided the DBE meets the other requirements of the regulations.
 - (iii) for materials or supplies purchased from a DBE which is neither a manufacturer nor a regular dealer, MassDOT will count the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site toward the Contract participation goal, provided that MassDOT determines the fees to be reasonable and not excessive as compared with fees customarily allowed for similar services; the cost of the materials and supplies themselves will not be counted; and provided the DBE meets the other requirements of the regulations.

c. Joint Check Policy

MassDOT recognizes that the use of joint checks may be a business practice required by material suppliers and vendors in the construction industry. A joint check is a two-party check issued by a/the Prime Contractor to a DBE third party such as a regular dealer of material or supplies. The Prime Contractor issues the check as payor to the DBE and the third party jointly as payees to guarantee payment to the third party for materials or supplies obtained or to be used by the DBE. FHWA has established criteria to ensure that DBEs are in fact performing a commercially useful function ("CUF") while using a joint check arrangement. Contractors and DBEs must meet and conform to these conditions and criteria governing the use of joint checks.

In the event that a Contractor or DBE Subcontractor desires to use a joint check, MassDOT will require prior notice and will closely monitor the arrangement for compliance with FHWA regulations and guidance. MassDOT may allow a joint check arrangement and give credit to a Contractor for use of the DBE where one or more of the following conditions exist:

- The use of a joint check is in fact required by this type of vendor or supplier as a standard industry practice that applies to all Contractors (DBEs and non-DBEs); or is required by a specific vendor or supplier;
- Payment for supplies or materials would be delayed for an unreasonably extended period without the joint check arrangement;
- The DBE (or any of its Subcontractors) has a pattern or history of not paying a vendor or supplier within a reasonable time or has not established enough of a credit history with the supplier or vendor; and/or
- The presence of severe adverse economic conditions, where credit resources may be limited and such practices may be necessary or required to effect timely payments.

Other factors MassDOT may consider:

- Whether there is a requirement by the Prime Contractor that a DBE should use a specific vendor or supplier to meet their Subcontractor specifications;
- Whether there is a requirement that a DBE use the Prime Contractor's negotiated price;
- The independence of the DBE;
- Whether approval has been sought prior to use of a joint check arrangement; and
- Whether any approved joint check arrangement has exceeded a reasonable period of use;
- The operation of the joint check arrangement; and
- Whether the DBE has made an effort to establish alternate arrangements for following periods (i.e., the DBE must show it can, or has, or why it has not, established or increased a credit line with the vendor or supplier).

Even with the use of a Joint Check, both the Contractor and DBE remain responsible for compliance with all other elements under 49 CFR § 26.55 (c) (1), and must still be able to prove that a commercially useful function is being performed for the Contractor.

d. Joint Check Procedure(s)

- The DBE advises its General or Prime Contractor that it will have to use a Joint Check and provide proof of such requirement.
- The General or the Prime Contractor submits a request for approval to MassDOT, using MassDOT's approved Joint Check Request form (Document B00855) and by notification on the DBE Letter of Intent (Document B00854), and any other relevant documents. Requests that are not initiated during the bid process should be made in writing and comply with the procedure.
- The MassDOT Office of Civil Rights will review the request and render a decision as part of the approval process for DBE Schedules and Letters of Intent.
- Review and Approval will be project specific and relevant documents will be made part of the project Contract file.
- Payments should be made in the name of both the DBE and vendor or supplier. Payments should be issued and signed by the Contractor as only the guarantor for prompt payment of purchases to the vendor or supplier. The payment to the vendor or supplier should be handled by the DBE (i.e. if possible, funds or the joint check should be processed by the DBE and sent by the DBE to the vendor or supplier).
- MassDOT may request copies of cancelled checks (front and back) and transmittal information to verify any payments made to the DBE and vendor or supplier.
- MassDOT may request other information and documents, and may ask questions of the Contractor, Subcontractor and vendor or supplier prior to, during, and after the project performance to ascertain whether the Subcontractor is performing a commercially useful function and all parties are complying with DBE Program policies and procedures as part of the Subcontractor approval process.

7. AWARD DOCUMENTATION AND PROCEDURES

- a. The two lowest bidders/the two bidders with the lowest price per quality score point, shall submit, by the close of business on the third (3rd) business day after the bid opening, a completed Schedule of Participation by DBEs (Document B00853) which shall list:
- (1) The full company name, address and telephone number of each DBE with whom the bidder intends to make a commitment.
 - (2) The contract item(s), by number(s) and quantity(ies), if applicable, or specific description of other business activity to be performed by each DBE as set forth in the Letters of Intent. The Bidder shall list only firms which have the capacity to perform, manage and supervise the work proposed in accordance with the requirements of 49 CFR Part 26 and Section **6.b** of these Special Provisions.
 - (3) The total dollar amount to be paid to each DBE. (Bidders are cautioned that at least one half of the participation goal must be met with construction activity work.)
 - (4) The total dollar amount to be paid to each DBE that is eligible for credit toward the DBE participation goal under the counting rules set out in Section **6.b**.
 - (5) The total creditable DBE participation as a percentage of the total bid price.
- b. All firms listed on the Schedule must be currently certified.
- c. The two lowest bidders/the two bidders with the lowest price per quality score point, shall each submit, with their Schedules of Participation, fully completed, signed Letters of Intent (Document B00854) from each of the DBEs listed on the Schedule. The Letters of Intent shall be in the form attached and shall identify specifically the contract activity the DBE proposes to perform, expressed as contract item number, if applicable, description of the activity, NAICS code, quantity, unit price and total price. In the event of discrepancy between the Schedule and the Letter of Intent, the Letter of Intent shall govern.
- d. Evidence of good faith efforts will be evaluated by MassDOT in the selection of the lowest responsible bidder.

All information requested by MassDOT for the purpose of evaluating the Contractor's efforts to achieve the participation goal must be provided within three (3) calendar days and must be accurate and complete in every detail. The apparent low bidder's attainment of the DBE participation goal or a satisfactory demonstration of good faith efforts is a prerequisite for award of the Contract.

- e. Failure to meet, or to demonstrate good faith efforts to meet, the requirements of these Special Provisions shall render a bid non-responsive. Therefore, in order to be eligible for award, the bidder (1) must list all DBE's it plans to employ on the Schedule of Participation; and provide the required Letters of Intent for, DBE participation which meets or exceeds the Contract goal in accordance with the terms of these Special Provisions or (2) must demonstrate, to the satisfaction of MassDOT, that good faith efforts were made to achieve the participation goal. MassDOT will adhere to the guidance provided in Appendix A to 49 CFR Part 26 on the determination of a Contractor's good faith efforts to meet the DBE participation goal(s) set forth in Section 2 herein.

- f. If MassDOT finds that the percentage of DBE participation submitted by the bidder on its Schedule does not meet the Contract participation goal, or that Schedule and Letters of Intent were not timely filed, and that the bidder has not demonstrated good faith efforts to comply with these requirements, it shall propose that the bidder be declared ineligible for award. In that case, the bidder may request administrative reconsideration. Such requests must be sent in writing within three (3) calendar days of receiving notice of proposed ineligibility to: The Office of the General Counsel, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA, 02116.
- g. If, after administrative reconsideration, MassDOT finds that the bidder has not shown that sufficient good faith efforts were made to comply with the requirements of these Special Provisions, it shall reject the bidder's proposal and may retain the proposal guaranty.
- h. Actions which constitute evidence of good faith efforts to meet a DBE participation goal include, but are not limited to, the following examples, which are set forth in 49 CFR Part 26, Appendix A:
- (1) Soliciting through all reasonable and available means (e.g., attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified DBEs who have the capability to perform the work of the Contract. The bidder must solicit this interest within sufficient time to allow the DBEs to respond to the solicitation. The bidder must determine with certainty if the DBEs are interested by taking appropriate steps to follow up initial solicitations.
 - (2) Selecting portions of the work to be performed by DBEs in order to increase the likelihood that the DBE participation goal will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the Prime Contractor might otherwise prefer to perform these work items with its own forces.
 - (3) Providing interested DBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.
 - (4) Negotiating in good faith with interested DBEs. It is the bidder's responsibility to make a portion of the work available to DBE Subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE Subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone number of DBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBEs to perform the work.

A bidder using good business judgment would consider a number of factors in negotiating with Subcontractors, including DBE Subcontractors, and would take a firm's price and capabilities as well as Contract participation goals into consideration. However, the fact that there may be some additional costs involved in finding and using DBEs is not in itself sufficient reason for a bidder's failure to meet the Contract DBE participation goal, as long as such costs are reasonable. Also, the ability or desire of a Prime Contractor to perform the work of a Contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Prime Contractors are not, however, required to accept higher quotes from DBEs if the price difference is excessive or unreasonable.

- (5) Not rejecting DBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. Contractors should be careful of adding additional requirements of performance that would in effect limit participation by DBEs or any small business. The Contractor's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. nonunion employee status) are not legitimate causes for the rejection or non-solicitation of bids in the Contractor's efforts to meet the Contract participation goal.
- (6) Making efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or contractor.
- (7) Making efforts to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.
- (8) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; local, state, and federal minority/women business assistance offices; and other organizations as allowed on a case by case basis to provide assistance in the recruitment and placement of DBEs.

8. COMPLIANCE

- a. All activity performed by a DBE for credit toward the Contract participation goal must be performed, managed and supervised by the DBE in accordance with all commercially useful function requirements of 49 CFR Part 26. The Prime Contractor shall not enter into, or condone, any other arrangement.
- b. The Prime Contractor shall not perform with its own organization, or assign to any other business, an activity designated for the DBE(s) named on the Schedule(s) submitted by the Prime Contractor under Section 7 or under paragraph 8.f of this section, without the approval of MassDOT in accordance with the requirements of paragraphs 8.f and 8.j of this section.
- c. MassDOT may suspend payment for any activity that was not performed by the DBE to whom the activity was committed on the approved Schedule of Participation, or that was not performed in accordance with the requirements of Section 6.
- d. MassDOT retains the right to approve or disapprove of any or all Subcontractors. Requests by the Prime Contractor for approval of participation by a DBE Subcontractor for credit toward the Contract participation goal must include, in addition to any other requirements for Subcontractor approval, the following:
 - (1) A copy of the proposed subcontract. The subcontract must be for at least the dollar amount, and for the work described, in the Bidder's Schedule of Participation.
 - (2) A resume stating the qualifications and experience of the DBE Superintendent and/or foreperson who will supervise the on-site work. A new resume will be required for any change in supervisory personnel during the progress of the work.
 - (3) A Schedule of Operations indicating when the DBE is expected to perform the work.
 - (4) A list of (1) equipment owned by the DBE to be used on the Project, and (2) equipment to be leased by the DBE for use on the Project.

- (5) A list of: (1) all projects (public and private) which the DBE is currently performing; (2) all projects (public and private) to which the DBE is committed; and (3) all projects (public and private) to which the DBE intends to make a commitment. For each Contract, list the contracting organization, the name and telephone number of a contact person for the contracting organization, the dollar value of the work, a description of the work, and the DBE's work schedule for each project.
- e. If, pursuant to the Subcontractor approval process, MassDOT finds that a DBE Subcontractor does not have sufficient experience or resources to perform, manage and supervise work of the kind proposed in accordance with the requirements of 49 CFR Part 26, approval of the DBE Subcontractor may be denied. In the event of such denial, the Prime Contractor shall proceed in accordance with the requirements paragraphs **8.f** and **8.j** of this section.
- f. If, for reasons beyond its control, the Prime Contractor cannot comply with its DBE participation commitment in accordance with the Schedule of Participation submitted under Section 7, the Prime Contractor shall submit to MassDOT the reasons for its inability to comply with its obligations and shall submit, and request approval for, a revised Schedule of Participation. If approved by MassDOT, the revised Schedule shall govern the Prime Contractor's performance in meeting its obligations under these Special Provisions.
- g. A Prime Contractor's compliance with the participation goal in Section 2 shall be determined by reference to the established percentage of the total contract price, provided, however, that no decrease in the dollar amount of a bidder's commitment to any DBE shall be allowed without the approval of MassDOT.
- h. If the contract amount is increased, the Prime Contractor may be required to submit a revised Schedule of Participation in accordance with paragraphs **8.f** and **8.j** of this section.
- i. In the event of the decertification of a DBE scheduled to participate on the Contract for credit toward the participation goal, but not under subcontract, the Contractor shall proceed in accordance with paragraphs **8.f** and **8.j** of this section.
- j. The Prime Contractor shall notify MassDOT immediately of any facts that come to its attention indicating that it may or will be unable to comply with any aspect of its DBE obligation under this Contract.
- k. Any notice required by these Special Provisions shall be given in writing to: (1) the Resident Engineer; (2) the District designated Compliance Officer; and (3) the DBE Liaison Officer, MassDOT Office of Civil Rights, 10 Park Plaza, – 3rd Floor - West, Boston, MA, 02116 and cc'd to the Deputy Chief of External Programs.
- l. The Prime Contractor and its Subcontractors shall comply with MassDOT's Electronic Reporting System Requirements (MassDOT Document 00821) and submit all information required by MassDOT related to the DBE Special Provisions through the Equitable Business Opportunity Solution ("EBO"). MassDOT reserves the right to request reports in the format it deems necessary anytime during the performance of the Contract.
- m. Termination of DBE by Prime Contractor
- (1) A Prime Contractor shall not terminate a DBE Subcontractor or an approved substitute DBE firm without the prior written consent of MassDOT. This includes, but is not limited to, instances in which a Prime Contractor seeks to perform work originally designated for a DBE Subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm.

- (2) MassDOT may provide such written consent only if MassDOT agrees, for reasons stated in its concurrence document, that the Prime Contractor has good cause to terminate the DBE firm.
- (3) For purposes of this paragraph, good cause includes the following circumstances:
 - (i) The DBE Subcontractor fails or refuses to execute a written contract;
 - (ii) The DBE Subcontractor fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Good cause, however, does not exist if the failure or refusal of the DBE Subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the Prime Contractor;
 - (iii) The DBE Subcontractor fails or refuses to meet the Prime Contractor's reasonable, nondiscriminatory bond requirements.
 - (iv) The DBE Subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness;
 - (v) The DBE Subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant 2 CFR Parts 180, 215 and 1,200 or applicable State law;
 - (vi) (vii) MassDOT has determined that the listed DBE Subcontractor is not a responsible contractor;
 - (vii) The listed DBE Subcontractor voluntarily withdraws from the Project and provides written notice of its withdrawal;
 - (viii) The listed DBE is ineligible to receive DBE credit for the type of work required;
 - (ix) A DBE owner dies or becomes disabled with the result that the listed DBE Contractor is unable to complete its work on the Contract;
 - (x) Other documented good cause that MassDOT determines compels the termination of the DBE Subcontractor. Good cause, however, does not exist if the Prime Contractor seeks to terminate a DBE it relied upon to obtain the Contract so that the Prime Contractor can self-perform the DBE work or substitute another DBE or non-DBE Contractor after Contract Award.
- (4) Before transmitting to MassDOT a request to terminate and/or substitute a DBE Subcontractor, the Prime Contractor must give notice in writing to the DBE Subcontractor, with a copy to MassDOT, of its intent to request to terminate and/or substitute, and the reason for the request.
- (5) The Prime Contractor must give the DBE five (5) business days to respond to the Prime Contractor's notice. The DBE must advise MassDOT and the Contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why MassDOT should not approve the Prime Contractor's action. If required in a particular case as a matter of public necessity (e.g., safety), MassDOT may provide a response period shorter than five (5) business days.
- (6) In addition to post-award terminations, the provisions of this section apply to pre-award deletions of or substitutions for DBE firms.

n. Prompt Payment.

Contractors are required to promptly pay Subcontractors under this Prime Contract within ten (10) business days from the receipt of each payment the Prime Contractor receives from MassDOT. Failure to comply with this requirement may result in the withholding of payment to the Prime Contractor until such time as all payments due under this provision have been received by the Subcontractor(s) and/or referral to the Prequalification Committee for action which may affect the Contractor's prequalification status.

9. SANCTIONS

If the Prime Contractor does not comply with the terms of these Special Provisions and cannot demonstrate to the satisfaction of MassDOT that good faith efforts were made to achieve such compliance, MassDOT may, in addition to any other remedy provided for in the Contract, and notwithstanding any other provision in the Contract:

- a. Retain, in connection with final acceptance and final payment processing, an amount determined by multiplying the total contract amount by the percentage in Section 2, less the amount paid to approved DBE(s) for work performed under the Contract in accordance with the provisions of Section 8.
- b. Suspend, terminate or cancel this Contract, in whole or in part, and call upon the Prime Contractor's surety to perform all terms and conditions in the Contract.
- c. In accordance with 720 CMR 5.05(1)(f), modify or revoke the Prime Contractor's Prequalification status or recommend that the Prime Contractor not receive award of a pending Contract. The Prime Contractor may appeal the determination of the Prequalification Committee in accordance with the provisions of 720 CMR 5.06.
- d. Initiate debarment proceedings pursuant to M.G.L. c. 29 §29F and, as applicable, 2 CFR Parts 180, 215 and 1,200.
- e. Refer the matter to the Massachusetts Attorney General for review and prosecution, if appropriate, of any false claim or pursuant to M.G.L. c. 12, §§ 5A to 5O (the Massachusetts False Claim Act).
- f. Refer the matter to the U.S. DOT's Office of the Inspector General or other agencies for prosecution under Title 18, U.S.C. § 1001, 49 CFR Parts 29 and 31, and other applicable laws and regulations.

10. FURTHER INFORMATION; ENFORCEMENT, COOPERATION AND CONFIDENTIALITY.

- a. Any proposed DBE, bidder, or Contractor shall provide such information as is necessary in the judgment of MassDOT to ascertain its compliance with the terms of this Special Provision. Further, pursuant to 49 CFR, Part 26.107:

- (1) If you are a firm that does not meet the eligibility criteria of 49 CFR, Parts 26.61 to 26.73 (“subpart D”), that attempts to participate in a DOT- assisted program as a DBE on the basis of false, fraudulent, or deceitful statements or representations or under circumstances indicating a serious lack of business integrity or honesty, MassDOT or FHWA may initiate suspension or debarment proceedings against you under 49 CFR Part 29.
 - (2) If you are a firm that, in order to meet DBE Contract participation goals or other DBE Program requirements, uses or attempts to use, on the basis of false, fraudulent or deceitful statements or representations or under circumstances indicating a serious lack of business integrity or honesty, another firm that does not meet the eligibility criteria of subpart D, FHWA may initiate suspension or debarment proceedings against you under 49 CFR Part 29.
 - (3) In a suspension or debarment proceeding brought either under subparagraph a.(1) or b.(2) of this section, the concerned operating administration may consider the fact that a purported DBE has been certified by a recipient. Such certification does not preclude FHWA from determining that the purported DBE, or another firm that has used or attempted to use it to meet DBE participation goals, should be suspended or debarred.
 - (4) FHWA may take enforcement action under 49 CFR Part 31, Program Fraud and Civil Remedies, against any participant in the DBE Program whose conduct is subject to such action under 49 CFR Part 31.
 - (5) FHWA may refer to the Department of Justice, for prosecution under 18 U.S.C. 1001 or other applicable provisions of law, any person who makes a false or fraudulent statement in connection with participation of a DBE in any DOT-assisted program or otherwise violates applicable Federal statutes.
- b. Pursuant to 49 CFR Part 26.109, the rules governing information, confidentiality, cooperation, and intimidation or retaliation are as follows:
- (1) Availability of records.

 - (i) In responding to requests for information concerning any aspect of the DBE Program, FHWA complies with provisions of the Federal Freedom of Information and Privacy Acts (5 U.S.C. 552 and 552a). FHWA may make available to the public any information concerning the DBE Program release of which is not prohibited by Federal law.
 - (ii) MassDOT shall safeguard from disclosure to unauthorized persons information that may reasonably be considered as confidential business information, consistent with Federal and Massachusetts General Law (M.G.L. c. 66, § 10, M.G.L. c. 4, §7 (26), 950 CMR 32.00).
 - (2) Confidentiality of information on complainants. Notwithstanding the provisions of subparagraph b.(1) of this section, the identity of complainants shall be kept confidential, at their election. If such confidentiality will hinder the investigation, proceeding or hearing, or result in a denial of appropriate administrative due process to other parties, the complainant must be advised for the purpose of waiving the privilege. Complainants are advised that, in some circumstances, failure to waive the privilege may result in the closure of the investigation or dismissal of the proceeding or hearing.

- (3) Cooperation. All participants in FHWA's DBE Program (including, but not limited to, recipients, DBE firms and applicants for DBE certification, complainants and appellants, and Contractors using DBE firms to meet Contract participation goals) are required to cooperate fully and promptly with U.S. DOT and recipient compliance reviews, certification reviews, investigations, and other requests for information. Failure to do so shall be a ground for appropriate action against the party involved (e.g., with respect to recipients, a finding of noncompliance; with respect to DBE firms, denial of certification or removal of eligibility and/or suspension and debarment; with respect to a complainant or appellant, dismissal of the complaint or appeal; with respect to a Contractor which uses DBE firms to meet participation goals, findings of non-responsibility for future Contracts and/or suspension and debarment).
- (4) Intimidation and retaliation. No recipient, Contractor, or any other participant in the program, may intimidate, threaten, coerce, or discriminate against any individual or firm for the purpose of interfering with any right or privilege secured by this part or because the individual or firm has made a complaint, testified, assisted, or participated in any manner in an investigation, proceeding, or hearing under this part. If any recipient or contractor violates this prohibition, that entity is in noncompliance with this 49 CFR Part 26.

11. LIST OF ADDITIONAL DOCUMENTS.

- a. The following documents shall be completed and signed by the bidder and designated DBEs in accordance with Section 7 - Award Documentation and Procedures. These documents must be returned by the bidder to MassDOT's Bid Document Distribution Center:
- Schedule of DBE Participation (Document B00853)
 - Letter of Intent (Document B00854)
 - DBE Joint Check Arrangement Approval Form (Document B00855), if Contractor and DBE plan, or if DBE is required to use a Joint Check
- b. The following document shall be signed and returned by Contractor and Subcontractors/DBEs to the MassDOT District Office overseeing the Project, as applicable:
- Contractor/Subcontractor Certification Form (Document No. 00859) (a checklist of other documents to be included with every subcontract (DBEs and non-DBEs alike)).
- c. The following document shall be provided to MassDOT's Office of Civil Rights and Prequalification Office at least fourteen (14) business days before the bid opening date, if applicable:
- Affidavit of DBE/Non-DBE Joint Venture (Document B00856)
- d. The following document shall be provided to MassDOT's District Office of Civil Rights within 30 calendar days after the work of the DBE is completed, or no later than 30 calendar days after the work of the DBE is on a completed and processed CQE. This document shall be completed and submitted by the Prime Contractor:
- Certificate of Completion by a Minority/Women or Disadvantaged Business Enterprise (M/W/DBE) (Form No. CSD-100)

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

- I. General
- II. Nondiscrimination
- III. Non-segregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
- XI. Certification Regarding Use of Contract Funds for Lobbying
- XII. 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. Form FHWA-1273 must be physically incorporated in each construction contract funded under title 23, United States Code, as required in 23 CFR 633.102(b) (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services). 23 CFR 633.102(e).

The applicable requirements 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 shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider. 23 CFR 633.102(e).

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services) in accordance with 23 CFR 633.102. The 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, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract). 23 CFR 633.102(b).

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. 23 CFR 633.102(d).

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 (23 CFR 230.107(a); 23 CFR Part 230, Subpart A, Appendix A; EO 11246)

The provisions of this section related to 23 CFR Part 230, Subpart A, Appendix A are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 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; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 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; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR Part 230, Subpart A, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal Employment Opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (see 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140, shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. 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. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract. 23 CFR 230.409 (g)(4) & (5).

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, gender identity, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action or are substantially involved in such action, will be made fully cognizant of and will implement the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action

within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs (i.e., apprenticeship and on-the-job training programs for the geographical area of contract performance). In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. 23 CFR 230.409. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide

sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established thereunder. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors, suppliers, and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurances Required:

a. The requirements of 49 CFR Part 26 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 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 are incorporated by reference. 49 CFR Part 21.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of more than \$10,000. 41 CFR 60-1.5.

As prescribed by 41 CFR 60-1.8, the contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location under the contractor's control where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. 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 V, 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 procurement 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

the equal employment opportunity requirements of Executive Order 11246, as amended, and [29 CFR part 30](#).

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 IV. 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 FHWA-1273 in any subcontracts, 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](#).

V. 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.

* \$31 as of January 15, 2023 (See 88 FR 88 FR 2210) 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 IV 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 procurement 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.

VI. 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 Section VI 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 Section VI 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).

VII. 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).

VIII. 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."

IX. 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.

X. 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.

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.

XI. 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.

XII. 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 (23 CFR 633, Subpart B, Appendix B)**
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 23 CFR 633.207(e) 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

April 18, 2024

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	\$0.65
2	ASTM A27 (AASHTO M103) Steel Castings, H-Pile Points & Pipe Pile Shoes (See Note below.)	\$0.90
3	ASTM A668 / A668M (AASHTO M102) Steel Forgings	\$0.90
4	ASTM A108 (AASHTO M169) Steel Forgings for Shear Studs	\$0.93
5	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Plate	\$0.99
6	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Shapes	\$0.92
7	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Plate	\$0.99
8	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Shapes	\$0.92
9	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Plate	\$1.03
10	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Shapes	\$0.93
11	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W 345W Structural Steel Plate	\$1.03
12	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W or 345W Structural Steel Shapes	\$0.93
13	ASTM A709/A709M Grade HPS 50W / AASHTO M270M/M270 Grade HPS 50W or 345W Structural Steel Plate	\$1.08
14	ASTM A709/A709M Grade HPS 70W / AASHTO M270M/M270 Grade HPS 70W or 485W Structural Steel Plate	\$1.15
15	ASTM A514/A514M-05 Grade HPS 100W / AASHTO M270M/M270 Grade HPS 100W or 690W Structural Steel Plate	\$1.75
16	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Plate	\$1.03
17	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Shapes	\$0.93
18	ASTM A276 Type 316 Stainless Steel	\$5.23
19	ASTM A240 Type 316 Stainless Steel	\$5.23
20	ASTM A148 Grade 80/50 Steel Castings (See Note below.)	\$1.80
21	ASTM A53 Grade B Structural Steel Pipe	\$1.15
22	ASTM A500 Grades A, B, 36 & 50 Structural Steel Pipe	\$1.15
23	ASTM A252, Grades 240 (36 KSI) & 414 (60 KSI) Pipe Pile	\$0.91
24	ASTM 252, Grade 2 Permanent Steel Casing	\$0.91
25	ASTM A36 (AASHTO M183) for H-piles, steel supports and sign supports	\$0.98
26	ASTM A328 / A328M, Grade 50 (AASHTO M202) Steel Sheetpiling	\$1.72
27	ASTM A572 / A572M, Grade 50 Sheetpiling	\$1.72
28	ASTM A36/36M, Grade 50	\$0.99
29	ASTM A570, Grade 50	\$0.98
30	ASTM A572 (AASHTO M223), Grade 50 H-Piles	\$0.99
31	ASTM A1085 Grade A (50 KSI) Steel Hollow Structural Sections (HSS), heat-treated per ASTM A1085 Supplement S1	\$1.15
32	AREA 140 LB Rail and Track Accessories	\$0.59

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 151 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 preceding 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.:** 125780 **Project No.:** 606517 **Federal Aid No.:** STP/TAP-0032(040)**Location:** WEST BROOKFIELD**Project Description:** Resurfacing & Related Work on Route 9, from Ware T.L. to 850' West of Welcome Road (1.1 miles – Phase I)

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. You may also find guidance at: <http://www.dol.gov/ofccp/TAGuides/consttag.pdf> or <http://www.wdol.gov/dba.aspx#0>.
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: _____

(Print Name and Title)

Telephone Number: _____

Federal I.D. Number: _____

(Authorized Signature)

Estimated Start Date: _____

Estimated Completion Date: _____

Estimated Dollar Amount: _____

(Date)

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 than two weeks 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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MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

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

Prevailing Wage Rates

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: MassDOT Highway
Contract Number: 125780 **City/Town:** WEST BROOKFIELD
Description of Work: WEST BROOKFIELD - Federal Aid Project No. STP/TAP-0032(040) Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)
Job Location: Along Route 9

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- **The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor.** For multi-year CM AT RISK projects, the awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. The annual update requirement is not applicable to 27F “rental of equipment” contracts. **The updated wage schedule must be provided to all contractors, including general and sub-contractors, working on the construction project.**
- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the “Wage Request Number” on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or a sub-contractor.
- Apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentices must keep their apprentice identification card on their persons during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DAS regardless of whether they are registered with another federal, state, local, or private agency must be paid the journeyworker's rate.**
- Every contractor or subcontractor working on the construction project must submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee’s name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. For a sample payroll reporting form go to <http://www.mass.gov/dols/pw>.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Contractors must obtain the wage schedules from awarding authorities. Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may file a complaint with the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

Issue Date: 04/16/2024

Wage Request Number: 20240416-001

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	01/01/2024	\$38.95	\$15.07	\$18.67	\$0.00	\$72.69
	06/01/2024	\$39.95	\$15.07	\$18.67	\$0.00	\$73.69
	12/01/2024	\$39.95	\$15.07	\$20.17	\$0.00	\$75.19
	01/01/2025	\$39.95	\$15.57	\$20.17	\$0.00	\$75.69
	06/01/2025	\$40.95	\$15.57	\$20.17	\$0.00	\$76.69
	12/01/2025	\$40.95	\$15.57	\$21.78	\$0.00	\$78.30
	01/01/2026	\$40.95	\$16.17	\$21.78	\$0.00	\$78.90
	06/01/2026	\$41.95	\$16.17	\$21.78	\$0.00	\$79.90
	12/01/2026	\$41.95	\$16.17	\$23.52	\$0.00	\$81.64
	01/01/2027	\$41.95	\$16.77	\$23.52	\$0.00	\$82.24
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	01/01/2024	\$39.02	\$15.07	\$18.67	\$0.00	\$72.76
	06/01/2024	\$40.02	\$15.07	\$18.67	\$0.00	\$73.76
	12/01/2024	\$40.02	\$15.07	\$20.17	\$0.00	\$75.26
	01/01/2025	\$40.02	\$15.57	\$20.17	\$0.00	\$75.76
	06/01/2025	\$41.02	\$15.57	\$20.17	\$0.00	\$76.76
	12/01/2025	\$41.02	\$15.57	\$21.78	\$0.00	\$78.37
	01/01/2026	\$41.02	\$16.17	\$21.78	\$0.00	\$78.97
	06/01/2026	\$42.02	\$16.17	\$21.78	\$0.00	\$79.97
	12/01/2026	\$42.02	\$16.17	\$23.52	\$0.00	\$81.71
	01/01/2027	\$42.02	\$16.77	\$23.52	\$0.00	\$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	01/01/2024	\$39.14	\$15.07	\$18.67	\$0.00	\$72.88
	06/01/2024	\$40.14	\$15.07	\$18.67	\$0.00	\$73.88
	12/01/2024	\$40.14	\$15.07	\$20.17	\$0.00	\$75.38
	01/01/2025	\$40.14	\$15.57	\$20.17	\$0.00	\$75.88
	06/01/2025	\$41.14	\$15.57	\$20.17	\$0.00	\$76.88
	12/01/2025	\$41.14	\$15.57	\$21.78	\$0.00	\$78.49
	01/01/2026	\$41.14	\$16.17	\$21.78	\$0.00	\$79.09
	06/01/2026	\$42.14	\$16.17	\$21.78	\$0.00	\$80.09
	12/01/2026	\$42.14	\$16.17	\$23.52	\$0.00	\$81.83
	01/01/2027	\$42.14	\$16.77	\$23.52	\$0.00	\$82.43
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.61	\$9.65	\$17.14	\$0.00	\$65.40
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$38.61	\$9.65	\$17.14	\$0.00	\$65.40
	06/01/2024	\$39.94	\$9.65	\$17.14	\$0.00	\$66.73
	12/01/2024	\$41.27	\$9.65	\$17.14	\$0.00	\$68.06
	06/01/2025	\$42.66	\$9.65	\$17.14	\$0.00	\$69.45
	12/01/2025	\$44.04	\$9.65	\$17.14	\$0.00	\$70.83
	06/01/2026	\$45.48	\$9.65	\$17.14	\$0.00	\$72.27
	12/01/2026	\$46.92	\$9.65	\$17.14	\$0.00	\$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ASBESTOS WORKER (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)</i>	12/01/2023	\$40.80	\$14.50	\$11.05	\$0.00	\$66.35
	06/01/2024	\$41.80	\$14.50	\$11.05	\$0.00	\$67.35
	12/01/2024	\$42.80	\$14.50	\$11.05	\$0.00	\$68.35
	06/01/2025	\$43.80	\$14.50	\$11.05	\$0.00	\$69.35
	12/01/2025	\$44.80	\$14.50	\$11.05	\$0.00	\$70.35
ASPHALT RAKER <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
	06/01/2024	\$39.44	\$9.65	\$17.14	\$0.00	\$66.23
	12/01/2024	\$40.77	\$9.65	\$17.14	\$0.00	\$67.56
	06/01/2025	\$42.16	\$9.65	\$17.14	\$0.00	\$68.95
	12/01/2025	\$43.54	\$9.65	\$17.14	\$0.00	\$70.33
	06/01/2026	\$44.98	\$9.65	\$17.14	\$0.00	\$71.77
	12/01/2026	\$46.42	\$9.65	\$17.14	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
AUTOMATIC GRADER-EXCAVATOR (RECLAIMER) <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2023	\$39.56	\$13.78	\$15.15	\$0.00	\$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER OPERATOR <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2023	\$39.56	\$13.78	\$15.15	\$0.00	\$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
For apprentice rates see "Apprentice- LABORER"						
BATCH/CEMENT PLANT - ON SITE <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2023	\$39.03	\$13.38	\$15.15	\$0.00	\$67.56
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.61	\$9.65	\$17.14	\$0.00	\$65.40
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$38.61	\$9.65	\$17.14	\$0.00	\$65.40
	06/01/2024	\$39.94	\$9.65	\$17.14	\$0.00	\$66.73
	12/01/2024	\$41.27	\$9.65	\$17.14	\$0.00	\$68.06
	06/01/2025	\$42.66	\$9.65	\$17.14	\$0.00	\$69.45
	12/01/2025	\$44.04	\$9.65	\$17.14	\$0.00	\$70.83
	06/01/2026	\$45.48	\$9.65	\$17.14	\$0.00	\$72.27
12/01/2026	\$46.92	\$9.65	\$17.14	\$0.00	\$73.71	
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2024	\$48.12	\$7.07	\$20.60	\$0.00	\$75.79

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$31.28	\$7.07	\$13.22	\$0.00	\$51.57
2	65	\$31.28	\$7.07	\$13.22	\$0.00	\$51.57
3	70	\$33.68	\$7.07	\$14.23	\$0.00	\$54.98
4	75	\$36.09	\$7.07	\$15.24	\$0.00	\$58.40
5	80	\$38.50	\$7.07	\$16.25	\$0.00	\$61.82
6	85	\$40.90	\$7.07	\$17.28	\$0.00	\$65.25
7	90	\$43.31	\$7.07	\$18.28	\$0.00	\$68.66
8	95	\$45.71	\$7.07	\$19.32	\$0.00	\$72.10

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	02/01/2024	\$60.26	\$11.49	\$22.90	\$0.00	\$94.65
BRICKLAYERS LOCAL 3 (WORCESTER)	08/01/2024	\$62.36	\$11.49	\$22.90	\$0.00	\$96.75
	02/01/2025	\$63.66	\$11.49	\$22.90	\$0.00	\$98.05
	08/01/2025	\$65.81	\$11.49	\$22.90	\$0.00	\$100.20
	02/01/2026	\$67.16	\$11.49	\$22.90	\$0.00	\$101.55
	08/01/2026	\$69.36	\$11.49	\$22.90	\$0.00	\$103.75
	02/01/2027	\$70.76	\$11.49	\$22.90	\$0.00	\$105.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Worcester

Effective Date - 02/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.13	\$11.49	\$22.90	\$0.00	\$64.52
2	60	\$36.16	\$11.49	\$22.90	\$0.00	\$70.55
3	70	\$42.18	\$11.49	\$22.90	\$0.00	\$76.57
4	80	\$48.21	\$11.49	\$22.90	\$0.00	\$82.60
5	90	\$54.23	\$11.49	\$22.90	\$0.00	\$88.62

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.18	\$11.49	\$22.90	\$0.00	\$65.57
2	60	\$37.42	\$11.49	\$22.90	\$0.00	\$71.81
3	70	\$43.65	\$11.49	\$22.90	\$0.00	\$78.04
4	80	\$49.89	\$11.49	\$22.90	\$0.00	\$84.28
5	90	\$56.12	\$11.49	\$22.90	\$0.00	\$90.51

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/POWER SHOVEL/TREE SHREDDER /CLAM SHELL OPERATING	12/01/2023	\$39.56	\$13.78	\$15.15	\$0.00	\$68.49
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ENGINEERS LOCAL 98

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

CAISSON & UNDERPINNING BOTTOM MAN LABORERS - FOUNDATION AND MARINE	12/01/2023	\$45.48	\$9.65	\$18.22	\$0.00	\$73.35
	06/01/2024	\$46.96	\$9.65	\$18.22	\$0.00	\$74.83
	12/01/2024	\$48.43	\$9.65	\$18.22	\$0.00	\$76.30
	06/01/2025	\$49.93	\$9.65	\$18.22	\$0.00	\$77.80
	12/01/2025	\$51.43	\$9.65	\$18.22	\$0.00	\$79.30
	06/01/2026	\$52.98	\$9.65	\$18.22	\$0.00	\$80.85
	12/01/2026	\$54.48	\$9.65	\$18.22	\$0.00	\$82.35

For apprentice rates see "Apprentice- LABORER"

CAISSON & UNDERPINNING LABORER LABORERS - FOUNDATION AND MARINE	12/01/2023	\$44.33	\$9.65	\$18.22	\$0.00	\$72.20
	06/01/2024	\$45.81	\$9.65	\$18.22	\$0.00	\$73.68
	12/01/2024	\$47.28	\$9.65	\$18.22	\$0.00	\$75.15
	06/01/2025	\$48.78	\$9.65	\$18.22	\$0.00	\$76.65
	12/01/2025	\$50.28	\$9.65	\$18.22	\$0.00	\$78.15
	06/01/2026	\$51.83	\$9.65	\$18.22	\$0.00	\$79.70
	12/01/2026	\$53.33	\$9.65	\$18.22	\$0.00	\$81.20

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CAISSON & UNDERPINNING TOP MAN <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2023	\$44.33	\$9.65	\$18.22	\$0.00	\$72.20
	06/01/2024	\$45.81	\$9.65	\$18.22	\$0.00	\$73.68
	12/01/2024	\$47.28	\$9.65	\$18.22	\$0.00	\$75.15
	06/01/2025	\$48.78	\$9.65	\$18.22	\$0.00	\$76.65
	12/01/2025	\$50.28	\$9.65	\$18.22	\$0.00	\$78.15
	06/01/2026	\$51.83	\$9.65	\$18.22	\$0.00	\$79.70
	12/01/2026	\$53.33	\$9.65	\$18.22	\$0.00	\$81.20
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
For apprentice rates see "Apprentice- LABORER"						
CARPENTER <i>CARPENTERS LOCAL 336 - HAMPDEN HAMPSHIRE FRANKLIN</i>	03/01/2024	\$41.41	\$7.91	\$18.15	\$0.00	\$67.47
	09/01/2024	\$42.36	\$7.91	\$18.15	\$0.00	\$68.42
	03/01/2025	\$43.26	\$7.91	\$18.15	\$0.00	\$69.32
	09/01/2025	\$44.21	\$7.91	\$18.15	\$0.00	\$70.27
	03/01/2026	\$45.11	\$7.91	\$18.15	\$0.00	\$71.17
	09/01/2026	\$46.06	\$7.91	\$18.15	\$0.00	\$72.12
	03/01/2027	\$46.96	\$7.91	\$18.15	\$0.00	\$73.02

Apprentice - CARPENTER - Local 336 Hampden Hampshire Franklin

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$18.63	\$7.91	\$1.40	\$0.00	\$27.94
2	45	\$18.63	\$7.91	\$1.40	\$0.00	\$27.94
3	55	\$22.78	\$7.91	\$2.76	\$0.00	\$33.45
4	55	\$22.78	\$7.91	\$2.76	\$0.00	\$33.45
5	70	\$28.99	\$7.91	\$15.39	\$0.00	\$52.29
6	70	\$28.99	\$7.91	\$15.39	\$0.00	\$52.29
7	80	\$33.13	\$7.91	\$16.77	\$0.00	\$57.81
8	80	\$33.13	\$7.91	\$16.77	\$0.00	\$57.81

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$19.06	\$7.91	\$1.40	\$0.00	\$28.37
2	45	\$19.06	\$7.91	\$1.40	\$0.00	\$28.37
3	55	\$23.30	\$7.91	\$2.76	\$0.00	\$33.97
4	55	\$23.30	\$7.91	\$2.76	\$0.00	\$33.97
5	70	\$29.65	\$7.91	\$15.39	\$0.00	\$52.95
6	70	\$29.65	\$7.91	\$15.39	\$0.00	\$52.95
7	80	\$33.89	\$7.91	\$16.77	\$0.00	\$58.57
8	80	\$33.89	\$7.91	\$16.77	\$0.00	\$58.57

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARPENTER WOOD FRAME	10/01/2023	\$25.55	\$7.02	\$4.80	\$0.00	\$37.37
<i>CARPENTERS-ZONE 3 (Wood Frame)</i>	10/01/2024	\$26.65	\$7.02	\$4.80	\$0.00	\$38.47
	10/01/2025	\$27.75	\$7.02	\$4.80	\$0.00	\$39.57
	10/01/2026	\$28.85	\$7.02	\$4.80	\$0.00	\$40.67

All Aspects of New Wood Frame Work

Apprentice - CARPENTER (Wood Frame) - Zone 3

Effective Date - 10/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$15.33	\$7.02	\$0.00	\$0.00	\$22.35
2	60	\$15.33	\$7.02	\$0.00	\$0.00	\$22.35
3	65	\$16.61	\$7.02	\$1.00	\$0.00	\$24.63
4	70	\$17.89	\$7.02	\$1.00	\$0.00	\$25.91
5	75	\$19.16	\$7.02	\$4.80	\$0.00	\$30.98
6	80	\$20.44	\$7.02	\$4.80	\$0.00	\$32.26
7	85	\$21.72	\$7.02	\$4.80	\$0.00	\$33.54
8	90	\$23.00	\$7.02	\$4.80	\$0.00	\$34.82

Effective Date - 10/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$15.99	\$7.02	\$0.00	\$0.00	\$23.01
2	60	\$15.99	\$7.02	\$0.00	\$0.00	\$23.01
3	65	\$17.32	\$7.02	\$1.00	\$0.00	\$25.34
4	70	\$18.66	\$7.02	\$1.00	\$0.00	\$26.68
5	75	\$19.99	\$7.02	\$4.80	\$0.00	\$31.81
6	80	\$21.32	\$7.02	\$4.80	\$0.00	\$33.14
7	85	\$22.65	\$7.02	\$4.80	\$0.00	\$34.47
8	90	\$23.99	\$7.02	\$4.80	\$0.00	\$35.81

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
 Step 1&2 \$18.52/ 3&4 \$21.07/ 5&6 \$28.70/ 7&8 \$31.26

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING	01/01/2024	\$49.33	\$13.00	\$23.57	\$1.30	\$87.20
<i>BRICKLAYERS LOCAL 3 (WORCESTER)</i>						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - CEMENT MASONRY/PLASTERING - Worcester

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.67	\$13.00	\$15.93	\$0.00	\$53.60
2	60	\$29.60	\$13.00	\$18.57	\$1.30	\$62.47
3	65	\$32.06	\$13.00	\$19.57	\$1.30	\$65.93
4	70	\$34.53	\$13.00	\$20.57	\$1.30	\$69.40
5	75	\$37.00	\$13.00	\$21.57	\$1.30	\$72.87
6	80	\$39.46	\$13.00	\$22.57	\$1.30	\$76.33
7	90	\$44.40	\$13.00	\$23.57	\$1.30	\$82.27

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
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For apprentice rates see "Apprentice- LABORER"

COMPRESSOR OPERATOR <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2023	\$39.03	\$13.38	\$15.15	\$0.00	\$67.56
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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

CRANE OPERATOR <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2023	\$43.06	\$13.78	\$15.15	\$0.00	\$71.99
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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

DELEADER (BRIDGE) <i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2024	\$56.06	\$9.95	\$23.95	\$0.00	\$89.96
	07/01/2024	\$57.26	\$9.95	\$23.95	\$0.00	\$91.16
	01/01/2025	\$58.46	\$9.95	\$23.95	\$0.00	\$92.36

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.03	\$9.95	\$0.00	\$0.00	\$37.98
2	55	\$30.83	\$9.95	\$6.66	\$0.00	\$47.44
3	60	\$33.64	\$9.95	\$7.26	\$0.00	\$50.85
4	65	\$36.44	\$9.95	\$7.87	\$0.00	\$54.26
5	70	\$39.24	\$9.95	\$20.32	\$0.00	\$69.51
6	75	\$42.05	\$9.95	\$20.93	\$0.00	\$72.93
7	80	\$44.85	\$9.95	\$21.53	\$0.00	\$76.33
8	90	\$50.45	\$9.95	\$22.74	\$0.00	\$83.14

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$9.95	\$0.00	\$0.00	\$38.58
2	55	\$31.49	\$9.95	\$6.66	\$0.00	\$48.10
3	60	\$34.36	\$9.95	\$7.26	\$0.00	\$51.57
4	65	\$37.22	\$9.95	\$7.87	\$0.00	\$55.04
5	70	\$40.08	\$9.95	\$20.32	\$0.00	\$70.35
6	75	\$42.95	\$9.95	\$20.93	\$0.00	\$73.83
7	80	\$45.81	\$9.95	\$21.53	\$0.00	\$77.29
8	90	\$51.53	\$9.95	\$22.74	\$0.00	\$84.22

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN LABORERS - ZONE 2	12/01/2023	\$44.48	\$9.65	\$18.07	\$0.00	\$72.20
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For apprentice rates see "Apprentice- LABORER"

DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS - ZONE 2	12/01/2023	\$45.48	\$9.65	\$18.07	\$0.00	\$73.20
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For apprentice rates see "Apprentice- LABORER"

DEMO: BURNERS LABORERS - ZONE 2	12/01/2023	\$45.23	\$9.65	\$18.07	\$0.00	\$72.95
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For apprentice rates see "Apprentice- LABORER"

DEMO: CONCRETE CUTTER/SAWYER LABORERS - ZONE 2	12/01/2023	\$45.48	\$9.65	\$18.07	\$0.00	\$73.20
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For apprentice rates see "Apprentice- LABORER"

DEMO: JACKHAMMER OPERATOR LABORERS - ZONE 2	12/01/2023	\$45.23	\$9.65	\$18.07	\$0.00	\$72.95
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For apprentice rates see "Apprentice- LABORER"

DEMO: WRECKING LABORER LABORERS - ZONE 2	12/01/2023	\$44.48	\$9.65	\$18.07	\$0.00	\$72.20
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For apprentice rates see "Apprentice- LABORER"

DIVER PILE DRIVER LOCAL 56 (ZONE 2)	08/01/2020	\$68.70	\$9.40	\$23.12	\$0.00	\$101.22
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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$73.60	\$9.40	\$23.12	\$0.00	\$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) <i>DRAWBRIDGE - SEIU LOCAL 888</i>	07/01/2020	\$26.77	\$6.67	\$3.93	\$0.16	\$37.53
For apprentice rates see "Apprentice- PILE DRIVER"						
ELECTRICIAN <i>ELECTRICIANS LOCAL 96</i>	09/03/2023	\$45.99	\$13.00	\$18.84	\$0.00	\$77.83
	09/01/2024	\$47.05	\$13.99	\$19.22	\$0.00	\$80.26
	09/07/2025	\$48.16	\$14.98	\$19.60	\$0.00	\$82.74
	09/06/2026	\$49.38	\$15.96	\$20.00	\$0.00	\$85.34

Apprentice - ELECTRICIAN - Local 96

Effective Date - 09/03/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.40	\$13.00	\$0.55	\$0.00	\$31.95
2	45	\$20.70	\$13.00	\$0.62	\$0.00	\$34.32
3	48	\$22.08	\$13.00	\$15.49	\$0.00	\$50.57
4	55	\$25.29	\$13.00	\$15.94	\$0.00	\$54.23
5	65	\$29.89	\$13.00	\$16.59	\$0.00	\$59.48
6	80	\$36.79	\$13.00	\$17.55	\$0.00	\$67.34

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.82	\$13.99	\$0.56	\$0.00	\$33.37
2	45	\$21.17	\$13.99	\$0.64	\$0.00	\$35.80
3	48	\$22.58	\$13.99	\$15.79	\$0.00	\$52.36
4	55	\$25.88	\$13.99	\$16.26	\$0.00	\$56.13
5	65	\$30.58	\$13.99	\$16.91	\$0.00	\$61.48
6	80	\$37.64	\$13.99	\$17.90	\$0.00	\$69.53

Notes:

Steps 1-2 are 1000 hrs; Steps 3-6 are 1500 hrs.

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR <i>ELEVATOR CONSTRUCTORS LOCAL 41</i>	01/01/2024	\$61.98	\$16.18	\$20.96	\$0.00	\$99.12
	01/01/2025	\$62.83	\$16.28	\$21.36	\$0.00	\$100.47
	01/01/2026	\$63.68	\$16.38	\$21.76	\$0.00	\$101.82
	01/01/2027	\$64.53	\$16.48	\$22.16	\$0.00	\$103.17

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - ELEVATOR CONSTRUCTOR - Local 41

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.99	\$16.18	\$0.00	\$0.00	\$47.17
2	55	\$34.09	\$16.18	\$20.96	\$0.00	\$71.23
3	65	\$40.29	\$16.18	\$20.96	\$0.00	\$77.43
4	70	\$43.39	\$16.18	\$20.96	\$0.00	\$80.53
5	80	\$49.58	\$16.18	\$20.96	\$0.00	\$86.72

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.42	\$16.28	\$0.00	\$0.00	\$47.70
2	55	\$34.56	\$16.28	\$21.36	\$0.00	\$72.20
3	65	\$40.84	\$16.28	\$21.36	\$0.00	\$78.48
4	70	\$43.98	\$16.28	\$21.36	\$0.00	\$81.62
5	80	\$50.26	\$16.28	\$21.36	\$0.00	\$87.90

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER <i>ELEVATOR CONSTRUCTORS LOCAL 41</i>	01/01/2024	\$43.39	\$16.18	\$20.96	\$0.00	\$80.53
	01/01/2025	\$43.98	\$16.28	\$21.36	\$0.00	\$81.62
	01/01/2026	\$44.58	\$16.38	\$21.76	\$0.00	\$82.72
	01/01/2027	\$45.17	\$16.48	\$22.16	\$0.00	\$83.81

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
	06/01/2024	\$39.44	\$9.65	\$17.14	\$0.00	\$66.23
	12/01/2024	\$40.77	\$9.65	\$17.14	\$0.00	\$67.56
	06/01/2025	\$42.16	\$9.65	\$17.14	\$0.00	\$68.95
	12/01/2025	\$43.54	\$9.65	\$17.14	\$0.00	\$70.33
	06/01/2026	\$44.98	\$9.65	\$17.14	\$0.00	\$71.77
	12/01/2026	\$46.42	\$9.65	\$17.14	\$0.00	\$73.21

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

FIELD ENG.INST/ROD-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 98</i>	06/01/1999	\$18.84	\$4.80	\$4.10	\$0.00	\$27.74
FIELD ENG.PARTY CHIEF:BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 98</i>	06/01/1999	\$21.33	\$4.80	\$4.10	\$0.00	\$30.23
FIELD ENG.SURVEY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 98</i>	06/01/1999	\$22.33	\$4.80	\$4.10	\$0.00	\$31.23

FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 96</i>	09/03/2023	\$45.99	\$13.00	\$18.84	\$0.00	\$77.83
	09/01/2024	\$47.05	\$13.99	\$19.22	\$0.00	\$80.26
	09/07/2025	\$48.16	\$14.98	\$19.60	\$0.00	\$82.74
	09/06/2026	\$49.38	\$15.96	\$20.00	\$0.00	\$85.34

For apprentice rates see "Apprentice- ELECTRICIAN"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIRE ALARM REPAIR / MAINT/COMMISSIONING <i>ELECTRICIANS LOCAL 96</i>	09/03/2023	\$45.99	\$13.00	\$18.84	\$0.00	\$77.83
	09/01/2024	\$47.05	\$13.99	\$19.22	\$0.00	\$80.26
	09/07/2025	\$48.16	\$14.98	\$19.60	\$0.00	\$82.74
	09/06/2026	\$49.38	\$15.96	\$20.00	\$0.00	\$85.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIREMAN <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2023	\$39.03	\$13.38	\$15.15	\$0.00	\$67.56

Apprentice - OPERATING ENGINEERS - Local 98 Class 3

Effective Date - 12/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$23.42	\$13.38	\$15.15	\$0.00	\$51.95
2	70	\$27.32	\$13.38	\$15.15	\$0.00	\$55.85
3	80	\$31.22	\$13.38	\$15.15	\$0.00	\$59.75
4	90	\$35.13	\$13.38	\$15.15	\$0.00	\$63.66

Notes:

Steps 1-2 are 1000 hrs.; Steps 3-4 are 2000 hrs.

Apprentice to Journeyworker Ratio:1:6

FLAGGER & SIGNALER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$25.48	\$9.65	\$17.14	\$0.00	\$52.27
	06/01/2024	\$26.51	\$9.65	\$17.14	\$0.00	\$53.30
	12/01/2024	\$26.51	\$9.65	\$17.14	\$0.00	\$53.30
	06/01/2025	\$27.59	\$9.65	\$17.14	\$0.00	\$54.38
	12/01/2025	\$27.59	\$9.65	\$17.14	\$0.00	\$54.38
	06/01/2026	\$28.71	\$9.65	\$17.14	\$0.00	\$55.50
	12/01/2026	\$28.71	\$9.65	\$17.14	\$0.00	\$55.50
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE II</i>	03/01/2024	\$49.47	\$8.83	\$20.27	\$0.00	\$78.57
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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - FLOORCOVERER - Local 2168 Zone II

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.74	\$8.83	\$1.76	\$0.00	\$35.33
2	55	\$27.21	\$8.83	\$1.76	\$0.00	\$37.80
3	60	\$29.68	\$8.83	\$3.52	\$0.00	\$42.03
4	65	\$32.16	\$8.83	\$3.52	\$0.00	\$44.51
5	70	\$34.63	\$8.83	\$16.75	\$0.00	\$60.21
6	75	\$37.10	\$8.83	\$16.75	\$0.00	\$62.68
7	80	\$39.58	\$8.83	\$18.51	\$0.00	\$66.92
8	85	\$42.05	\$8.83	\$18.51	\$0.00	\$69.39

Notes: Steps are 750 hrs.
 % After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
 Step 1&2 \$32.63/ 3&4 \$39.28/ 5&6 \$59.86/ 7&8 \$66.52

Apprentice to Journeyworker Ratio:1:1

FORK LIFT <i>OPERATING ENGINEERS LOCAL 98</i> For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2023	\$39.25	\$13.78	\$15.15	\$0.00	\$68.18
GENERATORS/LIGHTING PLANTS <i>OPERATING ENGINEERS LOCAL 98</i> For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2023	\$35.80	\$13.78	\$15.15	\$0.00	\$64.73
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) <i>GLAZIERS LOCAL 35 (ZONE 2)</i>	01/01/2024	\$45.56	\$9.95	\$23.95	\$0.00	\$79.46
	07/01/2024	\$46.76	\$9.95	\$23.95	\$0.00	\$80.66
	01/01/2025	\$47.96	\$9.95	\$23.95	\$0.00	\$81.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (TESTING AND BALANCING -WATER) <i>PLUMBERS LOCAL 4</i>	03/01/2024	\$53.95	\$9.90	\$17.42	\$0.00	\$81.27
	09/01/2024	\$55.35	\$9.90	\$17.42	\$0.00	\$82.67
	03/01/2025	\$56.75	\$9.90	\$17.42	\$0.00	\$84.07
	09/01/2025	\$58.15	\$9.90	\$17.42	\$0.00	\$85.47
	03/01/2026	\$59.55	\$9.90	\$17.42	\$0.00	\$86.87
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC <i>PLUMBERS LOCAL 4</i>	03/01/2024	\$53.95	\$9.90	\$17.42	\$0.00	\$81.27
	09/01/2024	\$55.35	\$9.90	\$17.42	\$0.00	\$82.67
	03/01/2025	\$56.75	\$9.90	\$17.42	\$0.00	\$84.07
	09/01/2025	\$58.15	\$9.90	\$17.42	\$0.00	\$85.47
	03/01/2026	\$59.55	\$9.90	\$17.42	\$0.00	\$86.87
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.61	\$9.65	\$17.14	\$0.00	\$65.40
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$38.61	\$9.65	\$17.14	\$0.00	\$65.40
	06/01/2024	\$39.94	\$9.65	\$17.14	\$0.00	\$66.73
	12/01/2024	\$41.27	\$9.65	\$17.14	\$0.00	\$68.06
	06/01/2025	\$42.66	\$9.65	\$17.14	\$0.00	\$69.45
	12/01/2025	\$44.04	\$9.65	\$17.14	\$0.00	\$70.83
	06/01/2026	\$45.48	\$9.65	\$17.14	\$0.00	\$72.27
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)</i>	09/01/2023	\$48.15	\$14.75	\$19.61	\$0.00	\$82.51
	09/01/2024	\$51.23	\$14.75	\$19.61	\$0.00	\$85.59
	09/01/2025	\$54.31	\$14.75	\$19.61	\$0.00	\$88.67
	09/01/2026	\$57.38	\$14.75	\$19.61	\$0.00	\$91.74

Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Worcester

Effective Date - 09/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.08	\$14.75	\$14.32	\$0.00	\$53.15
2	60	\$28.89	\$14.75	\$15.37	\$0.00	\$59.01
3	70	\$33.71	\$14.75	\$16.43	\$0.00	\$64.89
4	80	\$38.52	\$14.75	\$17.49	\$0.00	\$70.76

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.62	\$14.75	\$14.32	\$0.00	\$54.69
2	60	\$30.74	\$14.75	\$15.37	\$0.00	\$60.86
3	70	\$35.86	\$14.75	\$16.43	\$0.00	\$67.04
4	80	\$40.98	\$14.75	\$17.49	\$0.00	\$73.22

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER <i>IRONWORKERS LOCAL 7 (WORCESTER AREA)</i>	03/16/2024	\$53.67	\$8.35	\$26.70	\$0.00	\$88.72

Apprentice - IRONWORKER - Local 7 Worcester

Effective Date - 03/16/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$32.20	\$8.35	\$26.70	\$0.00	\$67.25
2	70	\$37.57	\$8.35	\$26.70	\$0.00	\$72.62
3	75	\$40.25	\$8.35	\$26.70	\$0.00	\$75.30
4	80	\$42.94	\$8.35	\$26.70	\$0.00	\$77.99
5	85	\$45.62	\$8.35	\$26.70	\$0.00	\$80.67
6	90	\$48.30	\$8.35	\$26.70	\$0.00	\$83.35

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
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For apprentice rates see "Apprentice- LABORER"

LABORER <i>LABORERS - ZONE 2</i>	12/01/2023	\$37.86	\$9.65	\$17.14	\$0.00	\$64.65
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Apprentice - LABORER - Zone 2

Effective Date - 12/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$22.72	\$9.65	\$16.89	\$0.00	\$49.26
2	70	\$26.50	\$9.65	\$16.89	\$0.00	\$53.04
3	80	\$30.29	\$9.65	\$16.89	\$0.00	\$56.83
4	90	\$34.07	\$9.65	\$16.89	\$0.00	\$60.61

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$37.86	\$9.65	\$17.14	\$0.00	\$64.65
	06/01/2024	\$39.19	\$9.65	\$17.14	\$0.00	\$65.98
	12/01/2024	\$40.52	\$9.65	\$17.14	\$0.00	\$67.31
	06/01/2025	\$41.91	\$9.65	\$17.14	\$0.00	\$68.70
	12/01/2025	\$43.29	\$9.65	\$17.14	\$0.00	\$70.08
	06/01/2026	\$44.73	\$9.65	\$17.14	\$0.00	\$71.52
	12/01/2026	\$46.17	\$9.65	\$17.14	\$0.00	\$72.96

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - LABORER (Heavy & Highway) - Zone 2

Effective Date - 12/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$22.72	\$9.65	\$17.14	\$0.00	\$49.51
2	70	\$26.50	\$9.65	\$17.14	\$0.00	\$53.29
3	80	\$30.29	\$9.65	\$17.14	\$0.00	\$57.08
4	90	\$34.07	\$9.65	\$17.14	\$0.00	\$60.86

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$23.51	\$9.00	\$16.89	\$0.00	\$49.40
2	70	\$27.43	\$9.00	\$16.89	\$0.00	\$53.32
3	80	\$31.35	\$9.00	\$16.89	\$0.00	\$57.24
4	90	\$35.27	\$9.00	\$16.89	\$0.00	\$61.16

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER <i>LABORERS - ZONE 2</i>	12/01/2023	\$37.86	\$9.65	\$17.14	\$0.00	\$64.65
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For apprentice rates see "Apprentice- LABORER"

LABORER: CEMENT FINISHER TENDER <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.36	\$9.40	\$16.89	\$0.00	\$64.65
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For apprentice rates see "Apprentice- LABORER"

LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER <i>LABORERS - ZONE 2</i>	12/01/2023	\$37.95	\$9.65	\$17.20	\$0.00	\$64.80
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For apprentice rates see "Apprentice- LABORER"

LABORER: MASON TENDER <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
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For apprentice rates see "Apprentice- LABORER"

LABORER: MASON TENDER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
	06/01/2024	\$39.44	\$9.65	\$17.14	\$0.00	\$66.23
	12/01/2024	\$40.77	\$9.65	\$17.14	\$0.00	\$67.56
	06/01/2025	\$42.16	\$9.65	\$17.14	\$0.00	\$68.95
	12/01/2025	\$43.54	\$9.65	\$17.14	\$0.00	\$70.33
	06/01/2026	\$44.98	\$9.65	\$17.14	\$0.00	\$71.77
	12/01/2026	\$46.42	\$9.65	\$17.14	\$0.00	\$73.21

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

LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 2</i>	12/01/2023	\$37.86	\$9.65	\$17.14	\$0.00	\$64.65
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For apprentice rates see "Apprentice- LABORER"

LABORER: TREE REMOVER <i>LABORERS - ZONE 2</i>	12/01/2023	\$37.86	\$9.65	\$17.14	\$0.00	\$64.65
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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 <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
	06/01/2024	\$39.44	\$9.65	\$17.14	\$0.00	\$66.23
	12/01/2024	\$40.77	\$9.65	\$17.14	\$0.00	\$67.56
	06/01/2025	\$42.16	\$9.65	\$17.14	\$0.00	\$68.95
	12/01/2025	\$43.54	\$9.65	\$17.14	\$0.00	\$70.33
	06/01/2026	\$44.98	\$9.65	\$17.14	\$0.00	\$71.77
	12/01/2026	\$46.42	\$9.65	\$17.14	\$0.00	\$73.21

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2024	\$47.89	\$11.49	\$21.37	\$0.00	\$80.75
	08/01/2024	\$49.57	\$11.49	\$21.37	\$0.00	\$82.43
	02/01/2025	\$50.61	\$11.49	\$21.37	\$0.00	\$83.47
	08/01/2025	\$52.33	\$11.49	\$21.37	\$0.00	\$85.19
	02/01/2026	\$53.41	\$11.49	\$21.37	\$0.00	\$86.27
	08/01/2026	\$55.17	\$11.49	\$21.37	\$0.00	\$88.03
	02/01/2027	\$56.29	\$11.49	\$21.37	\$0.00	\$89.15

Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.95	\$11.49	\$21.37	\$0.00	\$56.81
2	60	\$28.73	\$11.49	\$21.37	\$0.00	\$61.59
3	70	\$33.52	\$11.49	\$21.37	\$0.00	\$66.38
4	80	\$38.31	\$11.49	\$21.37	\$0.00	\$71.17
5	90	\$43.10	\$11.49	\$21.37	\$0.00	\$75.96

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.79	\$11.49	\$21.37	\$0.00	\$57.65
2	60	\$29.74	\$11.49	\$21.37	\$0.00	\$62.60
3	70	\$34.70	\$11.49	\$21.37	\$0.00	\$67.56
4	80	\$39.66	\$11.49	\$21.37	\$0.00	\$72.52
5	90	\$44.61	\$11.49	\$21.37	\$0.00	\$77.47

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS, TILELAYERS & TERRAZZO MECH <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2024	\$62.42	\$11.49	\$23.56	\$0.00	\$97.47
	08/01/2024	\$64.52	\$11.49	\$23.56	\$0.00	\$99.57
	02/01/2025	\$65.82	\$11.49	\$23.56	\$0.00	\$100.87
	08/01/2025	\$67.97	\$11.49	\$23.56	\$0.00	\$103.02
	02/01/2026	\$69.32	\$11.49	\$23.56	\$0.00	\$104.37
	08/01/2026	\$71.52	\$11.49	\$23.56	\$0.00	\$106.57
	02/01/2027	\$72.92	\$11.49	\$23.56	\$0.00	\$107.97

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - MILLWRIGHT - Local 1121 Zone 3						
Effective Date - 01/01/2024						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$22.66	\$10.08	\$5.36	\$0.00	\$38.10
2	65	\$26.78	\$10.08	\$6.34	\$0.00	\$43.20
3	75	\$30.90	\$10.08	\$18.78	\$0.00	\$59.76
4	85	\$35.02	\$10.08	\$19.76	\$0.00	\$64.86
Effective Date - 01/06/2025						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$23.91	\$10.08	\$5.36	\$0.00	\$39.35
2	65	\$28.26	\$10.08	\$6.34	\$0.00	\$44.68
3	75	\$32.61	\$10.08	\$18.78	\$0.00	\$61.47
4	85	\$36.96	\$10.08	\$19.76	\$0.00	\$66.80
Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension, but do receive annuity. (Step 1 \$5.72, Step 2 \$6.66) Steps are 2,000 hours						
Apprentice to Journeyworker Ratio:1:4						

MORTAR MIXER LABORERS - ZONE 2	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
For apprentice rates see "Apprentice- LABORER"						
OILER OPERATING ENGINEERS LOCAL 98	12/01/2023	\$35.02	\$13.78	\$15.15	\$0.00	\$63.95
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS VI OPERATING ENGINEERS LOCAL 98	12/01/2023	\$32.74	\$13.78	\$15.15	\$0.00	\$61.67
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) PAINTERS LOCAL 35 - ZONE 2	01/01/2024	\$56.06	\$9.95	\$23.95	\$0.00	\$89.96
	07/01/2024	\$57.26	\$9.95	\$23.95	\$0.00	\$91.16
	01/01/2025	\$58.46	\$9.95	\$23.95	\$0.00	\$92.36

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

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.03	\$9.95	\$0.00	\$0.00	\$37.98
2	55	\$30.83	\$9.95	\$6.66	\$0.00	\$47.44
3	60	\$33.64	\$9.95	\$7.26	\$0.00	\$50.85
4	65	\$36.44	\$9.95	\$7.87	\$0.00	\$54.26
5	70	\$39.24	\$9.95	\$20.32	\$0.00	\$69.51
6	75	\$42.05	\$9.95	\$20.93	\$0.00	\$72.93
7	80	\$44.85	\$9.95	\$21.53	\$0.00	\$76.33
8	90	\$50.45	\$9.95	\$22.74	\$0.00	\$83.14

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$9.95	\$0.00	\$0.00	\$38.58
2	55	\$31.49	\$9.95	\$6.66	\$0.00	\$48.10
3	60	\$34.36	\$9.95	\$7.26	\$0.00	\$51.57
4	65	\$37.22	\$9.95	\$7.87	\$0.00	\$55.04
5	70	\$40.08	\$9.95	\$20.32	\$0.00	\$70.35
6	75	\$42.95	\$9.95	\$20.93	\$0.00	\$73.83
7	80	\$45.81	\$9.95	\$21.53	\$0.00	\$77.29
8	90	\$51.53	\$9.95	\$22.74	\$0.00	\$84.22

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2024	\$46.96	\$9.95	\$23.95	\$0.00	\$80.86
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	07/01/2024	\$48.16	\$9.95	\$23.95	\$0.00	\$82.06
	01/01/2025	\$49.36	\$9.95	\$23.95	\$0.00	\$83.26

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - New

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.48	\$9.95	\$0.00	\$0.00	\$33.43
2	55	\$25.83	\$9.95	\$6.66	\$0.00	\$42.44
3	60	\$28.18	\$9.95	\$7.26	\$0.00	\$45.39
4	65	\$30.52	\$9.95	\$7.87	\$0.00	\$48.34
5	70	\$32.87	\$9.95	\$20.32	\$0.00	\$63.14
6	75	\$35.22	\$9.95	\$20.93	\$0.00	\$66.10
7	80	\$37.57	\$9.95	\$21.53	\$0.00	\$69.05
8	90	\$42.26	\$9.95	\$22.74	\$0.00	\$74.95

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.08	\$9.95	\$0.00	\$0.00	\$34.03
2	55	\$26.49	\$9.95	\$6.66	\$0.00	\$43.10
3	60	\$28.90	\$9.95	\$7.26	\$0.00	\$46.11
4	65	\$31.30	\$9.95	\$7.87	\$0.00	\$49.12
5	70	\$33.71	\$9.95	\$20.32	\$0.00	\$63.98
6	75	\$36.12	\$9.95	\$20.93	\$0.00	\$67.00
7	80	\$38.53	\$9.95	\$21.53	\$0.00	\$70.01
8	90	\$43.34	\$9.95	\$22.74	\$0.00	\$76.03

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	01/01/2024	\$45.02	\$9.95	\$23.95	\$0.00	\$78.92
PAINTERS LOCAL 35 - ZONE 2	07/01/2024	\$46.22	\$9.95	\$23.95	\$0.00	\$80.12
	01/01/2025	\$47.42	\$9.95	\$23.95	\$0.00	\$81.32

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER - Local 35 Zone 2 - BRUSH NEW

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.78	\$9.95	\$0.00	\$0.00	\$32.73
2	55	\$25.06	\$9.95	\$6.66	\$0.00	\$41.67
3	60	\$27.34	\$9.95	\$7.26	\$0.00	\$44.55
4	65	\$29.61	\$9.95	\$7.87	\$0.00	\$47.43
5	70	\$31.89	\$9.95	\$20.32	\$0.00	\$62.16
6	75	\$34.17	\$9.95	\$20.93	\$0.00	\$65.05
7	80	\$36.45	\$9.95	\$21.53	\$0.00	\$67.93
8	90	\$41.00	\$9.95	\$22.74	\$0.00	\$73.69

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.38	\$9.95	\$0.00	\$0.00	\$33.33
2	55	\$25.72	\$9.95	\$6.66	\$0.00	\$42.33
3	60	\$28.06	\$9.95	\$7.26	\$0.00	\$45.27
4	65	\$30.39	\$9.95	\$7.87	\$0.00	\$48.21
5	70	\$32.73	\$9.95	\$20.32	\$0.00	\$63.00
6	75	\$35.07	\$9.95	\$20.93	\$0.00	\$65.95
7	80	\$37.41	\$9.95	\$21.53	\$0.00	\$68.89
8	90	\$42.08	\$9.95	\$22.74	\$0.00	\$74.77

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT)	01/01/2024	\$43.62	\$9.95	\$23.95	\$0.00	\$77.52
PAINTERS LOCAL 35 - ZONE 2	07/01/2024	\$44.82	\$9.95	\$23.95	\$0.00	\$78.72
	01/01/2025	\$46.02	\$9.95	\$23.95	\$0.00	\$79.92

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) <i>PILE DRIVER LOCAL 56 (ZONE 2)</i> For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	\$46.11	\$9.40	\$23.12	\$0.00	\$78.63
PILE DRIVER <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$46.11	\$9.40	\$23.12	\$0.00	\$78.63

Apprentice - PILE DRIVER - Local 56 Zone 2

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Notes: Apprentice wages shall be no less than the following Steps;

(Same as set in Zone 1)

1\$57.06/2\$61.96/3\$66.87/4\$69.32/5\$71.78/6\$71.78/7\$76.68/8\$76.68

Apprentice to Journeyworker Ratio:1:5

PIPELAYER <i>LABORERS - ZONE 2</i> For apprentice rates see "Apprentice- LABORER"	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
PIPELAYER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
	06/01/2024	\$39.44	\$9.65	\$17.14	\$0.00	\$66.23
	12/01/2024	\$40.77	\$9.65	\$17.14	\$0.00	\$67.56
	06/01/2025	\$42.16	\$9.65	\$17.14	\$0.00	\$68.95
	12/01/2025	\$43.54	\$9.65	\$17.14	\$0.00	\$70.33
	06/01/2026	\$44.98	\$9.65	\$17.14	\$0.00	\$71.77
	12/01/2026	\$46.42	\$9.65	\$17.14	\$0.00	\$73.21
	For apprentice rates see "Apprentice- LABORER (Heavy and Highway)					
PLUMBER & PIPEFITTER <i>PLUMBERS LOCAL 4</i>	03/01/2024	\$53.95	\$9.90	\$17.42	\$0.00	\$81.27
	09/01/2024	\$55.35	\$9.90	\$17.42	\$0.00	\$82.67
	03/01/2025	\$56.75	\$9.90	\$17.42	\$0.00	\$84.07
	09/01/2025	\$58.15	\$9.90	\$17.42	\$0.00	\$85.47
	03/01/2026	\$59.55	\$9.90	\$17.42	\$0.00	\$86.87

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - PLUMBER/PIPEFITTER - Local 4

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$21.58	\$9.90	\$0.00	\$0.00	\$31.48
2	50	\$26.98	\$9.90	\$0.00	\$0.00	\$36.88
3	60	\$32.37	\$9.90	\$0.00	\$0.00	\$42.27
4	70	\$37.77	\$9.90	\$7.71	\$0.00	\$55.38
5	80	\$43.16	\$9.90	\$7.71	\$0.00	\$60.77

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$22.14	\$9.90	\$0.00	\$0.00	\$32.04
2	50	\$27.68	\$9.90	\$0.00	\$0.00	\$37.58
3	60	\$33.21	\$9.90	\$0.00	\$0.00	\$43.11
4	70	\$38.75	\$9.90	\$7.71	\$0.00	\$56.36
5	80	\$44.28	\$9.90	\$7.71	\$0.00	\$61.89

Notes:

Steps - 2000 hrs; Step 4 w/lic 75%, Step 5 w/lic 85%
 Step 4 w/lic \$52.59, Step 5 w/lic \$57.44

Apprentice to Journeyworker Ratio:1:3

PNEUMATIC CONTROLS (TEMP.) <i>PLUMBERS LOCAL 4</i>	03/01/2024	\$53.95	\$9.90	\$17.42	\$0.00	\$81.27
	09/01/2024	\$55.35	\$9.90	\$17.42	\$0.00	\$82.67
	03/01/2025	\$56.75	\$9.90	\$17.42	\$0.00	\$84.07
	09/01/2025	\$58.15	\$9.90	\$17.42	\$0.00	\$85.47
	03/01/2026	\$59.55	\$9.90	\$17.42	\$0.00	\$86.87

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

PNEUMATIC DRILL/TOOL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
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For apprentice rates see "Apprentice- LABORER"

PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
	06/01/2024	\$39.44	\$9.65	\$17.14	\$0.00	\$66.23
	12/01/2024	\$40.77	\$9.65	\$17.14	\$0.00	\$67.56
	06/01/2025	\$42.16	\$9.65	\$17.14	\$0.00	\$68.95
	12/01/2025	\$43.54	\$9.65	\$17.14	\$0.00	\$70.33
	06/01/2026	\$44.98	\$9.65	\$17.14	\$0.00	\$71.77
	12/01/2026	\$46.42	\$9.65	\$17.14	\$0.00	\$73.21

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

POWDERMAN & BLASTER <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.86	\$9.65	\$17.14	\$0.00	\$65.65
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For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$39.36	\$9.40	\$16.89	\$0.00	\$65.65
	06/01/2024	\$40.69	\$9.40	\$16.89	\$0.00	\$66.98
	12/01/2024	\$42.02	\$9.40	\$16.89	\$0.00	\$68.31
	06/01/2025	\$43.41	\$9.40	\$16.89	\$0.00	\$69.70
	12/01/2025	\$44.79	\$9.40	\$16.89	\$0.00	\$71.08
	06/01/2026	\$46.23	\$9.40	\$16.89	\$0.00	\$72.52
	12/01/2026	\$47.67	\$9.40	\$16.89	\$0.00	\$73.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2023	\$39.56	\$13.78	\$15.15	\$0.00	\$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2023	\$39.03	\$13.38	\$15.15	\$0.00	\$67.56
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER <i>TEAMSTERS 404 - Construction Service (Northampton)</i>	05/01/2023	\$25.24	\$11.57	\$7.00	\$0.00	\$43.81
	05/01/2024	\$26.14	\$11.82	\$7.25	\$0.00	\$45.21
RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
For apprentice rates see "Apprentice- LABORER"						
ROLLER OPERATOR <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2023	\$38.42	\$13.78	\$15.15	\$0.00	\$67.35
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofing &Roofer Damproofg) <i>ROOFERS LOCAL 33</i>	02/01/2024	\$50.03	\$12.78	\$21.45	\$0.00	\$84.26
	08/01/2024	\$51.53	\$12.78	\$21.45	\$0.00	\$85.76
	02/01/2025	\$52.78	\$12.78	\$21.45	\$0.00	\$87.01
	08/01/2025	\$54.28	\$12.78	\$21.45	\$0.00	\$88.51
	02/01/2026	\$55.53	\$12.78	\$21.45	\$0.00	\$89.76

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - ROOFER - Local 33

Effective Date - 02/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.02	\$12.78	\$6.21	\$0.00	\$44.01
2	60	\$30.02	\$12.78	\$21.45	\$0.00	\$64.25
3	65	\$32.52	\$12.78	\$21.45	\$0.00	\$66.75
4	75	\$37.52	\$12.78	\$21.45	\$0.00	\$71.75
5	85	\$42.53	\$12.78	\$21.45	\$0.00	\$76.76

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.77	\$12.78	\$6.21	\$0.00	\$44.76
2	60	\$30.92	\$12.78	\$21.45	\$0.00	\$65.15
3	65	\$33.49	\$12.78	\$21.45	\$0.00	\$67.72
4	75	\$38.65	\$12.78	\$21.45	\$0.00	\$72.88
5	85	\$43.80	\$12.78	\$21.45	\$0.00	\$78.03

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
 Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
 (Hot Pitch Mechanics' receive \$1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE	02/01/2024	\$50.28	\$12.78	\$21.45	\$0.00	\$84.51
ROOFERS LOCAL 33	08/01/2024	\$51.78	\$12.78	\$21.45	\$0.00	\$86.01
	02/01/2025	\$53.03	\$12.78	\$21.45	\$0.00	\$87.26
	08/01/2025	\$54.53	\$12.78	\$21.45	\$0.00	\$88.76
	02/01/2026	\$55.78	\$12.78	\$21.45	\$0.00	\$90.01

For apprentice rates see "Apprentice- ROOFER"

SCRAPER	12/01/2023	\$39.03	\$13.38	\$15.15	\$0.00	\$67.56
OPERATING ENGINEERS LOCAL 98						

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

SELF-POWERED ROLLERS AND COMPACTORS (TAMPERS)	12/01/2023	\$38.42	\$13.78	\$15.15	\$0.00	\$67.35
OPERATING ENGINEERS LOCAL 98						

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

SELF-PROPELLED POWER BROOM	12/01/2023	\$35.80	\$13.78	\$15.15	\$0.00	\$64.73
OPERATING ENGINEERS LOCAL 98						

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

SHEETMETAL WORKER	01/01/2024	\$40.22	\$11.96	\$18.74	\$2.13	\$73.05
SHEETMETAL WORKERS LOCAL 63	07/01/2024	\$41.47	\$11.96	\$18.74	\$2.13	\$74.30
	01/01/2025	\$42.72	\$11.96	\$18.74	\$2.13	\$75.55

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - SHEET METAL WORKER - Local 63

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$18.10	\$5.38	\$4.86	\$0.85	\$29.19
2	50	\$20.11	\$5.98	\$5.40	\$0.94	\$32.43
3	55	\$22.12	\$6.58	\$9.71	\$1.15	\$39.56
4	60	\$24.13	\$7.18	\$9.71	\$1.23	\$42.25
5	65	\$26.14	\$7.77	\$9.71	\$1.31	\$44.93
6	70	\$28.15	\$8.37	\$9.71	\$1.39	\$47.62
7	75	\$30.17	\$8.97	\$9.71	\$1.47	\$50.32
8	80	\$32.18	\$9.57	\$17.66	\$1.78	\$61.19
9	85	\$34.19	\$10.17	\$17.66	\$1.86	\$63.88
10	90	\$36.20	\$10.76	\$17.66	\$1.94	\$66.56

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$18.66	\$5.38	\$4.86	\$0.85	\$29.75
2	50	\$20.74	\$5.98	\$5.40	\$0.94	\$33.06
3	55	\$22.81	\$6.58	\$9.71	\$1.15	\$40.25
4	60	\$24.88	\$7.18	\$9.71	\$1.23	\$43.00
5	65	\$26.96	\$7.77	\$9.71	\$1.31	\$45.75
6	70	\$29.03	\$8.37	\$9.71	\$1.39	\$48.50
7	75	\$31.10	\$8.97	\$9.71	\$1.47	\$51.25
8	80	\$33.18	\$9.57	\$17.66	\$1.78	\$62.19
9	85	\$35.25	\$10.17	\$17.66	\$1.86	\$64.94
10	90	\$37.32	\$10.76	\$17.66	\$1.94	\$67.68

Notes:

Apprentice to Journeyworker Ratio:1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	01/01/2024	\$39.24	\$15.07	\$18.67	\$0.00	\$72.98
	06/01/2024	\$40.24	\$15.07	\$18.67	\$0.00	\$73.98
	12/01/2024	\$40.24	\$15.07	\$20.17	\$0.00	\$75.48
	01/01/2025	\$40.24	\$15.57	\$20.17	\$0.00	\$75.98
	06/01/2025	\$41.24	\$15.57	\$20.17	\$0.00	\$76.98
	12/01/2025	\$41.24	\$15.57	\$21.78	\$0.00	\$78.59
	01/01/2026	\$41.24	\$16.17	\$21.78	\$0.00	\$79.19
	06/01/2026	\$42.24	\$16.17	\$21.78	\$0.00	\$80.19
	12/01/2026	\$42.24	\$16.17	\$23.52	\$0.00	\$81.93
	01/01/2027	\$42.24	\$16.77	\$23.52	\$0.00	\$82.53

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP > 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	01/01/2024	\$39.53	\$15.07	\$18.67	\$0.00	\$73.27
	06/01/2024	\$40.53	\$15.07	\$18.67	\$0.00	\$74.27
	12/01/2024	\$40.53	\$15.07	\$20.17	\$0.00	\$75.77
	01/01/2025	\$40.53	\$15.57	\$20.17	\$0.00	\$76.27
	06/01/2025	\$41.53	\$15.57	\$20.17	\$0.00	\$77.27
	12/01/2025	\$41.53	\$15.57	\$21.78	\$0.00	\$78.88
	01/01/2026	\$41.53	\$16.17	\$21.78	\$0.00	\$79.48
	06/01/2026	\$42.53	\$16.17	\$21.78	\$0.00	\$80.48
	12/01/2026	\$42.53	\$16.17	\$23.52	\$0.00	\$82.22
	01/01/2027	\$42.53	\$16.77	\$23.52	\$0.00	\$82.82
SPRINKLER FITTER <i>SPRINKLER FITTERS LOCAL 669</i>	04/01/2023	\$47.43	\$11.45	\$16.61	\$0.00	\$75.49

Apprentice - *SPRINKLER FITTER - Local 669*

Effective Date - 04/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$21.34	\$8.22	\$0.00	\$0.00	\$29.56
2	50	\$23.72	\$8.22	\$0.00	\$0.00	\$31.94
3	55	\$26.09	\$11.45	\$7.20	\$0.00	\$44.74
4	60	\$28.46	\$11.45	\$8.35	\$0.00	\$48.26
5	65	\$30.83	\$11.45	\$8.35	\$0.00	\$50.63
6	70	\$33.20	\$11.45	\$8.60	\$0.00	\$53.25
7	75	\$35.57	\$11.45	\$8.60	\$0.00	\$55.62
8	80	\$37.94	\$11.45	\$8.60	\$0.00	\$57.99
9	85	\$40.32	\$11.45	\$8.60	\$0.00	\$60.37
10	90	\$42.69	\$11.45	\$8.60	\$0.00	\$62.74

Notes:

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2024	\$61.34	\$11.49	\$23.59	\$0.00	\$96.42
	08/01/2024	\$63.44	\$11.49	\$23.59	\$0.00	\$98.52
	02/01/2025	\$64.74	\$11.49	\$23.59	\$0.00	\$99.82
	08/01/2025	\$66.89	\$11.49	\$23.59	\$0.00	\$101.97
	02/01/2026	\$68.24	\$11.49	\$23.59	\$0.00	\$103.32
	08/01/2026	\$70.44	\$11.49	\$23.59	\$0.00	\$105.52
	02/01/2027	\$71.84	\$11.49	\$23.59	\$0.00	\$106.92

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TRACTORS <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2023	\$38.42	\$13.78	\$15.15	\$0.00	\$67.35
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	01/01/2024	\$39.82	\$15.07	\$18.67	\$0.00	\$73.56
	06/01/2024	\$40.82	\$15.07	\$18.67	\$0.00	\$74.56
	12/01/2024	\$40.82	\$15.07	\$20.17	\$0.00	\$76.06
	01/01/2025	\$40.82	\$15.57	\$20.17	\$0.00	\$76.56
	06/01/2025	\$41.82	\$15.57	\$20.17	\$0.00	\$77.56
	12/01/2025	\$41.82	\$15.57	\$21.78	\$0.00	\$79.17
	01/01/2026	\$41.82	\$16.17	\$21.78	\$0.00	\$79.77
	06/01/2026	\$42.82	\$16.17	\$21.78	\$0.00	\$80.77
	12/01/2026	\$42.82	\$16.17	\$23.52	\$0.00	\$82.51
	01/01/2027	\$42.82	\$16.77	\$23.52	\$0.00	\$83.11
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	12/01/2023	\$56.56	\$9.65	\$18.67	\$0.00	\$84.88
	06/01/2024	\$58.04	\$9.65	\$18.67	\$0.00	\$86.36
	12/01/2024	\$59.51	\$9.65	\$18.67	\$0.00	\$87.83
	06/01/2025	\$61.01	\$9.65	\$18.67	\$0.00	\$89.33
	12/01/2025	\$62.51	\$9.65	\$18.67	\$0.00	\$90.83
	06/01/2026	\$64.06	\$9.65	\$18.67	\$0.00	\$92.38
	12/01/2026	\$65.56	\$9.65	\$18.67	\$0.00	\$93.88
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	12/01/2023	\$58.56	\$9.65	\$18.67	\$0.00	\$86.88
	06/01/2024	\$60.04	\$9.65	\$18.67	\$0.00	\$88.36
	12/01/2024	\$61.51	\$9.65	\$18.67	\$0.00	\$89.83
	06/01/2025	\$63.01	\$9.65	\$18.67	\$0.00	\$91.33
	12/01/2025	\$64.51	\$9.65	\$18.67	\$0.00	\$92.83
	06/01/2026	\$66.06	\$9.65	\$18.67	\$0.00	\$94.38
	12/01/2026	\$67.56	\$9.65	\$18.67	\$0.00	\$95.88
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2023	\$48.63	\$9.65	\$18.67	\$0.00	\$76.95
	06/01/2024	\$50.11	\$9.65	\$18.67	\$0.00	\$78.43
	12/01/2024	\$51.58	\$9.65	\$18.67	\$0.00	\$79.90
	06/01/2025	\$53.08	\$9.65	\$18.67	\$0.00	\$81.40
	12/01/2025	\$54.58	\$9.65	\$18.67	\$0.00	\$82.90
	06/01/2026	\$56.13	\$9.65	\$18.67	\$0.00	\$84.45
	12/01/2026	\$57.63	\$9.65	\$18.67	\$0.00	\$85.95
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2023	\$50.63	\$9.65	\$18.67	\$0.00	\$78.95
	06/01/2024	\$52.11	\$9.65	\$18.67	\$0.00	\$80.43
	12/01/2024	\$53.58	\$9.65	\$18.67	\$0.00	\$81.90
	06/01/2025	\$55.08	\$9.65	\$18.67	\$0.00	\$83.40
	12/01/2025	\$56.58	\$9.65	\$18.67	\$0.00	\$84.90
	06/01/2026	\$58.13	\$9.65	\$18.67	\$0.00	\$86.45
	12/01/2026	\$59.63	\$9.65	\$18.67	\$0.00	\$87.95
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	01/01/2024	\$39.24	\$15.07	\$18.67	\$0.00	\$72.98
	06/01/2024	\$40.24	\$15.07	\$18.67	\$0.00	\$73.98
	12/01/2024	\$40.24	\$15.07	\$20.17	\$0.00	\$75.48
	01/01/2025	\$40.24	\$15.57	\$20.17	\$0.00	\$75.98
	06/01/2025	\$41.24	\$15.57	\$20.17	\$0.00	\$76.98
	12/01/2025	\$41.24	\$15.57	\$21.78	\$0.00	\$78.59
	01/01/2026	\$41.24	\$16.17	\$21.78	\$0.00	\$79.19
	06/01/2026	\$42.24	\$16.17	\$21.78	\$0.00	\$80.19
	12/01/2026	\$42.24	\$16.17	\$23.52	\$0.00	\$81.93
01/01/2027	\$42.24	\$16.77	\$23.52	\$0.00	\$82.53	
VOICE-DATA-VIDEO TECHNICIAN <i>ELECTRICIANS LOCAL 96</i>	09/03/2023	\$34.49	\$13.00	\$17.22	\$0.00	\$64.71
	09/01/2024	\$35.29	\$13.99	\$17.57	\$0.00	\$66.85
	09/07/2025	\$36.12	\$14.98	\$17.91	\$0.00	\$69.01
	09/06/2026	\$37.04	\$15.96	\$18.27	\$0.00	\$71.27

Apprentice - VOICE-DATA-VIDEO TECHNICIAN - Local 96

Effective Date - 09/03/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$17.25	\$13.00	\$4.31	\$0.00	\$34.56
2	55	\$18.97	\$13.00	\$4.36	\$0.00	\$36.33
3	60	\$20.69	\$13.00	\$16.81	\$0.00	\$50.50
4	65	\$22.42	\$13.00	\$16.86	\$0.00	\$52.28
5	70	\$24.14	\$13.00	\$16.91	\$0.00	\$54.05
6	75	\$25.87	\$13.00	\$16.97	\$0.00	\$55.84
7	80	\$27.59	\$13.00	\$17.02	\$0.00	\$57.61
8	85	\$29.32	\$13.00	\$17.07	\$0.00	\$59.39

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$17.65	\$13.99	\$4.41	\$0.00	\$36.05
2	55	\$19.41	\$13.99	\$4.46	\$0.00	\$37.86
3	60	\$21.17	\$13.99	\$17.15	\$0.00	\$52.31
4	65	\$22.94	\$13.99	\$17.20	\$0.00	\$54.13
5	70	\$24.70	\$13.99	\$17.25	\$0.00	\$55.94
6	75	\$26.47	\$13.99	\$17.30	\$0.00	\$57.76
7	80	\$28.23	\$13.99	\$17.36	\$0.00	\$59.58
8	85	\$30.00	\$13.99	\$17.41	\$0.00	\$61.40

Notes:

Apprentice to Journeyworker Ratio:1:1

WAGON DRILL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
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For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2023	\$38.11	\$9.65	\$17.14	\$0.00	\$64.90
	06/01/2024	\$39.44	\$9.65	\$17.14	\$0.00	\$66.23
	12/01/2024	\$40.77	\$9.65	\$17.14	\$0.00	\$67.56
	06/01/2025	\$42.16	\$9.65	\$17.14	\$0.00	\$68.95
	12/01/2025	\$43.54	\$9.65	\$17.14	\$0.00	\$70.33
	06/01/2026	\$44.98	\$9.65	\$17.14	\$0.00	\$71.77
	12/01/2026	\$46.42	\$9.65	\$17.14	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
WATER METER INSTALLER <i>PLUMBERS LOCAL 4</i>	03/01/2024	\$53.95	\$9.90	\$17.42	\$0.00	\$81.27
	09/01/2024	\$55.35	\$9.90	\$17.42	\$0.00	\$82.67
	03/01/2025	\$56.75	\$9.90	\$17.42	\$0.00	\$84.07
	09/01/2025	\$58.15	\$9.90	\$17.42	\$0.00	\$85.47
	03/01/2026	\$59.55	\$9.90	\$17.42	\$0.00	\$86.87
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						

Additional Apprentices Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentices ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)

Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.

*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.

**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

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STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT
SPECIFICATIONS

(EXECUTIVE ORDER 11246)

Revised April 9, 2019

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 (pursuant to 41 CFR 60-4.5) 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, Executive Order 11246, or the regulations promulgated pursuant thereto.

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 where there is an obligation to do so under 41 CFR Part 60-3.
 - 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 pursuant to Executive Order 11246.

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 pursuant to Executive Order 11246, as amended, and its implementing regulations, 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 and Executive Order 11246, as amended.
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.
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

<u>STATE:</u>	<u>Goals (percent)</u>
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	
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 contract, 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 00875
TRAINEE SPECIAL PROVISIONS
Revised October, 2016

THE REQUIRED NUMBER OF TRAINEES TO BE TRAINED UNDER THIS CONTRACT WILL BE 1

The contractor shall provide on-the job training aimed at developing full journeyworkers in the type of trade of job classification involved.

In the event that a contractor subcontracts a portion of the contract work, the General Contractor shall determine how many, if any, of the trainees are to be trained by the subcontractor, provided, however, that the contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The contractor shall also insure that this training special provision is made applicable to such subcontract. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training.

The number of trainees shall be distributed among the work classifications on the basis of the contractor's needs and the availability of journeyworkers in the various classifications within a reasonable area of recruitment. Prior to commencing construction, the contractor shall submit to the Massachusetts Department Of Transportation (MassDOT) for approval the number of trainees to be trained in each selected classification and training program to be used. Furthermore, the contractor shall specify the starting time for training in each of the classifications. The contractor will be credited for each trainee employed on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees as provided hereinafter.

Training and upgrading of minorities and women toward journeyworker status is a primary objective of the Training Special Provision. Accordingly, the contractor shall make every effort to enroll minority and women trainees (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees) to the extent that such persons are available within a reasonable area of recruitment. The contractor will be responsible for demonstrating the steps that have been taken in pursuance thereof, prior to a determination as to whether the contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training.

No employee shall be trained under this Special Provision in any classification in which he or she has successfully completed a training course leading to journeyworker status or in which he or she has been employed as a journeyworker. The contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used the contractor's records should document the finding in each case.

The minimum length and type of training for each classification will be as established in the training program selected by the contractor and approved by the Massachusetts Department Of Transportation and the Federal Highway Administration. The Massachusetts Department Of Transportation and the Federal Highway Administration shall approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the contractor and to qualify the average trainee for journeyworker status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typist or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc. where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the Federal Highway Administration division office. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Reimbursement

Under these Training Special Provisions, reimbursement will be as follows:

The Contractor will only be reimbursed 80 cents for each hour of on the job training as specified in the approved Training Program.

The Contractor is advised and encouraged that it may train additional persons in excess of the number specified and will be reimbursed as stated above. Reimbursement will be made even though the contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the contractor from receiving other reimbursement.

If less than full training specified in the approved training programs is provided, payment to the contractor will be made at a rate of 80 cents for each hour of training completed under this contract. However, no payment shall be made to the contractor if either the failure to provide the required training, or the failure to hire the trainee as a journeyworker, is caused by the contractor and evidences a lack of good faith on the part of the contractor in meeting the requirements of this Training Special Provision.

Payment

Trainees will be paid:

1. Percentage (%) of the journeyworker's rate as provided in the existing programs approved by the Department of Labor or Transportation as of September 15, 1970.
2. For journeyworker programs submitted by the Contractor and approved by Massachusetts Department Of Transportation and the Federal Highway Administration at least 60 percent of the appropriate minimum journeyworker's rate specified in the contract for the first half of the training period, 75 percent for the third quarter if the training period, and 90 percent for the last quarter of the training period.
3. For skilled laborer programs, the minimum starting wage rate of unskilled laborer. At the conclusion of training, he or she will be paid the minimum wage rate of the Classification for programs submitted by the Contractor and approved by the Massachusetts Department Of Transportation and the Federal Highway Administration.
4. For the purposes of meeting the legal requirements of State Prevailing Wage Law, please be advised that no person may be paid the Apprentice wage rate as listed on a MA Prevailing Wage Rates schedule, unless that person and program is registered with the Department of Labor Standards/Division of Apprentice Standards (DLS/DAS). Any person or program not registered with DLS/DAS, regardless of whether or not they are registered with any other federal, state, local, or private entity must be paid the journeyworker's rate for the trade.

The contractor shall provide each trainee with a certification showing the type and length of training satisfactorily complete.

The contractor will provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.

Form FHWA-1409, Federal-aid Highway Construction Contracting Semi Annual Training Report, shall be submitted as per instructions on the Form.

*** 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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Modification Number	Publication Date
0	01/05/2024
1	01/19/2024
2	03/22/2024

* CARP0336-004 03/01/2024

	Rates	Fringes
CARPENTER (Includes Form Work)...	\$ 46.86	30.94

* ELEC0103-007 03/01/2024

	Rates	Fringes
ELECTRICIAN.....	\$ 61.86	36.14

ENGI0004-030 12/01/2023

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Group 1.....	\$ 48.73	29.25+A
GROUP 1.....	\$ 55.03	32.45
Group 2.....	\$ 48.23	29.25+A
GROUP 2.....	\$ 54.43	32.45

FOOTNOTE FOR POWER EQUIPMENT OPERATORS:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday,
 Labor Day, Memorial Day, Independence Day, Patriot's Day,
 Columbus Day, Veteran's Day, Thanksgiving Day, Christmas Day

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

Group 1: Backhoe/Excavator/Trackhoe; Bobcat/Skid Steer/Skid Loader; Broom/Sweeper; Gradall; Loader; Paver (Asphalt, Aggregate, and Concrete); Post Driver (Guardrail/Fences)
 Group 2: Bulldozer; Grader/Blade; Roller

ENGI0004-031 12/01/2023

	Rates	Fringes
POWER EQUIPMENT OPERATOR: (Milling Machine).....	\$ 55.03	32.45

FOOTNOTE FOR POWER EQUIPMENT OPERATORS:

A. PAID HOLIDAYS: New Year's Day, Washington's
Birthday,
Labor Day, Memorial Day, Independence Day, Patriot's Day,
Columbus Day, Veteran's Day, Thanksgiving Day, Christmas
Day

IRON0007-028 09/16/2023

	Rates	Fringes
IRONWORKER, STRUCTURAL.....	\$ 53.40	36.21

IRON0007-029 09/16/2023

	Rates	Fringes
IRONWORKER, ORNAMENTAL.....	\$ 53.70	36.21

LABO0039-003 06/01/2018

	Rates	Fringes
LABORER Asphalt, Includes Raker, Shoveler, Spreader and Distributor.....	\$ 33.50	22.92
Common or General.....	\$ 33.25	22.92
Guardrail Installation.....	\$ 33.50	22.92

PAIN0035-023 07/01/2023

	Rates	Fringes
PAINTER (Steel).....	\$ 55.51	35.10

SUMA2014-015 01/11/2017

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER....	\$ 56.70	21.08
IRONWORKER, REINFORCING.....	\$ 56.48	20.62
LABORER: Concrete Saw (Hand Held/Walk Behind).....	\$ 41.78	18.37
LABORER: Landscape.....	\$ 40.39	17.68
OPERATOR: Crane.....	\$ 52.14	21.08
OPERATOR: Forklift.....	\$ 64.67	0.00
OPERATOR: Mechanic.....	\$ 48.14	17.02
OPERATOR: Piledriver.....	\$ 44.46	16.94
PAINTER: Spray (Linestriping)....	\$ 48.00	0.00
PILEDRIVERMAN.....	\$ 45.65	23.33
TRAFFIC CONTROL: Flagger.....	\$ 23.00	20.44
TRAFFIC CONTROL: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper.....	\$ 44.49	12.41
TRUCK DRIVER: Concrete Truck....	\$ 33.69	15.79
TRUCK DRIVER: Dump Truck.....	\$ 30.38	7.20

TRUCK DRIVER: Flatbed Truck.....\$ 48.53 0.00

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>.

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 classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which 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. 07/01/2014 is the effective date of the

most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of 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. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write 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 the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write 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 by 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

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

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DOCUMENT A00801

SPECIAL PROVISIONS

WEST BROOKFIELD

Federal Aid Project No. STP/TAP-0032(040)

**Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road
(1.1 Miles – Phase I)**

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 *2024 Standard Specifications for Highways and Bridges*, the *2017 Construction Standard Details*, the *Traffic Management Plans and Detail Drawings*, *MassDOT Work Zone Safety Temporary Traffic Control*, 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 American Standard for Nursery Stock*; the Plans and these Special Provisions.

The project consists of resurfacing and related work on Route 9, from the Ware town line to 850 feet west of Welcome Road (1.1 miles – Phase I). Proposed work includes a combination of mill & overlay, full depth construction, full depth widening, guardrail installation, drainage improvements, signing & traffic markings, modified rockfill slopes, and retaining wall construction.

All work shall be performed within, and accessed by, existing State roadway layouts. No rights to enter on, or occupy, private property have been acquired for this project by the State – this is a Municipal project only and all required takings are on Municipal side.

SUBSECTION 7.05 INSURANCE REQUIREMENTS

B. Public Liability Insurance

The insurance requirements set forth in this section are in addition to the requirements of the Standard Specifications and supersede all other requirements.

Paragraphs 1 and 2

The Massachusetts Department of Transportation and applicable railroads shall be named as additional insureds.

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 project file number and municipality is to be placed in the subject line.

WORK SCHEDULE

Work on this project shall be restricted to a 7:00 AM to 3:30 PM eight (8) hour day, five (5) day work week Monday through Friday, but not on Saturdays, Sundays or holidays without prior approval of the Engineer.

The Contractor shall give notice to the Engineer at least 48 hours in advance of beginning any work affecting the maintenance of traffic and shall not proceed with surfacing operations without specific notice to, and the approval of, the Engineer.

SECTION 6.00: CONTROL OF MATERIALS

Subsection 6.01: Source of Supply and Quality

Replace this subsection with the following:

The Engineer may approve material at the source of supply before delivery to the project.

The Department reserves the right to require approval of the source of supply for any material to be incorporated into the work prior to delivery or manufacture.

The Engineer reserves the right to prohibit the use of materials, products, or components which, in their opinion, may be supplied in a manner not reasonably consistent with contract requirements.

The determination of the Engineer shall be final upon all questions which pertain to supplier approval.

Fabricators of structural steel, miscellaneous steel and aluminum products, and producers of precast concrete and prestressed concrete must be on the Department's approved fabricators list on the date the bids are opened. Only approved fabricators will be allowed to perform work for the Department.

The Contractor shall furnish all materials required for the work specified in the Contract. Said materials shall meet the requirements of the specifications for the kind of work involving their use. For any materials named or described in these specifications, an approved equivalent to that named or described in the said specifications, may be furnished.

Chapter 7, Section 22, Clause 17, of the General Laws, as amended, shall apply to the purchase by the Contractor of supplies and materials to be used in the execution of this Contract.

The rules referred to require a preference in the purchase of supplies and materials, other considerations being equal, in favor first, of supplies and materials manufactured and sold within the Commonwealth, and second, of supplies and materials manufactured and sold within the United States.

All iron and steel products, manufactured products, and construction materials shall comply with all Federal Buy America and Federal Build America Buy America (BABA) requirements, where applicable.

In Contracts requiring structural steel, precast, or prestress concrete, the Contractor shall furnish approved shop drawings, and fabrication procedures to the Department's inspector at the supply source or fabrication site. Materials for permanent construction shall be new, shall conform to the requirements of these specifications, and shall be approved by the Engineer.

SECTION 6.00 (Continued)

Materials for temporary structures or supports adjacent to traveled ways, the failure of which would compromise the safety of the public or the traveled ways, need not be new but the Contractor shall be required to submit certification by a Structural Professional Engineer that the material meets the requirements for the intended use and shall be approved by the Engineer. Any fabrication shall conform to the requirements of these specifications. These requirements shall not apply to gantry systems and supports as well as other mechanized systems.

If testing finds that an approved supplier does not furnish a uniform product, or if the product from such source proves unacceptable at any time, the Contractor shall, at their own expense, take any and all steps necessary to furnish approved materials.

The Contractor shall submit to the Department for approval a notarized Certificate of Compliance (COC) from the Manufacturer or Supplier for each kind of manufactured or fabricated material furnished.

The COC shall certify compliance with the specifications and shall contain the following information:

1. Contract Number, City or Town, Name of Road and Federal Aid Number;
2. Name of the Contractor to which the material is supplied;
3. Kind of material supplied;
4. Quantity of material represented by the certificate;
5. Means of definitively identifying the consignment, such as invoice number, lot number, bill of lading number, label, marking, etc.;
6. Date and method of shipment;
7. Statement indicating that the material has been tested and found in conformity with the pertinent parts of the Contract;
8. Statement indicating that the material meets the requirements of Buy America and BABA, where applicable;
9. Results of all required tests including the chemical analysis in the case of metal: or in lieu of furnishing the results a statement that results of all required tests pertinent to the certificate and not submitted shall be maintained available by the undersigned for a period of not less than three years from date of final acceptance or not less than three years from date of final payment (whichever period is the longest shall apply).
10. Signature of a person having legal authority to bind the supplier.

These COCs shall be delivered to the contract site at the same time that the materials are delivered and before such materials are incorporated into the work. The Contractor shall attach to the COC a document listing the contract bid item number(s), sub item(s), or lump sum breakdown item number(s), as applicable, under which the material will be compensated. Payment for the item in which the materials are incorporated may be withheld until these COCs are received in a form that meets the contract requirements.

SECTION 6.00 (Continued)

If the Contractor has new materials purchased for use on a previous Department Contract which have never been used and which comply with the specifications, these materials may be furnished and used. The Contractor shall submit their own sworn statement certifying that such materials were purchased for use on a previous Contract (naming and identifying such Contract) and shall attach the original COC.

Any cost involved in furnishing the certificate shall be borne by the Contractor.

SUBSECTION 6.03: Delivery and Storage of Materials

Replace this Subsection with the following:

Materials and equipment shall be progressively delivered to or removed from the site so that there will be neither delay in the progress of the work nor an accumulation of materials that are not to be used or removed within a reasonable time. All materials shall be stored in pre-approved locations per the conditions of the property owner.

Delivered materials and materials originating from the site, shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection.

Approved portions of the State Highway Layout (SHLO) may be used for storage of project materials and for the placing of the Contractor's plant and equipment upon obtaining a state highway access permit. All storage sites shall be restored to their original condition by the Contractor. No additional compensation shall be given for the design, construction, preparation, or restoration of the storage site(s) or obtaining the access permit which may include but is not limited to a Traffic Management Plan (TMP), utilities, and lighting.

The application for a permit shall contain a locus map identifying the proposed location, a description of the specific activities and uses of the staging area, a TMP in accordance with section 7.10 depicting minimum setbacks from the roadway and any existing structures for stored materials and equipment and how equipment will safely access and exit the staging area.

Any additional space required must be provided by the Contractor at their expense. Municipal, private, or other state-owned property shall not be used for storage purposes without written permission of the owner or lessee, and copies of such written permission shall be furnished to the Engineer.

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION FILE NUMBER SIGN

This project is subject to Massachusetts General Laws, Chapter 131, Section 40 as amended. Signs shall be in accordance with the latest MassDOT Construction Standards. All costs for the manufacture, erection, maintenance, moving, and removal of the signs shall be absorbed by the contractor with no additional compensation other than the contract unit prices.

For this project the Massachusetts Department of Environmental Protection File Number is 329-0237.

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. Quantities for soil disposal are based on the project design, existing knowledge of soil contamination in the project area, the presence of known risk factors for soil contamination in the project area, and the designer's best professional judgment.

NOTIFICATION OF FUNDING SOURCES FOR WORK TO BE PAID BY OTHERS

This contract has an agreement with the *Town of WEST BROOKFIELD*; whereas when the construction costs for the contract scope exceed the total participating contract bid price by more than ten percent (10%), the *Town* shall be responsible for the amount over 110% of the total participating contract bid price.

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.

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.

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.

HOLIDAY WORK RESTRICTIONS (Continued)

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.

NORTHERN LONG-EARED BAT PROTECTION

The U.S. Fish and Wildlife Service (USFWS) has listed the northern long-eared bat (NLEB) as threatened under the Endangered Species Act (ESA) and the following requirements exist to protect the bat and its habitat. 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 for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat revised February 5, 2018.

On July 21-24, 2022, Stantec, on behalf of MassDOT Highway Division Environmental Services, conducted a northern long-eared bat summer presence/absence survey using acoustic detection methods, in accordance with the 2022 survey guidelines. The survey did not detect northern long-eared bat, and as stated within the survey guidelines, the survey is valid for five years. Due to the 5-year validity of the negative presence/absence survey, it is recommended that the contractor conduct all activities that could result in stressors to the bats such as tree removal/trimming, bridge and/or structure removal/maintenance, lighting, or use of percussive, by July 21, 2027. If additional stressor producing work is proposed by the Contractor past this date, additional review is required by the MassDOT Highway Division's Environmental Services Section, and additional review and restrictions may be required by the USFWS.

Due to the negative survey results, the project is eligible for a May Affect, Not Likely to Adversely Affect (NLAA) determination, without Avoidance and Minimizations Measures (AMMs), in accordance with the FHWA, FRA and FTA Range-wide Programmatic Consultation for Indiana Bat and Northern Long-eared Bat. On behalf of FHWA, the lead federal agency for Section 7 consultation, MassDOT submitted a Programmatic Consultation for Transportation Projects affecting NLEB or Indiana Bat to the USFWS through the Information for Planning and Consultation (IPaC) webpage and generated a NLAA documentation letter (see Document A00870). Therefore, the project has completed Section 7 consultation through the Endangered Species Act, and no AMMs apply to the project.

The Contractor shall ensure all personnel working in on the project site are aware of all environmental commitments related to NLEB, including all applicable AMMs. NLEB Bat information (<https://www.fws.gov/midwest/endangered/mammals/nleb/>) shall be made available to all personnel.

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 0.7 million 18-kip (80-kn) ESALs.

NOTICE TO OWNERS OF UTILITIES

Written notice shall be given by the Contractor to all public service corporations or officials owning or having charge of publicly or privately owned utilities of his/her intention to commence operations affecting such utilities at least one week in advance of such operations. The Contractor shall, at the same time, file a copy of each notice with the Engineer.

The following are the names and addresses of the utilities presumed to be effected, but the completeness of the list is not guaranteed:

Telephone:

Verizon
385 Myles Standish Blvd.
Taunton, MA 02780
Attn: Karen Mealey
karen.m.mealey@verizon.com
774-409-3160

WRTA:

Joshua Rickman
WRTA Administrator
60 Forester St
Worcester, MA 01608
508-453-3400
jrickman@therta.com

Water:

West Brookfield Water Department
PO Box 9
West Brookfield, MA 01585
Attn: Wesley Cassavant
508-867-1421 EX 306

DPW:

West Brookfield Highway Department
PO Box 521
West Brookfield, MA 01585
Attn: James Daley
508-867-1417
Jdaley@wbrookfield.com

Electric:

National Grid Electric
548 Haydenville Road
Leeds, MA 01053
Attn: Sandra Annis
sandra.annis@nationalgrid.com
413-582-7424

WRTA:

Nick Burnham - WRTA
Manager of Transit Operations & Planning
60 Forester St
Worcester, MA 01608
508-453-3401
nburnham@therta.com

Other:

Axia KCST
30 Elmview Circle
Dover, NH 03820
Attn: Jason Wing
jason.wing@axia.com
403-538-4545

Cable:

Charter Communications
301 Barber Avenue
Worcester, MA 01606
Attn: Rick Molnar
774-243-9789
Rick.Molnar@charter.com

NOTICE TO OWNERS OF UTILITIES (Continued)

The following website lists the names and addresses of the utilities may be affected, but the completeness of the list is not guaranteed:

<https://www.mass.gov/info-details/utility-contacts-by-district-and-municipality>

Select District 2

Select WEST BROOKFIELD Town, and then locate the utility

The utility contact list is for guidance only and is not guaranteed to be complete or up to date.

COORDINATION WITH UTILITY COMPANIES

The contractor shall coordinate with the West Brookfield Fire District/ Water Commissioners with regard to any required water service connections within the limits of the work.

NATIONAL GRID EMERGENCY TELEPHONE NUMBERS

ELECTRIC:

Outage/ Emergency: 1-800-465-1212

New Service: 1-800-375-7405

Customer Support: 1-800-322-3223

GAS:

Emergency: 1-800-233-5325

New Service: 1- 877-696-4743

Customer Support: 1-800-732-3400

COORDINATION WITH TOWN TREE WARDEN

The Contractor shall coordinate tree related activities such as tree protection and tree removals with the Town of West Brookfield's Tree Warden, Jim Dimaio.

CONTROL OF WATER FOR HEADWALLS

The control of water for existing headwalls to be removed and proposed headwalls shall be the responsibility of the Contractor. Any and all costs associated with the control of water will be incidental to the headwall removal and construction.

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.

BUILD AMERICA BUY AMERICA PREFERENCE

On Federally-aid projects the Buy America (23.CFR § 635.410) and Build America, Buy America Act (Pub. L. No. 117-58, §§ 70901-52). 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 the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation; and

BUILD AMERICA BUY AMERICA PREFERENCE (Continued)

(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.

NOTE: The requirements for manufactured products indicated in paragraph (2) above are not in effect for this contract.

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.

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

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.

SUBSECTION 8.14 (Continued)**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 Contractor 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.

SUBSECTION 8.14 (/Continued)

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;

- 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.

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.

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.

SECTION 722 CONSTRUCTION SCHEDULING

DESCRIPTION

722.20 General

The Contractor's approach to prosecution of the Work shall be disclosed to the Department by submission of a Critical Path Method (CPM) schedule and a cost/resource loaded Construction Schedule when required in this Subsection. These requirements are in addition to, and not in limitation of, requirements imposed in other sections.

The requirements for scheduling submissions are established based on the Project Value at the time of the bid and are designated as Type A, B, C or D. The definitions of these Schedule Requirement Types are summarized below. Complete descriptions of all detailed requirements are established elsewhere in this specification.

Type A – for all Site-Specific Contracts with a Project Value over \$20 Million

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Resource-Loading
- Resources Graphic Reporting
- Cash Flow Projections from the CPM
- Cash Flow Charts
- Cost-loaded CPM
- Contractor-furnished CPM software, computer and training

Type B – for all Site-Specific Contracts with a Project Value between \$10 Million and \$20 Million

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Cost-loaded CPM
- Resource-Loading
- Monthly Projected Spending Report (PSR)
- Contractor-furnished CPM software, computer and training

SECTION 722 (Continued)

Type C – for all Site-Specific Contracts with a Project Value between \$3 Million and \$10 Million

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Monthly Projected Spending Report (PSR)
- Contractor-furnished CPM software, computer and training

Type D - for all contracts with a Project Value less than \$3 Million; various locations contracts of any dollar amount; contracts with durations less than one-hundred and eighty (180) Calendar Days; and other contracts as determined by the Engineer.

- Bar chart schedule updated monthly or at the request of the Engineer (See Section 722.62.B - Bar Charts.)
- Monthly Projected Spending Report (PSR) (See Section 722.62.F - Projected Spending Reports.)

MATERIALS, EQUIPMENT, PERSONNEL**722.40 General****A. Software Requirements** (Types A, B and C)

The Contractor shall use Primavera P6 computer scheduling software.

In addition to the requirements of Section 740 – Engineer’s Field Office and Equipment, the Contractor shall provide to the Department one (1) copy of the scheduling software, one (1) software license and one (1) computer capable of running the scheduling software for the duration of the Contract. This computer and software shall be installed in the Engineer’s Field Office within twenty-eight (28) Calendar Days after Notice to Proceed. The computer and software shall be maintained and serviced as recommended by the computer manufacturer and/or as required by the Engineer during the duration of the Contract at no additional cost to the Department. The Contractor shall provide professional training in the basic use of the software for up to eight (8) Department employees. The trainer shall be approved by the Engineer. This training shall be provided within twenty-eight (28) Calendar Days after Notice to Proceed.

B. Scheduler Requirements

For all schedule types, if the Contractor plans to use outside scheduling services, the scheduler shall be approved as a subcontractor by the Engineer.

For Type A, B and C Schedules the name of the Contractor’s Project Scheduler together with his/her qualifications shall be submitted to the Department for approval by the Engineer within seven (7) Calendar Days after NTP. The Project Scheduler shall have a minimum of five [5] years of project CPM scheduling experience, three [3] years of which shall be on projects of similar scope and value as the project for which the Project Scheduler is being proposed. References shall be provided from past projects that can attest to the capabilities of the Project Scheduler.

SECTION 722 (Continued)**CONSTRUCTION METHODS****722.60 General****A. Schedule Planning Session**

(Types A, B and C)

The Contractor shall conduct a schedule planning session within seven (7) Calendar Days after the Contractor receives the NTP and prior to submission of the Baseline Schedule. This session will be attended by the Department and its consultants. During this session, the Contractor shall present its planned approach to the project including, but not limited to:

1. the Work to be performed by the Contractor and its subcontractors;
2. the planned construction sequence and phasing; planned crew sizes;
3. summary of equipment types, sizes, and numbers to be used for each work activity;
4. all early work related to third party utilities;
5. identification of the most critical submittals and projected submission timelines;
6. estimated durations of major work activities;
7. the anticipated Critical Path of the project and a summary of the activities on that Critical Path;
8. a summary of the most difficult schedule challenges the Contractor is anticipating and how it plans to manage and control those challenges;
9. a summary of the anticipated quarterly cash flow over the life of the project.

This will be an interactive session and the Contractor shall answer all questions that the Department and its consultants may have. The Contractor shall provide a minimum of five (5) copies of a written summary of the information presented and discussed during the session to the Engineer. The Contractor's Baseline Schedule and accompanying Schedule Narrative shall incorporate the information discussed at this Schedule Planning Session.

B. Schedule Reviews by the Department (All Types)

1. Baseline Schedule Reviews

The Engineer will respond to the Baseline Schedule Submission within thirty (30) Calendar Days of receipt providing comments, questions and/or disposition that either accepts the schedule or requires revision and resubmittal. Baseline Schedules shall be resubmitted within fifteen (15) Calendar Days after receipt of the Engineer's comments.

2. Contract Progress Schedule / Monthly Update Reviews

The Engineer will respond to each submittal within twenty one (21) Calendar Days. Schedules shall be resubmitted by the Contractor within five (5) Calendar Days after receipt of the Engineer's comments.

Failure to submit schedules as and when required could result in the withholding of full or partial pay estimate payments by the Engineer.

SECTION 722 (Continued)**722.61 Schedule Content and Preparation Requirements**
(Types A, B and C unless otherwise noted)

Each Contract Progress Schedule shall fully conform to these requirements.

A. LOGIC

The schedules shall divide the Work into activities with appropriate logic ties to show:

1. conformance with the requirements of this Section and Division I, Subsection 8.02 - Schedule of Operations
2. the Contractor's overall approach to the planning, scheduling and execution of the Work
3. conformance with any additional sequences of Work required by the Contract Documents, including, but not limited to, Subsection 8.03 - Prosecution of Work and Subsection 8.06 – Limitations of Operations.

B. ACTIVITIES

The schedules shall clearly define the progression of the Work from NTP to Contractor Field Completion (CFC) by using separate activities for each of the following items:

1. NTP
2. Each component of the Work defined by specific activities
3. Detailed activities to satisfy permit requirements
4. Procurement of fabricated materials and equipment with long lead times, including time for review and approval of submittals required before purchasing
5. The preparation and submission of shop drawings, procedures and other required submittals, with a planned duration that is to be demonstrated to the Engineer as reasonable
6. The review and return of shop drawings, procedures and other required submittals, approved or with comments, the duration of which shall be thirty (30) Calendar Days, unless otherwise specified or as approved by the Engineer
7. Interfaces with adjacent work, utility companies, other public agencies, sensitive abutters, and/or any other third party work affecting the Contract
8. The Critical Path, clearly defined and organized
9. Float shall be clearly identified
10. Access Restraints – restrictions on access to areas of the Work that are defined by the Department in the bid package, in Subsection 8.06 – Limitations of Operations or elsewhere in the Contract
11. Milestones listed in Subsection 8.03 - Prosecution of Work or elsewhere in the Contract Documents
12. Subcontractor approvals at fifteen (15) Calendar Days from submittal to response
13. Full Beneficial Use (FBU) Contract Milestone per the requirements of Subsection 8.03 - Prosecution of Work
14. Contractor's request for validation of FBU (ready to open to traffic)
15. The Department's confirmation of completed work to allow for FBU

SECTION 722 (Continued)

16. Substantial Completion Contract Milestone per the requirements of Subsections 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes and 8.03 - Prosecution of Work
17. Contractor's request for validation of Substantial Completion
18. Punchlist Completion Period of at least thirty (30) Calendar Days per the requirements of Subsections 5.11 - Final Acceptance, 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes and 8.03 - Prosecution of Work
19. Contractor confirmation that all punchlist work and documentation has been completed
20. Physical Completion of the Work Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
21. Documentation Completion per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
22. Contractor Field Completion Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
23. Utility work to be performed in accordance with the Project Utility Coordination (PUC) Form as provided in Section 8.14 - Utilities Coordination, Documentation and Monitoring Responsibilities
24. Traffic work zone set-up and removal, night work and phasing
25. Early Utility Relocation (by others) that has been identified in the Contract
26. Right-of-Way (ROW) takings that have been identified in the Contract
27. Material Certifications
28. Work Breakdown Structure in accordance with the MassDOT-Highway Division Contractor Construction Schedule Toolkit located on the MassDOT-Highway Division website at:
<https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit>
29. For Type A and B Contracts only: All items to be paid, including all Unit Price and Lump Sum pay items, shall be identified by activity. This shall include all non-construction activities such as engineering work; purchase of permanent materials and equipment, purchase of structural steel stock, equipment procurement, equipment delivery to the site or storage location and the representative amount of overhead/indirect costs that was included in the Contractor's Bid Prices.

C. EARLY AND LATE DATES

Early Dates shall be based on proceeding with the Work or a designated part of the Work exactly on the date when the corresponding Contract Time commences. Late Dates shall be based on completing the Work or a designated part of the Work exactly on the corresponding Contract Time, even if the Contractor anticipates early completion.

SECTION 722 (Continued)**D. DURATIONS**

Activity durations shall be in Work Days. Planned Original Durations shall be established with consideration to resources and production rates that correspond to the Contractor's Bid Price. Within all of the Department-required schedules, the Contractor shall plan the Work using durations for all physical construction activities of no less than one (1) Work Day and no greater than fourteen (14) Work Days, unless approved by the Engineer as part of the Baseline Schedule Review.

Should there be an activity with a duration that is determined by the Engineer to be unreasonable, the Contractor will be asked to provide a basis of the duration using bid documents, historic production rates for similar work, or other form of validation that is acceptable to the Engineer. Should the Contractor and the Engineer be unable to agree on reasonable activity durations, the Engineer will, at a minimum, note the disagreement in the Baseline Schedule Review along with a duration the Engineer considers reasonable and the basis for that duration. A schedule that contains a substantial number of activities with durations that are deemed unreasonable by the Engineer will not be accepted.

E. MATERIALS ON HAND (for Types A and B only)

The Contractor shall identify in the Baseline Schedule all items of permanent materials (Materials On Hand) for which the Contractor intends to request payment prior to the incorporation of such items into the Work.

F. ACTIVITY DESCRIPTIONS

The Contractor shall use activity descriptions in all schedules that clearly describe the work to be performed using a combination of words, structure numbers, station numbers, bid item numbers, work breakdown structure (WBS) and/or elevations in a concise and compact label as specified in the MassDOT-Highway Division Contractor Construction Schedule Toolkit located on the MassDOT-Highway Division website at:

<https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit>

G. ACTIVITY IDENTIFICATION NUMBERS

The Contractor shall use the activity identification numbering system specified in the MassDOT-Highway Division Contractor Construction Schedule Toolkit located online at the address above.

H. ACTIVITY CODES

The Contractor shall use the activity codes specified in the MassDOT-Highway Division Contractor Construction Schedule Toolkit located online at the address above.

I. CALENDARS

Different calendars may be created and assigned to all activities or to individual activities. Calendars define the available hours of work in each Calendar Day, holidays and general or project-specific non-Work Days such as Fish Migration Periods, time of year (TOY) restrictions and/or area roadway restrictions.

SECTION 722 (Continued)

Examples of special calendars include, but are not limited to:

- Winter Shutdown Period, specific work is required by separate special provision to be performed during the winter. See Special Provision 8.03 (if applicable)
- Peak traffic hours on heavily traveled roadways. This shall be from 6:30 am to 9:30 am and from 3:30 pm to 7:00 pm, unless specified differently elsewhere in the Contract.
- Special requirements by sensitive abutters, railroads, utilities and/or other state agencies as defined in the Contract.
- Cape Cod and the Islands Summer Roadway Work Restrictions: A general restriction against highway and bridge construction is enforced between Memorial Day and Labor Day, unless otherwise directed by the Engineer. Refer to the Project Special Provisions for specific restrictions.
- Cape Ann Summer Roadway Work Restrictions: While there are no general restrictions for Cape Ann as there are for Cape Cod and the Islands, project-specific restrictions may be enforced. Refer to the Project Special Provisions for specific restrictions.
- Turtle and/or Fish Migration Periods and/or other in-water work restrictions: Refer to the Project Special Provisions for specific restrictions.
- Working over Waterways Restricted Periods: Refer to the Project Special Provisions for specific restrictions.
- Night-time paving and striping operations, traffic and temperature restrictions: Refer to the Project Special Provisions for specific restrictions.
- Utility Restrictions shall be as specified within the Contract.

J. FLOAT

For the calculation of float in the CPM schedule, the setting for *Retained Logic* is required for all schedule submissions, starting with the Baseline Schedule Submission. Should the Contractor have a reason to propose that an alternative calculation setting such as *Progress Override* be used, the Contractor shall obtain the Engineer's approval prior to modifying to this setting.

K. COST AND RESOURCE LOADING (Types A and B only)

For all Type A and B Schedules, the Contractor shall provide a cost and resource-loaded schedule with an accurate allocation of the costs and resources necessary to complete the Work. The costs and resources shall be assigned to all schedule activities in order to enable the Contractor to efficiently execute the Contract requirements and the Engineer to validate the original plan, monitor progress, provide cash flow projections and analyze delays.

1. Each schedule activity shall have an assigned cost that accurately represents the value of the Work. Each schedule activity shall have its resources assigned to it by craft and the anticipated hours to accomplish the work. Each schedule activity's equipment resources shall be assigned to it by equipment type and hours operated. Front-loading or other unbalancing of the cost distribution will not be permitted.
2. The sum of the cost of all schedule activities shall be equal to the Contractor's Bid Price.
3. Indicating the labor hours per individual, per day, by craft and equipment hours/day will be acceptable.

SECTION 722 (Continued)

4. The Engineer reserves the right to use the cost-loading as a means to resolve changes, disputes, time entitlement evaluations, increases or decreases in the scope of Work, unit price renegotiations and/or claims.
5. For all Type A and B Schedules, all subnets, fragnets, Proposal Schedules, and Recovery Schedules shall be cost and resource- loaded to help to quickly validate and monitor the duration of the Work to be performed.
6. For Type A Schedules, cost-loading of the schedule will also be used for cash flow projection purposes.
7. The cost-loading of each activity shall indicate the portion of the cost for that activity that is applicable to a specific bid item (cost account.) The total cost for each cost account must equal the bid item price.
8. For Type A Schedules, each month, the Contractor will be paid using the Cost-loaded CPM activities for Lump Sum payment items. This requirement supersedes any requirements elsewhere in this Contract regarding partial payments of schedule-of-values for all Lump Sum items.

L. NOT TO BE USED IN THE CONTRACTOR'S CPM SCHEDULE

1. Milestones or constraint dates not specified in the Contract
2. Scheduled work not required for the accomplishment of a Contract Milestone
3. Use of activity durations, logic ties and/or sequences deemed unreasonable by the Engineer
4. Delayed starts of follow-on trades
5. Float suppression techniques

722.62 Submittal Requirements

All schedules shall be prepared and submitted in accordance with the requirements listed below.

Each monthly Contract Progress Schedule submittal shall be uniquely identified.

Except as stated elsewhere in this subsection, schedule submittals shall include each of the documents listed below, prepared in two formats, for distribution as follows:

- a. four (4) compact discs (CD); one (1) each for the Office of Project Controls and Performance Oversight (O-PC&PO), the Boston Construction Section Office, the District Construction Office and the Resident Engineer's Office. Additional copies shall be required if the work is performed in more than one district.
- b. two (2) hard copies plotted in color on 24" X 36" paper; one (1) copy each for the District Construction Office and the Resident Engineer's Office. No copies for the O-PC&PO and the Boston Construction Section Office. Additional copies shall be required if the work is performed in more than one district.

SECTION 722 (Continued)**A. Narratives**

A written narrative shall be submitted with every schedule submittal. The narrative shall:

1. itemize and describe the flow of work for all activities on the Critical Path in a format that includes any changes made to the schedule since the previous Contract Progress Schedule / Monthly Update or the Baseline Schedule, whichever is most recent;
2. provide a description of any specification requirements that are not being followed. Identify those that are improvements and those that are not considered to be meeting the requirements;
3. provide all references to any Notice of Delay that has been issued, within the time period of the Contract Progress Schedule Update, by letter to the Engineer. Note that any Notice of Delay that is not issued by letter will not be recognized by the Engineer. See Subsection 722.64.A - Notice of Delay;
4. provide a description of each third-party utility's planned vs. actual progress and note any that are trending late or are late per the durations and commitments as provided in the PUC Form; provide a description of the five (5) most important responses needed from the Department and the need date for the responses in order to maintain the current Schedule of Record;
5. provide a description of all critical issues that are not within the control of the Contractor or the Department (third party) and any impact they had or may have on the Critical Path;
6. provide a description of any possible considerations to improve the probability of completing the project early or on-time;
7. compare Early and Late Dates for activities on the Critical Path and describe reasons for changes in the top three (3) most critical paths ;
8. describe the Contractor's plan, approach, methodologies and resources to be employed for completing the various operations and elements of the Work for the top three (3) most critical paths. For update schedules, describe and propose changes to those plans and verify that a Proposal Schedule is not required;
9. describe, in general, the need for shifts that are not 5 days/week, 8 hours/day, the holidays that are inserted into each calendar and a tabulation of each calendar that has been used in the schedule;
10. describe any out-of-sequence logic and provide an explanation of why each out-of-sequence activity does not require a correction, if one has not been provided, and an adequate demonstration that these changes represent the basis of how these activities will be built, including considerations for resources, dependencies and previously-approved production rates;
11. identify any possible duration increases resulting from actual or anticipated unit price item quantity overruns as compared to the baseline duration, with a corresponding suggestion to mitigate any possible delays to the Critical Path. If the delay is anticipated to impact the Critical Path, refer to Subsections 4.06 - Increased or Decreased Contract Quantities and 8.10 - Determination and Extension of Contract Time for Completion and submit a letter to the Engineer notifying of a potential delay;
12. include a schedule log consisting of the name of the schedule, the data date and the date submitted.

SECTION 722 (Continued)**B. Bar Charts (Types A, B, C and D)**

One (1) time-scaled bar chart containing all activities shall be prepared and submitted using a scale that yields readable plots and that meets the requirements of Subsection 722.61 - Schedule Content and Preparation Requirements. Activities shall be linked by logic ties and shown on their Early Dates. Critical Paths shall be highlighted and Total Float shall be shown for all activities.

A second time-scaled bar chart shall also be prepared containing only the Critical Path or, if the Critical Path is not the longest path, the Longest Path using a scale that yields readable plots and that meets the requirements of Subsection 722.61 - Schedule Content and Preparation Requirements. Activities shall be linked by logic ties and shown on their Early Dates. Total Float shall be shown for all activities.

Bar Charts shall be printed in color and submitted on 11" X 17" paper or, if approved by the Engineer, as a .pdf file.

C. Detailed Activity Schedule Comparisons

A Detailed Activity Schedule Comparison (DASC) is a simple reporting tool in the format of a graphical report that will provide Resident Engineers with immediate, timely and up-to-date information. The DASC consists of an updated bar chart that overlays the current time period's bar chart onto the previous time period's bar chart for an easily-read comparison of progress during the present and previous reporting periods. The DASC shall be prepared and submitted in accordance with the instructions contained in the Construction Schedule Toolkit located on the MassDOT-Highway Division website at:

<https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit>

The reports described in Subsections D, E and F below shall be submitted with all of the schedules listed in Subsection 722.20 - General:

D. Activity Cost Report and Monthly Cash Flow Projections (Type A only)

With each Contractor Quantity Estimate (CQE), the Contractor shall submit an Activity Cost Report and Cash Flow Projection that includes all activities grouped by Contract Bid Item.

The Activity Cost Report shall be generated from the Schedule of Record and shall be the basis of the Monthly Cash Flow Projection. Within each contract Bid Item, activities shall be sequenced by ascending activity identification number and shall show:

1. activity ID and description,
2. forecast start and finish dates for each activity and,
3. when submitted as a revised schedule, actual start and finish dates for each completed activity.

For Unit Price pay items, in addition to the above, estimates to complete and any variance to the estimated Contract quantity shall be shown.

E. Resource Graphs (Type A only)

Monthly and cumulative resource graphs for the remaining Contract period using the Early Dates and Late Dates in the Contract Progress Schedule shall be included as part of each schedule submittal.

SECTION 722 (Continued)**F. Projected Spending Reports (Types B, C and D)**

A Projected Spending Report (PSR) shall be prepared and submitted in accordance with the instructions listed at the end of this section. The PSR shall indicate the monthly spending (cash flow) projection for each month from NTP to Contractor Field Completion (CFC). Each month's actual spending shall be calculated using all CQEs paid during that month. If the difference between the Contractor's monthly projections vs. the actual spending is greater than 10%, the Contractor's monthly spending projection shall be revised and resubmitted within fifteen (15) Calendar Days.

The Projected Spending Report (PSR) shall be depicted in a tabular format and printed in color on 11 x 17-sized paper or larger as approved by the Engineer. For additional instructions and a template for preparing the Projected Spending Report (PSR), refer to the Contractor's Construction Schedule Toolkit located on the MassDOT-Highway Division website at:

<https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit> or consult with the District Construction Scheduler.

722.63. Progress Schedule Requirements**A. Baseline Schedule**

The Baseline Schedule shall be due thirty (30) Calendar Days after Notice to Proceed (NTP.) The Baseline Schedule shall only reflect the Work awarded to the Contractor and shall not include any additional work involving Extra Work Orders or any other type of alleged delay. The Baseline Schedule shall be prepared and submitted in accordance with Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements. Once the Baseline Schedule has been accepted by the Engineer, with or without comments, it shall represent the as-planned schedule for the Work and become the Contract Progress Schedule of Record until such time as the schedule is updated or revised under Subsections 722.63.C - Contract Progress Schedules / Monthly Updates, 722.64.C - Recovery Schedules and 722.64.D - Proposal Schedules.

The Cost and Resource-Loading information (Types A and B only) shall be provided by the Contractor within forty-five (45) Calendar Days after NTP.

The Engineer's review comments on the Baseline Schedule and the Contractor's responses to them will be maintained for the duration of the Contract and will be used by the Engineer to monitor the Contractor's work progress by comparing it to the Contract Progress Schedule / Monthly Update.

B. Interim Progress-Only Schedule Submissions

The first monthly update of the Contract Progress Schedule/Monthly Update is due within seventy (70) Calendar Days after Notice to Proceed (NTP.) The Baseline Schedule review period ends at sixty (60) Calendar Days after NTP, see Subsection 722.60.B - Schedule Reviews by the Department. If the Baseline Schedule has not been accepted within sixty (60) Calendar Days after NTP, an Interim Progress-Only Schedule shall be due within seventy (70) Calendar Days after NTP. The purpose of the Interim Progress-Only Schedule is to document the actual progress of all activities, including non-construction activities, from NTP until the Baseline Schedule is accepted.

SECTION 722 (Continued)**C. Contract Progress Schedules / Monthly Updates** (Types A, B, C and D)

The first Contract Progress Schedule shall be submitted by the Contractor no later than seventy (70) Calendar Days after NTP. The data date for this first Progress Schedule shall be sixty (60) Calendar Days after NTP. Subsequent Progress Schedules shall be submitted monthly.

Each Contract Progress Schedule shall reflect progress up to the data date. Updated progress shall be limited to as-built sequencing and as-built dates for completed and in-progress activities. As-built data shall include actual start dates, remaining Work Days and actual finish dates for each activity, but shall not change any activity descriptions, the Original Durations, or the Original Resources (as planned at the time of bid), without the acceptance of the Engineer. If any activities have been completed out-of-sequence, the Contractor shall propose new logic ties for affected in-progress and future activities that accurately reflect the previously-approved sequencing. Alternatively, the Contractor may submit to the Engineer for approval an explanation of why an out-of-sequence activity does not require a correction and an adequate demonstration that the changes accurately represent how the activities will be built, including considerations for resources, dependencies and previously approved production rates. Once approved by the Engineer, the Contractor may incorporate the changes in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.

No revisions to logic ties; sequence, description or duration of future activities; or planned resource costs shall be made without prior approval by the Engineer.

Any proposed logic changes for in-progress or future activities shall be submitted to the Engineer for approval before being incorporated into a Contract Progress Schedule. The logic changes must be submitted using a Proposal Schedule or a schedule fragment submission. Once approved by the Engineer, the Contractor may incorporate the logic in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.

For any proposed changes to the original sequence, description or duration of future activities, the Contractor shall submit to the Engineer for approval an explanation of how the proposed description or duration change reflects how the activity will be progressed, including considerations for resources and previously approved production rates. Any description or duration change that does not accurately reflect how the activity will be progressed will not be approved by the Engineer. Once approved by the Engineer, the Contractor may incorporate the changes in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.

Except as otherwise designated by a Contract Modification, no Contract Progress Schedule that extends performance beyond the Contract Time and/or beyond any Contract Milestone shall be approved by the Engineer. The Contractor shall submit a Recovery Schedule if any Contract Progress Schedule/Monthly Update indicates a failure to meet the Contract Dates.

D. Short-Term Construction Schedule

The Contractor shall provide a Short-Term Construction Schedule that details daily work activities, including any multiple shift work that the Contractor intends to conduct, in a bar chart format. The daily activities shall directly correspond to the Contract Progress Schedule activities, with a matching reference to the activity identification number in the Contract Progress Schedule, and may be at a greater level of detail.

SECTION 722 (Continued)

The Short-Term Construction Schedule shall be submitted every two weeks. It shall display all work for a thirty-five (35) Calendar Day period consisting of completed work for the two (2) week period prior and all planned work for the following three (3) week period. The initial submission shall be provided no later than thirty (30) Calendar Days after NTP or as required by the Engineer.

The Contractor shall be prepared to discuss the Short-Term Construction Schedule, in detail, with the Engineer in order to coordinate field inspection staff requirements, the schedule of work affecting abutters and any corresponding work with affected utilities. Short-Term Construction Schedules shall be prepared and submitted in accordance with Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements.

Failure to submit Short-Term Construction Schedules every two (2) weeks may result in withholding of full or partial payments by the Engineer.

722.64 Impacted Schedule Requirements**A. Notice of Delay**

The Contractor shall notify the Engineer in writing, with copies to the District and State Construction Engineers, within three (3) Calendar Days of the start of any delays to the Critical Path that are caused by actions or inactions that were not within the control of the Contractor. Delay notifications that are not provided in a letter to the Engineer, such as a delay notification in the schedule narrative, will not be recognized as contractual notice in the determination of any Time Extension related to the impacts to the work associated with this specific alleged delay. Should such delay continue for more than one (1) week, the Contractor shall note it in the Schedule Narrative until the delay is no longer impacting the Critical Path for the completion of the Contract Milestones. The Engineer will evaluate the alleged delay and its impact and will respond to the Contractor within ten (10) Calendar Days after receipt of a notice of delay.

B. Time Entitlement Analysis

A Time Entitlement Analysis (TEA) shall consist of a descriptive narrative, prepared in accordance with Subsection 722.62.A - Narratives, and an as-built CPM schedule, which may be in the form of a schedule fragnet (that has been developed from the project's Contract Progress Schedule of Record, and illustrates the impact of a delay to the Critical Path, Contract Milestones and/or Contract Completion Date as required in Subsection 8.10 - Determination and Extension of Contract Time for Completion. TEAs shall also be used to determine the schedule impact of proposed Extra Work Orders (EWO) as also required in Subsection 8.10.

TEAs shall be prepared and submitted in accordance with the requirements of Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements and shall be based on the Contract Progress Schedule of Record applicable at the start of the delay or impact from an EWO. A TEA fragnet must start with a specific new activity describing the work contained in either a Notice of Delay previously submitted to the Department per Subsection 722.64.A - Notice of Delay or an EWO.

SECTION 722 (Continued)

TEAs shall be submitted:

1. as part of any Extra Work Order that may impact Contract Time,
2. with a request for a Time Extension,
3. within fourteen (14) Calendar Days after a request for a TEA by the Engineer for any other reason.

A TEA shall be submitted to the Engineer before any Time Extension is granted to the Contractor. Time Extensions will not be granted unless the TEA accurately reflects an evaluation of all past delays and the actual events that occurred that impacted the Critical Path. The TEA must also demonstrate a plan for the efficient completion of all of the remaining work through an optimized CPM Schedule. The analysis shall include all delays, including Contractor-caused delays, and shall be subdivided into timeframes and causes of delays.

TEAs shall incorporate any proposed activities, logic ties, resource considerations, and activity costs required to most efficiently demonstrate the schedule impacts in addition to detailing all impacts to existing activities, logic ties, the Critical Path, Contract Milestones and the Contract Completion Date. In addition, TEAs shall accurately reflect any changes made to activities, logic ties, restraints and activity costs, necessitated by an Extra Work Order or other schedule impact, for the completion of the remaining work. The Contractor shall provide TEAs that demonstrate that all delays have been mitigated to the fullest extent possible without requiring an Equitable Adjustment to the original bid basis.

All TEAs shall clearly indicate any overtime hours, additional shifts and the resource that are proposed to be incorporated in the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts. The Engineer shall have the right to require that overtime hours and/or additional shifts be used to minimize the duration of Time Extensions if it is determined to be in the best interest of the Department to do so.

When accepted, the changes included in a TEA shall be incorporated into the next Contract Progress Schedule per the requirements of Subsection 722.63.C - Contract Progress Schedules / Monthly Updates.

During the review of any TEA, all Contract Progress Schedules shall continue to be submitted as required.

The Engineer may request that the Contractor prepare a Proposal Schedule or a Recovery Schedule to further mitigate any delays that are shown in the accepted TEA/Contract Progress Schedule.

C. Recovery Schedules

The Contractor shall promptly report to the Engineer all schedule delays during the prosecution of the Work. Except as otherwise designated by a Contract Modification, no Contract Progress Schedule that extends performance beyond the Contract Time and/or beyond any Contract Milestone shall be approved by the Engineer. The Contractor shall submit a Recovery Schedule within fourteen (14) Calendar Days of a Contract Progress Schedule submission that shows failure to meet the Contract Dates. This requirement is critical to the Department's ability to make informed decisions regarding Contract Time and costs.

SECTION 722 (Continued)

During the prosecution of the Work, should the Contractor's progress on a critical operation clearly not meet anticipated production, without cause by fault of the Department, or should a critical activity or series of activities not be staffed in accordance with the Contractor's approved Baseline Schedule resource planning, the Contractor shall be obligated to recover such delay. Recovery Schedules shall be prepared and submitted in accordance with Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements within fourteen (14) Calendar Days of any of the cases listed above.

Recovery Schedules shall clearly indicate any proposed overtime hours, additional shifts, and the resources that are proposed to be incorporated in to the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts and shall have the right to require that overtime hours and/or additional shifts be used to minimize the duration of Time Extensions, without additional compensation for any Contractor delays, if it is determined to be in the best interest of the Department to do so.

During the review of any Recovery Schedule, all Contract Progress Schedules shall continue to be required every month.

The Engineer may request that the Contractor prepare a Recovery Schedule to further mitigate any delays that are shown in an accepted TEA/Contract Progress Schedule.

Changes represented in accepted Recovery Schedules shall be incorporated into the next Contract Progress Schedule.

D. Proposal Schedules

A Proposal Schedule is an alternative schedule used to evaluate proposed changes to the Contract scope or significant alternatives to previously approved approaches to complete the Work, which may include changes to activity durations, logic and sequence. For Types A and B Schedules, the Proposal Schedule shall be cost and resource-loaded.

A Proposal Schedule may be requested by the Department at any time or may be offered by the Contractor. The Engineer may request that the Contractor prepare a Proposal Schedule to further mitigate any delays that are shown in an accepted TEA/Contract Progress Schedule.

The Contractor shall submit the Proposal Schedule within thirty (30) Calendar Days of a request from the Department.

The Proposal Schedule shall not be considered a Schedule of Record until the logic, durations, narrative and basis of the Proposal Schedule have been accepted by the Engineer. If the Proposal Schedule took the form of a fragnet, it must be incorporated into the Contract Progress Schedule of Record showing the current progress of all other activities and the impacts/results of the changes made by the Proposal Schedule before the Proposal Schedule is accepted by the Department.

Proposal Schedules shall clearly indicate any proposed overtime hours, additional shifts, and the resources that are proposed to be incorporated in the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts.

Changes represented in accepted Proposal Schedules shall be incorporated into the next Contract Progress Schedule. During the review of any Proposal Schedule, all Contract Progress Schedules shall continue to be required every month.

SECTION 722 (Continued)**E. Disputes (Types A, B, C and D)**

All schedules shall be submitted, reviewed, dispositioned and accepted in the timely manner specified herein so as to provide the greatest possible benefit to the execution of this Contract.

Any dispute concerning the acceptance of a schedule or any other question of fact arising under this subsection shall be determined by the Engineer. Pending resolution of any dispute, the last schedule accepted by the Engineer will remain the Contract Schedule of Record.

COMPENSATION**722.80 Method of Measurement and Basis of Payment** (Types A, B, C and D)

The Special Provisions will specify the fixed-price amount to be paid to the Contractor for the Project Schedule requirements contained herein. Each bidder shall include this lump-sum, fixed-price bid item amount in his/her bid. Failure to do so may be grounds for the rejection of the bid.

All required schedule-related work, including, but not limited to computers, computer software, the planning and coordination with utilities, training, schedule preparation and schedule submittals will be paid for under the fixed price amount.

This fixed price amount is for payment purposes only and is separate from what the Department considers to be the Contractor's General Condition costs. If the Contractor deems it necessary to include additional costs to provide all of the requirements of this section, these additional costs shall be included in the Contractor's overall bid price.

Twenty percent (20%) of this pay item will be paid upon the Engineer's acceptance of the Contractor's Baseline Schedule, prepared and submitted in accordance with Subsection 722.63.A.

The remaining eighty percent (80%) of this pay item will be paid in equal monthly installments distributed across the Contract Duration from Notice to Proceed (NTP) to Contractor Field Completion (CFC), less the 2 months required for the submittal and review of the Baseline Schedule in accordance with the following formula:

$$\text{Monthly Payment} = \frac{\text{Remaining Fixed Price amount (80\% of Item 100.)}}{\text{Contract Duration in whole months} - 2 \text{ months}}$$

The timely and accurate submission of the Baseline Schedule is critical to the Contract and the Department's ability to make informed decisions. Only payments under Item 740 - Engineer's Field Office and Item 748 - Mobilization will be made until the Baseline Schedule is accepted by the Engineer.

SECTION 722 (Continued)

No payment for any other pay item will be processed beyond seventy-five (75) Calendar Days from Notice to Proceed (NTP) until the Baseline Schedule is accepted by the Engineer. Until the Engineer's acceptance of the Baseline Schedule, the combined total of all payments made to the Contractor will be limited to an amount no greater than the total price for Item 748 - Mobilization or 3% of the contract price, whichever is less.

All Contract Progress Schedule Updates submitted later than ten (10) Calendar Days after the CQE (Contract Quantity Estimate) completion date, or greater than forty (40) Calendar Days from the Data Date of the previous submission, will be deemed to be no longer useful and will not qualify for payment. Late submittal of missed Contract Progress Monthly Updates will not result in recovery of the previously forfeited portion of the Schedule of Operations Fixed Price Payment Item.

Failure to submit schedules as and when required may result in the forfeiture of that portion of the Schedule of Operations Fixed Price Payment and/or the withholding of the full or partial CQE payments by the Engineer.

Failure to submit schedules that are acceptable to the Engineer may result in the forfeiture of that portion of the Schedule of Operations Fixed Price Payment and/or the withholding of the full or partial CQE payments by the Engineer.

The Schedule of Operations pay item will be adjusted to pay for only the actual quantity of schedules that have been submitted in accordance with this section.

The Contractor's failure or refusal to comply with the requirements of this Section shall be reasonable evidence that the Contractor is not prosecuting the Work with due diligence and may result in the withholding of full or partial payments by the Engineer.

Should there be a Time Extension granted to the Contractor, the Engineer may provide an Equitable Adjustment for additional Contract Progress Schedule Updates at intervals directed by the Engineer. Item 100. will be the basis for this Equitable Adjustment.

722.82 Payment Items

100. SCHEDULE OF OPERATIONS - FIXED PRICE \$ _____ LUMP SUM

ITEM 100.002**LABORER****HOUR**

Under this Item, the Contractor will furnish laborer(s) as directed by the Engineer and Landscape Architect to perform litter pickup as part of the Riverfront Mitigation.

Laborer shall be equipped with appropriate gloves and equipment required for safe litter pickup and disposal.

Work will be take place after construction and prior to the end of the project.

The Contractor shall provide to the Engineer a daily count of each landscape laborer including the name and function of each individual employed on the assignment.

All trash and litter picked up shall become property of the Contractor and disposed legally off site at no additional cost.

The Engineer shall be notified of any change in staffing or work hours immediately.

Extra attention shall be given to picking up litter adjacent to environmentally sensitive areas including wetland and channel areas.

Work shall be during daytime hours only.

Method of Measurement

Item 100.002 will be measured for payment by the hour of the laborer doing actual litter cleanup on the project, as required and verified by the Engineer.

Measurements will not include travel time to and from the Contractor's place of business and it shall not include time for setting up traffic controls.

Work is for litter from cars only and does not include clean up resulting from construction work or litter left by the contractor.

Basis of Payment

Item 100.002 will be paid for at the Contract unit price per Hour, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

Payment will be made on 0.5 hour increments.

ITEM 102.3 **HERBICIDE TREATMENT OF INVASIVE PLANTS** **HOOR**

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 measured and paid for under Item 102.33 Invasive Plant Management Strategy.

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. 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 IPMS 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@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, damages or fines received in the last three (3) years.
3. Company must provide proof of experience with invasive plant control and include following:
 - a. 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.
 - b. 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.
 - c. Photo documentation of these projects.
 - d. 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.

ITEM 102.3 (Continued)

SUBMITTALS

No work shall begin without approval of the submittals.

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 a completed and signed MassDOT Herbicide Use Report.

Photo Documentation

Digital photos with date and time of herbicide application work may be required and shall be submitted 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.

ITEM 102.3 (Continued)**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.

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.

ITEM 102.3 (Continued)

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.

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 crew time spent on the project doing actual herbicide application work. 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 time spent on the project doing actual work and shall not include travel time to and from the Contractor's place of business and shall also not include 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. The IPMS shall be submitted for review and approval and the IPMS shall be implemented on-site.

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, the IPMS Written Report, and if necessary 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 final walk through when a Final Report has been requested.

Invasive Plant Management Strategy (IPMS)

At least thirty (30) days prior to construction activities and/or any proposed treatment, submit a written IPMS proposal 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.

ITEM 102.3 (Continued)

The IPMS shall be completed in coordination with the Roadway Contractor and the Engineer and shall include the following as appropriate to the project:

- I. Project Information**
 - a. Company writing IPMS and performing 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.
- 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.

ITEM 102.3 (Continued)

Photo Documentation

Digital photos with date and time verification shall be provided with the IPMS and with any follow-up monitoring or reporting.

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.

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.

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.

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 Sections 771 and shall be for furnishing and installing temporary tree trunk protection and for minor limb pruning or removal of lower tree limbs to prevent injury to the tree from construction equipment and activities.

Trunk armoring is for instances where construction activity (the use of heavy equipment) comes close enough to potentially damage the tree trunk or limbs. It is to be used where shown on the plans and as directed 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. Selected material shall be such that installation and removal will not damage the trunk.

Acceptable materials include 2x4 wood cladding with wire or metal strapping, or, for instances when duration of construction activities is less than three months, corrugated plastic pipe mounted with duct tape. Height of cladding shall be from base of tree (including root flare) to the bottom of the first branch, eight feet above the ground, or as required by the Engineer. Material and methods shall be approved by the Engineer.

Other materials or methods may be acceptable if approved by MassDOT Landscape Design or by an Arborist (if included in the contract).

METHODS OF WORK

Prior to construction activities, the Engineer, the Contractor, the Town Tree Warden, and the Arborist (if item is included in the contract), shall review trees noted on the plans to be protected. Final decision as to trees 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 replaced and maintained such that it is effective for as long as required and shall be removed immediately upon completion of work activities adjacent to trees.

Pruning of limbs shall conform to the techniques and standards of the most recent ANSI A300 standards.

ITEM 102.511 (Continued)**DAMAGES**

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 obtain an Arborist. The Arborist shall be approved by MassDOT.

If, based on the recommendations 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, and/or watering, the damage will be repaired as soon as possible within the appropriate season for such work and according to industry standards.

If the Engineer determines that damages are irreparable, the Contractor shall pay for the damages in the amount of \$500.00 per diameter inch at breast height (DBH) per tree.

Additionally, if the Engineer determines that the damages are such that the tree is sufficiently compromised as to pose a future safety hazard, the tree shall be removed. Tree removal will include clean up of all wood parts, 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.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.511 will be measured and paid at the contract unit price per each. 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.

In the event of tree damage, cost of Arborist services, of remediation measures, and/or tree removal will be borne by the Contractor.

Payment under this item will be scheduled throughout the length of contract:

- 40% of value shall be paid upon installation of trunk armoring and completion of pruning work, if required.
- 60% shall be paid at the end of construction operations that would 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.

In the event of irreparable damage due to lack of proper protective measures being take there will be no compensation in addition to the \$500.00 per diameter inch penalty.

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 consists of furnishing, installing, removing and resetting, maintaining fence in a vertical and effective position at all times, and final removal of temporary fence.

The purpose of the fence is to prevent damage to tree roots, tree trunks, soil, and all other vegetation within a delineated Tree and Plant Protection Zone (TPPZ) as shown on the plans, as directed by the Engineer, and as described herein.

Protection shall be for the duration of the construction activities unless otherwise directed.

MATERIALS

Temporary Fence shall be such that it provides a minimum 48-inch tall barrier that remains vertical and effective (not sagging) for the duration of period required. Fence shall be plastic orange safety fence (recommended where high visibility is necessary), wooden snow fencing, or other approved material.

Per the Engineer, additional posts, deeper post depths, and/or additional attachments will be used if the fabric or fence sags, leans or otherwise shows signs of failing to create a sufficient barrier to access.

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 TPPZ

Fencing shall be used for construction areas, staging areas, and stockpile areas as shown on the plans and as directed by the Engineer to establish the Tree and Plant Protection Zone (TPPZ).

Fence shall be located as close to the work zone limit and as far from the trunk 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. In these instances, the TPPZ limit shall be the Drip Line of each tree or as close as possible to the Drip Line, and as shown on the plans and details. The Drip Line is defined as the limit of tree canopy.

ITEM 102.521 (Continued)

The Contractor shall not engage in any construction activity within the TPPZ without the approval of the Engineer, including: operating, moving or storing equipment; storing supplies or materials; locating temporary facilities including trailers or portable toilets; and shall not permit employees to traverse the area to access adjacent areas of the project or use the area for lunch or any other work breaks.

METHOD OF WORK

Fence shall be installed prior to any construction work or staging activities and shall be installed and maintained in a vertical and effective position at all times.

Fence shall be repositioned where and as necessary for optimum effectiveness. Repositioning shall be incidental to this item. Fence 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 directed by the Engineer, fence, stakes, and other materials 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-inch depth of wood chips or approved matting for root protection, pruning of branches, and/or trunk protection. These protection measures will be paid under applicable items.

Landscaping work specified within the TPPZ shall be accomplished by hand tools. Where hand work is not feasible, with permission of the Engineer, work shall be conducted with the smallest mechanized equipment necessary.

TREE AND PLANT DAMAGES OR LOSS

If the TPPZ is intruded upon, at the discretion of the Engineer, the Contractor will be required to provide a more durable barrier (e.g., Jersey Barriers) to secure the area. Cost of furnishing and installing additional or more durable barrier shall be borne by the Contractor.

If the Contractor intrudes into a TPPZ without approval, soil will be considered compacted and tree root damage will be assumed. Action will be taken as specified below.

In the event that 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 obtain an Arborist. The Arborist shall be approved by MassDOT.

ITEM 102.521 (Continued)

In the event of spills, compaction or damage, 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 damages can be remedied by corrective measures, such as repairing trunk or limb injury, soil compaction remediation, pruning, and/or watering, the damage will be repaired as soon as possible within the appropriate season for such work and according to industry standards.

If the Engineer determines that damages are irreparable, the Contractor shall pay for the damages in the amount of \$500.00 per diameter inch at breast height (DBH) per tree.

Additionally, if the Engineer determines that the damages are such that the tree is sufficiently compromised as to pose a future safety hazard, the tree shall be removed. Tree removal will include cleanup of all wood parts, 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.

Shrubs will be replaced with a plant of similar species and equal size or the largest size plants reasonably available. The Engineer will approve the size and quality of the replacement plant. Replacement will include a minimum of one year of watering and care.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.521 will be measured and paid for payment by the foot of Tree and Plant Protection Fence, complete in place. This includes all labor, materials, equipment, maintenance, final removal and disposal of the protective materials, damages repair, and all incidental cost required to complete the work.

Payment of 40 percent of value will be made upon installation of Fence. The remaining 60 percent will be made when protection materials have been removed and disposed off-site.

No separate payment will be made for costs of remedial actions, including addition of more durable barriers, or arborist services, but all costs in connection therewith shall be included in the Contract unit price bid.

In the event of irreparable damage due to lack of proper protective measures being take there will be no compensation in addition to the \$500.00 per diameter inch penalty.

ITEM 102.523 **TREE AND PLANT PROTECTION - VISIBILITY STAKES** **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 consists of furnishing, installing, removing, replacing, and resetting visibility stakes, and final removal of stakes.

The purpose of the visibility stakes is to delineate a Tree and Plant Protection Zone (TPPZ) to prevent damage to tree roots, tree trunks, soil, and all other vegetation as shown on the plans, as directed by the Engineer, and as described herein.

Protection shall be maintained as effective delineation and remain for the duration of the construction activities unless otherwise directed.

MATERIALS

Stakes shall be wood stakes or metal U-Channel stakes or similar as approved by the Engineer. Stakes shall be a minimum of 48 inches tall and painted orange for visibility. Stakes shall be set at the distance necessary to remain effective, but no farther than 4 feet apart.

If required to establishment a more effective protected zone, the Contractor shall supply and install signage to notify workers of the intent.

ESTABLISHMENT OF TPPZ

Stakes shall be used to delineate and establish a Tree and Plant Protection Zone (TPPZ) for construction areas, staging areas, and stockpile areas as shown on the plans and as directed by the Engineer.

Line of stakes shall be located as close to the work zone limit and as far from the trunk as possible to maximize the area to be protected. Stakes 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. In these instances, the TPPZ limit shall be the Drip Line of each tree or as close as possible to the Drip Line, and as shown on the plans and details. The Drip Line is defined as the limit of tree canopy.

The Contractor shall not engage in any construction activity within the TPPZ without the approval of the Engineer, including: operating, moving or storing equipment; storing supplies or materials; locating temporary facilities including trailers or portable toilets; and shall not permit employees to traverse the area to access adjacent areas of the project or use the area for lunch or any other work breaks.

ITEM 102.523 (Continued)**METHOD OF WORK**

Stakes shall be installed prior to any construction work or staging activities and be maintained in a vertical and effective position. Stakes shall be repositioned or replaced where and as necessary for optimum effectiveness. Repositioning, replacement and adding additional stakes shall be incidental to this item. Delineation line shall not be moved without prior approval by the Engineer.

Stakes that are broken, no longer visible, or otherwise no longer function for the intended purpose shall be immediately replaced.

The TPPZ shall be protected 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 directed by the Engineer, stakes, and other materials shall be removed and disposed off-site by the Contractor.

REQUIRED WORK WITHIN THE TPPZ

If 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-inch depth of wood chips or approved matting for root protection, pruning of branches, and/or trunk protection. These protection measures will be paid under applicable items.

Landscaping work specified within the TPPZ shall be accomplished by hand tools. Where hand work is not feasible, with permission of the Engineer, work shall be conducted with the smallest mechanized equipment necessary.

TREE AND PLANT DAMAGES OR LOSS

If the TPPZ is intruded upon, at the discretion of the Engineer, the Contractor will be required to provide a more durable barrier (e.g., fencing or Jersey barriers) to secure the area. Cost of furnishing and installing additional or more durable barrier shall be borne by the Contractor.

If the Contractor intrudes into a TPPZ without approval, soil will be considered compacted and tree root damage will be assumed. Action will be taken as specified below.

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 obtain an Arborist. The Arborist shall be approved by MassDOT.

ITEM 102.523 (Continued)

In the event of spills, compaction or damage, 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 damages can be remedied by corrective measures, such as repairing trunk or limb injury, soil compaction remediation, pruning, and/or watering, the damage will be repaired as soon as possible within the appropriate season for such work and according to industry standards.

If the Engineer determines that damages are irreparable, the Contractor shall pay for the damages in the amount of \$500.00 per diameter inch at breast height (DBH) per tree.

Additionally, if the Engineer determines that the damages are such that the tree is sufficiently compromised as to pose a future safety hazard, the tree shall be removed. Tree removal will include cleanup of all wood parts, 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.

Shrubs will be replaced with a plant of similar species and equal size or the largest size plants reasonably available. The Engineer will approve the size and quality of the replacement plant. Replacement will include a minimum of one year of watering and care.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.523 will be measured and paid for payment by the foot complete in place. This includes all labor, materials, equipment, maintenance, final removal and disposal of the protective materials, damages repaired, and all incidental cost required to complete the work.

Payment of 40 percent of value will be made upon installation of stakes. The remaining 60 percent will be made when protection materials have been removed and disposed off-site and provided stakes were maintained to function as intended.

Signage and replacement stakes shall be incidental to the item. No separate payment will be made for costs of remedial actions, including addition of more durable barriers, or arborist services, but all costs in connection therewith shall be included in the Contract unit price bid.

In the event of irreparable damage due to lack of proper protective measures being take there will be no compensation in addition to the \$500.00 per diameter inch penalty.

ITEM 140.

BRIDGE EXCAVATION

CUBIC YARD

The work under this Item will conform to the relevant provisions of Subsection 140 of the Standard Specifications and the following:

CONSTRUCTION METHODS

The contractor will design, provide, install, maintain and remove any cofferdams, sheeting, shoring and bracing used to support the excavation or control water as required to construct the wall while maintaining traffic, and limit disturbance as shown on the drawings or as directed by the Engineer. Any structure installed within the deflection zone of the traffic barrier will be designed for vehicular impact in accordance with the current AASHTO LRFD Bridge Design Specifications

The contractor will submit shop drawings for all earth retaining systems in conformance with Subsection 5.02

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 140. will be measured and paid for as per Subsections 140.80 and 140.81.

All cofferdams, sheeting, shoring, bracing and excavation support, including design and working drawing preparation, required to construct the wall will not be measured for payment. All cofferdams, sheeting, shoring, bracing and excavation support required to construct the wall will be considered incidental to this item.

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.

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.

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, soils, sediments and/or groundwater may be contaminated. 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 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 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 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 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 Department before submittal to the DEP, except if an imminent hazard condition exists as defined in 309 CMR 4.03(4)(b).

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.

In order 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 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. 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 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.

<u>ITEM 181.11</u>	<u>DISPOSAL OF UNREGULATED SOIL</u>	<u>TON</u>
<u>ITEM 181.12</u>	<u>DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY</u>	<u>TON</u>
<u>ITEM 181.13</u>	<u>DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY</u>	<u>TON</u>
<u>ITEM 181.14</u>	<u>DISPOSAL OF HAZARDOUS WASTE</u>	<u>TON</u>

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 necessary 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 must 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 through 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 should 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 in order 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.

ITEMS 181.11 through 181.14 (Continued)

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 must 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 must 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 must 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 should be performed in accordance with Item 180.03 – LSP Services. Additional sampling and analysis may be necessary to meet the requirements of the disposal facility license. The cost of such additional sampling and analysis shall be included in the bid cost 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 through 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 must 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 in order 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 must 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.

ITEMS 181.11 through 181.14 (Continued)**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 necessary 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 damages 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, must 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 baseplan to record this information.

The Sampling Results will be presented in tabular format. Each sample will be identified by appropriate identification matching the sample identification shown on the Chain of Custody Record. The sample must also be identified by location (e.g. grid number or stockpile number). For each sample, the following information must be listed: the classification (unregulated, regulated, etc.), proposed disposal option for the stockpile or unit of material represented, and, all analytical results.

ITEMS 181.11 through 181.14 (Continued)

Each Characterization Report will 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.
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 should 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 will not begin until the format is acceptable to MassDOT.

ITEMS 181.11 through 181.14 (Continued)

All soils, sediments and demolition debris must 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 must 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 will be based on the station-offset of the location. The tracking table will 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 will 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 will also track disposal of the material as defined by disposal date, quantity and disposal facility. The table must provide a reference to any analytical data generated for the material.

Soil/Sediment:

Soil excavation will be identified based on the station-offset of the excavation location limits. The tracking table will 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 will 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 And Basis Of Payment

Disposal of contaminated soil shall 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.

ITEM 181.11 Measurement for Disposal of Unregulated Soil shall be under the Contract Unit Price by the weight, in tons, of contaminated materials removed from the site and transported to and disposed of at an approved location or licensed facility, and includes any and all costs for approvals, permits, fees and taxes, additional testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 181.12 Measurement for Disposal of Regulated Soil – In-State Facility shall be under the Contract Unit Price by the weight in tons of contaminated materials removed from the site and transported to and disposed of at an approved in-state facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEMS 181.11 through 181.14 (Continued)

ITEM 181.13 Measurement for Disposal of Regulated Soil - Out-of-State Facility shall be under the Contract Unit Price by the weight in tons of contaminated materials removed from the site and transported to and disposed of at an approved out-of-state facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 181.14 Measurement for Disposal of Hazardous Waste shall be under the Contract Unit Price by the weight in tons of hazardous waste removed from the site and transported to and disposed of at the licensed hazardous waste facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 223.1

**FRAME AND GRATE (OR COVER)
REMOVED AND STACKED**

EACH

The work under this item shall conform to the relevant provisions of Subsection 220 of the Standard Specifications and the following:

Frames and Grate (or Cover)(s) determined to be in good condition that are proposed to be removed and stacked, as required by the Engineer will be removed and stacked under Item 223.1. The work under this item shall include the removal and stacking of these frames and grates or covers as shown on the plans, or as required by the Engineer.

The Contractor shall coordinate with the West Brookfield Highway Department, 15 Front Street, West Brookfield, MA 01585, Attn: James Daley, 508-867-1417 on the frames and grates or covers within the Town and County layout, determined to be in a good condition, to be removed and stacked. No additional payment shall be made for transporting castings. Frame and Grate (or Cover)(s) deemed to be unsuitable for reuse shall become property of the Contractor and disposed in an acceptable manner.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 223.1, Frame and Grate (or Cover) Removed and Stacked, will be measured and paid for at the contract unit price per Each, which price shall include all labor, material, equipment and incidental costs required to remove and stockpile the existing castings within the project limits.

ITEM 402.13 **PAVEMENT MILLING MULCH FOR SHOULDERS** **FOOT**

Work to be done shall conform to the relevant provisions of Subsection 769 of the Standard Specifications and the following:

The work consists of earthworks to install pavement millings mulch for shoulders at the edge of pavement. The existing shoulder shall be prepared for pavement milling mulch as necessary and directed by the Engineer. The work shall consist of excavation and leveling shoulder area to be mulched. The excavation and leveling of shoulder shall be pushed back down slope on embankment and/or excavated and disposed of on-site level and compacted as directed by the Engineer. Milling mulch shall be graded and compacted to a width as shown on the plans and a depth of 4 inches level with the edge of the pavement, top of edging or curb or as directed by the Engineer.

No geotextile fabric under the pavement millings shall be installed.

Materials

Pavement milling mulch shall be smaller than the Standard 1-1/2 inch sieve.

The on-site recycling of pavement millings sourced from the project is encouraged. All pavement milling mulch for shoulders will be accepted based on visual inspection by the Engineer. Mulch material greater than 1 ½ inch shall be removed off-site by the Contractor.

Method of Measurement

Item 402.13 will be measured per FOOT in the longitudinal direction parallel to the edge of road, complete in place.

Basis of Payment

Item 402.13 will be paid per FOOT of material installed which price includes materials, excavation, grading and leveling and disposing on site, compacting and all incidental costs required to complete the work to the satisfaction of the Engineer.

ITEM 470.2

HOT MIX ASPHALT BERM, TYPE A - MODIFIED

FOOT

Work under this Item shall conform to the relevant provisions of Subsection 470 of the Standard Specifications and the following:

CONSTRUCTION

Hot Mix Asphalt Berm, Type A – Modified, shall be constructed by means of an approved extrusion machine in conformance with the dimensions and at the locations shown on the Plans and Document A00816.

Method of Measurement

Item 470.2 will be measured for payment by Foot, of hot mix asphalt berm complete in place.

Basis of Payment

Item 470.2 will be paid for at the contract unit price per Foot of material installed which price include all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 691.1

BALANCE STONE WALL REMOVED AND STACKED

FOOT

Work under this item shall conform to the relevant provisions of Subsection 690 of the Standard Specifications and the following:

Work to be done under this Item shall consist of removal and stacking of the existing balance stone wall along West Main Street as called for on the Construction Plans. All stones shall be removed and stacked in their entirety. The Contractor shall coordinate with the property owner to determine where the stones will be stacked.

Method of Measurement

Item 691.1 will be measured for payment by Foot, of balance stone wall removed and stacked.

Basis of Payment

Item 691.1 will be paid for at the contract unit price per Foot, which price include all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 697.1**SILT SACK****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 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. Devices shall be ACF Environmental (800)-448-3636; Reed & Graham, Inc. Geosynthetics (888)-381-0800; The BMP Store (800)-644-9223; or approved equal.

CONSTRUCTION

Silt sacks 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 silt sack 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 written literature and as directed by the Engineer.

Silt sacks shall remain in place until the placement of the pavement overlay or top course and the graded areas have become permanently stabilized by vegetative growth. All materials used for the filter fabric will become the property of the Contractor and shall be removed from the site.

The Contractor shall inspect the condition of silt sacks after each rainstorm and during major rain events. Silt sacks shall be cleaned periodically to remove and disposed of accumulated debris as required. Silt sacks, which become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Department.

When emptying the silt sack, 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 Contractors expense. The silt and sediment from the silt sack shall be legally disposed of offsite. Under no condition shall silt and sediment from the insert be deposited on site and used in construction.

All curb openings shall be blocked to prevent stormwater from bypassing the device.

All debris accumulated in silt sacks shall be handled and disposed of as specified in Section 227 of the Standard Specifications

ITEM 697.1 (Continued)

COMPENSATION

Silt sacks will be measured and paid at the Contract unit price per each, 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 bid. Replacement of failed devices or components shall be made at no additional compensation.

ITEM 698.3

GEOTEXTILE FABRIC FOR SEPARATION

SQUARE YARD

The work under this item shall conform to the relevant provisions of Section 600 of the Standard Specifications and the following:

The work shall consist of furnishing and installing geotextile fabric below and around the stone for pipe ends with basin and as shown on the plans.

MATERIALS

Geotextile Fabric for Separation shall be non-woven and shall conform to subsection M9.50.0 of the MassDOT Standard Specifications and AASHTO M288, with property requirements per Table 3. The fabric shall also be listed on the MassDOT Qualified Construction Materials List (QCML) for the approved application of separation.

CONSTRUCTION

Fabric shall be placed in intimate contact with the gravel borrow subbase. Seams shall be overlapped by at least two feet. If the Contractor elects to sew seams instead of overlap, colored thread must be used. The Contractor shall take care not to allow more than two weeks of exposure to direct sunlight. Fabric rolls shall not be dropped more than two feet.

METHOD OF MEASUREMENT

Item 698.3, Geotextile fabric for separation, will be measured for payment by the square yard, complete in place. No separate measurement shall be made for overlapping material.

BASIS OF PAYMENT

Item 698.3, Geotextile fabric for separation, will be paid for at the Contract unit price per square yard, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

No separate payment shall be made for overlapping material but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 698.31 **GEOTEXTILE FABRIC FOR TEMPORARY** **SQUARE YARD**
SOIL PROTECTION

The work under this item shall conform to the relevant provisions of Section 600 of the Standard Specifications and the following:

The work under this item shall include furnishing and placement of geotextile fabric for temporary soil protection as shown on the plans and/or as required by the Engineer.

Geotextile Fabric for Temporary Soil protection shall conform to the requirements of AASHTO M 288 and shall be listed on the Qualified Construction Material's List and be approved for Separation.

Six inches of crushed stone shall be placed over the fabric prior to placement of fill. Stone shall meet M2.01.1.

Following completion of construction work, fill, stone, and fabric shall be removed and properly disposed off-site or as required by the Engineer.

METHOD OF MEASUREMENT

Item 698.31 will be measured for payment by the square yard, of geotextile fabric for temporary soil protection.

BASIS OF PAYMENT

Item 698.31 will be paid for at the Contract unit price per square yard, which price shall include all labor, materials, equipment, fabric, crushed stone, and incidental costs required to provide complete in place installation, and removal and disposal of stone and fill.

Overlapped matting will not be measured for payment.

Crushed stone and removal of stone will be incidental to this item.

Schedule of Payment shall be as follows:

- 50% upon approval of installation
- 50% upon removal of fabric and stone as required by the Engineer.

ITEM 698.4 **GEOTEXTILE FABRIC FOR PERMANENT** **SQUARE YARD**
EROSION CONTROL

The work under this item shall conform to the relevant provisions of Section 600 of the Standard Specifications and the following:

The work shall consist of furnishing and placing geotextile fabric for the stone lined drainage swale as shown on the Construction Plans and Details, or as directed by the Engineer.

MATERIALS

The geotextile fabric shall conform to subsection M9.50.0 of the MassDOT Standard Specifications and the requirements of AASHTO M 288, Class 1, for fabric used for permanent erosion control and must be on the MassDOT QCML. Construction and installation shall be in accordance with AASHTO M 288 (including the Appendix) and the following.

CONSTRUCTION

Atmospheric exposure of the geotextile fabric to the elements following lay down shall be a maximum of 14 days.

For seams that are sewn in the field, the Contractor shall provide at least a six-foot length of sample sewn seam for the approval of the Engineer before the geotextile fabric is installed. The seams sewn for sampling shall be sewn using the same type of equipment and procedures as will be used for the production seams. If seams are sewn in both the machine and cross machine direction, samples of seams for both directions shall be provided. The seam assembly description shall be submitted by the Contractor along with the seam samples. This description shall include the seam type, stitch type, sewing thread, and stitch density. If the Contractor elects to sew seams instead of overlap, colored thread must be used.

Geotextile shall be placed in intimate contact with soils without wrinkles or folds and shall be anchored on a smooth graded surface approved by the Engineer. The geotextile shall be placed in such a manner that placement of the overlaying materials will not excessively stretch or tear it.

Adjacent geotextile sheets shall be joined by either sewing or overlapping. At roll ends, overlapped seams shall overlap a minimum of 12 inches, except when placed under water, where they shall overlap a minimum of 3 feet. Adjacent rolls shall overlap a minimum of 12 inches.

Care shall be taken during installation to prevent damage to the geotextile as a result of the installation process. Should the geotextile be damaged, a geotextile patch shall be placed over the damaged area extending a minimum of 3 feet beyond the limits of the damage.

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 state.

ITEM 698.4 (Continued)

Placement of stones shall take place so as to avoid stretching and subsequent tearing of the geotextile. Stones shall not be dropped from a height exceeding 3 feet. Any geotextile damaged during backfill placement shall be replaced as required by the Engineer, at the Contractor's expense.

METHOD OF MEASUREMENT

Item 698.4 will be measured for payment by Square Yard, installed at the locations shown on the plans, in accordance with these specifications, or as directed 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, applied per manufacturer's installation recommendations or the Engineer's direction shall be measured for payment.

BASIS OF PAYMENT

Item 698.4 will be paid for at the contract unit price per square yard of fabric, which price shall include full compensation for furnishing and installing geotextile fabric, all miscellaneous associated assembly material, and all labor, equipment, material, and incidentals costs required to complete the work as specified and as directed 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:

Two computer systems 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
- 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 (RADF) (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.

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 751.7**COMPOST BLANKET****CUBIC YARD**

The work under this Item shall conform to the relevant provisions of Subsection 751 and M1.06.0 Organic Soil Additives of the Standard Specifications and the following:

Work shall consist of furnishing and pneumatically applying compost as a thin mulch blanket (1/2-1 inch depth) over prepared soil to provide temporary soil stabilization and organic matter for plant growth.

SUBMITTALS AND MATERIALS

No materials shall be delivered until the required submittals have been approved by the Engineer. Delivered materials shall match the approved samples. Approval of test results does not constitute final acceptance.

Contractor shall submit to the Engineer samples and certified test results no sooner than 60 days prior to application of compost. Vender certification that material delivered meets the test results shall be submitted if requested.

Compost may be a blended product of compost and fine wood chips. No kiln-dried wood, construction debris or ground palette is allowed. Material shall meet the following criteria:

- Organic matter content shall be minimum 30 percent (dry weight basis)
- Moisture content shall be 30-60 percent (wet weight basis)
- Bulk Density <1000 lb/cy
- pH shall be 5.5-7.5
- Conductivity shall be a maximum of 4 mmhos
- Stability test shall produce a maximum of 8mg CO₂-C/gram of organic material per day
- Particle size shall not exceed ¾ inch
- Compost may be a blended product of compost and fine wood chips.

Compost testing shall be by a laboratory approved by the US Compost Council using the Testing Method for the Examination of Compost and Composting (TMECC) protocols.

The Engineer shall approve the Contractor's equipment for application.

CONSTRUCTION METHODS

Application of compost material shall not begin until the Engineer has approved the site and soil conditions. Soil preparation shall be as specified under the applicable item for soil placement or for seeding. The Contractor shall notify the Engineer when areas are ready for inspection and application of compost.

Compost blanket shall be pneumatically applied (blown on) to a depth of one half to one inch. Where shown on the plans or when directed by the Engineer depth may be increased to provide berms for sediment control or to otherwise prevent slope erosion.

ITEM 751.7 (Continued)

When compost blanket is proposed with seeding, seed shall be broadcast and shall occur in conjunction with compost blanket, as specified under the relevant item for seeding.

When compost blanket is proposed for areas with planting, compost (and seed if applicable) shall be applied after planting. If compost and seed occur prior to planting, areas shall be regraded and compost and seed reapplied to the satisfaction of the Engineer and at the Contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 751.7 will be measured and paid for at the Contract unit price per Cubic Yard which price shall include all labor, materials, equipment, and all incidental costs required to complete the work of pneumatically applying compost.

Surface preparation of substrate receiving compost blanket shall be compensated under the applicable item for placement of loam, sand, ordinary borrow, wetland soil, topsoil rehandled and spread, tilled existing soil, or other specified substrate.

Seeding will be compensated for under the appropriate seeding items.

ITEM 751.765 COMPOST AND SEED OVER MODIFIED ROCK CUBIC 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 rock 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 765.411 Seeding – Low Upland 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 (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 (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 AND BASIS OF PAYMENT

Compost and Seed for Modified Rock will be measured and 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.

Native Seed Mix shall 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 755.35**INLAND WETLAND REPLICATION AREA****LUMP SUM**

The work under this item shall conform to the relevant provisions of Sections 120, 770, 771 of the MassDOT Standard Specifications and the following:

Work under this item shall include furnishing material and the construction and maintenance of inland wetland replication area as shown on the drawings and as required by the Engineer. Inland Wetland Replication Area shall hereafter be referred to as Replication Area. All work shall be in coordination with an approved Wetland Specialist as specified under that item.

Wetland Restoration work shall be as specified and compensated under that item.

The Replication Area shall be constructed after the adjacent retaining wall is constructed unless otherwise approved by the Engineer, specified herein, or specified in permit conditions and approvals. Construction schedule shall be appropriate to planting and seeding season (see below). Changes to this schedule will require written approval from the Engineer.

DESCRIPTION OF WORK

Construction of the Replication Area shall be completed as shown on the drawings at the following location:

Station: \approx 58+00 Right

Area = 300 sf.

Replication Area shall be constructed to meet the requirements of all associated permits and certifications, including relevant performance standards of the Massachusetts Wetlands Protection Act (MGL C. 131, s40), Section 401 Water Quality Certification, and Section 404, - U.S. Army Corps of Engineers Permit.

The Contractor is responsible for protection and preservation of natural areas adjacent to the Replication Area both within and outside the project limits and for the duration of the Contract; including but not limited to damage to soils or vegetation due to erosion, sedimentation, compaction, trampling, vehicles, storage of materials, or other negligence shall be repaired to the satisfaction of the Engineer and at the Contractor's expense.

The Wetland Specialist overseeing the Wetland Replication construction work shall not be from the same company as that which is performing planting, seeding, or participating in any aspect of the Wetland Replication construction.

SUBMITTALS - DOCUMENTS

Request for Conditional Acceptance: As specified below, a letter requesting Conditional Acceptance of the work and the site conditions shall be submitted to the Engineer.

Request for Certificate of Compliance (Partial or Full): As specified below, shall be submitted to the Engineer for distribution to appropriate regulatory agencies.

ITEM 755.35 (Continued)

Request for Final Acceptance: As specified below, a letter requesting Final Acceptance of the work and the site conditions shall be submitted to the Engineer.

Monitoring Reports: Reports shall be submitted to the Engineer as specified below. Reports shall be compensated under Item 755.75 and 755.76.

SUBMITTALS - MATERIAL**Soil and Amendments**

No soil, compost, or other soil amendment imported to the work site shall contain seeds, roots, stems, or other viable parts of invasive plants or other noxious plants.

At least sixty (60) days prior to installation and prior to ordering, the Contractor shall submit for approval sources of soil, compost, and amendments. Submittal shall include the supplier and location of the source. Off-site sources shall be identified and available for inspection by the Wetland Specialist prior to transport of material to the site to verify that they are likely to be free of invasive plant species, including all viable plant parts.

Samples of tested and approved wetland soil and soil amendments for soil texture, organic carbon content or other routine soil analysis parameters (e.g., pH, Cation Exchange Capacity, Percent Base Saturation) and Soil Organic Matter Analysis will be required if requested by the Engineer. The grab samples shall be collected by the Contractor or Wetland Specialist from multiple representative locations in the wetland topsoil mix following the "UMass Soil and Plant Tissue Testing Laboratory Sampling and Collection Protocols" (or equivalent certification paperwork provided by the soil supplier). The lab analysis shall be provided to the Engineer along with written certification from the Contractor or Wetland Specialist that the wetland topsoil was collected per the referenced protocol and meets the desired specification. The analysis and written certification of same shall be provided to the Engineer prior to placing the wetland topsoil in the Replication Area.

Seed Mix

Certificate of Materials from the supplier shall be submitted 30 days prior to seeding and must be approved prior to ordering materials. Seed species listed on the certificate shall include ecotype region (i.e., *Asclepias incarnata*, PA Ecotype).

Seed tag from the bag of seed used shall be submitted to the Engineer at the time of seeding. Seed tag shall include ecotype region and species, guaranteed percentages of purity, weed content and germination of the seed, and the net weight. Seed tag shall match the Certificate of Materials, include the name of the supplier, and date material was sent.

Bill of lading or notarized Certificate of Compliance from the Supplier serving as proof of purchase shall be submitted if requested by the Engineer. Document shall include date of sale, quantity, lot number, and address of Supplier. This shall match the seed tag. Notary shall not work for either the contractor or seed supplier.

ITEM 755.35 (Continued)**Plant Certification**

Plant Certification shall be per the applicable requirements of Subsection 771, PLANTING TREES, SHRUBS AND GROUND COVER, of the Standard Specifications. The nursery source shall certify the provenance or origin of all plants.

Other Material: Submittals shall be per the respective item.

MATERIALS**Sediment Control Barrier and Erosion Prevention Measures**

Sediment control barriers shall be per Item 767.121 and 767.122.

Erosion prevention measures for disturbed areas adjacent to the Replication Area shall include but not necessarily be limited to compost blankets, coir log, jute mesh, seeding, and/or combinations thereof as approved by the Engineer.

Sediment controls and erosion prevention devices and measures shall be compensated under the respective items.

Wetland Soil

Soil appropriate for the Replication Area may be either hydric soil excavated from the impacted wetland, a manufactured mix of compost and on-site borrow, or a combination thereof, as approved by the Engineer.

Hydric soil from the impacted wetland area may be spread on the surface of the constructed Replication Area as an inoculant or can be placed in a bulk fashion in a roughly 1:1 ratio of area and depth. Soil shall be handled such that the original soil structure is preserved and shall not be compacted, screened, or otherwise processed.

Hydric soil from the impacted wetland that is infested with invasive plant species identified on the Massachusetts Invasive Plant Advisory Group (MIPAG) shall not be used in the Replication Area unless approved by the Wetland Specialist and Engineer. To the extent possible, infested soil shall be disposed of within the project limits in an upland area outside of regulated areas and as approved by the Invasive Plant Management Strategy item (if in the contract) or by the Engineer.

A manufactured mix suitable for wetlands shall consist of on-site borrow from the proposed Replication Area (if approved by the Wetland Specialist and Engineer) thoroughly mixed with compost to achieve a target organic carbon content of 10-12% (up to 21% percent organic matter) by dry weight. The organic material used for mixing shall be well or partially decomposed. Clean leaf compost is the preferred soil amendment to achieve these standards though other materials may be used if approved by the Wetland Specialist and Engineer. Note that "clean" refers both to a negligible amount (<1%) of physical contaminants such as plastic and to the lack of chemical contaminants that might pose a hazard to plants or animals. Off-site borrow may be used for mixing if approved in advance by the Engineer.

ITEM 755.35 (Continued)

No soil or soil amendment shall be brought on site without approval of the material source by the Wetland Specialist and the Engineer. Soils used in the replacement area shall be free of rocks greater than 4 inches in diameter.

Seed Mix**Mix #765.555 - Wetland Seed – Part Shade Mix (to be used for all wetland areas and as noted on the plans)**

	<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS By Weight</u>
Grass			
	Poa palustris	Fowl Bluegrass	25.00%
	Elymus riparius	Riverbank Wild Rye	19.00%
	Carex lurida	Shallow Sedge	17.00%
	Carex vulpinoidea	Fox Sedge	10.00%
	Cinna arundinacea	Sweet Woodreed	5.00%
	Sparganium eurycarpum	Giant Bur Reed Eco PA	4.00%
	Carex scoparia	Broom sedge	4.00%
	Carex lupulina	Hop Sedge	4.00%
	Scirpus polyphyllus	Many Leaved Bulrush	3.00%
	Juncus effusus	Soft Rush	2.50%
	Carex intumescens	Bladder Sedge	2.00%
	Sparganium americanum	Burrweed	2.00%
	Scirpus cyperinus	Woolgrass	1.00%
	Carex crinita	Fringed Sedge	1.00%
	Juncus tenuis	Path Rush	<u>0.50%</u>
			100.00%

Seeding Rate:

Species ecotype shall be as native to New England region as possible. Apply this mix at 20 lbs PLS/acre (1.0 lbs/2,175 ft²).

Fertilizers shall not be used.

Water

The Contractor shall provide water and all equipment required at no extra cost. Water shall be suitable for irrigation and free from ingredients harmful to plants and wildlife. Water from the adjacent water bodies or waterways shall not be utilized. It is the Contractor's responsibility to correct injury or damage due to the lack of water, too much water, or use of contaminated water.

ITEM 755.35 (Continued)**Mulch/Compost Blanket for Seeding**

Hydromulch shall be per the manufacturer's recommendations and shall be wood fiber or straw mulch only. Mulch shall be incidental to seeding.

Compost Blanket may be used in lieu of mulch for seeding. Compost Blanket shall meet the material and submittal requirements of that Item and shall be applied as specified below. Compost Blanket shall be compensated under that item.

CONSTRUCTION METHODS & SEQUENCE**SITE PROTECTION MEASURES****Minimizing Damage**

The Contractor shall plan and execute operations in a manner minimizing the amount of excavated and exposed fill or other foreign materials that could be washed or otherwise carried into Replication Area and nearby resource areas.

Construction of and access to the Replication Area shall minimize damage to existing vegetation and soils as specified herein. Damage to soils or vegetation shall be repaired to the satisfaction of the Engineer and at the Contractor's expense. If required for soil remediation, tilling and the addition of compost shall be at the Contractor's expense.

Wetland topsoil shall be deposited and graded in the Replication Area in a manner that minimizes travel and subsequent compaction of the subgrade (including any specified pit and mound topography) to the extent practicable, including use of track mounted excavators as appropriate. Should soils be compacted, they shall be loosened by a method such as disking, spring-tooth harrowing and/or rototilling. The Contractor shall use boards, timber or composite mats, or other approved materials as necessary, to protect existing and/or new wetlands from compaction due to heavy foot traffic or if equipment is required to travel over wetland soil. All labor and materials required for protection and preservation of site shall be incidental to this item.

Stockpiling of Soil

Stockpiling of soil, including hydric soil for replication, shall be at least 100 feet from the edge of the bordering and isolated vegetated wetlands and inland banks, unless approved otherwise by the Engineer. Stockpiled soils shall be securely stabilized and contained. Any areas of exposed soil or stockpiles within and adjacent to the Replication Area that will remain inactive for more than 7 calendar days shall be sown with a mix of rapid germinating annual grasses (e.g., annual rye) covered with a layer of straw mulch applied at a rate of 90 pounds per 1,000 square feet. As necessary, the mulch shall be anchored with a tacking coat (non-tar) applied by a hydro seeder or other method recommended by the Wetland Specialist in consultation with the Engineer. In the event that there is excess borrow, it shall be disposed of under Excavation, Item 120..

ITEM 755.35 (Continued)**Sediment Barriers**

Placement: Sediment barriers shall be installed along the downslope perimeter of the Replication Area beginning and ending in the surrounding upland so that no excavated material or disturbed soil can enter adjacent wetlands or waters. Where construction work is immediately upgradient of the wetland, barriers shall be located so as to protect the Replication Area until slopes are stabilized. Sediment barriers shall be in place and approved by the Engineer prior to excavation work. No work shall take place outside the barriers.

Maintenance: The Contractor shall ensure that all sediment barriers function as intended and at all times per the specifications of those respective items.

Existing Trees to Remain

Tree protection shall be per the relevant specifications and as shown on the plans or as required by the Engineer. To protect root systems of existing trees to remain, the limits of the Replication Area may be adjusted, but, the total area of replication required by the permits shall not be reduced. Access route may be adjusted as required.

Trees to be retained as snags (upright dead or dying trees left for wildlife habitat) within or adjacent to the Replication Area shall be as shown on the plans or as directed by the Wetland Specialist or Landscape Architect during the initial site walk. Trees to remain as snags shall be clearly marked prior to clearing. Trees that pose a potential fall hazard (i.e., are near a roadway) should have limbs and trunk cut such that the tree does not pose a fall hazard.

Coarse woody debris in the form of cut trees, stumps, logs, and brush shall be incorporated as shown on the plans or as directed by the Wetland Specialist or Landscape Architect. On site material shall be selected and marked by the Wetland Specialist, retained on the project site, and placed as specified below under Incorporation of Coarse Woody Debris.

All trees, stumps, or brush not specified to remain shall be removed and shall not be stockpiled in the wetland resource areas while awaiting disposal.

Work shall be coordinated with Clearing or Tree Removal Item and compensated under that Item.

PRE-WETLAND CONSTRUCTION SITE WALK

Delineating the Replication Area and Access Route. The Contractor shall stake out the Replication Area boundaries and the intended access route and set grade stakes for approval by the Wetland Specialist, MassDOT Landscape Architect, and Engineer. Following staking and demarcation of areas, the Engineer and Wetland Specialist shall approve or modify as necessary the limits of work, the access route, final location and configuration of replication, grade stake elevations, proposed location of sediment barriers, and review proposed construction methods.

As part of the delineation and approval process, the Wetland Specialist shall mark trees to be converted to snags, select coarse woody debris to be retained for re-use, and select rocks or other elements to be used for habitat features.

ITEM 755.35 (Continued)

Invasive Plants: As part of the initial site walk, the wetland to be impacted and the proposed replication site shall be inspected for the presence of invasive plants. If invasive plants are found they shall be addressed as described herein under Invasive Plants.

SOIL WORK

Final grades in the Replication Area shall meet the target elevations as shown on the Plans or as adjusted by the Wetland Specialist to achieve the desired hydrology and micro-habitat. If adjustments are required, a Request for Information (RFI) shall be submitted to the Engineer for approval. Adjustments shall be documented and included in the As-Built plans (if required) and/or other applicable required documents.

Excavation & Grading

When required by permits, the Wetland Specialist shall notify MADEP and the ACOE (as applicable) at least 72 hours prior to excavation.

Soil in the proposed wetland areas that must be removed for grades to conform to the proposed elevations shall be stripped and disposed of, or, if suitable for reuse, be stockpiled in an approved location. Stockpiled soils shall be kept wet and not allowed to dry out. Procedures for maintaining appropriate moisture levels shall be documented by the Wetland Specialist and provided to the Engineer and the Contractor.

Replication area shall be excavated as shown on the drawings. Where replication area is adjacent to existing reference wetland, finish grade of replication shall generally match existing grades and micro-topography, notwithstanding any deviations that are necessary to achieve the desired hydrology and habitat in the Replication Area.

Prior to placement of backfill, scarify subgrade to a depth of 4 to 6 inches.

Placement of Wetland Soil

Following excavation, scarification, and grading of sub-grade, and after the sub-grade elevations are approved by the Wetland Specialist, suitable soil previously removed or an evenly mixed organic/mineral soil created on-site shall be spread to the design depth and thickness over the proposed wetland areas as shown on the plans and as directed by the Wetland Specialist.

Vehicles used to transport soil from offsite shall be washed or cleaned with air pressure to prevent exotic or invasive seeds or root fragments from contaminating the Replication Area.

ITEM 755.35 (Continued)**Final Grading**

The finished grade of the Replication Area shall be at an elevation that will provide an unrestricted hydrologic connection between the Replication Area and adjacent resource areas. The hydrologic connection should be in keeping with restoring the intended function of the replacement wetland relative to the impacted reference wetland. The Contractor shall verify that this elevation is not at a level that could negatively alter the hydrology of an adjacent wetland. Microtopography in the form of hummocks, pits and mounds shall be as shown on the plans or as adjusted by the Wetland Specialist. Final elevations and grading of wetland soil shall be approved by the Wetland Specialist and the Engineer.

To avoid compaction once soil has been placed, no heavy equipment shall travel across placed soil and no work shall occur in wet or moist soil. Soil that is compacted due to construction activities shall be replaced with soil as specified herein and at the Contractor's expense.

RESTORING VEGETATION**Placement of Coarse Woody Material**

If specified within this Contract or if directed by the Wetland Specialist or Landscape Architect during the initial site walk, woody debris shall be placed in the Replication Area and/or adjacent upland buffer. Material shall be placed as shown on the plans or as directed following placement of wetland soil and prior to application of compost and/or seed. Woody material shall cover a minimum of 5-20 percent of the Replication Area, depending on whether it is a meadow or woodland wetland and how much wood is available from construction clearing. Where trees are cut for construction purposes, logs of a minimum length of 8 feet must comprise a minimum of 50% of the woody material left on site. Brush shall be included along with logs and stumps as directed. Woody material shall be placed in a deliberate and naturalistic manner.

Planting

Following placement of wetland soil and approval of final grade and conditions, Replication Area shall be planted. Planting shall conform to SECTION 771 PLANTING TREES, SHRUBS AND GROUNDCOVER of the Division I Standard Specifications and as amended below.

Planting Season shall be May 15-June 15 and September 1-November 1 unless otherwise specified in applicable permit conditions.

Prior to planting, the Wetland Specialist shall approve the condition of the plant material and the method of installation and shall oversee the planting work. Replication Area shall be planted in the dry. Plants shall be placed according to the planting details and within the range of target elevations and at the spacing shown on the Plans or, if spacing is not indicated on the Plans, at the direction of the Wetland Specialist. Unless otherwise noted on the Plans, final plant locations shall be determined on site and located with regard to expected hydrology, plant growth characteristics, habitat desired, and water protection.

ITEM 755.35 (Continued)

Plant material shall be installed as soon as possible after delivery. Plants stored on-site prior to installation shall be stored in the shade and watered twice daily up until time of installation. Plants showing signs of stress or compromised health may be rejected by the Engineer or Wetland Specialist and shall be replaced at the Contractor's expense.

Plant material shall be furnished and installed as indicated including all labor, materials, plants, equipment, incidentals, re-setting of plants (frost heaves, etc), irrigation, re-planting and clean up. If previously approved species are not available at the time of planting, the Wetland Specialist may propose substitutions relative to species, size, and quantities for review and approval by the MassDOT Landscape Architect. Upon approval by MassDOT, substitutions shall be approved by the regulating authority, if and as necessary. Provisions shall be made for a growth warranty of at least two (2) calendar years from the date of Conditional Acceptance as described below or as required by permits.

Seeding

Following placement of wetland soil and planting (if included), the Replication Area shall be seeded using one of the following methods:

- Broadcast by hand or with a hand-held spreader followed by application of straw mulch. If necessary, seed shall be lightly raked to insure good seed-to-soil contact.
- Hydro-seeded with hydro mulch per the Standard Specifications and per the manufacturer's directions.
- Hand broadcast seed with Compost Blanket pneumatically applied at the same time to ensure light cover of soil topdressing over seed.

If spring conditions are drier than usual, supplemental watering may be required. If sowing during the summer months, supplemental watering will likely be required until germination.

If required, seeding limits for different seed mixes shall be determined by the Wetland Specialist.

PLANT ESTABLISHMENT AND INVASIVE MANAGEMENT

Plants shall be watered as necessary to maintain healthy establishment. Plants that fail by September 1 after spring planting or by May 15 after fall planting shall be replaced within the immediate or next planting period and at the Contractor's expense.

Seeding that fails to establish according to the conditions of acceptance below shall be overseeded as required by the Engineer. Washouts and channels shall be repaired and stabilized prior to overseeding. Excessive weed growth shall be pulled out by the roots or, with approval from the Engineer, cut prior to over-seeding. Soil repair and weed control are incidental to this item.

Invasive Plants: Corrective measures shall be taken to remove or treat invasive plant species in the Replication Areas. Invasive plants shall include those listed as invasive by Massachusetts Invasive Plant Advisory Group (MIPAG) and the US Army Corp of Engineer's New England District's Compensatory Mitigation Guidance

ITEM 755.35 (Continued)

If chemical treatment of invasive plants is necessary, the strategy for treatment shall be as determined under Item 102.3 Invasive Plant Management Strategy. That strategy shall be coordinated with the Wetland Specialist and all applicable permits and permitting agencies. Chemical application under 102.33 Invasive Plant Management On-site shall be compensated under that item and shall be for the duration of the contract only.

CONDITIONAL ACCEPTANCE OF WORK

Conditional Acceptance shall indicate approval of the wetland construction work and agreement that work has been done according to plan or modified as approved.

Upon completion of construction, the Contractor shall submit a Request for Conditional Acceptance that includes a brief narrative from the Wetland Specialist demonstrating that the wetland replication construction work was done according to plans (or how modified) and meets required permit conditions. The narrative shall include, photo-documentation of pre-construction conditions as well as soil work, planting, and seeding. Seed tags shall be submitted as part of the Request for Conditional Acceptance.

Upon receipt of a Request for Conditional Acceptance, the Engineer, the Wetland Specialist, and regulatory representative (if required) shall assess the Replication Area and surrounding areas. At a minimum, the following conditions shall be included in the narrative and reviewed as part of the on-site assessment of whether:

- The final finished target elevations have been met and maintained relative to the approved plans and reference wetland. Areas that are too high or too low should be identified along with suggested corrective measures.
- Hydrology meets performance standards.
- Specified seed mix has been seeded. If inspected 30 or more days after seeding, seeded species in the wetland and adjacent upland shall show signs of good germination and healthy growth.
- Planted woody and herbaceous species meet specifications and are establishing well.
- Soils are stabilized and there is no sediment in the wetland and no channeling of slopes.
- There are no invasive plants visible in the replication area.

Upon approval that the work meets the above conditions, MassDOT will issue a letter of Conditional Acceptance. If the Wetland Replication work is not approved, MassDOT will issue a rejection letter requiring corrective actions. The Wetland Specialist shall recommend corrective actions. Work not approved shall be addressed by the Contractor at no extra cost.

Wetland Specialist shall be compensated under Item 755.75.

Erosion of adjacent slopes or the flow of sediments into the wetland between Conditional and Final Acceptance shall be immediately addressed by the Contractor.

ITEM 755.35 (Continued)**REQUEST FOR CERTIFICATE OF COMPLIANCE**

If required, a request for a Certificate of Compliance (Partial or Full) pursuant to the Massachusetts Wetlands Protection Act regulations shall be prepared and submitted to MassDOT within 30 days following Conditional Acceptance.

The Request for Certificate of Compliance shall include the following:

- A brief narrative of the work on company letterhead signed by the Wetland Specialist. Narrative shall be prepared as a MS Word document and shall include substantive explanation that demonstrates compliance with EACH relevant permit condition. Narrative shall note variations from the originally permitted design.
- As-built Drawings signed by the Contractor's PE registered in the Commonwealth of Massachusetts. As-built drawings shall show hydrologic conditions, status of plantings and seeding, and shall include a narrative and minimum of 4 photographs documenting site conditions. Plans should note variations from the originally permitted design.

When required, drawings shall meet the Army Corp of Engineer's New England District's Compensatory Replication Guidance, including: scale in the range of 1"=20' to 1" = 100', contours at 1' intervals, spot elevations for intermediate elevations, and polygons outlining each Replication Area, and, as applicable, plant community types. The As-built Drawings shall be provided to the Engineer electronically in Portable Document Format (PDF). If requested by the Engineer, the Drawings shall be provided in printed paper format (11" x 17" sheets, unless otherwise directed). Drawings must be scalable.

- Other documents as required.

FINAL ACCEPTANCE OF WORK

Following one full growing season, the Contractor shall submit a Request for Final Acceptance. Submittal shall include a brief narrative of conditions. Upon receiving the Request, the Engineer, Contractor, Wetland Specialist, West Brookfield Highway Department Superintendent and regulatory representative (if required) shall assess the Replication Area. Final Acceptance will initiate the start of the Wetland Monitoring Period.

The following conditions shall be inspected and approved for acceptance and payment.

- Hydrology is functioning as intended.
- The desired seeded species are establishing well and cover at least 95 percent of the Replication Area, excluding areas of open water areas or planned bare soil.
- No sediments have entered the wetland.
- Adjacent slopes are stabilized with desirable vegetation.
- All planted species (if included) are living and establishing well.
- There are no visible invasive plants.
- Silt fence and non-biodegradable sediment barrier materials have been removed.

ITEM 755.35 (Continued)

If the mitigation work does not meet the above condition and is not approved, MassDOT will issue a rejection letter requiring corrective action. The Wetland Specialist shall recommend corrective actions. Work not approved will be addressed by the Contractor at no extra cost.

Wetland Specialist shall be compensated under Item 755.75.

MONITORING REPORTS FOR REGULATORY COMPLIANCE

Post wetland construction Monitoring Reports shall be completed and submitted by the Wetland Specialist at the end of the second full growing season per the WPA to the Resident Engineer or West Brookfield Highway Department Superintendent for review and approval as specified and compensated under Item 755.76 Wetland Monitoring Reports.

Generally, the following conditions shall be met upon each inspection:

- Hydrology is functioning as intended.
- The desired seeded species are establishing well and cover 95 percent of the area, excluding areas of open water areas or planned bare soil.
- No sediments have entered into wetland.
- Adjacent slopes are stabilized with desirable vegetation.
- All planted species (if included) are living and establishing well.
- There are no visible invasive plants.

If, at the end of the required monitoring period, the requirements have not been met and success of the wetland replication area has not been achieved as determined by the Monitoring Reports, the Contractor shall provide corrective measures. All costs associated with corrective measures and plant replacement shall be incidental to this item with no additional compensation.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 755.35 will be paid for at the Contract unit price per Lump Sum, which price shall include all labor, materials, equipment, submittals, maintenance, all required soil, site preparation, grading, wetland seeding, planting, mulching, watering, as-built plans, Request for Certificate of Compliance, and all incidental costs necessary to complete the work as required.

Payment shall be as follows:

- 60% upon Conditional Acceptance.
- 20% after receipt and acceptance of Certificate of Compliance by the Engineer and once all permit construction requirements have been met and approved.
- 20% upon Final Acceptance.

Excavation will be paid under Item 120.

Sediment Control Barrier will be paid under Item 767.121

Sediment Barrier – Coir Log will be paid under Item 767.122

Wetland Specialist will be paid under Item 755.75

Wetland Monitoring Reports for follow-up monitoring will be paid under Item 755.76

ITEM 755.45**WETLAND RESTORATION****SQUARE YARD****DESCRIPTION**

The work under this item shall conform to the relevant provisions of Sections 120, 751, 765, 767, and 771 of the Standard Specifications and the following:

The work under this item shall include furnishing materials as required, surveying, soil protection fabric, tilling and/or amending impacted soil, seeding, and all other work required to protect and restore existing inland wetland areas that will be temporarily impacted as shown on the drawings, specified herein, and as required by the Engineer.

Inland Wetland Replication work shall be as specified and compensated under that item.

Restoration Area shall be constructed to meet the requirements of all associated permits and certifications, including relevant performance standards of the Massachusetts Wetlands Protection Act (MGL C. 131, s40), Section 401 Water Quality Certification, and Section 404, U.S. Army Corps of Engineers General Permit.

Completion of the Wetland Restoration Area shall be completed as shown on the drawings at the following location:

Station \approx 61+00 Left Area = 77 sf.

SUBMITTALS – DOCUMENTS

Request for Conditional Acceptance: As specified below, a letter requesting Conditional Acceptance of the work and the site conditions shall be submitted to the Engineer.

Request for Final Acceptance: As specified below, a letter requesting Final Acceptance of the work and the site conditions shall be submitted to the Engineer.

ASSOCIATED ITEMS AND MATERIALS

Geotextile Fabric for Temporary Soil Protection shall be as specified under that item.

Compost shall be in accordance with Subsection 751 and M1.06.0 Organic Soil Additives of the Standard Specifications. Compost shall not contain seeds, roots, stems, or other viable parts of invasive plants or other noxious plants. Off-site sources shall be identified and available for inspection prior to transport of material to the site to verify that they are likely to be free of invasive plant species, including all viable plant parts.

ITEM 755.45 (Continued)**Seed Mix**

Required submittals include:

- Certificate of Materials from the supplier shall be submitted and approved 30 days prior to ordering seed. Seed species listed on the certificate shall include ecotype region (i.e., *Asclepias incarnata*, PA Ecotype).
- Seed tag from the bag of seed used shall be submitted to the Engineer at the time of seeding. Seed tag shall include ecotype region and species, guaranteed percentages of purity, weed content and germination of the seed, and the net weight. Seed tag shall match the Certificate of Materials, include the name of the supplier, and date material was sent.
- Bill of lading or a notarized Certificate of Compliance from the Supplier serving as proof of purchase shall be submitted if requested by the Engineer. Document shall include date of sale, quantity, lot number, and address of Supplier. This shall match the seed tag. Notary shall not work for either the contractor or seed supplier.

Seed mix shall be:

Mix #765.555 - Wetland Seed – Part Shade Mix (to be used for all wetland areas and as noted on the plans)

<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS By Weight</u>
Grass		
Poa palustris	Fowl Bluegrass	25.00%
Elymus riparius	Riverbank Wild Rye	19.00%
Carex lurida	Shallow Sedge	17.00%
Carex vulpinoidea	Fox Sedge	10.00%
Cinna arundinacea	Sweet Woodreed	5.00%
Sparganium eurycarpum	Giant Bur Reed Eco PA	4.00%
Carex scoparia	Broom sedge	4.00%
Carex lupulina	Hop Sedge	4.00%
Scirpus polyphyllus	Many Leaved Bulrush	3.00%
Juncus effusus	Soft Rush	2.50%
Carex intumescens	Bladder Sedge	2.00%
Sparganium americanum	Burrweed	2.00%
Scirpus cyperinus	Woolgrass	1.00%
Carex crinita	Fringed Sedge	1.00%
Juncus tenuis	Path Rush	<u>0.50%</u>
		100.00%

ITEM 755.45 (Continued)**Seeding Rate:**

Species ecotype shall be as native to New England region as possible. Apply this mix at 20 lbs PLS/acre (1.0 lbs/2,175 ft²).

Upon completion of seeding, additional erosion control will be placed at the toe of the side slope to prevent sedimentation. At this point the erosion control should encompass the restoration area.

Fertilizers shall not be used.

Straw mulch or hydromulch shall be per Section M6 of the Standard Specifications.

Water

The Contractor shall provide water and all equipment required at no extra cost. Water shall be suitable for irrigation and free from ingredients harmful to plants and wildlife. Water from the adjacent water bodies or waterways shall not be utilized. It is the Contractor's responsibility to correct injury or damage due to the lack of water, too much water, or use of contaminated water.

CONSTRUCTION METHODS & SEQUENCE**Site Protection Prior to Impacts**

Where and as required vegetation shall be cut flush and area surveyed to establish pre-construction elevations.

Following the cutting and surveying, temporary separation fabric or timber matting shall be placed as required to protect soil and vegetation from compaction, contamination, and/or other damages. Fabric and timber mats shall be placed as specified under the respective items and the Engineer shall approval placement.

Restoration Upon Completion of Roadway Construction Work**Sediment Barriers**

If required for sediment control during Restoration work (i.e, tilling), sediment barriers shall be installed along the downslope perimeter of the Restoration Area beginning and ending in the surrounding upland so that no disturbed soil can enter adjacent wetlands or waters. Sediment barriers shall be in place and approved by the Engineer prior to any soil disturbance. No work shall take place outside the barriers.

Removal of Fill and Grading

Fill and temporary separation fabric or mats shall be removed and disposed of as specified under the respective items.

ITEM 755.45 (Continued)

If required, grades shall be restored to pre-construction elevations as shown in the baseline survey or as required by the Engineer to restore hydrologic functions. Final elevations shall be approved by the Engineer prior to soil preparation and seeding. Grading shall be incidental to this item.

Following approval of grading to elevations required, soil shall be prepared and seeded as follows.

Soil Scarification

Compacted soil shall be scarified with equipment approved by the Engineer. Upon approval of soil scarification, the area shall be seeded with mulch as specified below. Seeding shall immediately follow soil preparation.

Seeding with Mulch

Upon approval of prepared soil, area shall be seeded. Seeding shall be hand broadcast with straw mulch applied per the Standard Specifications and per the manufacturer's directions. Hydromulch shall be straw or wood fiber only and shall be per the manufacturer's recommendations.

CONDITIONAL ACCEPTANCE OF WORK

Conditional Acceptance shall indicate approval of the wetland restoration work and agreement that work has been done according to plan or modified as approved.

Upon receipt of a Request for Conditional Acceptance, the Engineer and regulatory representative (if required) shall assess the Restoration Area and the surrounding areas. At a minimum, the following conditions shall be included in the narrative and reviewed as part of the on-site assessment of whether:

- The target elevations have been restored per the survey or adjusted per the Engineer. Areas that are too high or too low should be identified along with suggested corrective measures.
- Soil compaction has been mitigated.
- Soils are stabilized and there is no sediment in the wetland and no channeling of slopes.
- Hydrology meets performance standards and has been adequately restored.
- Specified seed mix has been seeded and seeded species in the wetland and adjacent upland show signs of good germination and healthy growth.
- There are no invasive plants visible in the restored wetland area.
- Silt fence and non-biodegradable sediment barrier materials have been removed.

Upon approval that the work meets the above conditions, MassDOT will issue a letter of Conditional Acceptance. If the Wetland Restoration work is not approved, MassDOT will issue a rejection letter requiring corrective actions. Work not approved shall be addressed by the Contractor at no extra cost.

ITEM 755.45 (Continued)

Erosion of adjacent slopes or the flow of sediments into the wetland between Conditional and Final Acceptance shall be immediately addressed by the Contractor.

FINAL ACCEPTANCE OF WORK

Following one full growing season, the Contractor shall submit a Request for Final Acceptance. Upon receiving the Request, the Engineer and regulatory representative (if required) shall assess the Restoration Area.

The following conditions shall be inspected and approved for acceptance and payment:

- Hydrology is functioning as intended.
- The desired seeded species are establishing well and cover 100 percent of the restoration area, excluding areas of open water, large boulders or planned bare soil.
- No sediments have entered the wetland.
- Adjacent slopes are stabilized with desirable vegetation.
- There are no visible invasive plants.

If the restoration work is not approved, MassDOT will issue a rejection letter requiring corrective action. All costs associated with corrective measures and plant replacement shall be incidental to this item with no additional compensation. Work not approved shall be addressed by the Contractor at no extra cost.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 755.45 will be paid for at the Contract unit price per Square Yard, which price shall include all labor, materials, compost and amendments, seed, mulch, equipment, submittals, maintenance, grading, and incidental costs necessary to complete the work as required.

Payment shall be as follows:

- 50% upon completion of soil preparation and seeding
- 25% upon Conditional Acceptance
- 25% upon Final Acceptance or approval of the Engineer

Excavation of temporary fill will be paid under Item 120.

Geotextile Fabric for Temporary Soil Protection will be paid under Item 698.31

Sediment Control Barrier will be paid under Item 767.121

Compost Blanket will be paid under Item 751.7

ITEM 755.50 **LAND UNDER WATER & BANK RESTORATION** **LUMP SUM**

The work under this item shall conform to the relevant provisions of Section 700 of the Standard Specifications and the following:

The purpose of this item is to provide for the restoration of natural bank and streambed/Land Under Water material following headwall replacements and retaining wall construction associated with Route 9/West Main Street road improvements as shown on drawings.

DESCRIPTION

The work shall include all necessary excavation, shop drawings for restored streambed, furnishing of materials, and constructing the restored streambeds and banks as shown on the plans or Directed by the Engineer. The locations are as follows:

<u>Station / Offset</u>	<u>Land Under Water (s.f.)</u>	<u>Bank (l.f.)</u>
≈ 19+95 LT	50	20
≈ 32+80 LT	0	20
≈ 33+00 LT	183	10
≈ 41+50 LT	41	10
≈ 58+00 RT	85	20
Total	359	80

MATERIALS

The Contractor shall use the excavated material from the existing stream channels for restored channels as applicable. If the excavated material is determined to be unsuitable or if supplemental material is required, the Contractor will provide material that meets the gradation of the existing stream channel per the gradation analysis submitted.

Stones shall be native to the location or similar in appearance and to replicate stream function.

SUBMITTALS

Contractor shall provide a shop drawing detailing proposed relocated stream segments, including spot elevations and grading, illustrating profile and connection between the drainage structure and the undisturbed streambed and banks. The limits of the restored stream, including all necessary regrading and restoration, shall be within the limit of the easement as shown on the plans and section showing materials as proposed for construction. Drawings shall be submitted for approval by the Wetland Specialist and Engineer.

Provide photos of existing streambed and banks to Engineer to provide reference for construction of restored stream segments.

Submit a soil texture profile analysis of existing stream beds as applicable, showing texture analysis and gradients to a depth of two feet. Purpose of this analysis is to provide basis for additional streambed material in the event that existing streambed material is unsuitable or is not of sufficient quantity to construct the relocated segment.

ITEM 755.50 (Continued)**METHODS**

In order to ensure the bank and streambed restoration is constructed as designed, the Wetland Specialist shall provide on-site oversight and assistance during streambed and bank restoration.

At least 30 days prior to the commencement of construction, the Contractor or Resident Engineer shall coordinate with Tim Dexter (Fish & Wildlife Program Coordinator, 857-368-8794, timothy.dexter@state.ma.us) to set up a meeting with the Wetland Specialist, Contractor and Resident Engineer. At this meeting, the Contractor will provide an overview of the restoration work, and will discuss the anticipated means, methods, and schedule.

The Wetland Specialist will periodically be on site during construction to assist the Contractor and Resident Engineer on protection of the natural streambed material in accordance with the environmental permits.

Final location, configuration and depth of streambed may be altered as necessary for proper flow and function as required and directed by the Wetland Specialist, based on approved shop drawing.

The Contractor shall sample the stream substrate in the existing stream channels to be impacted to determine percent particle size and pattern as applicable. Stone for restored stream channels shall be based on that analysis and shall be per the proposed streambed gradation submitted to and approved by the Wetland Specialist and the Engineer.

The bottom of the relocated streambed segments shall be set 2 feet below the proposed stream bottom elevation, as applicable, and shall be filled with the stockpiled approved streambed substrate, in compacted lifts. Place material in lifts, watering down between lifts to ensure stable bed with no voids. The final result shall be a dense, well-graded mix with a percentage and type of fine material (rock, cobble, gravel, sand and silt) similar to the percentage and type in the reference stream channel subsurface.

Following completion of restoration of existing streambed(s), bank area shall be graded as necessary per the direction of the Wetland Specialist. Following grading banks and approval of grading, placement of compost topsoil and seeding will occur.

CONSTRUCTION

The restoration of streambed/bank under this item shall not begin until the Engineer approves the planned construction methodology. The Contractor shall submit to the Engineer for approval prior to the start of operations, his/her restoration plan and method.

Once all material has been placed in the stream channel and approved by the Wetland Specialist and Resident Engineer, the Contractor shall remove the cofferdams in such a way to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment.

ITEM 755.50 (Continued)**Erosion and Sedimentation Controls**

Prior to the commencement of construction activities, erosion and sedimentation controls (i.e. compost filter tubes / coir logs) will be installed along the boundaries of existing resource areas abutting selected restoration sites. Erosion controls will be inspected throughout construction and maintained as required to prevent sediment from entering the bank/channel areas, and the controls will remain in place until restoration areas are fully vegetated and stabilized.

Clearing

The proposed channel area will be cleared of existing vegetation. Suitable wetland vegetation with hydric indicators of FAC or wetter can be set aside for re-planting. Indigenous vegetation from graded areas can also be set aside and used for revegetating restoration sites.

Rough Grading

All work within the intermittent stream channels should be conducted during dry conditions. Construction for the stream restoration segments may require excavation of the channel to the desired depth and width consistent with above/below natural channel areas. The restored banks will be constructed at grades consistent within existing adjacent banks/areas and/or at a maximum 2:1 gradients. The banks above the fiber logs (see below) will be constructed to 12 inches below final desired grades, as applicable, to accommodate 12 inches of surface organic layers. Restoration bottom materials should be consistent with existing, downstream channel bottoms and should consist generally of sand, gravel, cobble and rock materials. The final elevation of restoration areas will be determined in the field by a qualified wetland specialist in order to successfully create suitable channel/bank conditions to support hydrophytic species. Upland side slopes will be graded at a 3:1 slope and/or blended into existing uplands and/or roadside slopes per construction requirements.

Bank Stabilization/Soil Installation

Coir/coconut rolls (fiber logs) and/or erosion control fabric (jute netting/equivalent) are the primary stabilization measures that will be installed along the restored stream banks. The fiber logs (12-inch) will be partially imbedded (a few inches) into the soil of the lower banks along the channel to protect against scour and erosion Site Plan details. They will be held in place with wooden stakes angled to prevent the rolls from floating or moving and secured with biodegradable twine. Soils will be backfilled behind the fiber logs and organic soils (12 inches) added to slopes as the surface layer. Erosion control fabric (jute netting/natural fiber blankets/equivalent) with pins/staples will be installed on the slopes within the bank restoration areas to protect against scour and erosion. Banks will be seeded (see below) prior to spreading and securing the mesh/blankets.

ITEM 755.50 (Continued)**Seeding**

The intermittent stream banks will be seeded with a Roadside Riverbank – Part Shade Seed Mix¹ at an application rate of 1 pound per 1,750 square feet. Upon completion of seeding, additional erosion controls will be placed at the toe of side slopes as necessary to prevent sedimentation into resource areas (See below).

Item 765.442 Seeding – Roadside Riverbank – Part Shade Seed Mix¹

	<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS By Weight</u>
Grass			
	Elymus virginicus	Virginia Wild Rye	25.00%
	Elymus canadensis	Canada Wild Rye	20.00%
	Schizachyrium scoparium 'Albany Pine'	Little Bluestem 'Albany Pine'	20.00%
	Festuca rubra	Creeping Red Fescue	12.00%
	Dichanthelium clandestinum 'Tioga'	Deertongue grass 'Tioga'	8.00%
	Agrostis perennans	Upland Bentgrass	6.00%
	Carex vulpinoidea	Fox Sedge	2.00%
	Juncus tenuis	Path Rush	2.00%
	Juncus effusus	Soft Rush	0.10%
			<u>95.10%</u>
Herb/Forb			
	Penstemon digitalis	Beard-tongue	2.00%
	Aster novae-angliae	New England Aster	1.00%
	Solidago caesia	Woodland Goldenrod	0.50%
	Aster cordifolius	Blue Wood Aster	0.50%
	Eupatorium maculatum	Joe-pye Weed	0.30%
	Geum canadense	White Avens	0.30%
	Solidago rigida	Rigid Goldenrod	0.20%
	Rudbeckia hirta	Black-eyed Susan	0.10%
			<u>4.90%</u>
			<u>100.00%</u>

ITEM 755.50 (Continued)**Monitoring**

Monitoring of the restoration areas will be performed by a wetland specialist approved by the Engineer and/or West Brookfield Conservation Commission. Monitoring reports will be prepared and submitted to the Commission upon the completion of planting and following the first and second growing seasons. The reports will describe the work completed, development of soils, hydrology, and vegetation within restoration sites as well as any action to be taken to repair, restore, or replant the restoration areas if needed. Following annual inspections, the contractor will replace all plants that have not become established and re-seed areas that have not reached the desired 75 % cover after the first growing season.

The final banks and streambed materials shall look like natural steams and shall match nearby stream reaches upstream and downstream upon final inspection by the Resident Engineer and Wetland Specialist.

BASIS OF PAYMENT

Item 755.50 will be paid for at the Contract unit price per lump sum, which price shall include all labor, materials, equipment, seeding, plantings, and incidental costs required to complete the work. Bank stabilization materials, or other material recommended by the Wetland Specialist and approved by the Engineer not compensated under other items shall be incidental to this item.

Compost Blanket for bank shall be per Item 751.7 Compost Blanket and shall be compensated under that item.

Wetland Specialist shall be per Item 755.75 and shall be compensated under that item.

Jute Mesh Erosion Control Fabric for bank shall be per Item 767.9 and shall be compensated under that item.

Sediment Control Barrier shall be per Item 767.121 and shall be compensated under that item.

Sediment Barrier – Coir Log shall be per Item 767.122 and shall be compensated under that item.

ITEM 755.75**WETLAND SPECIALIST****HOUR**

Work under this Item shall be for services of a Wetland Scientist, Wetland Ecologist, Restoration Ecologist, or other professional with similar qualifications hereafter referred to as the “Wetland Specialist.”

“Wetland Mitigation” shall be used herein for applicable wetland work. For this project, applicable wetland work is for: Item 755.35 Inland Wetland Replication Area (creation of a new wetland), Item 755.45 Wetland Restoration, and Item 755.50 Land Under Water & Bank Restoration.

The Wetland Specialist shall demonstrate knowledge and expertise to coordinate and oversee all work associated with the Wetland Mitigation as defined herein, as shown on the Plans, as required by permits, and as specified under the relevant Wetland Mitigation items.

Regulatory monitoring reports following Final Acceptance of the Wetland Mitigation shall be per Item 755.76, Wetland Monitoring Reports.

For all onsite work, the Wetland Specialist shall sign in and sign out with the Engineer.

The Wetland Specialist shall not be from the same company as the company responsible for planting, seeding, and/or maintaining the wetland.

The Wetland Specialist shall be approved by the Resident Engineer and West Brookfield Highway Department Superintendent. The resident engineer shall be present on-site to oversee the replication processes per MassDOT standard requirements.

The Replication Area shall be constructed to meet the requirements of all associated permits and certifications, including relevant performance standards of the Massachusetts Wetlands Protection Act (MGL C. 131, s40), Section 401 Water Quality Certification, and Section 404, - U.S. Army Corps of Engineers Permit.

QUALIFICATIONS

The Wetland Specialist shall have a minimum of five (5) years of experience with construction and monitoring of wetland mitigation areas similar in size, type, and complexity to the Contract mitigation. When required by permits, at least ten (10) years of experience may be required. The Wetland Specialist shall be thoroughly versed in the Commonwealth of Massachusetts Wetlands Protection Act (MGL C.131, s.40), U.S. Army Corps of Engineers New England District Compensatory Mitigation Guidance, and all other relevant regulations of the Massachusetts Department of Environmental Protection and the U.S. Army Corps of Engineers New England District.

ITEM 755.75 (Continued)**SUBMITTALS - QUALIFICATION**

Within sixty (60) days following the Notice to Proceed, the Contractor shall provide proof of qualifications for the Wetland Specialist to the Engineer for approval. Submittals shall include, but not be limited to, the following:

- Resume of the individual on-site implementing the Wetland Specialist work. If the Wetland Specialist changes over the course of the project, the new individual shall submit resume and qualifications for approval 30 days prior to doing any work on-site.
- Resume of any personnel working on-site in place of the Wetland Specialist. Individual shall be approved prior to work on-site.
- Narrative describing the company, its expertise, technical qualifications and experience with wetland construction.
- At least three (3) references from prior work of a similar nature completed in the last five (5) years and by the individuals who will perform the work. Provide contact information for each reference including address, phone number and email.
- A summary of each reference project including nature of the work, project size, dates, and period of construction and monitoring, methodologies used, and summary of success (or not) in terms of meeting performance objectives. Summary shall include a minimum of one before and one after photo for each project.

SUBMITTALS – DOCUMENTATION AND REPORTS**Wetland Construction Oversight**

Wetland Specialist shall provide documentation of pre-existing conditions and wetland construction as specified below and as part of fulfilling the Scope of Work described below. Documentation shall include photos that are clear and legible. Photos are incidental to this item.

- ***Site Walk Prior to Disturbance and Construction of Wetlands:*** Provide brief assessment with photos, including documentation of the existing wetlands to be impacted (both permanent and temporary), proposed wetland replication area, and reference/model wetland areas (typically an adjacent undisturbed wetland or the existing wetland to be impacted). Photos of existing wetlands that will be temporarily impacted shall include a view from at least 3 angles.
- ***Excavation and Grading:*** Documentation shall include minimum of two photos of the excavated wetland and two photos after final grading prior to planting and seeding. For restoration areas, photos shall show soil preparation (i.e, tilling and grading), if applicable.
- ***Approval of Subgrades:*** The Wetland Specialist shall inspect the sub-grade of the Replication Area to ensure that proper hydrology is likely to be established and shall provide the Engineer with written confirmation and photographs upon completion of subgrade excavation work. Written confirmation shall include recommended field adjustments, based on field observations, to achieve the desired hydrology and designed wetland system.
- ***Planting and Seeding:*** Provide assessment and photos of vegetation upon completion of planting and seeding work.

ITEM 755.75 (Continued)

Wetland construction documentation and reports shall be submitted with Request for Conditional Acceptance and for the Order of Conditions, Water Quality Certifications, and other regulatory permits as required.

Requests for Acceptance of Work & Regulatory Compliance

The Wetland Specialist shall submit the following documents if and as specified herein and under Item the relevant Wetland Mitigation items:

- Request for Conditional Acceptance.
- Request for Certificate of Compliance (Partial or Full) when applicable.
- Request for Final Acceptance.

SCOPE OF WORK

In the event of discrepancies with the applicable permits, the Wetland Specialist shall submit a Request for Information (RFI) to the Engineer.

General

The Wetland Specialist shall be responsible for the following:

- Review and have a comprehensive knowledge of the environmental permits relevant to the specific mitigation work being done so as to ensure compliance throughout the duration of the contract.
- Identify and inform the Contractor and Engineer of unique site conditions which may require adjustments to the schedule, design, or construction methods. For example, wildlife nesting, illegal dumping, or rare species.
- Identify and inform the Contractor and Engineer of any sediment or erosion control problems observed within mitigation areas.
- Advise so as to avoid impacts to adjacent areas and regulated wetland resources.
- Participate in necessary meetings as required by permits and when requested by the Engineer.

Inspections & Construction Oversight

The Wetland Specialist shall be responsible for, but not limited to, the following:

- Pre-Construction Site Walk
 - Following surveying, flagging, and staking of all relevant boundaries and elevations by the Contractor, the Wetland Specialist shall walk the site with the Engineer and the Contractor to review existing and proposed conditions, recommend changes if necessary, and approve the following: location and boundaries of the Mitigation Area, target elevations and grades, location of tree protection associated with the Mitigation Area, and final layout and limits of clearing for access route.
 - Select and mark snags, logs, and woody material to be retained for incorporation into the Wetland Mitigation, as appropriate.
 - Note invasive plants in and adjacent to Wetland Mitigation.

ITEM 755.75 (Continued)

- Provide summary report if and as specified under Wetland Mitigation items.
- Excavation, Soil Placement, Grading for Replication Areas
 - Approve excavated depth and grading for appropriate wetland hydrology, subsoil preparation, and finished grade of placed wetland soil.
 - Adjust grades as required and approve microtopography. If grades need to be adjusted, submit an RFI to the Engineer.
 - If requested by the Engineer, the Wetland Specialist shall inspect stockpiled wetland soil for moisture content and signs of undesirable weeds.
- Soil Protection and Restoration Measures for Restoration Areas
 - Review and approve methods of soil protection and restoration if required.
 - Confirm decompaction will adequately restore appropriate wetland hydrology. If decompaction measures need to be adjusted, submit an RFI to the Engineer.
- Re-vegetation of Mitigation Area
 - Locate woody material to be re-used.
 - Verify seed used complies with specifications and site conditions, determine limits for wetland seeding based on elevations, approve seeding and mulching methods, and collect seed tags to submit with Request for Conditional Acceptance.
 - Review planting methods (if applicable) prior to installation and oversee layout of wetland plants.

Conditional Acceptance

Upon completion of construction of the wetland, as part of the Request for Conditional Acceptance, the Wetland Specialist shall provide a brief narrative demonstrating that the wetland construction work was done according to plans (or how modified) and meets the conditions required for acceptance as specified under the Wetland Mitigation items. Submittal shall include a report and photo documentation of pre-construction conditions, construction work, seeding, planting, and other work as specified under the Wetland Mitigation items. Photos of completed Wetland Restoration areas shall include the same views as the pre-construction reference photos.

Upon receipt of a Request for Conditional Acceptance, the Engineer, the Wetland Specialist and regulatory representative (if required) shall assess the Wetland Mitigation and surrounding area to ensure that it meets the conditions specified under the Wetland Mitigation items.

Upon approval, MassDOT will issue a letter of Conditional Acceptance. If the Wetland Mitigation work is not approved, MassDOT will issue a rejection letter requiring corrective action. The Wetland Specialist shall recommend corrective actions.

Request for Certificate of Compliance

If required, a Request for Certificate of Compliance shall be prepared and submitted to the Engineer immediately following Conditional Acceptance. Request shall be as specified under the relevant Wetland Mitigation items.

ITEM 755.75 (Continued)

Request for Final Acceptance

Following one full growing season, the Wetland Specialist shall provide a brief narrative of the status of the Wetland Mitigation to be submitted with the Request for Final Acceptance.

Upon receipt of the Request, the Engineer, the Wetland Specialist and regulatory representative (if required) shall assess the Wetland Mitigation and surrounding area to ensure that it meets the conditions specified under the relevant Wetland Mitigation items.

If the Wetland Mitigation is not approved, MassDOT will issue a rejection letter requiring corrective action. The Wetland Specialist shall recommend corrective actions.

METHOD OF MEASUREMENT

Item 755.75 Wetland Specialist will be measured per hour for on-site service provided by the Wetland Specialist.

Work shall include all inspections, photos, submittals, and associated tasks for construction and restoration oversight, narratives for Conditional and Final Acceptance, Request for Certificate of Compliance (Partial or Full) if required, documentation required for permits, and all other work specified above. Payment shall not include travel time or time spent off-site on reports. Decimal Pay Limits will be 0.25 hours.

BASIS OF PAYMENT

Item 755.75 Wetland Specialist will be paid at the Contractor bid price for each hour, or fraction thereof, spent on-site to perform the work as described above. Reports and photo documentation are required for payment.

Post wetland construction reports shall be per Item 755.76, Wetland Monitoring Reports.

ITEM 755.76**WETLANDS MONITORING REPORTS****LUMP SUM**

Work under this item shall be for the submittal of Wetland Monitoring Reports following the completion of wetland construction and shall include all inspections, photos, and other work required to complete those reports as specified herein.

“Wetland Mitigation” shall be used herein for applicable wetland work, whether Wetland Replication (creation of a new wetland) and/or Wetland Restoration (restoration after temporary impacts).

The Contractor shall retain the services of a Wetland Scientist, Wetland Ecologist, Restoration Ecologist, or other professional with similar qualifications, hereafter referred to as the “Wetland Specialist,” to complete the Wetland Monitoring reports. Wetland Specialist shall meet requirements specified under Item 755.75 Wetland Specialist.

All on-site Wetland Specialist services required to complete the construction and revegetation of the wetland replication, including preparation and submission of monitoring reports during construction, shall be per Item 755.75 Wetland Specialist.

SCOPE OF WORK**Post-Construction Wetland Monitoring Reports**

Final Acceptance of the wetland construction work as specified under item 755.35 shall initiate the beginning of the Monitoring Period.

Inspections and reports shall be performed to ensure compliance with mitigation requirements defined under the relevant Wetland Mitigation items and with all applicable environmental permits. Monitoring reports shall cover the following:

- Identification of all plant species present
- Percent cover for each plant species and overall percent surface area cover by indigenous wetland plant species for replication area and upland
- Description of the viability, health, and vigor of installed plants as well as volunteer plant species within the replication areas
- Description of remedial measures taken to ensure criteria are met
- Depth to apparent water table and/or depth of surface inundation, both as measured from the soil surface and data loggers, as appropriate.
- A conclusion regarding the success of the wetland mitigation area relative to the performance standards at 310 CMR 10.55(4)(b) (unless varied), the design plans, and performance criteria established by MADEP in the variance conditions (when applicable), and the reference wetland.
- Recommendation for a corrective plan of action if needed.

ITEM 755.76 (continued)

Reports shall be submitted to the Engineer as a digital copy in Portable Document Format (PDF) unless otherwise requested. Hard copies shall be provided as requested by the Engineer. All reports shall be marked with the applicable permit numbers and identifying information as required in the permits. Reports shall include photo documentation of the wetland/s being monitored and shall include a minimum of 3 views from different orientations. Views shall be labeled.

Spring Reports, when required, shall be submitted to the Engineer by July 1 for dispersal to the appropriate permitting agencies.

End of Year Reports (which may serve as the Fall Report) shall be based on inspections that occur prior to October 15th. Reports shall be submitted to the Engineer no later than November 1 of each year.

Monitoring Reports shall be as follows:

- Conservation Commission: Annual report - two (2) years

BASIS OF PAYMENT

Item 755.76 Wetland Monitoring Reports and associated inspections will be at the Contract unit price per Lump Sum and shall include all labor, materials, equipment, and all incidental costs required to complete the work. Lump Sum will be paid in equal installments of the Lump Sum divided by the number of reports submitted. Payment shall be upon submittal and acceptance of each report, based on the following schedule:

- Year 1 = One (1) Report
 - Submitted to Conservation Commission and MassDOT
- Year 2 = One (1) Report
 - Submitted to Conservation Commission and MassDOT

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.

ITEM 756. (Continued)

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. 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.

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.

ITEM 756. (Continued)

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.

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 submission 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 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**SEEDING – LOW UPLAND 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 765.411 (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 $90\% \times [78 + 10 + 2]\% = 81\%$ PLS.

Therefore, each pound of PLS would need $1 \text{ pound} / 0.81 = 1.2$ 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 765.411 Seeding – Low Upland Mix

Herbaceous Species may be substituted with similar species native to Massachusetts if those specified are not available. Please check with MassDOT Landscape Design on grass substitutions.

ITEM 765.411 (Continued)

<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS By Weight</u>
Grass		
Schizachyrium scoparium 'Albany Pine'	Little Bluestem 'Albany Pine'	52.0%
Elymus virginicus	Virginia Wild Rye	20.00%
Festuca rubra	Creeping Red Fescue	10.0%
Panicum clandestinum 'Tioga'	Deer Tongue 'Tioga'	5.00%
Agrostis perennans	Upland Bentgrass	4.00%
Juncus tenuis	Path Rush	1.0%
		92.0%
Herb/Forb		
Chamaecrista fasciculata	Partridge Pea	4.10%
Penstemon digitalis	Beard-tongue	2.00%
Solidago nemoralis	Grey Goldenrod	0.5%
Solidago caesia	Woodland Goldenrod	0.5%
Aster cordifolius	Blue Wood Aster	0.3%
Aster laevis	Smooth Aster	0.2%
Pycnanthemum tenuifolium	Slender Mountain Mint	0.2%
Baptisia tinctoria	Wild Indigo	0.20%
		8.0%
		100.00%

Application Rate

Apply this mix at 20 lbs PLS/acre on areas of less than 3:1 slope and 60 lbs PLS on areas of greater than 3:1 slope.

Add 30 lbs/acre of a cover crop. For a cover crop use either grain oats (1 Jan to 31 July) or grain rye (1 Aug to 31 Dec).

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 765.411 (Continued)

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Seeding – Low Upland Mix will be measured for payment by the pound of Pure Live Seed delivered and complete in place.

Seeding – Low Upland 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.

Cover crop not included as part of the permanent mix composition will be paid for under Item 765.21, Annual Cover Crop.

ITEM 765.411 (Continued)

SUPPLIER VERIFICATION OF SEED DELIVERY FOR MASSDOT PROJECTS

Date _____

We hereby certify that (*Seed Supplier*): _____

Furnished to (*Contractor*): _____

For use on: (*Project Description*) _____

Project #: _____ Contract #: _____

Pounds of Pure Live Seed: _____

Of Mix (*Description*): _____

Lot Number _____

The material was delivered on (*Date*) _____.

The labels and contents meet all State and Federal regulations. The mixture consists of the following species, including cultivars (as applicable) and ecotype region, and at the following percentages (may be attached separately):

Name (print): _____ Title: _____

Supplier: _____

Signature and Seal: _____

ITEM 765.411 (Continued)

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 Pure Live Seed (PLS¹):

_____ **Total Pounds PLS**

Engineer: Verification at Time of Application

Number pounds delivered to site²: _____ 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).

²Quantity 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 regraded 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.

ITEM 765.635 (Continued)

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.

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.

ITEM 765.635 (Continued)

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.

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.

ITEM 765.635 (Continued)

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. 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.

ITEM 765.635 (Continued)

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.

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 damaged by construction activities shall be repaired or replaced as directed by the Engineer at the Contractor's expense.

ITEM 767.122**SEDIMENT BARRIER - COIR LOG****FOOT**

The work under this item shall conform to the relevant provisions of Subsections 101, 120, 170, and 751 of the Standard Specifications and the following:

Sediment Barrier - Coir Log shall be used in wet locations where the barrier will not require removal; when barrier is placed immediately adjacent to existing wetlands; as a check dam in swales; in locations as shown on the Drawings; and/or in locations required by the Engineer.

Permits, Codes and Regulations: The Contractor shall comply with all rules, regulations, laws and ordinances of the City/Town and State, and all other authorities having jurisdiction over the Project site. All labor, materials, equipment, and services necessary to make the work comply with such requirements shall be provided by the Contractor without additional cost to the Department.

MATERIALS

Coir Log: Coir Log shall be biodegradable coir fiber cylindrical bundles. Inner core shall be 100 percent unsorted, well-cleaned, coir fiber uniformly distributed along the length of the log. The stuffed density of the coir fiber shall be a minimum of 9 pounds per cubic foot.

Outer netting shall be constructed from a minimum 3-ply high strength coir bristle twine. The netting shall have 2-inch by 2-inch rhombic openings with hand-knotted junctions. The average breaking strength of the coir twine shall be a minimum of 80 pounds. Production tolerance for all the above parameters shall not exceed plus or minus 10 percent.

Coir log diameter shall be sized as shown on the drawings. Typical lengths are supplied in 10 foot or 20-foot increments. Coir logs or coir netting may not be cut to decrease length and shall maintain the physical properties as supplied by the Manufacturer.

Notched Wood Stakes: Stakes shall be oak or southern pine with dimensions as shown on the Drawings. Stakes shall be free from knots and other defects which would cause splitting and shall have a downward-angled notch as shown in the drawing.

Coconut Fiber Cord: Coconut fiber cord shall be two-ply braided cord with a breaking strength of 80 pounds, minimum 0.25-inch diameter.

Delivery, Storage and Handling: Protect materials from deterioration during delivery and while stored at site.

CONSTRUCTION METHODS

General: Prior to initial placement of the coir log sediment barrier, the Contractor and the Engineer shall review locations specified on the plans and adjust placement, if required, to ensure that the coir log positioning and configuration will provide maximum sediment capture. Coir log sediment barrier(s) shall be in place prior to excavation work and no work shall take place outside the coir log barrier(s).

ITEM 767.122 (Continued)

Installation: Coir logs shall be staked and secured as shown on the Drawings, as specified herein, and/or as recommended by the Manufacturer. The Contractor shall remove all underlying vegetation or debris to ensure that each coir log is securely in contact with soil, such that there is no flow beneath the log.

When used as a check dam barrier in a swale, the coir log shall be centered in the low point of the swale, perpendicular to the flow, with ends extending upslope. The log check dam barrier shall extend such that the log top elevation at the center of the swale is lower than the lowest elevation at the end log, to ensure that sediment-laden runoff will flow either through or over the coir log but not around it. The coir log check dam barrier shall have length such that no seams occur in the swale.

Notched wood stakes shall be driven parallel on both sides of the coir log at a typical spacing of 5 feet on center, unless site conditions warrant a closer spacing distance to ensure logs are firmly secured to the underlying soil. Stakes shall not extend more than 1 foot beyond the top of the log. Coir twine shall lash the logs to notched stakes in a cross-lashing fashion between stakes, throughout the length of the log barrier.

When utilizing multiple logs for sediment control, each coir log shall be laced together end-to-end (creating a seam) with coir twine to create a continuous length. End-to-end lacing may be completed before or after placement, to facilitate handling.

Maintenance: Maintenance of the coir log sediment barrier shall be per the Stormwater Pollution Prevention Plan (SWPPP).

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. The Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively for all phases of the Contract. Under no condition shall sediment be allowed to accumulate more than 4 inches above the original ground line.

If a breach or other failure of the barrier occurs, the barrier shall be immediately restored. Repair shall include replacement of entire defective segments or for short breaches, revetment with additional coir logs, set directly adjacent to the downslope side of the breach. Revetment coir logs must overlap breach by a minimum of 2 feet on each side. The Engineer must approve breach repair means and methods as well as outcome.

If the coir log sediment barrier is damaged by equipment or undergoes a significant washout or other major failure, the Contractor shall replace the component in its entirety, at the discretion and approval of the Engineer. Any delay in maintaining the barrier shall be cause to immediately suspend the work as provided for in Subsection 8.09: Delay and Suspension of Work.

Disposition/Removal: For naturalized areas, coir logs and wooden stakes may be left in place to decompose on-site. For areas where, in the determination of the Engineer, aesthetics are a concern, logs, errant coir fiber material, and stakes may require removal.

ITEM 767.122 (Continued)

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.122 Sediment Barrier - Coir Log will be measured for payment by the FOOT, complete in place and 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.

No separate payment will be made for coir log(s) follow-up maintenance and repairs, or disposal (if required), but all costs in connection therewith shall be included in the Contract unit price bid.

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.

ITEM 767.9 (Continued)

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.

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, reseeded of trenched and disturbed areas, and all incidental costs required to complete the work.

ITEM 799.21

TREE – DECIDUOUS 4-5 FT

EACH

The work under this item shall conform to the relevant provisions of Section 700 of the Standard Specifications and the following.

Items 799.21 shall be used per the direction of the Engineer if and as required for the wetland replication area.

Tree species shall be selected by the MassDOT Landscape Architect based on field conditions. Locations shall be approved by the MassDOT Landscape Architect. Planting and care shall be per the MassDOT Standard Specifications.

METHOD OF MEASUREMENT

Item 799.21 will be measured per each in accordance with Subsection 771.80 of the Standard Specifications.

BASIS OF PAYMENT

Item 799.21 will be paid for at the contract unit price per Each, in accordance with Subsection 771.81 of the Standard Specifications, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 816.81**TEMPORARY TRAFFIC CONTROL SIGNAL****LUMP SUM**

The work to be done under this item shall conform to the relevant provisions of Sections 800, 815, and 900 of the Standard Specification, and the following:

The work shall consist of furnishing all necessary labor, materials, and equipment required to install, complete in place and ready for operation, a portable temporary traffic control signal system with 30-day battery backup and related work at the locations shown on the plans or as directed by the Engineer. Any location shown on the plans are approximate and the exact locations will be established by the Engineer in the field.

The work includes furnishing a complete portable traffic signal installation. Portable traffic signal systems shall meet the requirements of the MUTCD and appear on the Department's Approved List. The portable traffic signal system shall consist of two (2) self-contained trailer mounted signals, each with a vertical signal mast, horizontal mast arm and two signal heads. Each signal face shall have steady circular red, yellow, and green indications with 12-inch diameter lenses. The system shall have a built-in conflict monitor to prevent the display of conflicting indications and have a means to keep the signals. The system shall also be compliant with any emergency pre-emption systems that are used in the area of the project. The system shall be capable of providing traffic actuated control with video detection and adequate phasing to serve expected traffic movements. The phasing shall be as shown on the plans and modified as required by the Engineer. The Contractor shall determine the method of powering the portable signals. Potential options may include solar power and/or generator. All equipment and materials shall remain the property of the Contractor at the completion of the project.

Operation and Programming

Operation of temporary traffic control signals shall be initiated only in the Engineer's presence. The Contractor shall provide all equipment and program all timing in accordance with the plans. The Contractor shall coordinate schedules of all required personnel and MassDOT to assure their mutual presence on the site. Communication between both ends of the temporary lane closure shall be maintained. The Contractor shall ensure compatibility of pre-emption equipment with the existing equipment installed in Town operated emergency vehicles.

BASIS OF PAYMENT

Item 816.81, Temporary Traffic Control Signal, will be paid for at the Contract lump sum price, which price shall include all labor, materials, equipment necessary including any associated engineering, the positioning and repositioning during construction phases are incidental to the installation of a temporary traffic control system, its maintenance during the prosecution of the work on the project, and its subsequent removal upon completion of the project. , and all incidental costs required to complete the installation, removal, and reinstallation at each required location. In the event of any malfunction, all costs associated with signal repairs shall be included in the lump sum bid for Item 816.81, with no additional cost to the Project.

ITEM 853.21 TEMPORARY BARRIER REMOVED AND RESET FOOT

Work under this item shall conform to the relevant provisions of Section 850 and shall consist of removing, transporting and resetting temporary barrier systems and limited deflection temporary barrier systems from alignments established along the roadway to new alignments in accordance with the details shown on the plans, as required by the construction and staged construction operations and as required by the Engineer for the channelization of traffic and/or work zone protection.

The work shall also include furnishing and installing all hardware and associated materials per the details and/or manufacturer's specifications. The work shall also include necessary patches and repairs caused by the temporary barrier system to damaged pavement surfaces or any adjacent longitudinal barrier once the system has been removed.

Temporary barrier systems and limited deflection temporary barrier systems shall be removed from existing locations and reset in accordance to the construction methods stated in the respective barrier items.

Damage to the pavement surface or adjacent permanent barriers caused by removing or resetting temporary barrier shall be repaired as directed by the Engineer at the Contractor's expense.

Method of Measurement and Basis of Payment

Item 853.21 will be measured and paid by the foot, in place which shall provide full compensation for removing, relocating, resetting, realigning, and transporting maintaining the temporary barrier system and/or limited deflection temporary barrier system. The Contractor will be paid for this item each time the barrier is relocated either to a new work zone, to off-season storage, or back to the project from storage. The Contractor will not be separately compensated for any work necessary to maintain or re-align units or replace damaged units. No payment will be made for removing and resetting barriers for the purpose of gaining access to the construction work zone. No payment will be made for removing, relocating and resetting any barriers moved for the convenience of the Contractor.

For temporary barrier systems that require anchorage systems, the cost of furnishing, installing and removing the anchorage and hardware and the restoration of pavement surfaces or adjacent permanent barrier systems to facilitate anchorage shall be considered incidental to the cost of this Item.

ITEM 853.33 TEMPORARY BARRIER – LIMITED DEFLECTION (TL-3) FOOT**DESCRIPTION**

Work under this item shall conform to the relevant provisions of Subsection 850 and 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 combined working width of 45 inches which includes the width of the barrier plus the dynamic deflection; and shall be used in areas where the available clear area behind the barrier systems to obstructions or vertical drop-offs is greater than the anticipated barrier deflection.

MATERIALS

The Contractor shall use a temporary barrier system that is listed on the Qualified Traffic Control Equipment List that meets the specified working width indicated above and the minimum requirements of the AASHTO Manual on Assessing Safety Hardware (MASH) at Test Level (TL) 3 or higher.

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.

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.

The Contractor shall supply 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.

Delineators shall be installed on all limited deflection temporary barrier systems in conformance with the relevant provisions of Subsection 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.

ITEM 853.33 (Continued)**CONSTRUCTION METHODS**

Limited deflection temporary barrier systems shall be placed as required and in accordance with the Temporary Traffic Control Plans. Installation shall be per the manufacturer's specifications, details, and the approved shop drawings.

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 directed by the Engineer at the Contractor's expense.

Limited deflection temporary barrier systems that require anchorage systems shall conform with the relevant provisions of Subsection 850.70, including the restoration of roadway surfaces where barrier is pinned to the roadway, the pin holes shall be filled with a sand mortar mix upon removal of the barrier.

METHOD OF MEASUREMENT

Item 853.33 will be measured by the Foot, in place.

BASIS OF PAYMENT

Payment for work under this item will be made at the Contract price per Foot for Temporary Barrier - Limited Deflection (TL-3) installed in place, including all incidental items. This price shall include the cost of furnishing, installing, maintaining and final removal of all limited deflection temporary barrier systems.

For limited deflection temporary barrier systems that require anchorage or attachment systems, the cost of furnishing and installing the anchorage/attachment and hardware and the restoration of bridge deck, pavement surfaces or adjacent permanent barrier systems to facilitate anchorage/attachment shall be considered incidental to the cost of the item.

Limited deflection temporary barrier removed and reset shall be paid for under item 853.21 – Temporary Barrier Removed and Reset.

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 LWCSO.
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.

ITEM 859.1 (Continued)

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 864.35**SLOTTED PAVEMENT MARKER**
TWO-WAY YELLOW/YELLOW**EACH**

The work under this item shall conform to the relevant provision of Subsection 860 of the Standard Specifications and the following:

DESCRIPTION

The work to be done under these items shall consist of furnishing and installing two-way reflectorized pavement markers (slotted in pavement) in accordance with the relevant provisions of Traffic Standards TR 6.2 "Raised Pavement Marker Placement" and TR.6.5 "Typical Pavement Marking for Conventional Roads" from the MassDOT 1996 Construction and Traffic Standard Details and the contract documents.

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 $1/8 \pm$ inch below the top of the adjacent pavement.

Surface preparation and installation shall be in strict accordance with the manufacturer's instructions.

Reflectorized pavement markers shall be 3M Series 290, Ennis-Flint Stimsonite C80, Ray-O-Lite Model 2004 or an approved equivalent.

METHOD OF MEASUREMENT

Slotted pavement marker two-way yellow/yellow will be measured for payment by each unit installed, complete in place.

BASIS OF PAYMENT

Slotted pavement marker two-way yellow/yellow will be paid for at the respective Contract unit prices per each, which price shall include all labor, materials, equipment and incidental costs 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 866.206 **6 INCH REFLECTORIZED WHITE LINE (POLYUREA)** **FOOT**
(RECESSED)

ITEM 867.306 **6 INCH REFLECTORIZED YELLOW LINE (POLYUREA)** **FOOT**

Work to be completed under these items shall conform to the relevant provisions of Subsection 860 of the Standard Specifications and the following:

Work shall consist of grooving a slot in the pavement surface and the furnishing and installation of wet reflective polyurea pavement markings. **Note that item 867.306 shall not be recessed, but shall be surface applied over the centerline rumble strips.**

MATERIALS

Wet reflective polyurea pavement markings shall consist of a liquid binder, first drop beads or elements to provide dry and wet retroreflectivity, and second drop glass beads to improve the durability of the pavement marking, reduce track-free times, and provide supplementary dry retroreflectivity.

The Contractor shall use one of the following binders and first drop beads or elements, or approved equivalents:

1. 3M™ Liquid Pavement Marking Series 5000 with 3M™ All Weather Series 90 elements;
2. Epoplex GLOMARC® 90 with Potters VISIMAX® Glass Bead System; or
3. SWARCO MFUA-12 with SWARCO MEGALUX-BEADS®.

Combination of other binder and first drop bead or element series may only be used at the approval of the Engineer.

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 shall have a minimum refractive index of 1.51 when tested in accordance with AASHTO M247.

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 866.206 & 867.306 (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**Installation of Groove**

Prior to cutting out the grooves for all recessed lines, the Contractor shall use a chalk line or other suitable method to layout the proposed pavement markings on the surface course so that the Engineer can inspect the locations. Once the Engineer has inspected and approved the proposed striping layout, the grooves for the proposed pavement markings may be cut. No pavement grooving shall be done without the prior approval of the Engineer.

Groove position shall be a minimum of 4 inches from the edge of the pavement marking to any longitudinal pavement joints. The groove shall not be installed on bridge joints, on drainage structures, or in other areas identified by the Engineer. The groove shall not be installed continuously for intermittent pavement markings, but only where markings are to be applied.

The use of gang stacked diamond cutting blades to grind a smooth square slot is required for producing all grooves. The spacers between blade cuts shall be such that there will be less than a 10 mil rise in the finished groove between the blades. The acceptability of the surface texture will be determined by the Engineer.

The diamond grinder shall have an articulating head so that the slots are installed correctly on grades and super elevated sections.

Grooves that are ground deeper or wider than the specified allowable limits shall be repaired per the direction of the Engineer at no additional cost. Grooves that are ground too shallow, too narrow, or with unacceptable rises between blade cuts shall be reground to the correct size, depth, and surface finish at no additional cost. Slots ground out of alignment shall be patched using an approved method and materials.

Grooves shall be 1 inch \pm ¼ inch wider than the pavement marking material. Groove depth shall be 100 mils \pm 5 mils, unless otherwise approved by the Engineer. Depth shall be consistent across the full width of the groove. Depth plates shall be provided by the Contractor to the Engineer to assure that desired groove depth is achieved.

ITEMS 866.206 & 867.306 (Continued)

Grooves shall be clean, dry and free of laitance, oil, dirt, grease, paint or other foreign contaminants. Shrouds and a vacuum apparatus shall be included as part of the grinder to remove larger pieces of pavement that are ground out. If water is used to clean the groove or the grooving process takes place during rainfall, a minimum of 24 hours of dry time is required prior to the placement of pavement markings.

After the depth, width, length, and surface condition has been approved by the Engineer, an air lance shall be used to remove fine particles from the groove. Air compressors shall initially be blown out away from the application area to prevent compressor condensation build-up from entering the groove. The Contractor shall prevent traffic from traversing the grooves and re-clean grooves, as necessary, prior to application of pavement markings at no additional cost to the Department.

All grooves must be given final approval by the Engineer prior to the placement of pavement markings.

Installation of Wet Reflective Polyurea

Installation of wet reflective polyurea pavement markings shall conform to the Manufacturer's specifications and the following:

Application rate for binder and all beads and elements shall consider final pavement surface composition and smoothness in advance of application to ensure proper wet film thickness and embedment of all beads and elements. The Contractor shall provide the Engineer with documentation from the Manufacturer with all recommended application rates (and conformance to initial dry and wet reflectivity requirements) in advance of any pavement marking installation.

The minimum uniform wet thickness for the polyurea binder shall be 25-30 mils. The line thickness shall be met across at least the middle $\frac{2}{3}$ 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.

First and second drop beads and/or elements 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 and elements should be embedded in the binder to a depth of approximately 50% of their diameter.

Drop rate for first drop bead or element shall be per the Manufacturer's specifications.

Drop rate for second drop glass bead shall be 6.4-10.2 lbs. per gallon.

ITEMS 866.206 & 867.306 (Continued)

Newly installed pavement markings shall be protected from tracking during the setting period per Subsection 860.63.

Incidental to the cost of these items, the Contractor shall measure the average retroreflectance of the pavement markings, and report the results to the Engineer. The Contractor shall take retroreflectance measurements between 7 and 14 days from date of application. Contractor shall perform retroreflectance 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. The following tests shall be performed during the measurement and sampling process:

1. ASTM E1710 (*Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer*); and
2. 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 retroreflectance readings shall exceed the following minimum values:

	*White Markings	*Yellow Markings
ASTM E1710 (Dry)	475 mcd/lux/m ²	375 mcd/lux/m ²
ASTM E2177 (Wet Recovery)	375 mcd/lux/m ²	300 mcd/lux/m ²

*Observation Angle = 1.05°, Entrance Angle = 88.8°

Pavement markings with measured average initial retroreflectance 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.

Pavement Marking Asset Management

Upon completion of the pavement marking installation, the following data shall be tabulated by the Contractor:

1. Retroreflectance readings, including date(s), time(s), and location(s) where readings took place;
2. Liquid binder type(s) and application rate;
3. Reflective element type and drop rate;
4. Date of groove installation;
5. Lot, batch number, or any other material identifiers and manufacturing information;
6. Date and time of final liquid marking installation;
7. Highway location (including direction) of installation;
8. Air and pavement temperature during application;
9. Measured material application thickness, depth of groove; and
10. Any other pertinent information that may assist MassDOT with Quality Control.

ITEMS 866.206 & 867.306 (Continued)

Results for all readings shall be provided within 10 business days of testing to the Engineer, with a second copy sent to:

State Traffic Engineer
Attention: Pavement Marking Installation & Testing
10 Park Plaza, Room 7210
Boston, MA 02116

The cost to prepare and submit this data shall be considered incidental to the cost of the items.

METHOD OF MEASUREMENT

Item 866.206 and Item 867.306 will be measured for payment respectively by Foot, of the actual length of lines applied.

BASIS OF PAYMENT

Item 866.206 and Item 867.306 will be paid for at the respective contract unit prices per Foot, which prices shall include all material, labor, equipment, and all incidental costs required to complete the work.

ITEM 874.2

TRAFFIC SIGN REMOVED AND RESET

EACH

The work to be done under this Item shall conform to the relevant provisions of Subsections 828 and 840 of the Standard Specifications and the following:

The work under this item shall include the dismantling, removal, transporting, storing, and resetting of the existing signs at the location indicated on the Plans. The work also includes the removal and disposal of the existing sign supports and foundations.

The Contractor shall exercise particular care in the dismantling, removal, transporting and resetting of the existing signs designated to be reused. Any sign panel damaged during construction operations, shall be replaced immediately at the Contractor's expense.

Signs, attachment hardware and sign support posts lost, damaged or otherwise made unsuitable for reuse while being removed, transported, stored or reset shall be replaced with new material at no additional cost. New attachment hardware shall be furnished and installed as necessary to replace any missing or unusable existing hardware.

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 Each unit removed and reset including the post. Multiple signs on one post assembly, single or double, such as a route marker and cardinal direction marker or a sign requiring a second graphic sign, shall be considered as one unit.

BASIS OF PAYMENT

Item 874.2 will be paid for at the Contract unit price per Each sign removed and reset together with its post complete in place, which price shall include all labor, materials, equipment, backfill and area restoration, and all incidental costs required to complete the work.

ITEM 874.4

TRAFFIC SIGN REMOVED AND STACKED

EACH

Work under this item will include the dismantling, removal, transporting and stacking of the existing roadside traffic signs and/or posts as indicated on plans or as directed by the Engineer including the removal and disposal of the sign supports and their foundations.

The work shall include removing the supports, excavating the existing foundation, the disposal of the concrete and supports, the backfilling with compacted gravel of the holes resulting from the excavation and the removal of the supports and the replacement, in kind, of any surface material disturbed outside of areas to be reconstructed under this project. If in the opinion of the Engineer, the existing foundation will not interfere with new construction, it may be removed to a depth of 6 inches below the existing ground, backfilled with compacted gravel and the existing surfaces restored or replaced in kind.

The Contractor shall coordinate with the West Brookfield Highway Department, 15 Front Street, West Brookfield, MA 01585, Attn: James Daley, 508-867-1417 on the signs and posts within the Town and County layout to be removed and stacked.

The existing signs shall not be removed until the new signs and structures replacing them are ready for traffic or until the Engineer shall permit.

METHOD OF MEASUREMENT

Item 874.4 will be measured for payment by Each unit removed and stacked including the post. Multiple signs on one post assembly, single or double, shall be considered as one unit.

BASIS OF PAYMENT

Item 874.4 will be paid for at the Contract unit price per Each sign removed and stacked together with its post, which price shall include all labor, materials, equipment, backfill area restoration, and all incidental costs required to complete the work.

ITEM 874.41

TRAFFIC SIGN REMOVED AND DISCARDED

EACH

The work under this item shall conform to the relevant provisions of Subsection 828 of the Standard Specifications and the following:

CONSTRUCTION METHODS

The Contractor shall carefully remove and discard existing sign panels, attachment hardware, and sign support posts not included under other sign items as shown on the plans included in this Contract and as required by the Engineer.

The work shall also include excavating the existing foundation, the disposal of the concrete and supports, the backfilling with compacted gravel of the holes resulting from the excavation and the removal of the supports and the replacement, in kind, of any surface material disturbed outside of areas to be reconstructed under this project. If in the opinion of the Engineer, the existing foundation will not interfere with new construction, it may be removed to a depth of 6 inches below the existing ground, backfilled with compacted gravel and the existing surfaces restored or replaced in kind.

METHOD OF MEASUREMENT

Item 874.41 will be measured for payment by each, traffic sign removed and discarded.

BASIS OF PAYMENT

Item 874.41 will be paid for at the Contract unit price per each, which prices shall include all labor, material, equipment and incidental costs required to complete the work including removal and disposal of sign panels and posts deemed to be unsuitable for reuse.

The contractor is responsible to dispose of the unwanted signs and posts in accordance with the applicable laws, without additional compensation.

<u>ITEM 912.101</u>	<u>PASSIVE ROCK DOWELS</u>	<u>FOOT</u>
<u>ITEM 912.102</u>	<u>PROOF TESTING OF PASSIVE ROCK DOWELS</u>	<u>EACH</u>

GENERAL

The work under this item shall consist of furnishing all necessary labor, equipment, Engineering services, and materials required to install and perform proof testing of passive (un-tensioned) rock dowels at locations, inclinations, and to the minimum length required by the Contractor's engineer.

Passive rock dowels shall be as required where rock cuts result in potentially unstable rock blocks that require reinforcing. The area anticipated to require these passive rock dowels (Item 912.101) is from project station 61+56 to 64+25. The actual need for and number of dowels required shall be determined after completing the rock cut as shown on the drawings.

Sacrificial passive rock dowels shall be installed and proof-tested to confirm the capacity (Item 912.102).

Drill fluid shall not be used unless the Contractor can demonstrate as required by the Engineer that it will not flow outside the right of way. Also, drill spoil shall not be permitted to extend beyond the project right of way or enter any drainage structures.

MATERIALS

All materials specified herein and on the Contract Drawings used for passive rock dowels shall be furnished new without defects. Defective materials will be rejected by the engineer and shall be removed from the site by the Contractor.

Passive rock dowels shall consist of 75ksi, galvanized, No. 10 deformed bar or approved equal conforming to ASTM A615. Socks shall be placed over the bars as required to limit grout permeation into open joints.

All rock dowel bars, couplers, beveled washers, bearing plates, and nuts shall be galvanized. Galvanization defects should be repaired to the satisfaction of the engineer prior to installation.

Cement grout used for rock dowels shall conform to ASTM C150, Type 1, with a maximum water-cement ratio of 0.45 and with a minimum 28-day compressive strength of 4,000 psi per ASTM C109

Heavy duty hex nuts shall be capable of developing 95 percent of the minimum guaranteed ultimate tensile strength.

Bearing plates shall be 6-inches by 6-inches and 1-inch-thick A36 steel and use beveled washers.

ITEMS 912.101 & 912.102 (Continued)

CONSTRUCTION METHODS

QUALIFICATIONS

The passive rock dowel installer shall have a minimum of 2 years of experience installing and testing rock anchors/dowels and shall demonstrate at least 5 projects where rock anchors/dowels have been successfully installed.

SUBMITTALS

Not less than 7 days prior to commencing installation of passive rock dowels, the contractor shall submit the following to the engineer for review:

1. Work plans describing the proposed construction sequence of the passive rock dowels and schedule of installation.
2. The proposed passive rock dowel drilling, placement and grouting procedures and equipment.
3. The proposed passive rock dowel drill hole diameter.
4. The proposed couplers, bearing plate, centralizers, flat washer, and beveled washer specifications including manufacturers data sheets, catalog cuts and mill certificates.
5. The proposed grout mix design, including the type of portland cement, proportions of mix by weight and water-cement ratio, manufacturers data sheets and catalog cuts, and the procedures for placing the grout.
6. Calibration data for each load cell test jack pressure gauge and master pressure gauge to be used for testing of passive rock dowels. An independent testing laboratory shall have performed the calibration tests and tests shall have been performed within 60 calendar days of the date submitted.
7. Certified mill test results for all passive rock dowels specifying the minimum ultimate strength, yield strength, elongation, chemical composition, and galvanizing.

Submit the results of grout cube testing within 24 hours of receiving the laboratory test results.

Submit the results of testing of passive rock dowels within 24 hours of testing for acceptance by the engineer.

Submit as-built drawings of retaining wall and passive rock dowels within 3 weeks of completing the work. Include all installation logs, grout testing results and proof test results.

ITEMS 912.101 & 912.102 (Continued)**PASSIVE ROCK DOWEL INSTALLATION**

Passive rock dowels shall be installed in minimum 3.5-inch diameter drill holes.

Where soil/vegetation is present at the proposed dowel locations, remove soil as needed to expose rock at the installation location and place dry-pack grout on the rock surface as a leveling pad to facilitate drilling and placement of the bearing plate.

Drill holes shall be installed within 5-degrees of the angle specified. Holes shall be over-drilled 1-foot below the bottom of bar. PVC centralizers shall be placed on the bar at a typical spacing of 10-feet on center (minimum 2 centralizers per bar). The contractor shall flush the drill holes of all drill cuttings and debris prior to installation of the dowel.

Centralizers shall be used to hold the center bar in place within the drill hole prior to placement of grout. Centralizers shall be securely attached to the passive rock dowel bar, sized to position the dowel bar within 1 inch of the center of the drill hole, sized to allow tremie pipe insertion to the bottom of the drill hole, and sized to allow grout to flow freely up the drill hole.

Dowels that will not be grouted the same day as drilling shall be capped with a plug on the same day they are drilled.

Dowel bars shall be inserted into the drill hole immediately prior to grouting to the required length without difficulty and in such a manner as to prevent damage to the drill hole, bar, tremie tube, or spacers. Dowel bars that cannot be fully inserted shall be removed and the drill hole cleaned sufficiently to allow unobstructed installation of the bar.

Passive rock dowels shall be grouted using neat cement grout with a minimum 28-day compressive strength of 4,000 psi per ASTM C109. Grouting shall be performed in one continuous operation using tremie methods and shall continue until clean grout return is observed in the drill hole. The grout shall be injected at the lowest point of each drill hole. The grout level shall be topped-off with dry-pack grout to the top of the hole prior to placement of bearing plates. The quantity of grout shall be recorded on the installation log for each dowel. Tremie tubes may be left in place and cut off below the bearing plate.

Grout equipment shall produce a uniformly mixed grout free of lumpy and undispersed cement. A positive displacement grout pump shall be used. The grouting equipment shall be sized to enable the entire dowel to be grouted in one continuous operation. The mixer shall be capable of continuously agitating the grout during use.

Grout material shall be handled and stored to prevent moisture degradation and partial hydration. Cement that has become caked or lumpy shall not be used. Care shall be taken to prevent the grout from freezing. Heated water shall be used to mix the grout if temperatures are below 32 degrees during installation. Water shall maintain a temperature above 50-degrees prior to mixing.

ITEMS 912.101 & 912.102 (Continued)

Dowel bars shall be carefully handled and stored on supports to keep the steel from contacting the ground. Steel bars shall be picked up in such a way as to prevent overstressing. Damage to the steel or coatings as a result of overstressing, abrasion cuts, nicks, welds, and weld spatter shall be cause for rejection. Grounding of welding leads to the dowel steel will not be allowed. Dowel steel shall be protected from and sufficiently free of dirt, rust, and other deleterious substances prior to installation. Heavy corrosion or pitting of dowels shall be cause for rejection by the engineer. Replace dowels with damaged coatings.

Bearing plates and nuts used for the passive rock dowels shall be installed on the exterior of the rock face. The completed rock dowel shall be trimmed to within 6-inches of the rock face.

CONSTRUCTION QUALITY ASSURANCE

Installation and testing of passive rock dowels shall be performed in the presence of the Engineer. The Engineer will be the sole judge as to whether the passive rock dowels satisfy the requirements of the Contract Documents.

Three sets of 2-inch by 2-inch grout cubes shall be collected each day during grouting for confirmatory testing. Acceptance (proof) testing of passive rock dowels shall be performed in accordance with the requirements below.

ACCEPTANCE (PROOF) TESTING

The number of proof tests required for the passive rock dowels shall be determined by the Contractor's engineer. Proof tests shall be performed on sacrificial rock dowels prior to installation of production dowels to confirm the design bond stress. Test locations will be mutually agreed upon between the Contractor and the Engineer.

The test dowels shall match the planned length and diameter of production dowels. The grout level within the sacrificial dowels should be left 2-feet behind the face of rock to establish the bond zones.

Sacrificial proof test dowels shall be drilled with the same diameter as production dowels. The proof tests shall be performed in accordance with the following procedures and acceptance criteria:

1. Proof tests shall be completed in accordance with recommendations for proof testing detailed in chapter 8 of the most recent edition of the "Recommendations for Prestressed Rock and Soil Anchors" published by The Post Tensioning Institute (herein referred to as PTI). Within 24 hours of conducting proof tests, the contractor shall submit proof test data for interpretation by the Engineer.

ITEMS 912.101 & 912.102 (Continued)

2. Dowel testing equipment shall include a recently calibrated hydraulic jack graduated in increments of 100 psi maximum. A hydraulic jack with a throw of at least 2" shall be used to apply the test load. A minimum of two dial gages, aligned with the dowel, capable of measuring to 0.001" and with at least 1" of travel shall be set up on independent supports to measure movement of the dowel head. Hydraulic pressure on the jack shall be maintained to hold a constant load. Wire rope dowel testing equipment may consist of a recently calibrated dynamometer using suitable excavation equipment to apply test load.
3. The method of distributing test load pressures to the rock/excavation surface or reaction frame shall be developed by the contractor and submitted to the engineer for approval.
4. Test dowels shall not be loaded until the grout has developed the 28-day unconfined compressive strength. Give adequate notice of test dowel locations and testing schedule for review by the Engineer.
5. The tests shall be performed by incrementally loading the verification and proof test dowels to 133 percent of the design load (dl). For the purpose of the test loading, the design load (dl) is 33 kips, and the maximum test load is 44 kips.
6. Acceptance criteria for verification and proof tests:
 - a. Pullout failure does not occur at the maximum test load. Pullout failure is defined as the load at which attempts to further increase the test load simply result in continued pullout movement of the test nail.
 - b. The creep amount shall not exceed 0.040 inches (1mm) at test load during the period of 1 to 10 minutes. If this value is exceeded, then the total creep movement within the period of 6 to 60 minutes shall not exceed 0.080 inches (2mm).

Upon completion of dowel installation, the Contractor shall submit all dowel installation logs, compiled data from the proof tests including a plan showing the passive rock dowels that were proof tested and their capacity, and as-built plans showing the location, inclination, and length of the passive rock dowels.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 912.101 will be measured and paid for at the contract unit price per Foot, which price shall include all labor, materials, equipment, submittal, required to install the production passive rock dowels at the upslope rock cut and incidental costs required to complete the work.

Item 912.102 will be measured and paid for at the contract unit price per Each, which price shall include all labor, materials and equipment, submittal, required to install the test dowel and perform the required proof tests and incidental costs required to complete the work. Payment will not be made for failed tests.

ITEM 912.103**ROCK MECHANICS ENGINEER****HOUR**

Work under this Item shall be for services of a geotechnical engineer, geological engineer, or geologist, providing professional services and herein referred to as “Rock Mechanics Engineer”.

This item will be applicable for rock mechanics work associated with Items 912.101 Passive Rock Dowels and 912.102 Proof Testing of Passive Rock Dowels.

The Rock Mechanics Engineer shall demonstrate knowledge and expertise to coordinate and oversee all work associated with the design, installation and testing of passive rock dowels.

For all onsite work, the Rock Mechanics Engineer shall sign in and sign out with the Engineer.

The Rock Mechanics Engineer shall not be from the same company as the company responsible for installing and testing passive rock dowels.

The Rock Mechanics Engineer shall be approved by the Resident Engineer and West Brookfield Highway Department Superintendent. The resident engineer shall be present on-site to oversee the replication processes per MassDOT standard requirements.

QUALIFICATIONS

The Rock Mechanics Engineer shall have a minimum of five (5) years of experience with evaluation of rock slope stability and the design, construction and testing of grouted rock dowels. The Rock Mechanics Engineer shall be a licensed Professional Engineer in the State of Massachusetts.

SUBMITTALS - QUALIFICATION

Within sixty (60) days following the Notice to Proceed, the Contractor shall provide proof of qualifications for the Rock Mechanics Engineer to the Engineer for approval. Submittals shall include, but not be limited to, the following:

- Resume of the individual in responsible charge for all rock slope evaluation and design of passive rock dowels.
- Resume of any personnel working under the direction of the Rock Mechanics Engineer who will perform on-site rock slope evaluation or observation of passive rock dowel installation or testing.
- Narrative describing the company, its expertise, technical qualifications and experience with rock mechanics engineering.
- At least three (3) references from prior work of a similar nature completed in the last five (5) years and by the individuals who will perform the work. Provide contact information for each reference including address, phone number and email.
- A summary of each reference project including nature of the work, project size, dates, and period of construction and monitoring, methodologies used, and summary of success (or not) in terms of meeting performance objectives. Summary shall include a minimum of one before and one after photo for each project.

ITEM 912.103 (Continued)

SUBMITTALS – DOCUMENTATION AND REPORTS

Rock Cut Construction Oversight

Rock Mechanics Engineer, or their designee, shall provide documentation of post-construction slope condition including the information noted below. Documentation shall include photos that are clear and legible. Photos are incidental to this item.

- ***Rock Cut Configuration:*** Provide brief assessment with photos, including documentation of the rock cut after excavation as shown on the contract drawings. The assessment shall include estimation of rock cut angle, the direction and dipping angle of major fractures within the rock, and the presence of rock blocks which may be unstable.
- ***Rock Block Configuration:*** Documentation shall include the approximate length and width of rock blocks identified as potentially requiring stabilization. The intent of these measurements are to identify the surface area of each individual block requiring stabilization.

Rock cut construction documentation and reports shall be submitted with Request for Conditional Acceptance and for the Order of Conditions, Water Quality Certifications, and other regulatory permits as required.

Passive Rock Dowel Design

Rock Mechanics Engineer shall provide design of passive rock dowels for the purpose of stabilizing individual rock blocks identified during construction. Passive rock dowel design should indicate the following:

- *Drill hole diameter*
- *Drill hole location*
- *Drill hole length (bond & free-stress)*
- *Anchor bar diameter*
- *Centralizer type and spacing*
- *Dowel head assembly and lock-off procedure*
- *Passive Rock Dowel Design Load & Lock-off Load*
- *Construction details including test locations*

ITEM 912.103 (Continued)

Passive Rock Dowel Construction Oversight

Rock Mechanics Engineer, or their designee, shall perform continuous oversight of all passive rock anchor installation and testing. Passive rock dowel construction oversight should provide documentation of the following for each anchor:

- Drill start date
- Grout date
- *Drill hole diameter*
- *Drill hole location*
- *Drill hole length (bond & free-stress)*
- *Anchor bar diameter*

For all passive rock dowel tests, provide documentation of the testing data listed under Item 912.102.

SCOPE OF WORK

In the event of discrepancies, the Rock Mechanics Engineer shall submit a Request for Information (RFI) to the Engineer.

General

The Rock Mechanics Engineer shall be responsible for the following:

- Review and have a comprehensive knowledge of previous rock mechanics engineering performed for this project.
- Observe final rock cut for the presence of unstable blocks of rock requiring stabilization.
- Design passive rock dowels to support unstable rock blocks.
- Observe installation and testing of rock dowels.

METHOD OF MEASUREMENT

Item 912.103, Rock Mechanics Engineer, will be measured for payment by hour, spent on-site to perform the work. Decimal measurement Limits will be 0.25 hours.

BASIS OF PAYMENT

Item 912.103, Rock Mechanics Engineer, will be paid for at the Contractor unit price per hour, or fraction thereof, spent on-site to perform the work as described above. Reports and photo documentation are required for payment.

The unit price will include all inspections, photos, submittals, and associated tasks for rock cut oversight, passive rock dowel design and passive rock dowel installation and testing.

ITEM 996.01**WALL STRUCTURE, WALL NO. 1****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 the component parts of this Item. For those component parts where no specific requirement is stipulated, the Standard Specifications shall apply except for payment.

Work under this Item shall include all materials, equipment and labor needed to construct the retaining wall.

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of this wall 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.

5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE

The work to be done under this heading shall conform to the relevant provisions of Section 901 of the Supplemental Specifications, the Standard Special Provisions, and the following:

5000 psi, 3/4 in., 685 HP Cement Concrete shall be used for the footings and wall stem.

The labor and materials associated with the following items shall be considered as included in the unit price per cubic yard of concrete, as stated by the Contractor and as approved by the Engineer in the respective "Basis for Partial Payments": all waterstops, preformed and premolded filler, joint sealer, materials complete in place at construction joints, caulking, closed cell foam, membrane waterproofing and protective course, weep holes with stone at ends, Form liners and all other work considered as incidental to the work involved in furnishing, placing, finishing and curing the concrete to the lines and grades on the plans. Also included is the delivery of concrete to the job site, installation of concrete to the lines and grades on the plans and all other work not covered in the Schedule of Basis for Partial Payments or for which payment is not provided elsewhere in the Contract. There are no precast elements on this project.

SCHEDULE BASIS FOR PARTIAL PAYMENT

Within ten (10) days after the 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 996.01 as well as his/her total wall structure Lump Sum cost for Wall Structure, Wall No. 1. The wall 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 wall components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 996.01 and no further compensation will be allowed.

ITEM 996.01 (Continued)

The schedule on the proposal form applies only to Wall Structure, Wall No. 01. Payment for similar materials and construction at locations other than at this wall structure shall not be included under this Item. Sub-Item numbering is presented for information only in coordination with MassDOT Standard Nomenclature.

Sub-Item	Description	Quantity	Units	Unit Price	Amount
904.3	5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE	136	CY		
910.1	STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED	4500	LB		
970.	DAMP-PROOFING	38	SF		
LUMP SUM BID PRICE OF ITEM 996.01 =					

Excavation for retaining wall shall be paid for under item 140. Bridge Excavation.

Gravel borrow for retaining wall foundation shall be paid for under item 151.1 Gravel Borrow For Bridge Foundation.

Gravel borrow for backfilling shall be paid for under Item 151.2 Gravel Borrow for Backfilling Structures and Pipes.

ITEM 996.02**WALL STRUCTURE, WALL NO. 2****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 the component parts of this Item. For those component parts where no specific requirement is stipulated, the Standard Specifications shall apply except for payment.

Work under this Item shall include all materials, equipment and labor needed to construct the retaining wall.

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of this wall 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.

5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE

The work to be done under this heading shall conform to the relevant provisions of Section 901 of the Supplemental Specifications, the Standard Special Provisions, and the following:

5000 psi, 3/4 in., 685 HP Cement Concrete shall be used for the footings and wall stem.

The labor and materials associated with the following items shall be considered as included in the unit price per cubic yard of concrete, as stated by the Contractor and as approved by the Engineer in the respective "Basis for Partial Payments": all waterstops, preformed and premolded filler, joint sealer, materials complete in place at construction joints, caulking, closed cell foam, membrane waterproofing and protective course, weep holes with stone at ends, Form liners and all other work considered as incidental to the work involved in furnishing, placing, finishing and curing the concrete to the lines and grades on the plans. Also included is the delivery of concrete to the job site, installation of concrete to the lines and grades on the plans and all other work not covered in the Schedule of Basis for Partial Payments or for which payment is not provided elsewhere in the Contract. There are no precast elements on this project.

SCHEDULE BASIS FOR PARTIAL PAYMENT

Within ten (10) days after the 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 996.02 as well as his/her total wall structure Lump Sum cost for Wall Structure, Wall No. 2. The wall 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 wall components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 996.02 and no further compensation will be allowed.

ITEM 996.02 (Continued)

The schedule on the proposal form applies only to Wall Structure, Wall No. 02. Payment for similar materials and construction at locations other than at this wall structure shall not be included under this Item. Sub-Item numbering is presented for information only in coordination with MassDOT Standard Nomenclature.

Sub-Item	Description	Quantity	Units	Unit Price	Amount
904.3	5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE	248	CY		
910.1	STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED	7900	LB		
970.	DAMP-PROOFING	66	SF		
LUMP SUM BID PRICE OF ITEM 996.02 =					

Excavation for retaining wall shall be paid for under item 140. Bridge Excavation.

Gravel borrow for retaining wall foundation shall be paid for under item 151.1 Gravel Borrow For Bridge Foundation.

Gravel borrow for backfilling shall be paid under Item 151.2 Gravel Borrow for Backfilling Structures and Pipes.

ITEM 996.03**WALL STRUCTURE, WALL NO. 3****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 the component parts of this Item. For those component parts where no specific requirement is stipulated, the Standard Specifications shall apply except for payment.

Work under this Item shall include all materials, equipment and labor needed to construct the retaining wall.

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of this wall 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.

5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE

The work to be done under this heading shall conform to the relevant provisions of Section 901 of the Supplemental Specifications, the Standard Special Provisions, and the following:

5000 psi, 3/4 in., 685 HP Cement Concrete shall be used for the footings and wall stem.

The labor and materials associated with the following items shall be considered as included in the unit price per cubic yard of concrete, as stated by the Contractor and as approved by the Engineer in the respective "Basis for Partial Payments": all waterstops, preformed and premolded filler, joint sealer, materials complete in place at construction joints, caulking, closed cell foam, membrane waterproofing and protective course, weep holes with stone at ends, Form liners and all other work considered as incidental to the work involved in furnishing, placing, finishing and curing the concrete to the lines and grades on the plans. Also included is the delivery of concrete to the job site, installation of concrete to the lines and grades on the plans and all other work not covered in the Schedule of Basis for Partial Payments or for which payment is not provided elsewhere in the Contract. There are no precast elements on this project.

SCHEDULE BASIS FOR PARTIAL PAYMENT

Within ten (10) days after the 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 996.03 as well as his/her total wall structure Lump Sum cost for Wall Structure, Wall No. 3. The wall 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 wall components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 996.03 and no further compensation will be allowed.

ITEM 996.03 (Continued)

The schedule on the proposal form applies only to Wall Structure, Wall No. 3. Payment for similar materials and construction at locations other than at this wall structure shall not be included under this Item. Sub-Item numbering is presented for information only in coordination with MassDOT Standard Nomenclature.

Sub-Item	Description	Quantity	Units	Unit Price	Amount
904.3	5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE	629	CY		
910.1	STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED	57,500	LB		
970.	DAMP-PROOFING	178	SF		
LUMP SUM BID PRICE OF ITEM 996.03 =					

Excavation for retaining wall shall be paid for under item 140. Bridge Excavation.

Gravel borrow for retaining wall foundation shall be paid for under item 151.1 Gravel Borrow For Bridge Foundation.

Gravel borrow for backfilling shall be paid under Item 151.2 Gravel Borrow for Backfilling Structures and Pipes.

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DETAIL SHEETS

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PAVEMENT NOTES (Continued)

PROPOSED MILL & OVERLAY

SURFACE: 1.50" SUPERPAVE SURFACE COURSE 9.5 POLYMER (SSC-9.5-P)
OVER

INTERMEDIATE: 2.00" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5) OVER
VARIABLE DEPTH PAVEMENT STANDARD MILLING AND
SUPERPAVE LEVELING COURSE 12.5 (SLC-12.5) WHERE
REQUIRED

PROPOSED FULL DEPTH PERMANENT TRENCH PATCH

SURFACE: 3.00" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER
3.00" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER
SUBBASE: 12" GRAVEL BORROW - TYPE B OVER COMPACTED TRENCH
BACKFILL

PROPOSED TEMPORARY TRENCH PATCH

SURFACE: 3" HOT MIX ASPHALT OVER
SUBBASE: 8" GRAVEL BORROW - TYPE B OVER COMPACTED TRENCH BACKFILL

PROPOSED BOX WIDENING LESS THAN 4 FEET

SURFACE: 1.50" SUPERPAVE SURFACE COURSE 9.5 POLYMER (SSC-9.5-P)
OVER
INTERMEDIATE: 2.00" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5) OVER
BASE: 6.00" CEMENT CONCRETE BASE COURSE OVER
SUBBASE: 8" GRAVEL BORROW - TYPE B OVER
EXISTING SUBGRADE FINE GRADED AND COMPACTED

PAVEMENT NOTES (Continued)

PROPOSED HOT MIX ASPHALT DRIVEWAYS

SURFACE: 1.50” SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER
 2.50” SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5) OVER

SUBBASE: 8" GRAVEL BORROW - TYPE B

PROPOSED GRAVEL TURNOUT

SURFACE: 12” GRAVEL BORROW – TYPE B OVER

SUBBASE: EXISTING SUBGRADE FINE GRADED AND COMPACTED

ITEM 101. CLEARING AND GRUBBING

<u>Street</u>	<u>Station</u>	<u>Offset</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	11+74	LT		11+84	LT
West Main St	12+83	LT		17+00	LT
West Main St	11+80	RT		19+00	RT
West Main St	19+22	LT		23+46	LT
West Main St	21+31	RT		21+90	RT
West Main St	23+28	RT		24+35	RT
West Main St	25+15	LT		26+95	LT
West Main St	25+38	RT		25+86	RT
West Main St	28+95	LT		29+05	LT
West Main St	29+00	RT		31+95	RT
West Main St	31+61	LT		33+14	LT
West Main St	33+70	LT		36+45	LT
West Main St	37+65	LT		38+05	LT
West Main St	38+45	LT		40+30	LT
West Main St	40+56	LT		47+70	LT
West Main St	45+10	LT		47+50	RT
West Main St	48+76	RT		49+02	RT
West Main St	49+00	LT		52+00	LT
West Main St	52+60	LT		55+55	LT
West Main St	56+04	RT		58+20	RT
West Main St	56+50	LT		64+39	LT
West Main St	59+95	RT		61+55	RT
West Main St	61+73	RT		65+25	RT

ITEM 102.523 TREE AND PLANT PROTECTION – VISIBILITY STAKES

This item is to be used along the access route to the wetland replication area at Station 58+00 RT and as directed by the Engineer.

ITEM 104. TREE REMOVED – DIAMETER 24 INCHES AND OVER

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main St	28+68	RT

ITEM 120. EARTH EXCAVATION

For roadway reconstruction.
 For driveway reconstruction (Item 702.)
 For removing existing stone walls.

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	22+39		22+82	RT
West Main St	23+32		23+75	RT
West Main St	23+82		23+86	RT
West Main St	25+43		25+74	RT
West Main St	29+33		31+41	RT

ITEM 122. PRESPLITTING ROCK

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	44+10		44+30	LT
West Main St	44+75		46+95	LT
West Main St	62+30		63+60	RT
West Main St	62+25		64+20	LT

ITEM 140. BRIDGE EXCAVATION

This item is to be used for retaining wall excavation.

ITEM 141. CLASS A TRENCH EXCAVATION

This item is to be used for construction of cement concrete headwalls.

ITEM 144. CLASS B ROCK EXCAVATION

This item is to be used for rock encountered in the excavation for drainage pipe (Item 241.12), drainage structures (Items 201., 202., 203., 206.1, and 209.1), removal of existing headwalls, and as a contingency for rock encountered during the installation of guardrail posts.

ITEM 146. DRAINAGE STRUCTURE REMOVED

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main St	11+84	RT
West Main St	13+28	RT
West Main St	14+57	RT
West Main St	16+61	RT
West Main St	20+02	RT
West Main St	24+41	RT
West Main St	25+45	RT
West Main St	43+40	LT

ITEM 151. GRAVEL BORROW

For base of HMA driveways and waterway (Items 702., 280.).
 For full depth reconstruction, widening, curb, and gravel turnouts.
 To be used under stone for pipe ends with basin (Item 258.)

ITEM 151.1 GRAVEL BORROW FOR BRIDGE FOUNDATION

This item is used under the wall footing where directed by the Resident Engineer. It is used only when unsuitable foundation material is encountered and is placed 12" thick min.

ITEM 151.2 GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES

This item will be used to replace unsuitable existing material during the construction of drainage structures (Items 201., 202., 203., 206.1, 209.1) and drainage pipes (Item 241.12) and for backfilling retaining walls.

ITEM 156. CRUSHED STONE

A 12-inch-thick dense packed stone pad for each new drainage structure (Items 201., 202., 203., 206.1, 209.1).
 For 6" deep pad at base of rock cuts and to be placed under rockfill.
 For retaining wall weep holes.

ITEM 170. FINE GRADING AND COMPACTING – SUBGRADE AREA

For widening less than 4 ft (Item 430.), HMA driveways (Item 702.), full depth reconstruction and box widening greater than 4 ft (Item 450.221), and HMA paved waterways (Item 280.)

ITEM 201.**CATCH BASIN**

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main St	11+86	RT
West Main St	13+00	RT
West Main St	14+50	RT
West Main St	14+68	RT
West Main St	16+05	LT
West Main St	16+50	RT
West Main St	16+85	RT
West Main St	24+00	RT
West Main St	24+30	LT
West Main St	26+65	LT
West Main St	29+00	LT
West Main St	32+02	RT
West Main St	32+12	LT
West Main St	35+41	RT
West Main St	35+59	RT
West Main St	39+20	RT
West Main St	43+08	RT
West Main St	44+09	LT
West Main St	48+76	RT
West Main St	78+76	LT
West Main St	51+00	LT
West Main St	55+14	RT
West Main St	57+95	LT
West Main St	58+10	RT

ITEM 202.**MANHOLE**

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main St	11+79	RT
West Main St	14+53	RT
West Main St	16+61	RT
West Main St	16+60	LT
West Main St	20+03	RT
West Main St	24+41	RT
West Main St	24+41	LT
West Main St	32+02	LT
West Main St	35+50	RT
West Main St	43+08	LT
West Main St	44+00	LT
West Main St	48+85	RT
West Main St	48+85	LT
West Main St	55+23	RT
West Main St	13+29	RT

ITEM 203. **SPECIAL MANHOLE**

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main St	57+95	RT

ITEM 206.1 **DROP INLET, TYPE AF**

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main St	20+15	RT
West Main St	44+00	LT
West Main St	48+85	LT

ITEM 209.1 **DROP INLET, TYPE DF**

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main St	25+38	RT

ITEM 220. **DRAINAGE STRUCTURE ADJUSTED**

All proposed new structures and existing structures to remain located within the limits of roadway pavement are to be adjusted to finished grade (Items 201., 202., 203., 206.1, 209.1).

ITEM 221. **FRAME AND COVER**

This item is to be used for proposed manholes (Items 202., 203.).

ITEM 222.1 **FRAME AND GRATE – MASSDOT CASCADE TYPE**

This item is to be used for proposed catch basins (Item 201.).

ITEM 222.2 **FRAME AND GRATE – MASSDOT DROP INLET**

This item is to be used for proposed drop inlets (Items 206.1, 209.).

ITEM 223.1 **FRAME AND GRATE (OR COVER) REMOVED AND STACKED**

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main St	11+84	RT
West Main St	13+28	RT
West Main St	14+57	RT
West Main St	16+61	RT
West Main St	20+02	RT
West Main St	24+41	RT
West Main St	25+45	RT
West Main St	43+40	LT

ITEM 227.3 **REMOVAL OF DRAINAGE STRUCTURE SEDIMENT**

For removal of sediment in existing structures (Item 146.).

For removal of sediment at headwalls.

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main St	13+40	LT
West Main St	24+40	LT
West Main St	41+30	RT
West Main St	41+50	LT
West Main St	60+80	RT
West Main St	70+45	RT

ITEM 227.31 **REMOVAL OF DRAINAGE PIPE SEDIMENT**

<u>Street</u>	<u>Station</u>	<u>Offset</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	16+60	LT		16+61	RT
West Main St	19+92	LT		20+03	RT
West Main St	24+41	LT		24+41	RT
West Main St	55+22	LT		55+24	RT
West Main St	57+75	LT		58+00	RT
West Main St	61+10	RT		60+81	LT
West Main St	70+53	LT		70+46	RT

ITEM 242.12 **12 INCH REINFORCED CONCRETE PIPE FLARED END**

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main St	11+79	LT
West Main St	29+00	LT
West Main St	35+35	LT
West Main St	38+96	LT
West Main St	43+08	LT

ITEM 258. **STONE FOR PIPE ENDS**

For drainage outlets.

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main St	11+79	LT
West Main St	13+38	LT
West Main St	29+00	LT
West Main St	32+03	LT
West Main St	35+35	LT
West Main St	38+94	LT
West Main St	41+50	LT
West Main St	43+08	LT
West Main St	48+85	RT
West Main St	58+00	RT

For stone lined drainage swales.

<u>Street</u>	<u>Station</u>	<u>Offset</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	20+15	RT		21+86	RT
West Main St	28+35	RT		31+50	RT

For proposed check dams in stone lined drainage swale (Item 258.).

ITEM 280. **HOT MIX ASPHALT WATERWAY**

<u>Street</u>	<u>Station</u>	<u>Offset</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	21+85	RT		22+00	RT
West Main St	47+58	LT		47+70	LT
West Main St	69+81	RT		69+93	RT

ITEM 402. **DENSE GRADED CRUSHED STONE FOR SUB-BASE**

This item is to be used in areas of full depth reconstruction and box widening greater than 4 ft.

ITEM 402.13 **PAVEMENT MILLING MULCH FOR SHOULDERS**

<u>Street</u>	<u>Station</u>	<u>Offset</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	10+16	LT		12+96	LT
West Main St	10+16	RT		33+43	RT
West Main St	17+50	LT		18+71	LT
West Main St	23+28	LT		25+26	LT
West Main St	33+44	LT		40+65	LT
West Main St	43+45	RT		45+20	RT
West Main St	43+38	LT		56+52	LT
West Main St	49+50	RT		56+49	RT
West Main St	61+37	RT		71+00	RT
West Main St	62+18	LT		71+00	LT

Excludes milling mulch required under guardrail (Item 769.)

ITEM 415.1 **PAVEMENT STANDARD MILLING**

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>
West Main St	10+16		33+00
West Main St	41+00		45+75
West Main St	47+00		57+00
West Main St	59+25		63+50
West Main St	65+25		67+50
West Main St	69+57		71+00

ITEM 430. **CEMENT CONCRETE BASE COURSE**

This item is to be used in areas of box widening less than 4 ft.

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	28+14		30+06	LT
West Main St	41+00		42+34	RT
West Main St	55+92		57+00	LT
West Main St	69+57		70+52	RT

ITEM 450.221 **SUPERPAVE SURFACE COURSE - 9.5 POLYMER (SSC – 9.5 - P)**

A 1.5-inch surface course for mill & overlay and box widening less than 4 ft (Item 415.1, 430.)

A 1.5-inch surface course for full depth reconstruction.

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	10+86		28+14	LT
West Main St	10+57		33+00	RT
West Main St	30+06		33+00	LT
West Main St	33+00		41+00	
West Main St	41+00		45+75	LT
West Main St	42+37		45+75	RT
West Main St	45+75		47+00	
West Main St	47+00		59+92	LT
West Main St	47+00		57+00	RT
West Main St	57+00		59+25	
West Main St	59+25		63+50	LT
West Main St	59+25		63+50	RT
West Main St	63+50		65+25	
West Main St	65+25		67+50	LT
West Main St	65+25		67+50	RT
West Main St	67+50		69+57	

ITEM 450.31 SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC - 12.5)

A 2.0-inch intermediate course for mill & overlay, full depth reconstruction, box widening greater than 4 ft, and box widening less than 4 ft (Items 415.1, 450.221, 430.)

A 2.0-inch intermediate course under HMA Berm and curb (Item 470.).

ITEM 450.42 SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)

A 4.0-inch base course for full depth reconstruction

ITEM 450.53 SUPERPAVE LEVELING COURSE - 12.5 (SLC - 12.5)

For leveling course adjacent to full widening.

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	10+50		11+50	LT
West Main St	13+90		14+25	LT
West Main St	17+10		19+20	LT
West Main St	20+60		21+60	LT
West Main St	23+50		26+60	LT
West Main St	25+80		26+80	RT
West Main St	27+75		28+75	LT
West Main St	28+75		29+80	RT
West Main St	31+75		32+25	LT
West Main St	41+25		42+60	LT
West Main St	44+80		45+75	RT
West Main St	47+00		48+00	RT
West Main St	53+00		54+75	RT
West Main St	59+40		59+60	LT
West Main St	60+50		61+25	LT
West Main St	66+75		67+15	LT
West Main St	69+75		70+25	LT

For leveling course under full depth width of overlay.

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>
West Main St	14+25		14+90
West Main St	16+40		17+10
West Main St	19+90		20+60

ITEM 451. HMA FOR PATCHING

This item is to be used for permanent patching for pipe work in existing pavement.

ITEM 452. ASPHALT EMULSION FOR TACK COAT

This item is to be applied for full depth reconstruction, box widening less than 4 ft, and HMA driveway areas (Items 450.22, 430., 702.), for mill & overlay areas (Item 415.1), and HMA patches (Item 451.).

Tack coat application rates for specific surface conditions shall be in accordance with the following:

- a. On a new HMA surface, not opened to traffic, the emulsion application rate shall equal 0.06 to 0.08 gallons per square yard.
- b. On an existing tight smooth pavement the emulsion application rate shall equal 0.06 to 0.08 gallons per square yard.
- c. On a milled surface the emulsion application rate shall equal 0.07 to 0.09 gallons per square yard.
- d. On cement concrete base course the emulsion application rate shall be equal to spray application for adjacent surface.
- e. On new HMA patches the emulsion application rate shall equal 0.06 to 0.09 gallons per square yard.

ITEM 453. HMA JOINT ADHESIVE

Applied at the limits of work, limits of full depth reconstruction, and at longitudinal pavement joints.

ITEM 470. HOT MIX ASPHALT BERM

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	35+40		45+20	RT
West Main St	55+10		61+40	RT

ITEM 470.2 HOT MIX ASPHALT BERM, TYPE A - MODIFIED

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	26+60		33+57	LT
West Main St	47+70		55+00	LT
West Main St	48+65		52+30	RT
West Main St	67+98		69+81	RT

ITEM 472. TEMPORARY ASPHALT PATCHING

This item is to be used at limits of work, around raised structures (Items 201., 202., 203.) for temporary patches for drainage work and for temporary patches needed to maintain two-way traffic during construction.

ITEM 477.2 MILLED RUMBLE STRIP (TYPE C)

This item is to be used for centerline rumble strip (Item 867.206).

ITEM 482.5 **SAWCUTTING ASPHALT PAVEMENT FOR BOX WIDENING**

<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
10+86		33+00	LT
10+57		33+00	RT
41+00		45+75	LT
41+00		45+75	RT
47+00		57+00	LT
47+00		57+00	RT
59+25		63+50	LT
59+25		63+50	RT
65+25		67+50	LT
65+25		67+50	RT

ITEM 570.2 **HOT MIX ASPHALT CURB TYPE 2**

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	11+40		19+89	RT
West Main St	22+00		25+08	RT

ITEM 630.2 **HIGHWAY GUARD REMOVED AND DISCARDED**

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	13+02		17+20	LT
West Main St	18+96		23+29	LT
West Main St	25+26		27+30	LT
West Main St	27+77		33+44	LT
West Main St	33+32		43+22	RT
West Main St	40+97		43+57	LT
West Main St	46+56		49+28	RT
West Main St	56+51		62+23	LT
West Main St	56+49		59+79	RT
West Main St	59+95		62+14	RT

ITEM 691.1 BALANCE STONE WALL REMOVED AND STACKED

<u>Street</u>	<u>Station</u>	<u>Station</u>	<u>Offset</u>
West Main St	22+00	22+57	RT
West Main St	23+32	23+75	RT
West Main St	23+82	23+86	RT
West Main St	25+40	25+74	RT
West Main St	29+33	31+41	RT

ITEM 697.1 SILT SACK

This item is to be used for drainage control for all existing and proposed catch basins or drop inlets as directed by the Resident Engineer.

ITEM 698.3 GEOTEXTILE FABRIC FOR SEPARATION

This item is to be used under stone for pipe ends with basin.

ITEM 698.31 GEOTEXTILE FABRIC FOR TEMPORARY SOIL PROTECTION

This item is to be used as needed for associated wetland restoration work and as directed by the Engineer for temporary soil protection.

ITEM 698.4 GEOTEXTILE FABRIC FOR PERMANENT EROSION CONTROL

This item is to be used under stone lined drainage swale (Item 258.).

ITEM 702. HOT MIX ASPHALT SIDEWALK OR DRIVEWAY

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	25+08		25+39	RT
West Main St	67+03		67+50	LT
West Main St	69+60		70+10	LT

ITEM 711. BOUND REMOVED AND RESET

Item is for bounds relocated during construction.

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main St	30+30	RT
West Main St	43+50	RT
West Main St	62+33	RT
West Main St	62+35	LT

ITEM 751. **LOAM FOR ROADSIDES**

A 4-inch thick layer of loam borrow is required as shown on the Construction Plans and as directed by the Engineer.

<u>Street</u>	<u>STA</u>	<u>to</u>	<u>STA</u>	<u>Offset</u>
West Main St	64+27		67+06	LT

ITEM 751.7 **COMPOST BLANKET**

This item is to be used for disturbed slopes in rural areas of the project.

ITEM 751.765 **COMPOST AND SEED OVER MODIFIED ROCK**

Item to be used over modified rockfill slope (Item 986.).

ITEM 755.35 **INLAND WETLAND REPLICATION AREA**
ITEM 755.75 **WETLAND SPECIALIST**
ITEM 755.76 **WETLAND MONITORING REPORTS**

For wetland replication area at Station 58+00+/- RT.

ITEM 755.45 **WETLAND RESTORATION**

For the wetland restoration areas at Station 61+00+/- LT.

ITEM 755.50 **LAND UNDER WATER & BANK RESTORATION**

For the natural bank and land under water restoration as directed by the Engineer.

ITEM 765. **SEEDING**

Seeding to take place at all areas of proposed Loam for Roadsides (Item 751.).

ITEM 765.21 **ANNUAL COVER CROP FOR NATIVE SEEDING**

This item it to be used in conjunction with item 765.411.

ITEM 765.411 **SEEDING - LOW UPLAND MIX**

Seeding to take place over modified rockfill slope (Item 986.) and in areas of compost blanket and native seed (Item 751.7).

ITEM 765.635 **NATIVE SEEDING AND ESTABLISHMENT**

This item it to be used in conjunction with item 765.411.

ITEM 767.9 **JUTE MESH**

To be used as required to establish seeding on steep slopes.

ITEM 769. **PAVEMENT MILLING MULCH UNDER GUARD RAIL**

Pavement milling mulch to be placed under guardrail and end treatments. (Items 620.13, 620.131, and 627.83)

ITEM 799.21 **TREE – DECIDUOUS 4-5 FT**

This item to be used as directed by the Engineer.

ITEM 816.81 **TEMPORARY TRAFFIC CONTROL SIGNAL**

Item is to be used for retaining wall construction.

ITEM 829. **ROADSIDE GUIDE SIGN (G) – ALUMINUM PANEL (TYPE B)**

<u>Street</u>	<u>Station</u>	<u>Offset</u>	<u>Designation</u>
West Main Street	16+23.32	LT	MA-D1-7

ITEM 841.8 **SUPPORTS FOR GUIDE SIGN (D6 - SPECIAL DESIGN) STEEL**

<u>Street</u>	<u>Station</u>	<u>Offset</u>	<u>Designation</u>
West Main Street	16+23	LT	MA-D1-7

ITEM 854.016 **TEMPORARY PAVING MARKINGS – 6 INCH (PAINTED)**

This item is to be used to reproduce all pavement marking on milled surface and intermediate course, including side street, crosswalks, and stop lines.

ITEM 854.036 **TEMPORARY PAVING MARKINGS – 6 INCH (TAPE)**

This item is to be used for temporary centerline on surface course prior to application of permanent pavement markings.

ITEM 854.1 **PAVEMENT MARKING REMOVAL**

This item is to be used during retaining wall construction.

ITEM 856.12 PORTABLE CHANGEABLE MESSAGE SIGN

This item is to be used as directed by the Engineer.

**ITEM 859. REFLECTORIZED DRUM
ITEM 859.1 REFLECTORIZED DRUMS WITH SEQUENTIAL FLASHING
WARNING LIGHTS**

These items are to be used as directed by the Engineer.

**ITEM 864.35 SLOTTED PAVEMENT MARKER TWO-WAY
YELLOW/YELLOW**

This item is to be used along a double yellow, or a broken double yellow centerline at an interval of 40 feet.

**ITEM 866.206 6 INCH REFLECTORIZED WHITE LINE (POLYUREA)
(RECESSED)**

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	10+16		71+00	LT
West Main St	10+16		71+00	RT

ITEM 867.306 6 INCH REFLECTORIZED YELLOW LINE (POLYUREA)

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>
West Main St	10+16		71+00

ITEM 874.2 TRAFFIC SIGN REMOVED AND RESET

<u>Street</u>	<u>Station</u>	<u>Offset</u>
West Main Street	20+80	RT

**ITEM 874.4 TRAFFIC SIGN REMOVED AND STACKED
ITEM 874.41 TRAFFIC SIGN REMOVED AND DISCARDED**

As shown on the Traffic Sign and pavement marking plans and as directed by the Engineer.

ITEM 901. 4000 PSI, 1.5 IN., 565 CEMENT CONCRETE

This item is to be used for cement concrete headwalls.

**ITEM 910.1 STEEL REINFORCEMENT FOR STRUCTURES – EPOXY
COATED**

This item is to be used for cement concrete headwalls.

ITEM 912.101
ITEM 912.102
ITEM 912.103

PASSIVE ROCK DOWELS
PROOF TESTING OF PASSIVE ROCK DOWELS
ROCK MECHANICS ENGINEER

These items are to be used for rock cuts as directed by the Engineer.

ITEM 986. **MODIFIED ROCKFILL**

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	12+90		13+80	RT
West Main St	14+85		15+15	RT
West Main St	21+86		22+85	RT
West Main St	29+20		31+80	RT
West Main St	23+15		24+30	RT

ITEM 996.01 **WALL STRUCTURE, WALL NO. 01**

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	31+10		32+50	LT

ITEM 996.02 **WALL STRUCTURE, WALL NO. 02**

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	41+05		43+02	LT

ITEM 996.03 **WALL STRUCTURE, WALL NO. 03**

<u>Street</u>	<u>Station</u>	<u>to</u>	<u>Station</u>	<u>Offset</u>
West Main St	57+60		61+40	RT

DOCUMENT A00810

MASSDOT HERBICIDE USE REPORT

MassDOT Herbicide Use Report

Date Submitted:

Use multiple sheets for multiple application techniques or sites as needed.

Contractor Performing Work:

Project or Contract No:

Town/s:

Associated Route:

Project Description:

Treatment Description:

Area Treated (as applicable)

Acres:

Sq Yds:

Miles:

Weeds Targeted:

Gallons Formula Used:

Date/Time Began:

Application Method:

Date/Time End:

Product Used:

Name: _____
 EPA Reg. No: _____
 % Active Ingredient
 Dry: _____
 Liquid: _____
 Formulation (dilution rate): _____

Name: _____
 EPA Reg. No: _____
 % Active Ingredient
 Dry: _____
 Liquid: _____
 Formulation (dilution rate): _____

Name: _____
 EPA Reg. No: _____
 % Active Ingredient
 Dry: _____
 Liquid: _____
 Formulation (dilution rate): _____

Additional products used (surfactants, etc.) or other information:

Applicators:

License Numbers:

Upon completion, please submit form to MassDOT District Engineer and Landscape Design Section in Boston office.
11-16-2017



WORK ZONE SAFETY

Temporary Traffic Control

*Typical Details and
Massachusetts Guidelines
for MassDOT, Municipalities,
Utilities, and Contractors*

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INTRODUCTION

This guide has been prepared to assist in the planning and installing of temporary traffic controls in maintenance, utility, or short-term construction work areas (work lasting 10 hours or less). This guide serves to assist with the many decisions that must be made for each work site. Special planning for traffic control is necessary on a case by case basis because conditions can vary widely among work locations. **Since this guide cannot cover every situation, representative illustrations covering typical short-term construction, maintenance, and utility operations are presented.**

All typical traffic control device setups illustrated should be considered as guides. The traffic control devices that are shown, the arrangement or position of the devices, and the distances prescribed in the tables are based on the Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) and the Massachusetts Amendments to the MUTCD (MA Amendments), but these illustrations only present minimum standards. The provision of safe work zones for all roadway users and roadway workers affected by these activities is paramount. Traffic controls may be expanded or improved upon whenever deemed necessary. Traffic movement through the work site all traffic control devices shall be periodically observed and inspected at all locations.

If necessary, Part 6 of the MUTCD and the MA Amendments, Chapter 17 (Work Zone Management) of MassDOT's Project Development & Design Guide, and the "Traffic Engineering and Safety Section" of the MassDOT web site: (<https://www.massdot.state.ma.us/highway/Departments/TrafficandSafetyEngineering.aspx>), as well as MassDOT District offices can provide additional guidance, information, and suggestions for work zone setups.

RESPONSIBILITIES FOR TRAFFIC CONTROL

Short-term construction, maintenance, and utility work on or near the roadway creates a potentially hazardous situation, typically requiring the use of temporary traffic controls. These controls are important to protect both work crews and the road users. It is the responsibility of each maintenance foreman to establish and maintain safe and effective controls.

Usually the supervisor, working with the crew, plans the traffic control procedures for proposed work sites. The foreman is responsible for re-requesting, storing, and maintaining all traffic control devices necessary for their crews.

The foreman is responsible for placing the devices according to these guidelines. They must inspect each installation and observe traffic flow through the area. The foreman is generally authorized to make adjustments to the original installations that, in their judgment, are necessary to improve the control of traffic and establish greater safety.

All necessary traffic control devices must be installed before work begins and properly maintained during the work period. They must also be removed as soon as they are no longer relevant to the roadway conditions.

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In situations such as night time road or lane closures, detours, or other unusual conditions on state highways, the District Traffic Maintenance Engineer (DTME) should be advised. If the DTME is absent, the section foreman shall follow the instructions of the District Maintenance Engineer.

TRAFFIC CONTROL DEVICES

Traffic control devices regulate the movement of road users, warn of unexpected or unusual roadway conditions, and inform them how to maneuver safely through or around the work area. All signs, channelizing devices, barricades, and other miscellaneous traffic control devices should work together to guide traffic safely and efficiently. Common temporary traffic control devices are outlined and described below.

Signs

Temporary traffic control zone (TTCZ) signs are the primary means of providing information and directions to roadway users. All signs must be retroreflective per MassDOT's latest standard.

Warning signs call attention to unexpected conditions and to situations that might not be readily apparent to road users on or adjacent to a roadway. Warning signs alert road users to conditions that might call for a reduction of speed or an action in the interest of safety and efficient traffic operations. Nearly all warning signs for construction and work areas have black legends and borders on a fluorescent orange background.

Regulatory signs shall be used to inform road users of selected traffic laws or regulations and indicate the applicability of the legal requirements. Regulatory signs typically have black legends and borders on a white background.

Channelizing Devices

When used properly, traffic cones, reflectorized plastic drums, and barricades guide traffic through the work area along an appropriate travel path. It takes roadway users a certain distance along the roadway to safely move away from the upcoming active work site. These transition distances are based on the following taper length (L) formulas:

$L = WS^2/60$ for speeds of 40 mph or less; or

$L = WS$ for speeds of 45 mph or more; where

- L = minimum length of taper in feet,
- S = posted speed limit or typical travel speed in miles per hour prior to the work, and
- W = width of lane closure in feet.

The spacing of channelizing devices (in feet) is approximately equal to the existing speed of traffic (in mph).

Warning Lights

Rotating beacons and other flashing lights mounted on work vehicles, signs, or channelizing devices help alert roadway users to the work area. They may also be used to warn roadway users of hazards within the work area. The first 10 drums in any taper shall be equipped with sequential flashing lights.

Arrow Boards

Arrow boards are a special type of sign that are highly visible work zone warning devices. They are particularly effective on highways, where both speed and volume are high. Arrow boards in the non-directional, CAUTION, mode (four corner flashing) may be used to indicate that a shoulder is closed. Arrow boards in the arrow mode shall only be used when a travel lane is dropped on a multi-lane road and one lane of traffic must merge with another. All arrow boards should be located at the beginning of each lane or shoulder closure taper without extending outside of it. Arrow boards shall flash at a rate of 25 to 40 flashes per minute. Arrow boards shall not be used to indicate a lane shift.

BASIC REQUIREMENTS

In every work situation, the temporary traffic control setup must: Give roadway users sufficient advance warning of the work area; advise roadway users of the proper actions to take and travel paths to follow; and provide protection to roadway users, workers, and the work area. These three general requirements can be met as outlined below.

Provide Advance Warning

Warning devices along the approaches to a work area alert roadway Users to changes to road and operating conditions. Roadway users are usually alerted to these dangers via a sign or series of signs installed in the same order as the roadway user generally would expect to see them on long-term construction projects.

The initial project limit sign is usually a general warning such as "ROAD WORK 1500 FT". Other operational warning signs then provide the roadway user with more specific information about the situation. A minimum of three advance warning signs (the initial project limit sign and two operational warning signs) is recommended when work is located on the traveled way. Warning lights and flags can be used to attract attention to the signs. A highly visible work area helps reinforce the advance warnings.

Advise and Direct Travelers

Operational warning signs provide information to the road-way user such as the type of work being performed, special conditions to watch for, or actions to take. These include signs such as, SHOULDER WORK, RIGHT LANE CLOSED, DETOUR 500 FT, ROAD CLOSED to THRU TRAFFIC, POLICE OFFICER AHEAD, etc. All of these signs must be located far enough in advance of the work area that the roadway user has sufficient time to react to them appropriately. For projects in Urban Areas, see detail: Typical Device Spacing for minimum sign spacing.

Protect Travelers, Workers, and the Work Area

The primary protection of any work area is its own visibility. Traffic cones, reflectorized plastic drums, portable breakaway barricades, etc. are used to make the work area visible and separate workers from traffic.

PAGE 4

Other devices, such as flashing lights, flags, delineators, temporary lighting, and portable changeable message signs (PCMS) can be used to provide additional emphasis and visibility.

Workers must protect themselves by being alert to their work situation, wearing safety vests and hard hats, and by facing traffic whenever possible.

Work vehicles can also add protection when they are equipped with truck mounted attenuators, rotating beacons, flashing lights, flashing arrow boards, etc. and are parked between workers and oncoming traffic. However, workers should not position themselves between two closely parked vehicles. No private personal vehicles are allowed within the work site.

PLANNING GUIDELINES

Decisions regarding selection of work area traffic control devices require a knowledge and understanding of the specifics of each work zone. As there may be vast differences between situations, three main variables need to be considered prior to determining the need for, or the selection of, traffic control devices: 1) location of work, 2) type of roadway, and 3) speed of traffic.

Compiling information about these variables will help with planning a safe work area control. Each of these variables is explained below.

Location of Work

The choice of traffic controls needed for a short-term construction, maintenance, or utility operation depends upon the work zone's location. As a general rule, the closer the active work site is to the roadway, the more control devices are needed. Work can take place:

- Away from the shoulder or edge of pavement. No special devices are needed if work is confined to an area 15 or more feet from the edge of the shoulder. A general warning sign, such as ROAD WORK AHEAD, should be used if workers and equipment must occasionally move closer to the roadway.
- On or near the shoulder/ edge of pavement. This area should be signed as if work were on the road itself, since it is part of the roadway users' recovery area. Advance warning and operational signs are needed, as well as channelization devices to direct traffic and keep the work area visible to roadway users.
- On the median of a divided highway. Work in this location may require traffic control in both directions of traffic. Advance warning and channelization devices should be used if the median is narrow.
- On the roadway. This condition requires detailed protection for workers and sufficient warning to roadway users. Advance warning must provide a general message that work is taking place as well as information about specific hazards and specific actions the roadway user must take.

TYPE OF ROADWAY

The characteristics of the roadway also have an important influence on the selection of work area traffic control. The roadway, itself, may present special hazards. You should plan for maximum protection, using the worst hazard present as your guide to signing the work area. Some general considerations are described below for road conditions.

One-way roads: A one-way road requires signage on both sides of the road if it carries two or more lanes in one direction, ensuring roadway users in all lanes are alerted and informed.

Two-way roads:

- **Undivided:** Two-way, undivided roads will usually require controls for both directions of traffic. When the active work site is well off the roadway, controls for the opposite lane may be eliminated.
- **Divided:** Work on divided multi-lane roadways can often be handled as work along a one-way road (i.e. signs are provided along both sides of the roadway along the direction affected). If the work is in the median, both directions of traffic must be controlled, and both approaches should be double signed (i.e. have all 3 advance warning signs on both sides of each direction).

EFFECTS OF SPEED ON WORK ZONES

Speed is an important consideration in the use of work area traffic control devices. As a general rule, the greater the speed of traffic approaching a work area, the greater the size, number, and spacing of control devices.

Size. The standard size for most warning signs is 36 x 36 inches on conventional roadways and 48 x 48 inches on freeways and expressways. Signs larger than the standard 36 x 36 inches may be desirable on high-speed conventional roads.

Position. Install signs far enough in advance of the work area so the roadway users have time to react to them (see charts associated with diagrams for spacing).

OTHER FACTORS

Sight Obstructions. To ensure safety, work areas must be visible. Assess the placement of the temporary traffic control devices by driving through the area, and determine if the devices can be easily seen and provide sufficient time for roadway users to react in a safe manner. Extra precaution should be enacted in areas where horizontal or vertical curves may obstruct a roadway user's clear view of road activities ahead.

Police/Flaggers. It should be noted that the MUTCD does not require police/flaggers for stationary setups. If police/flaggers are used, a police/flagger ahead sign should be used in advance of any point where the police/flagger is stationed to control road users.

PROCEDURES FOR WORK AREA TRAFFIC CONTROL

1. PLAN YOUR WORK

Inspect location of work area and its surroundings.

Analyze:

- Location of work in relation to the traveled way, intersecting road-ways, driveways, and sight distances;
- Type of roadway and traffic involved; and
- Volume and speed of traffic.

Meet and discuss the work and necessary traffic control with the crew.

Study representative illustrations in this guide to develop a temporary traffic control plan (TTCP).

Other Considerations:

- Base your traffic control plan on the premise that all roadway users are unfamiliar with the area.
- The closer the work area location is to traffic, the more controls are needed.
- Plan for maximum protection.
- Select and inspect the temporary control devices needed (including all warning signs), if they are not in good condition, REPLACE THEM!
- Then collect and transport them to the work site.
- Determine their proper placement.
- Install signs and other traffic control devices prior to allowing personnel or equipment onto the roadway.
- Make sure signs are reflective, accurate, clean, and meet specifications. Completely cover any existing permanent signs that will conflict with the messages of the new work area control signs.

2. INSTALLING/REMOVING TEMP. TRAFFIC CONTROL DEVICES

Care must be exercised when installing and removing temporary traffic control (TTC) devices. The traffic control needed to perform the operation safely is dictated by the location on the roadway the operation will occur: in a shoulder or a lane, in the left lane or right, etc. In all cases, installing TTC begins and ends as a mobile operation.

A shadow vehicle with a truck mounted attenuator (TMA) shall be used to protect workers installing and removing TTC devices on all roadways with a posted speed limit of 45 MPH or greater as directed by the engineer. TTC devices shall not be installed or removed from a shadow vehicle with a TMA. TTC devices shall be installed or removed from a work operation vehicle only and a shadow vehicle with a TMA shall be used to protect the workers installing or removing the devices.

PROCEDURES FOR WORK AREA TRAFFIC CONTROL (CONT.)

3. INSTALL TRAFFIC CONTROL DEVICES AT WORK SITE FOR LOWER SPEED (≤ 40 MPH) ROADWAYS:

- 1) All devices shall be installed in order with the flow of traffic.
- 2) Where one direction of traffic is being affected, the first sign installed should be the sign farthest from the work site, and on the same side as the work.
- 3) Where two directions of traffic are affected, install signs for opposing traffic first, starting with the sign farthest from the work area. When signs for opposing traffic have been installed, install signs on the same side as the work area, again beginning with the sign farthest from the active work site.
- 4) Once signs are in place, other traffic control devices shall be installed in the same manner as the signs.

FOR HIGHER SPEED (≥ 45 MPH) ROADWAYS:

- 1) All devices shall be installed in order with the flow of traffic.
- 2) Install all advance warning signs, beginning with the ROAD WORK XXX (W20-1) sign and ending with the END ROAD WORK/DOUBLE FINES END (MA-R2-10E) sign.
- 3) Install all signs beginning with the opposite side which will be closed (for a right lane closure; first, install all signs on the left side (shoulder) and then install all signs on the right side (shoulder). No signs shall be erected on the roadway unless delineated by traffic control devices.
- 4) If required, install shoulder taper as the mobile operation advances.
- 5) Install arrow board on the shoulder prior to the merging taper or as close to the beginning of the merging taper as possible.
- 6) Install channelizing devices to form a merging taper. Use of a shadow vehicle with a TMA during installation is required on roads with speed limits of 45 MPH or greater or as directed by the Engineer.
- 7) Install traffic control devices along the buffer space at the appropriate spacing.
- 8) Continue placing devices along the work space at the appropriate spacing.
- 9) Install devices for the termination area as necessary.
- 10) Place the shadow vehicle with a TMA in advance of the first work crew or hazard approached by motorists. Multiple shadow vehicles may be required based on the number of lane and shoulder closures implemented.

4. INSPECT WORK AREA SIGNING AND CONTROL DEVICES

- 1) Assess the placement of the temporary traffic control devices by driving through the work area. All approaches to the work zone should be checked.
- 2) Ensure roadway users will have sufficient time to read signs and react in a safe manner.

PROCEDURES FOR WORK AREA TRAFFIC CONTROL (CONT.)

- 3) Check visibility of entire work area. If approaching roadway users can't see the work area well, or if they can't see ahead to traffic that may already be queued on the approach because of the work, additional traffic control devices should be deployed.
- 4) Check to ensure the proper temporary traffic control devices are positioned to protect workers from traffic (where possible).
- 5) Ensure all workers wear safety vests, hard hats, and all other necessary safety equipment. All worker safety gear should be in good condition. All reflective gear should be clean and highly visible in the dark.
- 6) Record in the log book the number and location of all signs and devices.

Considerations:

- Work area signs should never be blocked from view or obscured by vegetation, existing signs, or other obstructions.
- Flags, flashing lights, and edge line traffic cones can be used to improve visibility.

5. REMOVE TRAFFIC CONTROL DEVICES AT WORK SITE

All workers and equipment should be clear from work site BEFORE removing signs and other devices.

FOR LOWER SPEED (≤ 40 MPH) ROADWAYS:

- 1) Remove signs and other devices within the delineated area when work is complete.
- 2) Remove other traffic control devices in the reverse order in which they were installed
- 3) Remove signs in the reverse order in which they were installed (i.e. sign closest to the work area to be removed first).
- 4) When the operation is complete, uncover any existing permanent signs covered in Step 2.
- 5) Record in the log book the time at which the signs were removed.

FOR HIGHER SPEED (≥ 45 MPH) ROADWAYS:

All TTC devices for a stationary lane closure on a multi-lane roadway, except advance warning signs, should be removed against the flow of traffic in the following sequence:

- 1) Remove the channelizing devices starting from the end of the activity area working back to the widest part of the merging taper.
- 2) A shadow vehicle with TMA shall be positioned to protect workers removing devices and work backwards as the setup is removed from the roadway.

PROCEDURES FOR WORK AREA TRAFFIC CONTROL (CONT.)

- 3) Place the removal vehicle on the shoulder, and remove the channelizing devices from the merging taper by hand onto the work vehicle.
- 4) Remove the arrow board once traffic is clear and it is safe to do so.
- 5) Circle back and moving with the flow of traffic, remove the advance warning signs starting with the opposite side from previous lane closure first.
- 6) At no time shall workers run across the multilane roadway to remove signs on both sides of the road simultaneously.
- 7) Record in the log book the time at which the signs were removed

RAMP FACILITIES

At all times it is necessary to control the on and off-ramp traffic during the installation and breakdown of traffic control devices. Use of temporary traffic slow-downs or rolling roadblocks is recommended to allow for the safety of workers handing temporary traffic control devices on ramp facilities. A shadow vehicle with a TMA shall be used to protect the workers installing or removing the devices. At no time shall the work operation vehicle be used as the shadow vehicle with the TMA.

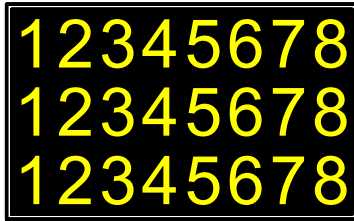
USE OF THIS GUIDE

Illustrations showing minimum standards for short-term construction, maintenance, and utility operations are arranged in this guide by type of operation. The users of this guide should compare all illustrated examples and examine their differences. After gathering information about the work zones using the general guidelines as outlined, proceed as follows:

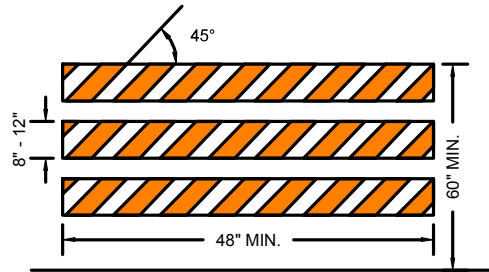
- 1) Turn to the Index. Consider the type of operations and the type of roadway upon which work will occur.
- 2) Select the figure that most closely matches the conditions where you plan to work. Remember that all diagrams represent minimum standards.
- 3) Read the title of the illustration to ensure that it is appropriate to your location. Study the layout of traffic control devices and read all notes.
- 4) Consult the appropriate tables, as directed on each illustration to determine taper length and proper spacing of signs. Notice that distances change when speeds change. Also note that these are guidelines, only, and they must be adapted to your specific work area.
- 5) Use the **“PROCEDURES FOR WORK AREA TRAFFIC CONTROL”** for assistance in completing all necessary steps to provide effective and safe work area traffic control.



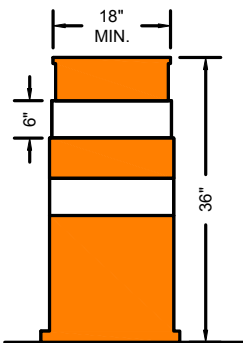
SIGN



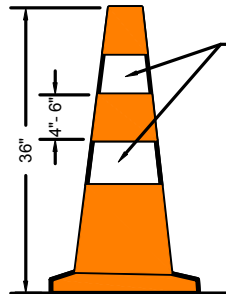
PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)



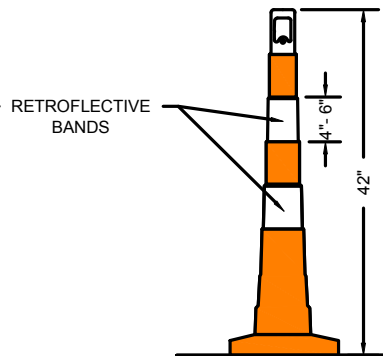
TYPE III BARRICADE



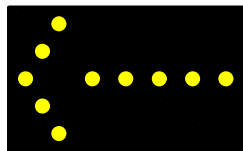
DRUM



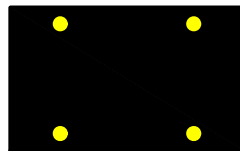
CONES



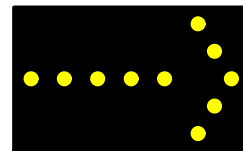
Cones may be used for all daytime operations. For night work, drums should be used to form the taper(s) and cones can be used along the tangent section of the work setup.



LEFT

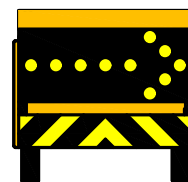


CAUTION



RIGHT

ARROW BOARD (WITH MODE)



TRUCK MOUNTED ATTENUATORS

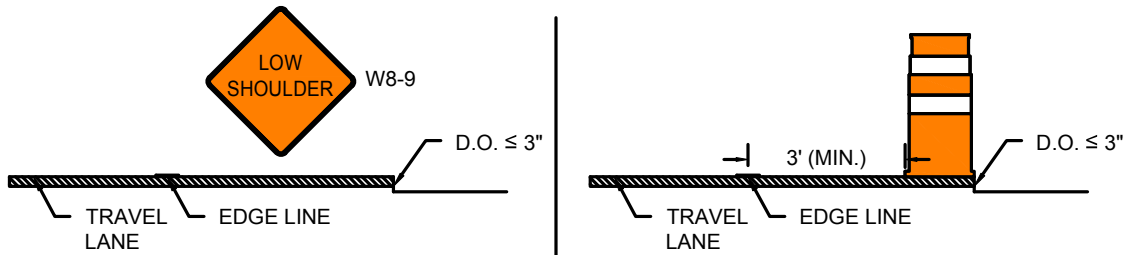
Truck Mounted Attenuators (TMA) shall be positioned between the start of the work area and the end of the designated buffer zone. The TMAs are to be positioned in each temporarily closed lane. This includes shoulders (≥ 8 feet) whether combined with a travel lane closure or being closed alone. These TMA conditions are required on roadways with speeds of 45 MPH or greater. TMAs can be used on other roadways at the discretion of the engineer. TMAs shall be used for the deployment and removal of all traffic control devices, including all advance warning signs.

SHORT-TERM PAVEMENT EDGE DROP-OFFS

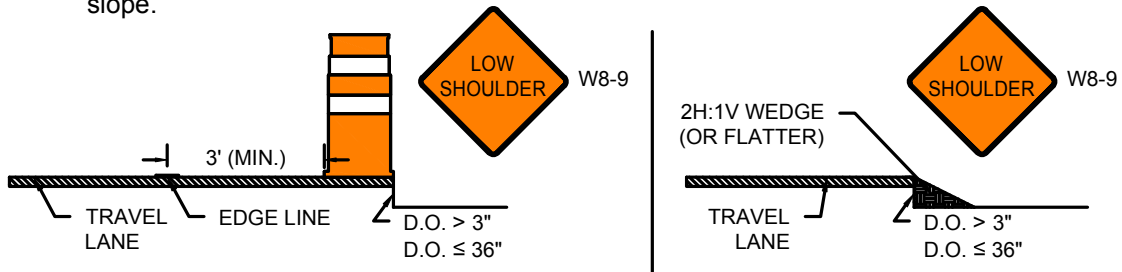
Note that this guidance is adopted from the Roadside Design Guide, 4th Edition.

Pavement drop-offs may occur during paving, excavation, and other construction activities. Drop-offs create hazards for vehicles if not properly mitigated. The following applies for all roads with speed limits greater than 30 mph; for roads with speed limits of 30 mph or less, treatments for pavement edge drop-offs are at the discretion of the Engineer. Drop-offs between adjacent, open travel lanes should not exceed 2", and any drop-off in excess of 3" should not be left unattended without one of these mitigation measures applied.

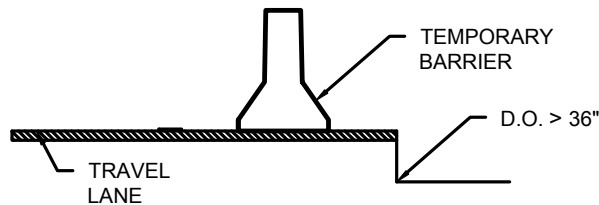
- Shoulder drop-offs 3" or less adjacent to a shoulder or active travel lane should be mitigated by:
 - ✓ A W8-9 (LOW SHOULDER) sign in advance of and at regular intervals throughout the treatment; or
 - ✓ The placement of drums on the traffic side of the drop-off.



- Shoulder drop-offs greater than 3" but less than or equal to 36" should be mitigated by:
 - ✓ A W8-9 (LOW SHOULDER) sign in advance of and at regular intervals throughout the treatment and the placement of drums on the traffic side off the drop-off, offset at least 3' from the travel lane; or
 - ✓ A W8-9 (LOW SHOULDER) sign in advance of and at regular intervals throughout the treatment and the placement of a temporary wedge of material along the face of the drop-off. The wedge should consist of stable material placed on a 2H:1V or flatter slope.



- Shoulder drop-offs greater than 36" must be protected by temporary barrier.





POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	320	305	20	55
45-55	500 / 1000 / 1000	660	495	40	40
60-65	1000 / 1600 / 2600	780	645	40	50










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

MINIMUM SPACING OF ADVANCE WARNING SIGNS FOR URBAN ROADWAYS	
ROAD TYPE	DISTANCE BETWEEN SIGNS
URBAN (LOW SPEED)	100 FT
URBAN (HIGH SPEED)	350 FT

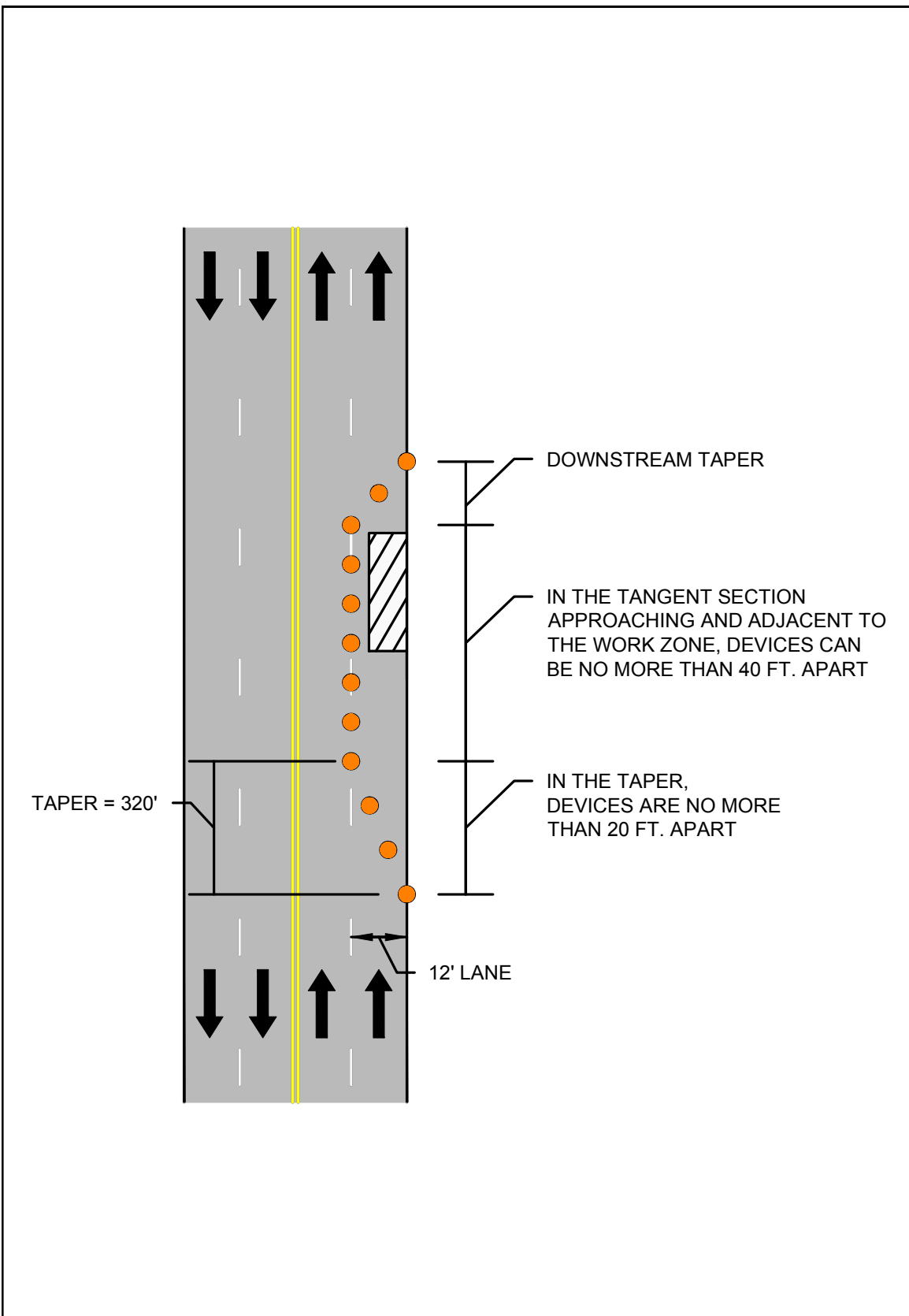
NOTES


1. 40 FT = 10 FT PAVEMENT MARKING + 30 FT SKIP

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 14</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FLAGGING GUIDANCE</p>
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Guidance for Flagging Operations

NOTE:

A flagger shall always be aware of their surroundings and have a good escape route. A flagger shall never be positioned directly beside or against construction equipment. When a flagger is required to direct traffic in an area where the escape route is partially blocked by a traversable obstruction such as a guardrail, the flagger shall be physically capable of traversing that obstruction. Prior to commencing a project, the supervisor in charge shall review the project, including guardrail areas, for safe flagging stations. The supervisor in charge shall clearly communicate with the flagger(s), indicating any locations where they cannot safely perform their duties.

Each flagger shall be equipped with the following high visibility clothing, signaling, and safety devices:

- 1) A white protective hard hat with a minimum level of reflectivity per the requirements of ANSI, Type I, Class E&G;
- 2) A clean, unfaded, untorn lime/yellow reflective safety vest and pants meeting the requirements of ANSI 107 Class 3 with the words "Traffic Control" on the front and rear panels in minimum two (2) inch (50 millimeter) high letters;
- 3) A 24 inch "STOP/SLOW" traffic paddle conforming to the requirements of Part 6E.03 of the Manual on Uniform Traffic Control Devices (MUTCD), a weighted, reflectorized red flag, flagger station advance warning signage, and two-way radios capable of providing clear communication within the work zone between flaggers, the Contractor, and the Engineer. The traffic paddle shall be mounted on a pole of sufficient length to be seven feet above the ground as measured from the bottom of the paddle;
- 4) A working flashlight with a minimum of 15,000 candlepower and a six inch red attachable wand, a whistle with a working lanyard, and a First Aid kit that complies with the requirements of ANSI Z308.1; and
- 5) An industrial/safety type portable air horn that complies with the requirements of the U.S. Coast Guard.

A "STOP/SLOW" paddle should be the primary hand-signaling device. It shall have an octagonal shape on a rigid handle. Flag use should be limited to emergency situations.

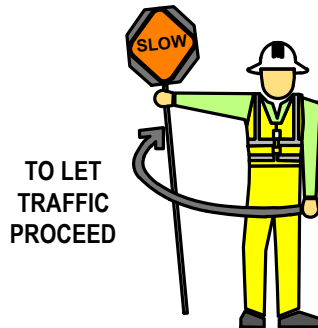


Properly Trained Flaggers

- Give clear messages to drivers.
- Allow distance for drivers to react.
- Coordinate with other flaggers.
- Use standard signaling methods.

Properly Equipped Flaggers

- Use approved stop/slow paddles.
- Use approved safety apparel.
- Use retroreflective equipment.
- Use hand held radios, as needed.
- All flaggers shall wear safety apparel that meets ANSI Class 3 requirements. The combination of vest and pants is required.



Proper Flagging Stations

- Good approach sight distance.
- Highly visible to traffic.
- Stand alone away from other machinery and people.
- Stand on right edge of pavement or shoulder- proceed to centerline only when first vehicle has come to stop.
- Have a good escape route.

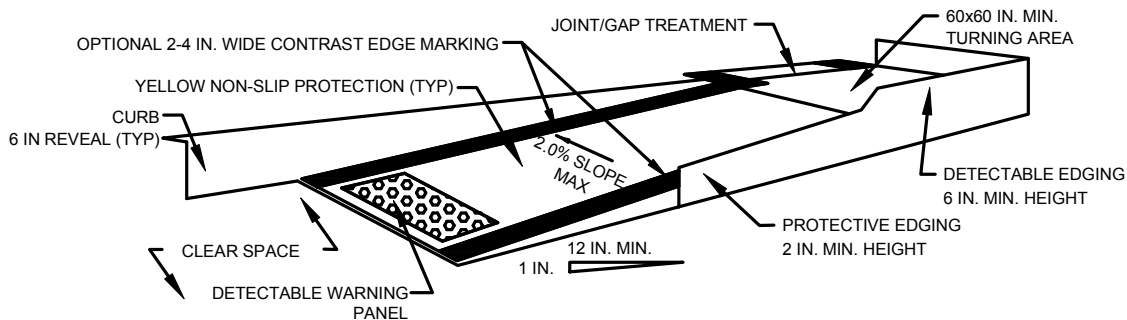


Proper Advance Warning Signs

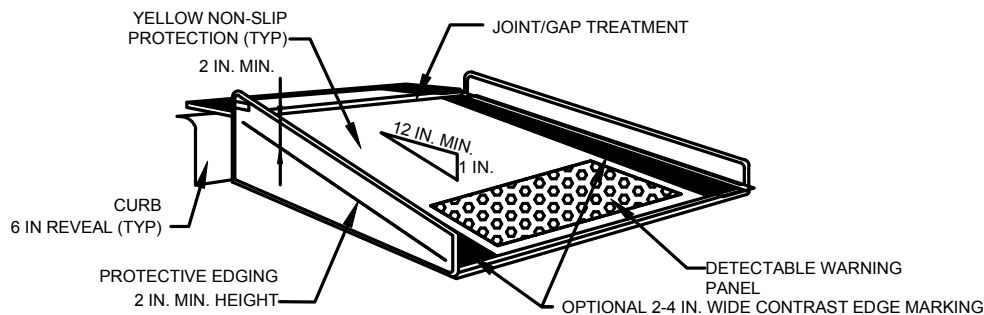
- Always use warning signs.
- Allow for reaction distance from signs.
- Remove signs if no longer necessary or not flagging.
- Use free hand in up-and-down motion to help slow traffic.



FIGURE 4
TYPICAL PEDESTRIAN DEVICES
(1 OF 2)
NOT TO SCALE



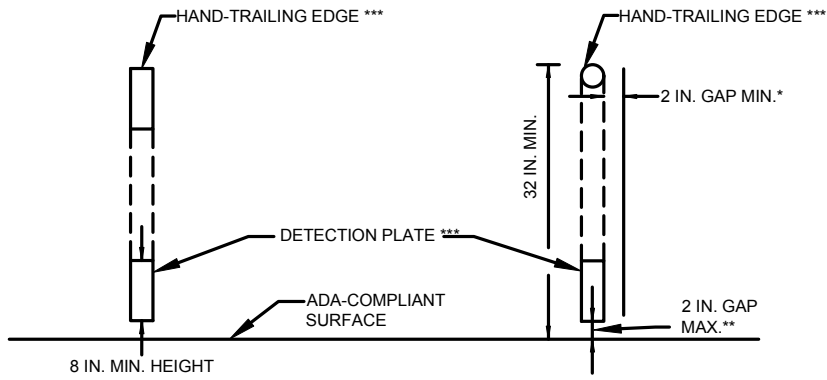
TEMPORARY CURB RAMP-PARALLEL TO CURB



TEMPORARY CURB RAMP-PERPENDICULAR TO CURB

NOTES:

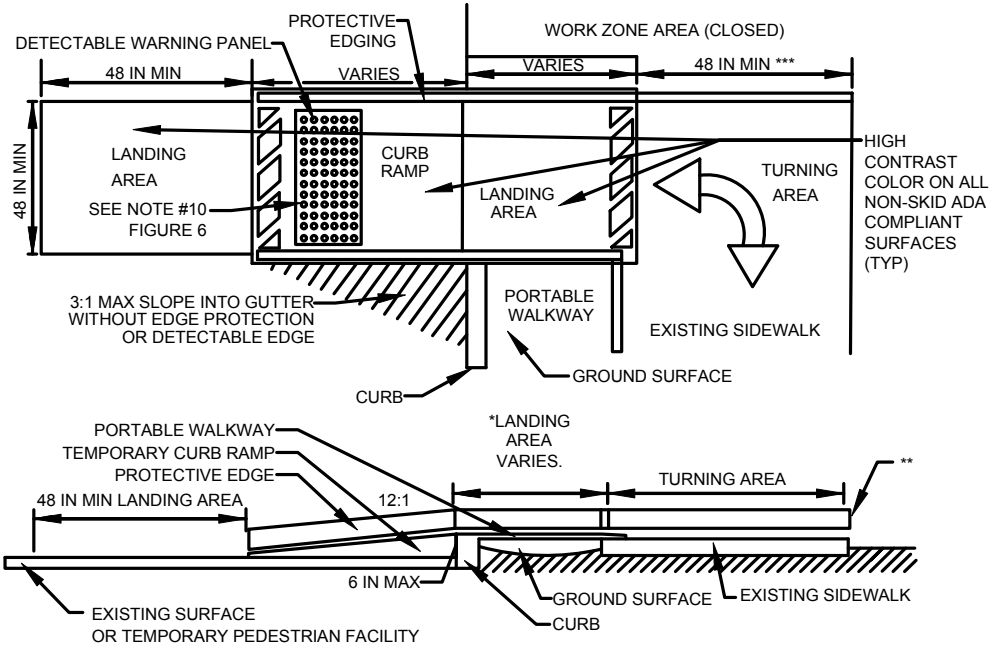
1. CURB RAMPS SHALL BE 60 IN. MINIMUM WIDTH WITH A FIRM, STABLE, AND NON-SLIP SURFACE.
2. PROTECTIVE EDGING WITH A 2 IN. MINIMUM HEIGHT SHALL BE INSTALLED WHEN THE CURB RAMP OR LANDING PLATFORM HAS A VERTICAL DROP OF 6 IN. OR GREATER OR HAS A SIDE APRON SLOPE STEEPER THAN 1:3 (33%). PROTECTIVE EDGING SHOULD BE CONSIDERED WHEN THE CURB RAMPS OR LANDING PLATFORMS HAVE A VERTICAL DROP OF 3 IN. OR MORE.
3. PROTECTABLE EDGING WITH 6 IN. MINIMUM HEIGHT AND CONTRASTING COLOR SHALL BE INSTALLED ON ALL CURB RAMP LANDINGS WHERE THE WALKWAY CHANGES DIRECTION (TURNS).
4. THE CURB RAMP WALKWAY AND LANDING AREA SURFACE SHALL BE OF A SOLID CONTINUOUS CONTRASTING COLOR ABUTTING UP TO THE EXISTING SIDEWALK.
5. CURB RAMPS AND LANDINGS SHOULD HAVE A 1:50 (2%) MAX CROSS-SLOPE.
6. CLEAR SPACE OF 48x48 IN. MINIMUM SHALL BE PROVIDED ABOVE AND BELOW THE CURB RAMP.
7. WATER FLOW IN THE GUTTER SYSTEM SHALL HAVE MINIMAL RESTRICTION.
8. LATERAL JOINTS OR GAPS BETWEEN SURFACES SHALL BE LESS THAN 0.5 IN. WIDTH.
9. CHANGES BETWEEN SURFACE HEIGHTS SHOULD NOT EXCEED 0.5 IN. LATERAL EDGES SHOULD BE VERTICAL UP TO 0.25 IN. HIGH, AND BEVELED AT 1:2 BETWEEN 0.25 IN. AND 0.5 IN. HEIGHT.
10. IF A TEMPORARY PEDESTRIAN RAMP LEADS TO A CROSSWALK, THEN A DETECTABLE WARNING PAD MUST BE ADHERED TO THE BASE OF THE RAMP. IF IT LEADS TO A PROTECTED PEDESTRIAN BYPASS THAT DOES NOT CONFLICT WITH VEHICULAR TRAFFIC, THEN A PAD SHALL NOT BE INSTALLED ON THE RAMP.



CROSS SECTION VIEW


PEDESTRIAN CHANNELIZING DEVICE

- * THERE SHALL BE A 2 INCH GAP BETWEEN THE HAND-TRAILING EDGE AND ITS SUPPORT.
- ** A MAXIMUM 2 INCH GAP BETWEEN THE BOTTOM OF THE BOTTOM RAIL AND THE SURFACE MAY BE USED TO PROVIDE DRAINAGE.
- *** THE HAND-TRAILING EDGE AND DETECTION PLATE SHALL BE CONTINUOUS THROUGHOUT THE LENGTH OF THE PATH SUCH THAT A PEDESTRIAN USER WITH A LONG CANE CAN FOLLOW IT.



TEMPORARY CURB RAMP

- * LANDING AREA USED TO OVERLAP NON-ADA COMPLIANT SURFACES.
- ** DETECTABLE EDGE REMOVED IF A CONTINUOUS SIDEWALK.
- *** 60 IN. IF AN OBSTRUCTION IS AT BACK OF SIDEWALK.

 Massachusetts Department of Transportation Highway Division	Work Zone Safety Standard Details and Drawings	FIGURE 5 TYPICAL PEDESTRIAN DEVICES (2 OF 2) NOT TO SCALE
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and Drawings

STATIONARY OPERATIONS
TWO LANE UNDIVIDED ROADWAY
HALF OF ROADWAY CLOSED
WORK NEAR CURVE










POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	50	100	20	30
45-55	500 / 1000 / 1000	100	150	40	20

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

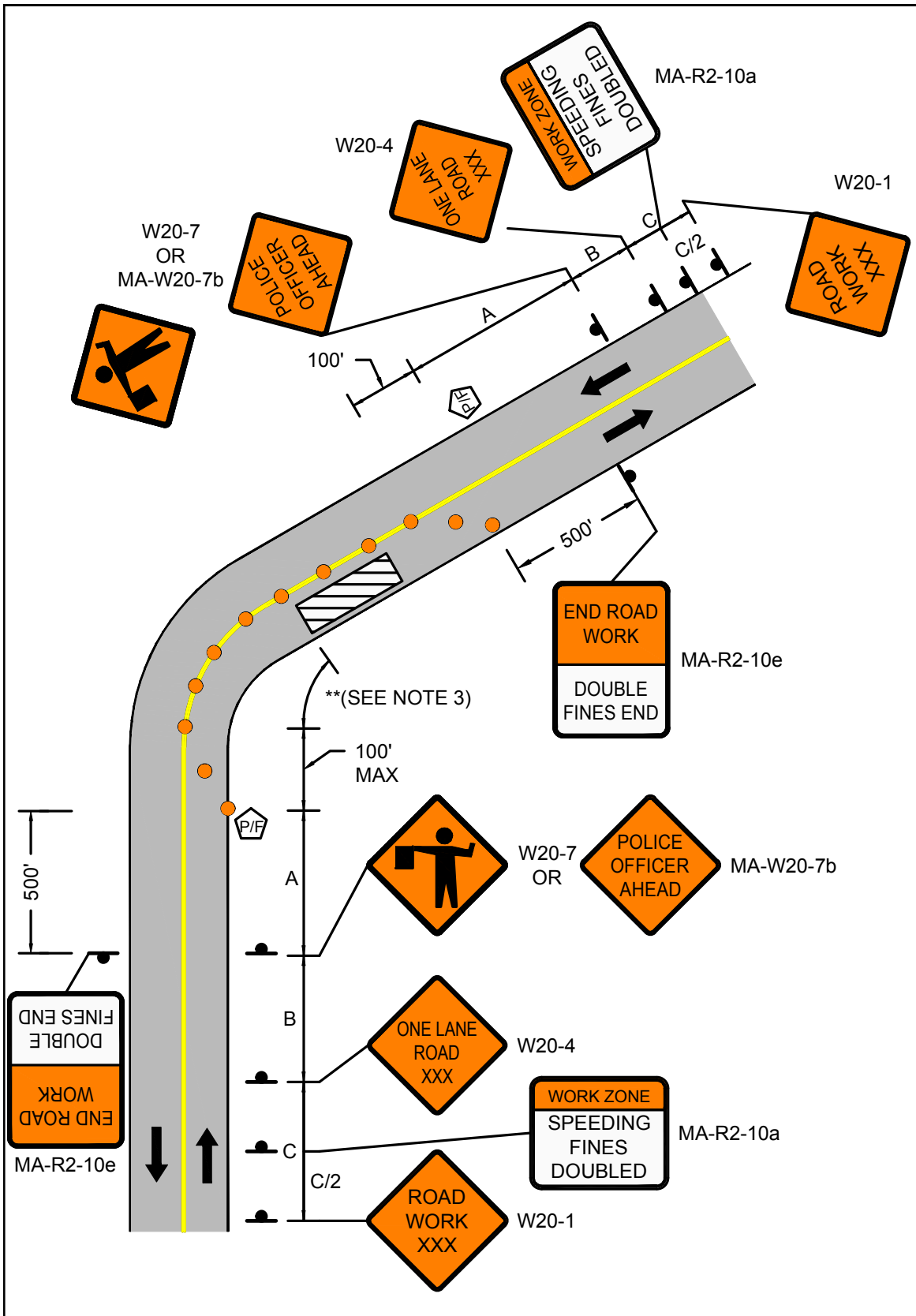
NOTES


1. IF POLICE DETAIL/UNIFORMED FLAGGER SUPPORT IS REQUIRED, PROVIDE TWO UNITS.
2. MA-R2-10a LOCATED AT C/2.
3. ** = EXTEND ENOUGH SO TAPER IS BEFORE CURVE

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 19</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 6 STATIONARY OPERATIONS TWO LANE UNDIVIDED ROADWAY HALF OF ROADWAY CLOSED WORK NEAR CURVE</p>
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STATIONARY OPERATIONS
TWO LANE UNDIVIDED ROADWAY
HALF OF ROADWAY CLOSED

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	50	100	20	30
45-55	500 / 1000 / 1000	100	150	40	20










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED REGULATORY OR WORK ZONE SPEED	SEPARATION BETWEEN RUMBLE STRIPS
36-mph to 55-mph	15-feet
35-mph and under	10-feet

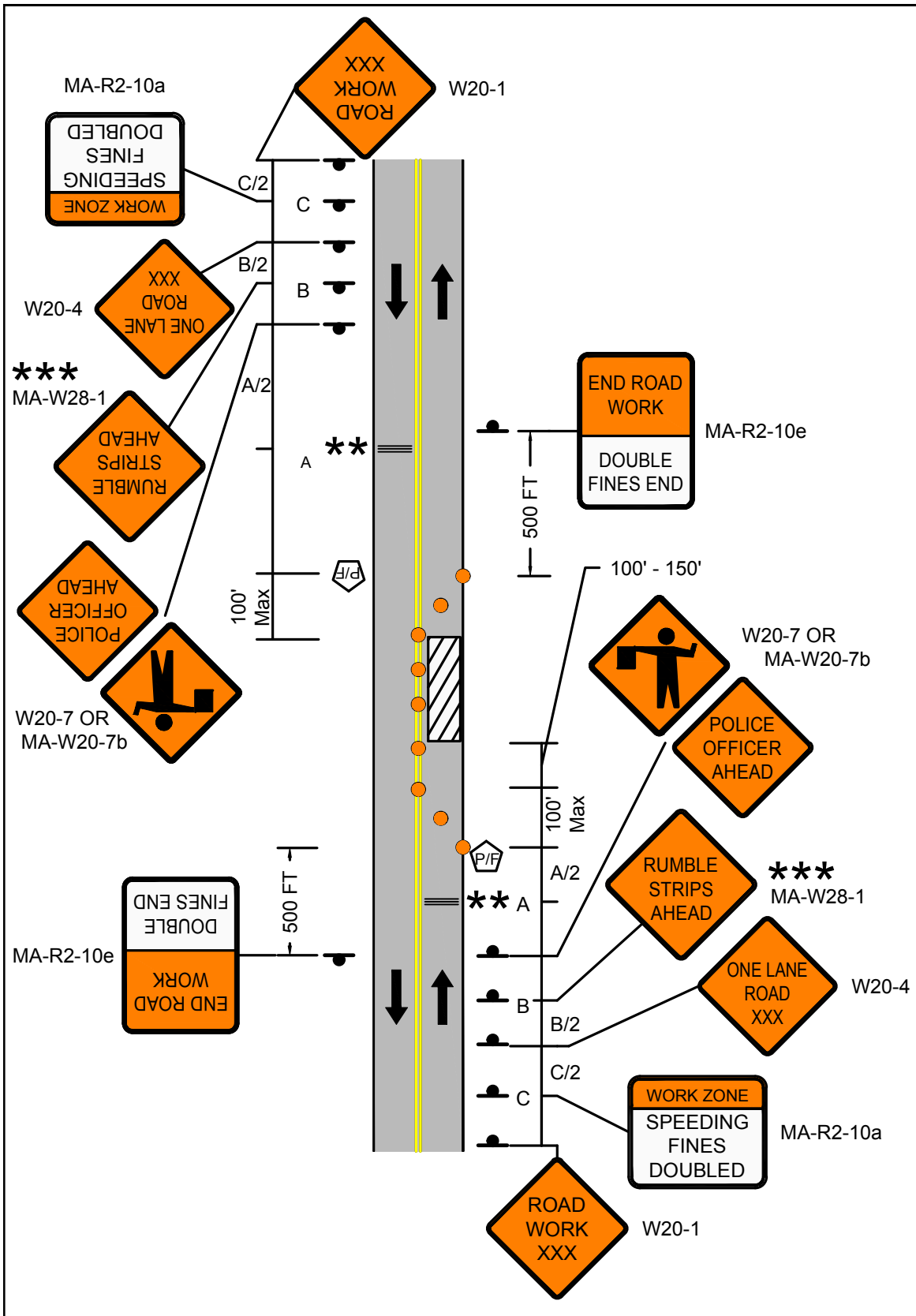
NOTES


1. IF POLICE DETAIL/UNIFORMED FLAGGER SUPPORT IS REQUIRED, PROVIDE TWO UNITS.
2. MA-R2-10a LOCATED AT C/2.
3. ** OPTIONAL AT THE ENGINEER'S DISCRETION.
4. *** SHALL BE DEPLOYED IF RUMBLE STRIPS ARE PRESENT.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 21</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 7 STATIONARY OPERATIONS TWO LANE UNDIVIDED ROADWAY HALF OF ROADWAY CLOSED</p>
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STATIONARY OPERATIONS
TWO LANE UNDIVIDED ROADWAY
SHOULDER CLOSED










POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		SHOULDER TAPER LENGTH (L/3) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	110	305	20	45
45-55	500 / 1000 / 1000	220	495	40	30
60-65	1000 / 1600 / 2600	260	645	40	35

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

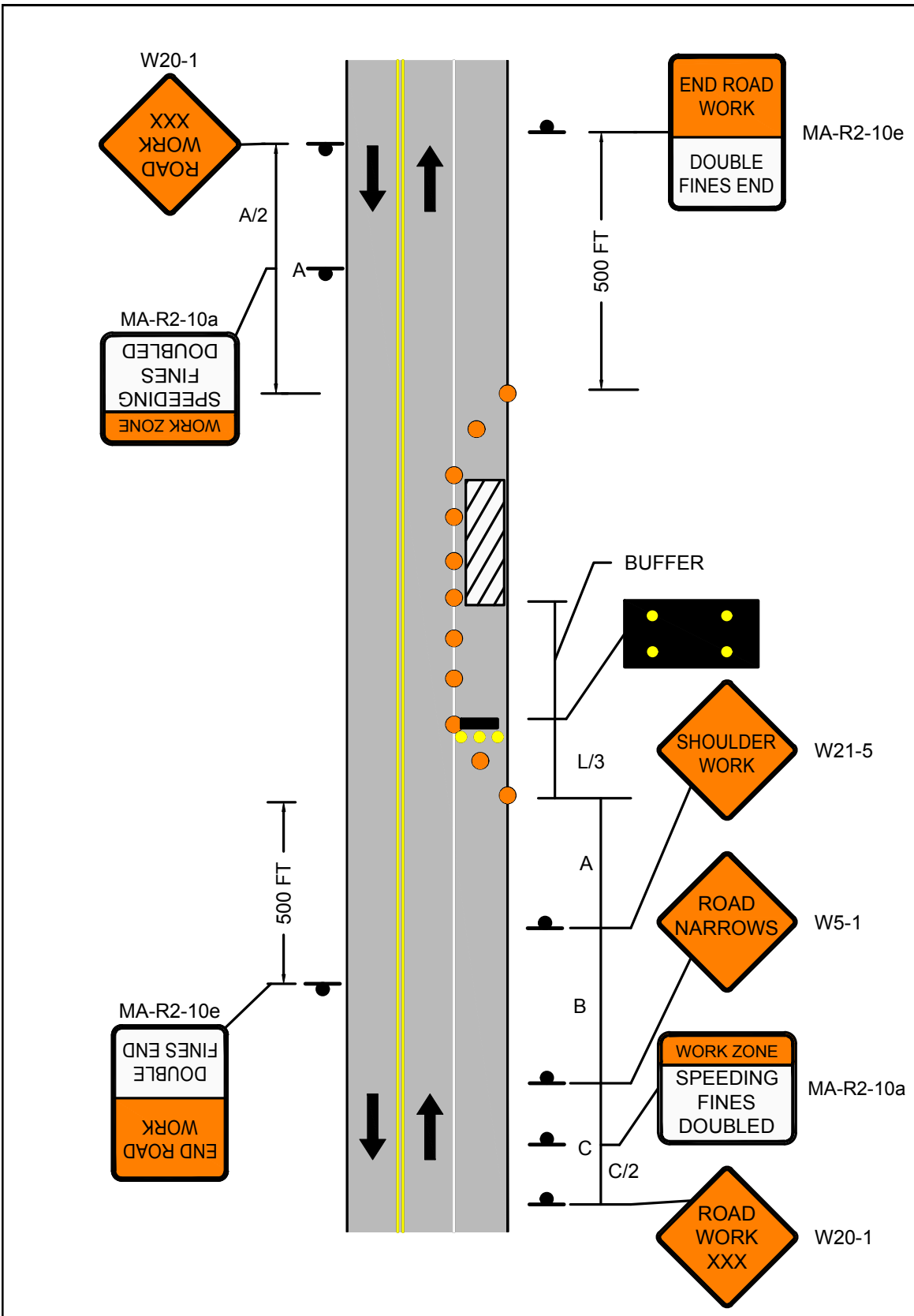
NOTES


1. MA-R2-10a at C/2 and A/2.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 23</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 8 STATIONARY OPERATIONS TWO LANE UNDIVIDED ROADWAY SHOULDER CLOSED</p>
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STATIONARY OPERATIONS
TWO LANE UNDIVIDED ROADWAY
WITH TRAVERSABLE SHOULDER
HALF OF ROADWAY CLOSED
MAINTAIN TWO-WAY TRAFFIC

POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)				
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE SHIFT LENGTH (L/2) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	160	305	20	125
45-55	220	330	495	40	100
60-65	260	390	645	40	115










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

NOTES

1. MA-R2-10a LOCATED AT C/2.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE

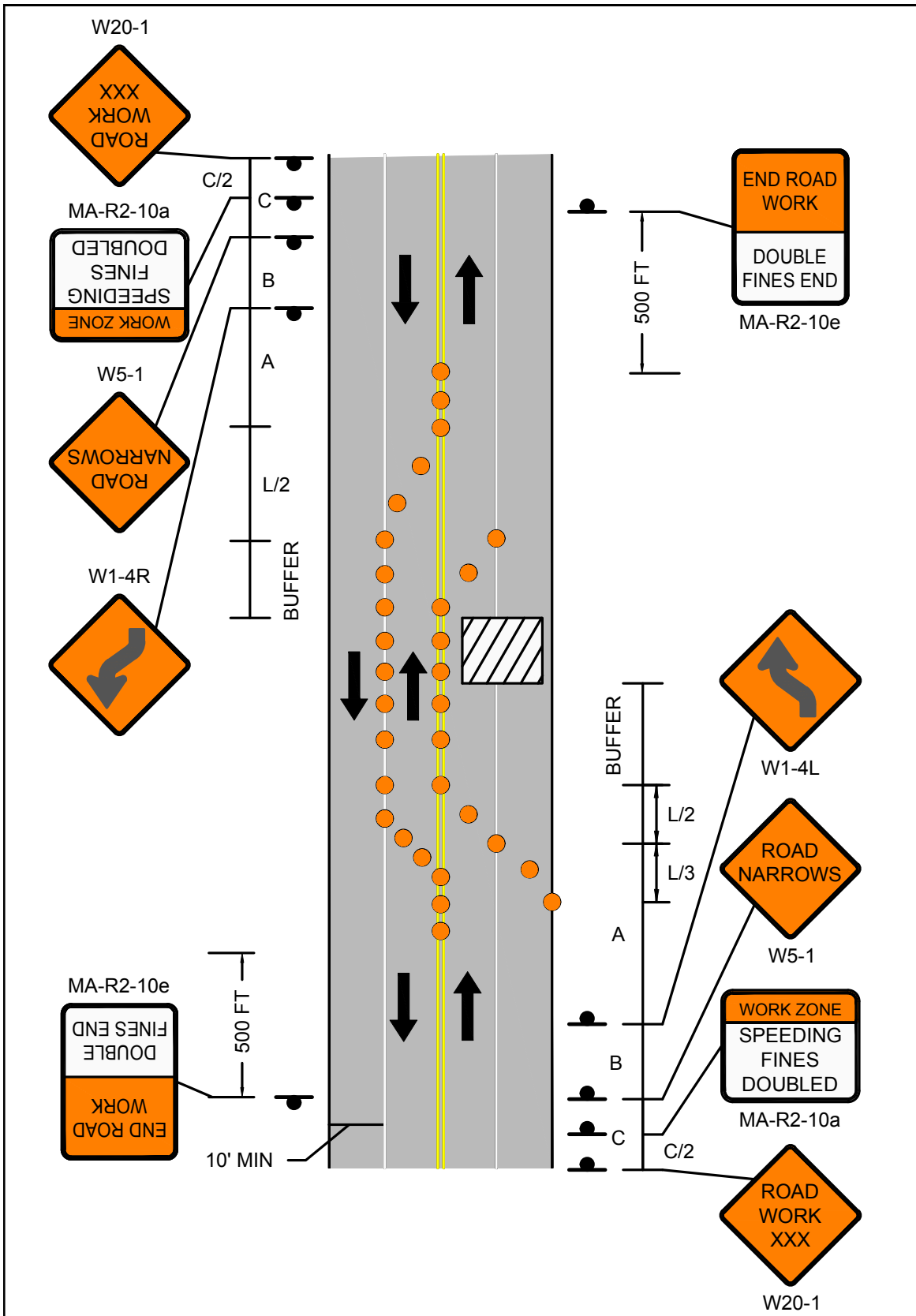


FIGURE 9
 STATIONARY OPERATIONS
 TWO LANE UNDIVIDED ROADWAY
 WITH TRAVERSABLE SHOULDER
 HALF OF ROADWAY CLOSED
 MAINTAIN TWO-WAY TRAFFIC





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STATIONARY OPERATIONS
FOUR LANE UNDIVIDED ROADWAY
RIGHT LANE CLOSED

POSTED SPEED LIMIT (MPH)	CHANNELATION DEVICES (DRUMS OR CONES)				
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	305	20	60
45-55	220	660	495	40	50
60-65	260	780	645	40	55










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

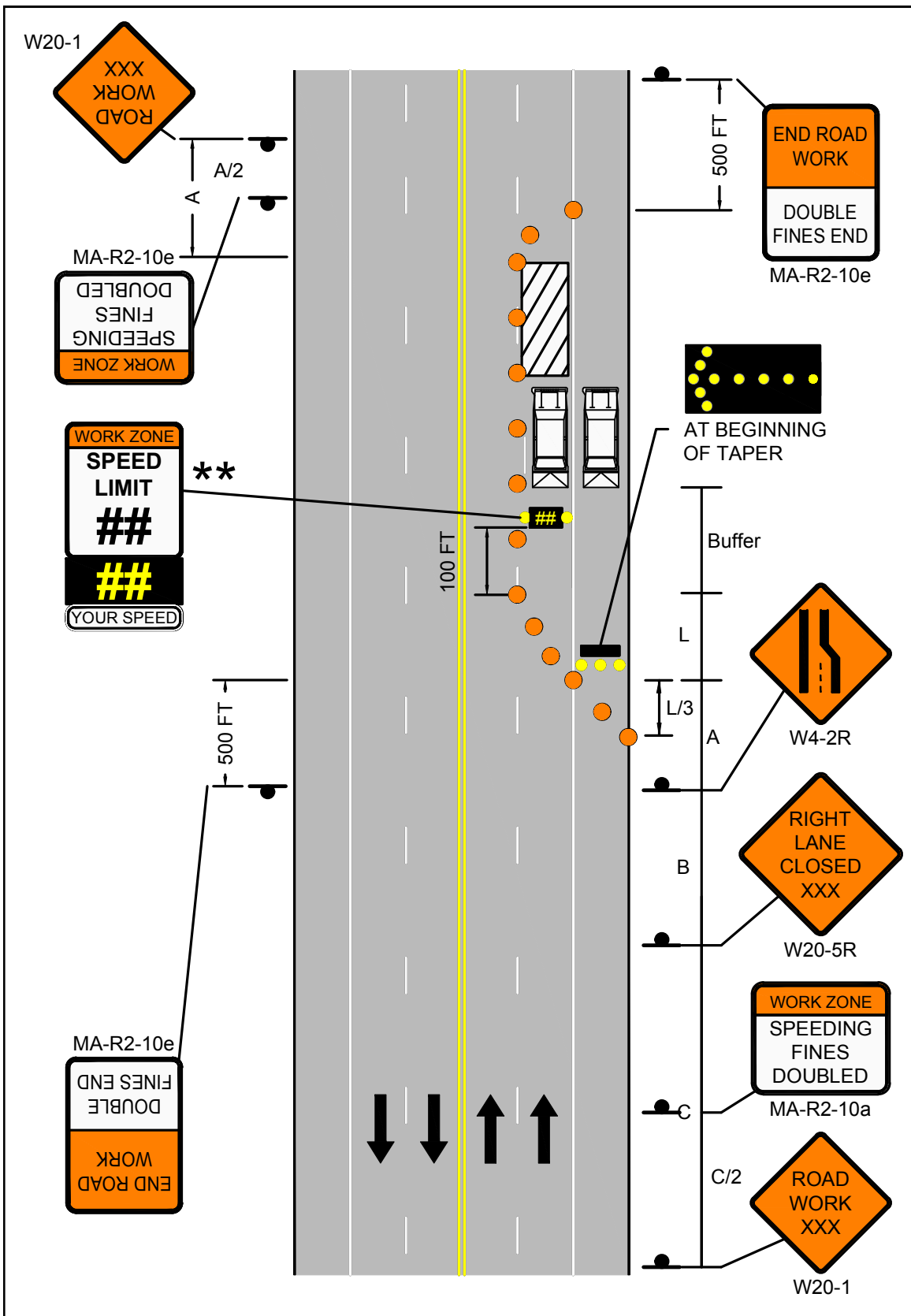
NOTES


1. MA-R2-10a LOCATED AT A/2 AND C/2.
2. **OPTIONAL AT THE ENGINEER'S DISCRETION.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 27</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 10 STATIONARY OPERATIONS FOUR LANE UNDIVIDED ROADWAY RIGHT LANE CLOSED</p>
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STATIONARY OPERATIONS
FOUR LANE UNDIVIDED ROADWAY
LEFT LANE CLOSED










POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	320	305	20	105
45-55	500 / 1000 / 1000	660	495	40	80
60-65	1000 / 1600 / 2600	780	645	40	100

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

NOTES

1. MA-R2-10a LOCATED AT A/2 AND C/2.
2. **OPTIONAL AT THE ENGINEER'S DISCRETION. 2' OFFSET FROM EDGE OF TRAVEL LANE TO RADAR SPEED FEEDBACK BOARD IS REQUIRED. BOARD MAY BE MOVED FULLY OR PARTIALLY OFF PAVED SHOULDER, IF REQUIRED.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE

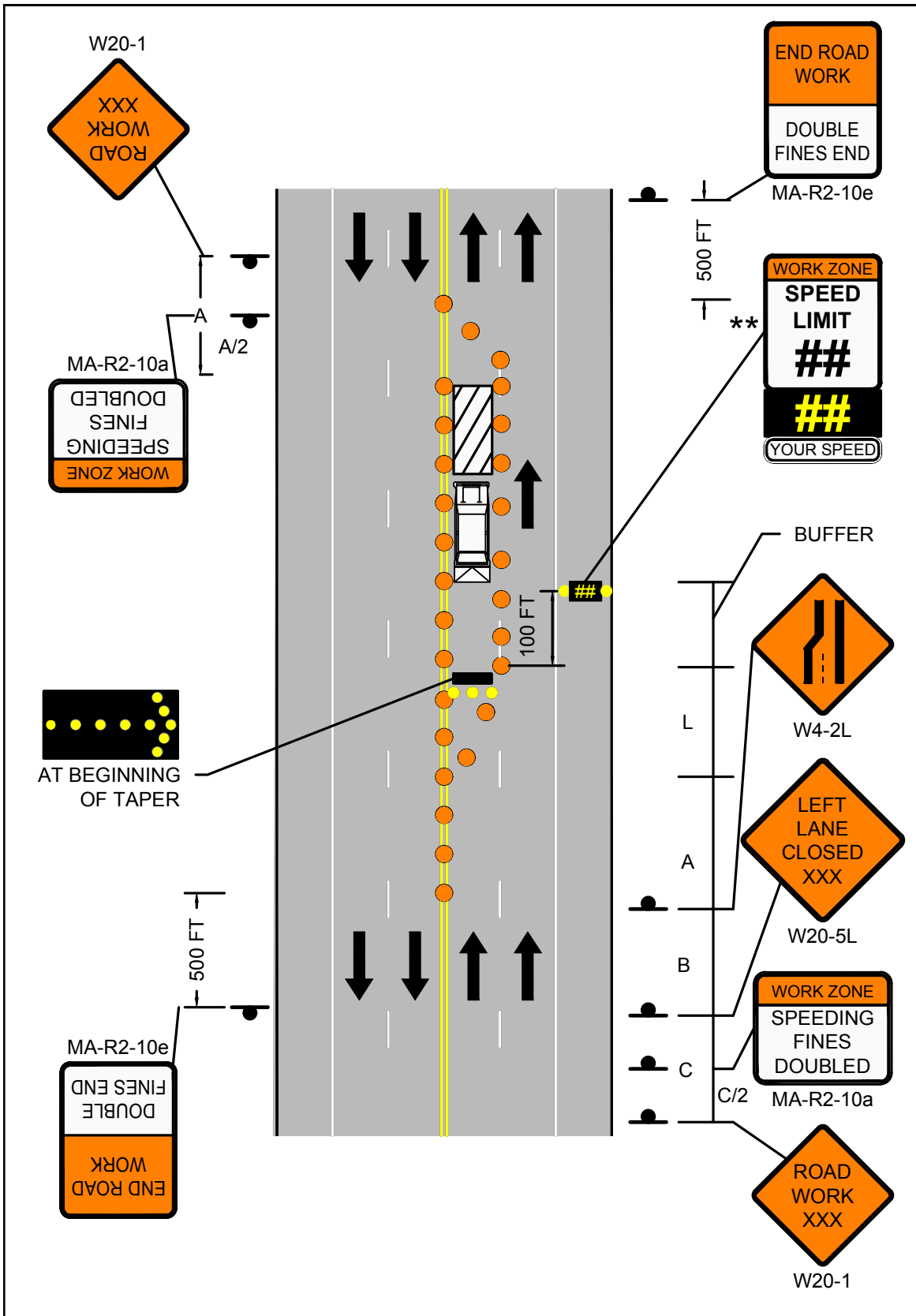



FIGURE 11
STATIONARY OPERATIONS
FOUR LANE UNDIVIDED ROADWAY
LEFT LANE CLOSED



 PAGE 30	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS FOUR LANE UNDIVIDED ROADWAY HALF OF ROADWAY CLOSED
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POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)					
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	TRAVEL LANE SHIFT LENGTH (L/2) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	160	305	20	140
45-55	220	660	330	495	40	120
60-65	260	780	390	645	40	140










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

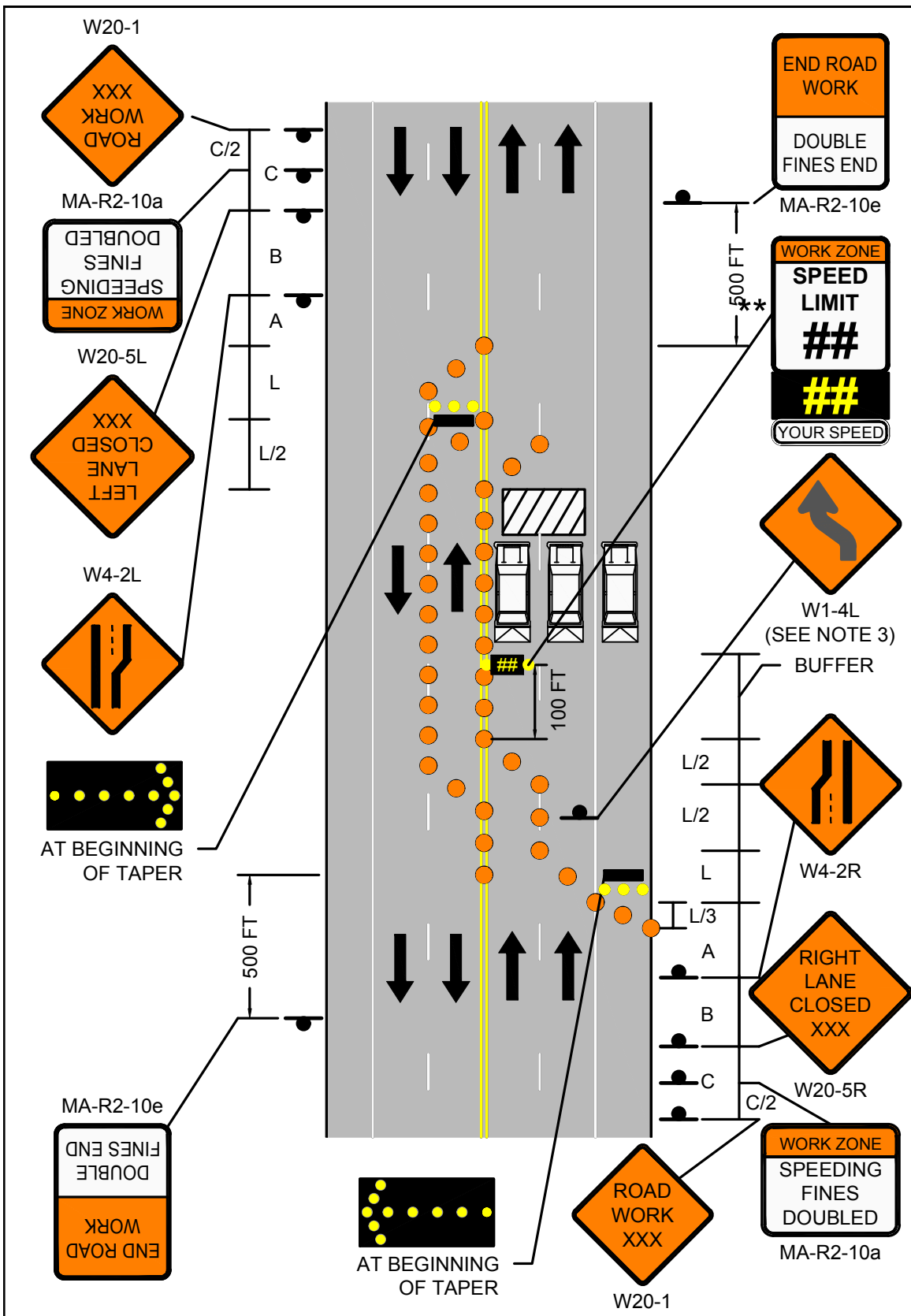
NOTES


1. MA-R2-10a LOCATED AT C/2.
2. **OPTIONAL AT THE ENGINEER'S DISCRETION.
3. W1-4L SHALL BE PLACED AT THE MIDDLE OF THE TANGENT.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 31</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 12 STATIONARY OPERATIONS FOUR LANE UNDIVIDED ROADWAY HALF OF ROADWAY CLOSED</p>
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STATIONARY OPERATIONS
MULTILANE DIVIDED ROADWAY
RIGHT LANE CLOSED

POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)				
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	305	20	60
45-55	220	660	495	40	50
60-65	260	780	645	40	55










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

NOTES

1. MA-R2-10a LOCATED AT C/2.
2. **OPTIONAL AT THE ENGINEER'S DISCRETION.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



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STATIONARY OPERATIONS
MULTILANE DIVIDED ROADWAY
LEFT LANE CLOSED

POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)				
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	305	20	60
45-55	220	660	495	40	50
60-65	260	780	645	40	55










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

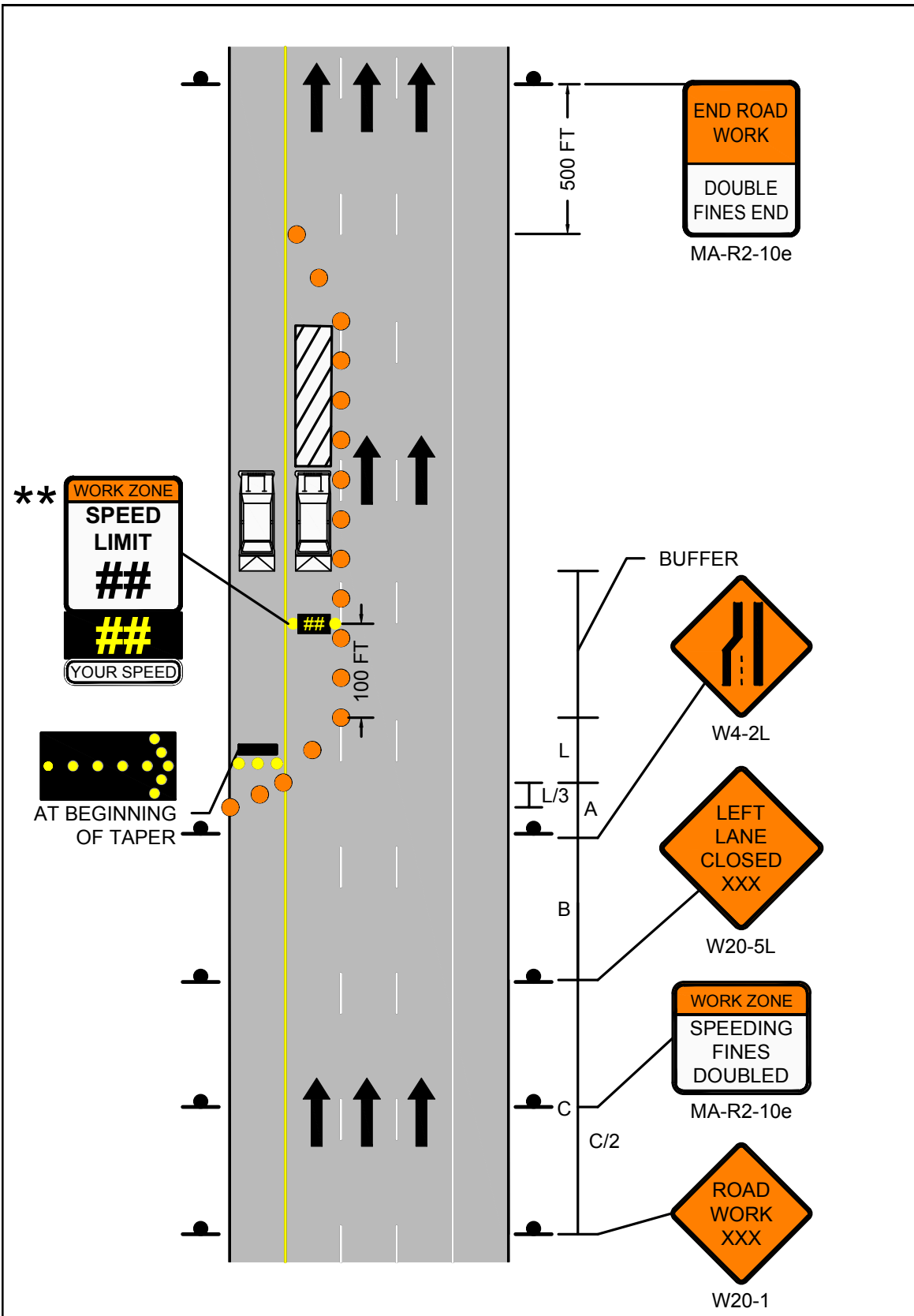
NOTES


1. MA-R2-10a LOCATED AT C/2.
2. **OPTIONAL AT THE ENGINEER'S DISCRETION.


LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 35</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 14 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY LEFT LANE CLOSED</p>
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 MASSACHUSETTS DEPARTMENT OF TRANSPORTATION Highway Division PAGE 36	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE OR RIGHT/CENTER LANES CLOSED
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POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)					
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	TANGENT LENGTH BETWEEN TAPERS T (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	640	305	20	110
45-55	220	660	1320	495	40	100
60-65	260	780	1560	645	40	115










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

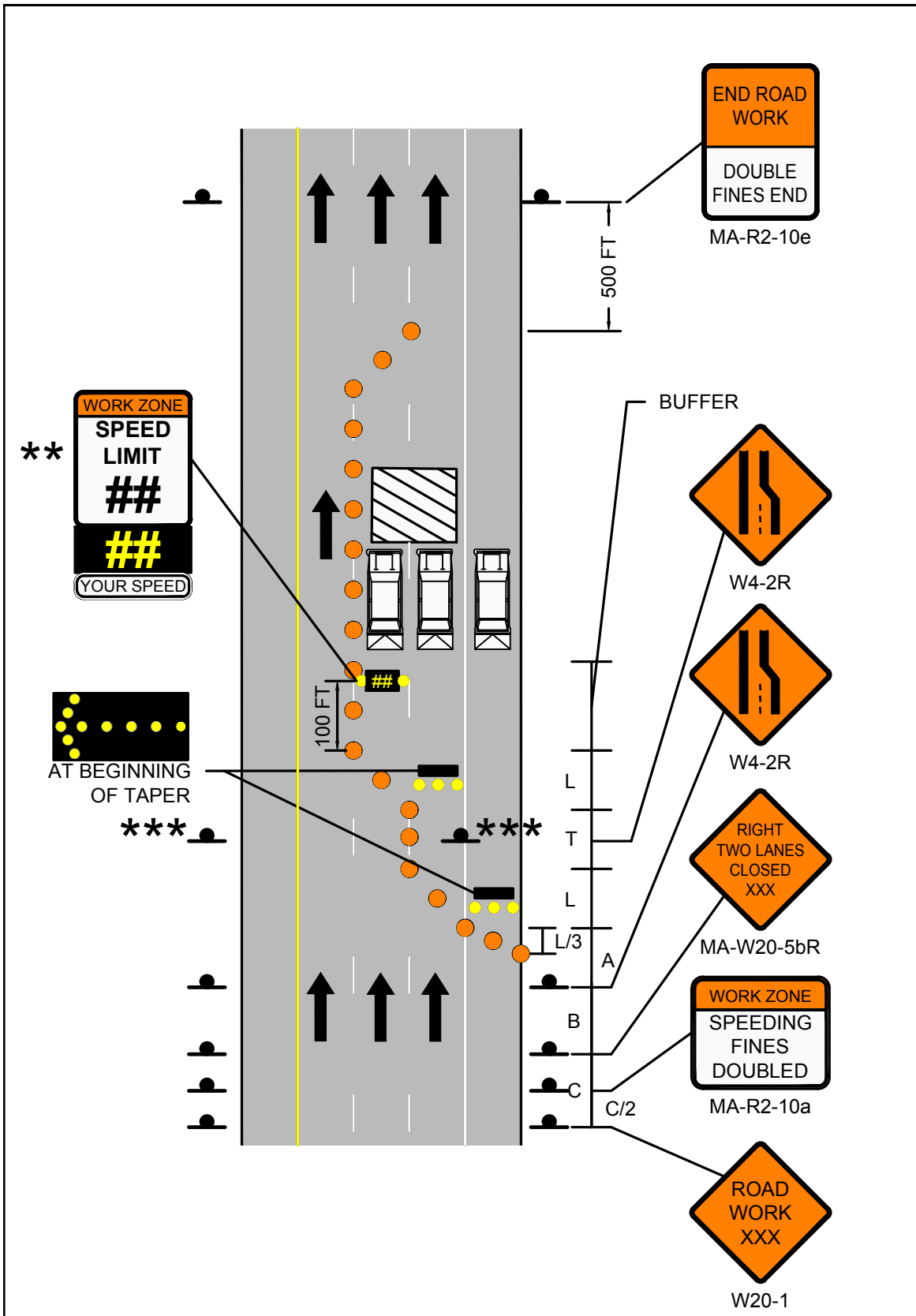
NOTES


1. MA-R2-10a LOCATED AT C/2.
2. ***OPTIONAL AT THE ENGINEER'S DISCRETION.
3. ***THIS SET OF SIGNS SHALL BE LOCATED AT T/2.


LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 37</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 15 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE OR RIGHT/CENTER LANES CLOSED</p>
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 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 38</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE OR LEFT/CENTER LANES CLOSED</p>
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POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)					
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	TANGENT LENGTH BETWEEN TAPERS T (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	640	305	20	110
45-55	220	660	1320	495	40	100
60-65	260	780	1560	645	40	115










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

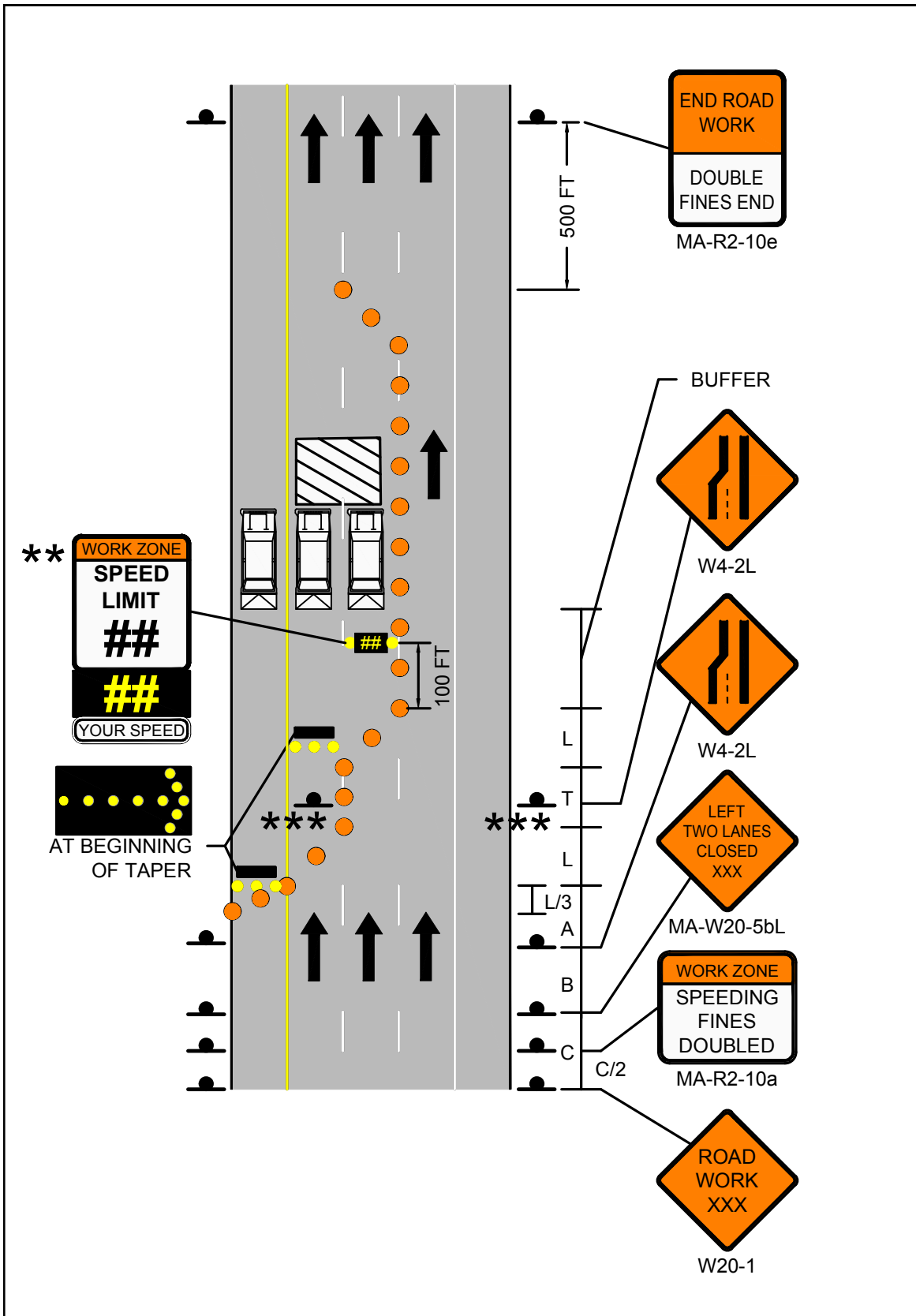
NOTES


1. MA-R2-10a LOCATED AT C/2.
2. ***OPTIONAL AT THE ENGINEER'S DISCRETION.
3. ***THIS SET OF SIGNS SHALL BE LOCATED AT T/2.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 39</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 16 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE OR LEFT/CENTER LANES CLOSED</p>
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Standard Details
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STATIONARY OPERATIONS
MULTILANE DIVIDED ROADWAY
RIGHT SIDE OF OFF RAMP CLOSED










POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE SHIFT LENGTH (L/2) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	160	305	20	45
45-55	500 / 1000 / 1000	330	495	40	35

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

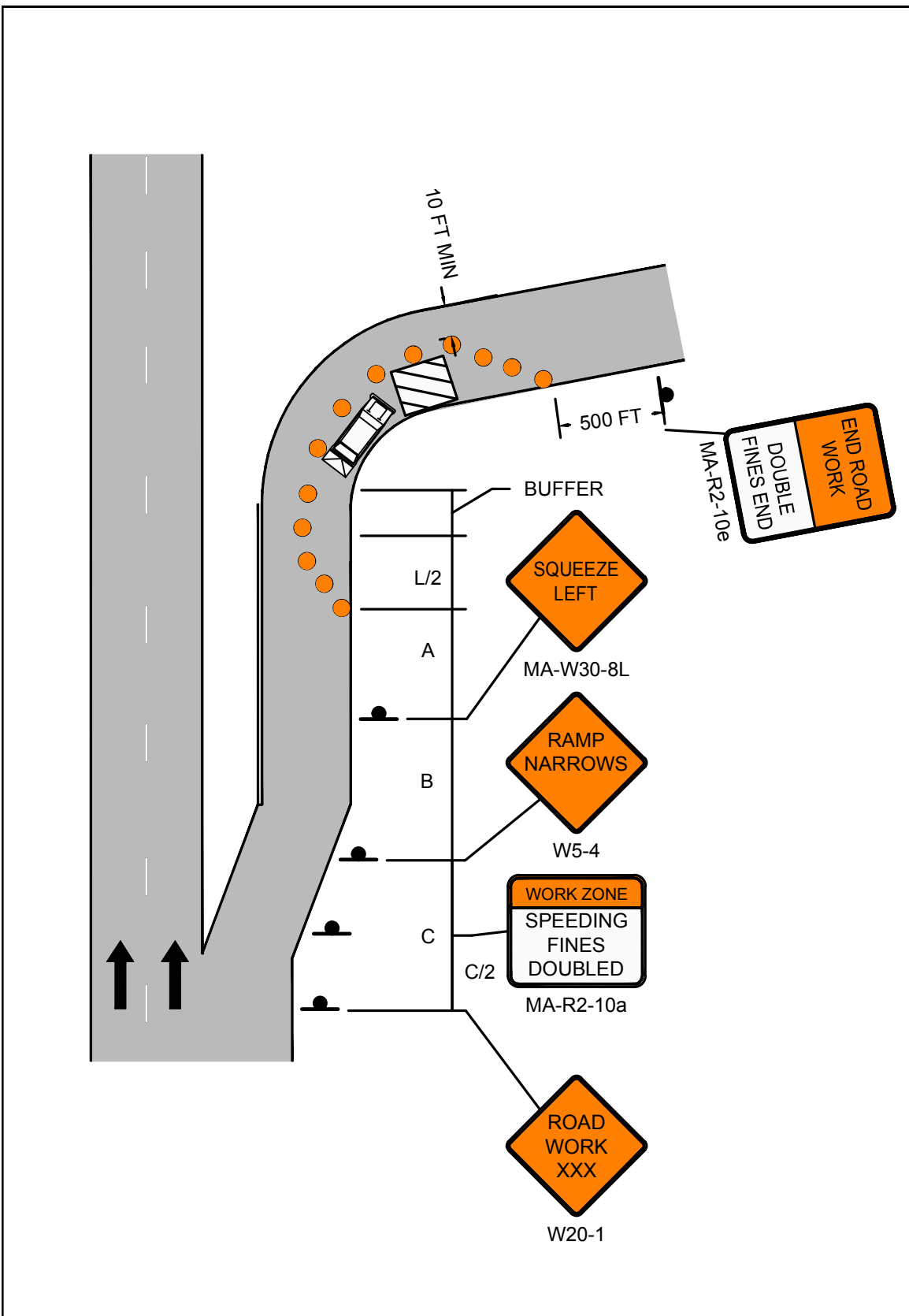
NOTES


1. MA-R2-10a LOCATED AT C/2.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 41</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 17 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY RIGHT SIDE OF OFF RAMP CLOSED</p>
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Work Zone Safety
Standard Details
and Drawings

STATIONARY OPERATIONS
MULTILANE DIVIDED ROADWAY
LEFT SIDE OF OFF RAMP CLOSED










POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE SHIFT LENGTH (L/2) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	160	305	20	45
45-55	500 / 1000 / 1000	330	495	40	35

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

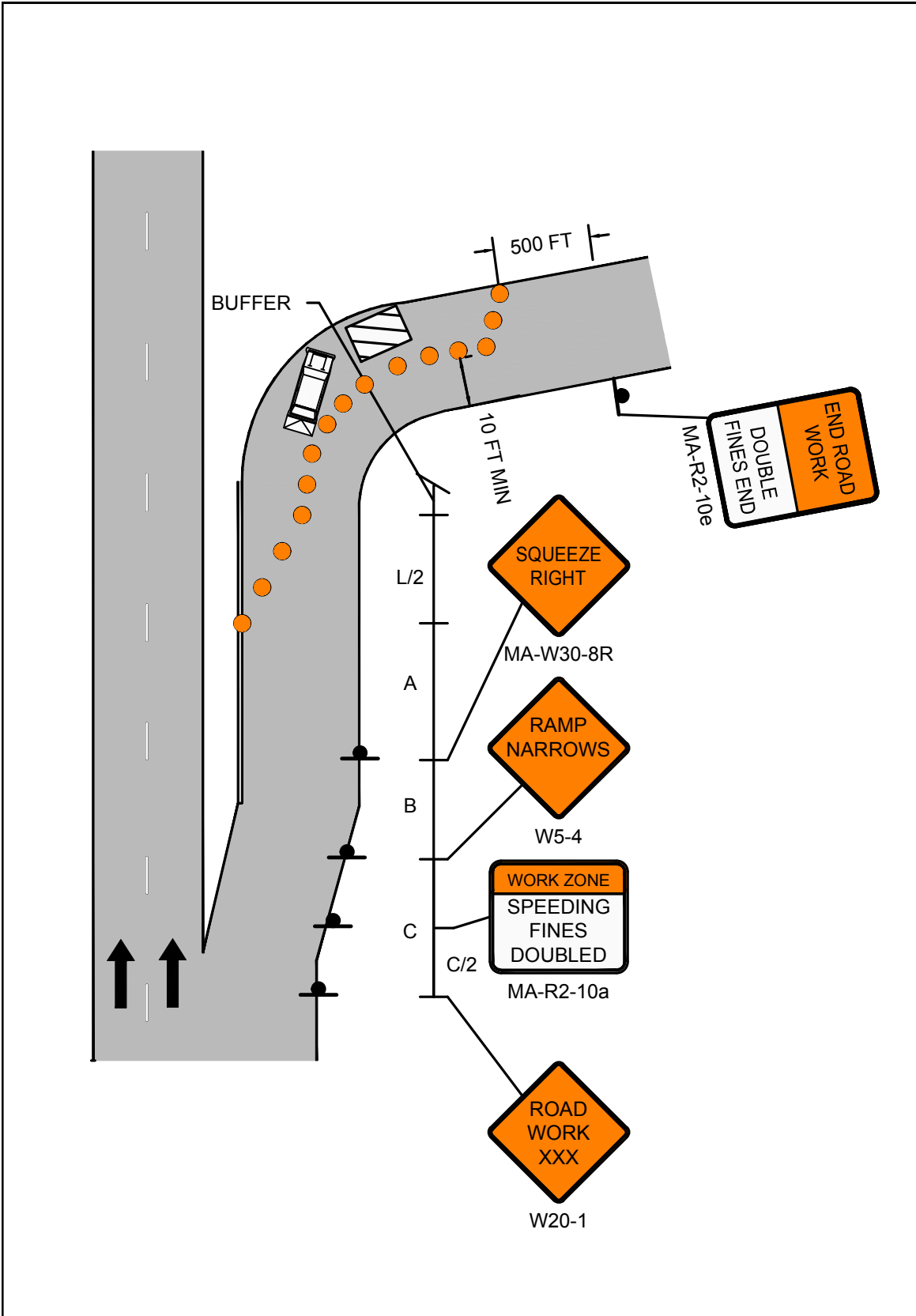
NOTES


1. MA-R2-10a LOCATED AT C/2.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 18 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY LEFT SIDE OF OFF RAMP CLOSED PAGE 43</p>
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STATIONARY OPERATIONS
MULTILANE DIVIDED ROADWAY
ROADWORK BEYOND ON RAMP

POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)				
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	305	20	175
45-55	220	660	495	40	135
60-65	260	780	645	40	155










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

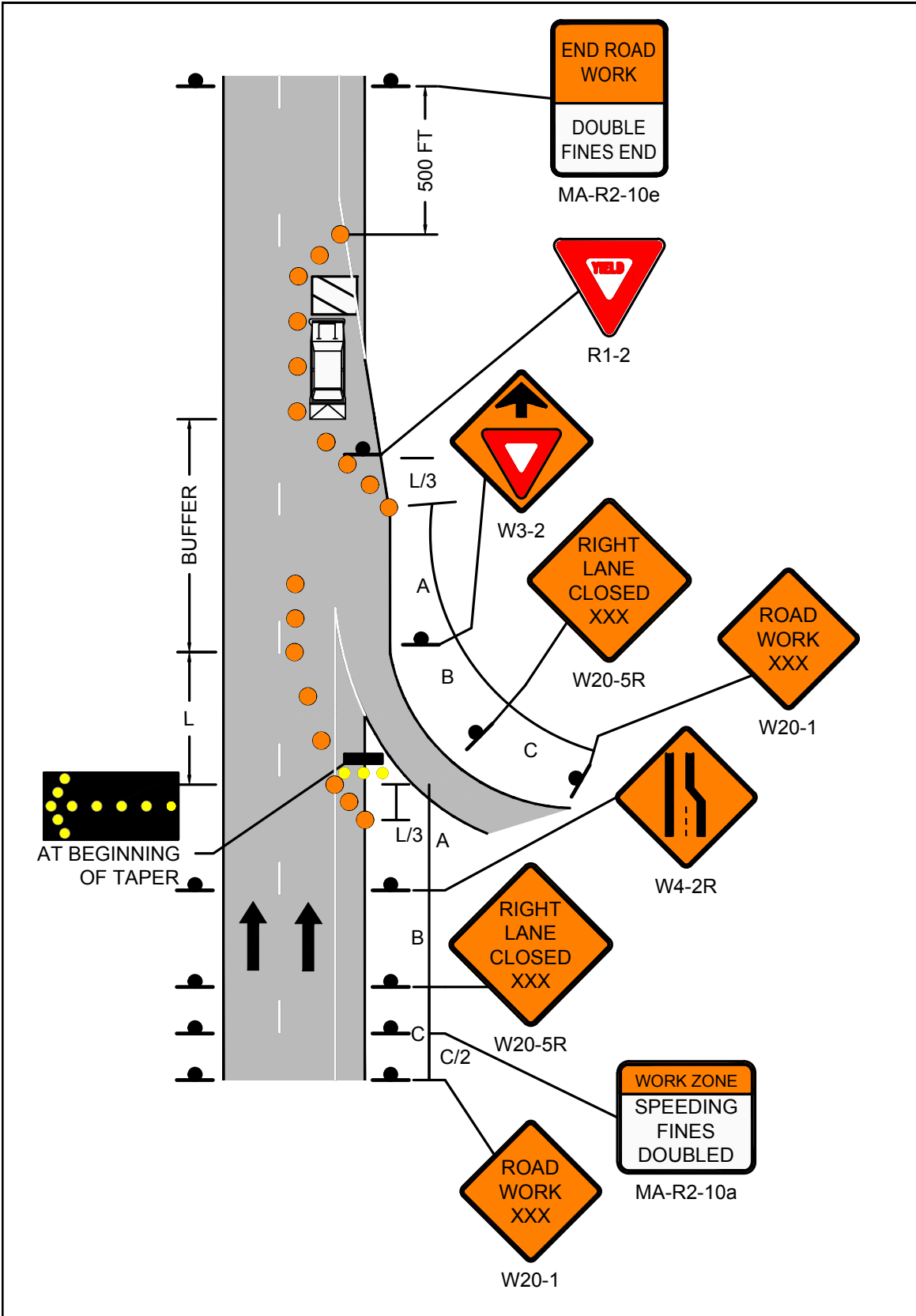
NOTES


1. MA-R2-10a LOCATED AT C/2.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 46</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY ROADWORK BEYOND OFF RAMP</p>
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POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)					
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	TRAVEL LANE SHIFT LENGTH (L/2) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	160	305	20	70
45-55	220	660	330	495	40	55
60-65	260	780	390	645	40	65










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

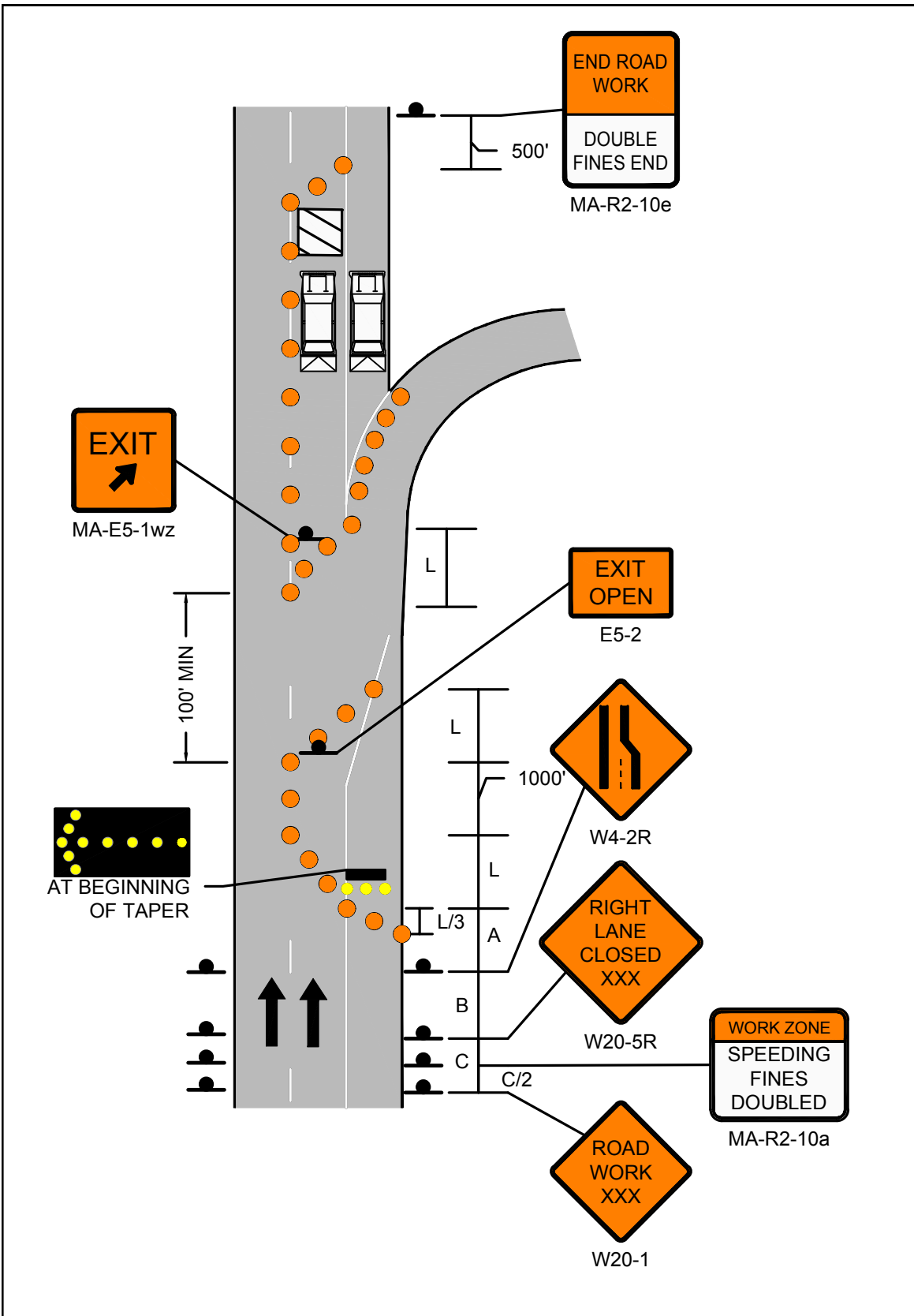
NOTES

1. MA-R2-10a LOCATED AT C/2.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE





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

MULTILANE DIVIDED ROADWAY
TYPICAL RAMP CLOSURE

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		SHOULDER TAPER LENGTH (L/3) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES
25-40	500 / 500 / 500	110	305	20	45
45-55	500 / 1000 / 1000	220	495	40	30
60-65	1000 / 1600 / 2600	260	645	40	35

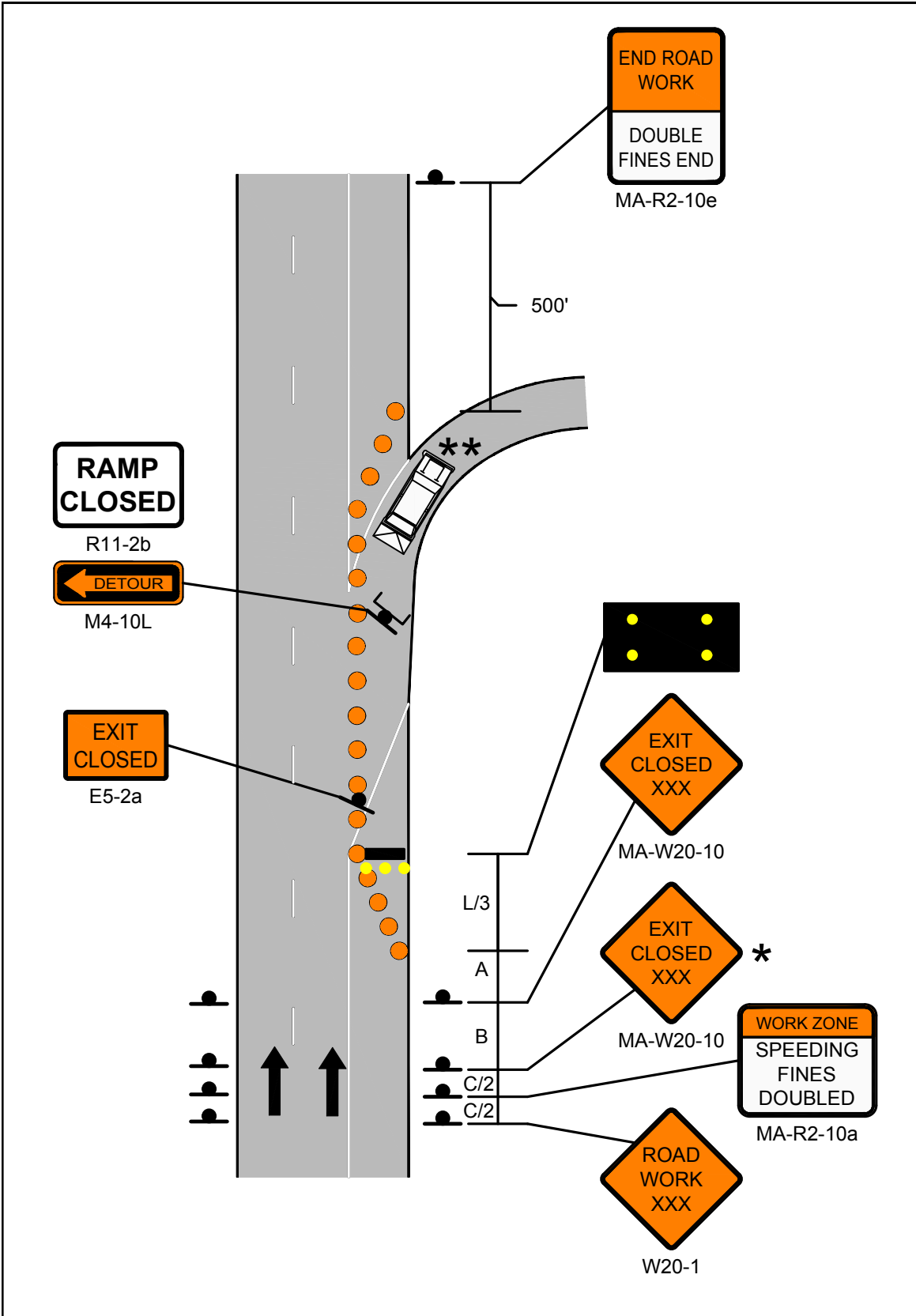
NOTES

1. MA-R2-10a LOCATED AT C/2.
2. * NOT REQUIRED IF RIGHT LANE IS CLOSED IN ADVANCE OF EXIT.
3. ** OPTIONAL AT ENGINEER'S DISCRETION.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE





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Work Zone Safety
Standard Details
and Drawings










MULTILANE DIVIDED ROADWAY
TYPICAL CLOVERLEAF RAMP CLOSURE

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		SHOULDER TAPER LENGTH (L/3) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES
25-40	500 / 500 / 500	110	305	20	45
45-55	500 / 1000 / 1000	220	495	40	30
60-65	1000 / 1600 / 2600	260	645	40	35

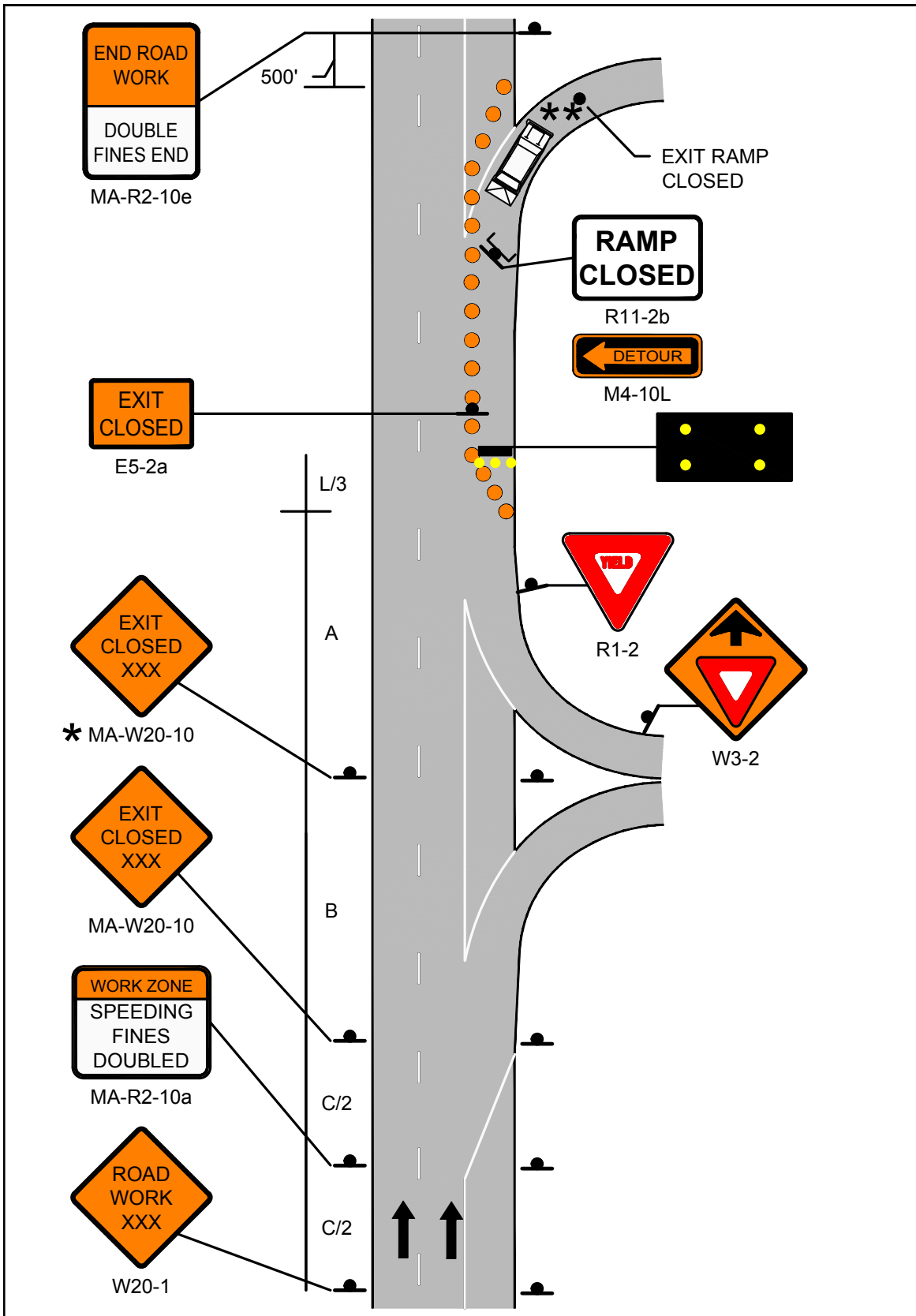
NOTES


1. MA-R2-10a LOCATED AT C/2.
2. * NOT REQUIRED IF RIGHT LANE IS CLOSED IN ADVANCE OF EXIT.
3. ** OPTIONAL AT ENGINEER'S DISCRETION.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 51</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 22 MULTILANE DIVIDED ROADWAY TYPICAL CLOVERLEAF RAMP CLOSURE</p>
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Work Zone Safety
Standard Details
and Drawings

MULTILANE DIVIDED ROADWAY
TYPICAL RAMP CLOSURE
ADVANCE SIGNING

NOTES

1. IF THE CLOSED RAMP IS LOCATED DOWNSTREAM FROM THE PROPOSED DETOUR ROUTE/RAMP, A PCMS SHALL BE POSITIONED AT A SUFFICIENT DISTANCE IN ADVANCE OF THE DETOUR ROUTE/RAMP AND SHOULD STATE WHICH RAMP IS CLOSED AND WHICH SHALL BE USED FOR THE DETOUR.
2. IF THE CLOSED RAMP IS LOCATED UPSTREAM FROM THE PROPOSED DETOUR ROUTE/RAMP, A PCMS SHALL BE POSITIONED PRIOR TO THE CLOSED RAMP AND SHOULD STATE WHICH RAMP IS CLOSED AND WHICH SHALL BE USED FOR THE DETOUR.
3. A SUFFICIENT NUMBER OF DETOUR SIGNS (M4-9 SERIES) SHOULD BE DEPLOYED TO PROPERLY DIRECT DETOURED TRAFFIC. SIGN SPACING SHALL BE AT THE DIRECTION OF THE ENGINEER.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE

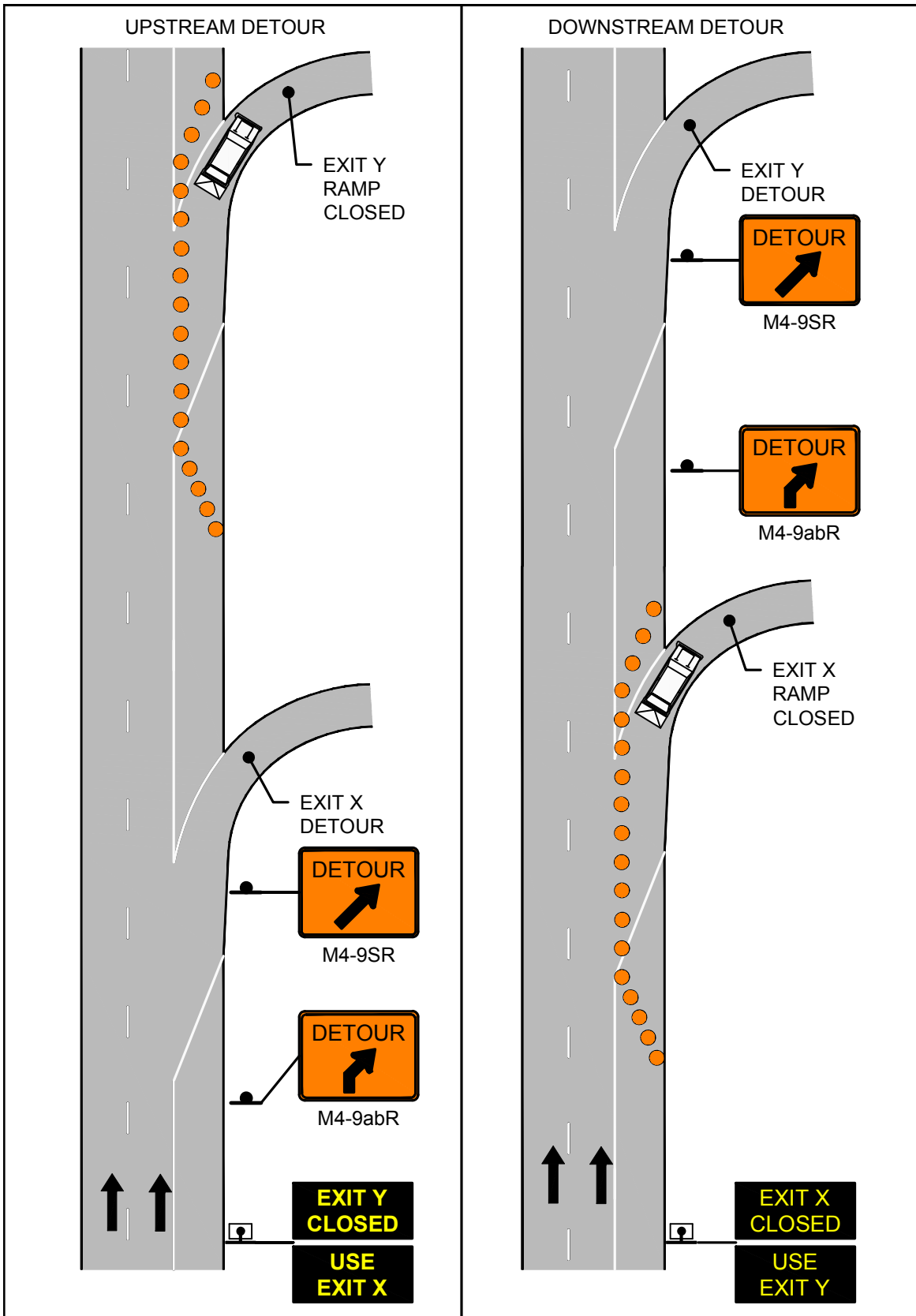



FIGURE 23
MULTILANE DIVIDED ROADWAY
TYPICAL RAMP CLOSURE
ADVANCE SIGNING

 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 54</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 24-1 MULTILANE DIVIDED ROADWAY PLACEMENT OF TEMPORARY PORTABLE RUMBLE STRIPS SHEET 1 OF 2</p>
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POSTED REGULATORY OR WORK ZONE SPEED	SEPARATION BETWEEN RUMBLE STRIPS
Above 55-mph	20-feet
36-mph to 55-mph	15-feet
35-mph and under	10-feet

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	TANGENT LENGTH BETWEEN TAPERS (T) (FT)
25-40	500 / 500 / 500	640
45-55	500 / 1000 / 1000	1320
60-65	1000 / 1600 / 2600	1560

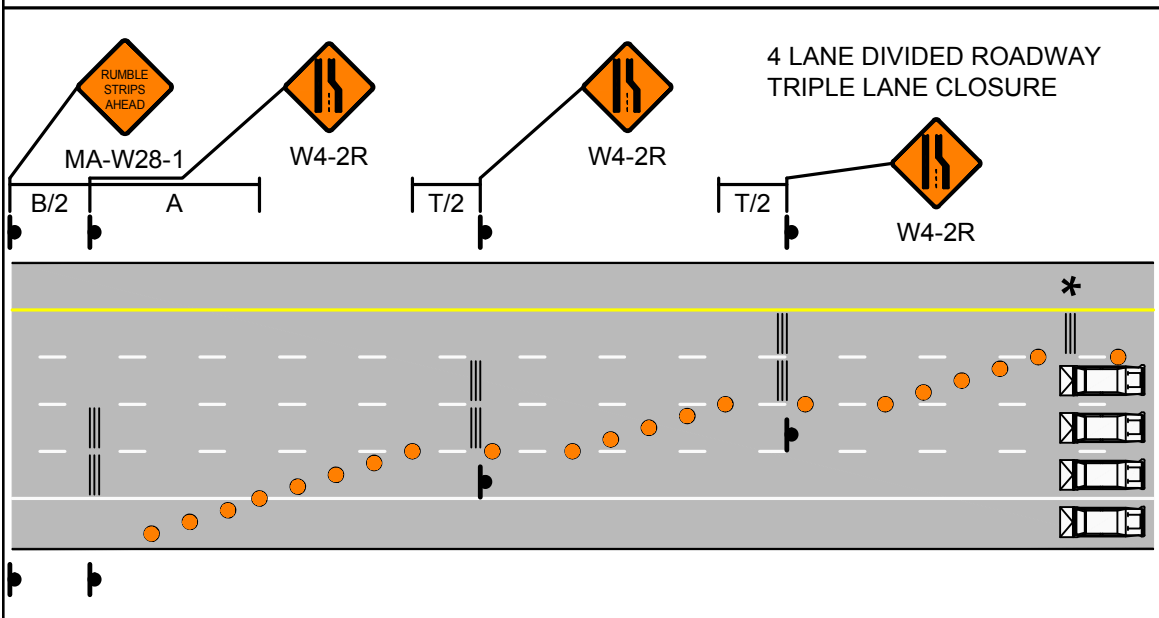
NOTES

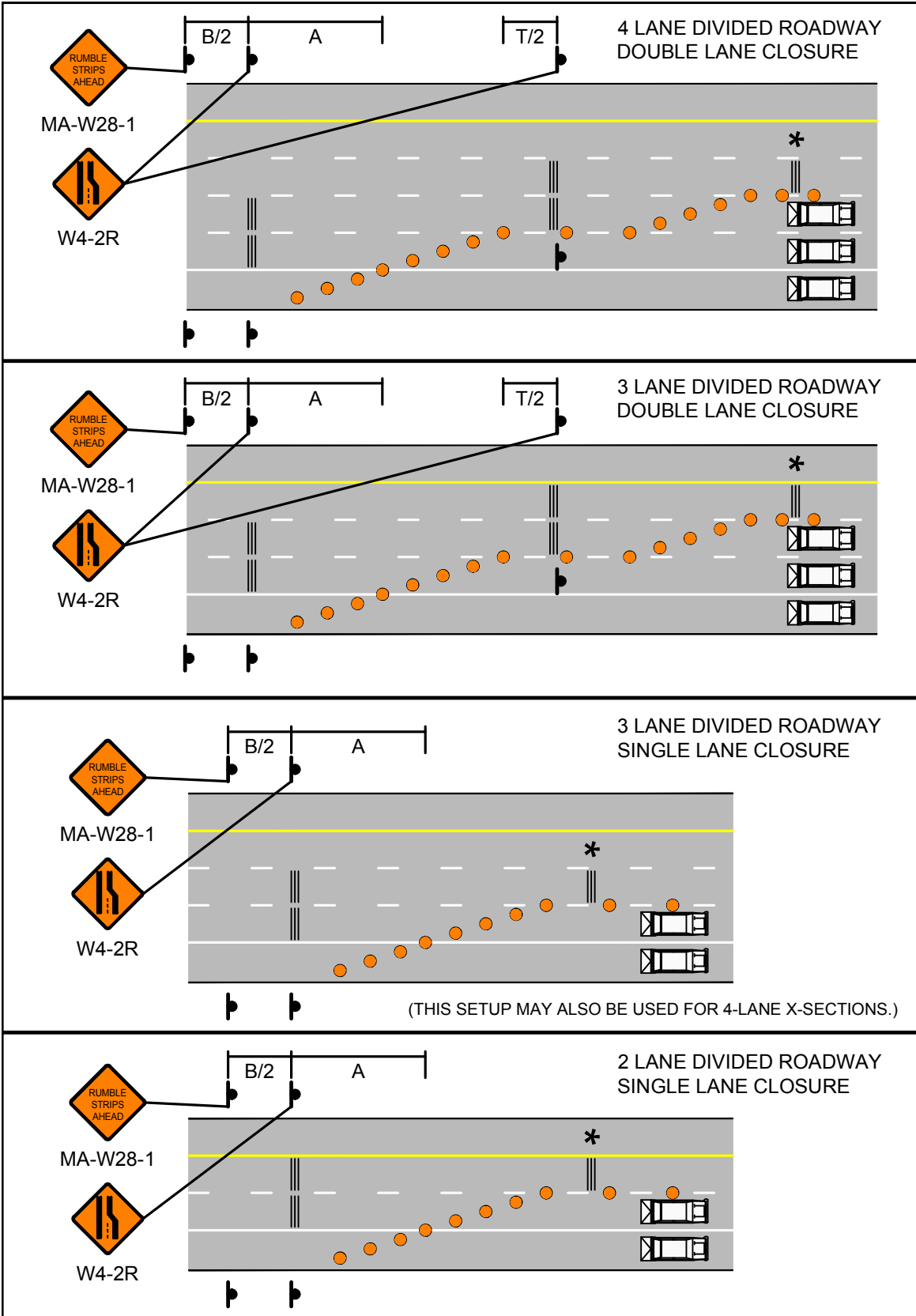
1. THE INTENTION OF THESE DETAILS IS ONLY TO DEPICT THE PLACEMENT OF TEMPORARY PORTABLE RUMBLE STRIPS (TPRS) IN RELATIONSHIP TO THE TAPER AND THE BUFFER OF A SINGLE- OR MULTI-LANE CLOSURE. THE DEPICTION OF THE NUMBER AND SPACING OF ALL OTHER TRAFFIC CONTROL DEVICES IS NOT TO SCALE. REFER TO OTHER DETAILS FOR LANE CLOSURES FOR THE PLACEMENT AND NUMBER OF ALL OTHER TRAFFIC CONTROL DEVICES.
2. THESE DETAILS ONLY DEPICT RIGHT LANE CLOSURES. LEFT LANE CLOSURES SHOULD UTILIZE A MIRROR IMAGE OF THESE SETUPS, STARTING WITH CLOSURE OF THE LEFTMOST LANE.
3. ★ THIS TPRS ARRAY IS OPTIONAL AT THE ENGINEER'S DISCRETION. IF USED, IT SHOULD BE PLACED ADJACENT TO THE BUFFER.
4. DETAILS SHOW THE MINIMUM NUMBER OF TPRS REQUIRED. ADDITIONAL MAY BE USED IF CONDITIONS WARRANT.


LEGEND

- CHANNELIZATION DEVICE
- ▣ TRUCK MOUNTED ATTENUATOR
- ≡≡≡ TEMPORARY PORTABLE RUMBLE STRIP

NOT TO SCALE

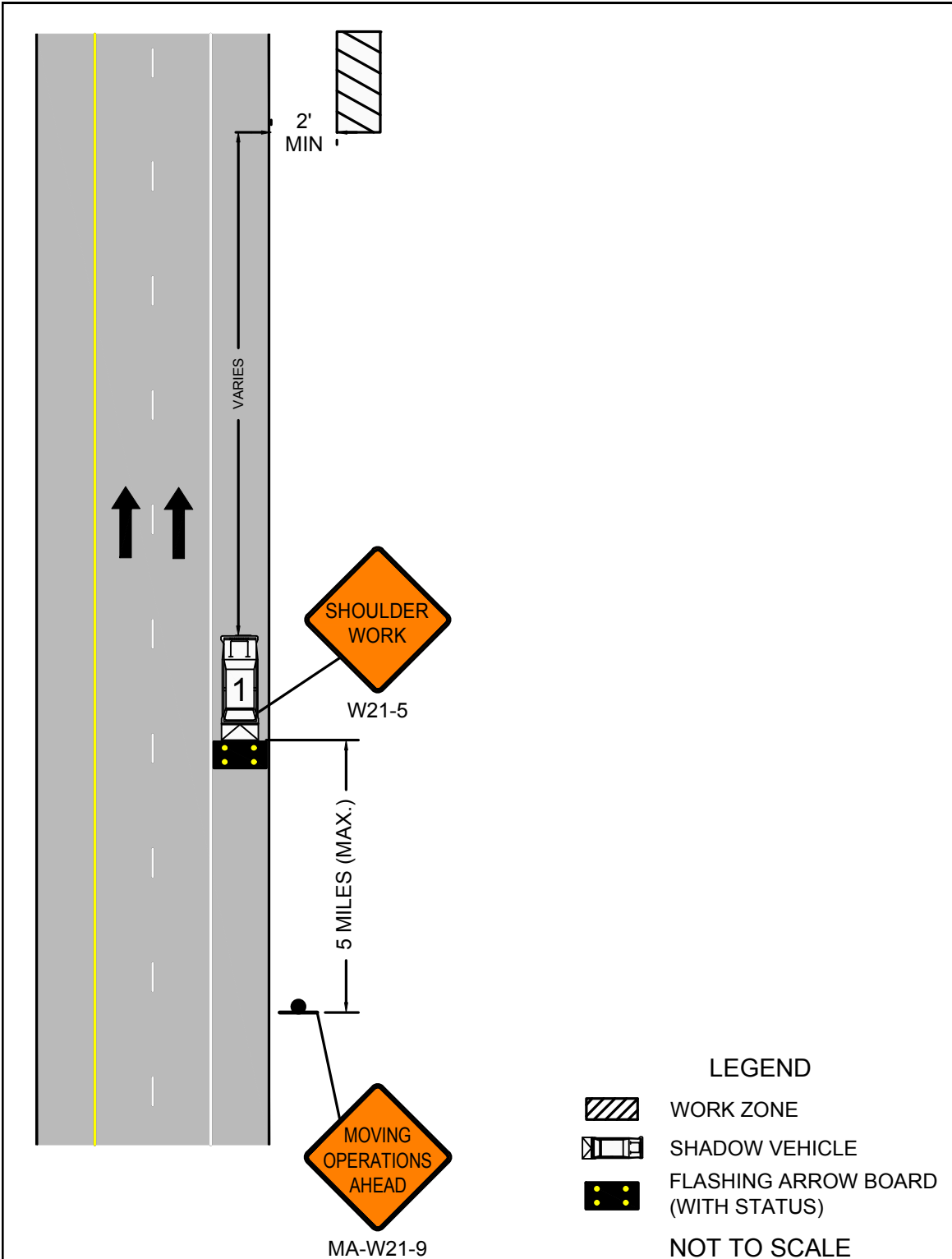




 <p>PAGE 56</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>NOTES FOR MOBILE OPERATIONS</p>
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Notes for Mobile Operations

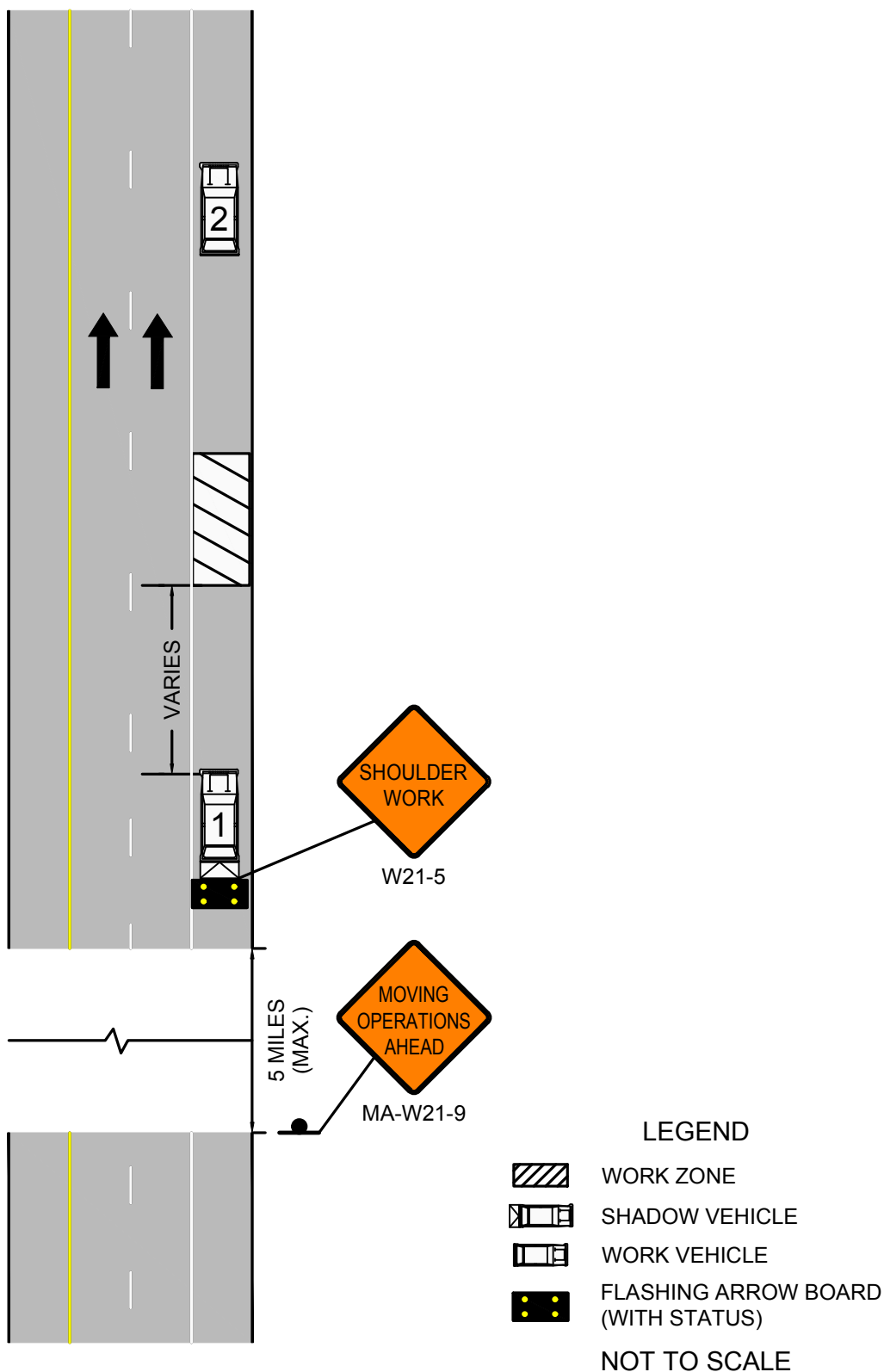
- Unless otherwise stated, these notes shall apply to all Mobile Operation setups.
 - Additional, setup-specific notes may be found on individual sheets.
1. The Supervisor shall travel the designated roadway prior to scheduling the work to ensure that sufficient and appropriate traffic control devices will be available. Special consideration shall be exercised to ensure that appropriate traffic controls be placed in areas that will have limited visibility of the work areas or any associated traffic queues.
 2. Vehicles used for these operations shall be made highly visible with appropriate equipment such as flashing lights, rotating beacons, flags, signs, flashing arrow boards, and/or portable changeable message signs. Any signs mounted to these vehicles shall not obscure the visibility of other devices.
 3. All vehicles shown may not be required based upon roadway conditions. However, when needed and practical, additional shadow vehicles and equipment to warn and protect motorists and workers should be used. Based upon roadway conditions, the addition of a police detail with cruiser may be used for additional protection or warning for the traveling public.
 4. The distance between the work and shadow vehicle(s) may vary according to the terrain and other factors. Shadow vehicles are used to warn traffic of the operations ahead. Whenever adequate sight distance exists, the shadow vehicle(s) should maintain the minimum appropriate distance and maintain the same speed to prevent non-work related vehicles from entering the work convoy. If this formation cannot be maintained then additional traffic control devices should be deployed in advance of any vertical or horizontal curves that may restrict the sight distance of an oncoming vehicle to either the work vehicle or associated traffic queue.
 5. All shadow vehicles shall be equipped with a truck or trailer mounted attenuator (TMA) and a flashing arrow board.
 6. Signs should be covered or turned from view when work is not in progress.
 7. Portable changeable message signs may be used in lieu of MA-W21-9 signs and any signs mounted directly to a shadow vehicle.

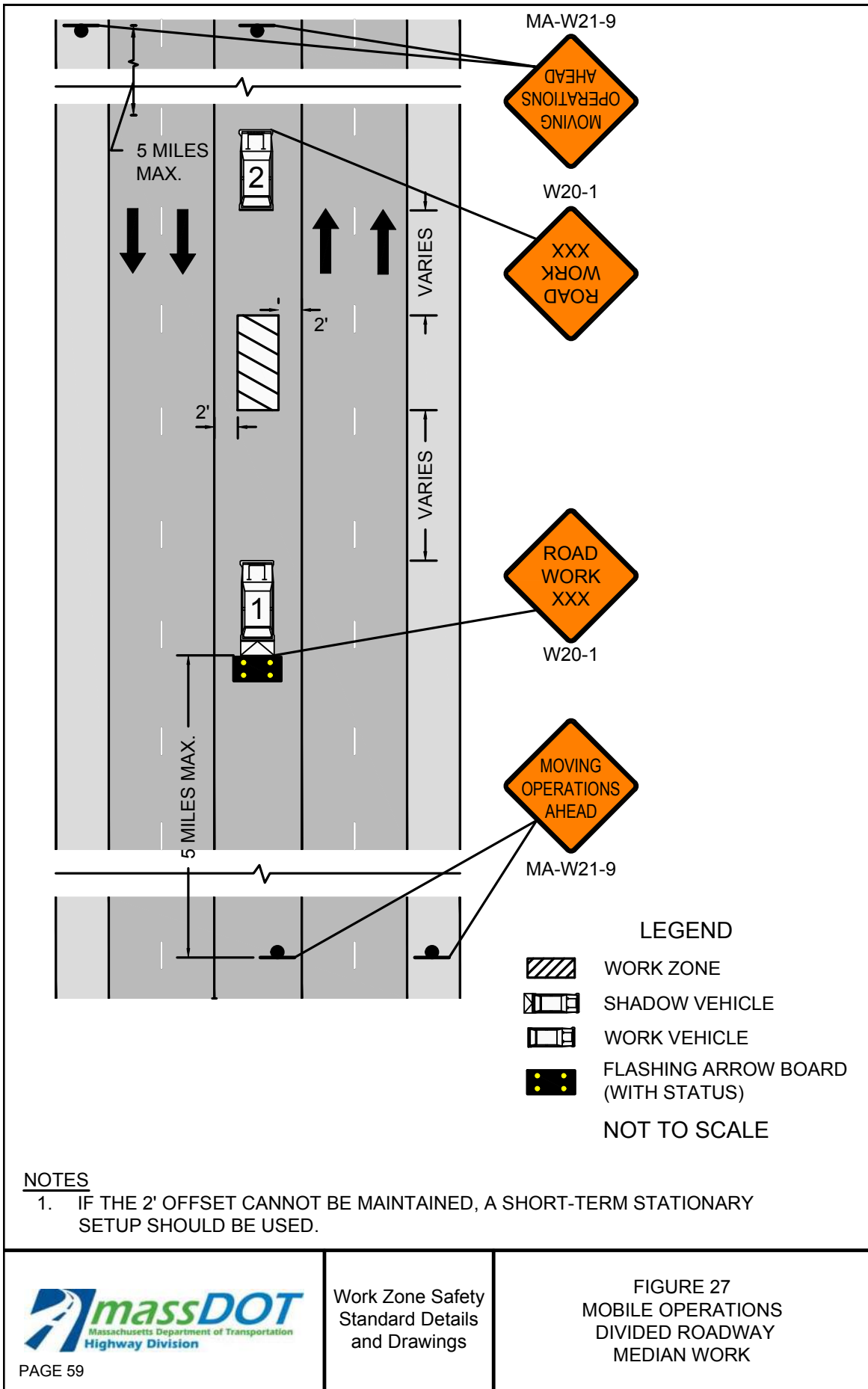


NOTES

1. IF THE WORK AREA IS SUFFICIENTLY AWAY FROM THE EDGE OF ROADWAY (20' MINIMUM) THEN SIGNS AND VEHICLES MAY NOT BE REQUIRED.

 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 57</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 25 MOBILE OPERATIONS ANY ROADWAY BEYOND RIGHT SHOULDER</p>
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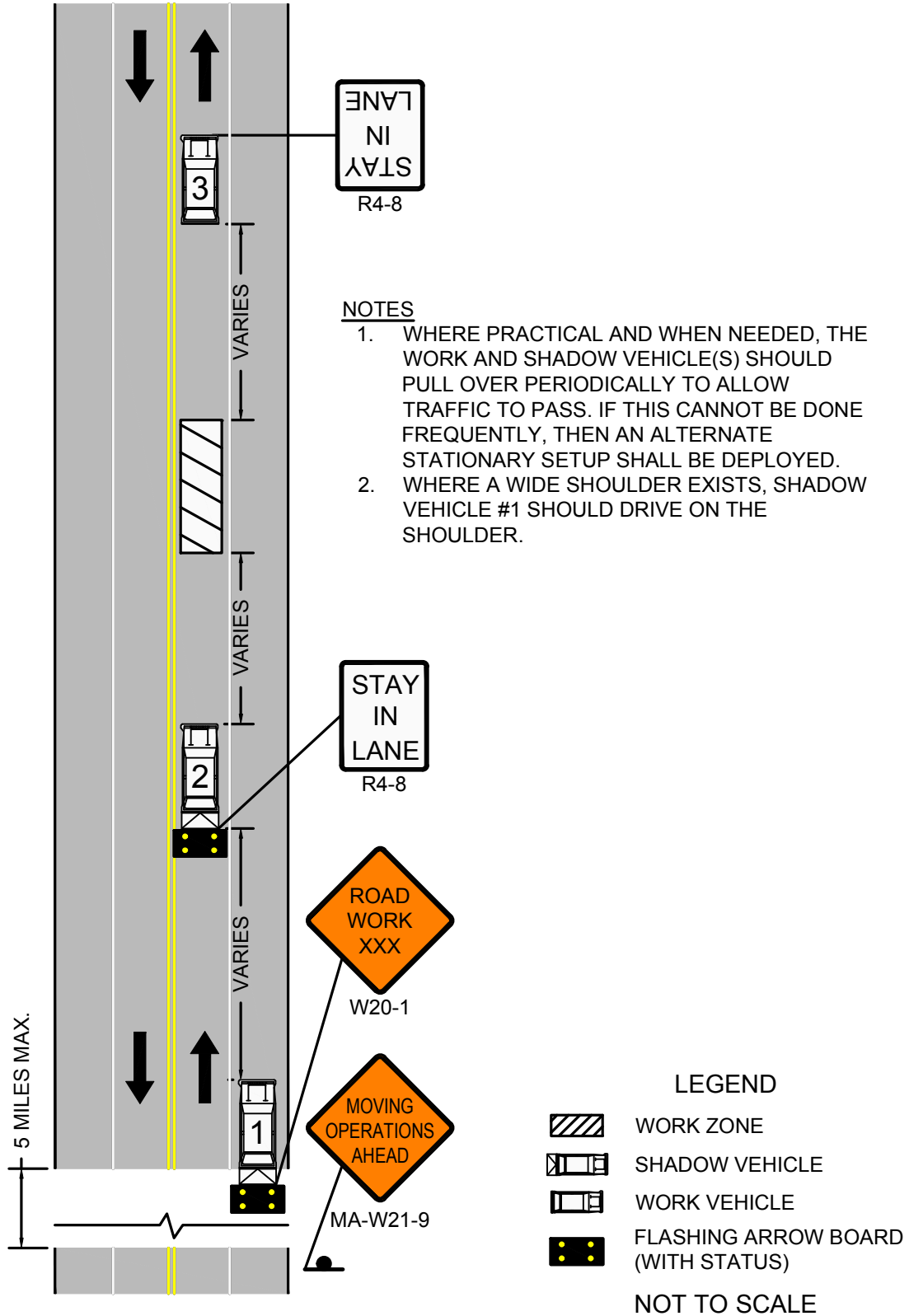


NOTES

1. IF THE 2' OFFSET CANNOT BE MAINTAINED, A SHORT-TERM STATIONARY SETUP SHOULD BE USED.



FIGURE 28
MOBILE OPERATIONS
UNDIVIDED TWO LANE ROADWAY
HALF OF ROADWAY CLOSED



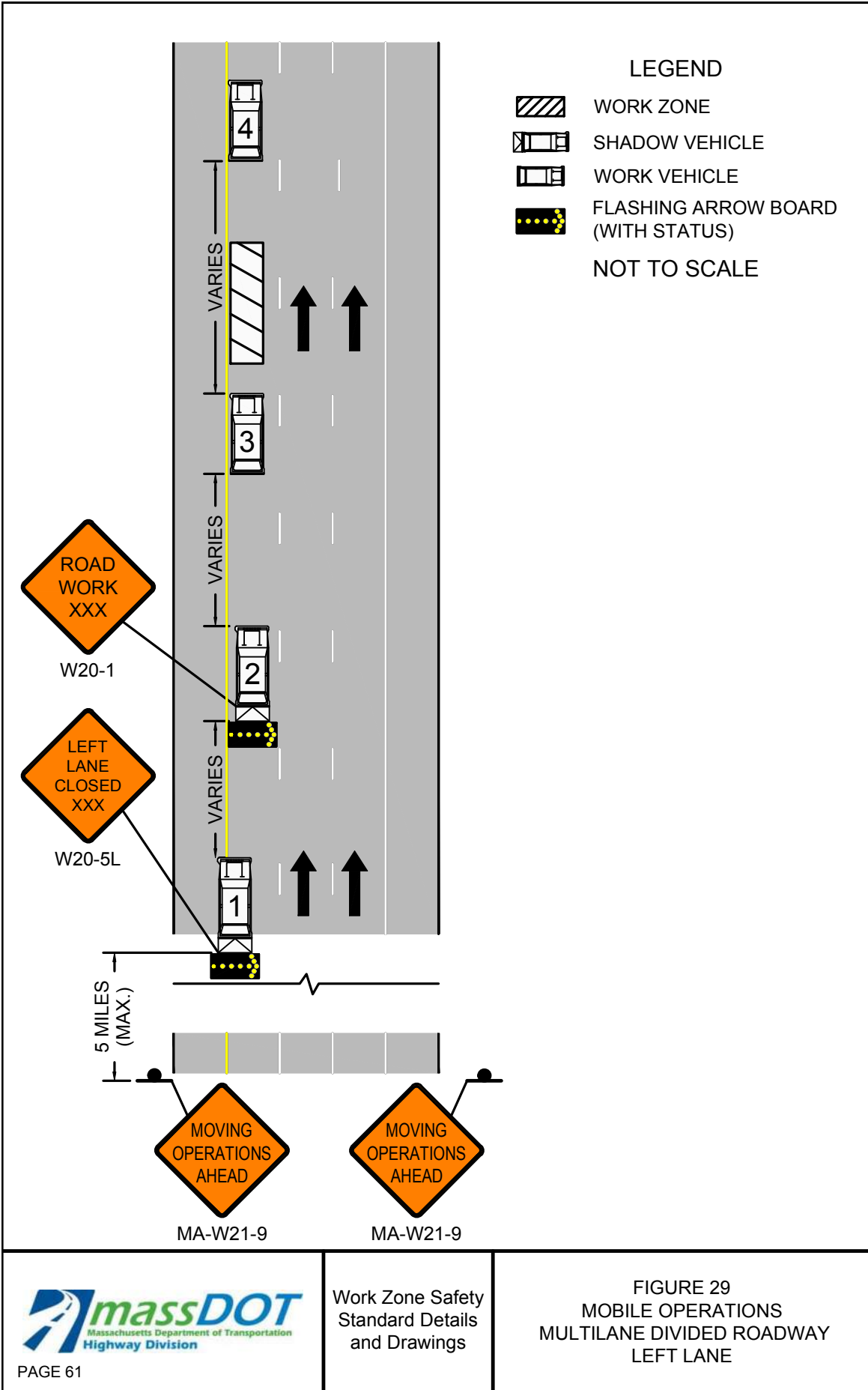
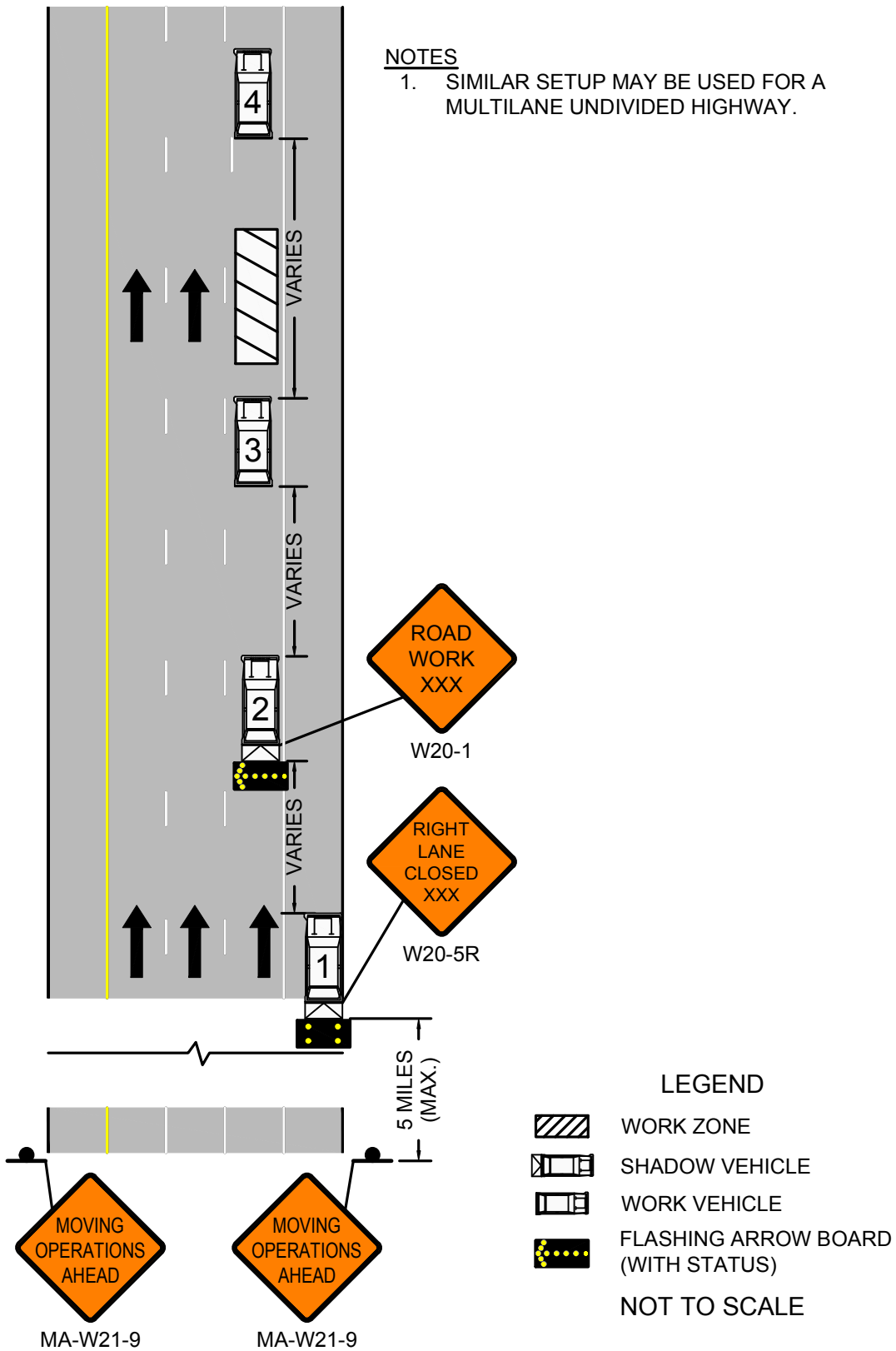
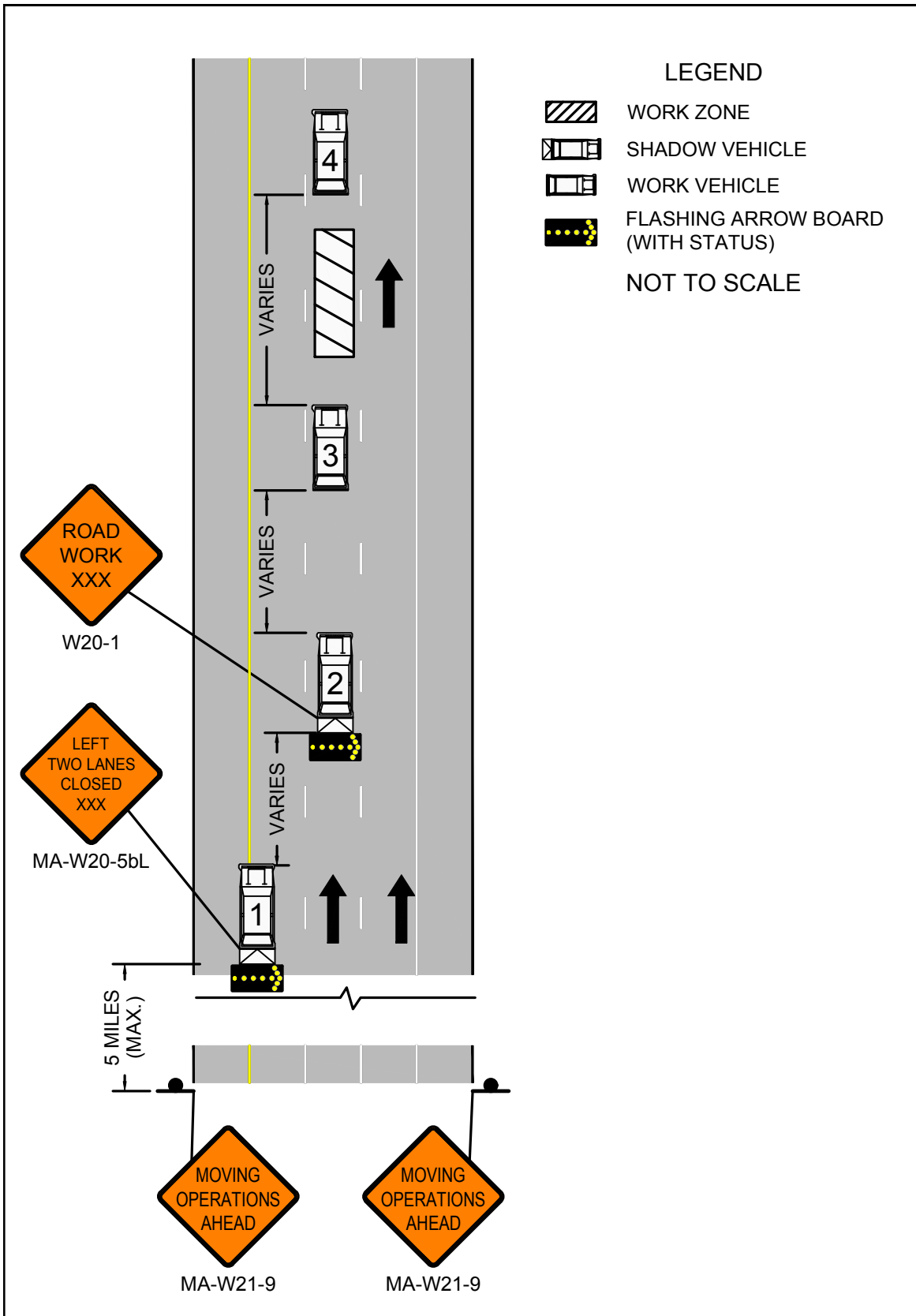



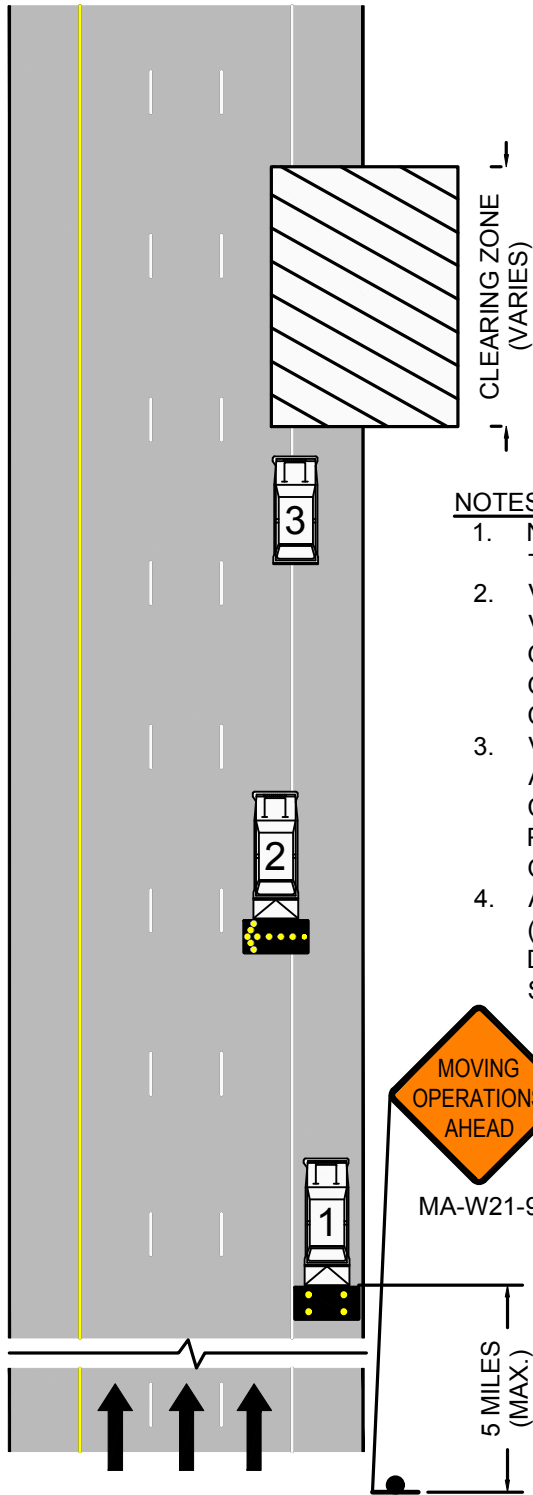


FIGURE 30
MOBILE OPERATIONS
MULTILANE DIVIDED ROADWAY
RIGHT LANE





 Massachusetts Department of Transportation Highway Division PAGE 63	Work Zone Safety Standard Details and Drawings	FIGURE 31 MOBILE OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE
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NOTES

1. NO OTHER NOTES ARE APPLICABLE TO THIS DETAIL.
2. VEHICLE #3 IS A SNOW/DEBRIS REMOVAL VEHICLE AND SHALL ALWAYS BE AWARE OF THE SURROUNDINGS. MORE THAN ONE VEHICLE MAY BE USED IN THE CLEARING ZONE.
3. VEHICLE #1 SHOULD BE EQUIPPED WITH A PCMS, A TMA, AND STAY IN VISUAL CONTACT WITH VEHICLE #3 WHILE PROVIDING AMPLE WARNING TO ONCOMING TRAFFIC.
4. A POLICE DETAIL WITH BLUE LIGHTS (OPTIONAL) SHALL REMAIN DOWNSTREAM OF VEHICLE #1 IN THE SHOULDER.

LEGEND

- WORK ZONE
- SHADOW VEHICLE
- WORK VEHICLE
- FLASHING ARROW BOARD (WITH STATUS)

NOT TO SCALE

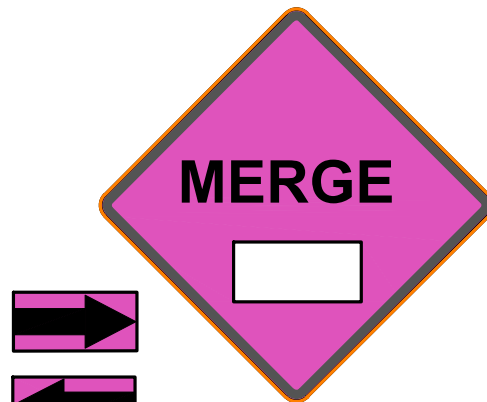
Notes for Traffic Emergency or Incident Operations

- The goal is to increase awareness of during traffic emergencies or incidents.
- These signs are to be used to differentiate from the traditional construction work zone and an emergency or incident.
- Upon arrival MassDOT First Responders shall assess the magnitude of the scene to determine if the incident is likely to last an hour or more in duration which would trigger the requirement to use these signs.
- Place the “Emergency Ahead” sign on the same side of the road as the incident, if possible, for up to an hour. Emergency response signs should be put up for all incidents and emergencies as soon as possible.
- Place the emergency sign 500 to 1000 feet before the first channelization devices.
- As an incident evolves this sign would be used as a secondary sign with all other emergency controls put in place.
- Only use “MERGE” signs where applicable (Not on 2 lane roads).
- Use MERGE signs on Multi-lane Roads to move traffic away from the incident and keep them in a safe lane.
- Place the MERGE sign about 500 feet before the closure.
- If additional signs are available, they should be placed accordingly as a sign informing people coming in the other direction or on the opposite side of the roadway.
- Use 12 emergency cones spaced 40 to 80 feet apart to form a taper and protect the scene.
- Sequential flashing lights/flares may be used in lieu of or to supplement cones.
- During a major incident that will last for a long duration, the EMERGENCY AHEAD sign should be moved back before an intersecting road or ramp to alert travelers and give them an option of using an alternate route. (Be sure all other devices are in place before moving this sign).

Standard Emergency Signs (36"x36" or 48"x48")



MA-W20-9






MA-W4-2aR/L



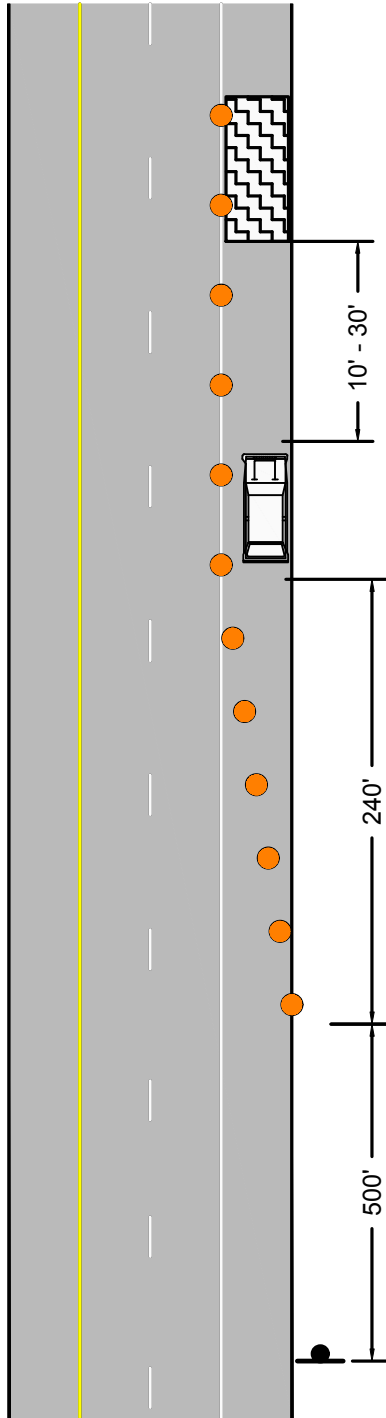


FIGURE 33
EMERGENCY RESPONSE
ANY ROADWAY
SHOULDER ENCROACHMENT

LEGEND

-  EMERGENCY AREA
-  CHANNELIZATION DEVICE
-  EMERGENCY RESPONSE VEHICLE

NOT TO SCALE



ORDER OF RESPONSE ACTIVITIES

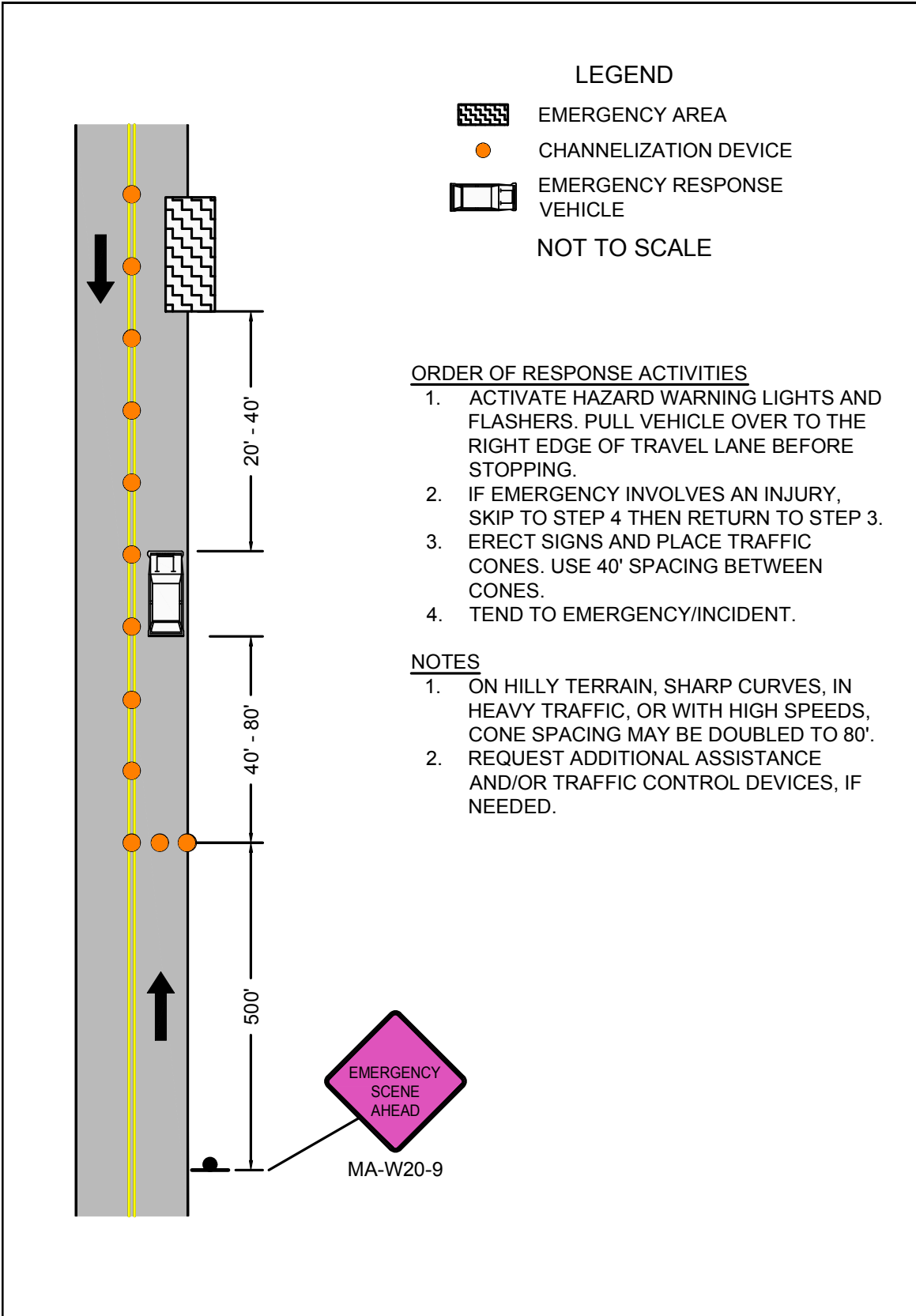
1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. PULL VEHICLE OVER TO THE RIGHT EDGE OF TRAVEL LANE BEFORE STOPPING.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 4 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. TEND TO EMERGENCY/INCIDENT.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.



MA-W20-9







 Massachusetts Department of Transportation Highway Division PAGE 67	Work Zone Safety Standard Details and Drawings	FIGURE 34 EMERGENCY RESPONSE TWO LANE ROADWAY NO SHOULDER TRAVEL LANE ENCROACHMENT
--	--	---

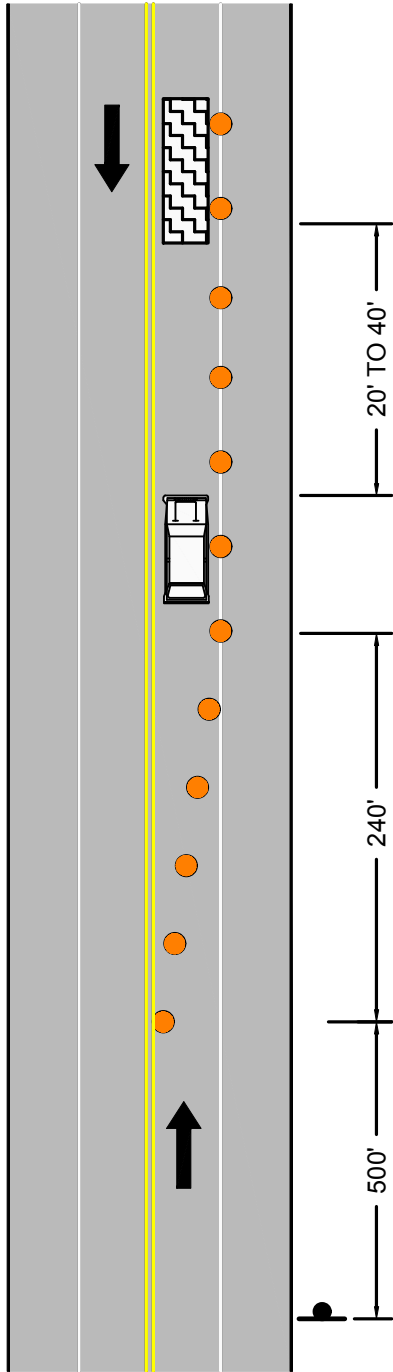


FIGURE 35
EMERGENCY RESPONSE
TWO LANE ROADWAY
TRAVERSABLE SHOULDER
SINGLE LANE ENCROACHMENT

LEGEND

-  EMERGENCY AREA
-  CHANNELIZATION DEVICE
-  EMERGENCY RESPONSE VEHICLE

NOT TO SCALE



ORDER OF RESPONSE ACTIVITIES

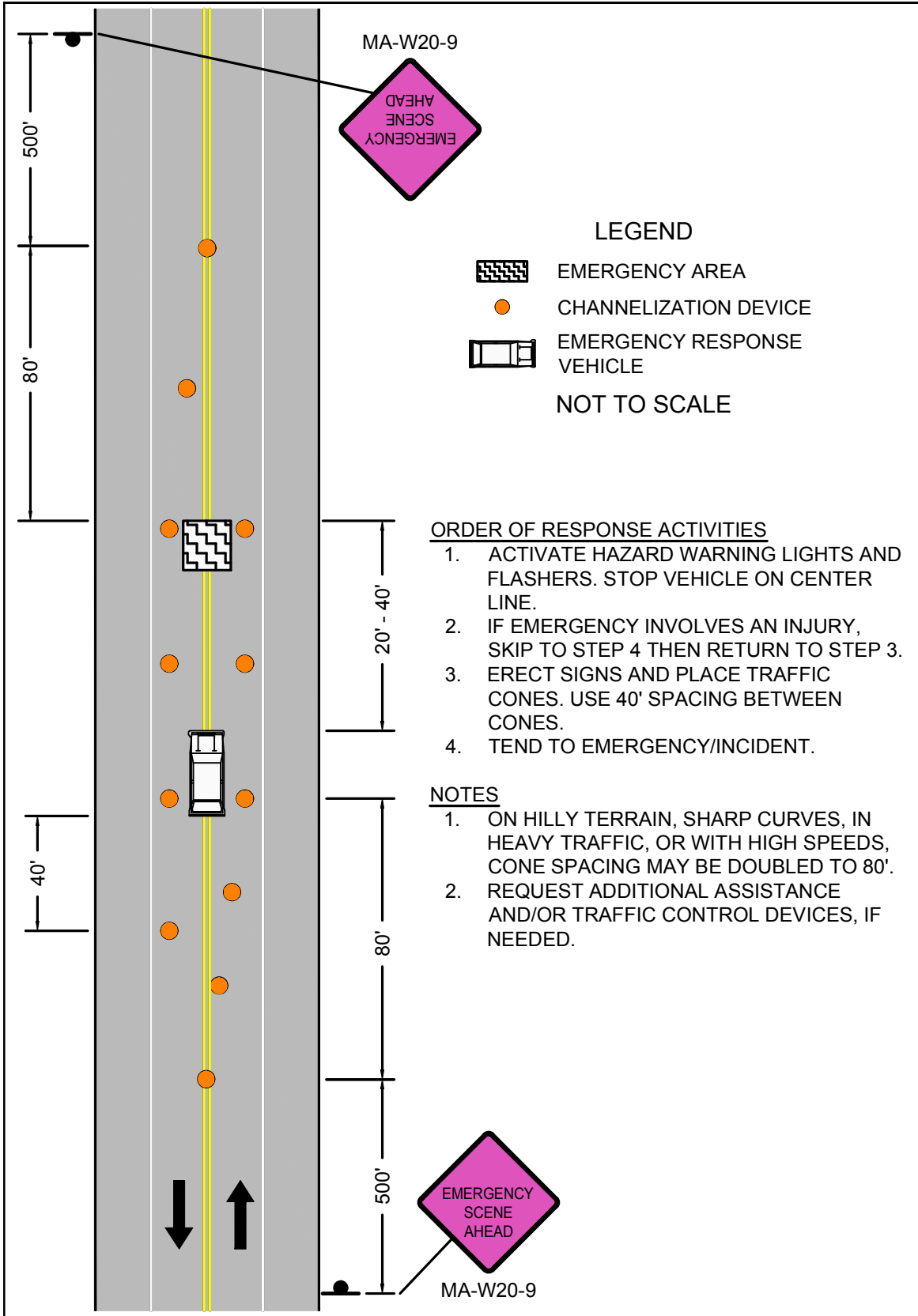
1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. PULL VEHICLE OVER TO THE LEFT EDGE OF TRAVEL LANE BEFORE STOPPING.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 4 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. TEND TO EMERGENCY/INCIDENT.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.



MA-W20-9




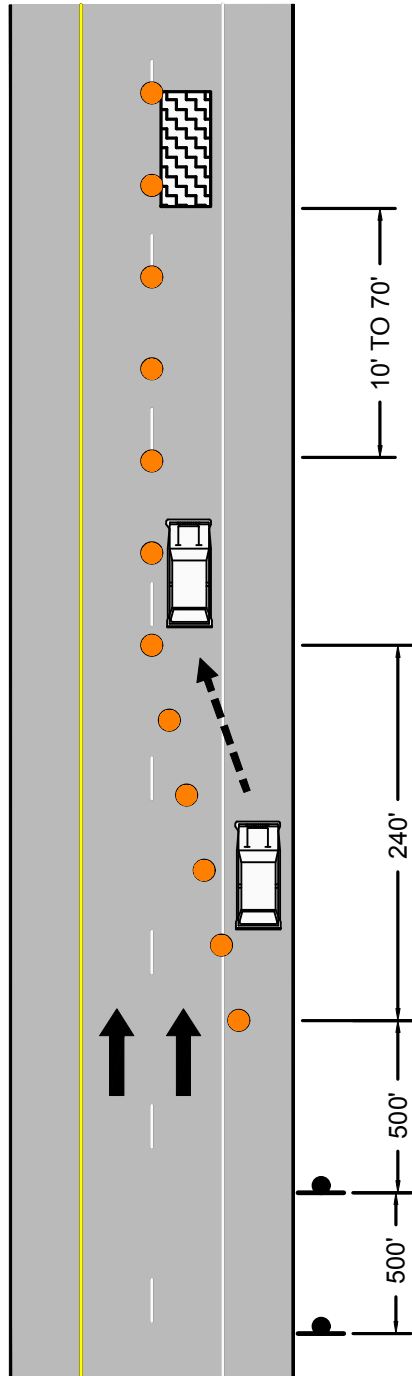




 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 69</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 36 EMERGENCY RESPONSE TWO LANE ROADWAY TRAVERSABLE SHOULDER CENTER OF ROADWAY</p>
---	---	---



FIGURE 37
EMERGENCY RESPONSE
MULTILANE DIVIDED ROADWAY
RIGHT LANE



LEGEND

-  EMERGENCY AREA
-  CHANNELIZATION DEVICE
-  EMERGENCY RESPONSE VEHICLE
-  RESPONSE VEHICLE MOVEMENT

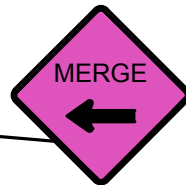
NOT TO SCALE

ORDER OF RESPONSE ACTIVITIES

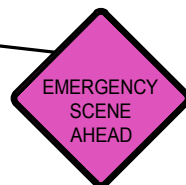
1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. STOP VEHICLE IN BREAKDOWN LANE.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 6 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. MOVE RESPONSE VEHICLE BEHIND EMERGENCY.
5. PLACE ADDITIONAL CONES.
6. TEND TO EMERGENCY.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.



MA-W4-2aL



MA-W20-9

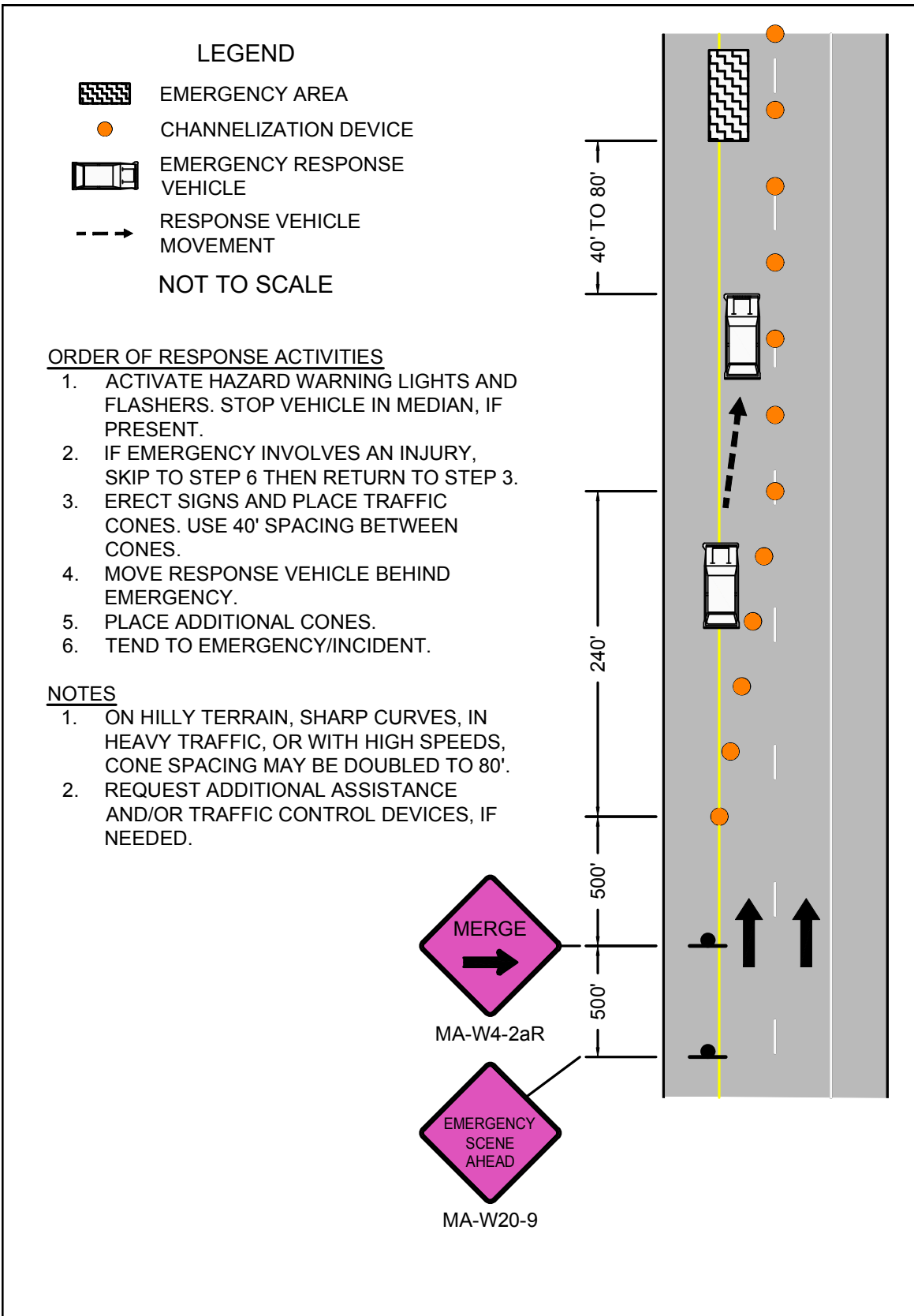
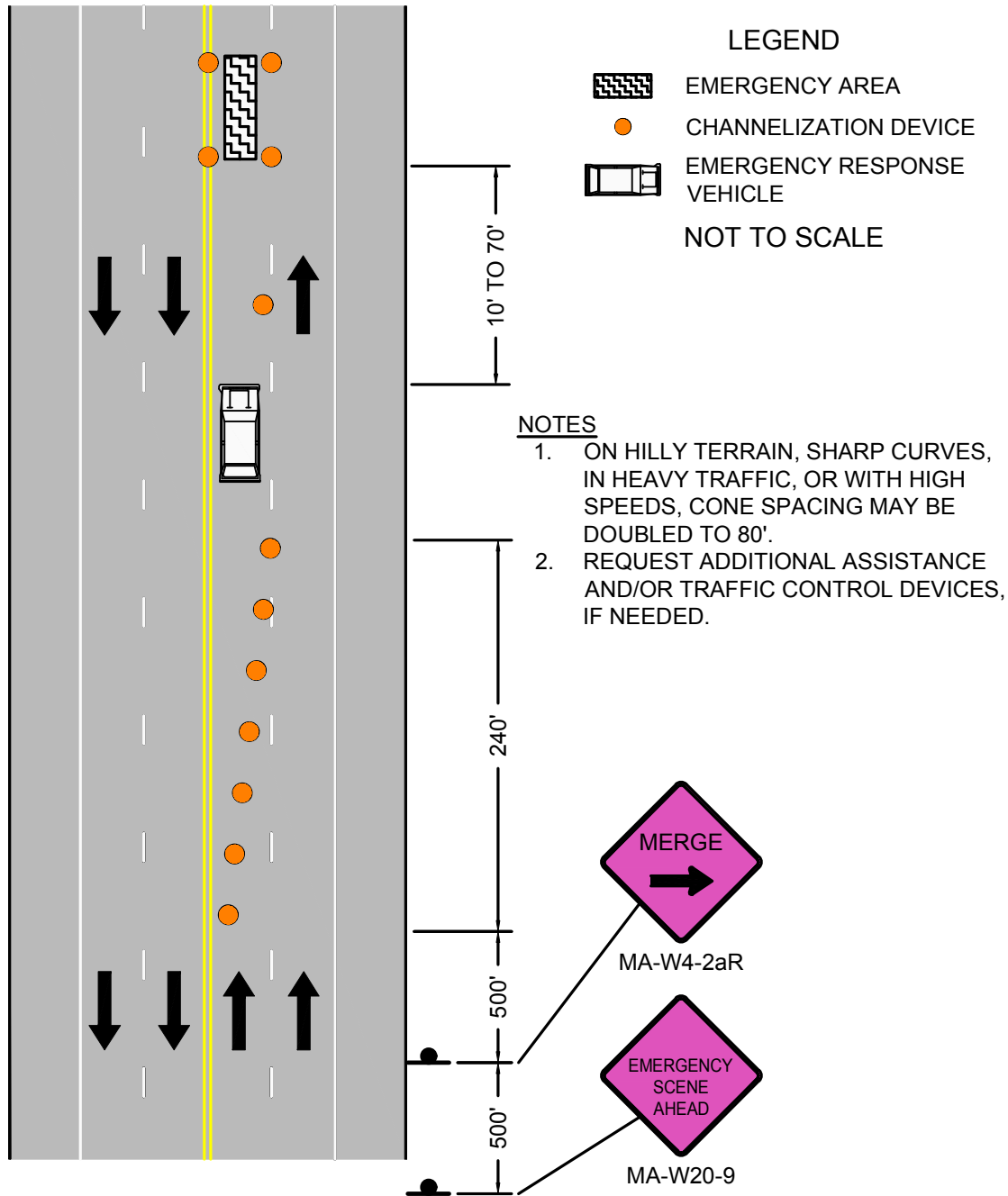




FIGURE 39
EMERGENCY RESPONSE
MULTILANE UNDIVIDED
ROADWAY
LEFT LANE



ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. PULL VEHICLE OVER TO THE RIGHT EDGE OF BREAKDOWN LANE OR SHOULDER OR, IF NOT PRESENT, RIGHT EDGE OF TRAVEL LANE BEFORE STOPPING.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 4 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. TEND TO EMERGENCY/INCIDENT.

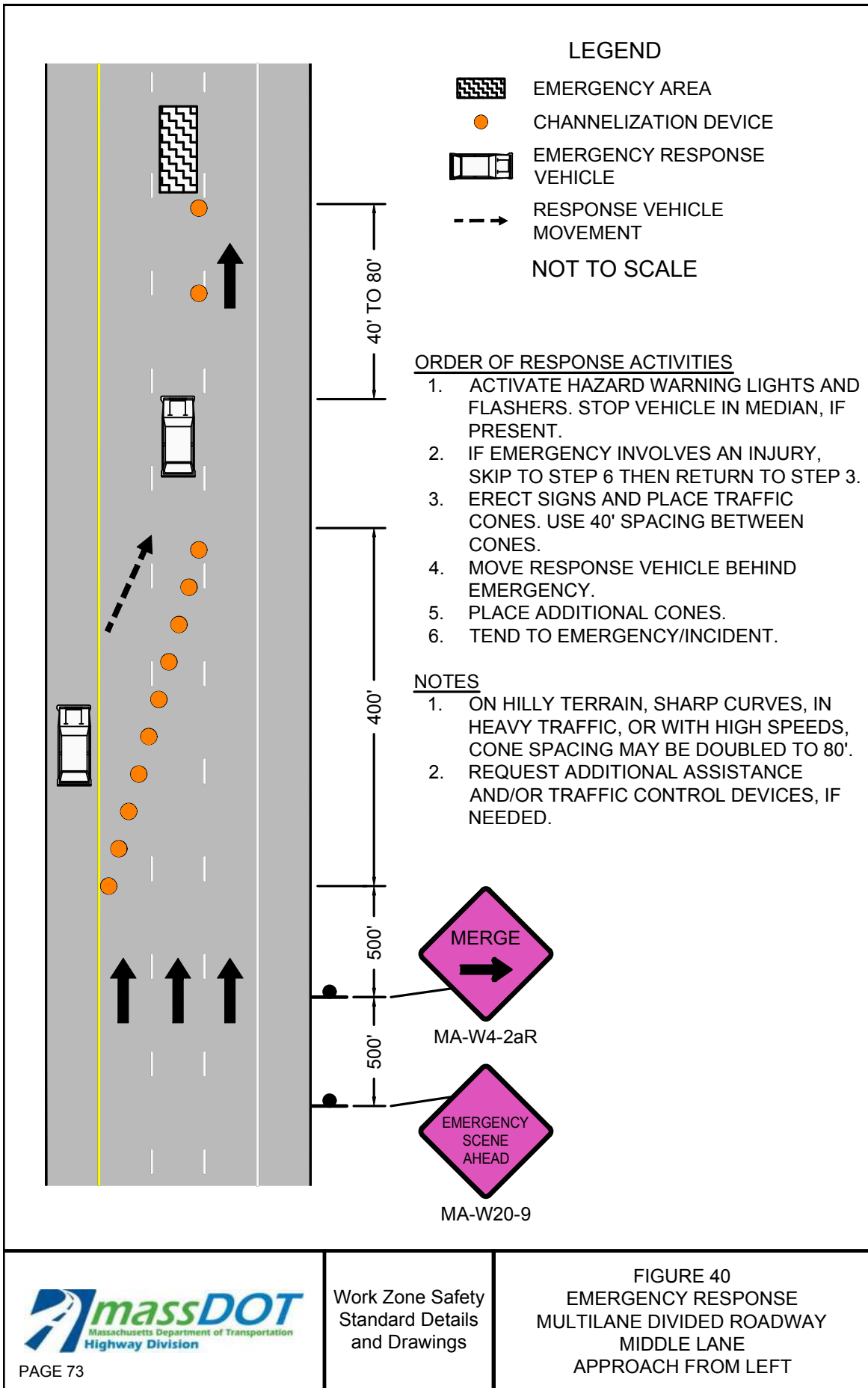
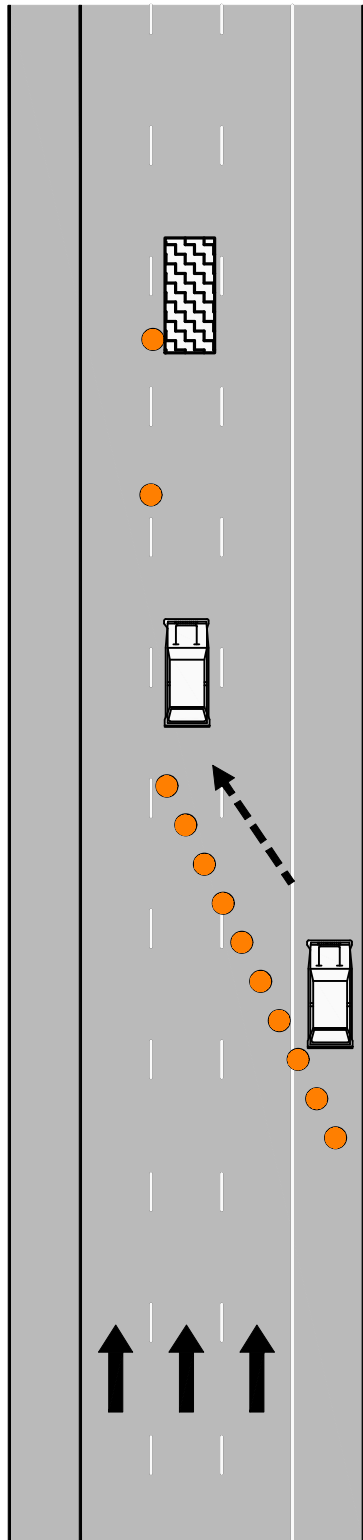








FIGURE 41
EMERGENCY RESPONSE
MULTILANE DIVIDED ROADWAY
MIDDLE LANE
APPROACH FROM RIGHT



LEGEND

-  EMERGENCY AREA
-  CHANNELIZATION DEVICE
-  EMERGENCY RESPONSE VEHICLE
-  RESPONSE VEHICLE MOVEMENT

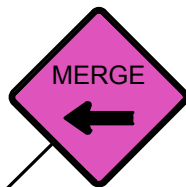
NOT TO SCALE

ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. STOP VEHICLE IN BREAKDOWN LANE.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 6 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. MOVE RESPONSE VEHICLE BEHIND EMERGENCY.
5. PLACE ADDITIONAL CONES.
6. TEND TO EMERGENCY.

NOTES

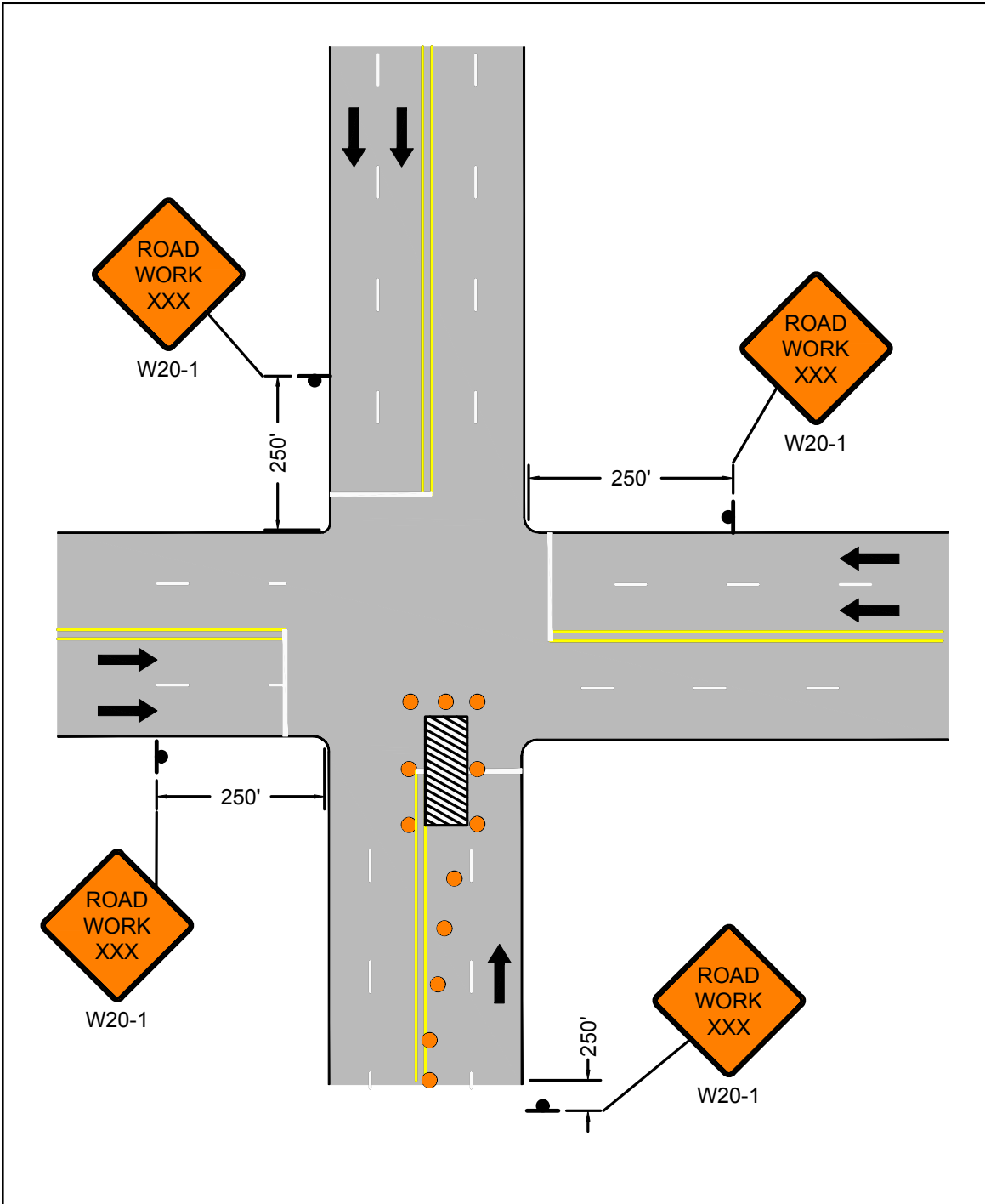
1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.





MA-W4-2aL



MA-W20-9



LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE

NOT TO SCALE

NOTES

1. DURATION OF WORK = 20 MINUTES OR LESS.
2. EQUIPMENT: 12 CONES + 4 PORTABLE SIGNS.
3. CONE SPACING IS 20 FEET.
4. SINGLE WORK VEHICLE PARKED/STOPPED.
5. POLICE DETAIL REQUIRED.

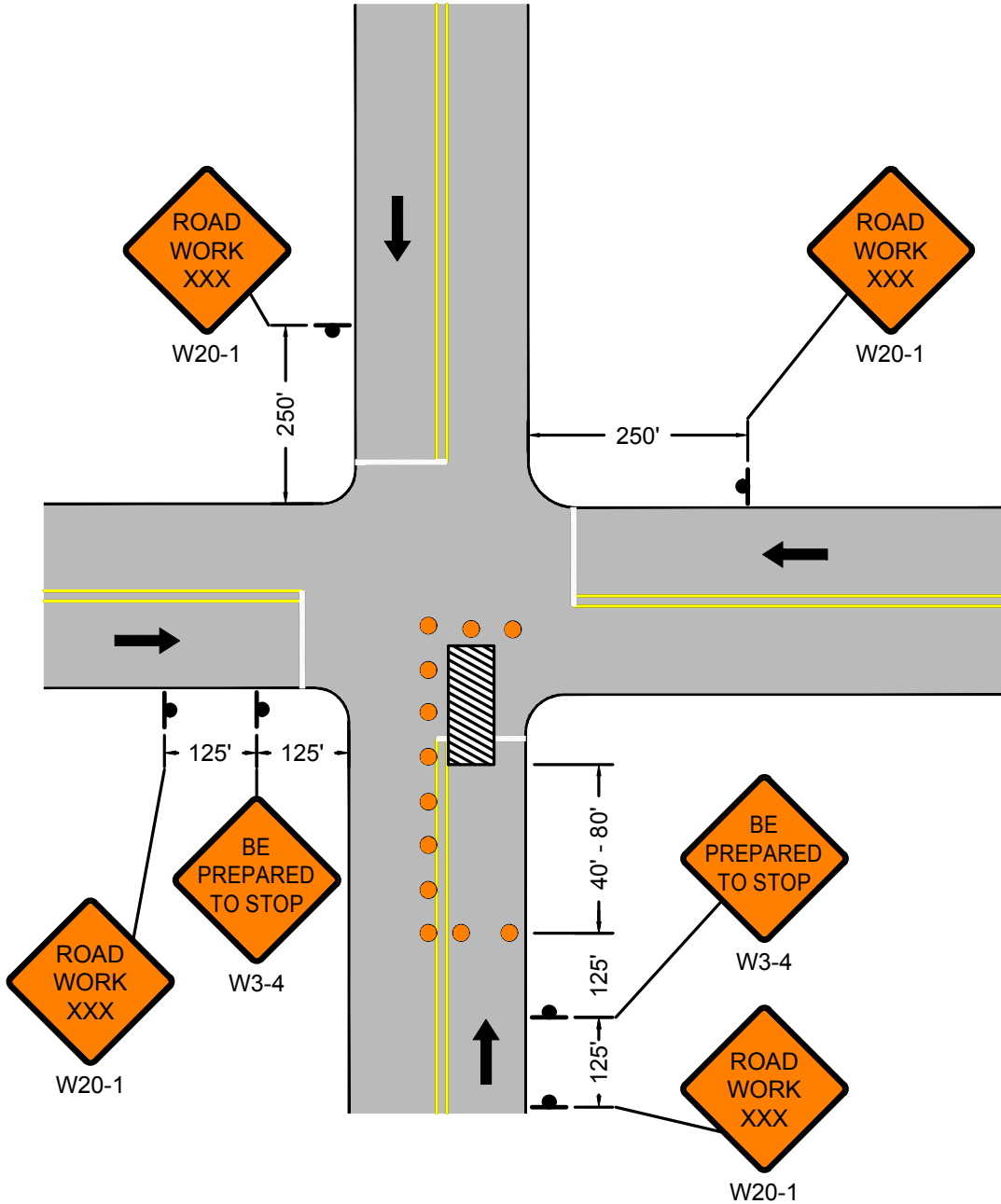






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Work Zone Safety
Standard Details
and Drawings

FIGURE 43
TRAFFIC SIGNAL REPAIR WORK
TWO LANE UNDIVIDED ROADWAY
ONE LEG OF INTERSECTION



LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
- NOT TO SCALE

NOTES

1. DURATION OF WORK = 20 MINUTES OR LESS.
2. EQUIPMENT: 12 CONES + 6 PORTABLE SIGNS.
3. CONE SPACING IS 20 FEET.
4. SINGLE WORK VEHICLE PARKED/STOPPED.
5. POLICE DETAIL REQUIRED.

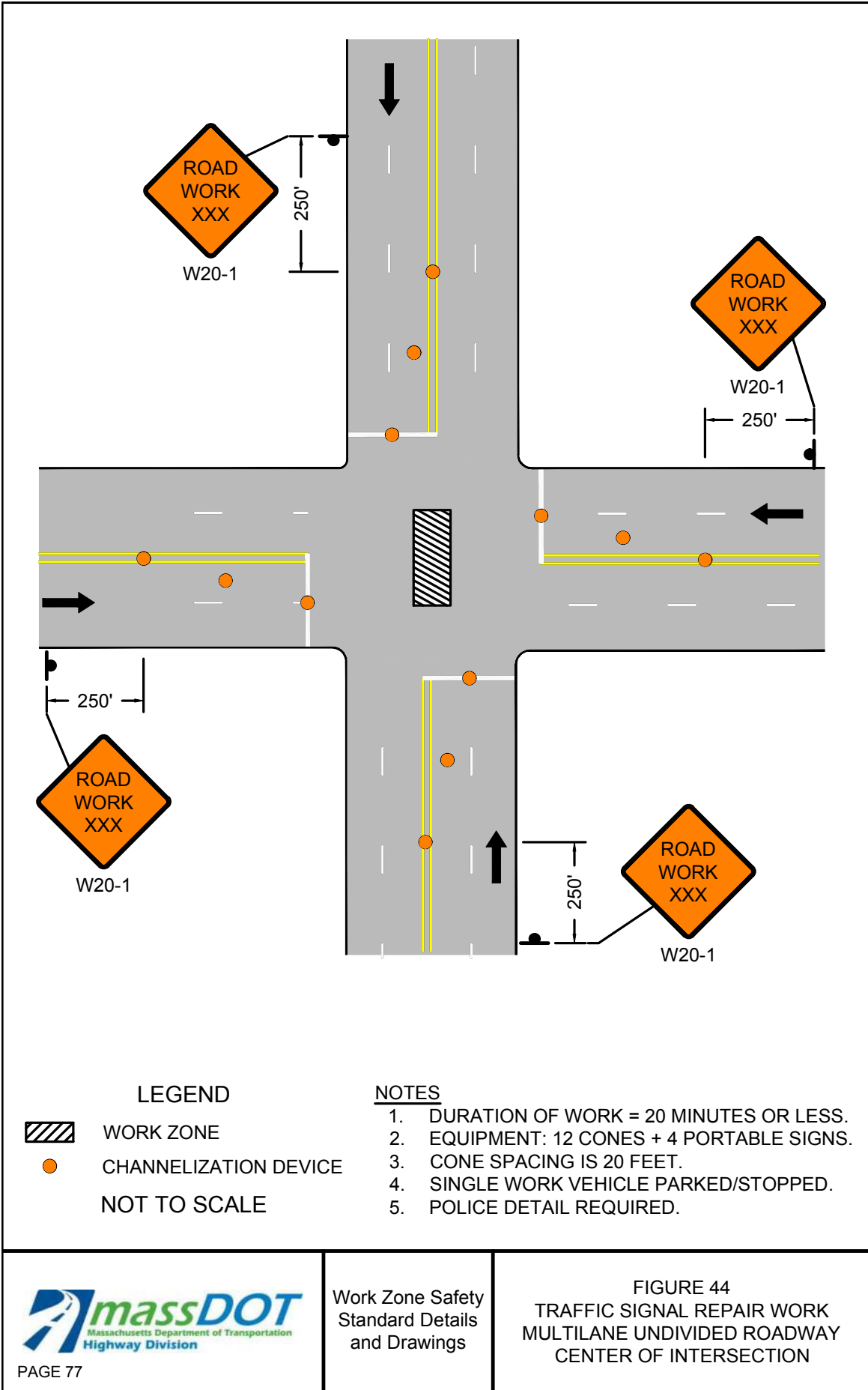
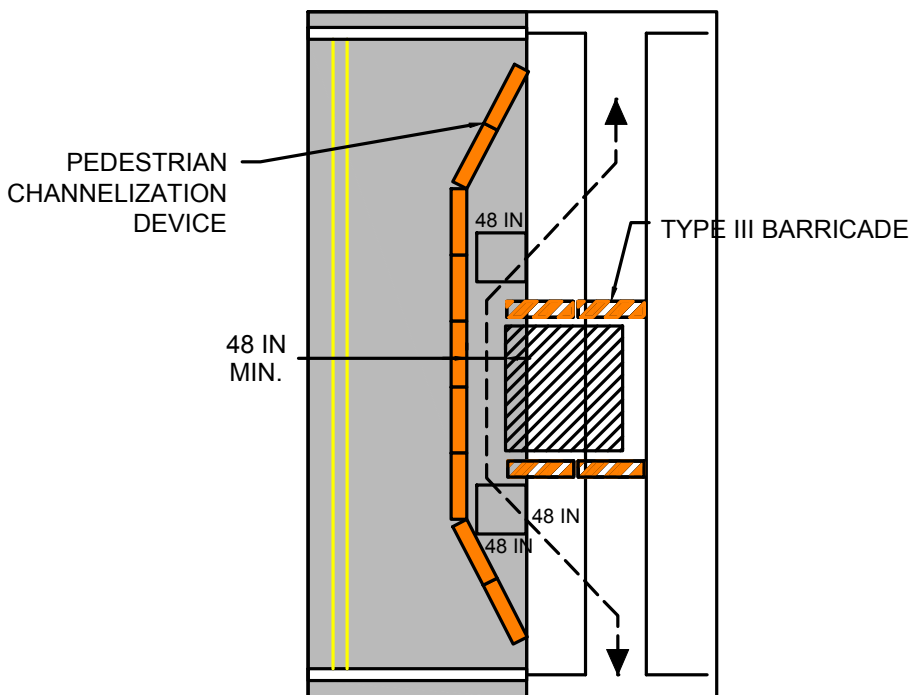


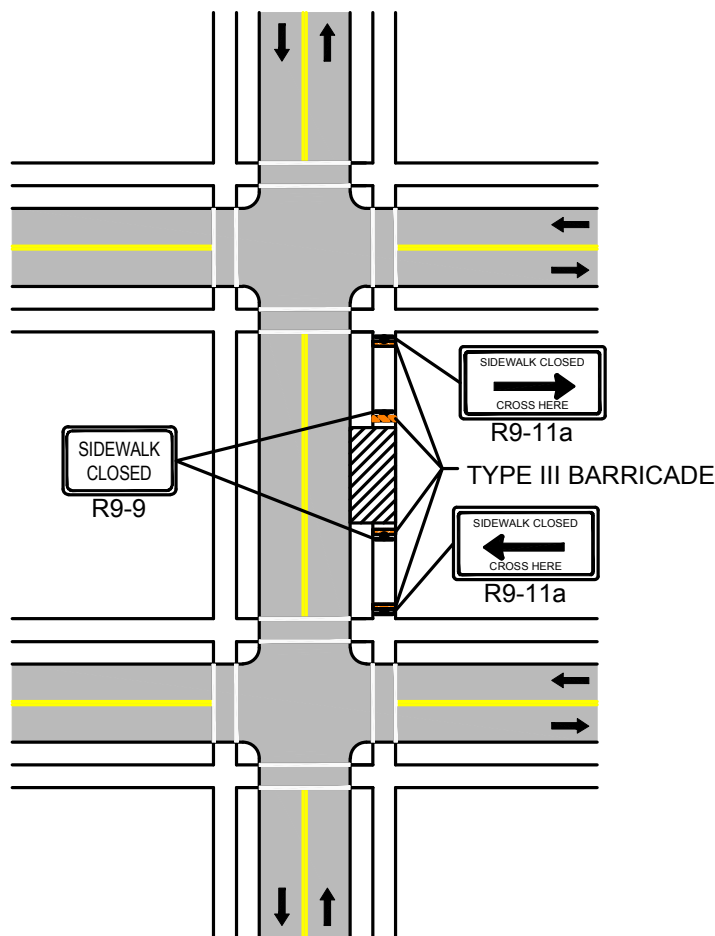


FIGURE 45
PEDESTRIAN BYPASS



NOTES:

1. WHEN EXISTING PEDESTRIAN FACILITIES ARE DISRUPTED, CLOSED, OR RELOCATED IN A TTC ZONE, TEMPORARY FACILITIES SHALL BE PROVIDED AND THEY SHALL BE DETECTABLE AND INCLUDE ACCESSIBILITY FEATURES CONSISTENT WITH THE FEATURES PRESENT IN THE EXISTING PEDESTRIAN FACILITY.
2. A PEDESTRIAN CHANNELIZATION DEVICE THAT IS DETECTABLE BY A PERSON WITH A VISUAL DISABILITY TRAVELING WITH THE AID OF A LONG CANE SHALL BE PLACED ALONG THE FULL LENGTH OF THE TEMPORARY PEDESTRIAN ROUTE.
3. WHEN USED, TEMPORARY RAMPS SHALL COMPLY WITH AMERICANS WITH DISABILITIES ACT.
4. THE ALTERNATE PATHWAY SHOULD HAVE A SMOOTH CONTINUOUS HARD SURFACE FOR THE ENTIRE LENGTH OF THE TEMPORARY PEDESTRIAN FACILITY.
5. THE TEMPORARY SIDEWALK SHOULD BE A MINIMUM OF 4 FEET WIDE. IF THE SIDEWALK EXCEEDS 200 FEET THEN A 5 FOOT BY 5 FOOT PASSING ZONE SHALL BE PROVIDED NEAR THE MID-POINT OF THE CLOSURE.
6. THE PROTECTIVE REQUIREMENTS OF A TTC WORK ZONE MAY HAVE AN IMPACT IN DETERMINING THE NEED FOR TEMPORARY TRAFFIC BARRIERS AND THEIR USE IN PROVIDING PEDESTRIAN DELINEATION SHOULD BE BASED ON ENGINEERING JUDGMENT.
7. ON-DEMAND PEDESTRIAN ASSISTANCE PERSONNEL TO ASSIST WITH NAVIGATION AROUND THE CLOSURE/WORK AREA MAY BE CONSIDERED AS AN OPTION IN PLACE OF PROVIDING ADA/AAB DEVICES FOR WORK FOR CLOSURES LASTING 4 HOURS OR LESS.
8. CONTROLS ONLY FOR PEDESTRIAN TRAFFIC ARE SHOWN; VEHICULAR TRAFFIC SHOULD BE HANDLED AS SHOWN ELSEWHERE. THESE DETAILS ARE USED IN CONJUNCTION WITH THE PROPOSED LANE CLOSURE DETAILS AND DURING CONSTRUCTION STAGING, AS DETERMINED BY THE ENGINEER.



NOTES:

1. CLOSURE OF A SIDEWALK FACILITY SHALL CONSTITUTE THE PROVISION FOR MANAGING PEDESTRIAN TRAFFIC AND ACCOMMODATING ALL USERS. IF THE EXISTING PEDESTRIAN ACCESS ROUTE(S) CAN BE TEMPORARILY RELOCATED ALONG THE EXISTING SIDEWALK , AND SAID FACILITY PROVIDES A MINIMUM WIDTH OF 48-INCHES OF SOLID, SMOOTH UNOBSTRUCTED SURFACE, THEN NO DETOURING OF THE ROUTE SHALL BE REQUIRED. DELINEATION OF THE WORK AREA IS STILL REQUIRED.
2. IF IT IS NECESSARY TO DIVERT PEDESTRIAN TRAFFIC TO AN ALTERNATE ROUTE ACROSS THE ROADWAY FROM THE EXISTING FACILITY, THE FIGURE ABOVE SHALL BE FOLLOWED TO PROVIDE ADEQUATE DIRECTION TO PEDESTRIANS. ALTERNATE ROUTE SHALL PROVIDE THE SAME LEVEL OF ACCOMMODATION AS THE FACILITY THAT IS BEING DETOURED AND RETAIN ADA COMPLIANCE IN ITS ENTIRETY.
3. FOR EMERGENCY OR SHORT-DURATION SIDEWALK CLOSURES OF 4-HOURS OR LESS, IT IS OPTIONAL TO HAVE ON-DEMAND PEDESTRIAN ASSISTANCE PERSONNEL AVAILABLE AT ALL TIMES DURING THE CLOSURE TO ASSIST THOSE MOBILITY CHALLENGED PERSONS WHO REQUIRE ADDITIONAL ASSISTANCE TO SAFELY NAVIGATE AROUND THE WORK AREA IN LIEU OF A FULL DETOUR.





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Work Zone Safety
Standard Details
and Drawings

STATIONARY OPERATIONS
BIKE LANE CLOSURE










POSTED SPEED LIMIT (MPH)	SPACING FOR BIKE ADVANCE WARNING SIGNS (FT) (A,B))	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRANSITION LENGTH (L/3)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	150 / 150	100	305	20	45
45-55	150 / 150	220	495	40	35
60-65	150 / 150	260	645	40	40

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

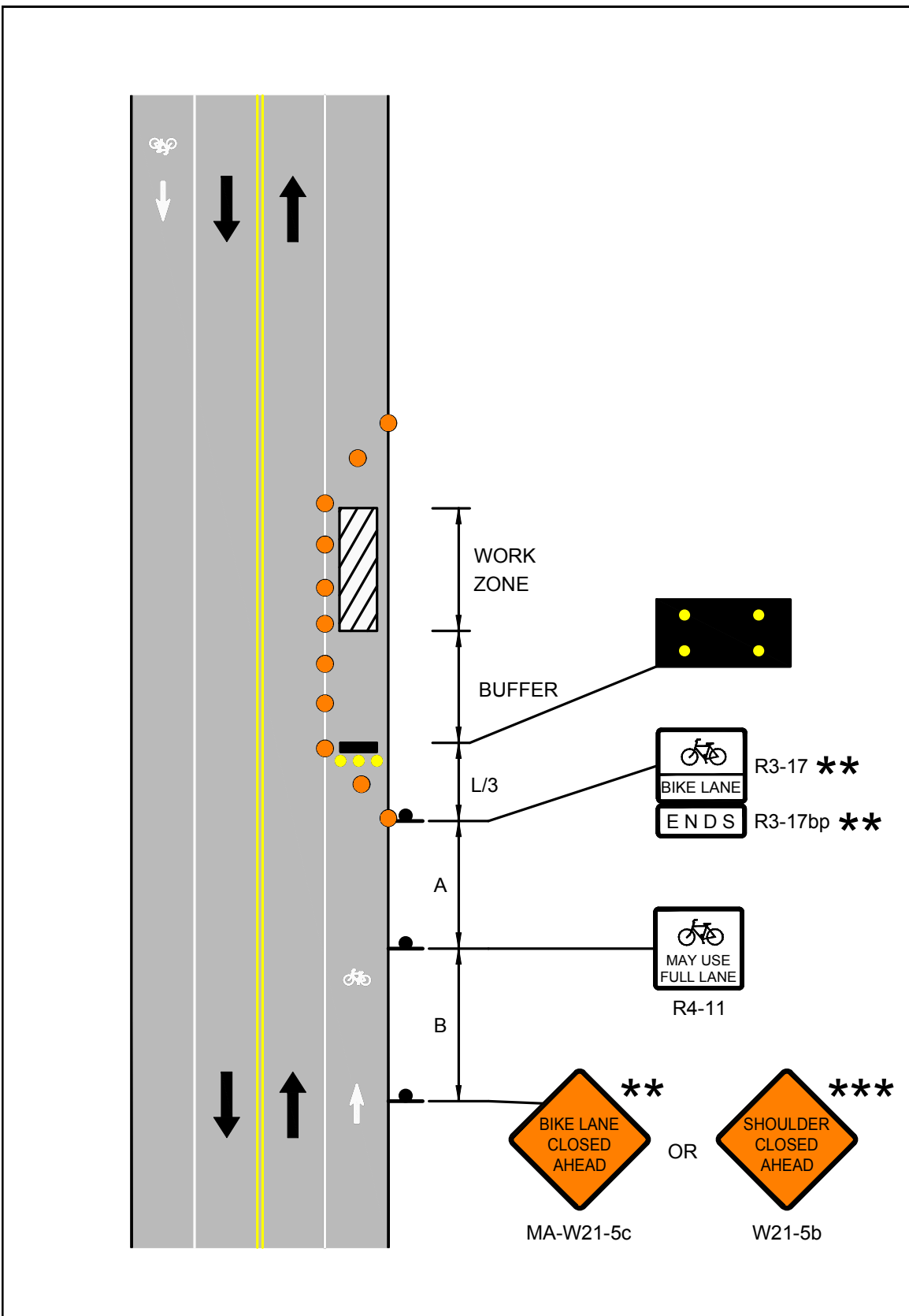
NOTES

1. DETAIL SHALL BE USED IN CONJUNCTION WITH THE PROPOSED LANE CLOSURE DETAILS. SIGNING SHOWN ONLY FOR BIKE TRAFFIC. FOLLOW ALL OTHER RELEVANT DETAILS FOR TTC DEVICES FOR VEHICULAR TRAFFIC.
2. ****** SIGN SHALL BE USED ONLY IF THERE IS A MARKED BIKE LANE.
3. ******* SIGN SHALL BE USED ONLY IF THERE IS NO MARKED BIKE LANE.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE

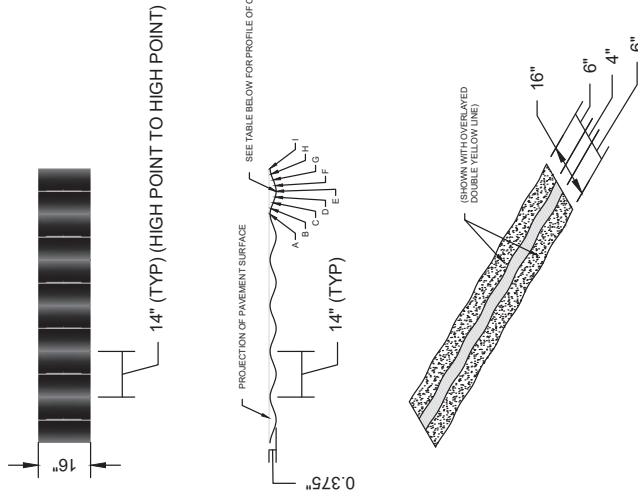




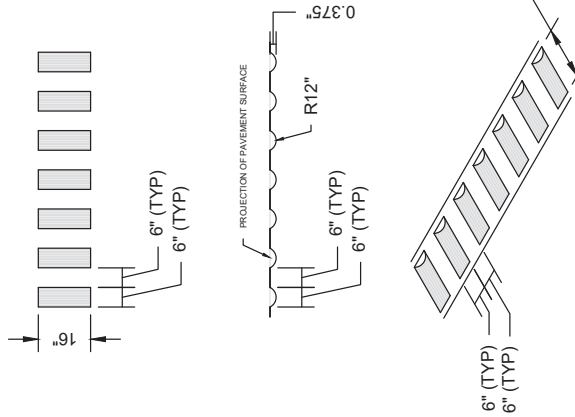
Rev. June, 2017

RUMBLE STRIP DETAILS

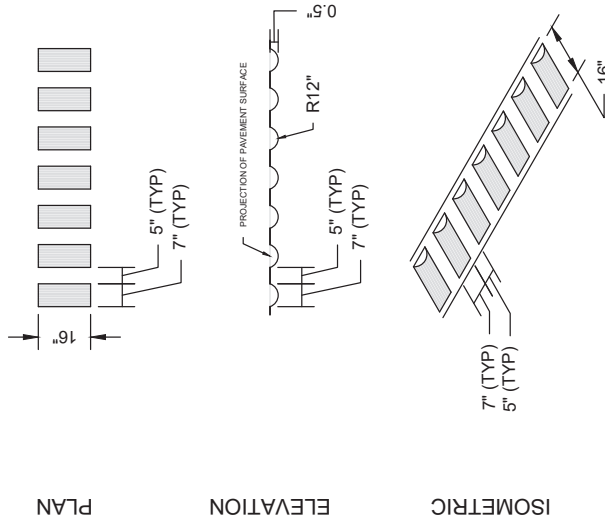
TYPE C
CONTINUOUS SINUSOIDAL
RUMBLE STRIP



TYPE B
CYLINDER RUMBLE STRIP
(BICYCLE TRAVEL PERMITTED)



TYPE A
CYLINDER RUMBLE STRIP
(BICYCLE TRAVEL PROHIBITED)



- NOTES:
1. NOT TO SCALE. SOME LINE WORK EXAGGERATED FOR CLARITY.
 2. SEE PLANS FOR LOCATION(S) AND START AND END STATIONS FOR ALL RUMBLE STRIP INSTALLATIONS.
 3. HIGH POINT OF SINUSOIDAL RUMBLE STRIP LOCATED $\frac{1}{16}$ " BELOW PAVEMENT SURFACE.

DESIGN OF CURVE PROFILE FOR SINUSOIDAL RUMBLE STRIP

POINT	A	B	C	D	E	F	G	H	I
DEPTH FROM PAVEMENT SURFACE (IN.)	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{7}{32}$	$\frac{11}{32}$	$\frac{3}{8}$	$\frac{11}{32}$	$\frac{7}{32}$	$\frac{1}{8}$	$\frac{1}{16}$
DISTANCE FROM HIGH POINT "A" (IN.)	0	1.75	3.5	5.25	7	8.75	10.5	12.25	14

massDOT
Massachusetts Department of Transportation
Highway Division

TRAFFIC & SAFETY STANDARDS
SECTION 860

RUMBLE STRIP DETAILS

D-T-E OF ISSUE
2020

DR- ING NUMBER

XXX.X.X

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: WEST BROOKFIELD Project File Number: 606517

Contract Number: 125780

Project Description: Resurfacing & Related Work on Route 9, from Ware T.L. to 850' West of Welcome Road (1.1 miles – Phase I)

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 A00831

ARMY CORPS OF ENGINEERS

GENERAL PERMIT

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**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 First - James Middle - P. Last - Daley Company - West Brookfield Highway Department E-mail Address - jdaley@wbrookfield.com	7. AGENT'S ADDRESS: First - John Middle - G Last - Morgan Company - CHA Consulting, Inc. E-mail Address - jmorgan@chacompanies.com
5. APPLICANT'S ADDRESS: Address- 2 East Main Street /P.O. Box 372 City - West Brookfield, State - MA Zip - 01585 Country - Worcest	8. AGENT'S ADDRESS: Address- 141 Longwater Drive - Suite 104 City - Norwell State - MA Zip - 02061 Country - Ply
6. APPLICANT'S PHONE NOs. w/AREA CODE a. Residence b. Business c. Fax 508-867-1417	9. AGENTS PHONE NOs. w/AREA CODE a. Residence b. Business c. Fax 781-982-5437

NAME, LOCATION, AND DESCRIPTION OF PROJECT SITE

10. PROJECT NAME OR TITLE Route 9 - Ware Town Line east to entrance Trustee of Res. (Rock House Res.), West Brookfield, MA; MassDOT # 606517	
11. FILE NUMBER(S) OF PREVIOUS USACE ACTIONS ON THE SITE (if applicable) Undetermined	12. NAME OF WATERBODY Ware River Watershed
13. PROJECT COORDINATES (in decimal degrees) Latitude: °N Longitude: °W 42° 16' 07" 72° 12' 20"	14. PROJECT STREET ADDRESS (if applicable) Address Route 9 - WareTown Line to TOR Entrance City - W. Brookfield State - MA Zip - 01585

ACTIVITY TYPE, PROJECT IMPACTS, AVOIDANCE & MINIMIZATION

15. GENERAL PERMIT ACTIVITIES (CHECK ALL THAT APPLY) 1 <input type="checkbox"/> 6 <input type="checkbox"/> 11 <input type="checkbox"/> 16 <input type="checkbox"/> 21 <input type="checkbox"/> 2 <input type="checkbox"/> 7 <input type="checkbox"/> 12 <input type="checkbox"/> 17 <input type="checkbox"/> 22 <input type="checkbox"/> 3 <input type="checkbox"/> 8 <input type="checkbox"/> 13 <input type="checkbox"/> 18 <input type="checkbox"/> 23 <input checked="" type="checkbox"/> 4 <input type="checkbox"/> 9 <input type="checkbox"/> 14 <input type="checkbox"/> 19 <input type="checkbox"/> 24 <input type="checkbox"/> 5 <input type="checkbox"/> 10 <input type="checkbox"/> 15 <input type="checkbox"/> 20 <input type="checkbox"/> 25 <input type="checkbox"/>	16. SUMMARY OF PROJECT IMPACTS (see instructions) <table border="1"> <thead> <tr> <th>Area (square feet)</th> <th>Length (linear feet)</th> <th>Volume (cubic yards)</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td>BVW - 140</td> <td align="center">-</td> <td align="center">-</td> <td>Perm./Temp.</td> </tr> <tr> <td>LUW - 385</td> <td align="center">-</td> <td align="center">-</td> <td>Temporary</td> </tr> <tr> <td align="center">-</td> <td>Bank - 80</td> <td align="center">-</td> <td>Temporary</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration	BVW - 140	-	-	Perm./Temp.	LUW - 385	-	-	Temporary	-	Bank - 80	-	Temporary								
Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration																						
BVW - 140	-	-	Perm./Temp.																						
LUW - 385	-	-	Temporary																						
-	Bank - 80	-	Temporary																						

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 Per Appendix A, SHPO was notified and they did not respond with concerns within 30 days.
- b. Massachusetts BUAR Per Appendix A, BUAR was notified and they did not respond with concerns within 30 days.
- c. Tribal Historic Preservation Officers The Tribe(s) were notified and they didn't respond with concerns within 30 days.
- d. Endangered Species Act - NOAA The activity is not located within the ESA-listed Species Range.
- e. Endangered Species Act - USFWS The activity is located within the Indiana Bat Species Range.
- f. Northern Long Eared Bat (ESA) NLAA determination reached with Rangewide D-Key.
- g. Essential Fish Habitat The project footprint does not contain EFH (see EFH definition in the MA GP).
- h. Wild & Scenic Rivers There are no WSR's within 0.25 miles of the project area.
- i. 401 Water Quality Certification 401 The activity qualifies under the general 401 WQC for the 2023 MA GPs.
 401 WQC/OOC File Number: Pending OOC issued: Pending 401 issued: NA
- j. Section 408 Permission Not Required per GC 15aN-f, no Federal Projects are within the project vicinity.
- k. Coastal Zone The project is not located within the coastal zone.
- l. Construction Mats N/A, the activity does not require the installation of construction mats.
- m. Time of Year Restrictions N/A, the project is not located in a waterbody that has TOY restrictions.
- n. Vernal Pools Per GC 28, the project is not located in a vernal pool.
- o. Sediment & Erosion Controls Per GC 25, the activity uses BMPs to avoid/minimize sedimentation & erosion.
- p. Stream/Wetland Crossings The activity does not require a stream/wetland crossing.

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)

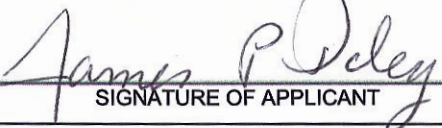

- a. The project plans are enclosed in this SVN submittal (see block 17).
- b. The activity **Select Option** funded through the Bipartisan Infrastructure Bill (also known as the Infrastructure Investment and Jobs Act).
- c. All required state, local and federal approvals were acquired prior to starting 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

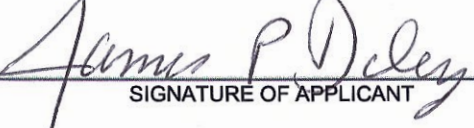
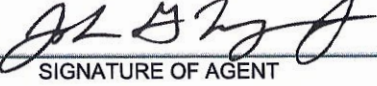
23. STATEMENT OF AUTHORIZATION (see instructions)

I certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

	2-15-24		2-15-24
SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

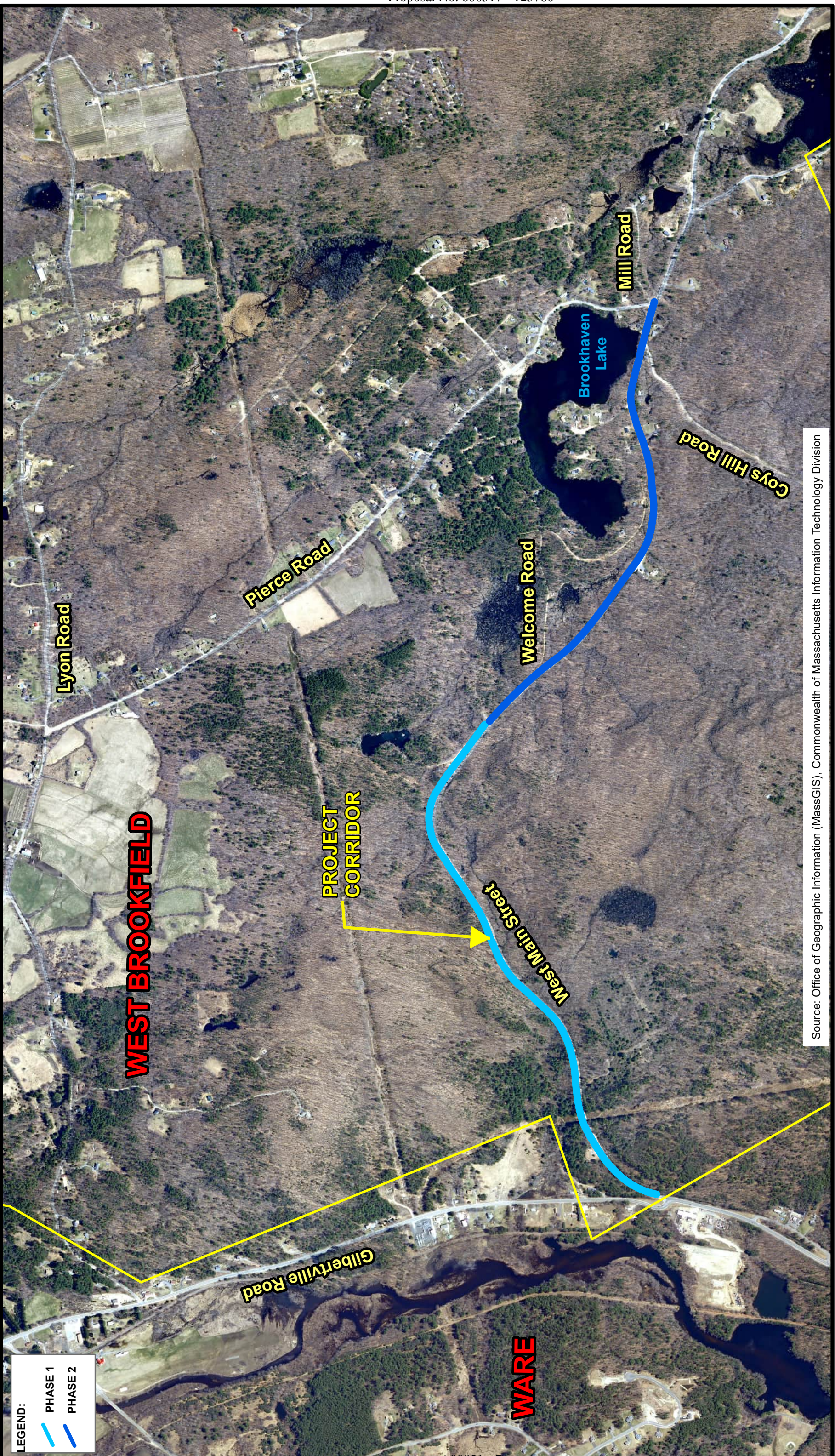
24. SIGNATURES (see instructions)

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.

	2-15-24		2-15-24
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.

FEDERAL, STATE AND LOCAL PERMITS/REVIEW PROPOSED ROUTE 9/WEST MAIN STREET IMPROVEMENTS, WEST BROOKFIELD, MA		
Permit	Issuing Agency	Status
Federal Permits/Agency Correspondence		
Section 404 permit Self-Verification Notification Form	Army Corps of Engineers (Corps) New England District	To Be Filed
Notification/Clearance	National Register of Historic Places/MA Historical Commission (SHPO)	Notified 06/29/23 No Response
Notification/Clearance	Wampanoag Tribe of Gay Head (Aquinnah) (THPO)	Notified Filed 03/15/23 No Response
Notification/Clearance	Mashpee Wampanoag Tribe (THPO)	Notified Filed 03/15/23 No Response
Notification/Clearance	Massachusetts Board of Underwater Archeological Resources (BUAR)	Notified Filed 03/15/23 No Response
Notification/Clearance	Narragansett Indian Longhouse	Notified Filed 03/15/23 No Response
Notification/Clearance	West Brookfield Historical Commission	Notified 02/13/12 No Response
Notification/Clearance	U. S. Fish and Wildlife Service	Consultation Concluded 08/21/23 – Phase 1 - Coordination
Notification/Clearance	Massachusetts Natural Heritage and Endangered Species Program	No Mapped Habitat Present MAGIS 2023/NHESP Atlas 2021
Massachusetts State Permits		
Environmental Notification Form (EENF & Proposed EIR; SEIR)	MA Executive Office of Energy and Environmental Affairs (EOEEA) – MA Environmental Policy Act (MEPA)	Decision Issued 01/29/24
Article 97 Land Transfer	MA Commonwealth Article 97 Program/ MA Executive Office of Energy and Environmental Affairs (EOEEA) – MA Environmental Policy Act (MEPA)	08/02/22
Local Permits		
Notice of Intent – Phase I and 2 MGL 131, Section 40	Town of West Brookfield Conservation Commission – NOI Order of Conditions - Phase 1	NOI Filed - 11/22/23 OoC - Pending



LEGEND:

- PHASE 1
- PHASE 2

WEST BROOKFIELD

WARE

PROJECT CORRIDOR

West Main Street

Lyon Road

Pierce Road

Welcome Road

Mill Road

Coys Hill Road

Gilbertville Road

Brookhaven Lake

Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Information Technology Division

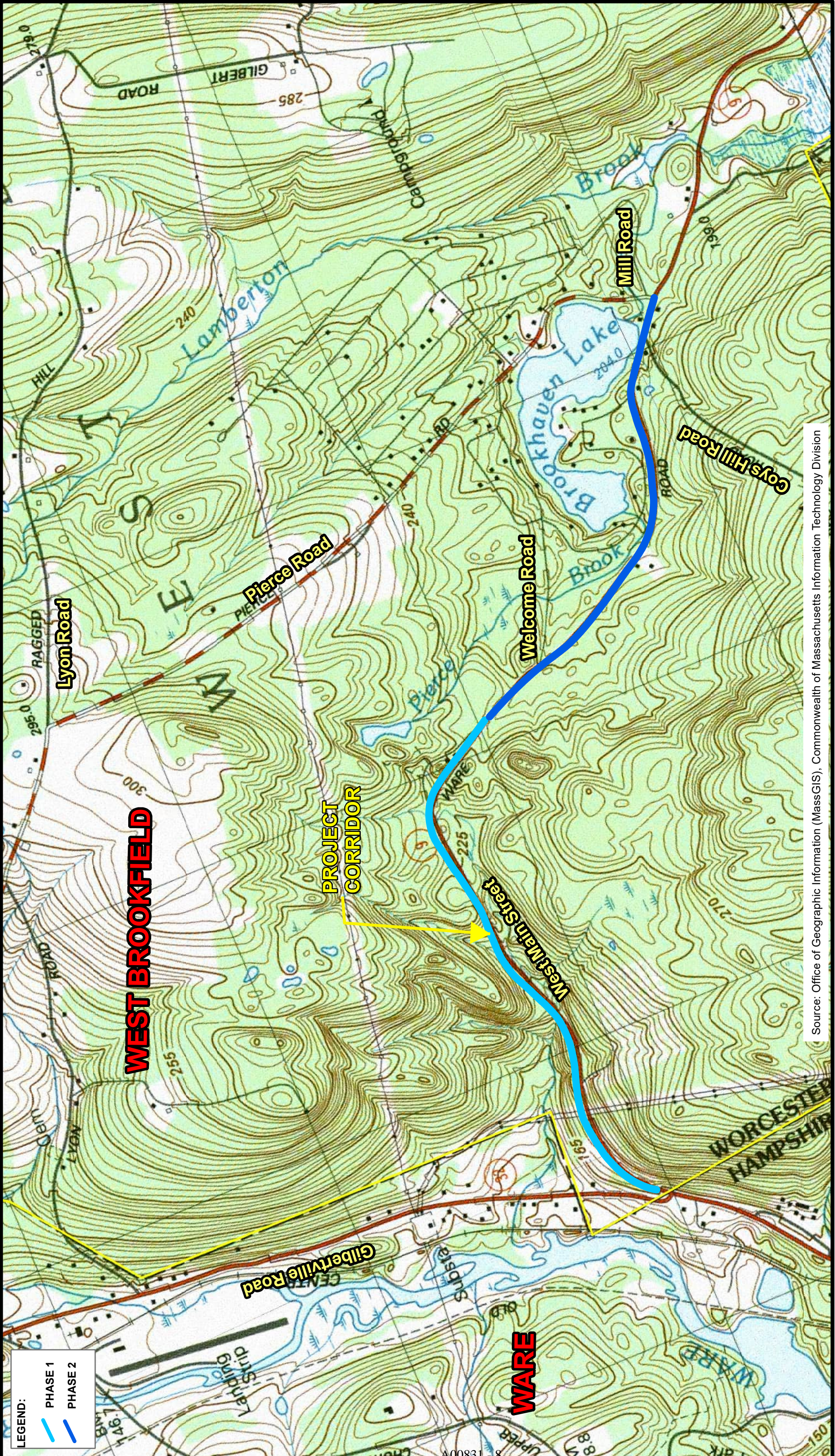
TOWN OF WEST BROOKFIELD, MA

**WEST MAIN STREET, WEST BROOKFIELD
ROADWAY IMPROVEMENTS
PROJECT ID: 606517**



Figure 1. Locus Map





Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Information Technology Division

TOWN OF WEST BROOKFIELD, MA

Figure 2. Topographic Map

WEST MAIN STREET, WEST BROOKFIELD
ROADWAY IMPROVEMENTS
PROJECT ID: 606517



Appendix A

Agency Consultations



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:

August 21, 2023

Project code: 2023-0005804

Project Name: 606517 - WEST BROOKFIELD- RESURFACING & RELATED WORK ON RE 9, FROM WARE T.L. TO WELCOME ROAD

Subject: Concurrence verification letter for the '606517 - WEST BROOKFIELD- RESURFACING & RELATED WORK ON RE 9, FROM WARE T.L. TO WELCOME ROAD' 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 August 21, 2023 to verify that the **606517 - WEST BROOKFIELD- RESURFACING & RELATED WORK ON RE 9, FROM WARE T.L. TO WELCOME ROAD** (Proposed Action) may rely on the concurrence provided in 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 (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 is within the scope and adheres to the criteria of the PBO, including the adoption of applicable avoidance and minimization measures, and may affect, but is not likely to adversely affect (NLAA) the endangered Indiana bat (*Myotis sodalis*) and/or the endangered northern long-eared bat (*Myotis septentrionalis*). Consultation with the Service pursuant to section 7(a)(2) of ESA (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) is required.

The Service has 14 calendar days to notify the lead Federal action agency or designated non-federal representative if we determine that the Proposed Action does not meet the criteria for a NLAA determination under the PBO. If we do not notify the lead Federal action agency or designated non-federal representative within that timeframe, you may proceed with the Proposed Action under the terms of the NLAA concurrence provided in the PBO. 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.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities: If your initial bridge/culvert or structure assessment documented signs of bat use or occupancy, or an assessment failed to detect Indiana bats and/or NLEBs, yet are 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 any potential take. In these instances, potential incidental take of Indiana bats and/or NLEBs is covered under the Incidental Take Statement in the 2018 FHWA, FRA, FTA PBO (provided that the take is reported to the Service).

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 assessments failed to detect Indiana bats and/or NLEB use or occupancy, yet bats are 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 any 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 contact this Service Office.

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Candidate

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

606517 - WEST BROOKFIELD- RESURFACING & RELATED WORK ON RE 9, FROM WARE T.L. TO WELCOME ROAD

DESCRIPTION

606517 - WEST BROOKFIELD- RESURFACING & RELATED WORK ON ROUTE 9, FROM WARE T.L. TO 850' WEST OF WELCOME ROAD (1.1 MILES - PHASE I)
Route 9 between the Ware Town Line and 850' west of Welcome Road (1.1 miles) will be widened to provide appropriate bicycle accommodation and resurfaced. Drainage improvements are proposed to remove stormwater runoff and snowmelt from the highway. Guardrail will be replaced as required and new signage and pavement markings will be included.

Monarch Butterfly: Candidate Species only, no conservation measures at this time.

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@42.2676008,-72.21760358212299,14z>



DETERMINATION KEY RESULT

Based on your answers provided, this project(s) may affect, but is not likely to adversely affect the endangered Indiana bat and/or the endangered northern long-eared 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 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.

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. Which Federal Agency is the lead for the action?

A) *Federal Highway Administration (FHWA)*

4. Are *all* project activities limited to non-construction^[1] activities only? (examples of non-construction activities include: bridge/abandoned structure assessments, surveys, planning and technical studies, property inspections, and property sales)

[1] Construction refers to activities involving ground disturbance, percussive noise, and/or lighting.

No

5. Does the project include *any* activities that are **greater than** 300 feet from existing road/rail surfaces^[1]?

[1] Road surface is defined as the actively used [e.g. motorized vehicles] driving surface and shoulders [may be pavement, gravel, etc.] and rail surface is defined as the edge of the actively used rail ballast.

No

6. Does the project include *any* activities **within** 0.5 miles of a known Indiana bat and/or NLEB hibernaculum^[1]?

[1] For the purpose of this consultation, a hibernaculum is a site, most often a cave or mine, where bats hibernate during the winter (see suitable habitat), but could also include bridges and structures if bats are found to be hibernating there during the winter.

No

7. Is the project located **within** a karst area?

No

8. Is there *any* suitable^[1] summer habitat for Indiana Bat or NLEB **within** the project action area^[2]? (includes any trees suitable for maternity, roosting, foraging, or travelling habitat)

[1] See the Service's [summer survey guidance](#) for our current definitions of suitable habitat.

[2] The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR Section 402.02). Further clarification is provided by the [User's Guide for the Range-wide Programmatic Consultation for Indiana Bat and Northern Long-eared Bat](#).

Yes

9. Will the project remove *any* suitable summer habitat^[1] and/or remove/trim any existing trees **within** suitable summer habitat?

[1] See the Service's [summer survey guidance](#) for our current definitions of suitable habitat.

Yes

10. Will the project clear more than 20 acres of suitable habitat per 5-mile section of road/rail?

No

11. Have presence/probable absence (P/A) summer surveys^{[1][2]} been conducted^{[3][4]} **within** the suitable habitat located within your project action area?

[1] See the Service's [summer survey guidance](#) for our current definitions of suitable habitat.

[2] Presence/probable absence summer surveys conducted within the fall swarming/spring emergence home range of a documented Indiana bat hibernaculum (contact local Service Field Office for appropriate distance from hibernacula) that result in a negative finding requires additional consultation with the local Service Field Office to determine if clearing of forested habitat is appropriate and/or if seasonal clearing restrictions are needed to avoid and minimize potential adverse effects on fall swarming and spring emerging Indiana bats.

[3] For projects within the range of either the Indiana bat or NLEB in which suitable habitat is present, and no bat surveys have been conducted, the transportation agency will assume presence of the appropriate species. This assumption of presence should be based upon the presence of suitable habitat and the capability of bats to occupy it because of their mobility.

[4] Negative presence/probable absence survey results obtained using the [summer survey guidance](#) are valid for a minimum of two years from the completion of the survey unless new information (e.g., other nearby surveys) suggest otherwise.

Yes

SUBMITTED DOCUMENTS

- 606517_rpt_westbrookfield_nleb_survey_20221011.pdf <https://ipac.ecosphere.fws.gov/project/ZAIH6X6VGIJGNHD4D53HELCM/projectDocuments/118205133>

12. Did the presence/probable absence (P/A) summer surveys detect Indiana bats and/or NLEB^[1]?

[1] P/A summer surveys conducted within the fall swarming/spring emergence home range of a documented Indiana bat hibernaculum (contact local Service Field Office for appropriate home range) that result in a negative finding requires additional consultation with the local Service Field Office to determine if clearing of forested habitat is appropriate and/or if seasonal clearing restrictions are needed to avoid and minimize potential adverse effects on fall swarming and spring emerging Indiana bats.

No

13. Were the P/A summer surveys conducted **within** the fall swarming/spring emergence range of a documented Indiana bat hibernaculum^[1]?

[1] Contact the local Service Field Office for appropriate distance from hibernacula.

No

14. Does the project include activities **within documented NLEB habitat**^{[1][2]}?

[1] Documented roosting or foraging habitat – for the purposes of this consultation, we are considering documented habitat as that where Indiana bats and/or NLEB have actually been captured and tracked using (1) radio telemetry to roosts; (2) radio telemetry biangulation/triangulation to estimate foraging areas; or (3) foraging areas with repeated use documented using acoustics. Documented roosting habitat is also considered as suitable summer habitat within 0.25 miles of documented roosts.)

[2] For the purposes of this key, we are considering documented corridors as that where Indiana bats and/or NLEB have actually been captured and tracked to using (1) radio telemetry; or (2) treed corridors located directly between documented roosting and foraging habitat.

No

15. Will the removal or trimming of habitat or trees occur **within** suitable but **undocumented NLEB** roosting/foraging habitat or travel corridors?

Yes

16. What time of year will the removal or trimming of habitat or trees **within** suitable but **undocumented NLEB** roosting/foraging habitat or travel corridors occur?

C) During both the active and inactive seasons

17. Will *any* tree trimming or removal occur **within** 100 feet of existing road/rail surfaces?

Yes

18. Will *any* tree trimming or removal occur **between** 100-300 feet of existing road/rail surfaces?

No

19. Are *all* trees that are being removed clearly demarcated?

Yes

20. Will the removal of habitat or the removal/trimming of trees involve the use of **temporary** lighting?

Yes

21. Will the removal of habitat or the removal/trimming of trees include installing new or replacing existing **permanent** lighting?

No

22. Does the project include wetland or stream protection activities associated with compensatory wetland mitigation?

Yes

23. Does the project include slash pile burning?

No

24. Does the project include *any* bridge removal, replacement, and/or maintenance activities (e.g., any bridge repair, retrofit, maintenance, and/or rehabilitation work)?

No

25. Does the project include the removal, replacement, and/or maintenance of *any* structure other than a bridge? (e.g., rest areas, offices, sheds, outbuildings, barns, parking garages, etc.)

No

26. Will the project involve the use of *any* **temporary** lighting in addition to the lighting already indicated for habitat removal (including the removal or trimming of trees), or bridge/structure removal, replacement or maintenance activities?

Yes

27. Is there *any* suitable habitat **within** 1,000 feet of the location(s) where **temporary** lighting (other than the lighting already indicated for habitat removal (including the removal or trimming of trees) or bridge/structure removal, replacement or maintenance activities) will be used?

Yes

28. Will the project install new or replace existing **permanent** lighting?

No

29. Does the project include percussives or other activities (**not including tree removal/trimming or bridge/structure work**) that will increase noise levels above existing traffic/background levels?

Yes

30. Will the activities that use percussives (**not including tree removal/trimming or bridge/structure work**) and/or increase noise levels above existing traffic/background levels be conducted *during* the active season^[1]?

[1] Coordinate with the local Service Field Office for appropriate dates.

Yes

31. Will *any* activities that use percussives (**not including tree removal/trimming or bridge/structure work**) and/or increase noise levels above existing traffic/background levels be conducted *during* the inactive season^[1]?

[1] Coordinate with the local Service Field Office for appropriate dates.

Yes

32. Are *all* project activities that are **not associated with** habitat removal, tree removal/trimming, bridge and/or structure activities, temporary or permanent lighting, or use of percussives, limited to actions that DO NOT cause any additional stressors to the bat species?

Examples: lining roadways, unlighted signage , rail road crossing signals, signal lighting, and minor road repair such as asphalt fill of potholes, etc.

Yes

33. Will the project raise the road profile **above the tree canopy**?

No

34. Are the wetland or stream protection activities associated with compensatory wetland/stream mitigation portion of this project consistent with a Not Likely to Adversely Affect determination in this key?

Automatically answered

Yes, because your activities associated with compensatory wetland/stream mitigation activities do not clear suitable summer habitat and are not within 0.5 miles of Indiana bat or NLEB hibernaculum.

35. Are the project activities that use percussives (not including tree removal/trimming or bridge/structure work) consistent with a Not Likely to Adversely Affect determination in this key?

Automatically answered

Yes, because the activities are within 300 feet of the existing road/rail surface, greater than 0.5 miles from a hibernacula, and conducted during the active season within undocumented habitat.

36. Are the project activities that use percussives (not including tree removal/trimming or bridge/structure work) and/or increase noise levels above existing traffic/background levels consistent with a No Effect determination in this key?

Automatically answered

Yes, because the activities are within 300 feet of the existing road/rail surface, greater than 0.5 miles from a hibernacula, and conducted during the inactive season

37. Is the location of this project consistent with a Not Likely to Adversely Affect determination in this key?

Automatically answered

Yes, because no bats were detected during presence/probable absence surveys conducted during the summer survey season and outside of the fall swarming/spring emergence periods. Additionally, all activities were at least 0.5 miles from any hibernaculum.

38. **General AMM 1**

Will the project ensure *all* operators, employees, and contractors working in areas of known or presumed bat habitat are aware of *all* FHWA/FRA/FTA (Transportation Agencies) environmental commitments, including all applicable Avoidance and Minimization Measures?

Yes

PROJECT QUESTIONNAIRE

1. Have you made a No Effect determination for *all* other species indicated on the FWS IPaC generated species list?

N/A

2. Have you made a May Affect determination for *any* other species on the FWS IPaC generated species list?

N/A

3. How many acres^[1] of trees are proposed for removal between 0-100 feet of the existing road/rail surface?

[1] If described as number of trees, multiply by 0.09 to convert to acreage and enter that number.

2.8

AVOIDANCE AND MINIMIZATION MEASURES (AMMS)

This determination key result includes the commitment to implement the following Avoidance and Minimization Measures (AMMs):

GENERAL AMM 1

Ensure all operators, employees, and contractors working in areas of known or presumed bat habitat are aware of all FHWA/FRA/FTA (Transportation Agencies) environmental commitments, including all applicable AMMs.

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING NLEB OR INDIANA BAT

This key was last updated in IPaC on July 27, 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: Trevor Burns

Address: 10 Park Plaza

City: Boston

State: MA

Zip: 02116

Email: trevor.b.burns@dot.state.ma.us

Phone: 8574885122

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration



CULTURAL RESOURCES PROJECT RECORD

City/Town:	West Brookfield	Project #	606517	Date Cleared	3/15/2022
Project Name	Resurfacing & Related Work -Route 9	Date Filed	3/9/2022	Finding Under Review	<input type="checkbox"/>
		FHWA to MHC			
Project Type:	Highway Reconstr - Restr and Rehab	Early Coord. Letter Sent:	<input checked="" type="checkbox"/>	Reviewer:	MHS
Review:	Section 106 (PA)	Comment Received:	<input type="checkbox"/> MHC <input type="checkbox"/> LHC	Consultant	
Finding:	Appendix 1				
Comments	PNF's will be emailed to the Narragansett, Aquinnah, and Mashpee Tribes, and the BUAR.				

Determination based on: Scope of Work Plans Inventory Site Visit Archaeological Survey
Attach appropriate documentation for checked items

Projects Requiring No Massachusetts SHPO Review

Programmatic Agreement, Appendix 1 (check all that apply) :

- | | |
|---|---|
| <input type="checkbox"/> 1) Interstate bridge or roadway projects | <input type="checkbox"/> 16) Bridge (less than 20' span) |
| <input checked="" type="checkbox"/> 2) Resurfacing, repair existing roadways | * <input checked="" type="checkbox"/> 17) Highway safety improvement |
| * <input checked="" type="checkbox"/> 3) Reconstruction on existing roadway | <input checked="" type="checkbox"/> 18) Drainage system element |
| * <input checked="" type="checkbox"/> 4) Roadway geometrics, intersections | * <input type="checkbox"/> 19) Traffic signal, safety improvement |
| * <input type="checkbox"/> 5) Curbs and sidewalks | * <input type="checkbox"/> 20) Intelligent Transportation System project |
| <input checked="" type="checkbox"/> 6) Pavement markings, rumble strips, etc | <input type="checkbox"/> 21) Rest area, maintenance facility |
| <input type="checkbox"/> 7) Curbs, sidewalks (MAAB, ADA) | * <input type="checkbox"/> 22) Bicycle, pedestrian lane, path or facility |
| * <input type="checkbox"/> 8) Removal of trees | <input type="checkbox"/> 23) Lighting system |
| <input checked="" type="checkbox"/> 9) Landscaping | <input checked="" type="checkbox"/> 24) Sign |
| <input type="checkbox"/> 10) Utilities | <input type="checkbox"/> 25) Hazardous waste |
| <input type="checkbox"/> 11) Railroad crossing | <input type="checkbox"/> 26) Highway fencing |
| <input type="checkbox"/> 12) Stream stabilization and restoration | <input type="checkbox"/> 27) Emergency repair |
| <input type="checkbox"/> 13) Wetland mitigation area | <input checked="" type="checkbox"/> 28) Erosion control |
| * <input type="checkbox"/> 14) Bridge (NR "Not Eligible" or "Conditionally Not Eligible") | <input type="checkbox"/> 29) Noise barrier |
| * <input type="checkbox"/> 15) Bridge (concrete slab post 1900, steel stringer) | * National Register eligibility evaluation required |

-OR-

No Historic Properties Affected

Programmatic Agreement Stipulation V.B. (check one):

- No NR listed or -eligible properties within Area of Potential Effect
 No effect on National Register listed or -eligible properties

Reviewer's Initials: MHH JMHH



CULTURAL RESOURCES PROJECT RECORD

Summary of MassDOT Highway Division Finding (Appendix 1 and Section V.B. Projects only)

Project Description:

MassDOT proposes to complete roadway improvements along Route 9 (West Main Street) from the West Brookfield/Ware Town Line (TL) easterly for approximately 2.1 miles to the intersection of Route 9/Pierce Road in West Brookfield. In 2014, this 2.1-mile section of Route 9 was reviewed under MassDOT #606517, but recently, the project was divided into two separate project numbers for funding purposes. Phase 1 (MassDOT #606517) will run from the Ware T.L. easterly to the east entrance to the Trustees of the Reservation’s Rock House Reservation for a total of 1.1 miles, and Phase 2 (MassDOT #609049) will run from just east of the Rock House Reservation’s entrance to Route 9’s intersection with Pierce Road for a total of 1.0 mile. The proposed roadway work along Phases 1 and 2 will include the following construction activities: pavement rehabilitation; minor box widening; installing new cement concrete retaining walls; installing modified rockfill slopes with compost and seeding; removing and resetting existing guardrails; painting pavement markings; adjusting and rebuilding drainage structures; clearing and thinning vegetation; installing erosion control measures; and other incidental work as required. There will be limited rock cutting to facilitate the minor roadway widening.

An Army Corps permit is required for Phase 1 and 2 project work to install new wetlands replication areas.

Cultural Resources:

A review of the National Register of Historic Places revealed no listed properties or districts within or adjacent to the project area. A review of the MHC Inventory revealed no inventoried properties within the vicinity of the project area.

A review of the archaeological base maps revealed one pre-contact archaeological site adjacent at the easternmost end of the Phase 1 project corridor: Rock House RS (19-WR-50), which is located approximately 500’ to the east of Route 9 at the entrance to the Trustees of the Reservations’ Rock House Reservation. Roadway work adjacent to the Rock House Reservation includes minor box widening (no more than 7’ on a side), concrete retaining wall construction along the eastbound side of Route 9, and resetting existing guardrails. There will be limited rock cutting in areas that have been previously blasted. MassDOT Cultural Resources Unit (CRU) staff, including a MassDOT archaeologist, visited the project area on December 18, 2014, to assess archaeological potential in the vicinity of the Rock House Site. CRU staff observed that the project area has been substantially disturbed by previous ledge removal associated with past roadway construction. Substantial amounts of bedrock were removed to accommodate the path of Route 9 as bedrock cuts border both sides of the highway. Little or no archaeological potential may be ascribed to the project area based on the scope of work, sloped topography, and the effects of previous roadway and drainage construction, ledge removal, grading and landscaping. No existing ledge within the project area will be removed as part of this project.

Appendix 1 Info:

On behalf of MassDOT, Coler & Colantonio, Inc. submitted an early environmental coordination letter (dated February 13, 2012) to the West Brookfield Historical Commission with a copy sent to the State Historic Preservation Officer. No responses to the early coordination letters have been received to date.

MassDOT’s CRU staff has determined that the project satisfies the conditions outlined in Appendix 1 of the amended Section 106 Programmatic Agreement. No further review is required, and all documentation in support of this finding has been placed on file at MassDOT.

Reviewer's Initials: _____



CULTURAL RESOURCES PROJECT RECORD

City/Town:	West Brookfield	Project #	609049	Date Cleared	3/15/2022
Project Name	Resurfacing & Related Work on Rte. 9, from 850' West of Welcome Rd.to Pierce Rd.(1Mile -Phase 2)	Date Filed	3/9/2022	Finding Under Review	<input type="checkbox"/>
Project Type:	Highway Reconstr - Restr and Rehab	Early Coord. Letter Sent:	<input checked="" type="checkbox"/>	Reviewer:	MHH
Review:	Section 106 (PA)	Comment Received:	<input type="checkbox"/> MHC <input type="checkbox"/> LHC	Consultant	
Finding:	Stip VB - No historic properties affected				
Comments	PNF's will be emailed to the Narragansett, Aquinnah, and Mashpee Tribes, and the BUAR.				

Determination based on: Scope of Work Plans Inventory Site Visit Archaeological Survey
Attach appropriate documentation for checked items

Projects Requiring No Massachusetts SHPO Review

Programmatic Agreement, Appendix 1 (check all that apply) :

- | | |
|---|---|
| <input type="checkbox"/> 1) Interstate bridge or roadway projects | <input type="checkbox"/> 16) Bridge (less than 20' span) |
| <input checked="" type="checkbox"/> 2) Resurfacing, repair existing roadways | * <input checked="" type="checkbox"/> 17) Highway safety improvement |
| * <input checked="" type="checkbox"/> 3) Reconstruction on existing roadway | <input checked="" type="checkbox"/> 18) Drainage system element |
| * <input checked="" type="checkbox"/> 4) Roadway geometrics, intersections | * <input type="checkbox"/> 19) Traffic signal, safety improvement |
| * <input type="checkbox"/> 5) Curbs and sidewalks | * <input type="checkbox"/> 20) Intelligent Transportation System project |
| <input checked="" type="checkbox"/> 6) Pavement markings, rumble strips, etc | <input type="checkbox"/> 21) Rest area, maintenance facility |
| <input type="checkbox"/> 7) Curbs, sidewalks (MAAB, ADA) | * <input type="checkbox"/> 22) Bicycle, pedestrian lane, path or facility |
| * <input type="checkbox"/> 8) Removal of trees | <input type="checkbox"/> 23) Lighting system |
| <input checked="" type="checkbox"/> 9) Landscaping | <input checked="" type="checkbox"/> 24) Sign |
| <input type="checkbox"/> 10) Utilities | <input type="checkbox"/> 25) Hazardous waste |
| <input type="checkbox"/> 11) Railroad crossing | <input type="checkbox"/> 26) Highway fencing |
| <input type="checkbox"/> 12) Stream stabilization and restoration | <input type="checkbox"/> 27) Emergency repair |
| <input type="checkbox"/> 13) Wetland mitigation area | <input checked="" type="checkbox"/> 28) Erosion control |
| * <input type="checkbox"/> 14) Bridge (NR "Not Eligible" or "Conditionally Not Eligible") | <input type="checkbox"/> 29) Noise barrier |
| * <input type="checkbox"/> 15) Bridge (concrete slab post 1900, steel stringer) | * National Register eligibility evaluation required |

-OR-

No Historic Properties Affected

Programmatic Agreement Stipulation V.B. (check one):

- No NR listed or -eligible properties within Area of Potential Effect
 No effect on National Register listed or -eligible properties

Reviewer's Initials: MHH JMh



CULTURAL RESOURCES PROJECT RECORD

Summary of MassDOT Highway Division Finding (Appendix 1 and Section V.B. Projects only)

Project Description:

MassDOT proposes to complete roadway improvements along Route 9 (West Main Street) from the West Brookfield/Ware Town Line (TL) easterly for approximately 2.1 miles to the intersection of Route 9/Pierce Road in West Brookfield. In 2014, this 2.1-mile section of Route 9 was reviewed under MassDOT #606517, but recently, the project was divided into two separate project numbers for funding purposes. Phase 1 (MassDOT #606517) will run from the Ware T.L. easterly to the east entrance to the Trustees of the Reservation's Rock House Reservation for a total of 1.1 miles, and Phase 2 (MassDOT #609049) will run from just east of the Rock House Reservation's entrance to Route 9's intersection with Pierce Road for a total of 1.0 mile. The proposed roadway work along Phases 1 and 2 will include the following construction activities: pavement rehabilitation; minor box widening; installing new cement concrete retaining walls; installing modified rockfill slopes with compost and seeding; removing and resetting existing guardrails; painting pavement markings; adjusting and rebuilding drainage structures; clearing and thinning vegetation; installing erosion control measures; and other incidental work as required. There will be limited rock cutting to facilitate the minor roadway widening.

An Army Corps permit is required for Phase 1 and 2 project work to install new wetlands replication areas.

Cultural Resources:

A review of the National Register of Historic Places revealed no listed properties or districts within or adjacent to the project area. A review of the MHC Inventory revealed no inventoried properties within the vicinity of the project area.

A review of the archaeological base maps revealed one pre-contact archaeological site adjacent at the easternmost end of the Phase 1 project corridor: Rock House RS (19-WR-50), which is located approximately 500' to the east of Route 9 at the entrance to the Trustees of the Reservations' Rock House Reservation. Roadway work adjacent to the Rock House Reservation includes minor box widening (no more than 7' on a side), concrete retaining wall construction along the eastbound side of Route 9, and resetting existing guardrails. There will be limited rock cutting in areas that have been previously blasted. MassDOT Cultural Resources Unit (CRU) staff, including a MassDOT archaeologist, visited the project area on December 18, 2014, to assess archaeological potential in the vicinity of the Rock House Site. CRU staff observed that the project area has been substantially disturbed by previous ledge removal associated with past roadway construction. Substantial amounts of bedrock were removed to accommodate the path of Route 9 as bedrock cuts border both sides of the highway. Little or no archaeological potential may be ascribed to the project area based on the scope of work, sloped topography, and the effects of previous roadway and drainage construction, ledge removal, grading and landscaping. No existing ledge within the project area will be removed as part of this project.

Appendix 1 Info:

On behalf of MassDOT, Coler & Colantonio, Inc. submitted an early environmental coordination letter (dated February 13, 2012) to the West Brookfield Historical Commission with a copy sent to the State Historic Preservation Officer. No responses to the early coordination letters have been received to date.

MassDOT's CRU staff has determined that the project satisfies the conditions outlined in Appendix 1 of the amended Section 106 Programmatic Agreement. No further review is required, and all documentation in support of this finding has been placed on file at MassDOT.

Reviewer's Initials: _____

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

RC. 52121

APPENDIX A
MASSACHUSETTS HISTORICAL COMMISSION
 220 MORRISSEY BOULEVARD
 BOSTON, MASS. 02125
 617-727-8470, FAX: 617-727-5128

RECEIVED

JUL 03 2023

MASS. HIST. COMM

PROJECT NOTIFICATION FORM

Project Name: Proposed Rte. 9 Rehabilitation & Related Work, Phase 1 (MassDOT #606517) & Phase 2 (MassDOT #609049)

Location /Address: Route 9 (West Main Street) **After review of MHC files and the materials you submitted, it has been determined that this project is unlikely to affect significant historic or archaeological resources.**

City/Town: West Brookfield

Project Proponent

Name: Massachusetts Department of Transportation *Brona Simon 7/28/23*

Address: 10 Park Plaza **Brona Simon** **Date**

City/Town/Zip/Telephone: Boston, MA 02116 **Executive Director**

Agency license or funding for the project (list all licenses, permits, approvals, grants or other entitlements being sought from state and federal agencies). **State Historic Preservation Officer**
Massachusetts Historical Commission

<u>Agency Name</u>	<u>Type of License or funding (specify)</u>
FHWA (lead Federal Agency)	Federal Aid Transportation Program
U. A. Army Corps of Engineers	Section 404 permit under the Clean Water Act

Project Description (narrative):

MassDOT proposes to complete roadway improvements along Route 9 (West Main Street) from the West Brookfield/Ware Town Line (TL) easterly for approximately 2.1 miles to the intersection of Route 9/Pierce Road in West Brookfield. In 2014, this 2.1-mile section of Route 9 was reviewed under MassDOT #606517, but recently, the project was divided into two separate project numbers for funding purposes. Phase 1 (MassDOT #606517) will run from the Ware T.L. easterly to the east entrance to the Trustees of the Reservation's Rock House Reservation for a total of 1.1 miles, and Phase 2 (MassDOT #609049) will run from just east of the Rock House Reservation's entrance to Route 9's intersection with Pierce Road for a total of 1.0 mile.

The proposed roadway work along Phases 1 and 2 will include the following construction activities: rehabilitating the pavement; minor box widening; installing new cement concrete retaining walls; installing modified rockfill slopes with compost and seeding; removing and resetting existing guardrails; painting pavement markings; adjusting and rebuilding drainage structures; clearing and thinning vegetation; installing erosion control measures; and other incidental work as required. There will be limited rock cutting to facilitate the minor roadway widening.

An Army Corps permit is required for Phase 1 and 2 project work to install new wetlands replication areas. This project was cleared in-house under FHWA's Programmatic Agreement.

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A (continued)

Does the project include demolition?

No

Does the project include rehabilitation of any existing buildings?

No

Does the project include new construction?

No

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.

A review of the National Register of Historic Places revealed no listed properties or districts within or adjacent to the project area. A review of the MHC Inventory revealed no inventoried properties within the vicinity of the project area.

A review of the archaeological base maps revealed one pre-contact archaeological site adjacent at the easternmost end of the Phase 1 project corridor: Rock House RS (19-WR-50), which is located approximately 500' to the east of Route 9 at the entrance to the Trustees of the Reservations' Rock House Reservation. Roadway work adjacent to the Rock House Reservation includes minor box widening (no more than 7' on a side), concrete retaining wall construction along the eastbound side of Route 9, and resetting existing guardrails. There will be limited rock cutting in areas that have been previously blasted. MassDOT Cultural Resources Unit (CRU) staff, including a MassDOT archaeologist, visited the project area on December 18, 2014, to assess archaeological potential in the vicinity of the Rock House Site. CRU staff observed that the project area has been substantially disturbed by previous ledge removal associated with past roadway construction. Substantial amounts of bedrock were removed to accommodate the path of Route 9 as bedrock cuts border both sides of the highway. Low sensitivity may be ascribed to the project area based on the scope of work, sloped topography, and the effects of previous roadway and drainage construction, ledge removal, grading and landscaping. No existing ledge within the project area will be removed as part of this project.

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
				Acres	

What is the acreage of the proposed new construction?

What is the present land use of the project area?

[The two-lane project corridor runs through a heavily wooded area of West Brookfield.

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A (continued)

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: MHH **Date:** 6/29/2023

Name: Mary Hafferty, Cultural Resources Specialist MassDOT

Address: 10 Park Plaza, Room 4260

City/Town/Zip: Boston, MA 02717

Telephone: 857-368-8799

REGULATORY AUTHORITY

950 CMR 71.00: M.G.L. c. 9, §§ 26-27C as amended by St. 1988, c. 254.

7/1/93

950 CMR - 27

CC: ACOE

From: Hafferty, Mary H. (DOT)
Sent: Tuesday, March 15, 2022 10:55 AM
To: thpo@wampanoagtribe-nsn.gov
Cc: Harwood, Jameson (DOT); tcrm2@wampanoagtribe-nsn.gov
Subject: RE: Rte. 9, West Brookfield (MassDOT #606517 & #609049)

Dear Ms. Washington,

MassDOT is submitting the enclosed project information to the Tribal Historic Preservation Officer to meet the Section 106 consultation requirements of the Federal highway Administration. 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.

Best regards,
Mary

Mary Hafferty
Cultural Resources Specialist
MassDOT – Highway Division
10 Park Plaza – Room 4260
Boston, MA 02116
781-801-0057 (cell)

From: Hafferty, Mary H. (DOT)
Sent: Tuesday, March 15, 2022 10:50 AM
To: Robinson, David S (EEA)
Cc: Harwood, Jameson (DOT)
Subject: Rte. 9, West Brookfield (MassDOT #606517 & #609049)
Attachments: [Phase 1 -W. Brookfield 100% HWY.pdf](#); [Phase 2 -W. Brookfield 75% HWY.pdf](#);
[W. Brookfield -PNF Maps.pdf](#); [W. Brookfield Phase 1&2 -Signed PNF.pdf](#)

Dear Mr. Robinson,

MassDOT is submitting the enclosed project information to the Board of Underwater Archaeological Resources to meet the Section 106 consultation requirements of the U. S. 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 Lavalley, 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.

Best regards,
Mary

Mary Hafferty
Cultural Resources Specialist
MassDOT – Highway Division
10 Park Plaza – Room 4260
Boston, MA 02116
781-801-0057 (cell)

From: Hafferty, Mary H. (DOT)
Sent: Tuesday, March 15, 2022 10:51 AM
To: David.Weeden@mwtribe-nsn.gov
Cc: Harwood, Jameson (DOT)
Subject: Rte. 9, West Brookfield (MassDOT #606517 & #609049)
Attachments: [Phase 1 -W. Brookfield 100% HWY.pdf](#); [Phase 2 -W. Brookfield 75% HWY.pdf](#);
[W. Brookfield -PNF Maps.pdf](#); [W. Brookfield Phase 1&2 -Signed PNF.pdf](#)

Dear Mr. Weeden,

MassDOT is submitting the enclosed project information to the Tribal Historic Preservation Officer to meet the Section 106 consultation requirements of the U. S. 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.

Best regards,
Mary

Mary Hafferty
Cultural Resources Specialist
MassDOT – Highway Division
10 Park Plaza – Room 4260
Boston, MA 02116
781-801-0057 (cell)

From: Hafferty, Mary H. (DOT)
Sent: Tuesday, March 15, 2022 10:50 AM
To: tashtesook@aol.com
Cc: Harwood, Jameson (DOT)
Subject: Rte. 9, West Brookfield (MassDOT #606517 & #609049)
Attachments: [Phase 1 -W. Brookfield 100% HWY.pdf](#); [Phase 2 -W. Brookfield 75% HWY.pdf](#);
[W. Brookfield -PNF Maps.pdf](#); [W. Brookfield Phase 1&2 -Signed PNF.pdf](#)

Dear Mr. Brown,

MassDOT is submitting the enclosed project information to the Tribal Historic Preservation Officer to meet the Section 106 consultation requirements of the U. S. 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.

Best regards,
Mary

Mary Hafferty
Cultural Resources Specialist
MassDOT – Highway Division
10 Park Plaza – Room 4260
Boston, MA 02116
781-801-0057 (cell)



February 13, 2012

William Francis Galvin
Secretary of the Commonwealth
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear Mr. Galvin:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

The Route 9 (West Main Street) project consists of approximately 2.1 miles of pavement rehabilitation from the Ware Town Line to Pierce Road in West Brookfield. The roadway will be widened to provide bicycle accommodation and resurfaced. Drainage improvements are proposed to remove stormwater runoff and snowmelt from the roadway. Guardrail will be replaced as required and new signage and pavement markings will be included.

Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the Massachusetts Historical Commission review the enclosed materials at its earliest convenience, and solicits any comments that the Massachusetts Historical Commission wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

Sincerely,

A handwritten signature in blue ink, appearing to read "John G. Morgan Jr.", is placed above the typed name.

John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.



February 13, 2012

Planning Board
2 East Main Street
West Brookfield, MA 01585

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear Planning Board Members:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

The Route 9 (West Main Street) project consists of approximately 2.1 miles of pavement rehabilitation from the Ware Town Line to Pierce Road in West Brookfield. The roadway will be widened to provide bicycle accommodation and resurfaced. Drainage improvements are proposed to remove stormwater runoff and snowmelt from the roadway. Guardrail will be replaced as required and new signage and pavement markings will be included.

Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the West Brookfield Planning Board review the enclosed materials at its earliest convenience, and solicits any comments that the Planning Board wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

Sincerely,

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John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.



February 13, 2012

Conservation Commission
2 East Main Street
West Brookfield, MA 01585

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear Planning Board Members:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

The Route 9 (West Main Street) project consists of approximately 2.1 miles of pavement rehabilitation from the Ware Town Line to Pierce Road in West Brookfield. The roadway will be widened to provide bicycle accommodation and resurfaced. Drainage improvements are proposed to remove stormwater runoff and snowmelt from the roadway. Guardrail will be replaced as required and new signage and pavement markings will be included.

Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the West Brookfield Conservation Commission review the enclosed materials at its earliest convenience, and solicits any comments that the Conservation Commission wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

Sincerely,

A handwritten signature in blue ink, appearing to read "John G. Morgan Jr.", is written over a light blue horizontal line.

John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.



February 13, 2012

Barry Nadon Jr.
Board of Selectmen
2 East Main Street
West Brookfield, MA 01585

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear Board of Selectmen:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

The Route 9 (West Main Street) project consists of approximately 2.1 miles of pavement rehabilitation from the Ware Town Line to Pierce Road in West Brookfield. The roadway will be widened to provide bicycle accommodation and resurfaced. Drainage improvements are proposed to remove stormwater runoff and snowmelt from the roadway. Guardrail will be replaced as required and new signage and pavement markings will be included.

Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the West Brookfield Board of Selectmen review the enclosed materials at its earliest convenience, and solicits any comments that the Board of Selectmen wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

Sincerely,

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John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.



February 13, 2012

Historical Commission
2 East Main Street
West Brookfield, MA 01585

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear Historical Commission Members:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

The Route 9 (West Main Street) project consists of approximately 2.1 miles of pavement rehabilitation from the Ware Town Line to Pierce Road in West Brookfield. The roadway will be widened to provide bicycle accommodation and resurfaced. Drainage improvements are proposed to remove stormwater runoff and snowmelt from the roadway. Guardrail will be replaced as required and new signage and pavement markings will be included.

Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the West Brookfield Historical Commission review the enclosed materials at its earliest convenience, and solicits any comments that the Historical Commission wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

Sincerely,

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John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.



February 13, 2012

C. Thomas O'Donnell
Police Chief
West Brookfield Police Department
2 East Main Street
West Brookfield, MA 01585

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear Mr. O'Donnell:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

The Route 9 (West Main Street) project consists of approximately 2.1 miles of pavement rehabilitation from the Ware Town Line to Pierce Road in West Brookfield. The roadway will be widened to provide bicycle accommodation and resurfaced. Drainage improvements are proposed to remove stormwater runoff and snowmelt from the roadway. Guardrail will be replaced as required and new signage and pavement markings will be included.

Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the West Brookfield Police Department review the enclosed materials at its earliest convenience, and solicits any comments that the Police Department wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

Sincerely,

A handwritten signature in blue ink, appearing to read "John G. Morgan Jr.", is placed above the printed name.

John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.



February 13, 2012

Fire Department
3 Cottage Street
West Brookfield, MA 01585

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear West Brookfield Fire Chief:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

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Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the West Brookfield Fire Department review the enclosed materials at its earliest convenience, and solicits any comments that the Fire Department wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

Sincerely,

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John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION

PLAN AND PROFILE OF
WEST MAIN STREET (ROUTE 9)

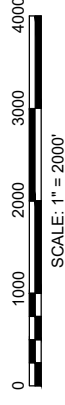
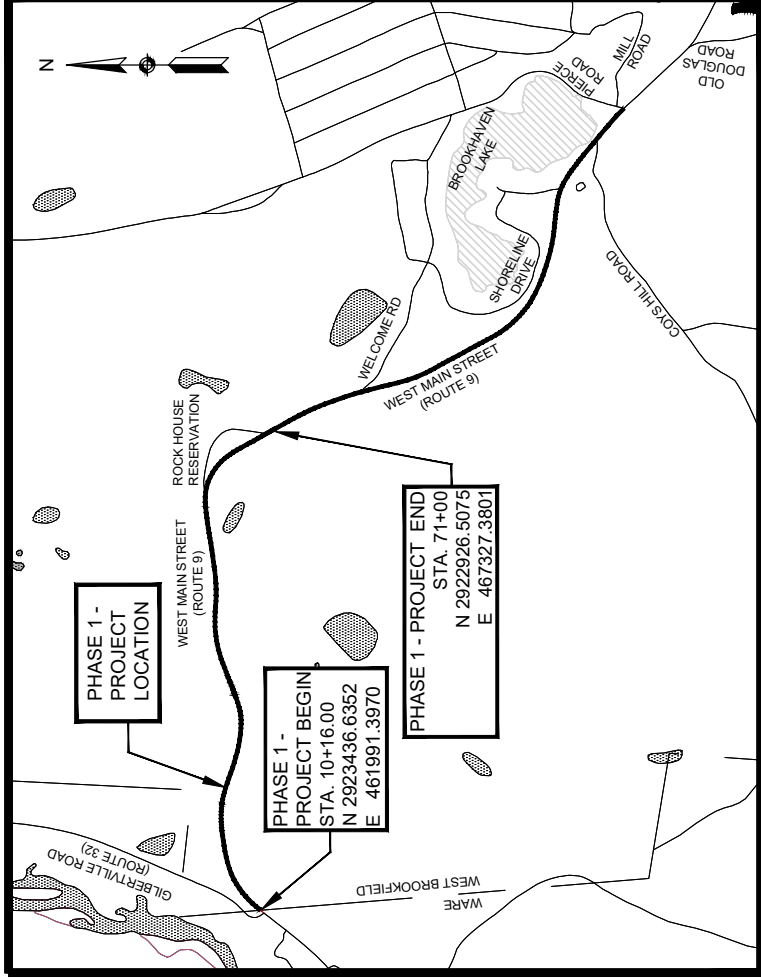
IN THE CITY/TOWN OF
WEST BROOKFIELD
WORCESTER COUNTY

FEDERAL AID PROJECT NO.

PERMITTING PLANS

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
2	LEGEND & ABBREVIATIONS
3	KEY PLAN, GENERAL NOTES & PAVEMENT CORE LOGS
4-8	TYPICAL SECTIONS
9-19	PERMITTING PLANS
20-25	PROFILE - WEST MAIN STREET
26-29	CONSTRUCTION DETAILS




LENGTH OF PHASE 1 PROJECT = 6,084.00 FEET = 1.152 MILES

WEST BROOKFIELD WEST MAIN STREET (ROUTE 9)			
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	29
PROJECT FILE NO. 606517			

TITLE SHEET & INDEX

ARMY CORPS OF ENGINEERS - 404 PERMIT
PERMITTING PLANS
FEBRUARY 2024

THESE PLANS ARE SUPPLEMENTED BY THE OCTOBER 2017 CONSTRUCTION STANDARD DETAILS, THE 2015 OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK.



141 Longwater Drive
Norwell, MA 02061
Main: (781) 962-5400 www.chacompanies.com

DATE	DESCRIPTION	REV #
02/08/2024		

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	29
PROJECT FILE NO.		606517	

LEGEND & ABBREVIATIONS

ABBREVIATIONS (cont.)

GENERAL

POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROJ	PROJECT
PROP	PROPOSED
PSB	PLANTABLE SOIL BORROW
PT	POINT OF TANGENCY
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PVMT	PAVEMENT
PWW	PAVED WATERWAY
R	RADIUS OF CURVATURE
R&D	REMOVE AND DISPOSE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REM	REMOVE
RET	RETAIN
RET WALL	RETAINING WALL
ROW	RIGHT OF WAY
RR	RAILROAD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT	RIGHT
SB	STONE BOUND
SHLD	SHOULDER
SMH	SEWER MANHOLE
ST	STREET
STA	STATION
SSD	STOPPING SIGHT DISTANCE
SHLO	STATE HIGHWAY LAYOUT LINE
SW	SIDEWALK
T	TANGENT DISTANCE OF CURVE/TRUCK %
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIABLES
VERT	VERTICAL
VC	VERTICAL CURVE
WCR	WHEEL CHAIR RAMP
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

ENVIRONMENTAL RESOURCE IMPACT AREA KEY

	PERMANENT WETLAND IMPACT
	TEMPORARY WETLAND IMPACT & RESTORATION
	WETLAND REPLICATION
	PERMANENT LAND UNDER WATER (LUW) IMPACT
	TEMPORARY LAND UNDER WATER (LUW) IMPACT & RESTORATION
	BORDERING LAND SUBJECT TO FLOODING (BLSF) IMPACT AREA

ABBREVIATIONS

GENERAL

AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABANDON	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BC	BOTTOM OF CURB
BD	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BR	BRIDGE
BVW	BORDERING VEGETATED WETLAND
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CC	CEMENT CONCRETE
CCM	CEMENT CONCRETE MASONRY
CEM	CEMENT
CI	CURB INLET
CIP	CAST IRON PIPE
CLF	CHAIN LINK FENCE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CSP	CORRUGATED STEEL PIPE
CO.	COUNTY
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
CR GR	CROWN GRADE
DHV	DESIGN HOURLY VOLUME
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DW	STEADY DONT WALK - PORTLAND ORANGE
DWY	DRIVEWAY
ELEV (or EL.)	ELEVATION
EMB	EMBANKMENT
EOP	EDGE OF PAVEMENT
EXIST (or EX)	EXISTING
EXC	EXCAVATION
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN.	FOUNDATION
FLDSTN	FIELDSTONE
GAR	GARAGE
GD	GROUND
GG	GAS GATE
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GRAN	GRANITE
GRAV	GRAVEL
GRD	GUARD
HDW	HEADWALL
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HT	HUB AND TACK
HYD	HYDRANT
INV	INVERT
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LP	LIGHT POLE
LT	LEFT
MAX	MAXIMUM
MB	MAILBOX
MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MIN	MINIMUM
NIC	NOT IN CONTRACT
NO.	NUMBER
OHW	OVERHEAD WIRE
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE

TRAFFIC SYMBOLS

EXISTING

	CONTROLLER PHASE ACTUATED
	TRAFFIC SIGNAL HEAD (SIZE AS NOTED)
	WIRE LOOP DETECTOR (6' x 6' TYP UNLESS OTHERWISE SPECIFIED)
	VIDEO DETECTION CAMERA
	MICROWAVE DETECTOR
	PEDESTRIAN PUSH BUTTON, SIGN (DIRECTIONAL ARROW AS SHOWN) AND SADDLE
	EMERGENCY PREEMPTION CONFIRMATION STROBE LIGHT
	VEHICULAR SIGNAL HEAD
	VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
	FLASHING BEACON
	PEDESTRIAN SIGNAL HEAD, (TYPE AS NOTED OR AS SPECIFIED)
	RAILROAD SIGNAL
	SIGNAL POST AND BASE (ALPHA-NUMERIC DESIGNATION NOTED)
	MAST ARM, SHAFT AND BASE (ARM LENGTH AS NOTED)
	HIGH MAST POLE OR TOWER
	SIGN AND POST
	SIGN AND POST (2 POSTS)
	MAST ARM WITH LUMINAIRE
	OPTICAL PRE-EMPTION DETECTOR
	CONTROL CABINET, GROUND MOUNTED
	CONTROL CABINET, POLE MOUNTED
	FLASHING BEACON CONTROL AND METER PEDESTAL
	LOAD CENTER ASSEMBLY
	PULL BOX 12"x12" (OR AS NOTED)
	ELECTRIC HANDHOLE 12"x24" (OR AS NOTED)
	TRAFFIC SIGNAL CONDUIT

PROPOSED

	CONTROLLER PHASE ACTUATED
	TRAFFIC SIGNAL HEAD (SIZE AS NOTED)
	WIRE LOOP DETECTOR (6' x 6' TYP UNLESS OTHERWISE SPECIFIED)
	VIDEO DETECTION CAMERA
	MICROWAVE DETECTOR
	PEDESTRIAN PUSH BUTTON, SIGN (DIRECTIONAL ARROW AS SHOWN) AND SADDLE
	EMERGENCY PREEMPTION CONFIRMATION STROBE LIGHT
	VEHICULAR SIGNAL HEAD
	VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
	FLASHING BEACON
	PEDESTRIAN SIGNAL HEAD, (TYPE AS NOTED OR AS SPECIFIED)
	RAILROAD SIGNAL
	SIGNAL POST AND BASE (ALPHA-NUMERIC DESIGNATION NOTED)
	MAST ARM, SHAFT AND BASE (ARM LENGTH AS NOTED)
	HIGH MAST POLE OR TOWER
	SIGN AND POST
	SIGN AND POST (2 POSTS)
	MAST ARM WITH LUMINAIRE
	OPTICAL PRE-EMPTION DETECTOR
	CONTROL CABINET, GROUND MOUNTED
	CONTROL CABINET, POLE MOUNTED
	FLASHING BEACON CONTROL AND METER PEDESTAL
	LOAD CENTER ASSEMBLY
	PULL BOX 12"x12" (OR AS NOTED)
	ELECTRIC HANDHOLE 12"x24" (OR AS NOTED)
	TRAFFIC SIGNAL CONDUIT

PAVEMENT MARKINGS SYMBOLS

EXISTING

	PAVEMENT ARROW - WHITE
	LEGEND "ONLY" - WHITE
	STOP LINE (12" WIDE)
	CROSSWALK
	SOLID WHITE LINE (6" WIDE)
	SOLID YELLOW LINE (6" WIDE)
	BROKEN WHITE LINE (10' LINE, 30' GAP)
	BROKEN YELLOW LINE (10' LINE, 30' GAP)
	DOTTED WHITE LINE (3' LINE, 9' GAP)
	DOTTED YELLOW LINE (3' LINE, 9' GAP)
	DOTTED WHITE LINE EXTENSION (2' LINE, 6' GAP)
	DOTTED YELLOW LINE EXTENSION (2' LINE, 6' GAP)
	DOUBLE WHITE LINE
	DOUBLE YELLOW LINE

PROPOSED

	PAVEMENT ARROW - WHITE
	LEGEND "ONLY" - WHITE
	STOP LINE (12" WIDE)
	CROSSWALK
	SOLID WHITE LINE (6" WIDE)
	SOLID YELLOW LINE (6" WIDE)
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	DOTTED WHITE LINE EXTENSION (2' LINE, 6' GAP)
	DOTTED YELLOW LINE EXTENSION (2' LINE, 6' GAP)
	DOUBLE WHITE LINE
	DOUBLE YELLOW LINE

GENERAL SYMBOLS

EXISTING

	JERSEY BARRIER
	CATCH BASIN
	CATCH BASIN CURB INLET
	FLAG POLE
	GAS PUMP
	MAIL BOX
	POST SQUARE
	POST CIRCULAR
	WELL
	ELECTRIC HANDHOLE
	FENCE GATE POST
	GAS GATE
	BORING HOLE
	MONITORING WELL
	TEST PIT
	HYDRANT
	LIGHT POLE
	COUNTY BOUND
	GPS POINT
	CABLE MANHOLE
	DRAINAGE MANHOLE
	ELECTRIC MANHOLE
	GAS MANHOLE
	MISC MANHOLE
	SEWER MANHOLE
	TELEPHONE MANHOLE
	WATER MANHOLE
	MASSACHUSETTS HIGHWAY BOUND
	MONUMENT
	STONE BOUND
	TOWN OR CITY BOUND
	TRAVERSE OR TRIANGULATION STATION
	TROLLEY POLE OR GUY POLE
	TRANSMISSION POLE
	UTILITY POLE W/ FIREBOX
	UTILITY POLE WITH DOUBLE LIGHT
	UTILITY POLE W/ 1 LIGHT
	UTILITY POLE
	BUSH
	TREE
	STUMP
	SWAMP/MARSH
	WATER GATE
	PARKING METER
	OVERHEAD CABLE/WIRE
	CURBING
	CONTOURS (ON-THE-GROUND SURVEY DATA)
	CONTOURS (PHOTOGAMMETRIC DATA)
	UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
	UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
	UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
	UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
	UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
	UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
	BALANCED STONE WALL
	GUARD RAIL - STEEL POSTS
	GUARD RAIL - WOOD POSTS
	CHAIN LINK OR METAL FENCE
	WOOD FENCE
	SEDIMENT CONTROL BARRIER
	TREE LINE
	SAWCUT LINE
	TOP OR BOTTOM OF SLOPE
	EDGE OF PAVEMENT
	LIMIT OF MICROMILLING AND OVERLAY
	BANK OF RIVER OR STREAM
	BORDER OF WETLAND
	100 FT WETLAND BUFFER
	200 FT RIVERFRONT BUFFER
	STATE HIGHWAY LAYOUT
	TOWN OR CITY LAYOUT
	COUNTY LAYOUT
	RAILROAD SIDELINE
	TOWN OR CITY BOUNDARY LINE
	PROPERTY LINE OR APPROXIMATE PROPERTY LINE
	EASEMENT

DESCRIPTION

PROPOSED

EXISTING

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	29
PROJECT FILE NO. 606517			

KEY PLAN, GENERAL NOTES & PAVEMENT CORE LOGS - 1

10. THE CONTRACTOR SHALL MAKE DETERMINATIONS OF SUBSURFACE CONDITIONS, INCLUDING THE LOCATION OF ROCK AND THE ACTUAL LOCATION OF UTILITIES OR OTHER FEATURES WHICH MAY AFFECT THE WORK.

11. THE CONTRACTOR SHALL CAUSE AS LITTLE INTERFERENCE AND INCONVENIENCE TO ADJUTERS AS POSSIBLE. THE CONTRACTOR SHALL MAINTAIN SAFE AND CONVENIENT ACCESS TO PRIVATE PROPERTIES AT ALL TIMES.

12. THE FLOW OF TRAFFIC THROUGH CONSTRUCTION ZONES IN EXISTING PUBLIC WAYS SHALL BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE SPECIFIED ON THE PLANS AND IN THE SPECIAL PROVISIONS.

13. ALL PAVEMENT MARKINGS SHALL BE RECESSED POLYUREA.

14. BASED UPON THE SUBSURFACE CONDITIONS ENCOUNTERED IN THE BORINGS AND IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 3.1, THE SITE CLASS FOR EACH CONCRETE RETAINING WALL LOCATION WAS DETERMINED AS FOLLOWS:

RETAINING WALL LOCATION	SEISMIC SITE CLASS
STA 31+10 TO STA 32+50 LT	C
STA 41+05 TO STA 43+02 LT	C
STA 57+60 TO STA 61+40 RT	C

15. FOR OTHER NOTES, REFER TO SPECIFIC PLANS AND DETAILS.

7. PLAN REFERENCES:
- 1928 COUNTY LAYOUT PLAN BOOK 49, PLAN 44
 - 1927 COUNTY LAYOUT PLAN BOOK 51, PLAN 4
 - 1966 COUNTY LAYOUT PLAN BOOK 302, PLAN 19
 - STATE HIGHWAY LAYOUT NO. 4990
 - STATE HIGHWAY LAYOUT NO. 5001
 - PLAN BOOK 781, PLAN 102
 - PLAN BOOK 760, PLAN 54
 - PLAN BOOK 777, PLAN 12
 - PLAN BOOK 302, PLAN 36
 - PLAN BOOK 318, PLAN 10
 - PLAN BOOK 302, PLAN 35
 - PLAN BOOK 300, PLAN 46

8. THE CONTRACTOR WILL COORDINATE ALL PRIVATE CASTINGS AND POLES THAT ARE TO BE ADJUSTED, RESET OR RELOCATED WITH THE APPROPRIATE UTILITY PURVEYOR. THE RELOCATION, INSTALLATION OR REMOVAL OF PRIVATE UTILITIES SHALL BE ACCOMPLISHED BY THEIR OWNER. THE CONTRACTOR SHALL COOPERATE WITH THE PRIVATE UTILITY PURVEYORS AND ALLOW THEM ADEQUATE TIME TO COMPLETE THEIR WORK IN ADVANCE OF PERFORMING ANY PAVING OPERATIONS OR OTHER FINISH WORK.

9. DRAINAGE ELEVATIONS ARE PROVIDED FOR DESIGN PURPOSES ONLY. THE CONTRACTOR SHALL VERIFY BY TEST PIT, THE LOCATIONS OF EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED DRAINAGE DESIGN. ANY FIELD ADJUSTMENTS REQUIRED WILL BE MADE AS APPROVED OR DIRECTED BY THE ENGINEER. ONLY AFTER THE CONTRACTOR VERIFIES ELEVATIONS FOR THE CONSTRUCTION OF THE DRAINAGE SYSTEM SHALL ANY STRUCTURES BE ORDERED. ANY FIELD ADJUSTMENTS TO LINE & GRADE UP TO A DEPTH OF 5 FEET SHALL BE INCLUDED IN THE COST OF THE PIPE. PIPE EXCAVATION GREATER THAN 5 FEET WILL BE PAID UNDER CLASS B TRENCH EXCAVATION.

1. ALL CONSTRUCTION IS TO BE IN ACCORDANCE WITH MASSDOT STANDARD DETAILS AND SPECIFICATIONS.

2. TOPOGRAPHY AND DETAIL SHOWN HEREON ARE A RESULT OF AN ON-THE-GROUND SURVEY PERFORMED BY COLER & COLANTONIO INC. (NOW CHA CONSULTING) DURING NOVEMBER AND DECEMBER OF 2011.

3. PRIMARY GEODETIC SURVEY CONTROL WAS ESTABLISHED FROM AN ON THE GROUND SURVEY USING GLOBAL POSITIONING SYSTEM (GPS) SURVEY METHODS ON SEPTEMBER 28, 2011. THE HORIZONTAL REFERENCED DATUM IS THE NAD 83 BASED ON THE GRS 80 REFERENCE ELLIPSOID. THE GRID COORDINATES ARE BASED ON THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM OF 1983 (MAINLAND 2001). ELEVATIONS ARE REFERENCED TO THE NAVD 88 VERTICAL DATUM.

RIM AND INVERT ELEVATIONS AND SPOT ELEVATIONS ARE PUBLISHED FOR DESIGN PURPOSES ONLY. VERTICAL BENCHMARKS SHOWN ON THE PLAN ARE TO BE USED FOR CONSTRUCTION EFFORTS.

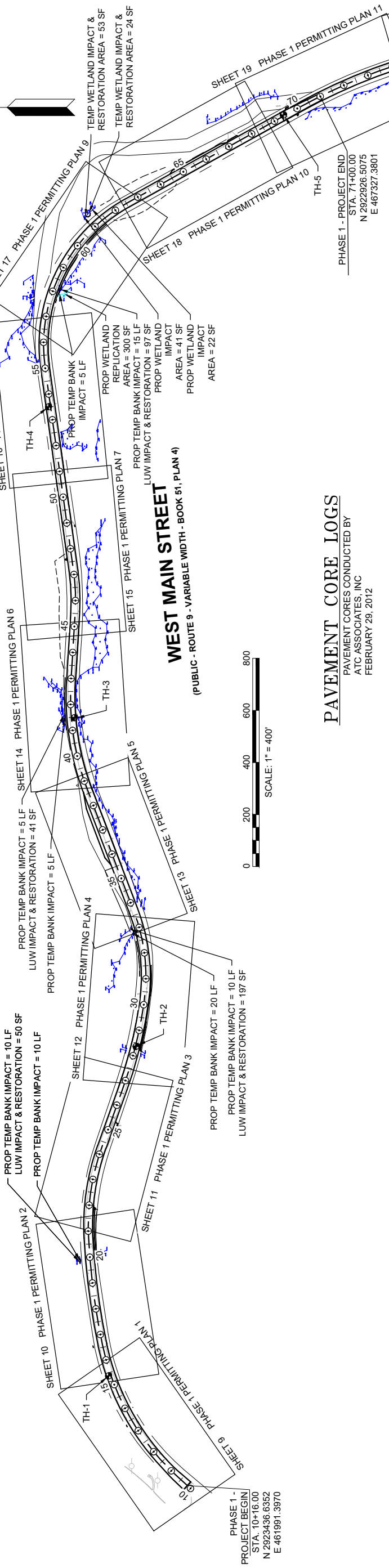
IN THE EVENT THAT BENCHMARKS (TBMS), ESTABLISHED FOR THIS PROJECT AND PUBLISHED ON THIS SURVEY, ARE DESTROYED, NOT RECOVERABLE OR A DISCREPANCY IS FOUND, THE USER SHOULD NOTIFY THIS FIRM IN WRITING PRIOR TO COMMENCING OR CONTINUING ANY WORK.

4. LOCATIONS OF SUBSURFACE UTILITIES SHOWN HEREON ARE APPROXIMATE AND ADDITIONAL UTILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS PLAN. LOCATIONS ARE COMPILED FROM UTILITY PLANS OF RECORD AND DIG-SAFE FIELD MARKINGS. THIS INFORMATION IS NOT TO BE USED FOR CONSTRUCTION. PRIOR TO ANY CONSTRUCTION, CONTACT DIG-SAFE AT (1-800-344-7233) TO FIELD VERIFY LOCATION OF ALL UTILITIES.

5. THE LOCUS AREA LIES WITHIN A FEMA NON-PRINTED PANEL(S) REFERENCE ID NUMBER 25027C0540E, COMMUNITY ID NUMBER 25027C, TOWN OF WEST BROOKFIELD IN WORCESTER COUNTY.

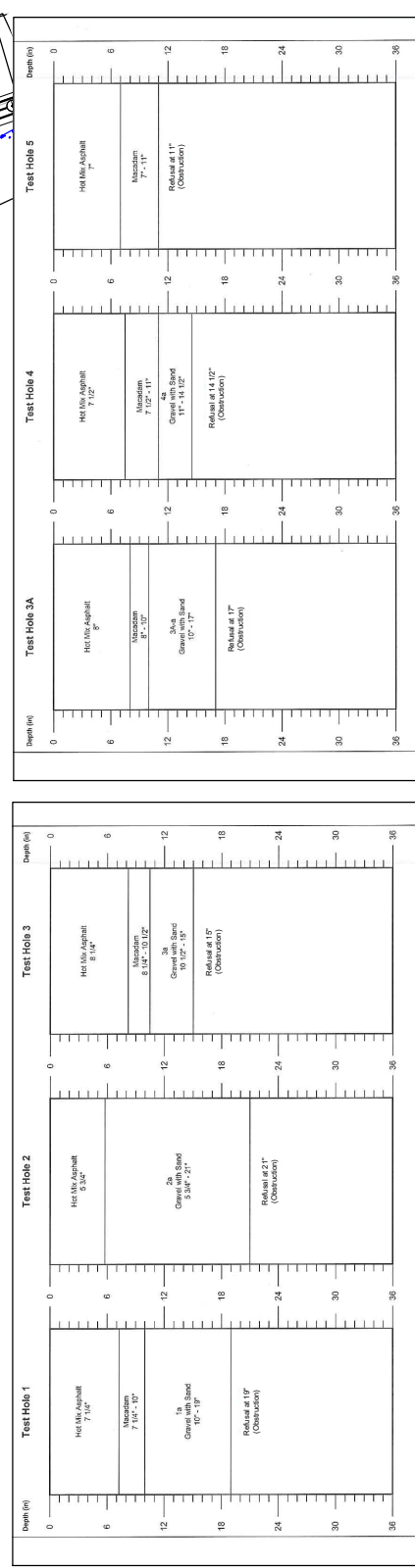
6. WETLAND AND CHANNEL LINES WERE DELINEATED IN NOVEMBER OF 2011 BY COLER & COLANTONIO, INC. (NOW CHA CONSULTING) AND CHECKING IN MARCH OF 2023 BY CHA CONSULTING.

7. WETLAND AND CHANNEL LINES WERE DELINEATED IN NOVEMBER OF 2011 BY COLER & COLANTONIO, INC. (NOW CHA CONSULTING) AND CHECKING IN MARCH OF 2023 BY CHA CONSULTING.



WEST MAIN STREET
(PUBLIC - ROUTE 9 - VARIABLE WIDTH - BOOK 51, PLAN 4)

PAVEMENT CORE LOGS
PAVEMENT CORES CONDUCTED BY
ATC ASSOCIATES, INC
FEBRUARY 29, 2012



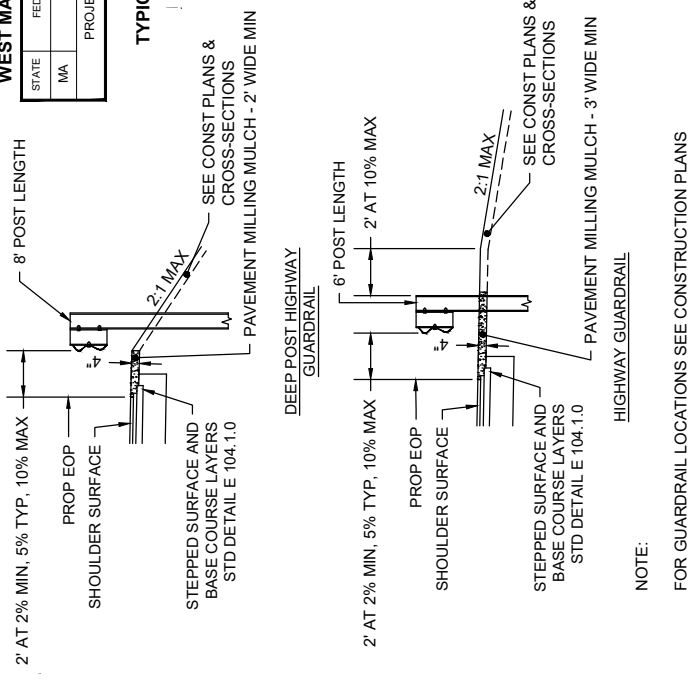
LOCATION	IMPACT SUMMARY				
	PERM WETLAND IMPACT (SQ. FEET)	WETLAND REPLICATION (SQ. FEET)	TEMP WETLAND IMPACT & RESTORATION (SQ. FEET)	TEMP LWF IMPACT & RESTORATION (SQ. FEET)	TEMPORARY BANK IMPACT (LINEAR FEET)
STA 19+95± LT				50	20
STA 32+80± LT					20
STA 33+00± LT				197	10
STA 41+50± LT				41	10
STA 58+00± RT	41	300	77	97	20
STA 61+00± LT	22				
STA 61+40± LT					
TOTAL	63	300	77	385	80

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**WEST BROOKFIELD
 WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		4	28
PROJECT FILE NO. 606517			

**PHASE 1
 TYPICAL SECTIONS - 1**



PAVEMENT NOTES

PROPOSED FULL DEPTH CONSTRUCTION / BOX WIDENING GREATER THAN 4 FEET

- 1-1/2" SUPERPAVE SURFACE COURSE 9.5 POLYMER (SSC-9.5-P) OVER
- 2" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5) OVER
- 4" SUPERPAVE BASE COURSE 37.5 (SBC-37.5) OVER
- 4" DENSE GRADED CRUSHED STONE FOR SUB-BASE
- 8" GRAVEL BORROW TYPE b SUB-BASE OVER
- EXISTING SUBGRADE FINE GRADED AND COMPACTED

PROPOSED MILL & OVERLAY

- 1-1/2" SUPERPAVE SURFACE COURSE 9.5 POLYMER (SSC-9.5-P) OVER
- 2" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5) OVER
- VARIABLE DEPTH PAVEMENT STANDARD MILLING AND SUPERPAVE LEVELING COURSE 12.5 (SIC-12.5) WHERE REQUIRED (SEE CONSTRUCTION DETAIL SHEET 51 AND CROSS-SECTIONS)

PROPOSED FULL DEPTH PERMANENT TRENCH PATCH

- 3" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER
- 3" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER
- 12" GRAVEL BORROW TYPE b OVER COMPACTED TRENCH BACKFILL

PROPOSED TEMPORARY TRENCH PATCH

- 3" HOT MIX ASPHALT (ITEM #472.) OVER
- 8" GRAVEL BORROW TYPE b OVER COMPACTED TRENCH BACKFILL

PROPOSED BOX WIDENING LESS THAN 4 FEET

- 1-1/2" SUPERPAVE SURFACE COURSE 9.5 POLYMER (SSC-9.5-P) OVER
- 2" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5) OVER
- 6" CEMENT CONCRETE BASE COURSE OVER
- 8" GRAVEL BORROW TYPE b OVER
- EXISTING SUBGRADE FINE GRADED AND COMPACTED

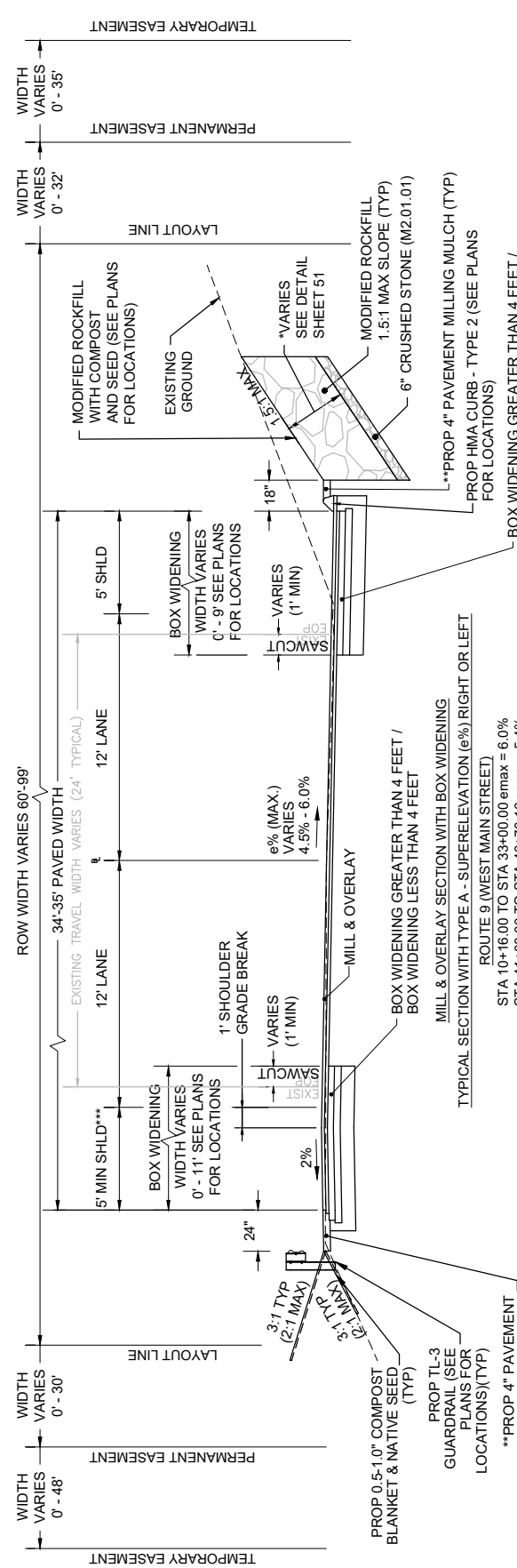
PROPOSED HOT MIX ASPHALT DRIVEWAYS

- 1-1/2" SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER
- 2-1/2" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5) OVER
- 8" GRAVEL BORROW TYPE b

PROPOSED GRAVEL TURNOUT

- 12" GRAVEL BORROW TYPE b OVER
- EXISTING SUBGRADE FINE GRADED AND COMPACTED

THE PROPOSED PAVEMENT LAYERS SHALL BE STAGGERED JOINTS TO RESIST CRACKING ALONG WIDENED SECTION AND IN THE WHEELPATH. IN AREAS OF OVERLAY WHERE THE BOTTOM OF THE PROPOSED PAVEMENT IS AT THE SURFACE OF THE EXISTING PAVEMENT, THE EXISTING PAVEMENT SHALL BE MILLED TO A DEPTH AS DIRECTED BY THE ENGINEER TO REMOVE ANY SURFACE DEFORMATIONS PRIOR TO PAVING ON TOP OF THE EXISTING PAVEMENT.



PAVEMENT NOTES

PROPOSED FULL DEPTH CONSTRUCTION / BOX WIDENING GREATER THAN 4 FEET

- 1-1/2" SUPERPAVE SURFACE COURSE 9.5 POLYMER (SSC-9.5-P) OVER
- 2" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5) OVER
- 4" SUPERPAVE BASE COURSE 37.5 (SBC-37.5) OVER
- 4" DENSE GRADED CRUSHED STONE FOR SUB-BASE
- 8" GRAVEL BORROW TYPE b SUB-BASE OVER
- EXISTING SUBGRADE FINE GRADED AND COMPACTED

PROPOSED MILL & OVERLAY

- 1-1/2" SUPERPAVE SURFACE COURSE 9.5 POLYMER (SSC-9.5-P) OVER
- 2" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5) OVER
- VARIABLE DEPTH PAVEMENT STANDARD MILLING AND SUPERPAVE LEVELING COURSE 12.5 (SIC-12.5) WHERE REQUIRED (SEE CONSTRUCTION DETAIL SHEET 51 AND CROSS-SECTIONS)

PROPOSED FULL DEPTH PERMANENT TRENCH PATCH

- 3" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER
- 3" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER
- 12" GRAVEL BORROW TYPE b OVER COMPACTED TRENCH BACKFILL

PROPOSED TEMPORARY TRENCH PATCH

- 3" HOT MIX ASPHALT (ITEM #472.) OVER
- 8" GRAVEL BORROW TYPE b OVER COMPACTED TRENCH BACKFILL

PROPOSED BOX WIDENING LESS THAN 4 FEET

- 1-1/2" SUPERPAVE SURFACE COURSE 9.5 POLYMER (SSC-9.5-P) OVER
- 2" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5) OVER
- 6" CEMENT CONCRETE BASE COURSE OVER
- 8" GRAVEL BORROW TYPE b OVER
- EXISTING SUBGRADE FINE GRADED AND COMPACTED

PROPOSED HOT MIX ASPHALT DRIVEWAYS

- 1-1/2" SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER
- 2-1/2" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5) OVER
- 8" GRAVEL BORROW TYPE b

PROPOSED GRAVEL TURNOUT

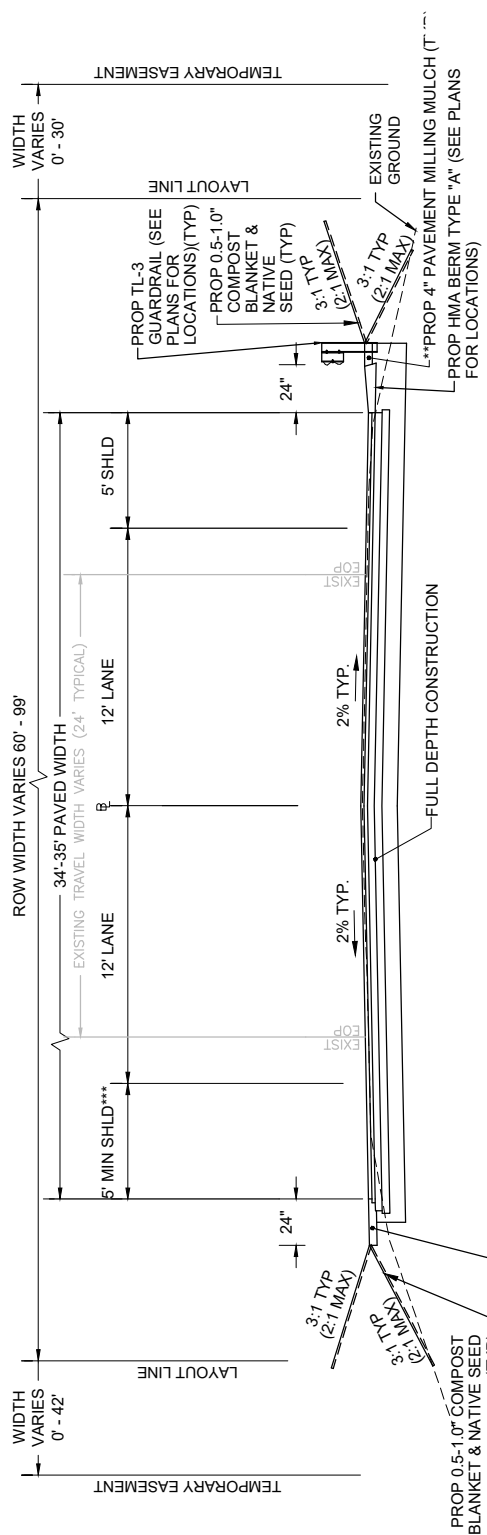
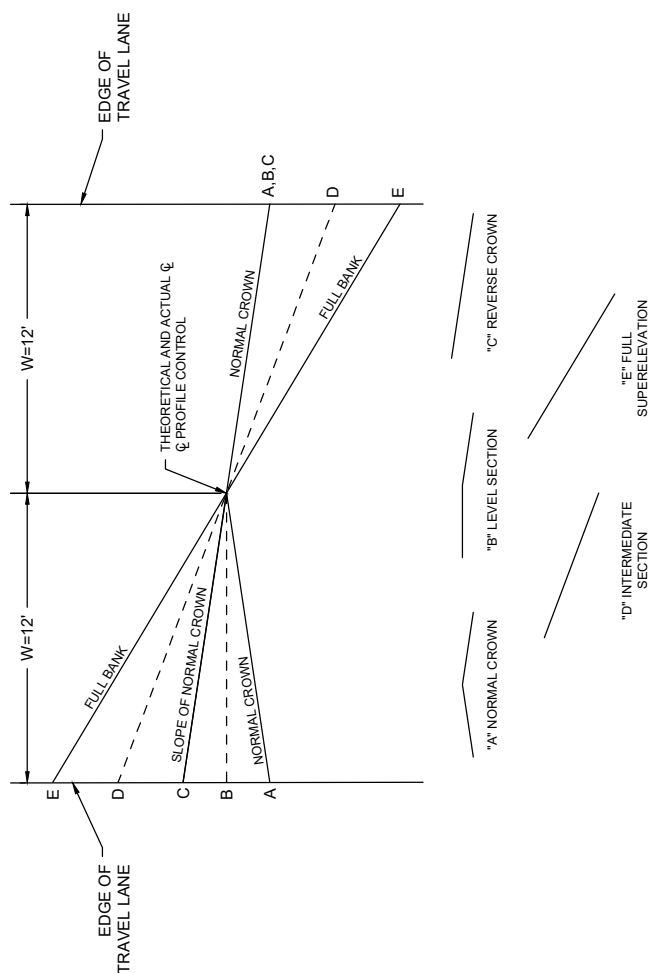
- 12" GRAVEL BORROW TYPE b OVER
- EXISTING SUBGRADE FINE GRADED AND COMPACTED

THE PROPOSED PAVEMENT LAYERS SHALL BE STAGGERED JOINTS TO RESIST CRACKING ALONG WIDENED SECTION AND IN THE WHEELPATH. IN AREAS OF OVERLAY WHERE THE BOTTOM OF THE PROPOSED PAVEMENT IS AT THE SURFACE OF THE EXISTING PAVEMENT, THE EXISTING PAVEMENT SHALL BE MILLED TO A DEPTH AS DIRECTED BY THE ENGINEER TO REMOVE ANY SURFACE DEFORMATIONS PRIOR TO PAVING ON TOP OF THE EXISTING PAVEMENT.

WEST BROOKFIELD WEST MAIN STREET (ROUTE 9)			
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	5	29
PROJECT FILE NO.		606517	

PHASE 1
TYPICAL SECTIONS - 2

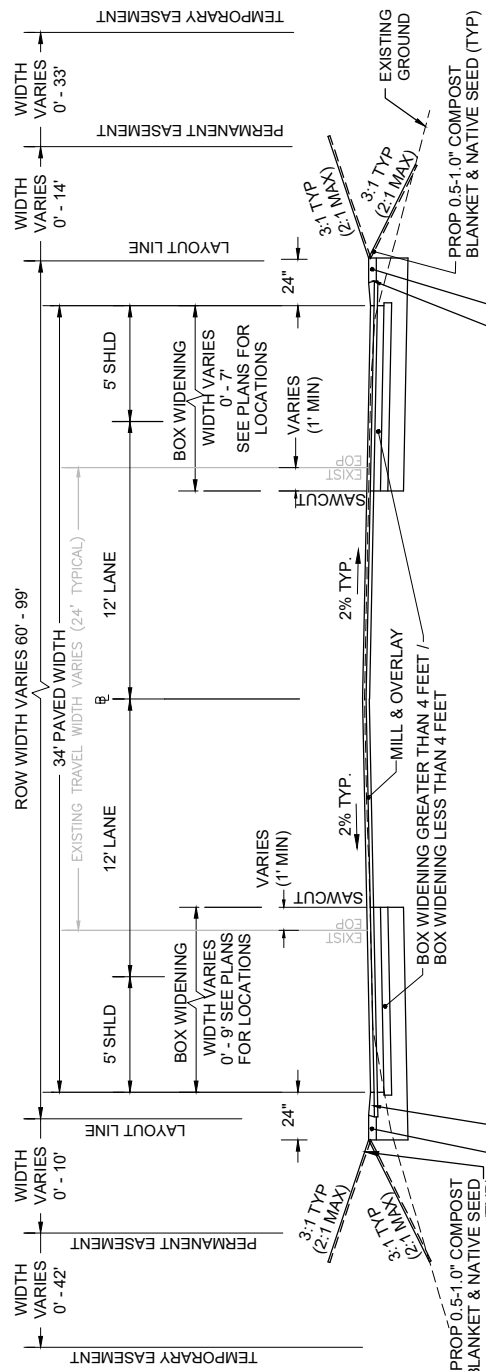
METHOD OF BANKING
UNDIVIDED HIGHWAY
ROTATION AROUND CENTERLINE



FULL DEPTH RECONSTRUCTION
TYPICAL SECTION WITH NORMAL CROWN
ROUTE 9 (WEST MAIN STREET)
STA 34+52.46 TO STA 37+80.58
STA 63+50.00 TO STA 65+25.00
STA 67+50.00 TO STA 69+57.44
1"=4'

**UNLESS OTHERWISE CALLED FOR IN THE PLANS, DETAILS, OR CROSS-SECTIONS, THE MILLING MULCH SHALL BE 1' WIDE MINIMUM BEHIND HMA BERM TYPE A MODIFIED, HMA BERM TYPE A, AND HMA CURB TYPE 2. MILLING MULCH TO BE 2' WIDE MINIMUM IN AREAS OF NO CURB OR CURB AND AREAS OF DEEP POST GUARDRAIL INSTALLATION. IN AREAS OF STANDARD GUARDRAIL INSTALLATION AND NO CURB OR BERM, THE MILLING MULCH IS TO BE 3' WIDE MINIMUM.

**PROP 4" PAVEMENT MILLING MULCH (TYP)
***SHOULDER INCREASES TO 6' WIDE BETWEEN STA 30+05 & STA 42+92



MILL & OVERLAY SECTION WITH BOX WIDENING
TYPICAL SECTION WITH NORMAL CROWN
ROUTE 9 (WEST MAIN STREET)
STA 43+70.16 TO STA 44+65.76
STA 47+98.98 TO STA 54+13.91
STA 63+42.47 TO STA 63+50.00
STA 66+25.00 TO STA 67+50.00
STA 69+57.44 TO STA 71+00.00
1"=4'

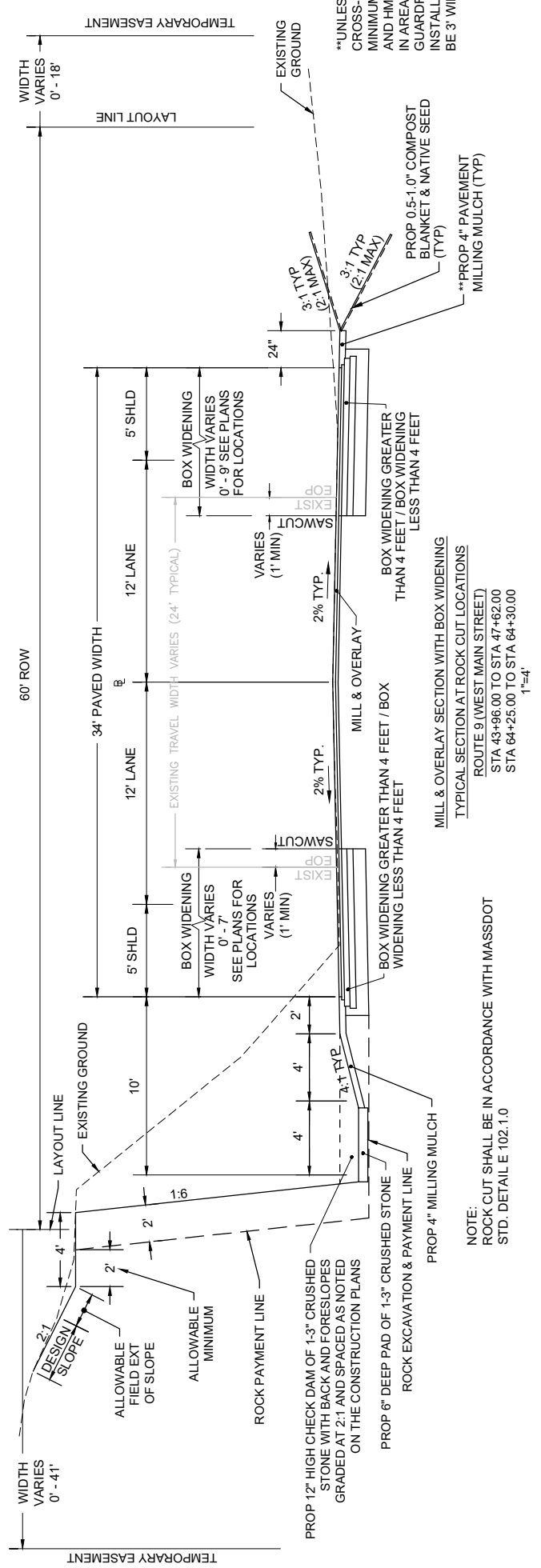
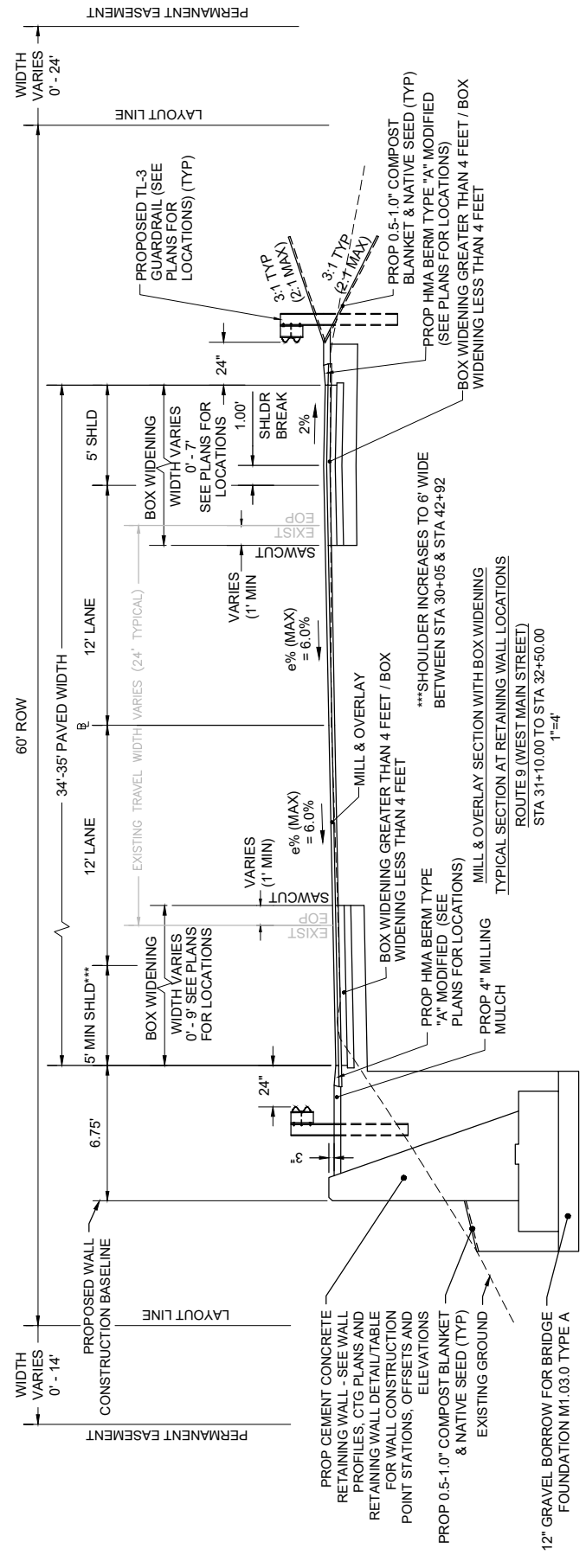
**UNLESS OTHERWISE CALLED FOR IN THE PLANS, DETAILS, OR CROSS-SECTIONS, THE MILLING MULCH SHALL BE 1' WIDE MINIMUM BEHIND HMA BERM TYPE A MODIFIED, HMA BERM TYPE A, AND HMA CURB TYPE 2. MILLING MULCH TO BE 2' WIDE MINIMUM IN AREAS OF NO CURB OR CURB AND AREAS OF DEEP POST GUARDRAIL INSTALLATION. IN AREAS OF STANDARD GUARDRAIL INSTALLATION AND NO CURB OR BERM, THE MILLING MULCH IS TO BE 3' WIDE MINIMUM.

**PROP 4" PAVEMENT MILLING MULCH 1' MIN PROP HMA BERM TYPE "A" MODIFIED (SEE PLANS FOR LOCATIONS)

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	29
PROJECT FILE NO. 606517			

**PHASE 1
TYPICAL SECTIONS - 4**

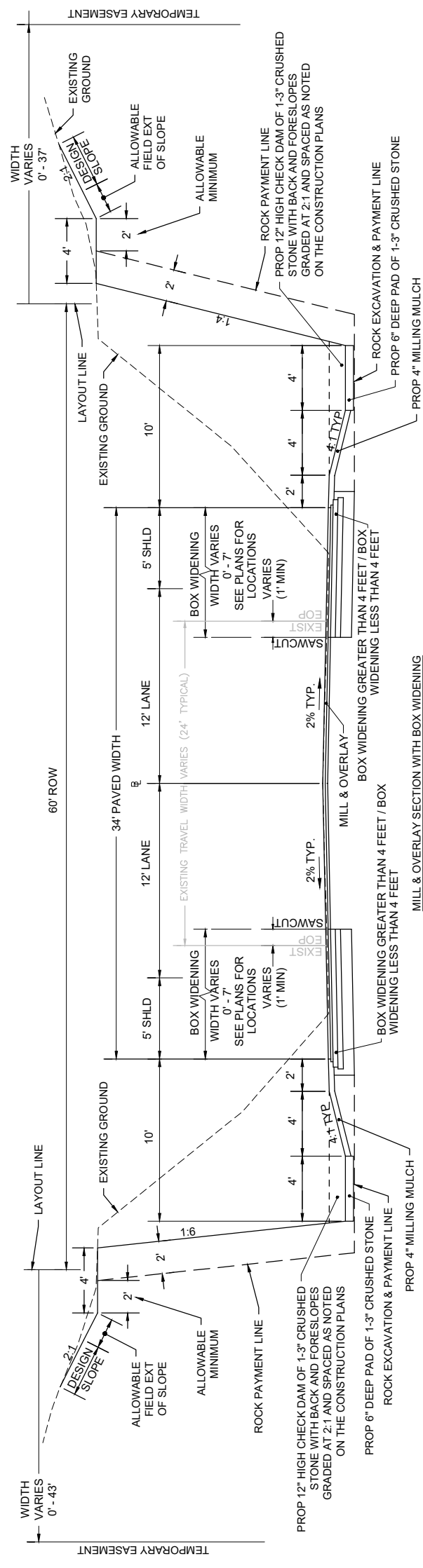


**UNLESS OTHERWISE CALLED FOR IN THE PLANS, DETAILS, OR CROSS-SECTIONS, THE MILLING MULCH SHALL BE 1" WIDE MINIMUM BEHIND HMA BERM TYPE A MODIFIED, HMA BERM TYPE A, AND HMA CURB TYPE 2. MILLING MULCH TO BE 2' WIDE MINIMUM IN AREAS OF NO BERM OR CURB AND AREAS OF DEEP POST GUARDRAIL INSTALLATION. IN AREAS OF STANDARD GUARDRAIL INSTALLATION AND NO CURB OR BERM, THE MILLING MULCH IS TO BE 3' WIDE MINIMUM.

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	8	29
PROJECT FILE NO. 606517			

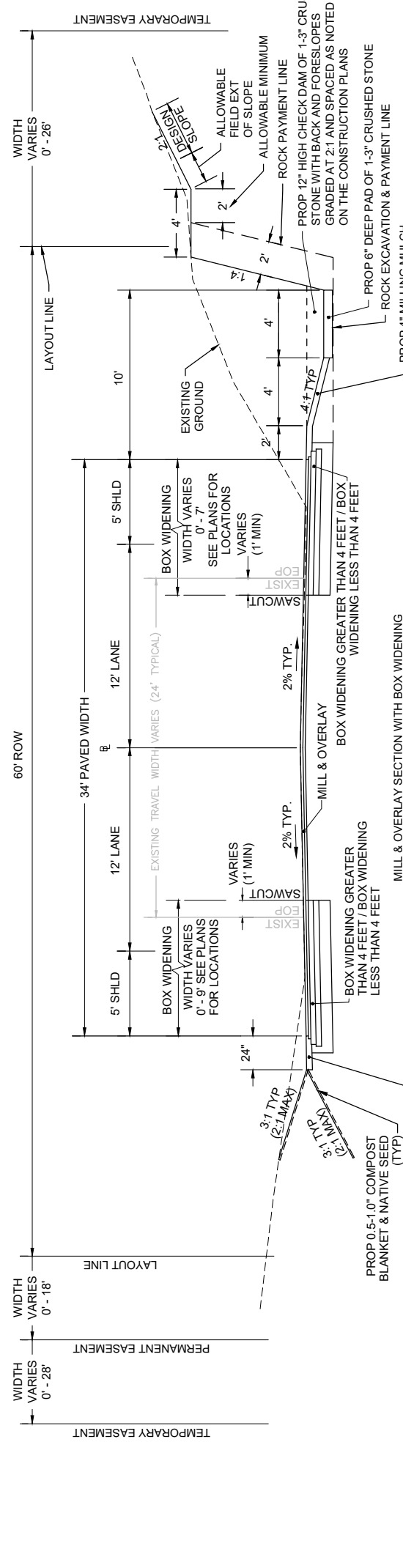
**PHASE 1
TYPICAL SECTIONS - 5**



**UNLESS OTHERWISE CALLED FOR IN THE PLANS, DETAILS, OR CROSS-SECTIONS, THE MILLING MULCH SHALL BE 1" WIDE MINIMUM BEHIND HMA BERM TYPE A, AND HMA CURB TYPE 2. MILLING MULCH TO BE 2' WIDE MINIMUM IN AREAS OF NO BERM OR CURB AND AREAS OF DEEP POST GUARDRAIL INSTALLATION. IN AREAS OF STANDARD GUARDRAIL INSTALLATION AND NO CURB OR BERM, THE MILLING MULCH IS TO BE 3' WIDE MINIMUM.

MILL & OVERLAY SECTION WITH BOX WIDENING
TYPICAL SECTION AT ROCK CUT LOCATIONS
ROUTE 9 (WEST MAIN STREET)
STA 62+00.00 TO STA 64+25.00
1"=4'

NOTE:
ROCK CUT SHALL BE IN ACCORDANCE WITH MASSDOT
STD. DETAIL E 102.1.0



MILL & OVERLAY SECTION WITH BOX WIDENING
TYPICAL SECTION AT ROCK CUT LOCATIONS
ROUTE 9 (WEST MAIN STREET)
STA 61+56.00 TO STA 62+00.00
1"=4'

**UNLESS OTHERWISE CALLED FOR IN THE PLANS, DETAILS, OR CROSS-SECTIONS, THE MILLING MULCH SHALL BE 1" WIDE MINIMUM BEHIND HMA BERM TYPE A, MODIFIED HMA BERM TYPE A, AND HMA CURB TYPE 2. MILLING MULCH TO BE 2' WIDE MINIMUM IN AREAS OF NO BERM OR CURB AND AREAS OF DEEP POST GUARDRAIL INSTALLATION. IN AREAS OF STANDARD GUARDRAIL INSTALLATION AND NO CURB OR BERM, THE MILLING MULCH IS TO BE 3' WIDE MINIMUM.

NOTE:
ROCK CUT SHALL BE IN ACCORDANCE WITH MASSDOT
STD. DETAIL E 102.1.0

606517_ACOE(PLANS-1)DWG Plotted on 8-Feb-2024 1:42 PM

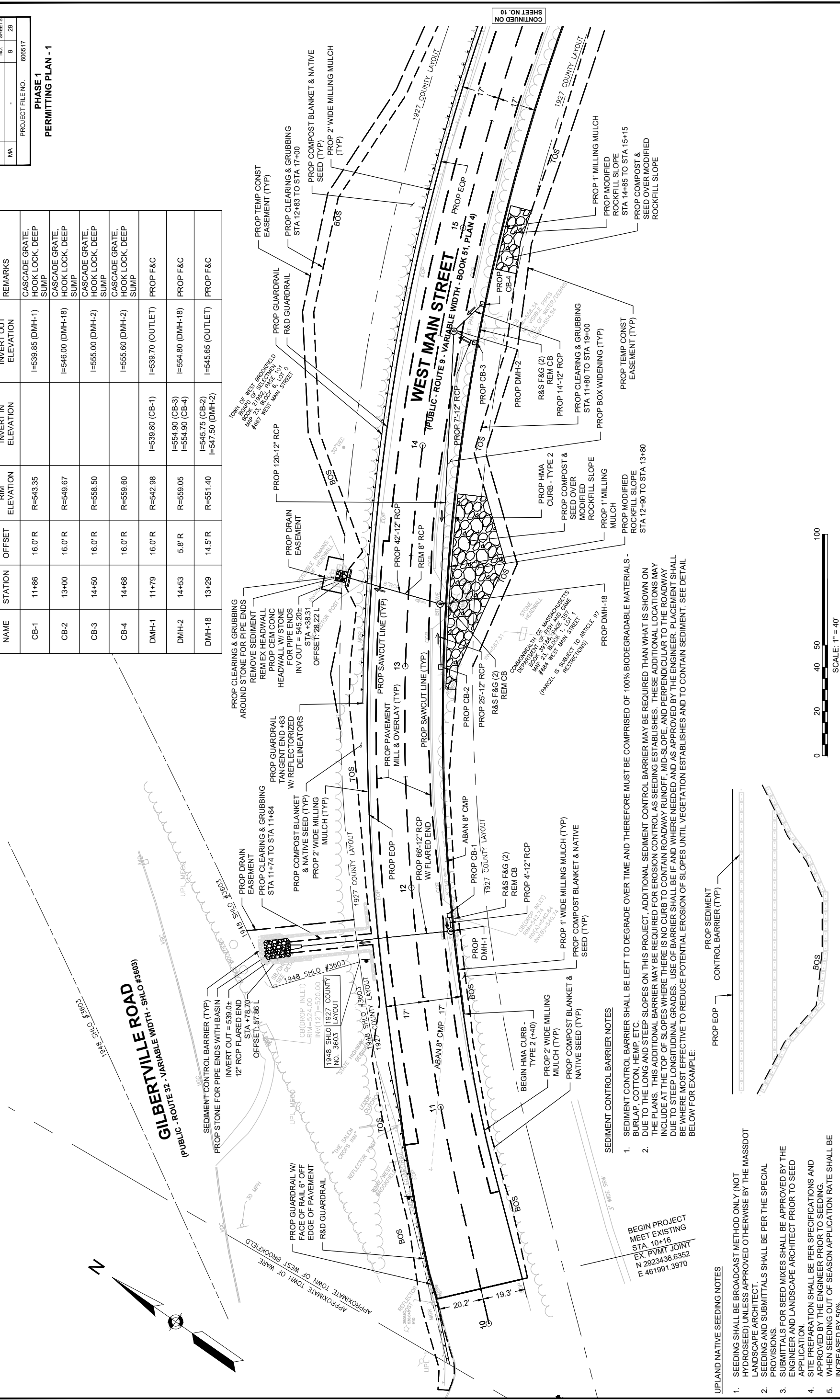
**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9	29
PROJECT FILE NO. 606517			

**PHASE 1
PERMITTING PLAN - 1**

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
CB-1	11+86	16.0' R	R=543.35		I=539.85 (DMH-1)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-2	13+00	16.0' R	R=549.67		I=546.00 (DMH-18)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-3	14+50	16.0' R	R=558.50		I=555.00 (DMH-2)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-4	14+68	16.0' R	R=559.60		I=555.00 (DMH-2)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
DMH-1	11+79	16.0' R	R=542.98	I=539.80 (CB-1)	I=539.70 (OUTLET)	PROP F&C
DMH-2	14+53	5.8' R	R=559.05	I=554.90 (CB-3) I=554.90 (CB-4)	I=554.80 (DMH-18)	PROP F&C
DMH-18	13+29	14.5' R	R=551.40	I=545.75 (CB-2) I=547.50 (DMH-2)	I=545.65 (OUTLET)	PROP F&C



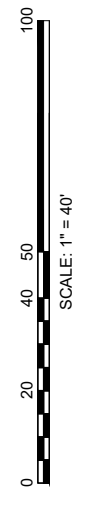
CONTINUED ON SHEET NO. 10

SEDIMENT CONTROL BARRIER NOTES

1. SEDIMENT CONTROL BARRIER SHALL BE LEFT TO DEGRADE OVER TIME AND THEREFORE MUST BE COMPRISED OF 100% BIODEGRADABLE MATERIALS - BURLAP, COTTON, HEMP, ETC.
2. DUE TO THE LONG AND STEEP SLOPES ON THIS PROJECT, ADDITIONAL SEDIMENT CONTROL BARRIER MAY BE REQUIRED. THESE ADDITIONAL LOCATIONS MAY INCLUDE AT THE TOP OF SLOPES WHERE THERE IS NO CURB TO CONTAIN ROADWAY RUNOFF, MID-SLOPE, AND PERPENDICULAR TO THE ROADWAY DUE TO STEEP LONGITUDINAL GRADES. USE OF BARRIER SHALL BE IF AND WHERE NEEDED AND AS APPROVED BY THE ENGINEER. PLACEMENT SHALL BE WHERE MOST EFFECTIVE TO REDUCE POTENTIAL EROSION OF SLOPES UNTIL VEGETATION ESTABLISHES AND TO CONTAIN SEDIMENT. SEE DETAIL BELOW FOR EXAMPLE.

BEGIN PROJECT MEET EXISTING
STA. 10+16
EX. PVTM JNT
N 2923436.6352
E 461991.3970

- UPLAND NATIVE SEEDING NOTES**
1. SEEDING SHALL BE BROADCAST METHOD ONLY (NOT HYDROSEED) UNLESS APPROVED OTHERWISE BY THE MASSDOT LANDSCAPE ARCHITECT.
 2. SEEDING AND SUBMITTALS SHALL BE PER THE SPECIAL PROVISIONS.
 3. SUBMITTALS FOR SEED MIXES SHALL BE APPROVED BY THE ENGINEER AND LANDSCAPE ARCHITECT PRIOR TO SEED APPLICATION.
 4. SITE PREPARATION SHALL BE PER SPECIFICATIONS AND APPROVED BY THE ENGINEER PRIOR TO SEEDING.
 5. WHEN SEEDING OUT OF SEASON APPLICATION RATE SHALL BE INCREASED BY 50%.



**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	10	29
PROJECT FILE NO. 606517			

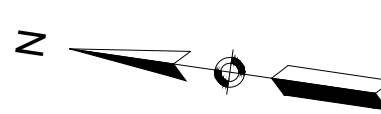
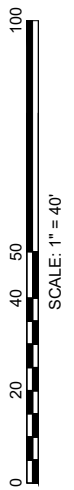
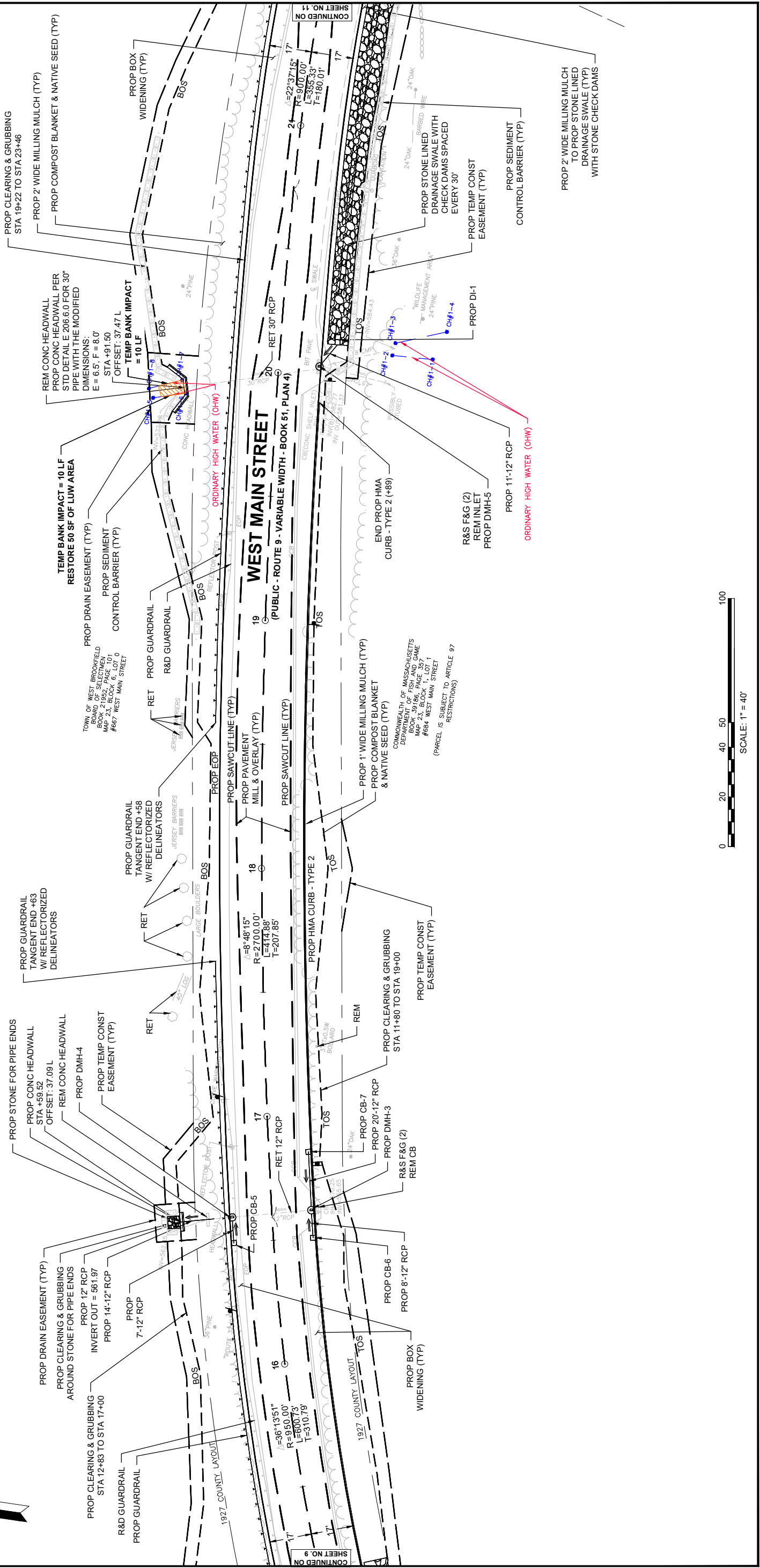
**PHASE 1
PERMITTING PLAN - 2**

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
DMH-3	16+61	16.0' R	R=571.00	I=565.99 (CB-6) I=567.29 (CB-7)	I=565.6 EX. (DMH-4)	PROP F&C. CONSTRUCT OVER EXIST 12" RCP
DMH-4	16+60	16.0' L	R=571.79	I=567.40 (CB-5)	I=563.6 EX. (OUTLET)	PROP F&C. CONSTRUCT OVER EXIST 12" RCP
DMH-5	20+03	16.0' R	R=587.08	I=582.57 EX. (18" CMP) I=582.77 EX. (15" CMP) I=583.43 (DI-1)	I=581.37 EX. (OUTLET)	PROP F&C. 6" DIAMETER DMH. CONSTRUCT OVER 30" RCP. RET 15" CMP & 18" CMP INLETS

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
CB-5	16+50	16.0' L	R=571.21	I=567.50 (DMH-4)	I=567.50 (DMH-4)	CASCADE GRATE. HOOK LOCK. DEEP SUMP
CB-6	16+50	16.0' R	R=570.37	I=567.00 (DMH-3)	I=567.00 (DMH-3)	CASCADE GRATE. HOOK LOCK. DEEP SUMP
CB-7	16+85	16.0' R	R=572.22	I=568.22 (DMH-3)	I=568.22 (DMH-3)	CASCADE GRATE. HOOK LOCK. DEEP SUMP
DI-1	20+15	23.0' R	R=586.54	I=583.54 (DMH-5)	I=583.54 (DMH-5)	TYPE AF. DROP INLET GRATES



606517_ACOE(PLANS-1).DWG Plotted on 8-Feb-2024 1:42 PM

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	29
PROJECT FILE NO. 606517			

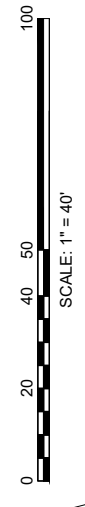
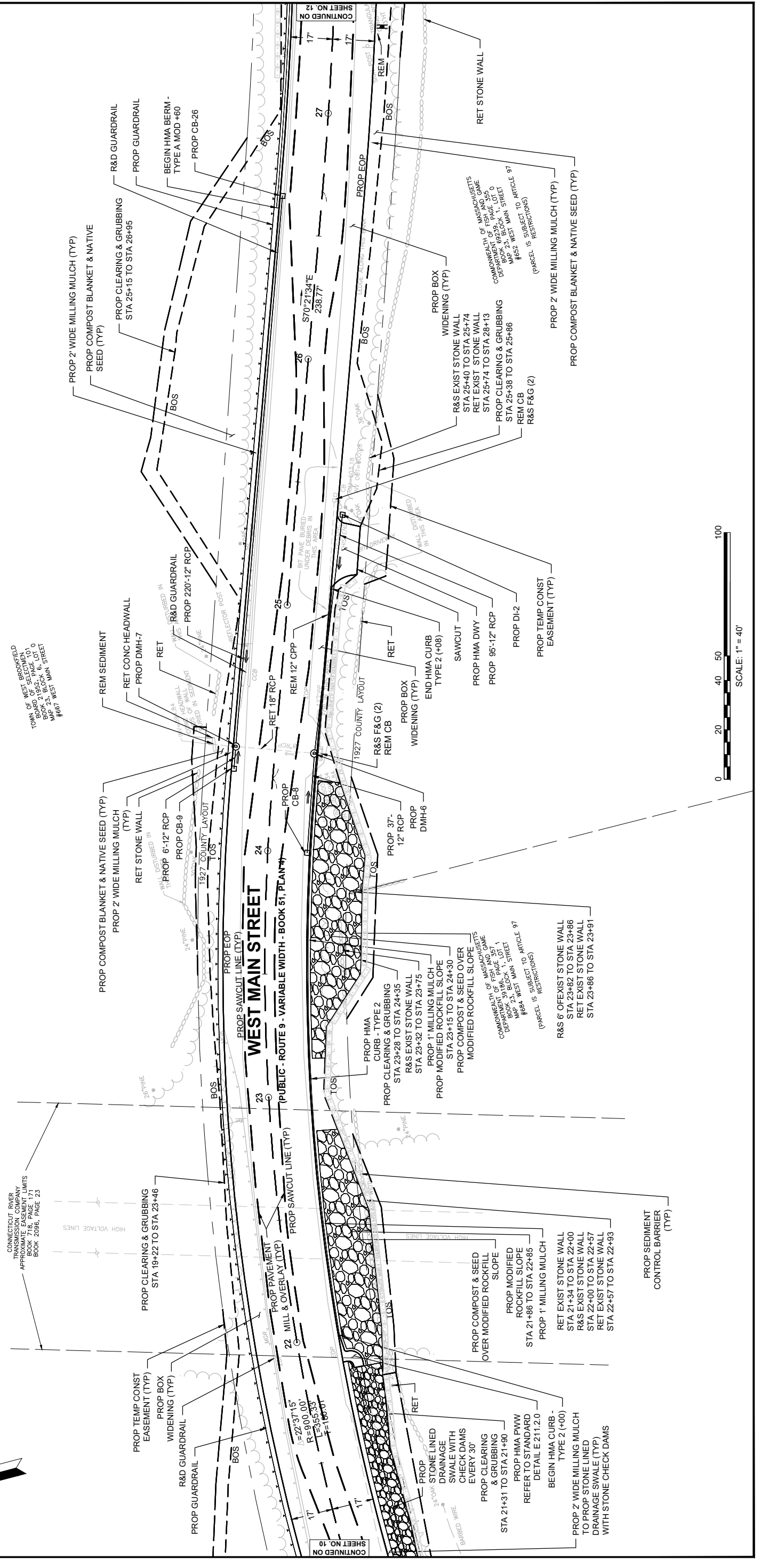
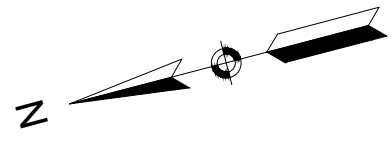
**PHASE 1
PERMITTING PLAN - 3**

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
DMH-6	24+41	16.0' R	R=600.90	I=595.90 (CB-8) I=596.80 (DI-2)	I=596.8 EX. (DMH-7)	PROP F&C. CONSTRUCT OVER 18" RCP
DMH-7	24+41	16.0' L	R=602.03	I=597.90 (CB-9) I=597.60 (CB-26)	I=595.1 EX. (OUTLET)	PROP F&C. CONSTRUCT OVER 18" RCP

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
CB-8	24+00	16.0' R	R=599.75	I=596.10 (DMH-6)	I=596.10 (DMH-6)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-9	24+30	16.0' L	R=601.84	I=598.00 (DMH-7)	I=598.00 (DMH-7)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-26	26+65	16.0' L	R=605.98	I=602.00 (DMH-7)	I=602.00 (DMH-7)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
DI-2	25+38	20.0' R	R=603.60	I=600.00 (DMH-6)	I=600.00 (DMH-6)	TYPE DF, DROP INLET GRATE



606517_ACOE(PLANS-1).DWG Plotted on 8-Feb-2024 1:42 PM

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	29

PROJECT FILE NO. 606517

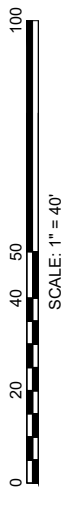
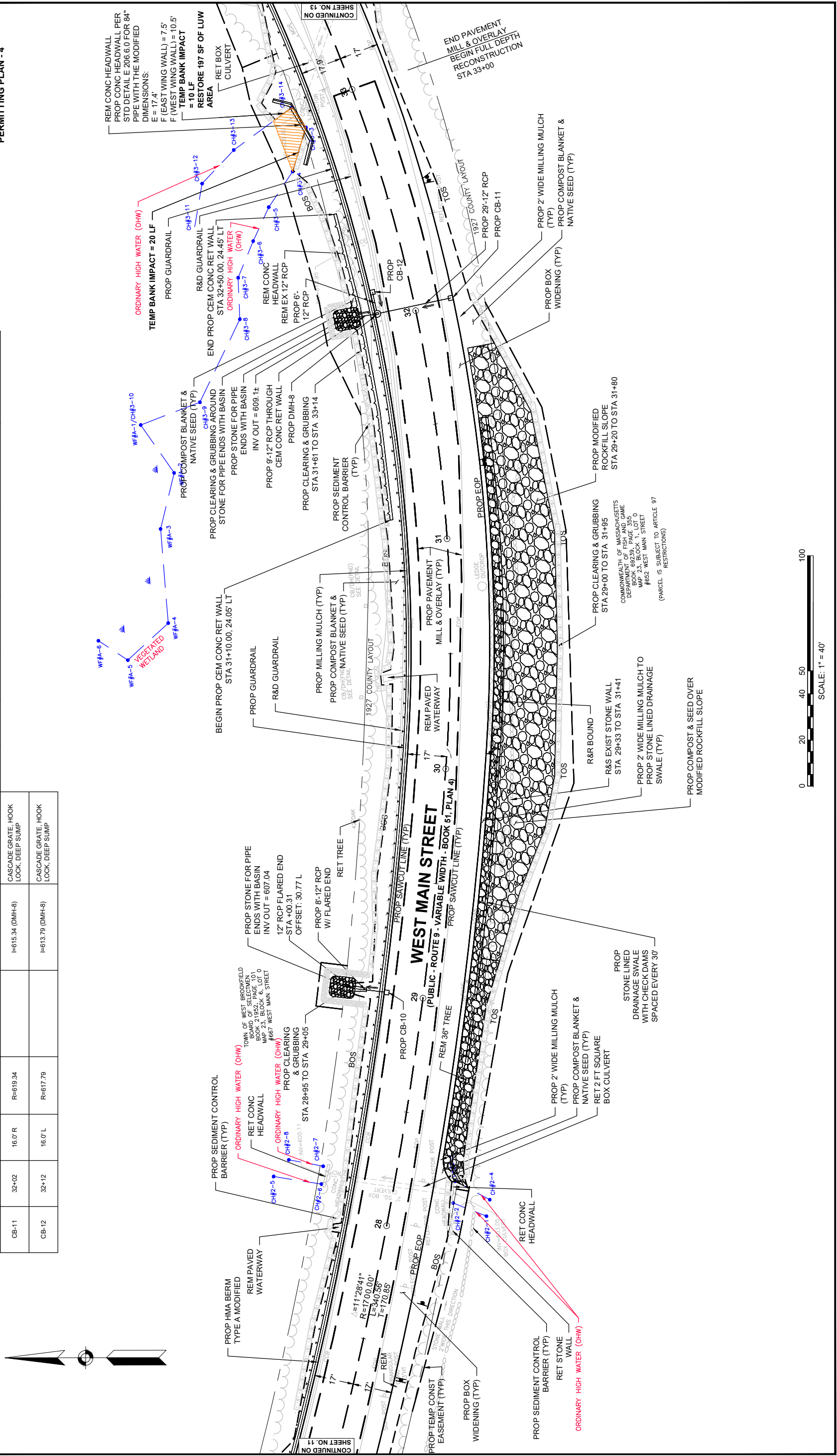
**PHASE 1
PERMITTING PLAN - 4**

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
DMH-8	32+02	16.0' L	R=617.65	I=613.65 (CB-11) I=613.65 (CB-12)	I=609.20 (OUTLET)	PROP F&C

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
CB-10	29+00	16.0' L	R=611.17		I=607.17 (OUTLET)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-11	32+02	16.0' R	R=619.34		I=615.34 (DMH-8)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-12	32+12	16.0' L	R=617.79		I=613.79 (DMH-8)	CASCADE GRATE, HOOK LOCK, DEEP SUMP



606517_ACOE(PLANS-1).DWG Plotted on 8-Feb-2024 1:42 PM

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	14	29
PROJECT FILE NO. 606517			

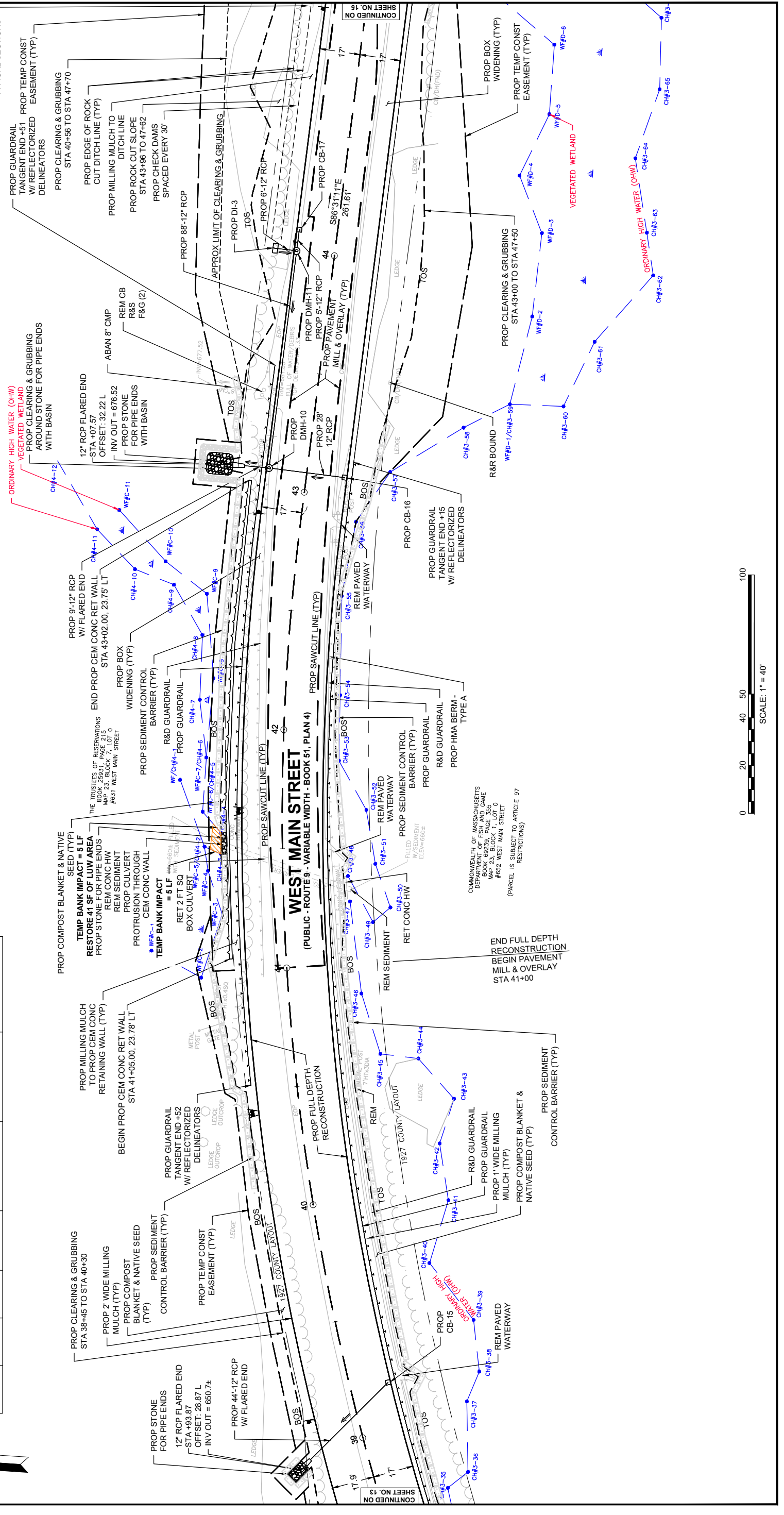
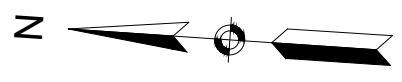
**PHASE 1
PERMITTING PLAN - 6**

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
CB-15	39+20	16.0' R	R=654.15	I=650.92 (OUTLET)	I=676.52 (CB-16) I=676.62 (DMH-11)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-16	43+08	16.0' R	R=676.66	I=676.66 (DMH+10)	I=681.90 (CB-17) I=682.16 (DI-3)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-17	44+09	16.0' L	R=686.52	I=682.00 (DMH+11)		CASCADE GRATE, HOOK LOCK, DEEP SUMP
DI-3	44+00	25.0' L	R=685.26	I=682.26 (DMH+11)		TYPE AF DROP INLET GRATES

DRAINAGE STRUCTURE TABLE

DRAINAGE STRUCTURE TABLE



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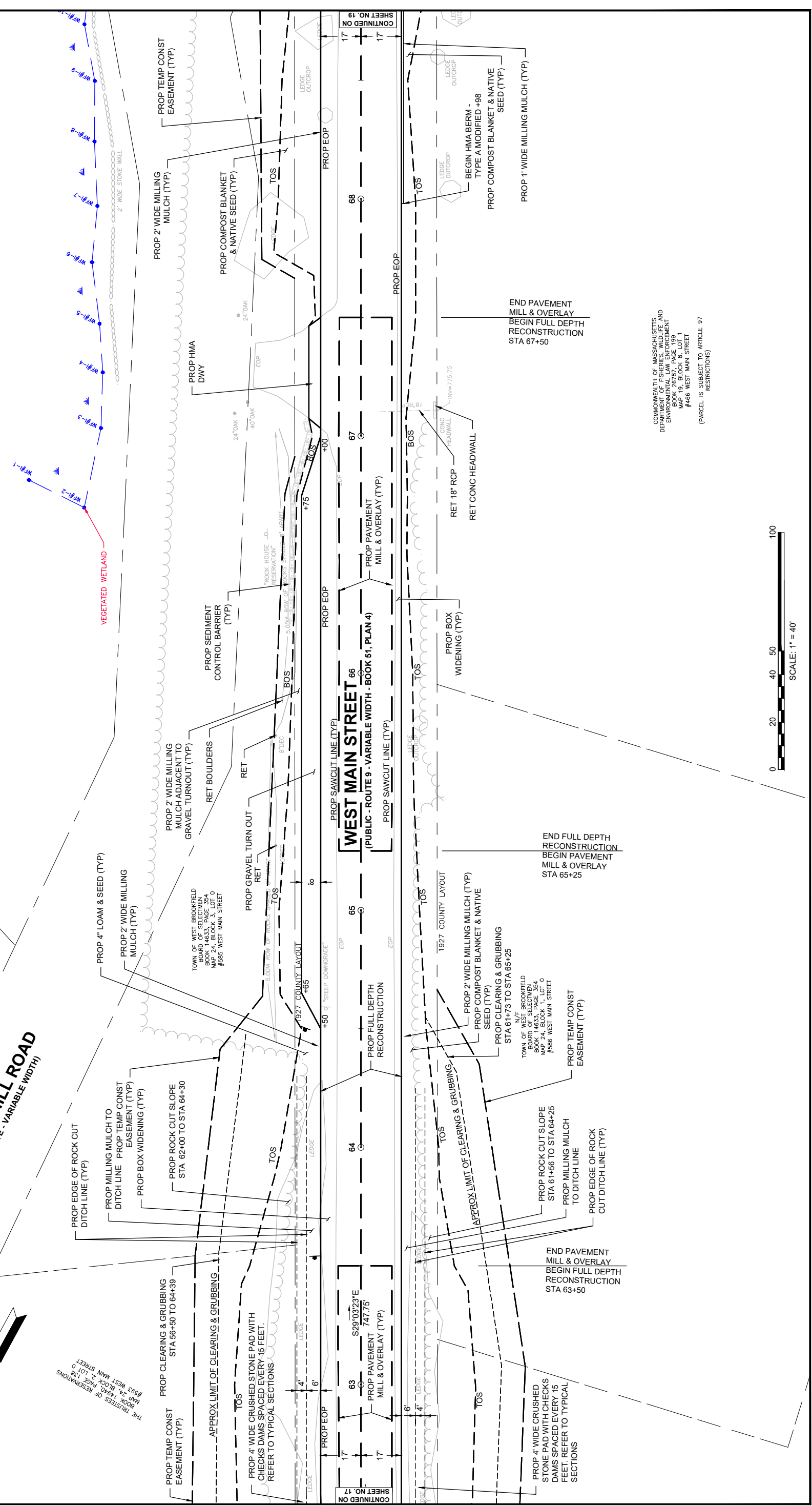
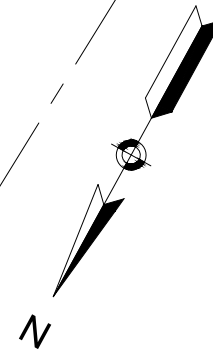
**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	18	29

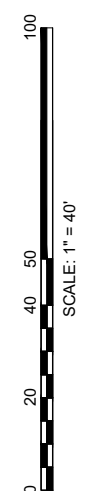
PROJECT FILE NO. 606517

**PHASE 1
PERMITTING PLAN - 10**

ROCKHURST HILL ROAD
(PRIVATE - VARIABLE WIDTH)



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENVIRONMENTAL LAW ENFORCEMENT
BOOK 26787, PAGE 199
MAP 19, BLOCK 8, LOT 1
#466 WEST MAIN STREET
(PARCEL IS SUBJECT TO ARTICLE 97
RESTRICTIONS)



606517_ACOE(PLANS-1).DWG Plotted on 8-Feb-2024 1:43 PM

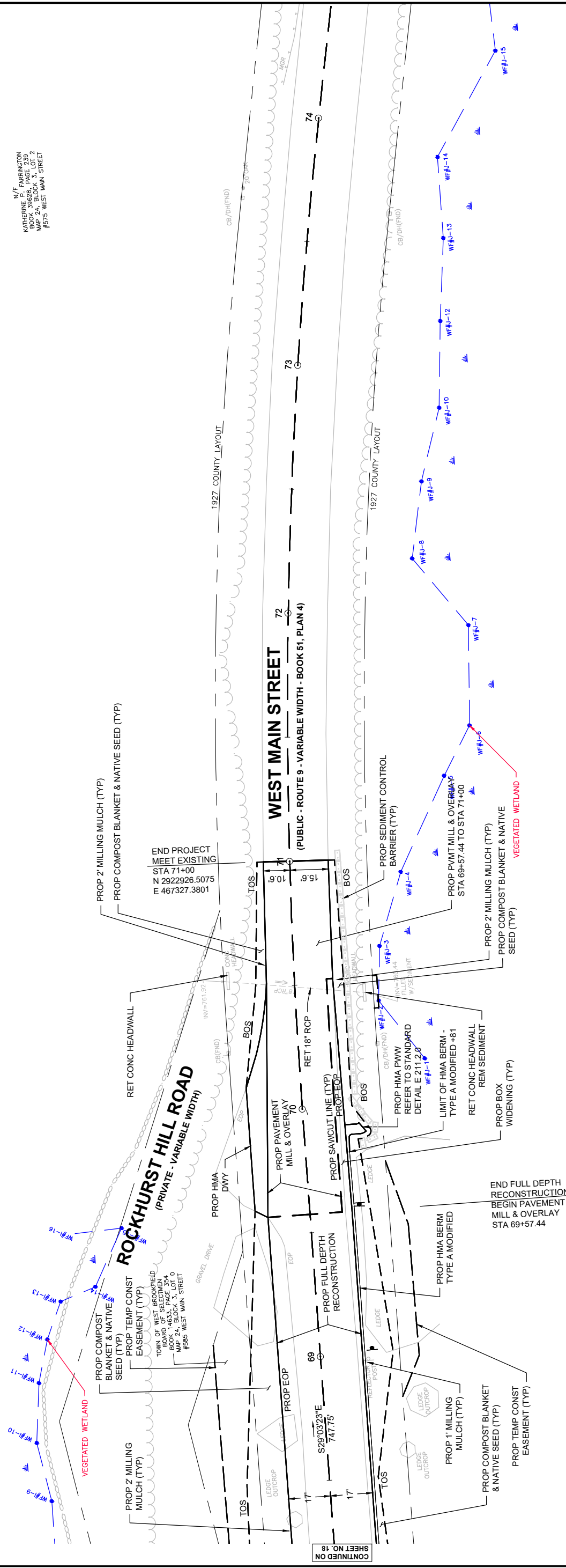
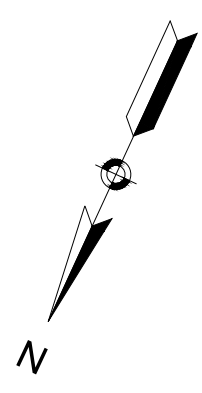
**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	19	29

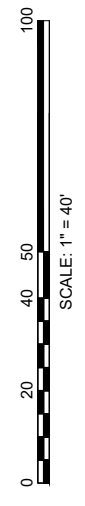
PROJECT FILE NO. 606517

**PHASE 1
PERMITTING PLAN - 11**

N/F FARRINGTON
KATHERINE #5628, PAGE 239
MAP 24, BLOCK 3, LOT 2
#575 WEST MAIN STREET



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF FISHERIES, WILDLIFE AND
ENVIRONMENTAL MANAGEMENT
BOOK 51, PLAN 4, PAGE 199
MAP 24, BLOCK 8, LOT 1
#468 WEST MAIN STREET
(PARCEL IS SUBJECT TO ARTICLE 97
RESTRICTIONS)



CONTINUED ON SHEET NO. 18

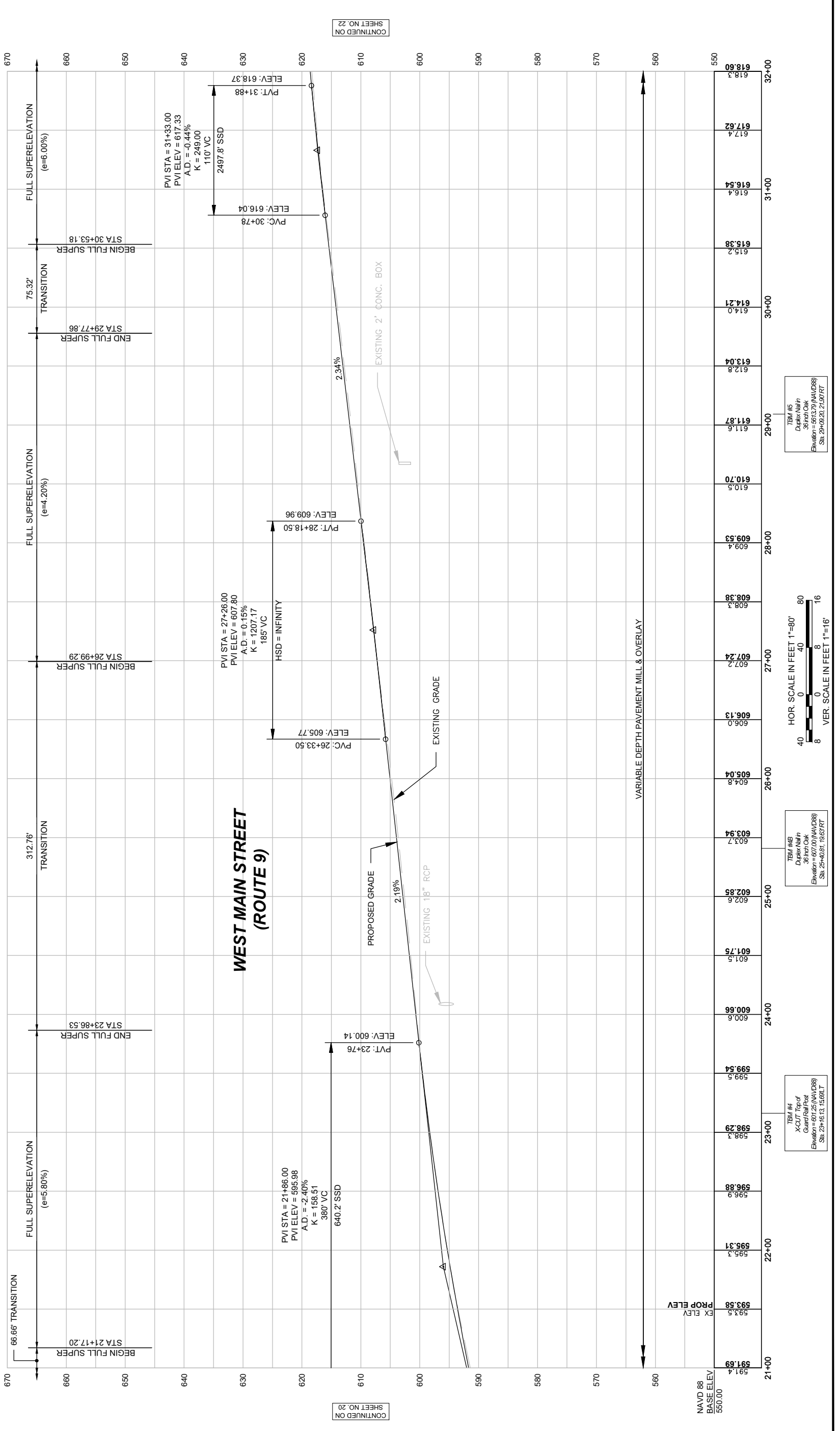
WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	21	29

PROJECT FILE NO. 606517

PHASE 1
WEST MAIN STREET (ROUTE 9)
PROFILE - 2

FOR PERMITTING PLANS SEE SHEETS 11-12



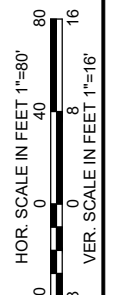
CONTINUED ON SHEET NO. 20

CONTINUED ON SHEET NO. 22

TM #1
XCUT Top of
Clearing Post
Elev. = 591.12 (13.8917)
Sta. 22+16.12 (13.8917)

TM #4
Duplex/Chain
Elev. = 603.70 (13.8917)
Sta. 25+40.01 (13.8917)

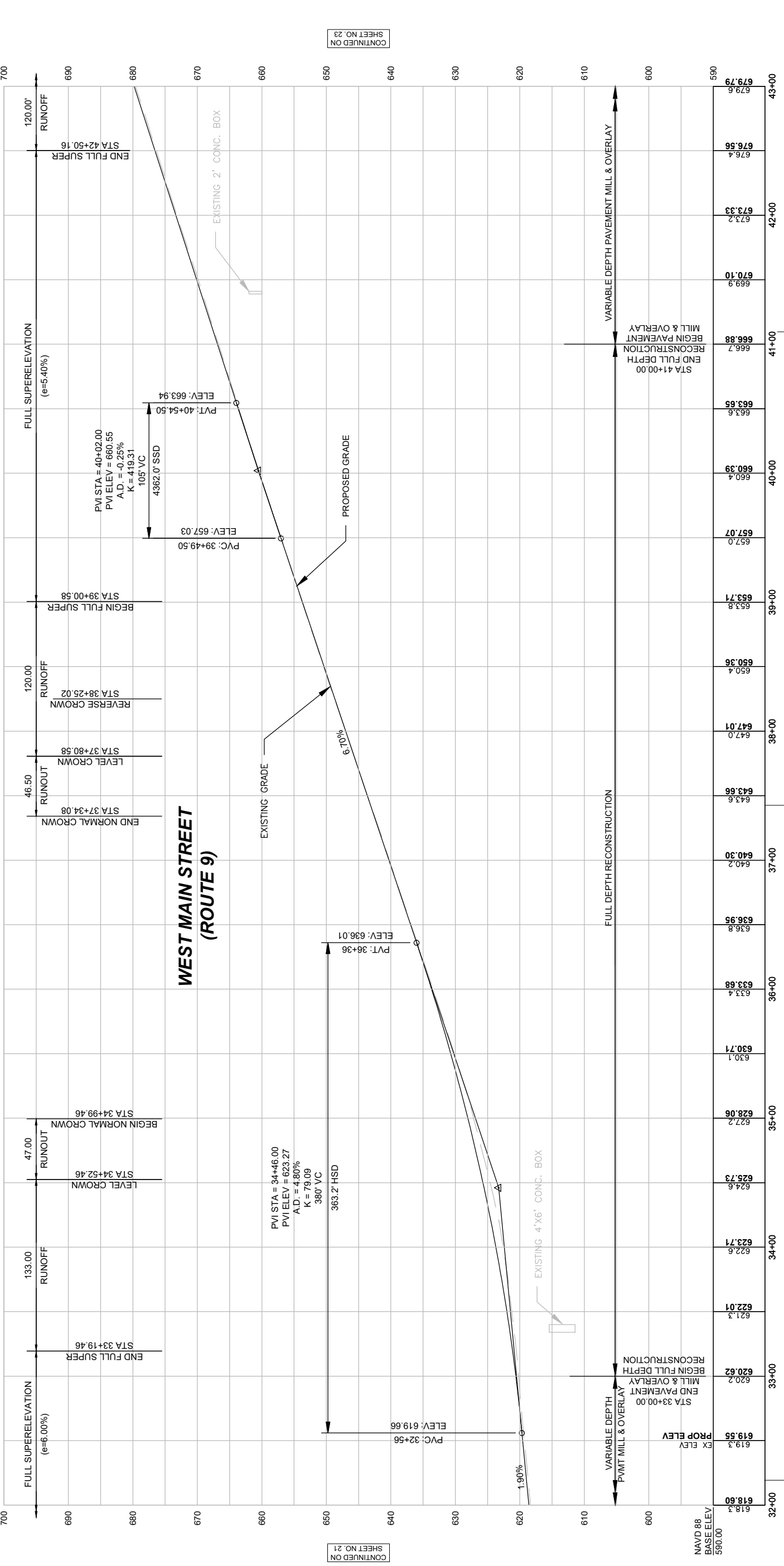
TM #5
Duplex/Chain
Elev. = 611.87 (13.8917)
Sta. 29+02.03 (13.8917)



606517_ACOE(PROFILE-1).DWG Plotted on 8-Feb-2024 1:44 PM

WEST BROOKFIELD WEST MAIN STREET (ROUTE 9)			
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	22	29
PROJECT FILE NO. 606517			

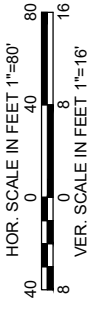
**PHASE 1
WEST MAIN STREET (ROUTE 9)
PROFILE - 3**



TBM #8
XCUT Top of
Guard Rail Post
Elevation = 666.61 (NAVD89)
Sta. 41+59.88, 13.31' LT

TBM #7
XCUT Top of
Guard Rail Post
Elevation = 645.37 (NAVD89)
Sta. 37+42.62, 17.67' RT

TBM #6
XCUT Top of
Guard Rail Post
Elevation = 620.28 (NAVD89)
Sta. 32+19.26, 14.99' LT



FOR PERMITTING PLANS SEE SHEETS 12-14

CONTINUED ON SHEET NO. 21

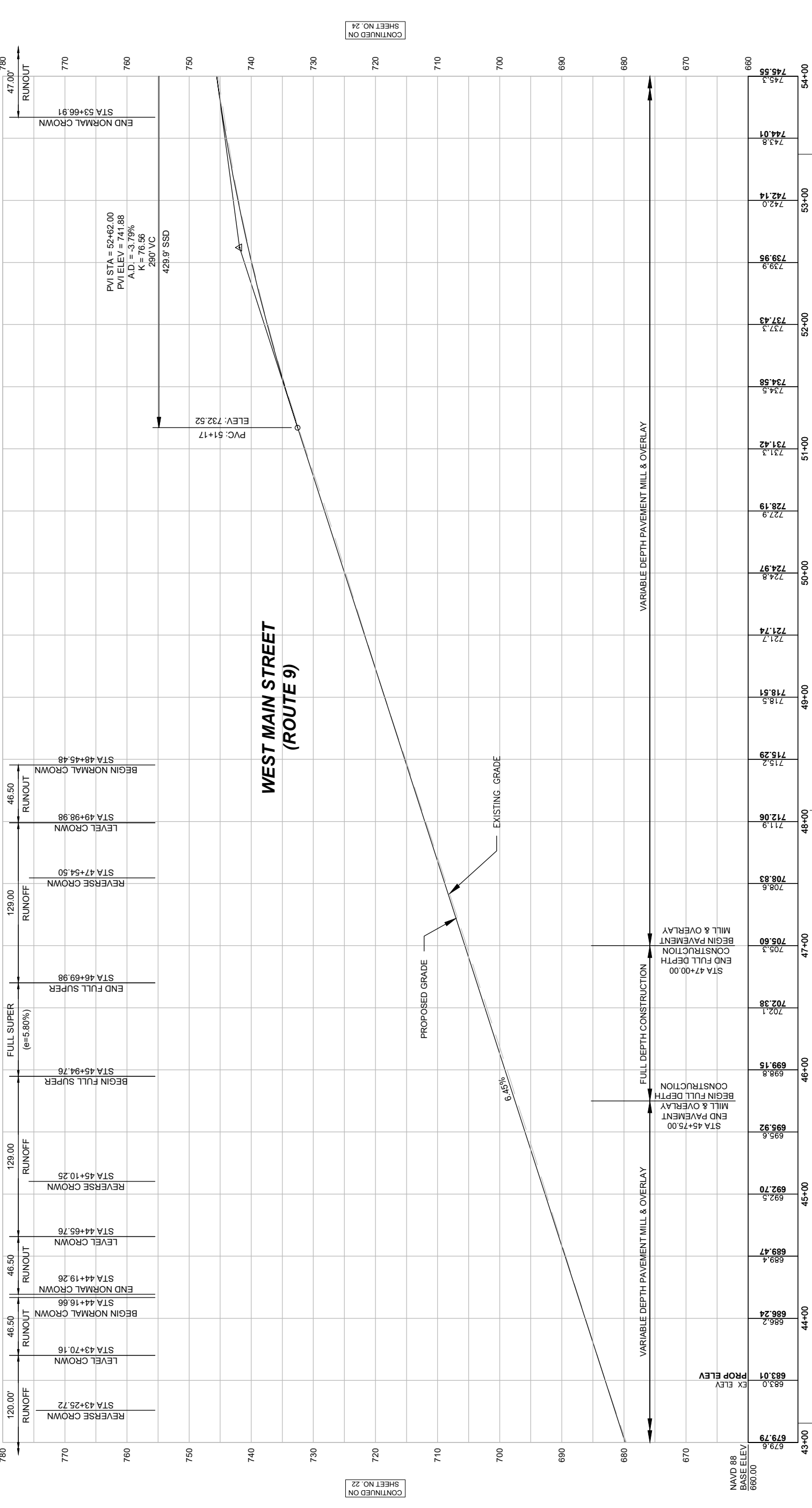
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606517_ACOE(PROFILE-1).DWG Plotted on 8-Feb-2024 1:44 PM

WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	23	29
PROJECT FILE NO. 606517			

PHASE 1
WEST MAIN STREET (ROUTE 9)
PROFILE - 4

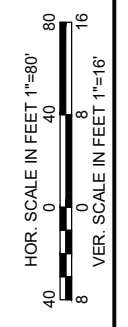


SHEET NO. 22

SHEET NO. 24

BM #10
Mass Concrete
Sta 43+15.55, 19.94 LT
Elevation = 681.21 (NAVD88) (Record)
Sta. 43+15.55, 19.94 LT

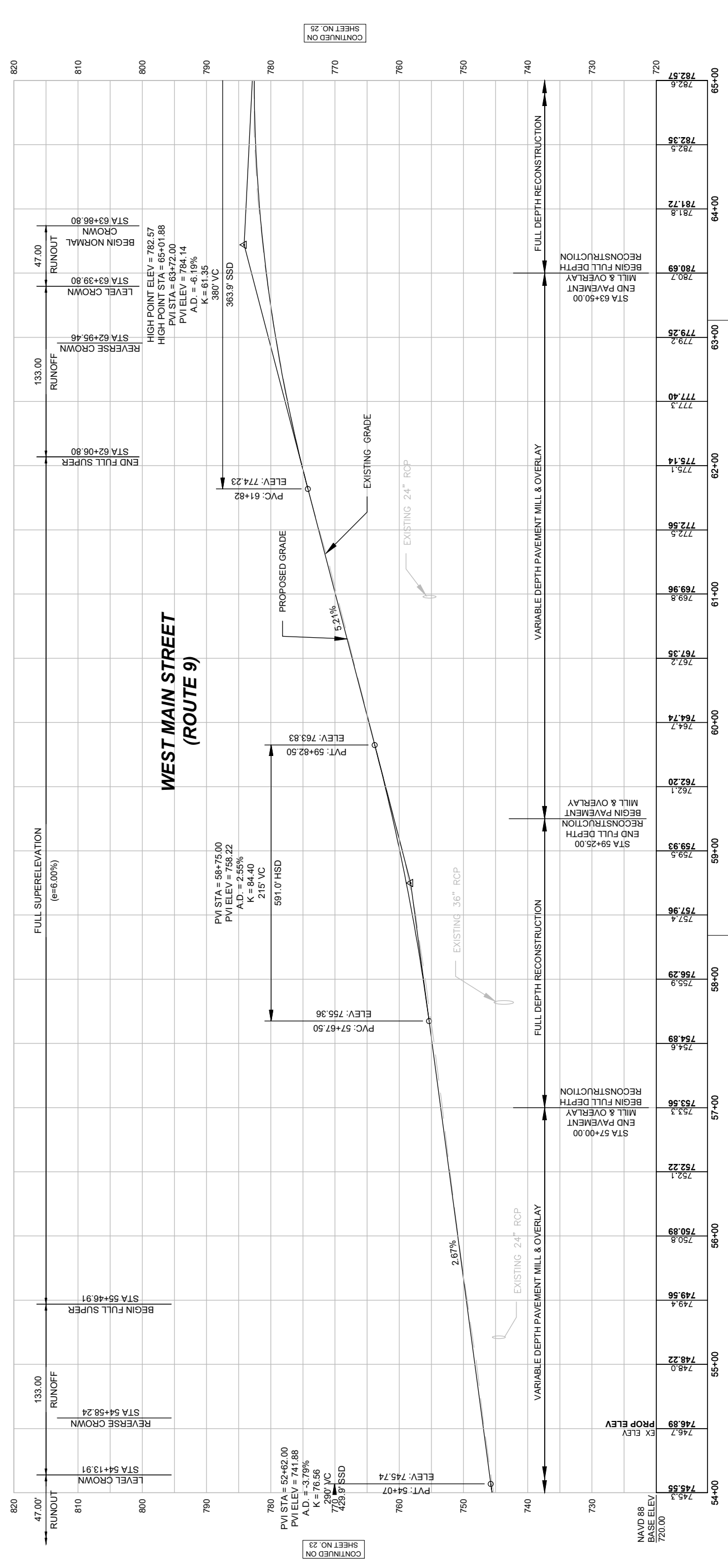
BM #11
Dumpy Station
24 Inch Oak
Elevation = 742.59 (NAVD88)
Sta. 53+37.28, 24.59 RT



WEST BROOKFIELD WEST MAIN STREET (ROUTE 9)			
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	24	29
PROJECT FILE NO. 606517			

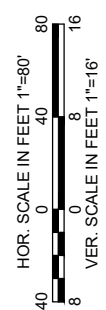
**PHASE 1
WEST BROOKFIELD (ROUTE 9)
PROFILE - 5**

FOR PERMITTING PLANS SEE SHEETS 16-18



TBM #13
 Close Call High
 Proposed
 Elevation = 782.57 (NAVD88)
 Sta. 63+13.23, 16.68' LT

TBM #12
 X-CUT Top of
 Grade
 Elevation = 750.11 (NAVD88)
 Sta. 58+34.16, 15.26' LT



CONTINUED ON
SHEET NO. 23

CONTINUED ON
SHEET NO. 26

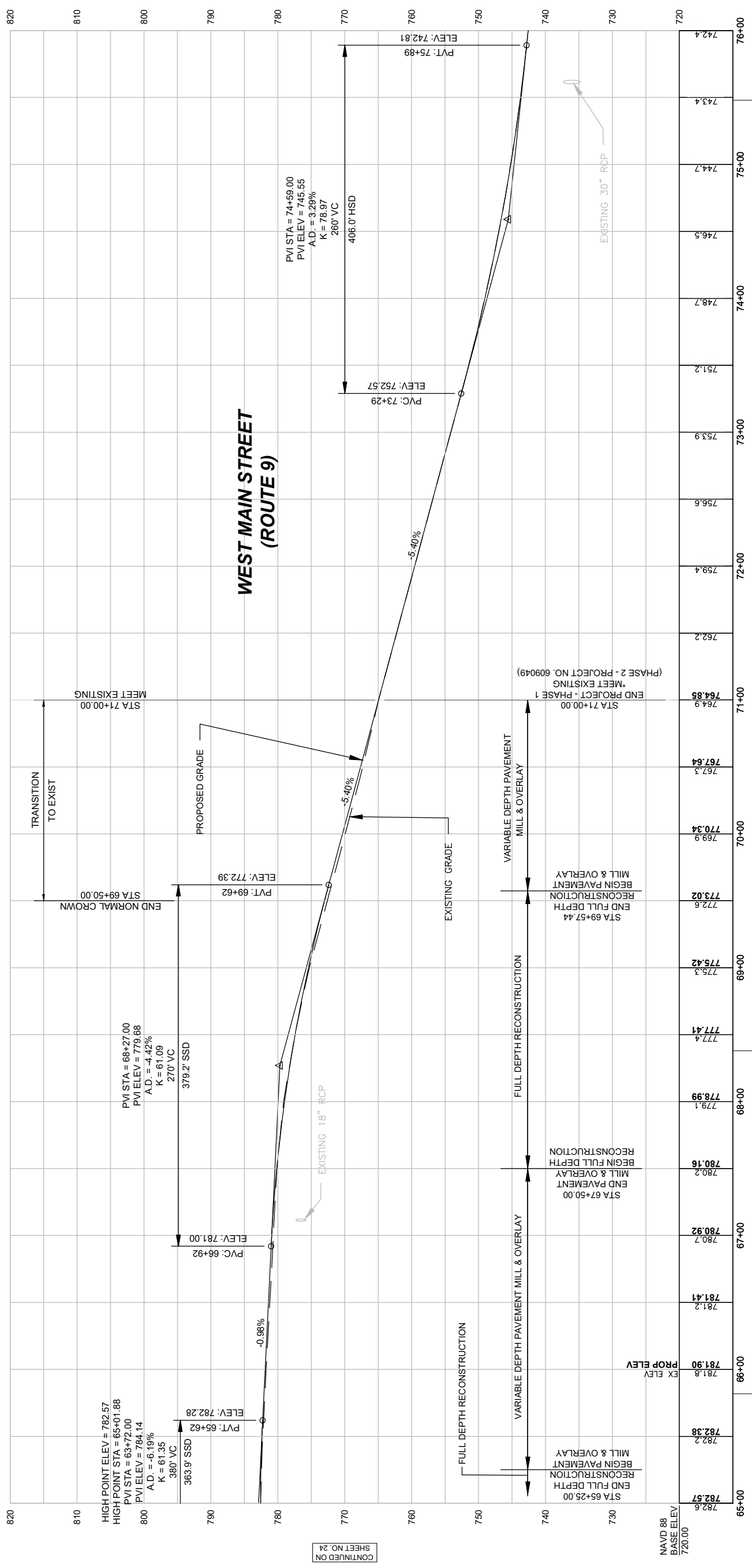
606517_ACOE(PROFILE-1).DWG Plotted on 8-Feb-2024 1:44 PM

WEST BROOKFIELD WEST MAIN STREET (ROUTE 9)			
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	25	29
PROJECT FILE NO. 606517			

**PHASE 1
WEST MAIN STREET (ROUTE 9)
PROFILE - 6**

*NOTE:
1. THE PROPOSED PROFILE SHOWN BELOW SHOWS THE FINAL COMBINED PROFILE OF PHASE 1 AND PHASE 2. SINCE PHASE 1 WILL BE CONSTRUCTED PRIOR TO PHASE 2, THE CONTRACTOR SHALL PROVIDE A 20' PAVEMENT TRANSITION FROM STATION 70+80 TO STATION 71+00 TO MEET THE EXISTING PROFILE GRADE AT THE LIMIT OF WORK FOR PHASE 1.

FOR PERMITTING PLANS SEE SHEETS 18-19

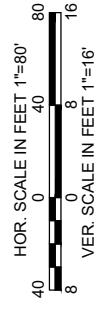


CONTINUED ON SHEET NO. 24

BM #17
Bench Mark
Corner Post
Elevation = 745.61 (NAVD88)
Sta. 75+48.03, 23.15 RT

BM #15
Corner Square
Elevation = 780.87 (NAVD88)
Sta. 69+37.94, 13.87 LT

BM #14
Manhole
Street/Box/Backfill/Leads
Elevation = 783.38 (NAVD88) (Recomp)
Sta. 65+81.57, 21.97 RT



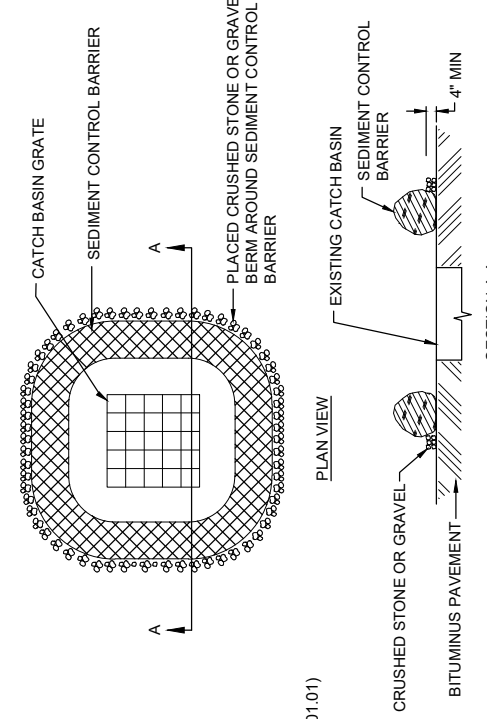
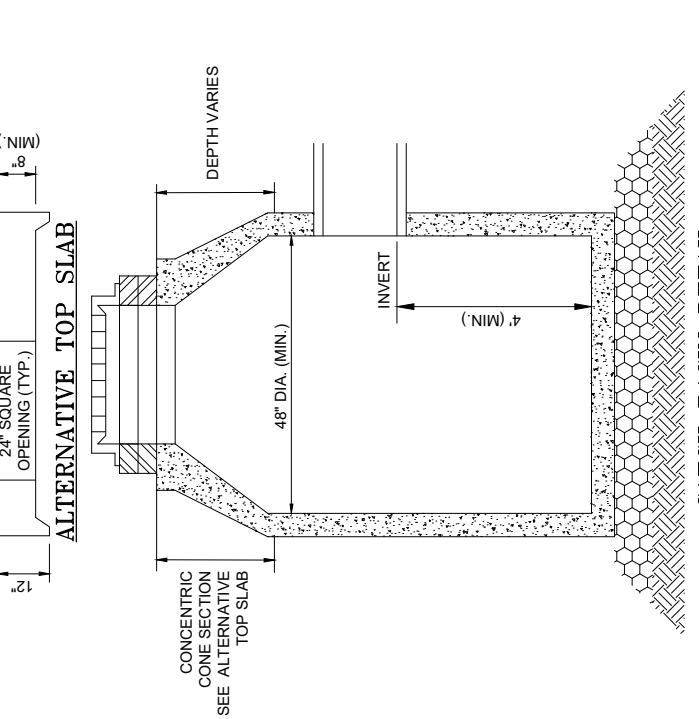
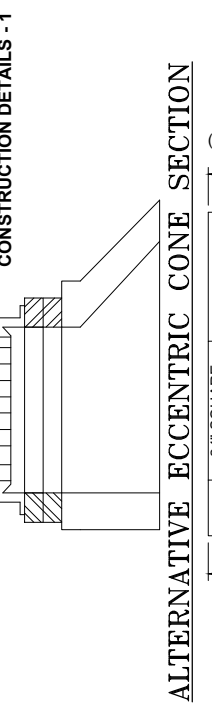
606517.ACOE(DETAIL).DWG Plotted on 8-Feb-2024 1:46 PM

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	26	29
PROJECT FILE NO.	606517	

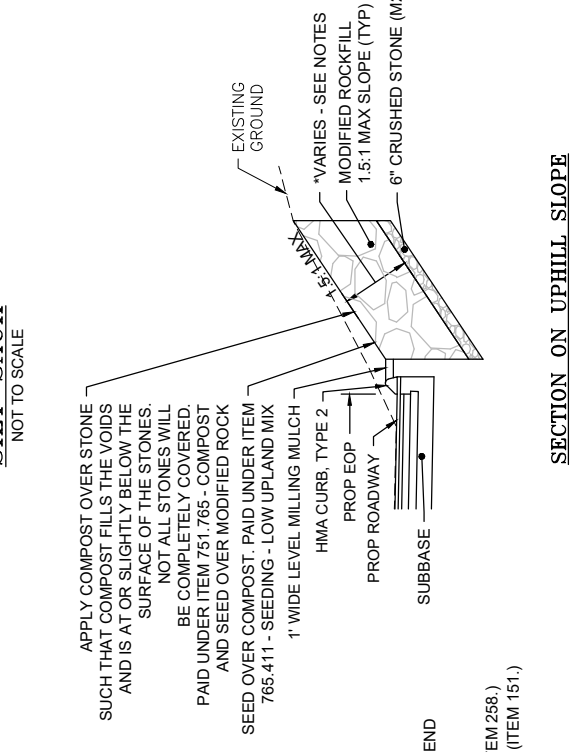
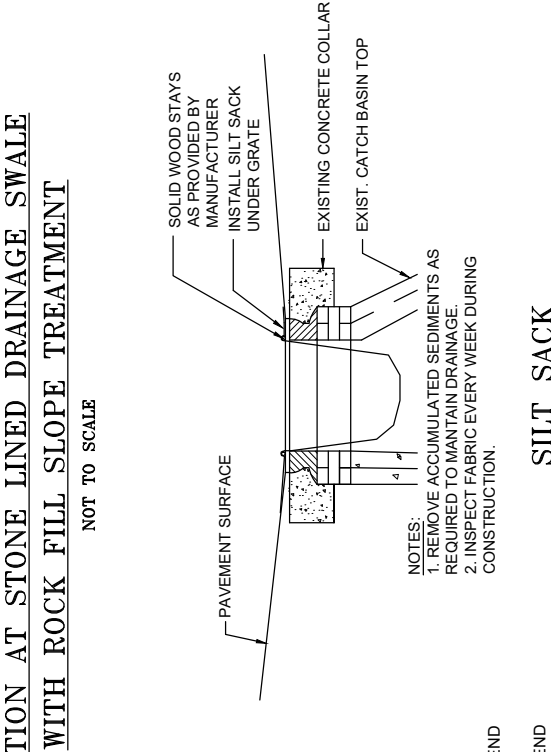
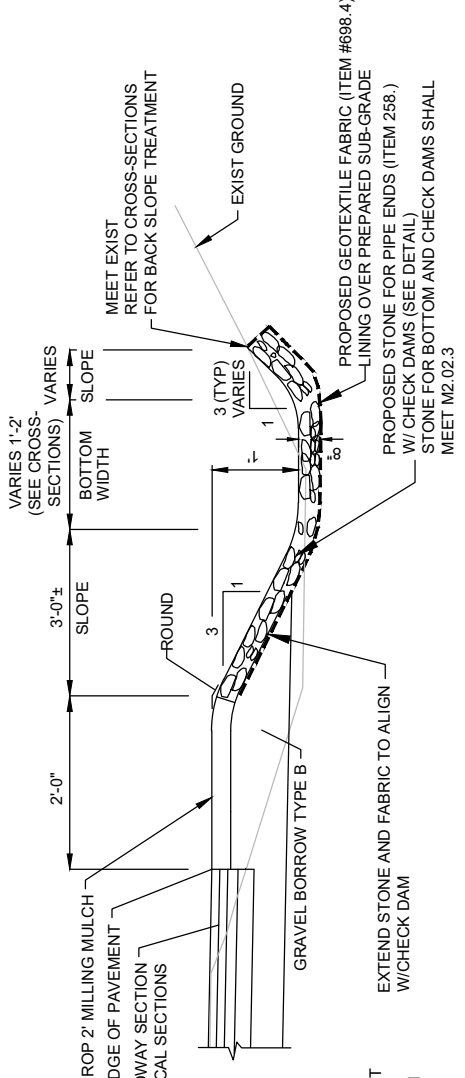
CONSTRUCTION DETAILS - 1

NOTES:
1. BASED ON ACTUAL FIELD CONDITIONS, THE CONTRACTOR SHALL DETERMINE WHICH STYLE OF TOP SECTION SHOULD BE USED



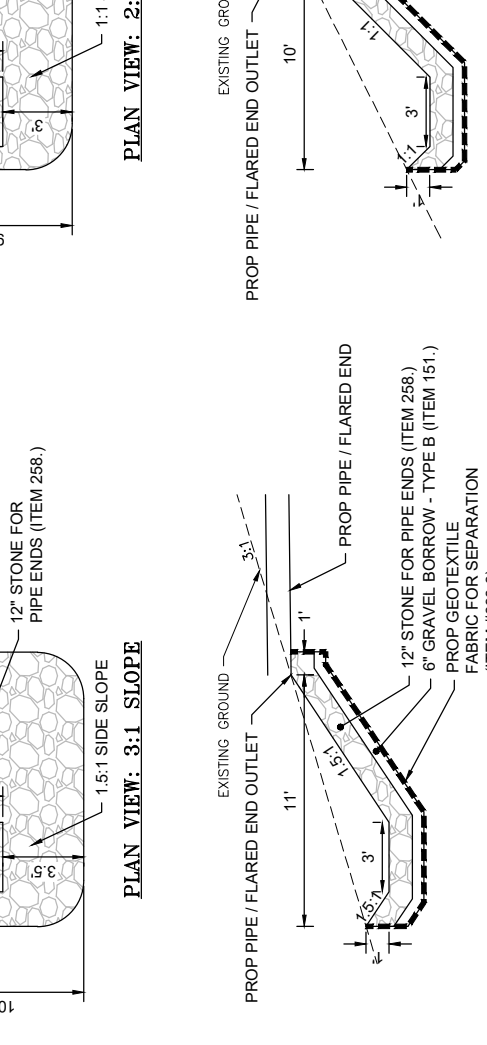
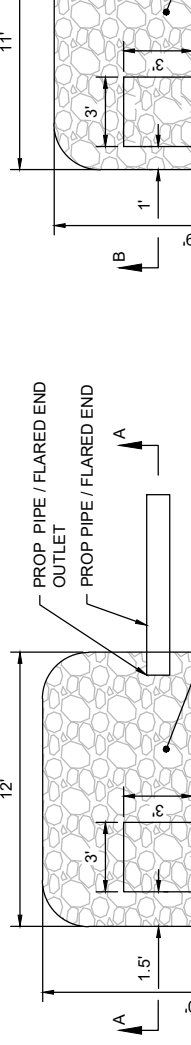
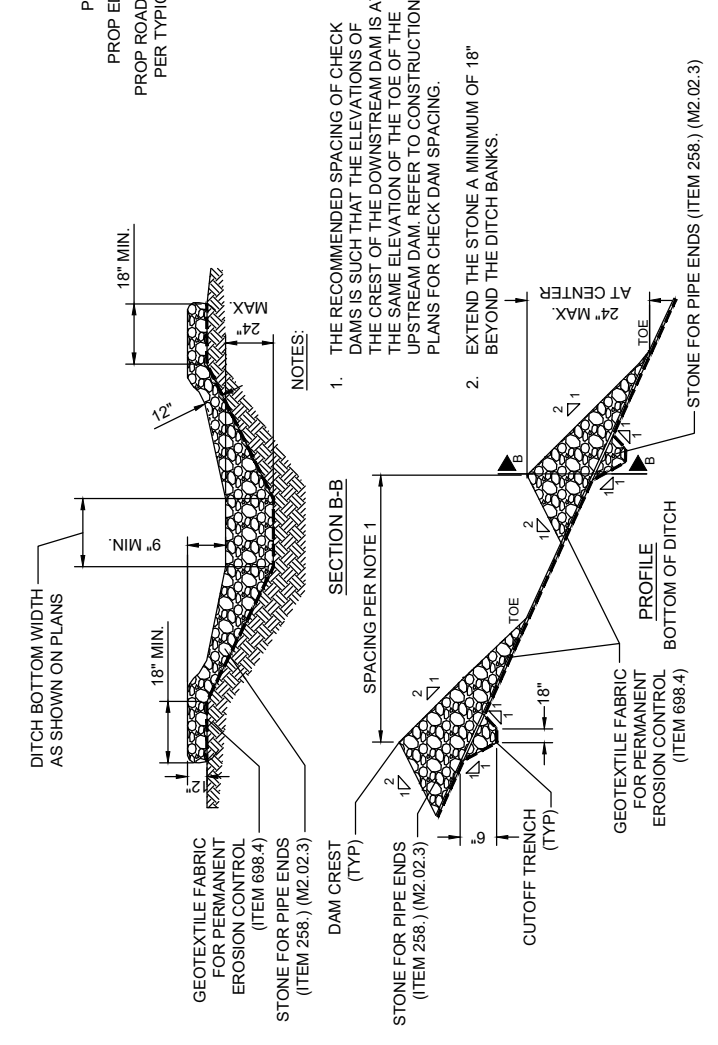
NOTES:
1. SURROUND DRAINAGE STRUCTURE INLET WITH SEDIMENT CONTROL BARRIER PRIOR TO CONSTRUCTION AND MAINTAIN UNTIL CONSTRUCTION IS COMPLETED. ACCUMULATED SEDIMENTS SHALL BE REMOVED.
2. 4" MIN GRAVEL BERM AROUND BOTTOM OF SEDIMENT CONTROL BARRIER.

**OFF ROADWAY CATCH BASIN/DROP INLET
EROSION CONTROL MEASURE**
NOT TO SCALE



NOTES:
1. THE MODIFIED ROCKFILL SLOPE FROM STATION 23+15 RT TO 24+30 RT SHALL BE 4' DEEP.
2. ALL OTHER MODIFIED ROCKFILL AREAS SHALL BE 3' DEEP.

TYPICAL MODIFIED ROCKFILL DETAIL WITH COMPOST AND SEED
NOT TO SCALE



NOTE: FOR STONE FOR PIPE ENDS ON SLOPES LESS THAN 3:1 REFER TO MASSDOT STANDARD DETAIL E 206.7.0.

STONE FOR PIPE ENDS WITH BASIN
NOT TO SCALE

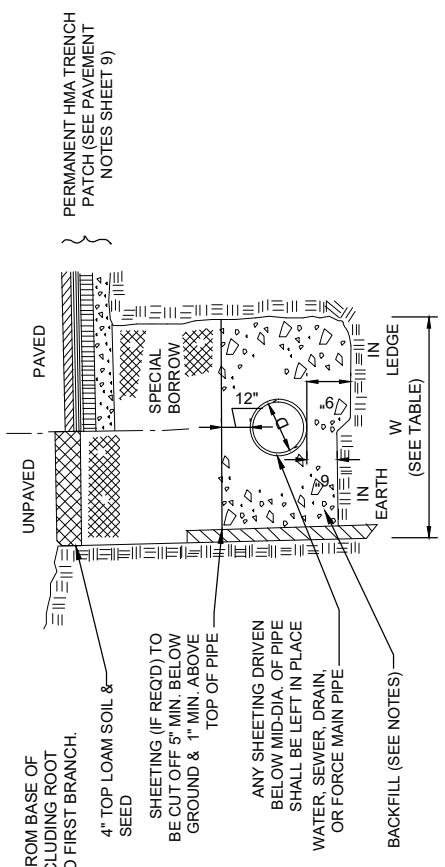
**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	27	29

PROJECT FILE NO. 606517

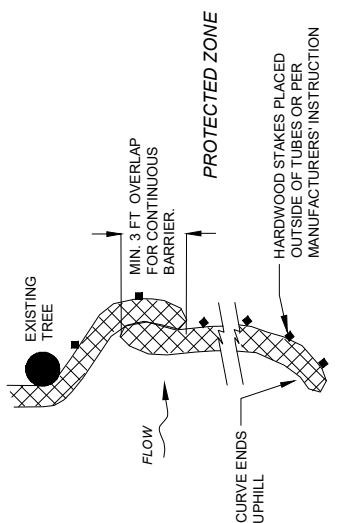
CONSTRUCTION DETAILS - 2

DIAMETER OF PIPE	TRENCH WIDTH	
	UNPAVED	PAVED
TO 12"	3'	4'
14" TO 24"	4'	5'
30" TO 36"	5'	6'



- NOTES:**
- BACKFILL WITH MATERIAL CONTAINING NO STONES LARGER THAN 3" GREATEST DIMENSION TO 12" OVER PIPE FOR DRAIN PIPES.
 - PROVIDE SCREENED GRAVEL BEDDING TO MID PIPE DIAMETER WHERE GROUNDWATER IS ENCOUNTERED AS DIRECTED BY THE ENGINEER.
 - REMOVE UNSUITABLE MATERIAL BELOW GRADE IF ENCOUNTERED, TO SUITABLE DEPTHS AS DIRECTED BY ENGINEER AND REPLACE WITH CLEAN GRANULAR FILL.
 - PAYMENT FOR PERMANENT HMA TRENCH PATCHING SHALL BE PAID FOR UNDER ITEM 451 - HMA UNDER ITEM 472. TEMPORARY ASPHALT PATCHING.
 - ALL TRENCH CONSTRUCTION TO CONFORM TO APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.
 - COMPACT FILL AND TAMP PIPE TO 93% MAX. DENSITY UNLESS OTHERWISE SPECIFIED.

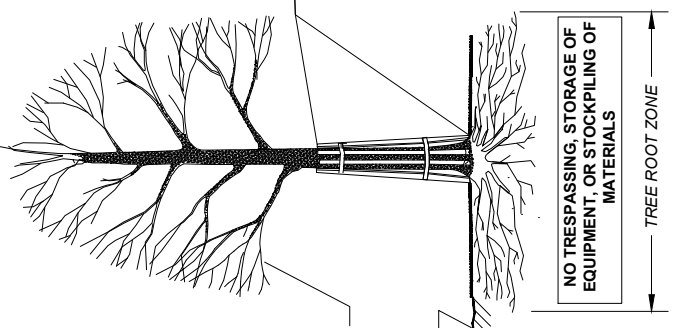
PERMANENT TRENCH PATCH
NOT TO SCALE



PLACE TUBE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE, ALONG CONTOURS, AND PERPENDICULAR TO FLOW.

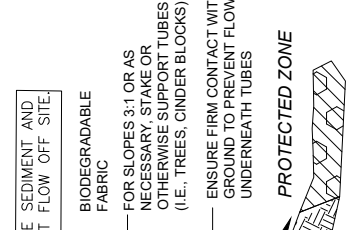
ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

PLAN VIEW

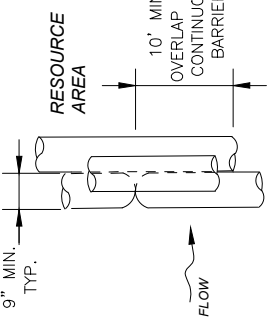


SECTION - TRUNK ARMORING & PRUNING

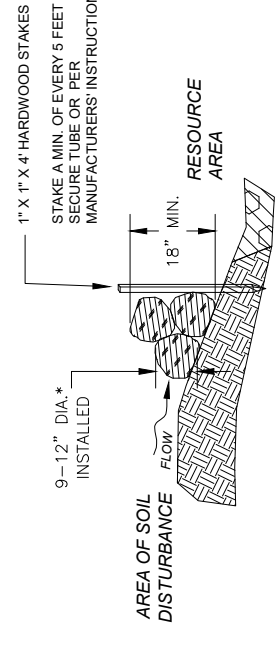
TREE PROTECTION TRUNK



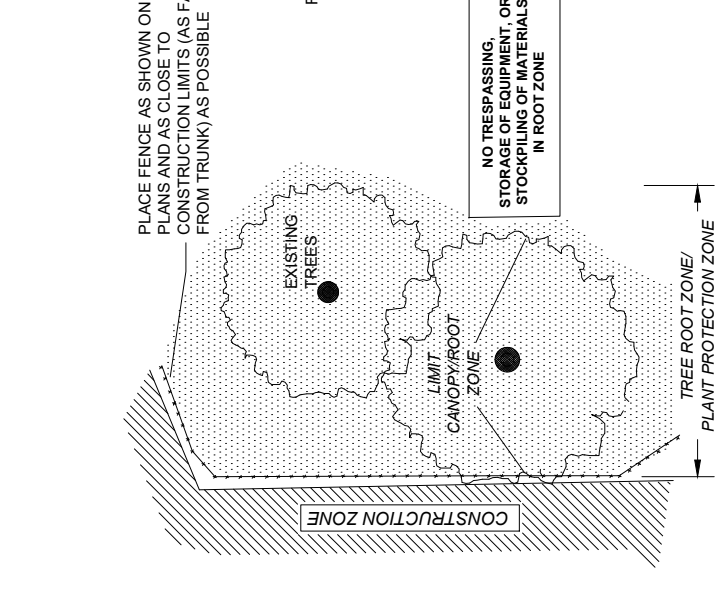
SECTION



PLAN VIEW



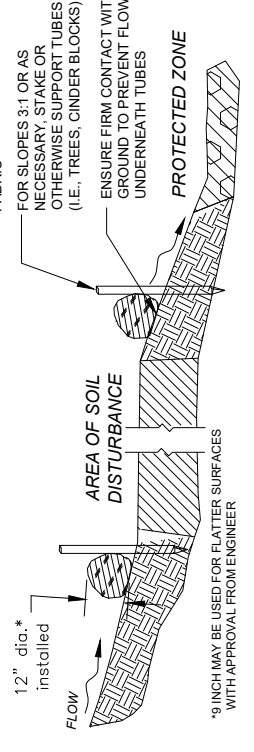
SECTION



PLAN VIEW - FENCE PROTECTION OF ROOT ZONE

TREE PROTECTION ROOT ZONE

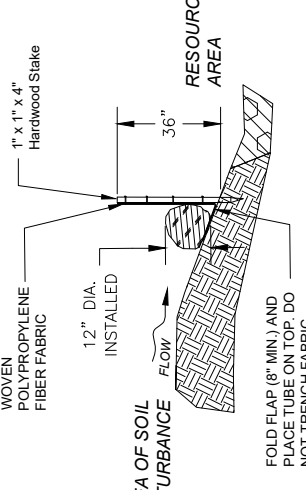
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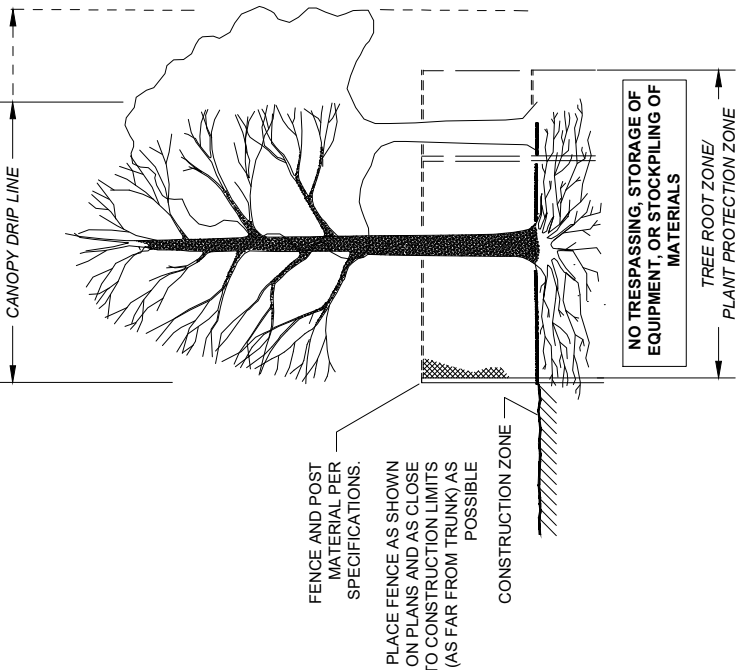
SECTION

SEDIMENT BARRIERS - COMPOST FILTER TUBES

NOT TO SCALE



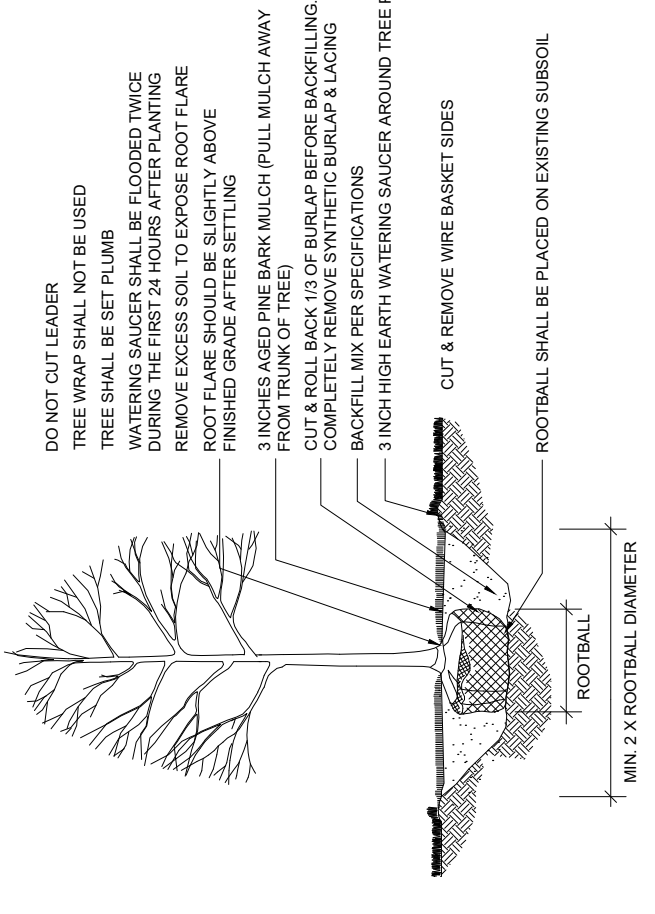
SECTION



SECTION - FENCE PROTECTION OF ROOT ZONE

DECIDUOUS TREE PLANTING

NOT TO SCALE



DECIDUOUS TREE PLANTING

NOT TO SCALE

COMPOST FILTER TUBE BERM (SLOPES 2:1 OR STEEPER)

NOT TO SCALE

COMPOST FILTER TUBE & SILT FENCE

NOT TO SCALE

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	28	29
PROJECT FILE NO. 606517			

CONSTRUCTION DETAILS - 3

WETLAND REPLICATION PLAN NOTES

1. CONTRACTOR SHALL NOT WORK WITHIN THE EXISTING WETLANDS / CHANNEL. WORK SHALL BE CONDUCTED TO THE WEST ON THE HIGH SIDE OF THE REPLICATION AREA.
2. CONTRACTOR SHALL MAINTAIN SEDIMENT CONTROL BARRIER ACROSS THE ACCESS ROUTE TO THE WETLAND REPLICATION AREA TO THE EXTENT PRACTICAL. ANY SEDIMENT CONTROL BARRIER THAT IS DAMAGED SHALL BE REPLACED.
3. COARSE WOODY DEBRIS IN THE FORM OF CUT TREES, STUMPS, LOGS, AND BRUSH SHALL BE INCORPORATED AS SHOWN ON THE PLANS OR AS DIRECTED BY THE WETLAND SPECIALIST OR LANDSCAPE ARCHITECT. ON SITE MATERIAL SHALL BE SELECTED AND MARKED BY THE WETLAND SPECIALIST, RETAINED ON THE PROJECT SITE, AND PLACED AS SPECIFIED IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
4. CONTRACTOR SHALL RESTORE THE ACCESS ROUTE AS NECESSARY TO THE PROPOSED FINAL CONDITIONS AS SHOWN.
5. IMPACTS TO EXISTING TREES AND SOILS SHALL BE MINIMIZED TO THE EXTENT POSSIBLE.
6. THE CONTRACTOR SHALL ARRANGE TO HAVE THE REPRESENTATIVE FROM MASSDOT LANDSCAPE DESIGN SECTION ON SITE DURING CONSTRUCTION IF REQUESTED BY THE REPRESENTATIVE.
7. THE REPRESENTATIVE FROM MASSDOT LANDSCAPE DESIGN SECTION FOR THIS PROJECT IS TARA MITCHELL: TARA.MITCHELL@DOT.STATE.MA.US

UPLAND NATIVE SEEDING NOTES

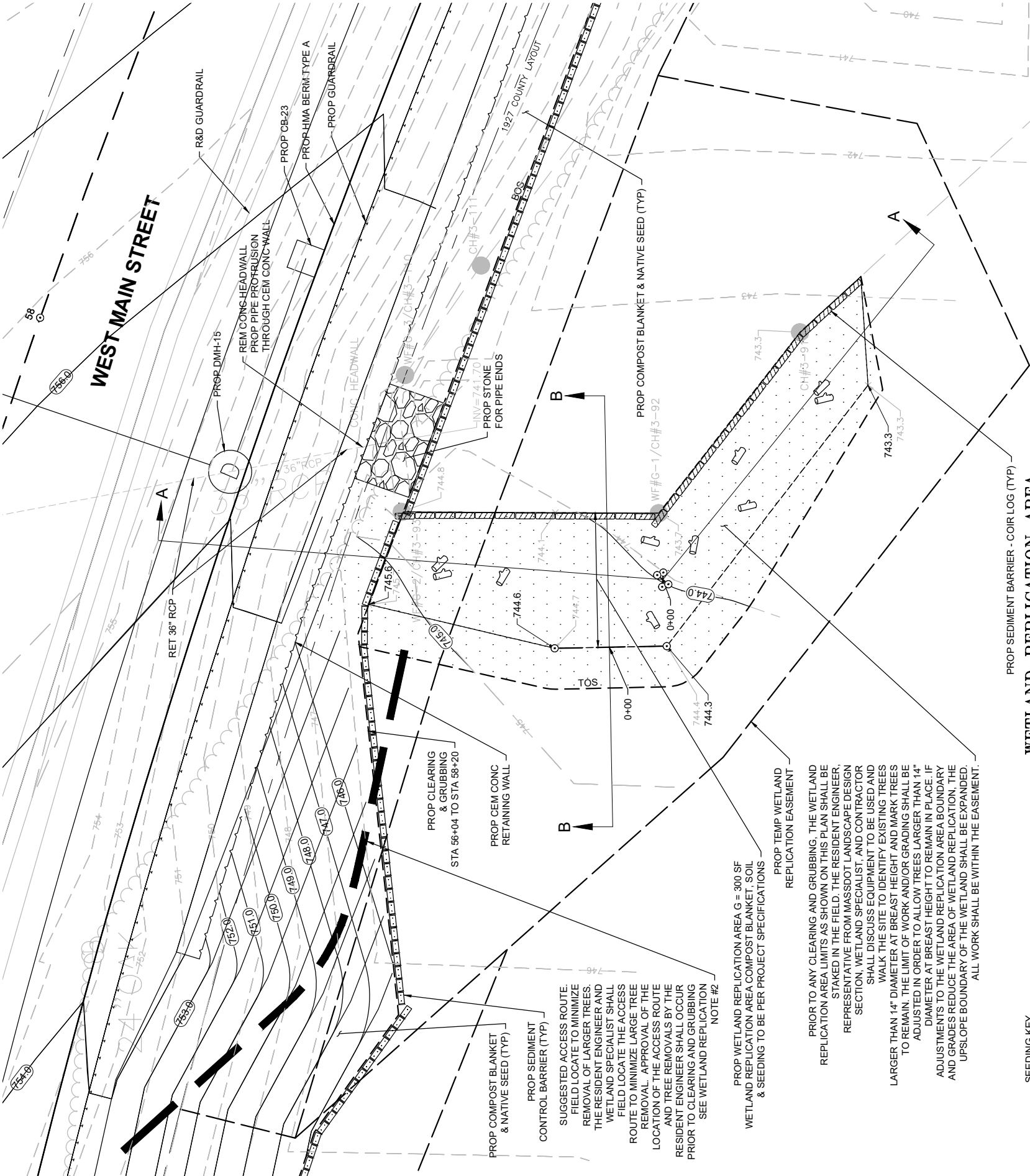
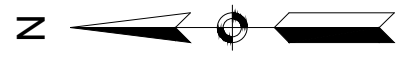
1. SEEDING SHALL BE BROADCAST METHOD ONLY (NOT HYDROSEED) UNLESS APPROVED OTHERWISE BY THE MASSDOT LANDSCAPE ARCHITECT.
2. SEEDING AND SUBMITTALS SHALL BE PER THE SPECIAL PROVISIONS.
3. SUBMITTALS FOR SEED MIXES SHALL BE APPROVED BY THE ENGINEER AND LANDSCAPE ARCHITECT PRIOR TO SEED APPLICATION.
4. SITE PREPARATION SHALL BE PER SPECIFICATIONS AND APPROVED BY THE ENGINEER PRIOR TO SEEDING.
5. WHEN SEEDING OUT OF SEASON APPLICATION RATE SHALL BE INCREASED BY 50%.

SEEDING & COMPOST BLANKET NOTES

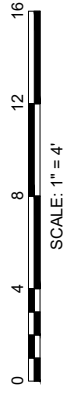
1. COMPOST BLANKET AND SEEDING SHALL OCCUR AFTER PLANTING.
2. SEEDING WITH COMPOST BLANKET SHALL BE PER THE SPECIAL PROVISIONS.
3. SEED RATES SHALL BE INCREASED AS SPECIFIED FOR SLOPE CONDITIONS.

SEDIMENT CONTROL BARRIER NOTES

1. SEDIMENT CONTROL BARRIER SHALL BE LEFT TO DEGRADE OVER TIME AND THEREFORE MUST BE COMPRISED OF 100% BIODEGRADABLE MATERIALS - BURLAP, COTTON, HEMP, ETC.
2. DUE TO THE LONG AND STEEP SLOPES ON THIS PROJECT, ADDITIONAL SEDIMENT CONTROL BARRIER MAY BE REQUIRED THAN WHAT IS SHOWN ON THE PLANS. THIS ADDITIONAL BARRIER MAY BE REQUIRED FOR EROSION CONTROL AS SEEDING ESTABLISHES. THESE ADDITIONAL LOCATIONS MAY INCLUDE AT THE TOP OF SLOPES WHERE THERE IS NO CURB TO CONTAIN ROADWAY RUNOFF, MID-SLOPE, AND PERPENDICULAR TO THE ROADWAY DUE TO STEEP LONGITUDINAL GRADES. USE OF BARRIER SHALL BE IF AND WHERE NEEDED AND AS APPROVED BY THE ENGINEER. PLACEMENT SHALL BE WHERE MOST EFFECTIVE TO REDUCE POTENTIAL EROSION OF SLOPES UNTIL VEGETATION ESTABLISHES AND TO CONTAIN SEDIMENT.



PROP SEDIMENT BARRIER - COIR LOG (TYP)
WETLAND REPLICATION AREA
STA 58+00 RT



SEEDING KEY



WETLAND SEEDING

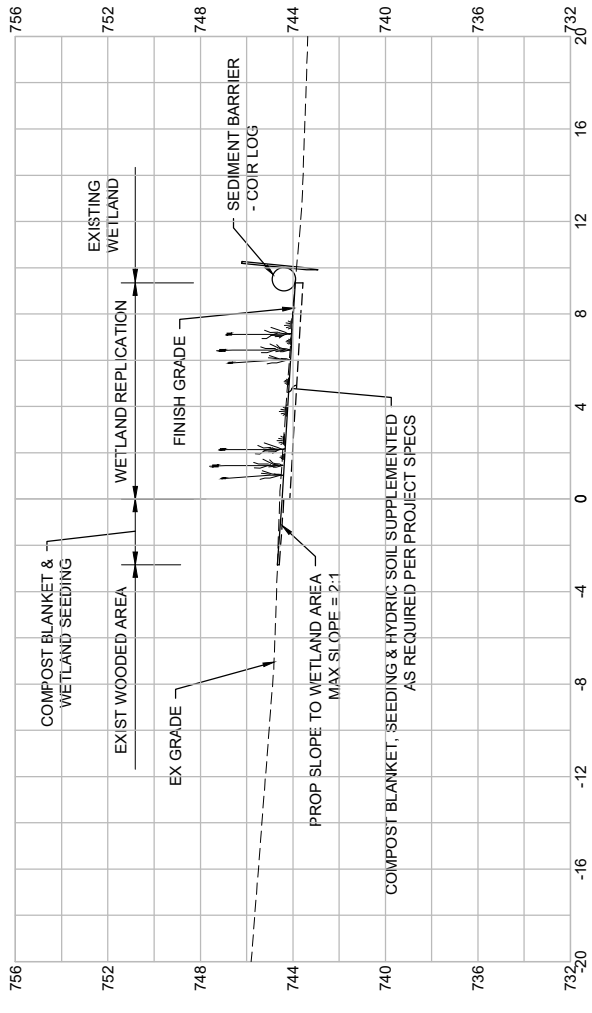
PROP WETLAND REPLICATION AREA G = 300 SF
WETLAND REPLICATION AREA COMPOST BLANKET, SOIL & SEEDING TO BE PER PROJECT SPECIFICATIONS

PRIOR TO ANY CLEARING AND GRUBBING, THE WETLAND REPLICATION AREA LIMITS AS SHOWN ON THIS PLAN SHALL BE STAKED IN THE FIELD. THE RESIDENT ENGINEER, REPRESENTATIVE FROM MASSDOT LANDSCAPE DESIGN SECTION, WETLAND SPECIALIST, AND CONTRACTOR SHALL DISCUSS EQUIPMENT TO BE USED AND WALK THE SITE TO IDENTIFY EXISTING TREES LARGER THAN 14" DIAMETER AT BREAST HEIGHT AND MARK TREES TO REMAIN. THE LIMIT OF WORK AND/OR GRADING SHALL BE ADJUSTED IN ORDER TO ALLOW TREES LARGER THAN 14" DIAMETER AT BREAST HEIGHT TO REMAIN IN PLACE. IF ADJUSTMENTS TO THE WETLAND REPLICATION AREA BOUNDARY AND GRADES REDUCE THE AREA OF WETLAND REPLICATION, THE UPSLOPE BOUNDARY OF THE WETLAND SHALL BE EXPANDED. ALL WORK SHALL BE WITHIN THE EASEMENT.

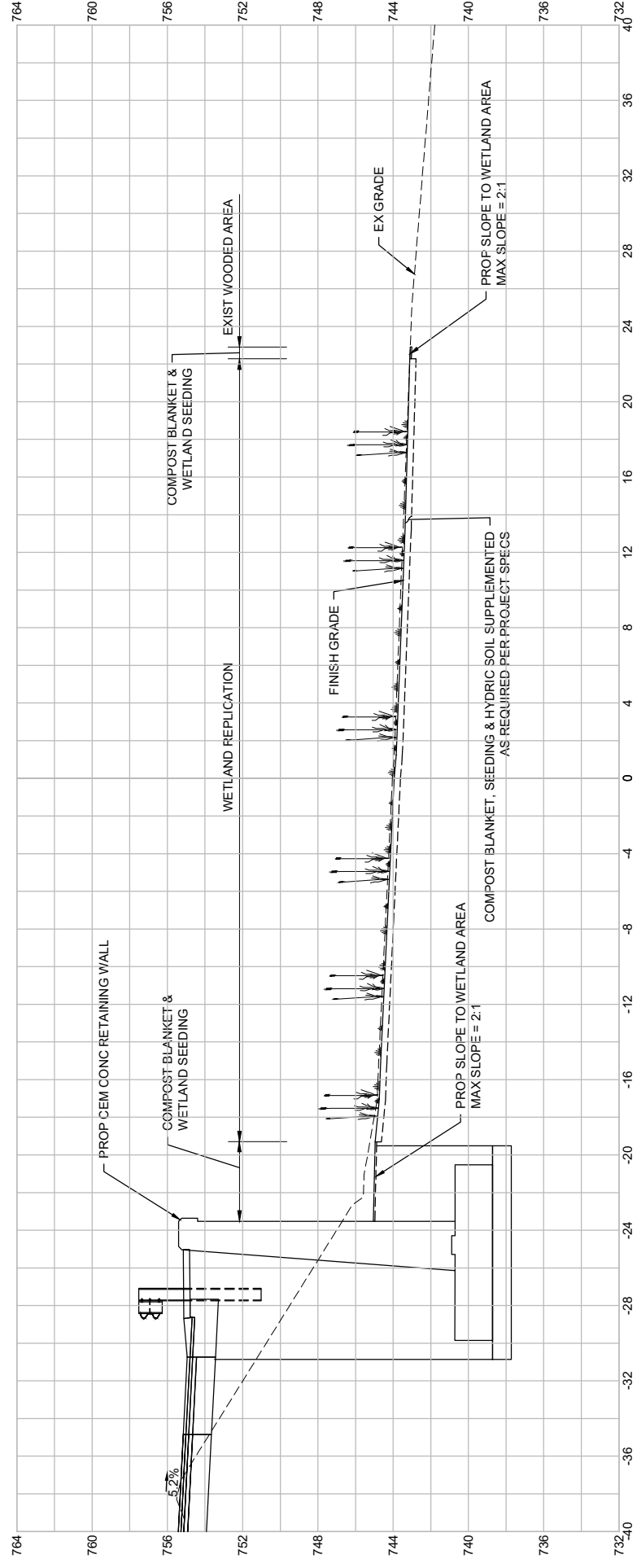
**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	29	29
PROJECT FILE NO.		606517	

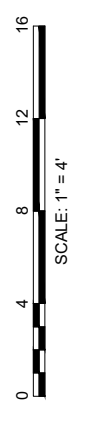
CONSTRUCTION DETAILS - 4



SECTION "B-B"



SECTION "A-A"



General Permit No.: NAE-2022-02649
 Applicant: General Public, Commonwealth of Massachusetts

Final Effective Date: June 2, 2023
 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:

	<u>Pages</u>
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 AUTHORITIES & 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-Construction 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

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.

Pre-Construction Notification Required

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 authorized¹, 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 SF² 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 facility¹; or (b) Moorings in a USACE Federal Navigation Anchorage or USACE Federal Navigation Channel, except municipal-operated mooring fields.

Self-Verification Eligible

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.

Pre-Construction Notification Required

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 out hauls, 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 $\leq 25\%$ 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 out hauls.
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 shallows¹; or (c) dredging in navigable waters of the U.S. (see GP 7).

Self-Verification Eligible

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.

Pre-Construction Notification Required

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. 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 pipelines¹, outfall or intake structures², 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

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.

Pre-Construction Notification Required

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-47¹ 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

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 $\leq 5,000$ SF.
 - b. Combined permanent and temporary impacts that are $\leq 1,000$ SF in mudflats and natural rocky habitat.
 - c. Not located in saltmarsh and tidal vegetated shallows.

Pre-Construction Notification Required

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

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.

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.
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 $>1/2$ acre.

Self-Verification Eligible

1. In non-tidal waters, the combined permanent and temporary impacts are (a) $\leq 1/2$ 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.

Pre-Construction Notification Required

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 $\leq 1/2$ 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

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.

Pre-Construction Notification Required

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

1. In non-tidal waters, the combined permanent and temporary impacts are (a) $\leq 5,000$ SF, and (b) not located in vegetated shallows and riffle and pool complexes.

Pre-Construction Notification Required

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

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.

Pre-Construction Notification Required

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

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.

Pre-Construction Notification Required

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

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.

Pre-Construction Notification Required

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

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.

Pre-Construction Notification Required

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 SHORELINES¹ (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

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.

Pre-Construction Notification Required

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

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.

Pre-Construction Notification Required

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

≤500 linear feet of drainage ditch will be reshaped provided excavated material is deposited in an upland area.

Pre-Construction Notification Required

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)

Activities¹ 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

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.

Pre-Construction Notification Required

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 situation¹, 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

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.

Pre-Construction Notification Required

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 applicable 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 effects¹ (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 method¹ 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-47² 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 $\geq 5,000$ 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 controls¹ (hereinafter referred to as “controls”) must be 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 siliceous 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 loss¹ of the resource area types listed below. Activities² 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

<u>Massachusetts Department of Environmental Protection (MassDEP)</u>	
<u>DEP Division of Wetlands & Waterways</u>	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 292-5695
<u>Northeast Region</u>	150 Presidential Way, Suite 300 Woburn, Massachusetts 01801 (978) 694-3200
<u>Southeast Region</u>	20 Riverside Drive, Route 105 Lakeville, Massachusetts 02347 (508) 946-2800
<u>Central Region</u>	8 New Bond Street Worcester, Massachusetts 01606 (508) 792-7650
<u>Western Region</u>	436 Dwight Street Springfield, Massachusetts 01103 (413) 784-1100

<u>Massachusetts Office of Coastal Zone Management (CZM)</u>	
Emails may be sent to: czm@mass.gov	
<u>MA Office of Coastal Zone Management</u>	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 626-1200
<u>North Shore Region</u>	2 State Fish Pier Gloucester, Massachusetts 01930 (978) 281-3972
<u>South Shore Region</u>	175 Edward Foster Road Scituate, Massachusetts 02066
<u>Cape Cod and Islands Region</u>	3195 Main Street, P.O. Box 220 Barnstable, MA 02630
<u>South Coastal Region</u>	81-B County Road, Suite E Mattapoisett, MA 02739

<u>Massachusetts Historical Commission (MHC)</u>	
Office Location:	220 Morrissey Boulevard Boston, Massachusetts 02125 (617) 727-8470

<u>Massachusetts Board of Underwater Archaeological Resources (BUAR)</u>	
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, dockminiums, 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	Cross Rip Shoals, Nantucket	Gloucester Harbor and
Aunt Lydia's Cove	Sound	Annisquam River
Beverly Harbor	Cuttyhunk Harbor	Green Harbor
Boston Harbor	Dorchester Bay and Neponset	Hingham Harbor
Buttermilk Bay Channel	River	Hyannis Harbor
Canapitsit Channel	Duxbury Harbor	Ipswich River
Cape Cod Canal	Edgartown Harbor	Island End River (Chelsea, MA)
Chatham Harbor	Essex River	Kingston Harbor
Cohasset Harbor	Fall River Harbor	Lagoon Pond
	Falmouth Harbor	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 shear 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 substrate 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 coarse 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 (*Ruppia 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 <u>excluding</u> 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 <u>excluding</u> 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 Form¹⁸, 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, it is 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 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.

Disclosure

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
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(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME First - Middle - Last - Company - E-mail Address -		8. AUTHORIZED AGENT'S NAME AND TITLE (<i>agent is not required</i>) First - Middle - Last - Company - E-mail Address -	
6. APPLICANT'S ADDRESS: Address- City - State - Zip - Country -		9. AGENT'S ADDRESS: Address- City - State - Zip - Country -	
7. APPLICANT'S PHONE NOs. with AREA CODE a. Residence b. Business c. Fax d. Mobile		10. AGENT'S PHONE NOs. with AREA CODE a. Residence b. Business c. Fax d. Mobile	

STATEMENT OF AUTHORIZATION

11. I hereby authorize, _____ 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*)

13. NAME OF WATERBODY, IF KNOWN (*if applicable*)

14. PROPOSED ACTIVITY STREET ADDRESS (*if applicable*)

15. LOCATION OF PROPOSED ACTIVITY (*see instructions*)

Latitude: °N Longitude: °W

City: State: Zip:

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (*see instructions*)

State Tax Parcel ID:

Municipality:

Section:

Township:

Range:

17. DIRECTIONS TO THE SITE.

18. IDENTIFY THE SPECIFIC GENERAL PERMIT(S) YOU PROPOSE TO USE:

19. DESCRIPTION OF PROPOSED GENERAL PERMIT ACTIVITY (*see instructions*)

20. DESCRIPTION OF PROPOSED MITIGATION MEASURES (*see instructions*)

21. PURPOSE OF GENERAL PERMIT ACTIVITY (*Describe the reason or purpose of the project, see instructions*)

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

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*)

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*)

Proposal No. 606517 - 125780

25. Is Any Portion of the General Permit Activity Already Complete? Yes 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*)

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*)

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":

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 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.

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.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE
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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 its 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
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APPLICANT AND AGENT INFORMATION

4. APPLICANT'S NAME				7. AGENT'S ADDRESS:			
First -	Middle -	Last -		First -	Middle -	Last -	
Company -				Company -			
E-mail Address -				E-mail Address -			
5. APPLICANT'S ADDRESS:				8. AGENT'S ADDRESS:			
Address-				Address-			
City -	State -	Zip -	Country -	City -	State -	Zip -	Country -
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	

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
	City - State - Zip -

ACTIVITY TYPE, PROJECT IMPACTS, AVOIDANCE & MINIMIZATION

15. GENERAL PERMIT ACTIVITIES (CHECK ALL THAT APPLY)					16. SUMMARY OF PROJECT IMPACTS (<i>see instructions</i>)			
1 _____	6 _____	11 _____	16 _____	21 _____	Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration
2 _____	7 _____	12 _____	17 _____	22 _____				
3 _____	8 _____	13 _____	18 _____	23 _____				
4 _____	9 _____	14 _____	19 _____	24 _____				
5 _____	10 _____	15 _____	20 _____	25 _____				

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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
- b. Massachusetts BUAR
- c. Tribal Historic Preservation Officers
- d. Endangered Species Act - NOAA
- e. Endangered Species Act - USFWS
- f. Northern Long Eared Bat (ESA)
- g. Essential Fish Habitat
- h. Wild & Scenic Rivers
- i. 401 Water Quality Certification 401

401 WQC/OOC File Number:

OOC issued:

401 issued:

- j. Section 408 Permission
- k. Coastal Zone
- l. Construction Mats
- m. Time of Year Restrictions
- n. Vernal Pools
- o. Sediment & Erosion Controls
- p. Stream/Wetland Crossings

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.
- 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 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 impacts²⁰ 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 $\geq 1-2$ feet for box culverts and pipe arches or $\geq 1-2$ 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 Mitigation²¹ 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 A00860

MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL PROTECTION

NOTICE OF INTENT

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Notice of Intent – Phase 1

Under 310 CMR 10.00
MA Wetlands Protection Act Regulations

Proposed Route 9/ West Main St. Rehabilitation & Related Work West Brookfield, MA

MassDOT Project Number: 606517
CHA Project Number: 25485

November 2023

Prepared for:
Town of West Brookfield
Conservation Commission
2 East Main Street/P.O. Box 237
West Brookfield, Massachusetts 01585

Applicant:
Town of West Brookfield, Highway Department
2 East Main Street//P.O. Box 237
West Brookfield, Massachusetts 01585

Prepared by:
CHA Consulting, Inc.
141 Longwater Drive, Suite 104
Norwell, MA, 02061
Phone: (781) 982-5400
Fax: (781) 982-5490



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Section I

WPA Form 3 - Notice of Intent



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
WPA Form 3 – Notice of Intent
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

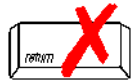
Provided by MassDEP:

 MassDEP File Number

 Document Transaction Number
 West Brookfield

 City/Town

Important:
 When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Note:
 Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

Route 9 -WareTown Line to Rock House Reservation

 West Brookfield

 b. City/Town
 01585

 c. Zip Code
 Latitude and Longitude: 42° 16' 07" 72° 12' 20"

 d. Latitude e. Longitude
 Map #s: 23 & 24

 f. Assessors Map/Plat Number Not applicable - Road right-of-way

 g. Parcel /Lot Number

2. Applicant:

James P. Daley

 a. First Name b. Last Name
 Town of West Brookfield Highway Department

 c. Organization
 2 East Main Street /P.O. Box 372

 d. Street Address
 West Brookfield MA 01585

 e. City/Town f. State g. Zip Code
 508-867-1417

 h. Phone Number i. Fax Number j. Email Address
 jdaley@wbrookfield.com

3. Property owner (required if different from applicant): Check if more than one owner

 a. First Name b. Last Name
 Town of West Brookfield Highway Department

 c. Organization
 2 East Main Street /P.O. Box 372

 d. Street Address
 West Brookfield MA 01585

 e. City/Town f. State g. Zip Code
 508-867-1417

 h. Phone Number i. Fax Number j. Email address

4. Representative (if any):

John G. Morgan, Jr.

 a. First Name b. Last Name
 CHA Consulting, Inc.

 c. Company
 141 Longwater Drive, Suite 104

 d. Street Address
 Norwell MA 02061

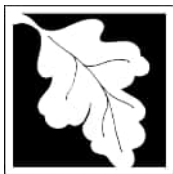
 e. City/Town f. State g. Zip Code
 781-982-5437 781-982-5490

 h. Phone Number i. Fax Number j. Email address
 jmorgan@chacompanies.com

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

Waived - Town Project Waived Waived

 a. Total Fee Paid b. State Fee Paid c. City/Town Fee Paid



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A. General Information (continued)

6. General Project Description:

The Town of West Brookfield Highway Department (WBHD) is proposing the Route 9/West Main Street Rehabilitation and Related Work Project - Phase 1 to extend the service life of the road as well as improve roadway conditions and safety for all roadway users and the storm drainage system. See Project Narrative.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

- | | |
|---|---|
| 1. <input type="checkbox"/> Single Family Home | 2. <input type="checkbox"/> Residential Subdivision |
| 3. <input type="checkbox"/> Commercial/Industrial | 4. <input type="checkbox"/> Dock/Pier |
| 5. <input type="checkbox"/> Utilities | 6. <input type="checkbox"/> Coastal engineering Structure |
| 7. <input type="checkbox"/> Agriculture (e.g., cranberries, forestry) | 8. <input checked="" type="checkbox"/> Transportation |
| 9. <input type="checkbox"/> Other | |

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. Yes No If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)
 310 CMR 10.53(3)(f) - maintenance/improvements to existing public roads; widening less than a single lane

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

<u>Worcester</u>	<u>Not Applicable</u>
a. County	b. Certificate # (if registered land)
<u>Not Applicable</u>	<u>Not Applicable</u>
c. Book	d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

- Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
- Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.



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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. <input checked="" type="checkbox"/> Bank	80 linear feet (l.f.) 1. linear feet	80 l.f. - restoration 2. linear feet
b. <input checked="" type="checkbox"/> Bordering Vegetated Wetland	140 square feet (s.f.) 1. square feet	300 s.f. replication 2. square feet
c. <input checked="" type="checkbox"/> Land Under Waterbodies and Waterways	385 s.f. 1. square feet 3. cubic yards dredged	385 s.f. -restoration 2. square feet

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. <input type="checkbox"/> Bordering Land Subject to Flooding	1. square feet 3. cubic feet of flood storage lost	2. square feet 4. cubic feet replaced
e. <input type="checkbox"/> Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet replaced
f. <input type="checkbox"/> Riverfront Area	1. Name of Waterway (if available) - specify coastal or inland	

2. Width of Riverfront Area (check one):

- 25 ft. - Designated Densely Developed Areas only
- 100 ft. - New agricultural projects only
- 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: _____ square feet

4. Proposed alteration of the Riverfront Area:

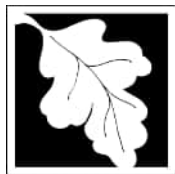
a. total square feet _____ b. square feet within 100 ft. _____ c. square feet between 100 ft. and 200 ft. _____

5. Has an alternatives analysis been done and is it attached to this NOI? Yes No

6. Was the lot where the activity is proposed created prior to August 1, 1996? Yes No

3. Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f.** above.



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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

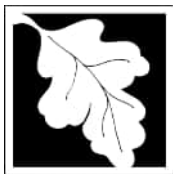
Online Users:
 Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

<u>Resource Area</u>	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
a. <input type="checkbox"/> Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. <input type="checkbox"/> Land Under the Ocean	_____	
	1. square feet	

	2. cubic yards dredged	
c. <input type="checkbox"/> Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. <input type="checkbox"/> Coastal Beaches	_____	_____
	1. square feet	2. cubic yards beach nourishment
e. <input type="checkbox"/> Coastal Dunes	_____	_____
	1. square feet	2. cubic yards dune nourishment
	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
f. <input type="checkbox"/> Coastal Banks	_____	
	1. linear feet	
g. <input type="checkbox"/> Rocky Intertidal Shores	_____	
	1. square feet	
h. <input type="checkbox"/> Salt Marshes	_____	_____
	1. square feet	2. sq ft restoration, rehab., creation
i. <input type="checkbox"/> Land Under Salt Ponds	_____	
	1. square feet	

	2. cubic yards dredged	
j. <input type="checkbox"/> Land Containing Shellfish	_____	
	1. square feet	
k. <input type="checkbox"/> Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above	

	1. cubic yards dredged	
l. <input type="checkbox"/> Land Subject to Coastal Storm Flowage	_____	
	1. square feet	
4. <input type="checkbox"/> Restoration/Enhancement	If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.	
	_____	_____
	a. square feet of BVW	b. square feet of Salt Marsh
5. <input type="checkbox"/> Project Involves Stream Crossings		
	_____	_____
	a. number of new stream crossings	b. number of replacement stream crossings



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C. Other Applicable Standards and Requirements

- This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

- 1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

a. Yes No **If yes, include proof of mailing or hand delivery of NOI to:**

Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
 1 Rabbit Hill Road
 Westborough, MA 01581

MAGIS 2023/ Aug.
2021 NHESP Atlas

If yes, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

c. Submit Supplemental Information for Endangered Species Review*

- 1. Percentage/acreage of property to be altered:
 - (a) within wetland Resource Area _____ percentage/acreage
 - (b) outside Resource Area _____ percentage/acreage

2. Assessor's Map or right-of-way plan of site

- 2. Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **
 - (a) Project description (including description of impacts outside of wetland resource area & buffer zone)
 - (b) Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see <http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/>). Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.



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C. Other Applicable Standards and Requirements (cont'd)

(c) MESA filing fee (fee information available at http://www.mass.gov/dfwele/dfw/nhosp/regulatory_review/mesa/mesa_fee_schedule.htm).
 Make check payable to “Commonwealth of Massachusetts - NHESP” and **mail to NHESP** at above address

Projects altering 10 or more acres of land, also submit:

(d) Vegetation cover type map of site

(e) Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. Project is exempt from MESA review.
 Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, http://www.mass.gov/dfwele/dfw/nhosp/regulatory_review/mesa/mesa_exemptions.htm; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. Separate MESA review ongoing. a. NHESP Tracking # _____ b. Date submitted to NHESP _____

3. Separate MESA review completed.
 Include copy of NHESP “no Take” determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. Not applicable – project is in inland resource area only b. Yes No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Cohasset to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
 Southeast Marine Fisheries Station
 Attn: Environmental Reviewer
 836 South Rodney French Blvd.
 New Bedford, MA 02744
 Email: DMF.EnvReview-South@state.ma.us

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
 North Shore Office
 Attn: Environmental Reviewer
 30 Emerson Avenue
 Gloucester, MA 01930
 Email: DMF.EnvReview-North@state.ma.us

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP’s Boston Office. For coastal towns in the Southeast Region, please contact MassDEP’s Southeast Regional Office.



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Online Users:
 Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

C. Other Applicable Standards and Requirements (cont'd)

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?
- a. Yes No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.
-
- b. ACEC
5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?
- a. Yes No
6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?
- a. Yes No
7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?
- a. Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:
1. Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)
 2. A portion of the site constitutes redevelopment
 3. Proprietary BMPs are included in the Stormwater Management System.
- b. No. Check why the project is exempt:
1. Single-family house
 2. Emergency road repair
 3. Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

- This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)
2. Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.



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Provided by MassDEP:

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D. Additional Information (cont'd)

3. Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. List the titles and dates for all plans and other materials submitted with this NOI.

Town of West Brookfield - Route 9

a. Plan Title

CHA Consulting, Inc.

John G. Morgan Jr., PE, PTOE

b. Prepared By

c. Signed and Stamped by

11/21/2023

1":20'; Variable

d. Final Revision Date

e. Scale

f. Additional Plan or Document Title

g. Date

5. If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. Attach NOI Wetland Fee Transmittal Form

9. Attach Stormwater Report, if needed.

E. Fees

1. Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

Not Applicable

-

2. Municipal Check Number

3. Check date

Not Applicable

-

4. State Check Number

5. Check date

Not Applicable

-

6. Payor name on check: First Name

7. Payor name on check: Last Name



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F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

James P. Daley

1. Signature of Applicant

11-21-23

2. Date

3. Signature of Property Owner (if different)

4. Date

[Signature]

5. Signature of Representative (if any)

11-21-23

6. Date

For Conservation Commission:

Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:

One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:

If the applicant has checked the "yes" box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Section II

Project Narrative

NOI PROJECT NARRATIVE

1.0 INTRODUCTION

On behalf of the Town of West Brookfield Highway Department (WBHD) and the Massachusetts Department of Transportation (MassDOT), CHA Consulting, Inc. is pleased to present Phase 1 of the *Proposed Route 9/West Main Street Rehabilitation and Related Work Project (Phase 1 and 2)* for the rehabilitation and expansion of the roadway surface along Route 9/West Main Street from the Ware/West Brookfield Town Line east to Pierce Road in West Brookfield, Massachusetts (See Section III – Figures 1 & 2). The objective of this approximately 2.1-mile project is to upgrade the existing roadway infrastructure which includes widening to extend the service life and improve traffic flow as well as increase safety for automobiles and cyclists. Road work along Route 9/West Main Street Road in its entirety from the Ware/West Brookfield Town Line to Pierce Road is anticipated to be constructed in two phases due to proposed funding sources and availability under the Transportation Improvement Program (TIP) with the MassDOT. **Phase 1, approximately 1.1 miles, occurring between the Ware/West Brookfield Town Line (western end) to the eastern driveway of Trustees of Reservation (TOR) Rock House Reservation/parking lot west of Welcome Road, is anticipated to go to construction in the Spring of 2024.** Phase 2, approximately 1.0 miles, will be assigned TIP funding in the following year (Summer 2025) and will extend from the TOR Rock House Reservation/parking lot east to Pierce Road.

Proposed improvements include: road widening (road center will remain essentially the same); mill and overlay; providing dedicated shoulders for bicycles throughout the project; improving the existing storm drainage system structures and installing/replacing deep sump catch basins and reinforced concrete pipes in some locations; and, construction of retaining walls and slope stabilization as identified on proposed Site Plans (See Section V). Safety improvements include installing guardrails, new signs and recessed polyurea pavement markings/stripping throughout the roadway corridor for improved automobile awareness.

The project qualifies under the Massachusetts Department of Environmental Protection (DEP) Wetlands Protection Act (WPA) (310 CMR 10.00) as a limited project under 310 CMR 10.53(3)(f) – *Maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving drainage systems.* The proposed roadway design project, which involves lane widening up to a 5-6 feet on either side, slope stabilization, vegetation clearing/thinning as well as installation of erosion and sediment control (ESC) measures, will occur predominantly within existing paved surfaces and maintained roadway shoulders and has been developed to reduce impacts to wetland resource areas to the greatest extent practicable. Temporarily disturbed wetland resource areas along roadsides will be restored in-kind with existing conditions, and permanent disturbance will be replicated chiefly within adjacent areas along the associated resources. Work is proposed to occur within Bordering Vegetated Wetlands (BVW), Inland Bank (Bank) and their associated 100-foot buffer zones as identified in Section 3.1.1 and 3.1.2. The project proposes to improve existing water quality/drainage patterns by installing deep sump catch basins/manholes and new reinforced concrete pipes and constructing retaining walls and/or slope stabilization practices.

Environmental permitting associated with the project involves filing this NOI with the DEP and Town of West Brookfield Conservation Commission as well as an Environmental Notification Form (ENF) with the Massachusetts Environmental Policy Act (MEPA) under the Executive Office of Energy and Environmental Affairs (EOEEA). A U.S. Army Corps of Engineers (Corps) Massachusetts General Permit (GP) program Self-Verification Notification Form (SVNF) will be required for minor work within wetlands and waterbodies as well.

Table 1				
Proposed Resource Area Impacts & Restoration/Replication				
Route 9 – West Main Street				
Resource Area	Total Impacts	Permanent Impacts	Temp. Impacts/ Restore-Replicate	Change
BVW ¹	0.0032 ac (140 sf)	0.0014 ac (63 sf)	0.007 ac (300 sf) ¹	+ 0.0004 ac (17 sf) ¹
LUW/LUWW ¹	385 sf	0 ft	385 ft	0 ft
Bank ^{1,2}	80 ft	0 ft	80 ft	0 ft
Buffer Zone ³	2.38 ac (103,975 sf)	0.79 ac (34,577 sf)	1.59 ac (69,347 sf)	- 0.79 ac (34,577 sf)

¹ See Section 3.1 – Inland Wetland Resource Areas

² Intermittent waterbodies only

³ Does not include existing paved roadway

No other special resources, as identified on MassGIS data layers, are associated with the proposed project corridor, including: Bordering Land Subject to Flooding (BLSF)/FEMA Zone AE/A 100-year floodplain (See Section III, Figure 4); Areas of Critical Environmental Concern (ACEC) (See Section III – Figure 3, ACEC & Endangered Species); DEP Wellhead Protection Zones (See Section III – Figure 5, Stormwater Critical Areas); public surface drinking water supplies (Zone A or B) and/or outstanding resource waters (ORW) (See Section III – Figure 6, Outstanding Resource Waters/Public Water Supplies); Open Space and active agricultural lands (See Section III – Figure 7, Open Space); and/or, Activity Use Limitation (AUL) Sites (See Section III – Figure 8, AUL Sites).

No Estimated or Priority Habitats of rare, threatened and/or endangered species listed under the Massachusetts Division of Fisheries & Wildlife (MA DF&W), Natural Heritage Endangered Species Program (NHESP) and/or under the jurisdiction of the WPA occur within the proposed work areas for (See Section III – Figure 3, ACEC & Endangered Species and Section 3.2 below). One (1) potential vernal pool (PVP) was identified along Route 9/West Main Street according to the MAGIS NHESP habitat layer. Work is proposed in the vicinity/adjacent to but not within these PVPs and no impacts are anticipated.

Consultation/coordination was conducted with the Massachusetts Historical Commission (MHC) State Historic Preservation Officer (SHPO) to identify the presence of any significant cultural resources along the Route 9/West Main Street project alignment (See Section IV, Appendix D). No response was received by the MHC, and although various National and state-listed historic buildings/structure/sites were identified along Route 9/West Main Street east of the project alignment, no buildings/structure/sites were identified and/or will be impacted, and no significant impacts are anticipated as a result of the project.

2.0 EXISTING CONDITIONS

Route 9/West Main Street is the old State Highway and the primary east-west route through the Town of West Brookfield (See Section III, Figures 1 & 2). The project extends from the Ware/West Brookfield Town Line east approximately 2.1 miles to Pierce Road. Route 9/West Main Street along the project is classified as a Rural Principal Arterial and the existing paved roadway varies from 20 to 26 feet with 10.5 - 11.5-foot lanes and 1-2-foot paved shoulders. There are no sidewalks throughout the project corridor or signalized intersections within the project limits and the roadway's narrow and winding alignment produces limited lines of sight, which can be dangerous for bicyclists. Minor intersections along Route 9/West Main Street include Rockhurst Hill Road and it provides access to residential properties. The western end of the project occurs just east of the intersection of Route 32/Gilbertville Road that occurs in the Town of Ware. Road shoulders are unimproved throughout the majority of Route 9/West Main Street Road and stormwater runoff occurs predominantly via country drainage. Open drainage systems consist of drop inlets and/or gutter flow with outfalls often discharging directly to adjacent wetland areas and stream channels.

Land uses along Route 9/West Main Street are predominantly undeveloped, mixed coniferous-deciduous forested areas/open space with scattered rural/residential, single-family homes. A Trustees of Reservation Property (TOR), Rock House Reservation, with parking and trail access occurs on the north side of Route 9/West Main Street west of Welcome Road. Other public lands and/or land with conservation restrictions include the Massachusetts Department of Fish and Game (MA DF&G) Coy Hill Wildlife Management Area (WMA) located on the south side of the road in the central-eastern portion of the project.

Topography along Route 9/West Main Street in the project area is variable with elevations ranging from approximately 500 to over 780 feet above sea level. Steep hills/side slopes occur on the western end with more moderate topography and sporadic level benches separating hills/slopes in the central and eastern ends. The highest elevations occur in the central portion of the project with the lowest elevations present at the western end of the alignment along Route 32 at the Ware Town Line. Intermediate elevations occur at the eastern end of the alignment. Soils along the project route consist of Canton and Ridgebury fine sandy loams (0 to 35 percent slopes), Hinckley loamy sand (8 to 15 percent slopes) and Brimfield-Brookfield-Rock outcrop complex (15 to 35 percent slopes).

Route 9/West Main Street crosses various intermittent/ephemeral streams identified on the USGS Ware topographical map (See Section III, Figures 1 & 2). No FEMA Zone A 100-year floodplain areas/BLSF are associated with Phase 1.

Uplands located along Route 9/West Main Street are classified predominantly as mixed, coniferous-deciduous forest dominated in the tree overstory by Eastern white pine (*Pinus strobus*), oak (*Quercus* spp.), black cherry (*Prunus serotina*), white ash (*Fraxinus americana*), maple (*Acer* spp.), birch (*Betula* spp.), American beech (*Fagus grandifolia*) and Eastern red cedar (*Juniperus virginiana*). Road shoulders are also vegetated with seedlings and saplings of overstory tree species and various woody shrubs and vines such as staghorn sumac (*Rhus typhina*), multiflora rose (*Rosa multiflora*), common greenbrier (*Smilax rotundifolia*), fox grape

(*Vitis labrusca*) and Tartarian honeysuckle (*Lonicera tatarica*). Diverse graminoids (Family *Poaceae*) and forbs (Family *Brassicaceae*) occupy the relatively sparse understory layer comprised of Kentucky bluegrass (*Poa pratensis*), little bluestem (*Schizachyrium scoparium*), orchard grass (*Dactylis glomerata*), crabgrass (*Dactylis glomerata*), plantain (*Plantago* spp.), common dandelion (*Taraxacum officinale*), bracken fern (*Pteridium aquilinum*) and assorted mustards. Wetland resource areas along the project corridor are described in Section 3 below.

3.0 Environmental Resources/Proposed Impacts

Wetland resource areas along the project corridor (See Section V) were delineated according to the DEP publication *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act* (1985) as well as the U.S. Army Corps of Engineers (Corps) *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast* (January 2012). The Town of West Brookfield has not created a Wetlands Protection Bylaw or Regulations to date. Each resource area was delineated with nylon survey flags and labeled with a unique alphanumeric series and numbered sequentially. They include Bordering Vegetated Wetlands (BVW), Inland Bank (bank) and Land Under Water Bodies and Waterways (LUWW) to intermittent waterbodies. The 100-foot buffer zones associated with BVW and bank associated with banks of intermittent streams were not delineated in the field. Wetlands along the project corridor were delineated by Professional Wetland Scientists (PWS) from CHA Consulting, Inc. in November of 2011. The delineation was reviewed/refreshed along the road by a CHA PWS in March 2023 with essentially no changes. These resource areas and proposed impacts/restoration are described below.

3.1 Inland Wetland Resource Areas

Approximately 63 square feet (s.f.) of Bordering Vegetated Wetlands (Wetland H – 63 s.f. (Sta. \approx 61+00)) will be permanently impacted with Phase 1 as a result of work associated with grading and culvert/headwall replacement proposed under this project (See Sheet 3, Site Plans (Section V)). Another 220 s.f. (Wetland K – 22 s.f. (Sta. \approx 75+50), Wetland L – 181 s.f. (Sta. \approx 81+00); and, Wetland N – 17 s.f. (Sta. \approx 87+50) will be impacted with Phase 2 for a total of 283 s.f. This area will be mitigated by replicating approximately 300 s.f. of new wetland (See Section IV, Appendix G, Wetland Replication/Restoration Spec) within Wetland G (\approx 58 + 90). The 300 square feet (s.f.) wetland replication area will be revegetated with indigenous tree and shrub species specific to the hydrophytic communities associated with the resource areas altered and will be seeded with an indigenous emergent wetland seed mix as identified in the wetland replication plan. An additional 77 square feet of BVW proposed to be temporarily impacted for Phase 1 will be restored (Wetland H (Sta. 61+00). For Phase 2, temporary impacts to BVW (approximately 371 s.f.) will also be restored (Wetland K – 91 s.f. (Sta. 75+50), Wetland L – 70 s.f. (Sta. 81+00), Wetland N/O – 154 s.f.) (Sta. 88+00) & Wetland T – 56 s.f. (Sta. 115+50). These areas will be seeded with the indigenous emergent wetland seed mix as identified in the wetland replication plan due to the small size of the impact areas.

Table 2					
Proposed Wetland Impacts & Restoration/Replication					
West Main Street/Route 9					
Approx. Milepost (midpoint)	Wetland Series	Wetland Class. ¹	Proposed Impacts & Repl./Rest./ (sf)		Comments
			Permanent/Temporary	Replication/Restoration/	
58+90 ²	G	PFO	0 sf / 0 sf	300 sf/ 0 sf	Associated with CH-3
61+00 ²	H	PFO	63 sf /77 sf	0 sf/ 77 sf	No associated channel
75+50 ³	K	PFO	22 sf/ 91 sf	0 sf/ 91 sf	No associated channel
81+00 ³	L	PFO	181 sf/70 sf	0 sf/ 70 sf	No associated channel
88+00 ³	N/O	PFO	17 sf /154 sf	0 sf/ 154 sf	No associated channel
115+50 ³	T	PFO	0 sf / 56 sf	0 sf/ 56 sf	No associated channel
Total			283 s.f.⁵/ 448 sf	300 sf/ 448 sf	

¹Classification: PFO = Palustrine Forested

²Phase 1

³Phase 2

3.1.1 Bordering Vegetated Wetlands (Bordering)

All wetlands along the project alignment are classified as BVW defined by Wetland Series A through W and are jurisdictional under the Corps §404 Program. BVW along Route 9/West Main Street (See Section IV, Appendix F, DEP Data Forms & Appendix E, Site Photos) are classified under the general vegetative categories as palustrine forested and scrub-shrub communities. The wetland resource areas are typically defined below according to the dominant layer in the tallest category that occur within proposed project work limits. Although palustrine emergent vegetation/multiple vegetative community layers are present in all wetland resource areas, the dominant vegetation is characterized as woody species in the overstory tree and shrub layers.

3.1.1.1 Palustrine Forested Wetlands

Palustrine forested wetlands are present throughout the Route 9/West Main Street road corridor and represent the dominant wetland type. They occupy a wide range of topography from riparian corridors along high-gradient streams on steep slopes to more level benches with meandering streams. Some wetland resource areas were bisected historically when the road was first constructed, and cross drainage surface streams/swales are maintained through culverts beneath the road in many areas. Subsurface groundwater continuity is still present in most of these areas as well where culverts are not present. Storm drainage discharge/overland flow from Route 9/West Main Street directed to these areas provides additional recharge of surface and groundwater hydrology. Palustrine forested wetlands include areas as defined by series: A through W. Dominant and/or common species in the tree overstory include red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), Eastern white pine (*Pinus strobus*), slippery elm (*Ulmus rubra*), green ash (*Fraxinus pennsylvanica*), and American beech (*Fagus grandifolia*).

Scrub-shrub and emergent communities, as identified below, typically comprise the understory of these forested wetlands as well.

3.1.1.2 Palustrine Scrub-Shrub Wetlands

Palustrine scrub-shrub wetland communities along Route 9/West Main Street often occupy roadside areas that are maintained every few years and may be found adjacent to forested wetlands/swamps. They often represent transitional areas that are reverting to forested swamps and include saplings/seedlings of overstory tree species. Palustrine scrub-shrub communities are integrated within the palustrine forested wetlands and present in most of the wetland series. Dominant and common species in the shrub layer include common winterberry (*Ilex verticillata*), spicebush (*Lindera benzoin*), highbush blueberry (*Vaccinium corymbosum*), common elder (*Sambucus canadensis*), speckled alder (*Alnus rugosa*), witch-hazel (*Hamamelis virginiana*) and multiflora rose (*Rosa multiflora*). Emergent communities typically occupy the herbaceous understory layer of these wetlands as well.

3.1.2 Perennial & Intermittent Streams/Bank/Riverfront Area/Land Under Waterbodies and Waterways

Route 9/West Main Street crosses various intermittent/ephemeral waterbodies (See Section III, Figures 1 & 2). No perennial streams or Riverfront Area are associated with Phase 1. The Phase 1 project drains west to the Ware River while the Phase 2 (eastern half of the project) flows east to Brookhaven Lake and the local Quaboag River Watershed. The highpoint dividing the two localized watersheds occurs at the TOR Rock House Reservation. Ultimately, the Quaboag River flows west to join the Ware River to the west of the project and both systems feed the larger Chicopee River watershed.

Table 3					
Perennial & Intermittent Streams - Classification/Resource Areas/Impacts					
West Main Street/Route 9					
Approx. Milepost (crossing or midpoint*)	Channel Series	Class.^{1,2}	Inland Bank Perm/Temp Impacts	Land Under Water Perm/Temp Impacts	Comments
19+95	CH. 1	Int/WW	0 ft / 20 ft	0 ft / 50 ft	-
32+80	CH. 3	Int/WW	0 ft / 20 ft	0 ft / 0 ft	Associated with WFA
33+00	CH. 3	Int/WW	0 ft / 10 ft	0 ft /197 ft	Associated with WFA
41+50	CH. 4	Int/WW	0 ft /10 ft	0 ft /41 ft	Associated with WFC
58+00	CH3	Int/WW	0 ft / 20 ft	0 ft /97 ft	Associated with WFG
Total			0 ft / 80 ft	0 ft / 385 ft	-

¹Waterbody Type: Int = Intermittent

²Fishery Classification: WW = Warmwater Fishery

Bankfull/ordinary high water (OHW) channel widths are variable for the four (4) unnamed intermittent/ephemeral tributaries and typically range between 3 to less than 10 feet. Bottom materials for the streams are a combination of silt/sand/gravel with cobbles and large

rocks/boulders/bedrock, typically increasing in percent composition with increasing slope gradient and/or stream size. Neither Piece Brook nor any of the unnamed intermittent streams along the project alignment are classified as high-quality waters/cold water fisheries according to the Massachusetts Division of Fisheries and Wildlife (MA DF&W).

No intermittent stream culverts are proposed for replacement/improvements for this project. Inland bank associated with road widening, replacement of stormwater structures and/or construction with headwall repair/replacement will be temporarily impacted, approximately 80 linear feet (l.f.), with 20 l.f. temporary - Channel 1 (Sta. \approx 19+95), 30 l.f. temporary - Channel 3 (Sta. \approx 33+00), 10 l.f. temporary - Channel 4 (Sta. \approx 41+50), and 20 l.f. temporary - Channel 3 (Sta. \approx 58+00), due to road widening, replacement of stormwater structures and/or construction of headwalls as identified on Site Plans (See Site Plans, Section V). The proposed stone for pipe ends will stabilize outlets and reduce erosion of adjacent slopes.

Impacts to Land Under Water (LUW) are also associated with road widening, replacement of stormwater structures and/or construction with headwall repair/replacement, approximately 415 s.f. For Phase 1 (385 s.f.), temporary impacts include: Channel 1 – 50 s.f. (Sta. \approx 19+95), Channel 3 – 197 s.f. (Sta. \approx 33+00), Channel 4 – 41 s.f. (Sta. \approx 41+50) and Channel 3 – 97 s.f. (Sta. \approx 58+00).

Proposed roadway and storm drainage system improvements will result in no alteration to Riverfront Area.

3.1.3 Bordering Land Subject to Flooding

A review of the Federal Emergency Management Act (FEMA) Federal Insurance Rate Maps (Panel #250346 0010B and 0005B; 06/01/82) for the Town of West Brookfield indicates that no 100-year floodplain (Zone A), classified under the WPA as Bordering Land Subject to Flooding (BLSF), occur on Phase 1 of the project (See Section III, Figure 4). Therefore, no FEMA 100-year floodplains/BLSF will be impacted as a result of this project and no compensatory storage is required.

3.1.4 Buffer Zone

Proposed work along the Phase 1 Route 9/West Main Street road corridor, including roadway improvements/widening and drainage improvements will take place within the 100-foot buffer zone to BVW and bank of intermittent streams jurisdictional under the DEP WPA (310 CMR 10.54 and 10.55, respectively). Approximately 4.45 acres (194,196 s.f.) of alteration will occur, although much of this area 2.07 acres (90,221 s.f.), occurs as existing paved road surface. Approximately 0.79 acres (34,577 s.f.) of new impervious area is proposed within the 100-foot buffer zone with 1.59 acres (69,347 s.f.) of temporary impact to be restored following construction. Proposed work occurs on both sides of Route 9/West Main Street and is the result of roadway/lane widening, curb installation, vegetation clearing/thinning as well as installation of ESC measures. Road stormwater drainage patterns will not be significantly altered since existing storm drainage culverts project-wide will not be replaced. Although the majority of existing catch basins will be replaced with new deep sump catch basins associated with road improvements, discharge points will be consistent with the existing drainage design. Erosion

and sedimentation control (ESC) measures will be placed at the limits of work, as seen on the project Site Plans (Section V), to prevent sediment from entering wetland resource areas, and all pervious areas will be stabilized with vegetation and/or appropriate roadside treatments such as retaining walls, modified rock fill, etc.

3.2 Other Federal, State and Local Resources

3.2.1 Wildlife Habitat

A review of the MA DF&W NHESP Massachusetts Natural Heritage Atlas (August 2021 edition) and MassGIS Website (2023) for the Estimated and Priority Habitat Layer under the jurisdiction of the WPA and/or MESA, respectively, for the Ware Quadrangle indicate that there are no designated habitats of rare, threatened and/or endangered species or certified vernal pools along the Phase 1 Route 9/West Main Street project alignment within the Town of West Brookfield (See Section III, Figure 3). One (1) potential vernal pool (PVPs) was identified south of the project route from the MAGIS database associated within Wetland Series G (approximate Sta. 60+00). However, no PVPs were identified during the wetland evaluation/delineation. The pool is not certified under the MA DF&W/NHESP but does receive protection under the WPA as part of the larger Wetland Series G. Although proposed Route 9/West Main Street road improvement work is located adjacent to this area, no work is located within the vicinity and no long-term impacts are anticipated to this area. Installation of ESC measures prior to any work will control stormwater discharges during the construction period. A site investigation can be conducted in the spring to identify if this potential resource area is used by vernal pool species.

The Corps recognizes vernal pools, regardless of designation by the NHESP. Minimization/avoidance to the greatest extent practicable, monitoring during the construction phase of the project, incorporation of Best Management Practices for sedimentation and erosion control measures and/or barrier fencing will help to avoid adverse impacts to vernal pool habitat and their designated wildlife habitat.

3.2.2 Outstanding Resource Waters/Surface & Ground Water Supply

No surface drinking water supplies (Zone A and B) or outstanding resource waters (ORW) and/or DEP Zone I, II or Interim Wellhead Protection Areas (See Section III – Figure 6, Outstanding Resource Waters/Public Water Supplies) occur along the project to route.

As discussed in Section 3.2.1, one (1) potential vernal pool (PVPs) was identified during the wetland evaluation/delineation. The pool is not certified and therefore not designated as Class B outstanding resource waters by the DEP but may be jurisdictional under the Corps. No direct or long-term impacts are anticipated to this area as a result of the road improvements, and installation of ESC measures prior to any work will control stormwater discharges during the construction period.

3.2.3 Historic and Tribal Cultural Resources

Various National Register of Historic Places (NHRP) and state-listed historic buildings/structure/sites are listed along Route 9/West Main Street according to the Massachusetts Historical Commission (MHC) State Historic Preservation Officer (SHPO). However, the buildings/structure/sites were identified east of the project alignment. Consultation/coordination was conducted with the MHC SHPO and the Town of West Brookfield Historical Commission (WBHC) to identify the presence of any significant cultural resources along the Route 9/West Main Street project alignment (See Section IV, Appendix D). No response was received by the MHC or WBHC and no buildings/structure/sites are anticipated to be adversely impacted the proposed project since the proposed road rehabilitation will remain within or immediately adjacent to the paved Route 9/West Main Street and limited to slope grading, including rockfill slopes and walls.

3.2.4 Public Shade Trees

Approximately 16 individual public shade trees (Phase 1 – 9; Phase 2 – 7), identified as those individuals of 14-inch diameter at breast height (Massachusetts Environmental Policy Act Regulations (MEPA) 301 CMR 11.00), within and adjacent to the Route 9/West Main Street public road right-of-way, will be removed as a result of roadway reconstruction/widening. No sidewalks or pedestrian infrastructure occur along these sections of Route 9/West Main Street and individual roadside forest trees were not identified in these areas. Clearing of public shade trees has been avoided to the greatest extent practicable, although due to the roadway widening, losses cannot be avoided. No trees are proposed to be replanted along Route 9 since clearing occurs predominantly within/adjacent to existing forested areas and there is little room for replanting. The proposed clearing will remove narrow bands of trees at the forest edge. The road surface will be expanded out to the new forest edge, leaving only narrow strips of road shoulder not suited for planting new trees/shrubs due to potential root restriction adjacent to pavement, and vegetation may represent potential visual safety hazards for vehicle operators. The Town of West Brookfield reviewed this section of Route 9 for a High Conservation Value Forest Assessment and determined that it contained none of the six (6) high value indicators. Public shade trees along the project route will be armored for protection as needed per location along the road and workspaces.

In addition, the Town of West Brookfield has agreed to plant and care for 16 public shade trees to replace those over 14-inch diameter that are proposed to be cleared. A MassDOT Specification form as well as a care and maintenance instruction document will be included in Appendix I for these replacement trees. The West Brookfield HD has identified a suitable location along Foster Hill Road in which to plant the new trees within the Quaboag River riparian zone. It can correspond with MassDOT and/or the West Brookfield Conservation Commission to identify particular species and locations of the plantings in this location.

3.2.5 Invasive Species Control

In terms of invasive and weedy species, their presence is limited along the project. Noxious species such as Japanese Knotweed (*Polygonum japonicus*) were not observed along the Route 9 project alignment. Invasive shrubs, such as multiflora rose and Tartarian honeysuckle, exist with

low coverages and indigenous communities are predominantly healthy and prevent the spread these invasives along the road. There are minimal areas for invasive species eradication along the project corridor. Nevertheless, invasive plant species special control provisions for the project, prepared by the MassDOT and located under the Landscape and Environmental Special Provisions (<https://www.mass.gov/lists/landscape-design-and-roadside-maintenance>), will be incorporated into the project contract.

4.0 PROPOSED ROAD IMPROVEMENTS AND RELATED WORK

The proposed road improvements will greatly enhance the service life of Route 9/West Main Street as well as increase the safety of the roadway for bicycle and automobile traffic. Repair/replacement to the stormwater drainage system and treatment structures have been incorporated into the project to improve sediment removal and drainage within the project corridor. BVWs impacted by the project will be replicated and work within the 100-foot buffer zone of wetland resource areas/bank will not result in significant adverse impacts to these resource areas.

4.1 Roadway Cross Section

Due to the pavement surface deficiencies, the proposed pavement rehabilitation technique is to cold plane and overlay with isolated full depth reconstruction and box widening throughout the length of the project. There will be approximately 9-foot widenings of the roadway to accommodate 12-foot travel lanes in each direction and 5-foot minimum shoulders on both sides. There are expected to be minimal impacts to existing Right-of-Way limits. Proposed improvements to existing drainage infrastructure will remove standing water from the roadway edges and reduce sheet flow potential. These improvements will also reduce, eliminate or treat direct surface discharge into nearby wetlands and Brookhaven Lake.

4.2 Bicyclist Facilities

There are currently no sidewalks within the project limits and pedestrian traffic is anticipated to be limited since Route 9/West Main Street does not represent a connection between dense residential areas along this section of roadway. Widening Route 9/West Main Street will improve bicycle accommodations by increasing space for both modes of transportation to safely share the roadway with a minimum of 5-foot shoulder provided throughout the project. New signage and pavement markings will also be installed throughout the corridor for improved bicycle and automobile awareness.

4.3 Stormwater Drainage and Culvert Improvements

The existing Route 9/West Main Street drainage system is primarily country drainage with paved and vegetated waterways directing surface runoff to low-lying areas, many of which are wetland areas. Although drop inlets/head walls are present in some locations, the lack of

drainage infrastructure results in sheet flow of storm water runoff across the roadway causing icy conditions during winter months.

Proposed cold plane and overlay with isolated full depth reconstruction and box widening will not involve culvert replacement. However, most catch basins along sections of the road with the open drainage systems have deteriorated and will be replaced in-situ or adjacent to. The 2.1-mile project (Phase 1 & 2) adds additional closed drainage system infrastructure and removes or consolidates eight (8) of the forty-five (45) existing discharges. Eight (8) of the thirty-seven (37) proposed discharges are existing cross culverts with no closed drainage connections which are not altered from the existing condition. The remaining twenty-nine (29) proposed discharges have pre-treatment via deep sump catch basins (See Section IV, Appendix H, Stormwater Engineering Report).

Drainage alterations along the roadway will be needed to accommodate the proposed widening. The project will continue to utilize the existing “country drainage” system including paved swales, natural swales and drop inlets/catch basins where possible. Asphalt berms will be constructed on portions of the roadway along steep grades where shoulder washout may occur. Drainage structures impacted by the proposed roadway work will be adjusted accordingly, and existing structures in poor condition will be replaced as necessary.

Low impact development (LID) measures:

Low impact development techniques were evaluated for use on this project. The following is a summary explaining how the project employs LID techniques and/or why it could not be incorporated into this project.

1. No Disturbance to Wetland Resource Areas – The project includes roadway that passes through the buffer zone of bordering vegetated wetlands (BVW) and unnamed tributaries to the Ware River. The project does result in direct impacts to BVW of approximately 63 square feet and direct impacts to channel banks of approximately 30 linear feet (l.f.) (30 l.f. temporary - Channel 3 - Sta. ≈ 33+00). However, wetland replication and restoration to mitigate impacts are proposed for the project.

2. Site Design Practices – This criterion does not apply to this roadway improvement project.

3. Reduced Impervious Area – This 1.1-mile project (Phase 1) increases the total impervious area by approximately 1.3 acres which is primarily associated with the construction of bike lanes/shoulders in order to satisfy MassDOT’s Healthy Transportation Policy Directive and improve safety for all roadway users.

4. Minimizing disturbance to existing trees and shrubs – This project minimizes disturbance to existing vegetation by grading to meet existing conditions as quickly as possible at the limit of work. Retaining walls are also proposed in some locations. Tree protection is included in the plans to minimize disturbance to existing trees.

5. LID Site Design Credit Requested – This criterion does not apply to this roadway improvement project.

6. Use of “country drainage” versus curb and gutter conveyance and pipe – Country drainage has been incorporated in the project to the maximum extent practical. This will include regrading roadway shoulders throughout the project corridor which have aggraded over time and thus no longer allow sheet flow off the pavement as intended.

7. Constructed Stormwater Wetlands (include Gravel Wetland designs) – Stormwater wetlands were not employed on this project due to limited available space within the ROW and wetlands located adjacent to the project.

8. Treebox Filter – Treebox filters were not employed on this project due to limited space for new plantings.

9. Water Quality Swale & Grass Channel – Water quality swales were not employed on this project due to limited available space within the ROW and wetlands located adjacent to the project.

10. Green Roof – This criterion does not apply to this roadway improvement project.

4.4 Safety Improvements

Safety improvements are proposed throughout the Route 9/West Main Street project limits. Lane widths are designed to meet MassDOT minimum requirements for rural principal arterials and the overall widening of the roadway to 34 feet minimum will improve safety for vehicles and cyclists while maintaining the existing rural character of the roadways. Cutting back slopes, removing ledge and clearing roadside vegetation will remedy sight distance issues along horizontal curves.

Shoulder widths are a minimum of 5-6 feet, which is MassDOT standard minimum for bicycle accommodations. The primary objective of this project is to improve the safety for vehicles and bicycles. This section of roadway has experienced 30 accidents over a four-year stretch (2007-2010) as well as a fatality in 2001. The widening proposed is to provide paved shoulders meeting design standards to improve the safety for roadway users. Recessed polyurea pavement markings are proposed to delineate the traveled ways and shoulders. Existing traffic signs that are in poor condition, or that are not warranted, will be removed. New regulatory and warning signs, conforming to the provisions of the Manual on Uniform Traffic Control Devices (MUTCD) and MassDOT, will be installed. These signs will be consistent with the proposed roadway design.

5.0 PROPOSED GENERAL CONSTRUCTION SEQUENCE

The following section provides construction details and highlights the general construction sequence and timing of earthmoving activities. Specific construction phases are undetermined at this time. However, with long, linear projects and active road systems, the construction sequence is typically applied to a discrete segment(s) of roadway, and construction is completed for one or

more segments, depending on the number of construction spreads, before work is begun on the next segment(s).

5.1 Minor Clearing

Clearing operations will include the removal of trees, shrubby vegetation and other organic materials within the construction workspace. Clearing methods employed will be dependent on vegetation density and topography. Vegetative clearing will be conducted either by hand or with mechanized cutting equipment. Prior to the commencement of clearing activities, the limits of clearing will be identified in accordance with the construction drawings. All construction activities and ground disturbance will be confined to the workspace as depicted on the construction drawings. Vegetation will be removed and disposed of offsite in approved locations in accordance with the MassDOT and the West Brookfield Highway Department (WBHD).

5.2 Erosion & Sediment Control/Drainage System Protection

Erosion and sediment control (ESC) measures (compost filter tubes/socks, silt fence, etc.), approximately 4,500 linear feet as seen on project alignment drawings, will be installed at the limits of the work areas prior to the commencement of construction activities. They will be located adjacent to wetland resource areas and inland bank, within the 100-foot buffer zones of BVW and bank (See Section V, Site Plan). Existing catch basins/storm grates and drop inlets that are not proposed to be replaced will be surrounded with compost filter tubes, crushed stone and/or protected with silt sacks during construction to control the flow of sediment-laden water off-site.

5.3 Grading, Excavation & Storm Drainage Repair/Replacement

During this phase of construction, minor grading and excavation will take place to prepare for road widening along Route 9/West Main Street as well as for the repair/replacement/installation of stormwater drainage structures (catch basins, drop inlets, culverts and headwalls). If suitable topsoil is found, it will be removed and stockpiled in approved upland areas. The stockpiled topsoil will be protected with compost filter tubes and/or temporarily seeded until ready for use on an as needed basis.

Old pavement (bituminous concrete) will be cold planed from the upper road layers and reclaimed to the sub-foundation along Route 9/West Main Street across the existing roadway footprint during this phase of construction. Pavement may be discarded in environmentally appropriate locations as designated by the MassDOT and/or approved by local and state regulatory agencies, or be reused as sub-base materials for new pavement. Excavation of the roadways sub-foundation will occur in the isolated locations proposed for box widening.

For the Phase 1, five (5) existing cross culverts beneath Route 9/West Main Street associated with intermittent streams (two crossings of Channel 3) will not be replaced/upgraded. Of the three (3) culverts associated with wetlands (exclusive of streams), none will be replaced/upgraded. Additionally, five (5) headwalls associated with channels and/or wetlands are proposed to be replaced with various structures: three (3) headwalls (two (2) channels/one (1)

wetland) and two (2) retaining walls (two (2) channels/wetlands). All proposed replacements will be in-situ and/or within 11 feet of the existing structures (See Section IV, Appendix H, Stormwater Engineering Report).

5.4 Road Construction/Stormwater Drainage Repair/Replacement

Pavement mill and overlay and box widening is proposed predominantly for Route 9/West Main Street although full depth construction is proposed for some sections. Following repair/replacement of open and closed drainage systems, preparation of the sub-foundation of the roadway (box widening) and road extensions will be completed, and the various layers of the road base will be installed. This generally includes a layer of gravel borrow overlain by a second layer of dense graded crushed stone. A base course of hot mix asphalt underlies the actual road surface that is generally composed of asphalt pavement. Thickness and consistencies of layers vary depending on use. Recessed polyurea pavement markings will be applied as the final step in roadway construction.

5.5 Site Stabilization

The final phase of the project is the restoration and stabilization of all exposed surfaces. Side slopes/road aprons will be composted/loamed and seeded and other exposed areas will be composted/loamed and seeded and/or landscaped where applicable. For slopes steeper than 2:1, modified rockfill with compost, seed and geotextile fabric will be applied. In the event that weather conditions prevent final restoration with vegetation, temporary erosion and sedimentation control measures will be employed until the weather is suitable for final cleanup. A final inspection will ensure that the project site is cleared of all project debris and that vegetation is well established or erosion and sedimentation controls are functioning properly. Erosion controls will not be removed until the site is stabilized and the final inspection is complete.

5.6 Monitoring and Maintenance

The contractor shall conduct follow-up inspections of all disturbed areas after the first and second growing seasons to determine the success of revegetation. Revegetation shall be considered successful if the vegetative cover is sufficient to prevent the erosion of soils on the disturbed workspace. Sufficient coverage is defined when vegetation has a uniform 75% vegetative coverage. If sufficient vegetative cover has not been achieved or if there are excessive invasive/noxious weeds after two full growing seasons, the Project Manager, Superintendent, or Environmental Inspector will be consulted to determine the need for additional restoration measures.

A final inspection will ensure that the project site is cleared of all project debris and that erosion and sedimentation controls are functioning properly. ESC measures will not be removed until the final inspection is complete, and a certificate of compliance is issued.

6.0 ALTERNATIVE ANALYSIS & REGULATORY COMPLIANCE

This proposed road improvements work qualifies as a limited project (310 CMR 10.53(3)(f)). No Riverfront Area occurs along Phase 1, but an alternative analysis was prepared to consider avoidance and minimization to jurisdictional resources areas under the WPA. Proposed work authorized as a redevelopment under the WPA will improve overall existing environmental conditions of to perform the capacity and function as identified in the WPA, and adverse impacts are to be minimized and mitigated to the greatest extent feasible. Alternatives considered to reduce/mitigate overall impacts to BVW, Inland Bank/Land Under Waterbodies and Waterways and the 100-foot state buffer zone and are identified in Section 6.1 below. Regulatory compliance with other jurisdictional wetland resource areas (Section 6.2) are also discussed.

6.1 Alternatives Analysis

Route 9/West Main Street Phase 1 crosses only intermittent waterbodies (See Section III, Figures 1 & 2). However, an alternative analysis was prepared to consider avoidance and minimization to jurisdiction resources areas under the WPA for this limited project (310 CMR 10.53(3)(f)).

6.1.1 No Action Alternative

The “no action” alternative represents the status quo with no proposed road improvements. The objective of this approximately 1.1-mile project is to upgrade the existing roadway to extend the service life and improve traffic flow as well as increase safety for cyclists and automobiles. Proposed improvements include: road widening (road center will remain essentially the same); installing new deep sump catch basin structures/pipe and repairing/replacing existing structures (drop inlets/culverts/headwalls) and swales along Route 9/West Main Street); and, safety improvements such as installing new signs and pavement markings. The “no action” alternative will not extend the service life of Route 9/West Main Street and/or improve vehicular and bicycle safety along the roadway.

6.1.2 Resurfacing/Limited Roadway

One alternative is to reduce the scope of the project to improve only the existing roadway and not widen the road or improve the stormwater drainage system/structures. Proposed mill and overlay resurfacing of the existing roadway would extend the surface life of Route 9/West Main Street. However, although the pavement is in fair condition with sections of light to moderate cracking including alligator, edge, longitudinal, and transverse, some sections require full depth reconstruction and there is also shoulder deterioration where there is no edge treatment present along some segments. Excavation of the pavement and portions of the roadbed will be required, and repair/replacement of the existing culverts, drop inlets, and/or headwalls is necessary to avoid future deterioration of the road foundation and adjacent side slopes as a result of potential headwall failure. In addition, this option will not achieve the project goals of restoring storm water quality/control or improving traffic flow as well as bicycle and vehicular safety along Route 9/West Main Street.

6.1.3 Culvert Replacement/Storm Drainage Improvement Best Management Practice (BMPs)

Other alternatives included upgrading the existing “country” stormwater drainage system along Route 9/West Main Street. It currently exists with sections of open gutter flow and drop inlets/culverts/headwalls with outfalls discharging directly to adjacent uplands and wetland resource areas/stream channels in some areas. However, creating a closed drainage system for the entire project was not considered for the scope of the project due to the incremental cost for this option. The project will be constructed using MassDOT TIP funding, and there is insufficient budget for construction of a closed drainage system project-wide.

Upgrading culverts/headwalls associated with intermittent streams in accordance with the Massachusetts River and Stream Crossing Standards (2011) was also examined. Some of these riparian systems are tied into the existing “country” stormwater drainage systems as well. However, replacement of existing concrete culverts with three-sided concrete box culverts, and requisite flood studies necessary to identify appropriate culvert sizing, were not incorporated into the scope of this study due to economic considerations. Extending the service life of Route 9/West Main Street and increasing safety for cyclists and automobiles utilizing the road are the primarily goals for this project.

Adding stormwater retention/detention basins to improve stormwater collection and water quality was also considered. An approximately 2,700 s.f. bioretention area with forebay was initially proposed in the early stages of the project at the western end of Phase 1 north of Route 9 near Station 34+50. This basin was designed for flood dissipation and infiltration. However, it was later rejected due to the presence of ledge and the requirement of clearing a forested area near Channel 3, located in that area.

6.1.4 Route Alternatives

Rerouting Route 9/West Main Street to avoid special resource interests is not a practical alternative. Acquisition will be difficult and costly due to existing residential and/or conservation properties along the project route as well as steep gradient road shoulders along some sections. Moreover, the continuity of Route 9/West Main Street precludes avoidance of linear features such as streams and wetlands, areas of significant acreage such as the MA DF&G Coy Hill Wildlife Management Area and private/conservation properties such as the TOR Rock House Reservation located north of the road. New road rights-of-way in undisturbed areas could create greater impacts and subdivide intact wetland resource areas into smaller parcels. Road widening is based off of the existing road corridor and the road center will remain essentially the same with minor widening on either side.

6.1.5 Buffer Revegetation and Invasive Species Control

The addition of native tree and shrub plantings in temporarily disturbed areas as well as the removal of invasive species with replacement by indigenous vegetation were also considered. However, roadside edges are mostly forested along this section of Route 9. Proposed clearing will remove narrow bands of trees at the forest edge. The road surface will be expanded out to

the new forest edge, leaving only narrow strips of road shoulder not suited for planting new trees/shrubs due to potential root restriction adjacent to pavement, and vegetation may represent potential visual safety hazards for vehicle operators. It should be noted in Section 3.2.4 that 16 public shade trees will be planted in the town to replace those over 14-inch diameter that are proposed to be cleared along Route 9.

In terms of invasive and weedy species, their presence is limited along the project. Noxious species such as Japanese Knotweed (*Polygonum japonicus*) were not observed along the Route 9 project alignment. Invasive shrubs, such as multiflora rose and Tartarian honeysuckle, exist with low coverages and indigenous communities are predominantly healthy and prevent the spread these invasives along the road. There are minimal areas for invasive species eradication along the project corridor. As noted in in Section 3.2.5, invasive plant species special control provisions for the project, prepared by the MassDOT and located under the Landscape and Environmental Special Provisions will be incorporated into the project contract.

6.1.6 Preferred Alternative

The preferred Phase 1 alternative will meet the project objective of upgrading the existing 1.1-mile roadway to extend the service life and improve traffic flow as well as increase safety for cyclists and automobiles. Proposed improvements include: road widening (road center will remain essentially the same); replacing/repairing the existing storm drainage system (drop inlets/culverts/headwalls) and installing new deep sump catch basin structures; and, safety improvements such as installing new signs and recessed polyurea pavement markings.

Environmental impacts have been minimized throughout the project to the maximum extent practical while obtaining the project objectives. The road center will remain essentially the same and road widening occurs only a few feet on either side. Sidewalks are not proposed along Route 9/West Main Street and retaining walls have been proposed in a number of locations in lieu of rock riprap slopes which will help reduce additional impacts to adjacent environmental resource areas such as BVW, bank, vernal pools, public and private lands. As identified above, stormwater drainage repair/replacement and extensions will maintain/improve the collection and treatment of stormwater post-construction. The preferred alternative represents a combination of environmental, safety and infrastructure improvements throughout Route 9/West Main Street in the Town of West Brookfield.

6.2 Regulatory Compliance – WPA Jurisdictional Areas

The Wetlands Protection Act Regulations presume that BVW and/or Inland Bank/Land Under Water Bodies and Waterways are significant to: the protection of private or public water supply, protection of groundwater, provision of flood control, prevention of storm damage, prevention of pollution as well as the protection of wildlife, fisheries and land containing shellfish. The following discussion identifies the various jurisdictional interests BVW and/or Inland Bank/Land Under Water Bodies and Waterways and how proposed roadway improvements will improve function where it has been lost/compromised or will result in no net change of its current role.

Drainage system modifications along the project (See Section IV, Appendix H, Stormwater Engineering Report Phase 1 & 2), will involve relocating/replacing/installing catch basins/inlets based on modifications to curb lines and road gradients. Within the project limits, the drainage system will be extended to the widened edge of pavement. Structures that are currently filled with debris or broken will be cleaned or replaced as needed. All new/replacement catch basins will be tied into existing outfalls. New basins will be implemented to meet MassDOT standards to improve drainage safety along the roadway and new/replacement catch basins will be installed with 4-foot sumps and will improve overall water quality associated with precipitation events along the project route.

6.2.1 Protection of Private or Public Water Supplies

Water supply is defined as any source or volume of surface or ground water demonstrated to be in public or private use or approved for public/private water supply by M.G.L. c. 111 § 160 by the Department of Environmental Protection.

No public water supplies (Zone A/B) and/or cold-water fisheries were identified along the project route. The existing stormwater country drainage will continue to discharge to vegetated areas along the roadside where natural filtration and infiltration into the soil will help protect water quality of various intermittent waterbodies. Installation of deep sump catch basins/manholes associated with the open/closed drainage systems along Route 9/West Main Street will improve overall stormwater collection and discharge of treated water in those areas.

Installation of Best Management Practice (BMPs) erosion and sediment control (ESC) measures at project limits of work and around existing stormwater features prior to ground disturbance will protect surface water resources during construction activities associated with road construction. ESC measures, approximately 5,500 linear feet as seen on project alignment drawings, will be installed at the limits of the work areas prior to the commencement of construction activities. Maintenance of ESC measures until all bare areas are fully stabilized and/or revegetated following construction in addition to long-term operation and maintenance of existing stormwater features will ensure protection to resources within the project area post construction.

6.2.2 Groundwater Supply

Groundwater supply is defined under the WPA as the water below the earth's surface in the zone of saturation. Groundwater recharge within the riparian zones of intermittent streams along this project will not change significantly as a result of the proposed roadway improvements. Most catch basins along sections of the road with the open drainage systems have deteriorated and will be replaced in-situ or adjacent to. The Phase 1 & 2 project adds additional closed drainage system infrastructure and removes or consolidates eight (8) of the forty-five (45) existing discharges. Eight (8) of the thirty-seven (37) proposed discharges are existing cross culverts with no closed drainage connections which are not altered from the existing condition. The remaining twenty-nine (29) proposed discharges have pre-treatment via deep sump catch basins. Drainage alterations along the roadway will be needed to accommodate the proposed widening. The project will continue to utilize the existing "country drainage" system including paved swales, natural swales and drop inlets/catch basins where possible. Asphalt berms will be

constructed on portions of the roadway along steep grades where shoulder washout may occur. Drainage structures impacted by the proposed roadway work will be adjusted accordingly, and existing structures in poor condition will be replaced as necessary. The proposed design will continue to discharge stormwater at similar volumes and durations to vegetated areas along the roadside where natural filtration and infiltration into the soil will help protect water quality.

6.2.3 Provision of Flood Control and Storm Damage Prevention

Storm Damage Prevention is defined as the prevention of damage caused by water from storms, including, but not limited to, erosion and sedimentation, damage to vegetation, property or buildings or damage caused by flooding, water-borne debris or water-borne ice. According to the Federal Emergency Management Act (FEMA) Federal Insurance Rate Maps (FIRM) (Panel #250346 0010B and 0005B; 06/01/82) for the Town of West Brookfield indicates that no 100-year floodplain (Zone A), classified under the WPA as Bordering Land Subject to Flooding (BLSF), occur on Phase 1 of the project (See Section III, Figure 4). Therefore, no FEMA 100-year floodplains/BLSF will be impacted as a result of this project and no compensatory storage is required.

6.2.4 Prevention of Pollution

Prevention of pollution is defined as the prevention or reduction of contamination of surface or groundwater. As previously described above and identified on the Site Plans (Section V), the installation of Best Management Practice (BMPs) erosion and sediment control (ESC) measures at project limits of work and around existing stormwater features prior to ground disturbance will protect surface water resources during construction activities associated with road construction. Maintenance of ESC measures until all bare areas are fully stabilized and/or revegetated following construction in addition to long-term operation and maintenance of existing stormwater features will ensure protection to resources within the project area post construction.

The proposed installation/replacement of deep sump sedimentation catch basins and/or manholes, will improve overall stormwater collection and discharge of treated water in these areas. The existing stormwater country drainage will continue to discharge to vegetated areas along the roadside following revegetation post-construction. Natural filtration and infiltration into the soil will help protect the water quality of various intermittent waterbodies and Pierce Brook.

6.2.5 Protection of Wildlife Habitat/Fisheries

The Route 9/West Main Street project corridor within the existing road right-of-way does not represent significant wildlife habitat in terms of food, shelter, or breeding/migration areas due to active road use and regular maintenance of the existing road right-of-way. No MA DF&W Natural Heritage Endangered Species Program (NHESP) Estimated Habitat of rare-listed species (See Section III – Figure 3), or NHESP BioMap Core Habitat as identified on MassGIS data layers occur along the proposed project route.

A review of the MA DF&W NHESP Massachusetts Natural Heritage Atlas (August 2021 edition) and MassGIS Website (2023) for the Estimated and Priority Habitat Layers under the jurisdiction of the WPA and MESA for the Ware Quadrangle indicate that there are no designated habitats of rare, threatened and/or endangered species or certified vernal pools along the Route 9/West Main Street project alignment within the Town of West Brookfield (See Section III, Figure 3).

One (1) potential vernal pool (PVP) was identified from the MAGIS database along the project route associated with Wetland Series G (approximate Sta. 60 +00) to the south. However, no PVPs were identified during the wetland evaluation/delineation. The pool is not certified under the MA DF&W/NHESP but does receive protection under the WPA as part of the larger Wetland Series G. Although proposed Route 9/West Main Street road improvement work is located adjacent to this area, no work is located within the vicinity and no long-term impacts are anticipated to these areas. Installation of ESC measures prior to any work will control stormwater discharges during the construction period. A site investigation can be conducted in the spring to identify if this potential resource area is used by vernal pool species.

No streams designated as cold-water fisheries occur along the project route or will be impacted by the proposed alignment.

6.3 Regulatory Compliance – WPA Resource Areas/Limited Projects

In accordance with the 310 CMR 10.53(3)(f) “limited project” designation under the Wetlands Protection Act (WPA) Regulations, the Commission can use its discretion in evaluating the magnitude of the wetland/resource area impacts proposed, the availability of alternatives, the minimization of adverse impacts as well as the significance of the particular wetland/resource area functions specific to the interests of the WPA to approve or deny the proposed work. As discussed below, the proposed roadway design has been developed to avoid and/or reduce impacts to wetland resource areas to the greatest extent feasible, and safety modifications for bicycle and automobile use and stormwater system renovations for pre-treatment of stormwater runoff will improve environmental and residential conditions along Route 9/West Main Street in the future.

This “limited project” proposes work within various inland wetland resource areas including: Bordering Vegetated Wetlands (BVW), Inland Bank (Bank) as well as buffer zones to BVW and Bank. Descriptions of the various wetland resource areas and proposed impacts are presented in Section 3 above. Adverse impacts are to be minimized and mitigated to the greatest extent feasible, and alternatives were considered to reduce/mitigate overall impacts to wetland resource areas and their associated 100-foot state buffer zones and are identified above (Section 6.1). Performance standards and compliance under the WPA for this limited project application are described below.

6.3.1 Bordering Vegetated Wetlands

Approximately 63 square feet (s.f.) of Bordering Vegetated Wetlands (Wetland H – 63 s.f. (Sta. ≈ 61+00)) will be permanently impacted with Phase 1 as a result of work associated with grading

and culvert/headwall replacement proposed under this project (See Sheet 3, Site Plans (Section V)). Another 220 s.f. (Wetland K – 22 s.f. (Sta. ≈ 75+50), Wetland L – 181 s.f. (Sta. ≈ 81+00); and, Wetland N – 17 s.f. (Sta. ≈ 87+50) will be impacted with Phase 2 for a total of 283 s.f. This area will be mitigated by replicating approximately 300 s.f. of new wetland (See Section IV, Appendix G, Wetland Replication/Restoration Spec) within Wetland G (≈ 58 + 90). The 300 square feet (s.f.) wetland replication area will be revegetated with indigenous tree and shrub species specific to the hydrophytic communities associated with the resource areas altered and will be seeded with an indigenous emergent wetland seed mix as identified in the wetland replication plan. An additional 77 square feet of BVW proposed to be temporarily impacted for Phase 1 will be restored (Wetland H (Sta. 61+00)). The wetlands occur along the road edges, and significant, adverse impacts to these areas are not anticipated as a result of this work.

6.3.2 Inland Bank/Land under Waterbodies and Waterways

Inland Bank

The project proposes to impact approximately 30 linear feet (l.f.) (30 l.f. temporary - Channel 3 - Sta. ≈ 33+00) of Inland Bank (Bank) associated with one intermittent stream due to road widening, replacement of stormwater structures and/or construction of headwalls and other improvements. No impacts are proposed to perennial river/stream banks. Presumptions under 310 CMR 10.54 (3) anticipate that bank functions and values are significant to the interests of the WPA. Performance standards for *removing, filling, dredging or altering* Bank under 310 CMR 10.54 (4) therefore shall not impair: physical stability, water-carrying capacity, ground and surface water quality or habitat for fisheries and wildlife. Specifically, for Banks that *provide important wildlife habitat functions*, up to 10 % or 50 l.f. alteration (whichever is less) may be allotted for a project under a standard NOI application. However, additional alteration may be allowed if no adverse effects occur to rare wildlife (310 CMR 10.60). The presumption of significance is rebuttable for the various bank functions and values.

At Channel 3 (Sta. ≈ 33+00), temporary impacts are proposed for a linear headwall replacement associated with a 92-foot long by 4 x 6 -foot box culvert on the north/downstream side of Route 9 necessary to protect the stream and road stability. A headwall with wingwalls is proposed for this area. Due to existing ledge at the crossing, the box culvert provides minimal function in terms of ground/surface water exchange, filtration for water quality purposes and does not represent habitat for fisheries or wildlife. In addition, due to ledge at the culvert outlet, there is a drop of 3 - 5 feet that prevents stream continuity for aquatic organisms beyond/upstream of this location. Bank functions and values per the WPA are limited for the channel at the road crossing location, and safety improvements for Route 9 represent a greater good. Other headwall repairs/replacements occur at Channels 1, 4, 5 and a second location in Channel 3. Similar to Channel 3 (Sta. ≈ 33+00), bank functions and values per the WPA are limited for the channels at the road crossing locations, and safety improvements for Route 9 represent a greater good.

No intermittent stream culverts are proposed for replacement/improvements for this project. Inland bank will be temporarily impacted, approximately 80 linear feet (l.f.), with 20 l.f. - Channel 1 (Sta. ≈ 19+95), 30 l.f. - Channel 3 (Sta. ≈ 33+00), 10 l.f. - Channel 4 (Sta. ≈ 41+50), and 20 l.f. - Channel 3 (Sta. ≈ 58+00), due to road widening, replacement of stormwater

structures and/or construction of headwalls as identified on Site Plans (See Site Plans, Section V). The proposed stone for pipe ends will stabilize outlets and reduce erosion of adjacent slopes.

Land Under Water Bodies and Waterways

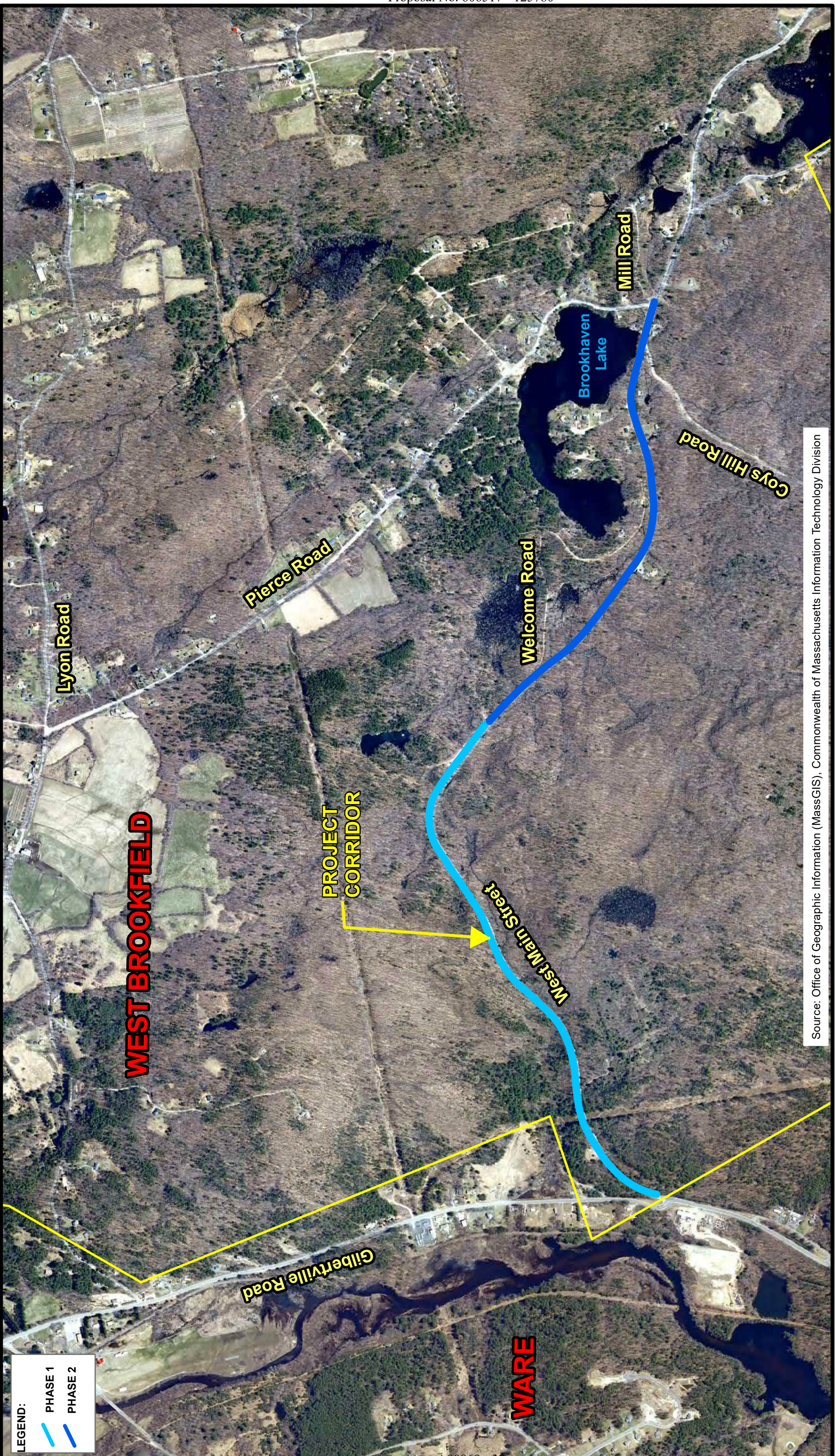
Impacts to Land Under Water Bodies and Waterways (LUWW) are also associated with road widening, replacement of stormwater structures and/or construction with headwall repair/replacement, approximately 385 s.f. For Phase 1, temporary impacts include: Channel 1 – 50 s.f. (Sta.≈ 19+95), Channel 3 – 197 s.f. (Sta.≈ 33+00), Channel 4 – 41 s.f. (Sta.≈ 41+50) and Channel 3 – 97 s.f. (Sta.≈ 58+00). However, most of this work involves equipment staging/materials within the channels themselves. All channels are intermittent and construction will be performed during dry conditions. Following construction, channels will essentially be restored in-kind and in-situ and tied into new/repaired headwalls as applicable.

6.3.3 Summary

The project qualifies under the Massachusetts DEP WPA (310 CMR 10.00) as a limited project under 310 CMR 10.53(3)(f) – *Maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving drainage systems.* The proposed roadway design project, which involves lane widening up to a few feet on either side, slope stabilization, vegetation clearing/thinning as well as installation of erosion and sediment control (ESC) measures, will occur predominantly within existing paved surfaces and maintained roadway shoulders and has been developed to reduce impacts to wetland resource areas to the greatest extent practicable. Temporarily disturbed areas along roadsides will be restored in-kind with existing conditions, and permanently disturbed wetland resource areas will be replicated chiefly within areas along the associated resources. Proposed work will improve overall existing conditions to perform the capacity and function as identified in the WPA and adverse impacts are to be minimized and mitigated to the greatest extent feasible. Therefore, significant, adverse impacts along Route 9/West Main Street are not anticipated as a result of this proposed project and the West Brookfield Conservation Commission may approve the proposed road improvements and related work with conditions as applicable.

Section III

Figures



LEGEND:

- PHASE 1
- PHASE 2

Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Information Technology Division

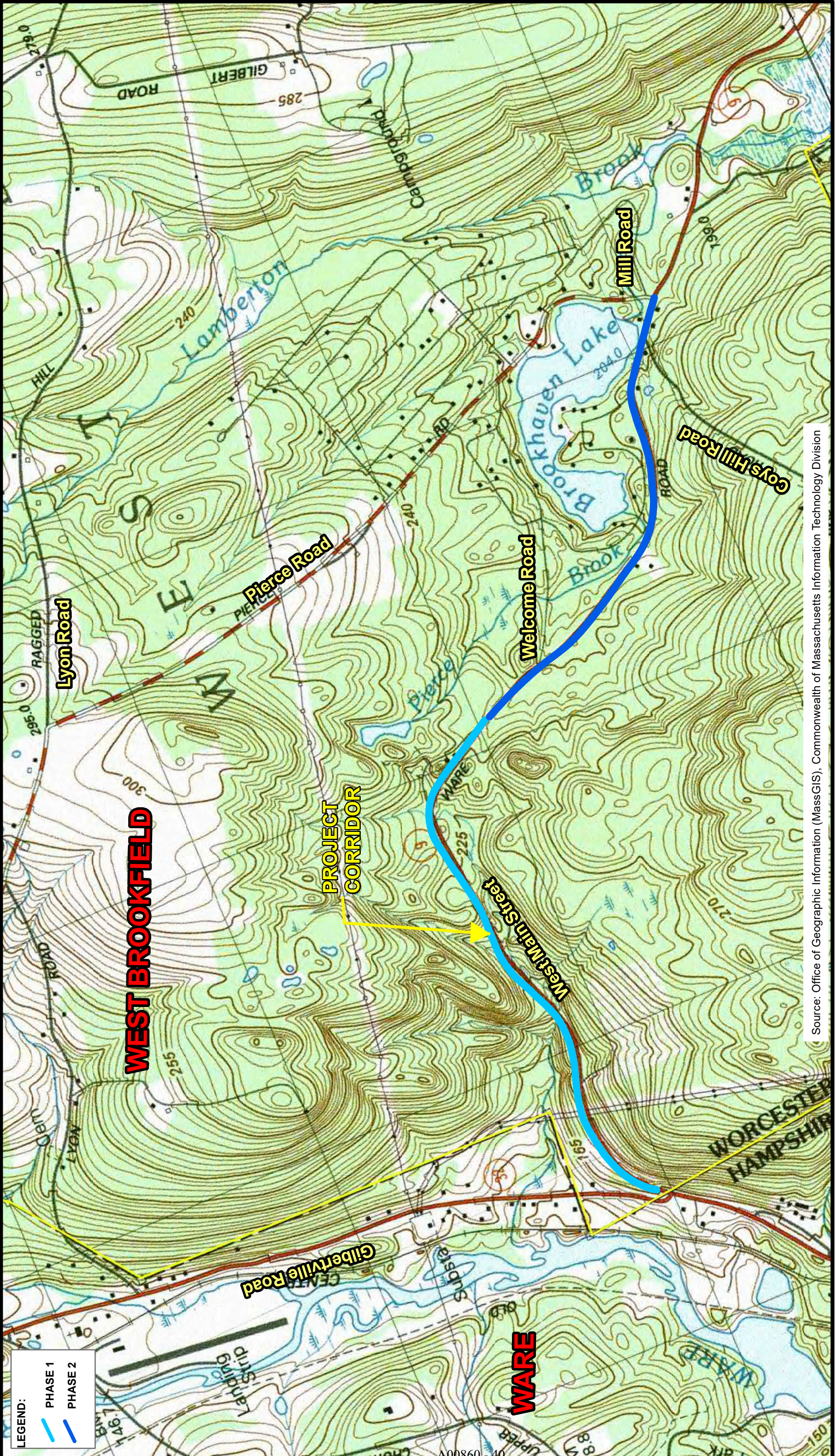
TOWN OF WEST BROOKFIELD, MA

**WEST MAIN STREET, WEST BROOKFIELD
ROADWAY IMPROVEMENTS
PROJECT ID: 606517**



Figure 1. Locus Map

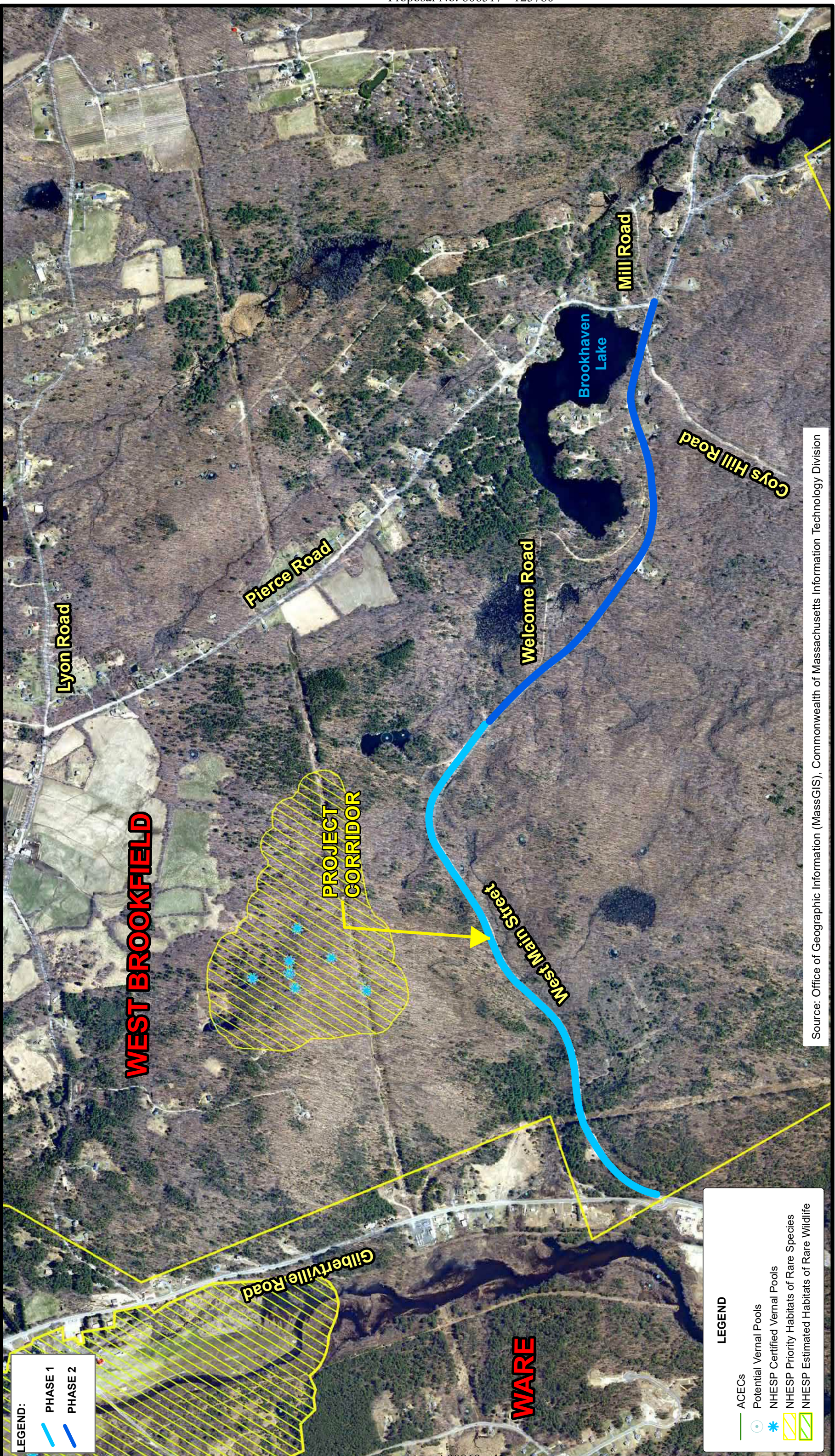




TOWN OF WEST BROOKFIELD, MA

Figure 2. Topographic Map

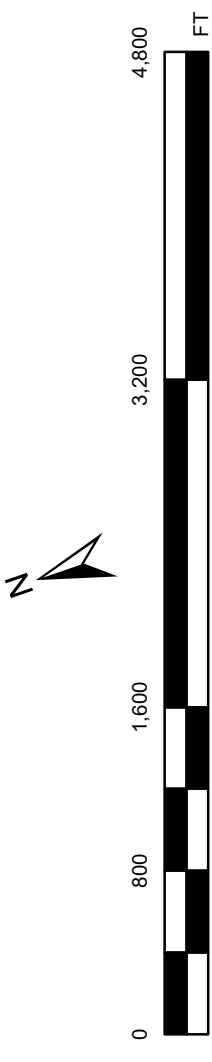




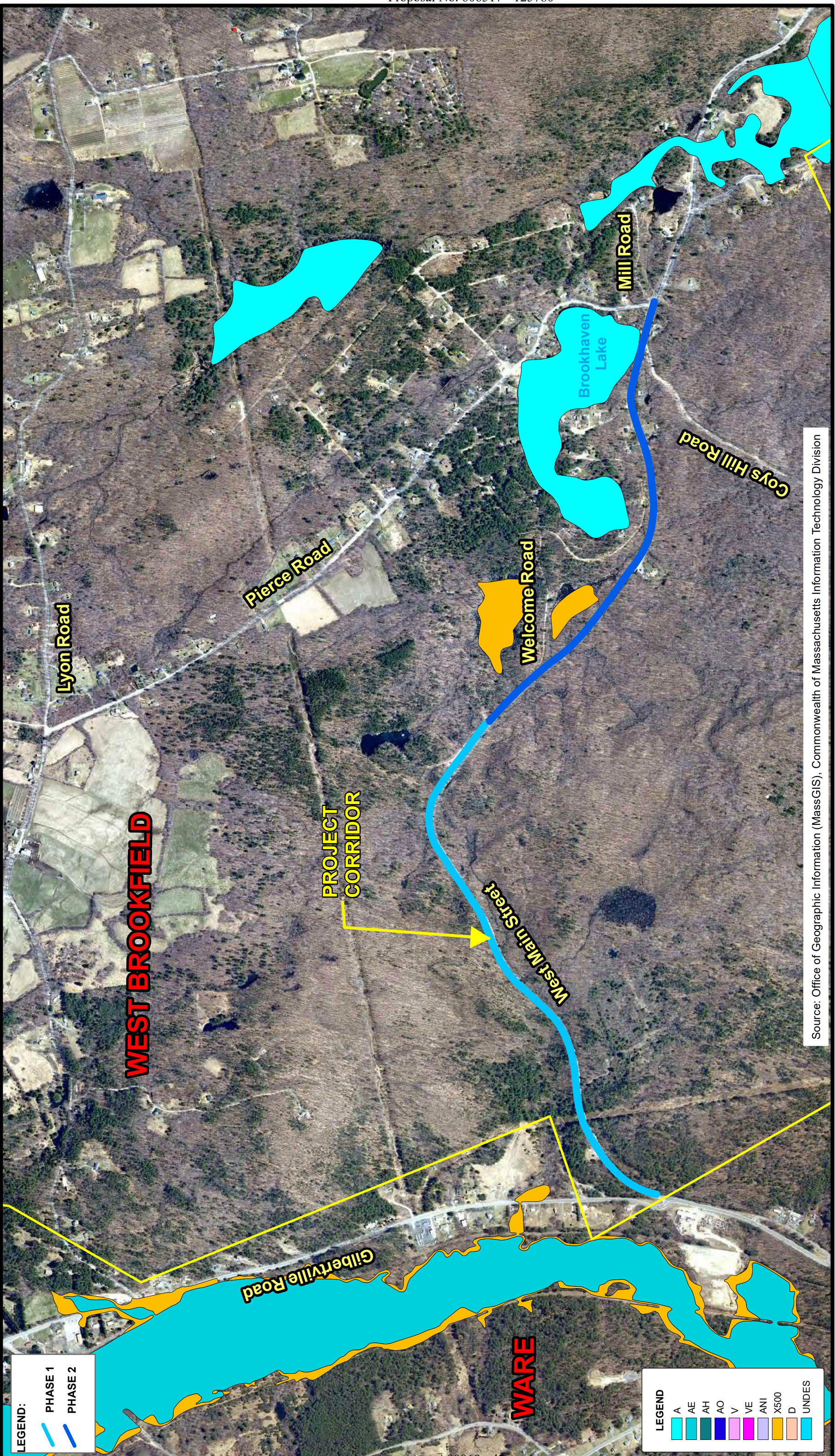
TOWN OF WEST BROOKFIELD, MA

WEST MAIN STREET, WEST BROOKFIELD
ROADWAY IMPROVEMENTS
PROJECT ID: 606517

Figure 3. ACECs & NHESP Habitats



Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Information Technology Division



LEGEND:

- PHASE 1
- PHASE 2

LEGEND

- A
- AE
- AH
- AO
- V
- VE
- ANI
- X500
- D
- UNDES

Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Information Technology Division

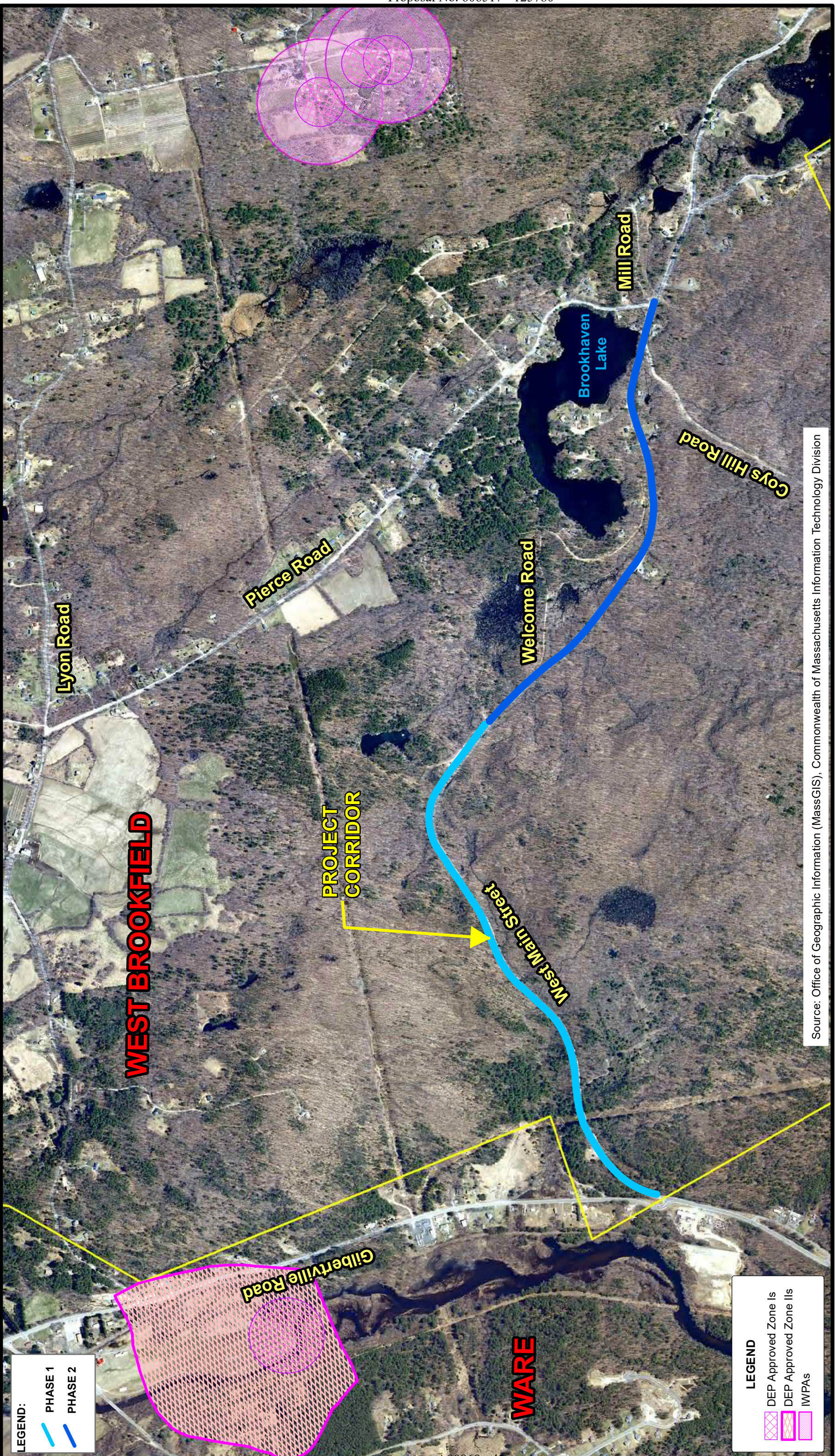
TOWN OF WEST BROOKFIELD, MA

**WEST MAIN STREET, WEST BROOKFIELD
ROADWAY IMPROVEMENTS
PROJECT ID: 606517**



Figure 4. FEMA Floodplain

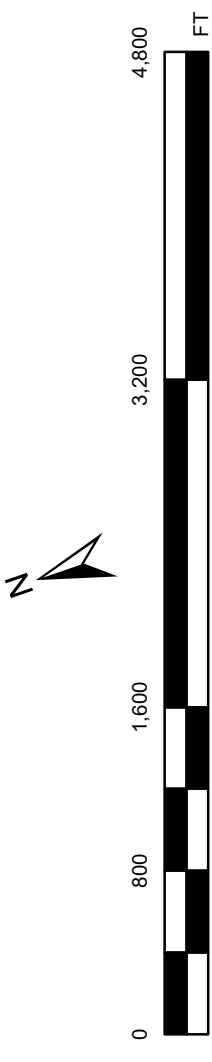


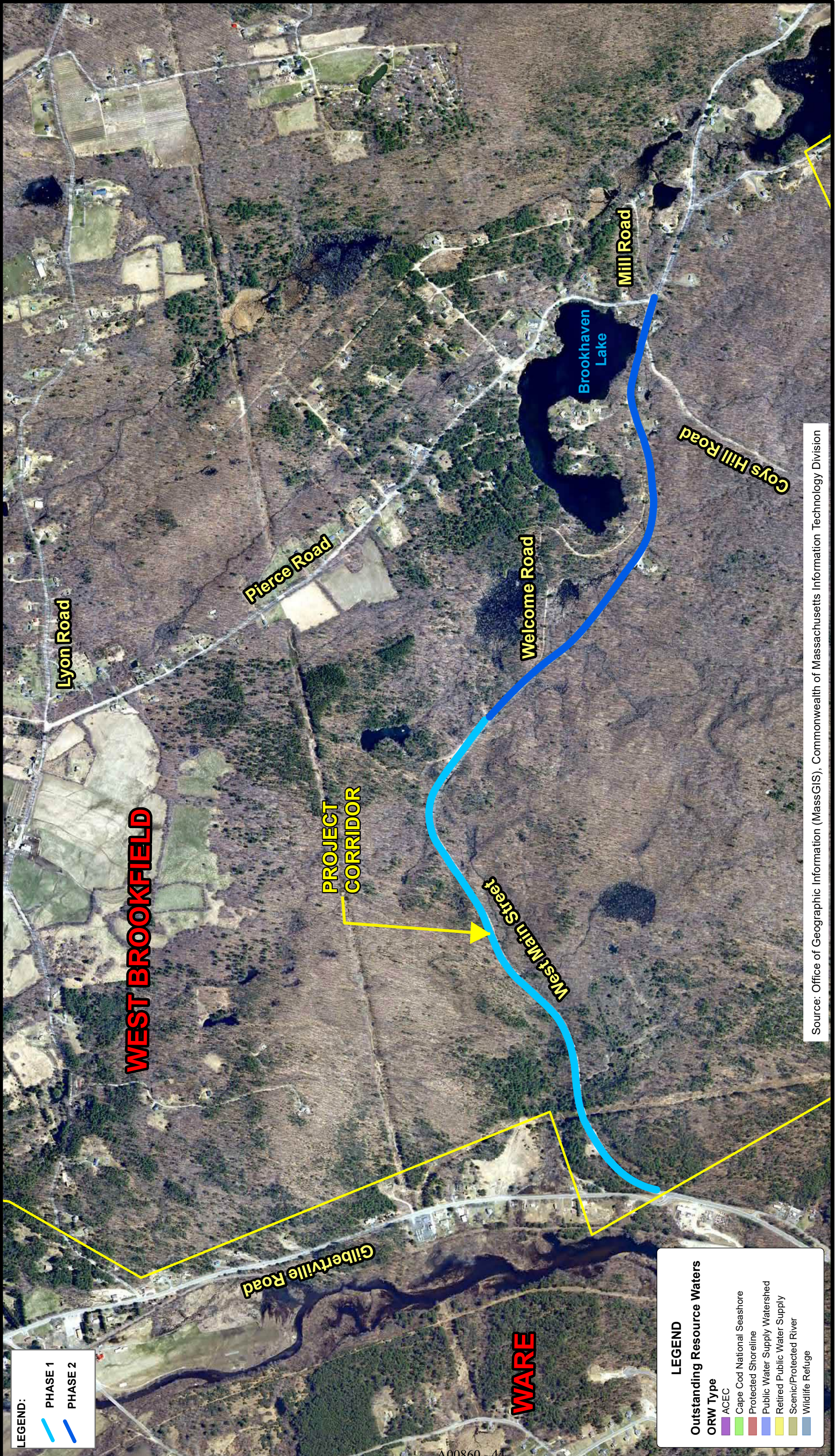


TOWN OF WEST BROOKFIELD, MA

WEST MAIN STREET, WEST BROOKFIELD
ROADWAY IMPROVEMENTS
PROJECT ID: 606517

Figure 5. Stormwater Critical Areas





LEGEND:

- PHASE 1
- PHASE 2

LEGEND

- Outstanding Resource Waters**
- ORW Type
- ACEC
 - Cape Cod National Seashore
 - Protected Shoreline
 - Public Water Supply Watershed
 - Retired Public Water Supply
 - Scenic/Protected River
 - Wildlife Refuge

Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Information Technology Division

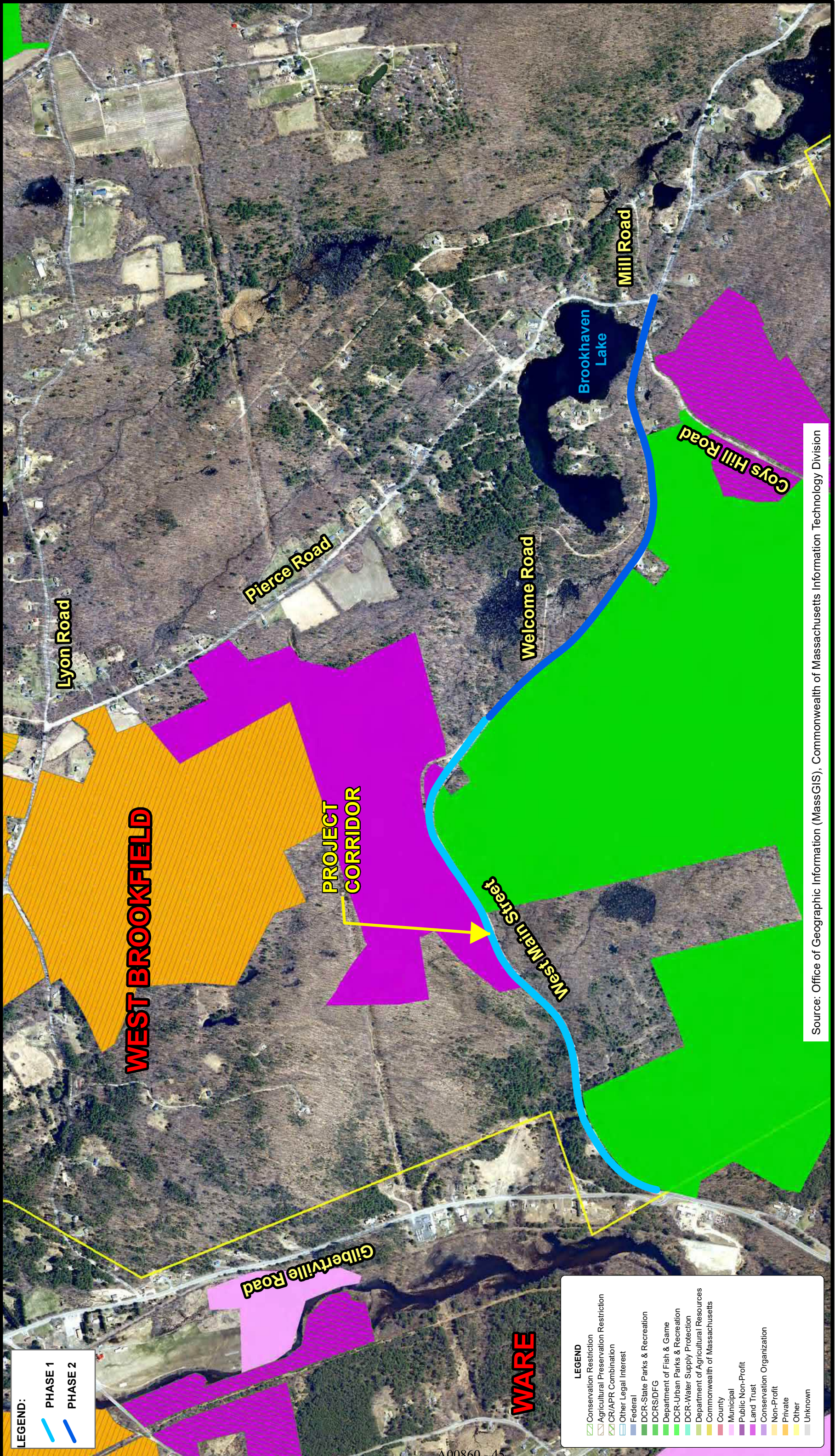
TOWN OF WEST BROOKFIELD, MA

WEST MAIN STREET, WEST BROOKFIELD ROADWAY IMPROVEMENTS
PROJECT ID: 606517



Figure 6. Outstanding Resource Waters





LEGEND:
 PHASE 1
 PHASE 2

LEGEND

- Conservation Restriction
- Agricultural Preservation Restriction
- CR/APR Combination
- Other Legal Interest
- Federal
- DCR-State Parks & Recreation
- DCRS/DFG
- Department of Fish & Game
- DCR-Urban Parks & Recreation
- DCR-Water Supply Protection
- Department of Agricultural Resources
- Commonwealth of Massachusetts
- County
- Municipal
- Public Non-Profit
- Land Trust
- Conservation Organization
- Non-Profit
- Private
- Other
- Unknown

Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Information Technology Division

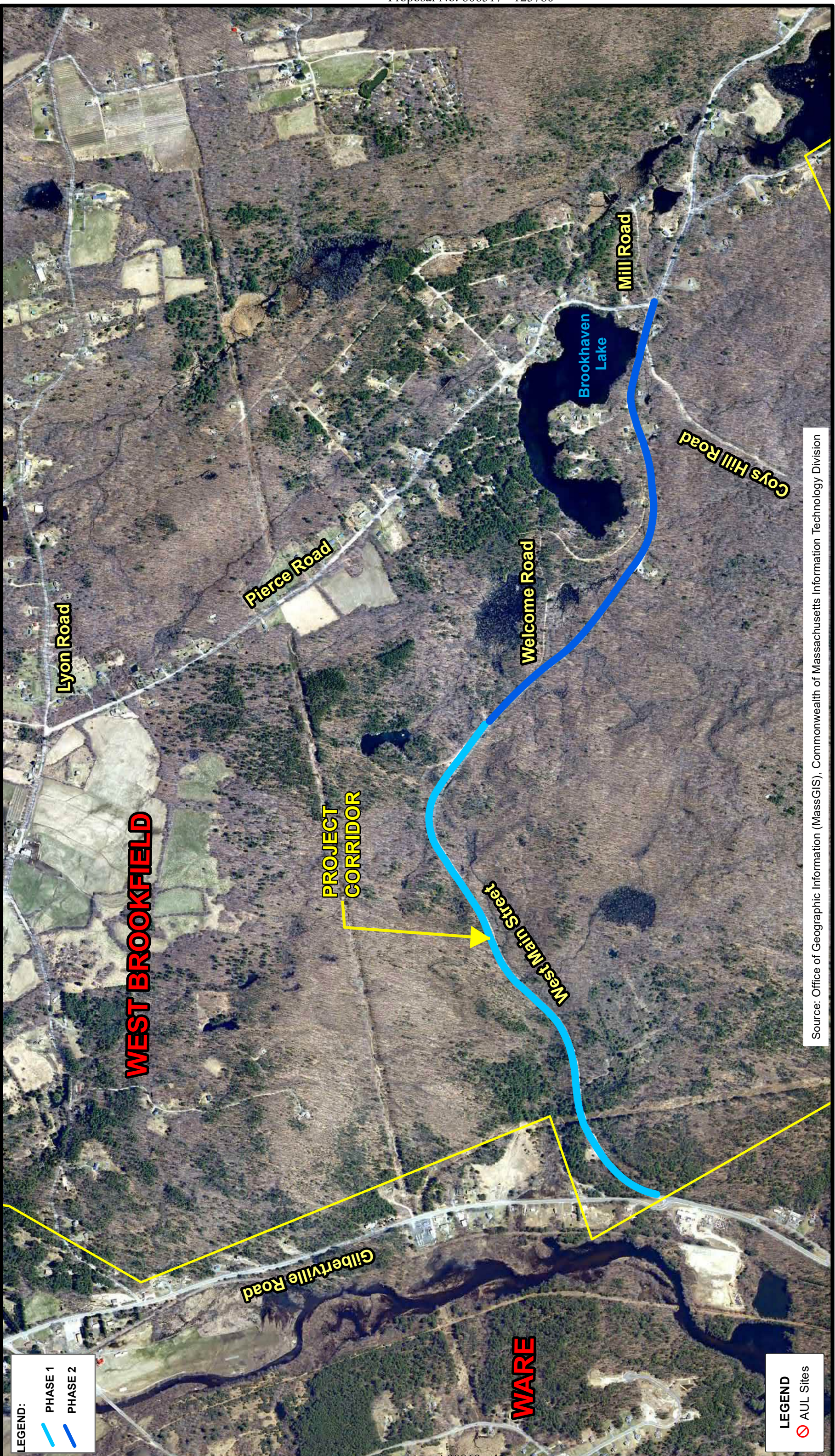
TOWN OF WEST BROOKFIELD, MA

**WEST MAIN STREET, WEST BROOKFIELD
 ROADWAY IMPROVEMENTS
 PROJECT ID: 606517**



Figure 7. Open Space





LEGEND:
 PHASE 1
 PHASE 2

LEGEND
 AUL Sites

Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Information Technology Division

TOWN OF WEST BROOKFIELD, MA

**WEST MAIN STREET, WEST BROOKFIELD
 ROADWAY IMPROVEMENTS
 PROJECT ID: 606517**



Figure 8. Activity and Use Limitation (AUL) Sites



Section IV

Appendices

Appendix A

Agency Permit Matrix

FEDERAL, STATE AND LOCAL PERMITS/REVIEW PROPOSED ROUTE 9/WEST MAIN STREET IMPROVEMENTS, WEST BROOKFIELD, MA		
Permit	Issuing Agency	Status
Federal Permits/Agency Correspondence		
Section 404 permit Self-Verification Notification Form	Army Corps of Engineers (Corps) New England District	To Be Filed
Notification/Clearance	National Register of Historic Places/MA Historical Commission (SHPO)	Notified 06/29/23 No Response
Notification/Clearance	West Brookfield Historical Commission	Notified 02/13/12 No Response
Notification/Clearance	U. S. Fish and Wildlife Service	Consultation Concluded 10/27/22 – Phase 1 - Clearance 04/26/23 – Phase 2 - No Effect
Notification/Clearance	Massachusetts Natural Heritage and Endangered Species Program	No Mapped Habitat Present MAGIS 2023/NHESP Atlas 2021
Massachusetts State Permits		
Environmental Notification Form (EENF & Proposed EIR)	MA Executive Office of Energy and Environmental Affairs (EOEEA) – MA Environmental Policy Act (MEPA)	Filed 07/31/23
Environmental Notification Form (SEIR)	MA Executive Office of Energy and Environmental Affairs (EOEEA) – MA Environmental Policy Act (MEPA)	To Be Filed 12/01/23
Local Permits		
Notice of Intent – Phase I and 2 MGL 131, Section 40	Town of West Brookfield Conservation Commission - Order of Conditions	Phase 1 - 11/22/23 Phase 2 – Winter 2024

Appendix B

Abutter Information and Public Notification

NOTIFICATION TO ABUTTERS UNDER MASSACHUSETTS WETLAND PROTECTION ACT

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, you are hereby notified of the following:

- A. The name of the applicant is **West Brookfield Highway Department**
- B. The applicant has filed a Notice of Intent with the Conservation Commission for the municipality of West Brookfield seeking permission to remove, fill dredge or alter an area subject to protection under the wetland protection act (General Laws Chapter 131, Section 40).
- C. The Address of the lot where the activity is proposed is **Route 9;Ware town line-Rock House Res.**
- D. Copies of the Notice in Intent may be examined at the West Brookfield Town Hall between the hours 10 am and 2 pm, Monday thru Thursday and 6 pm to 8 pm on Tuesday evenings.
- E. Brief description of the project: **Route 9 Rehabilitation & Related Work**
- F. Information regarding the date, time and place of the public hearing may be obtained from the West Brookfield Conservation Commission by calling 1-508-867-1421 Option 1.

Note: Notice of the public hearing, including the date, time, and place, will be published at least five (5) days in advance in the Worcester Telegram & Gazette.

Note: Notice of the public hearing, including the date, time, and place, will be posted in the Town Hall not less than forty-eight (48) hours in advance.

Note: You may also contact your local conservation commission or the nearest Department of Environmental Protection Office for more information about this application or the Wetlands Protection Act. To contact DEP call: Central Region: 1-508-792-7650.

West Main Street Route 9B

ITEM ID	REMJBL	REM_HBL	REM_FRCL_LOCM	REM_FRCL_L(K)STHE	IREM_P1	QTY	UNIT	OWW_NAME2	MAD_MAS_ADDR1	MAD_MAIL_CITY	MAD_STATE	MAD_ZIP
023 0	0001	0000 0	652	WEST MAIN STREET	652			WEST MAIN STREET REALTY LLC	BOBZAWADA	WORCESTER	MA	01606
023 0	0001	0001.0	684	WEST MAIN STREET	684			MASS FISH & WILDLIFE	CO PERNICE LEON J, TRIC1ANCOTTI	W SPRINGFIELD	MA	01089
023 0	0006	0000 0	667	WEST MAIN STREET	667			TOWN OF WEST BROOKFIELD	PO BOX 372	W BROOKFIELD	MA	01585
0230	0007	00000	631	WEST MAIN STREET	631			THE TRUSTEES OF RESERVATIONS	464 ABBOTT AVE	LEOMINSTER	MA	01453
Count												4

Appendix C

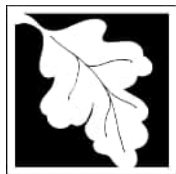
Filing Fee Information

CALCULATED FILING FEE STATEMENT

The Notice of Intent (NOI) application is being submitted by the Town of West Brookfield Highway Department. The roadway improvement activity falls under category 2 e as a limited project under 310 CMR 10.53(3)(f) – *Maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving drainage system* (Fee for each activity is \$500) under the Wetlands Protection Act 310 CMR 10.00. The proposed work also takes place within bordering vegetated wetlands, inland bank, the 100-foot buffers to BVW and banks.

Under the Wetlands Protection Act and the Town of West Brookfield Conservation Commission, no fees shall be assessed for projects of the federal government, the Commonwealth of Massachusetts, the Department of Environmental Protection (DEP) or its successors or cities and town of the Commonwealth.

Total project fee: \$0



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
NOI Wetland Fee Transmittal Form
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Applicant Information

1. Location of Project:

Route 9 - WareTown Line to Rock House Reservation	West Brookfield
Not Applicable - West Brookfield HD	N/A
c. Check number	d. Fee amount

2. Applicant Mailing Address:

James P.	Daley	
a. First Name	b. Last Name	
Town of West Brookfield Highway Department		
c. Organization		
2 East Main Street /P.O. Box 372		
d. Mailing Address		
West Brookfield	MA	01585
e. City/Town	f. State	g. Zip Code
508-867-1417	jdaley@wbrookfield.com	
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

Same		
a. First Name	b. Last Name	
Town of West Brookfield Highway Department		
c. Organization		
2 East Main Street /P.O. Box 372		
d. Mailing Address		
West Brookfield	MA	01585
e. City/Town	f. State	g. Zip Code
508-867-1417		
h. Phone Number	i. Fax Number	j. Email Address

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

B. Fees

Fee should be calculated using the following process & worksheet. **Please see Instructions before filling out worksheet.**

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract \$12.50. To calculate the city/town share of the fee, divide the total fee in half and add \$12.50.

Appendix D

Agency Consultations



February 13, 2012

William Francis Galvin
Secretary of the Commonwealth
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear Mr. Galvin:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

The Route 9 (West Main Street) project consists of approximately 2.1 miles of pavement rehabilitation from the Ware Town Line to Pierce Road in West Brookfield. The roadway will be widened to provide bicycle accommodation and resurfaced. Drainage improvements are proposed to remove stormwater runoff and snowmelt from the roadway. Guardrail will be replaced as required and new signage and pavement markings will be included.

Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the Massachusetts Historical Commission review the enclosed materials at its earliest convenience, and solicits any comments that the Massachusetts Historical Commission wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

Sincerely,

A handwritten signature in blue ink, appearing to read "John G. Morgan Jr.", is placed above the printed name.

John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.



February 13, 2012

Planning Board
2 East Main Street
West Brookfield, MA 01585

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear Planning Board Members:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

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Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the West Brookfield Planning Board review the enclosed materials at its earliest convenience, and solicits any comments that the Planning Board wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

Sincerely,

John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.



February 13, 2012

Conservation Commission
2 East Main Street
West Brookfield, MA 01585

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear Planning Board Members:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

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Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the West Brookfield Conservation Commission review the enclosed materials at its earliest convenience, and solicits any comments that the Conservation Commission wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

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John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.



February 13, 2012

Barry Nadon Jr.
Board of Selectmen
2 East Main Street
West Brookfield, MA 01585

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear Board of Selectmen:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

The Route 9 (West Main Street) project consists of approximately 2.1 miles of pavement rehabilitation from the Ware Town Line to Pierce Road in West Brookfield. The roadway will be widened to provide bicycle accommodation and resurfaced. Drainage improvements are proposed to remove stormwater runoff and snowmelt from the roadway. Guardrail will be replaced as required and new signage and pavement markings will be included.

Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the West Brookfield Board of Selectmen review the enclosed materials at its earliest convenience, and solicits any comments that the Board of Selectmen wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

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John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.



February 13, 2012

Historical Commission
2 East Main Street
West Brookfield, MA 01585

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear Historical Commission Members:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

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Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the West Brookfield Historical Commission review the enclosed materials at its earliest convenience, and solicits any comments that the Historical Commission wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

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John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.



February 13, 2012

C. Thomas O'Donnell
Police Chief
West Brookfield Police Department
2 East Main Street
West Brookfield, MA 01585

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear Mr. O'Donnell:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

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Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the West Brookfield Police Department review the enclosed materials at its earliest convenience, and solicits any comments that the Police Department wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

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John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.



February 13, 2012

Fire Department
3 Cottage Street
West Brookfield, MA 01585

RE: Project #606517
Route 9 Resurfacing and Related Work from Ware Town Line to Pierce Rd, West Brookfield
Early Project Coordination

Dear West Brookfield Fire Chief:

The Massachusetts Department of Transportation (MassDOT) and the Town of West Brookfield propose to perform roadway improvements along Route 9 between the Ware Town line and Pierce Road. It is anticipated that construction of this project will be funded through the Massachusetts Transportation Improvement Program (TIP), administered through the Massachusetts Department of Transportation – Highway Division (MassDOT). The enclosed project information is provided for your review in accordance with the Public Coordination requirements of MassDOT's Early Environmental Coordination Process.

The Route 9 (West Main Street) project consists of approximately 2.1 miles of pavement rehabilitation from the Ware Town Line to Pierce Road in West Brookfield. The roadway will be widened to provide bicycle accommodation and resurfaced. Drainage improvements are proposed to remove stormwater runoff and snowmelt from the roadway. Guardrail will be replaced as required and new signage and pavement markings will be included.

Coler & Colantonio, Inc. and the West Brookfield Highway Department request that the West Brookfield Fire Department review the enclosed materials at its earliest convenience, and solicits any comments that the Fire Department wishes to make regarding this project. Written comments should be submitted to Coler & Colantonio, Inc., 101 Accord Park Drive, Norwell, MA 02061, Attn: John G. Morgan, Jr., P.E., PTOE.

If you have any questions concerning the enclosed project information, please feel free to contact John Morgan (781-982-5437) or the Highway Superintendent James P. Daley (508-867-1417).

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John G. Morgan Jr., P.E., PTOE
Coler & Colantonio, Inc.

atts: locus map, project description
xcs: J. Daley, Highway Superintendent with atts.

Appendix E

Site Photographs

Wetland Resource Areas along Route 9, West Brookfield, MA



North/Downstream View of Channel #3 from Route 9 Road Crossing – East of Ware Town Line



East/Upstream View of Channel #3/Wetland Series B - Route 9 on North/Left Side



East/Upstream View of Channel #3/Wetland Series D - Route 9 on North/Left Side



North/Upstream View of Channel #3 & Wetland Series F North of Route 9



Southeast/Downstream View of Channel #3/Wetland Series G - Route 9 on North/Left Side



Northwest View of Wetland Series J - Route 9 Northwest/Left Side

Appendix F

DEP Data Forms

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Project Location: Ware Rd., W. Brookfield DEP File #: _____

Prepared by: CHA Consulting, Inc. Transect Number: _____

Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Wetland A Flag WFA - 3 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
<u>Trees:</u>				
yellow birch (<i>Betula alleghaniensis</i>)	38	38/48.5= 78%	yes	FAC*
Eastern white pine (<i>Pinus strobus</i>)	10.5	10.5/48.5=22%	yes	FACU
<u>Saplings:</u>				
yellow birch (<i>Betula alleghaniensis</i>)	10.5	10.5/10.5= 100%	yes	FAC*
<u>Shrubs:</u>				
spicebush (<i>Lindera benzoin</i>)	10.5	10.5/31.5= 33%	yes	FACW-*
witch-hazel (<i>Hamamelis virginiana</i>)	10.5	10.5/31.5= 33%	yes	FAC-
yellow birch (<i>Betula alleghaniensis</i>)	10.5	10.5/31.5= 33%	yes	FAC
<u>Herb:</u>				
water-cress (<i>Nasturtium officinale</i>)	38	38/86.5=44%	yes	OBL*
sphagnum moss (<i>Sphagnum, spp.</i>)	38	38/86.5=44%	yes	OBL*
hay-scented fern (<i>Dennstaedtia punctilobula</i>)	10.5	10.5/86.5=12%	no	NI - FACU
<u>Vines:</u>				
NA				

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Hydrophytic Plant Community
 Number of dominant wetland indicator plants: 7
 Number of dominant non-wetland indicator plants: 1
 Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 88% yes no

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Wetland Series A

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA– USDA NRCS Web Soil Survey (2019)**

map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	1 - 0"	-	OM
O_a	0 - 20"	10YR 2/1	OM

Rock Refusal

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: _____
- Depth to free water in observation hole: **2-3 "**
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: **Seep; Sulfur smell**

Vegetation and Hydrology Conclusion

Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants	yes <input checked="" type="checkbox"/>	no <input type="checkbox"/>
Wetland hydrology present:		
hydric soil present	<input checked="" type="checkbox"/>	<input type="checkbox"/>
other indicators of hydrology present	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample location is in BVW	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Upland A Transect Number: Flag WFA - 3 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees:				
Eastern white pine (<i>Pinus strobus</i>)	38	38/69= 55%	yes	FACU
gray birch (<i>Betula populifolia</i>)	20.5	20.5/69=30%	yes	FAC*
yellow birch (<i>Betula alleghaniensis</i>)	10.5	10.5/69=15%	no	FAC*
Saplings:				
gray birch (<i>Betula populifolia</i>)	10.5	10.5/10.5= 100%	yes	FAC*
Shrubs:				
witch-hazel (<i>Hamamelis virginiana</i>)	20.5	20.5/44.5= 46%	yes	FAC-
gray birch (<i>Betula populifolia</i>)	10.5	10.5/44.5= 24%	yes	FAC*
yellow birch (<i>Betula alleghaniensis</i>)	10.5	10.5/44.5= 24%	yes	FAC*
Tartarian honeysuckle (<i>Lonicera tatarica</i>)	3	3/44.5= 6%	no	FACU
Herb:				
Christmas fern (<i>Polystichum acrostichoides</i>)	20.5	20.5/47.5= 43%	yes	FACU
haircap moss (<i>Polytrichum</i> spp.)	10.5	10.5/47.5= 22%	yes	NI-FACU
princess pine (<i>Lycopodium obscurum</i>)	10.5	10.5/47.5= 22%	yes	FACU
northern red oak (<i>Quercus rubra</i>)	3	3/47.5=6%	no	FACU
hay-scented fern (<i>Dennstaedtia punctilobula</i>)	3	3/47.5=6%	no	NI-FACU
Vines:				
NA				

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Upland Plant Community
Number of dominant wetland indicator plants: 4
Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 44 % yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent. MA DEP; 3/95

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Upland Series A

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA– USDA NRCS Web Soil Survey (2019)**
map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	1.5 – 0"	-	OM
A_p	0 – 3.5"	10YR 3/2	loam
C	3.5 – 19"	10YR 5/6	sandy loam

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: _____
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: _____

Vegetation and Hydrology Conclusion		yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present:			
hydric soil present		<input type="checkbox"/>	<input checked="" type="checkbox"/>
other indicators of hydrology present		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample location is in BVW		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Wetland B Transect Number: Flag WFB - 5 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees:				
yellow birch (<i>Betula alleghaniensis</i>)	38	38/48.5= 78%	yes	FAC*
American beech (<i>Fagus grandifolia</i>)	10.5	10.5/48.5= 22%	yes	FACU
Saplings:				
yellow birch (<i>Betula alleghaniensis</i>)	20.5	20.5/20.5= 100%	yes	FAC*
Shrubs:				
yellow birch (<i>Betula alleghaniensis</i>)	20.5	20.5/29.5= 70%	yes	FAC*
spicebush (<i>Lindera benzoin</i>)	3	3/32.5= 10%	no	FACW-*
Tartarian honeysuckle (<i>Lonicera tatarica</i>)	3	3/32.5= 10%	no	FACU
red maple (<i>Acer rubrum</i>)	3	3/32.5= 10%	no	FAC*
Herb:				
sphagnum moss (<i>Sphagnum, spp.</i>)	20.5	20.5/32.5=64%	yes	OBL*
Eastern white pine (<i>Pinus strobus</i>)	3	3/32.5= 9%	no	FACU
New York fern (<i>Thelypteris noveboracensis</i>)	3	3/32.5= 9%	no	FAC*
hay-scented fern (<i>Dennstaedtia punctilobula</i>)	3	3/32.5= 9%	no	NI- FACU
field horsetail (<i>Equisetum arvense</i>)	3	3/32.5= 9%	no	FAC
Vines:				
NA				

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Hydrophytic Plant Community
 Number of dominant wetland indicator plants: 4
 Number of dominant non-wetland indicator plants: 1
 Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 80% yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent. MA DEP; 3/95

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Wetland Series B

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA – USDA NRCS Web Soil Survey (2019)**

map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	1 - 0"	-	OM
A_p	0 - 21"	10YR 2/2	Loam
Rock Refusal			Mixed w/ sand from road erosion

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: _____
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: _____

Vegetation and Hydrology Conclusion		yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present:			
hydric soil present		<input checked="" type="checkbox"/>	<input type="checkbox"/>
other indicators of hydrology present		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample location is in BVW		<input checked="" type="checkbox"/>	<input type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Upland B Transect Number: Flag WFB - 5 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
<u>Trees:</u> northern red oak (<i>Quercus rubra</i>)	38	38/38= 100%	yes	FACU
<u>Saplings:</u> northern red oak (<i>Quercus rubra</i>)	20.5	20.5/62=33%	yes	FACU
Eastern white pine (<i>Pinus strobus</i>)	20.5	20.5/62=33%	yes	FACU
white oak (<i>Quercus alba</i>)	10.5	10.5/62=17%	no	FACU-
shellbark hickory (<i>Carya laciniosa</i>)	10.5	10.5/62=17%	no	FAC
<u>Shrubs:</u> northern red oak (<i>Quercus rubra</i>)	10.5	10.5/34.5=30%	yes	FACU
Eastern white pine (<i>Pinus strobus</i>)	10.5	10.5/34.5=30%	yes	FACU
sassafras (<i>Sassafras albidum</i>)	10.5	10.5/34.5=30%	yes	FACU
white oak (<i>Quercus alba</i>)	3	3/34.5=10%	no	FACU-
<u>Herb:</u> northern red oak (<i>Quercus rubra</i>)	3	3/9= 33%	yes	FACU
Eastern white pine (<i>Pinus strobus</i>)	3	3/9= 33%	yes	FACU
striped wintergreen (<i>Chimaphila maculata</i>)	3	3/9= 33%	yes	NI-FACU
<u>Vines:</u> NA				

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Upland Plant Community

Number of dominant wetland indicator plants: 0

Number of dominant non-wetland indicator plants: 9

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 0 % yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent.

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Upland Series B

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA– USDA NRCS Web Soil Survey (2019)**
map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	0.5 – 0"	-	OM
A_p	0 – 4"	10YR 2/2	loam
C	4 – 20"+	7.5YR 4/6	sandy loam

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: _____
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: _____

Vegetation and Hydrology Conclusion

	yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present:		
hydric soil present	<input type="checkbox"/>	<input checked="" type="checkbox"/>
other indicators of hydrology present	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample location is in BVW	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Wetland C Transect Number: Flag WFC - 1 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees:				
yellow birch (<i>Betula alleghaniensis</i>)	38	38/59= 64%	yes	FAC*
white ash (<i>Fraxinus americana</i>)	10.5	10.5/59=18%	no	FACU
red maple (<i>Acer rubrum</i>)	10.5	10.5/59=18%	no	FAC*
Saplings:				
yellow birch (<i>Betula alleghaniensis</i>)	10.5	10.5/10.5= 100%	yes	FAC*
Shrubs:				
yellow birch (<i>Betula alleghaniensis</i>)	10.5	10.5/21= 50%	yes	FAC*
slippery elm (<i>Ulmus rubra</i>)	10.5	10.5/21= 50%	yes	FAC*
Herb:				
switchgrass (<i>Panicum virgatum</i>)	20.5	20.5/61= 34%	yes	FAC*
sphagnum moss (<i>Sphagnum, spp.</i>)	10.5	10.5/61=17%	yes	OBL*
sensitive fern (<i>Onoclea sensibilis</i>)	10.5	10.5/61=17%	yes	FACW
rough-stemmed goldenrod (<i>Solidago rugosa</i>)	10.5	10.5/61=17%	yes	FAC*
skunk-cabbage (<i>Symplocarpus foetidus</i>)	3	3/61 = 5%	no	OBL*
ostrich fern (<i>Matteucia struthiopteris</i>)	3	3/61 = 5%	no	FACW*
branching bur reed (<i>Sparganium angrocladum</i>)	3	3/61 = 5%	no	OBL*
Vines:				
NA				

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Hydrophytic Plant Community
 Number of dominant wetland indicator plants: **8**
 Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: **100%** yes no

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Wetland Series C

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA – USDA NRCS Web Soil Survey (2019)**

map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	1 – 0”	-	OM
O_a	1 – 13”	10YR 2/1	OM
C₁	13 – 18”	10YR 5/3	sand
C₂	18 – 20+”	2.5Y 5/3	sand
		Redox: 5YR 5/6 MMP	
		Redox: 5YR 5/6 MFP	

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: **1-3”** _____
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: _____

Vegetation and Hydrology Conclusion		yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present:			
hydric soil present		<input checked="" type="checkbox"/>	<input type="checkbox"/>
other indicators of hydrology present		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample location is in BVW		<input checked="" type="checkbox"/>	<input type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Upland C Transect Number: Flag WFC - 1 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees: northern red oak (<i>Quercus rubra</i>)	38	38/38= 100%	yes	FACU
Saplings: northern red oak (<i>Quercus rubra</i>)	20.5	20.5/62=33%	yes	FACU
Eastern white pine (<i>Pinus strobus</i>)	20.5	20.5/62=33%	yes	FACU
white oak (<i>Quercus alba</i>)	10.5	10.5/62=17%	no	FACU-
shellbark hickory (<i>Carya laciniosa</i>)	10.5	10.5/62=17%	no	FAC
Shrubs: northern red oak (<i>Quercus rubra</i>)	10.5	10.5/34.5=30%	yes	FACU
Eastern white pine (<i>Pinus strobus</i>)	10.5	10.5/34.5=30%	yes	FACU
sassafras (<i>Sassafras albidum</i>)	10.5	10.5/34.5=30%	yes	FACU
white oak (<i>Quercus alba</i>)	3	3/34.5=10%	no	FACU-
Herb: northern red oak (<i>Quercus rubra</i>)	3	3/9= 33%	yes	FACU
Eastern white pine (<i>Pinus strobus</i>)	3	3/9= 33%	yes	FACU
striped wintergreen (<i>Chimaphila maculata</i>)	3	3/9= 33%	yes	NI-FACU
Vines: NA				

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Upland Plant Community

Number of dominant wetland indicator plants: 0

Number of dominant non-wetland indicator plants: 9

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 0 % yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent.

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Upland Series C

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA– USDA NRCS Web Soil Survey (2019)**
map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	0.5 – 0"	-	OM
A_p	0 – 4"	10YR 2/2	loam
C	4 – 20"+	7.5YR 4/6	sandy loam

Rock Refusal

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: _____
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: _____

Vegetation and Hydrology Conclusion

	yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present:		
hydric soil present	<input type="checkbox"/>	<input checked="" type="checkbox"/>
other indicators of hydrology present	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample location is in BVW	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Wetland D Transect Number: Flag WFD - 13/14 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees:				
yellow birch (<i>Betula alleghaniensis</i>)	38	38/72= 53%	yes	FAC*
red maple (<i>Acer rubrum</i>)	20.5	20.5/72=28%	yes	FAC*
slippery elm (<i>Ulmus rubra</i>)	10.5	10.5/72= 15%	no	FAC*
white ash (<i>Fraxinus americana</i>)	3	3/72=4%	no	FACU
Saplings:				
red maple (<i>Acer rubrum</i>)	10.5	10.5/10.5= 100%	yes	FAC*
Shrubs:				
yellow birch (<i>Betula alleghaniensis</i>)	10.5	10.5/31.5=33%	yes	FAC*
witch-hazel (<i>Hamamelis virginiana</i>)	10.5	10.5/31.5=33%	yes	FAC-
common winterberry (<i>Ilex verticillata</i>)	10.5	10.5/31.5=33%	yes	FACW+*
Herb:				
cinnamon fern (<i>Osmunda cinnanomea</i>)	20.5	20.5/54.5=38%	yes	FACW
sphagnum moss (<i>Sphagnum, spp.</i>)	20.5	20.5/54.5=38%	yes	OBL*
hay-scented fern (<i>Dennstaedtia punctilobula</i>)	10.5	10.5/54.5=19%	no	NI - FACU
skunk-cabbage (<i>Symplocarpus foetidus</i>)	3	3/61 = 5%	no	OBL*

Vines: NA

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Hydrophytic Plant Community
 Number of dominant wetland indicator plants: 7
 Number of dominant non-wetland indicator plants: 1
 Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 88% yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent.

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Wetland Series D

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA – USDA NRCS Web Soil Survey (2019)**

map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	1 – 0"	-	OM
O_a	0 – 18"	10YR 2/1	Silt/OM
Rock Refusal			

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: _____
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: **Surface**
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: _____

Vegetation and Hydrology Conclusion		yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present:			
hydric soil present		<input checked="" type="checkbox"/>	<input type="checkbox"/>
other indicators of hydrology present		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample location is in BVW		<input checked="" type="checkbox"/>	<input type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Upland D Transect Number: Flag WFD - 13/14 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees:				
northern red oak (<i>Quercus rubra</i>)	38	38/69=55%	yes	FACU
sugar maple (<i>Acer saccharum</i>)	20.5	20.5/69= 30%	yes	FACU
white ash (<i>Fraxinus americana</i>)	10.5	10.5/69=15%	no	FACU
Saplings:				
northern red oak (<i>Quercus rubra</i>)	10.5	10.5/31.5=33%	yes	FACU
Eastern white pine (<i>Pinus strobus</i>)	10.5	10.5/31.5=33%	yes	FACU
white oak (<i>Quercus alba</i>)	10.5	10.5/31.5=33%	yes	FACU-
Shrubs:				
American beech (<i>Fagus grandifolia</i>)	20.5	20.5/42= 50%	yes	FACU
witch-hazel (<i>Hamamelis virginiana</i>)	10.5	10.5/42= 25%	yes	FAC-
sugar maple (<i>Acer saccharum</i>)	10.5	10.5/42= 25%	yes	FACU
Herb:				
northern red oak (<i>Quercus rubra</i>)	10.5	10.5/27= 39%	yes	FACU
Kentucky bluegrass (<i>Poa pratensis</i>)	10.5	10.5/27= 39%	yes	FACU
haircap moss (<i>Polytrichum</i> spp.)	3	3/27=11%	no	NI-FACU
striped maple (<i>Acer pensylvanicum</i>)	3	3/27=11%	no	FACU
Vines:				
NA				

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Upland Plant Community
Number of dominant wetland indicator plants: 0
Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 0% yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent. MA DEP; 3/95

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Upland Series D

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA – USDA NRCS Web Soil Survey (2019)**
map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	0.5 – 0"	-	OM
A_p	0 – 4.5"	10YR 2/2	loam
C	4.5 – 14"	7.5YR 4/6	sandy loam

Rock Refusal

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: _____
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: _____

Vegetation and Hydrology Conclusion

	yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present:		
hydric soil present	<input type="checkbox"/>	<input checked="" type="checkbox"/>
other indicators of hydrology present	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample location is in BVW	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Wetland E Transect Number: Flag WFE - 10 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
<u>Trees:</u>				
red maple (<i>Acer rubrum</i>)	38	38/58.5=65%	yes	FAC*
northern red oak (<i>Quercus rubra</i>)	20.5	20.5/58.5=33%	yes	FACU
<u>Saplings:</u>				
red maple (<i>Acer rubrum</i>)	10.5	10.5/10.5=100%	yes	FAC*
<u>Shrubs:</u>				
common winterberry (<i>Ilex verticillata</i>)	20.5	20.5/31.5=66%	yes	FACW+*
highbush blueberry (<i>Vaccinium corymbosum</i>)	10.5	10.5/31.5=34%	yes	FACW-*
<u>Herb:</u>				
cinnamon fern (<i>Osmunda cinnamomea</i>)	38	38/59=64%	yes	FACW
sphagnum moss (<i>Sphagnum, spp.</i>)	10.5	10.5/59=18%	no	OBL*
lurid sedge (<i>Carex lurida</i>)	10.5	10.5/59=18%	no	OBL
<u>Vines:</u>				
NA				

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW+, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Hydrophytic Plant Community
Number of dominant wetland indicator plants: 5
Number of dominant non-wetland indicator plants: 1
Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 83% yes no

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Wetland Series E

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA – USDA NRCS Web Soil Survey (2019)**

map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	1.5 – 0"	-	OM
O_a	0 – 20"	10YR 2/1	OM/Silt
Rock Refusal			

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: _____
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: **Surface**
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

<input type="checkbox"/> Other: _____	
Vegetation and Hydrology Conclusion	
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants	yes <input checked="" type="checkbox"/> no <input type="checkbox"/>
Wetland hydrology present:	
hydric soil present	<input checked="" type="checkbox"/>
other indicators of hydrology present	<input checked="" type="checkbox"/>
Sample location is in BVW	<input checked="" type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Upland E Transect Number: Flag WFE - 10 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees:				
northern red oak (<i>Quercus rubra</i>)	38	38/69=55%	yes	FACU
sugar maple (<i>Acer saccharum</i>)	20.5	20.5/69=30%	yes	FACU
white ash (<i>Fraxinus americana</i>)	10.5	10.5/69=15%	no	FACU
Saplings:				
northern red oak (<i>Quercus rubra</i>)	10.5	10.5/31.5=33%	yes	FACU
Eastern white pine (<i>Pinus strobus</i>)	10.5	10.5/31.5=33%	yes	FACU
white oak (<i>Quercus alba</i>)	10.5	10.5/31.5=33%	yes	FACU-
Shrubs:				
American beech (<i>Fagus grandifolia</i>)	20.5	20.5/42=50%	yes	FACU
witch-hazel (<i>Hamamelis virginiana</i>)	10.5	10.5/42=25%	yes	FAC-
sugar maple (<i>Acer saccharum</i>)	10.5	10.5/42=25%	yes	FACU
Herb:				
northern red oak (<i>Quercus rubra</i>)	10.5	10.5/27=39%	yes	FACU
Kentucky bluegrass (<i>Poa pratensis</i>)	10.5	10.5/27=39%	yes	FACU
haircap moss (<i>Polytrichum</i> spp.)	3	3/27=11%	no	NI-FACU
striped maple (<i>Acer pensylvanicum</i>)	3	3/27=11%	no	FACU
Vines:				
NA				

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Upland Plant Community
 Number of dominant wetland indicator plants: 0
 Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 0% yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent. MA DEP; 3/95

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Upland Series E

1. Soil Survey

Is there a published soil survey for this site? Yes no
 title/date: **Soil Survey of Worcester County, MA– USDA NRCS Web Soil Survey (2019)**
 map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	0.5 – 0"	-	OM
A_p	0 – 4.5"	10YR 2/2	loam
C	4.5 – 14"	7.5YR 4/6	sandy loam

Rock Refusal

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: _____
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: _____

Vegetation and Hydrology Conclusion

	yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present:		
hydric soil present	<input type="checkbox"/>	<input checked="" type="checkbox"/>
other indicators of hydrology present	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample location is in BVW	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Project Location: Ware Rd., W. Brookfield DEP File #: _____

Prepared by: CHA Consulting, Inc.

Project Location: Ware Rd., W. Brookfield

Prepared by: CHA Consulting, Inc.

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Wetland F Transect Number: Flag WFF - 11 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
<u>Trees:</u>				
red maple (<i>Acer rubrum</i>)	63	63/73.5=85%	yes	FAC*
white ash (<i>Fraxinus americana</i>)	10.5	10.5/73.5=14%	no	FACU
<u>Saplings:</u>				
red maple (<i>Acer rubrum</i>)	10.5	10.5/21= 50%	yes	FAC*
white ash (<i>Fraxinus americana</i>)	10.5	10.5/21= 50%	yes	FACU
<u>Shrubs:</u>				
common winterberry (<i>Ilex verticillata</i>)	20.5	20.5/41.5= 50%	yes	FACW+*
highbush blueberry (<i>Vaccinium corymbosum</i>)	10.5	10.5/41.5= 25%	yes	FACW-*
Japanese barberry (<i>Berberis thunbergii</i>)	10.5	10.5/41.5= 25%	yes	FACU
<u>Herb:</u>				
cinnamon fern (<i>Osmunda cinnamomea</i>)	38	38/48.5=78%	yes	FACW
hay-scented fern (<i>Dennstaedtia punctilobula</i>)	10.5	10.5/48.5=22%	yes	NI - FACU

Vines: NA

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW+, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Hydrophytic Plant Community

Number of dominant wetland indicator plants: 5

Number of dominant non-wetland indicator plants: 3

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 63% yes no

Section II. Indicators of Hydrology

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: 1/2 "
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Wetland Series F

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA– USDA NRCS Web Soil Survey (2019)**

map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	1 - 0"	-	OM
O_a	0 - 21"	10YR 2/1	OM/Silt
Rock Refusal			

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Vegetation and Hydrology Conclusion		yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present:			
hydric soil present		<input checked="" type="checkbox"/>	<input type="checkbox"/>
other indicators of hydrology present		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample location is in BVW		<input checked="" type="checkbox"/>	<input type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Upland F Transect Number: Flag WFF - 11 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees:				
northern red oak (<i>Quercus rubra</i>)	38	38/69= 55%	yes	FACU
Eastern white pine (<i>Pinus strobus</i>)	20.5	20.5/69=30%	yes	FACU
gray birch (<i>Betula populifolia</i>)	10.5	10.5/69=15%	no	FAC*
Saplings:				
Eastern white pine (<i>Pinus strobus</i>)	20.5	20.5/31=66%	yes	FACU
northern red oak (<i>Quercus rubra</i>)	10.5	20.5/31=34%	yes	FACU
Shrubs:				
Eastern white pine (<i>Pinus strobus</i>)	20.5	20.5/51.5= 37%	yes	FACU
black cherry (<i>Prunus serotina</i>)	20.5	20.5/51.5= 37%	yes	FACU
low-bush blueberry (<i>Vaccinium angustifolium</i>)	10.5	10.5/51.5=26%	yes	FACU-
Herb:				
haircap moss (<i>Polytrichum</i> spp.)	10.5	10.5/13.5= 78%	yes	NI-FACU
hay-scented fern (<i>Dennstaedtia punctilobula</i>)	3	3/13.5=22%	yes	NI-FACU
Vines:				
NA				

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Upland Plant Community
 Number of dominant wetland indicator plants: 0
 Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 0 % yes no

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Upland Series F

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA– USDA NRCS Web Soil Survey (2019)**
 map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	0.5 – 0"	-	OM
O_a	0 – 1"	10YR 2/1	OM
B	1 – 2"	7.5YR 3/2	loam
C	2 – 16+"	7.5YR 5/6	sandy loam

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: _____
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: _____

Vegetation and Hydrology Conclusion		yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present:			
hydric soil present		<input type="checkbox"/>	<input checked="" type="checkbox"/>
other indicators of hydrology present		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample location is in BVW		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: _____ Wetland G/H _____ Transect Number: _____ Flag WFG - 1 _____ Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees:				
yellow birch (<i>Betula alleghaniensis</i>)	38	38/69= 55%	yes	FAC*
red maple (<i>Acer rubrum</i>)	20.5	20.5/69=30%	yes	FAC*
northern red oak (<i>Quercus rubra</i>)	10.5	10.5/69=15%	no	FACU
Saplings:				
red maple (<i>Acer rubrum</i>)	10.5	10.5/10.5= 100%	yes	FAC*
Shrubs:				
red maple (<i>Acer rubrum</i>)	20.5	20.5/51.5= 37%	yes	FAC*
common winterberry (<i>Ilex verticillata</i>)	20.5	20.5/51.5= 37%	yes	FACW+*
Eastern white pine (<i>Pinus strobus</i>)	10.5	10.5/51.5=26%	yes	FACU
Herb:				
sphagnum moss (<i>Sphagnum, spp.</i>)	20.5	20.5/65=32%	yes	OBL*
spicebush (<i>Lindera benzoin</i>)	10.5	10.5/65= 16%	yes	FACW-*
Kentucky bluegrass (<i>Poa pratensis</i>)	10.5	10.5/65= 16%	yes	FACU
hay-scented fern (<i>Dennstaedtia punctilobula</i>)	10.5	10.5/65= 16%	yes	NI - FACU
Northern arrow-wood (<i>Viburnum dentatum</i>)	10.5	10.5/65= 16%	yes	FAC*
skunk-cabbage (<i>Symplocarpus foetidus</i>)	3	3/65 = 4%	no	OBL*
Vines:				
NA				

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Hydrophytic Plant Community
 Number of dominant wetland indicator plants: **8**
 Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: **73%** yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent. MA DEP; 3/95

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA – USDA NRCS Web Soil Survey (2019)**

map number: **N/A**

soil type mapped: **101E - Brimfield-Brookfield-Rock outcrop complex, 15 to 35 percent slopes**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	2 – 0”	-	OM
O_a	0 – 22+”	10YR 2/1	OM/Silt

Rock Refusal

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Wetland Series G/H

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: **Adjacent to Stream – 10” depth**
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: _____

Vegetation and Hydrology Conclusion		yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present:			
hydric soil present		<input checked="" type="checkbox"/>	<input type="checkbox"/>
other indicators of hydrology present		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample location is in BVW		<input checked="" type="checkbox"/>	<input type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: _____ Upland G/H _____ Transect Number: _____ Flag WFG - 1 _____ Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees:				
northern red oak (<i>Quercus rubra</i>)	38	38/69= 55%	yes	FACU
Eastern white pine (<i>Pinus strobus</i>)	20.5	20.5/69=30%	yes	FACU
gray birch (<i>Betula populifolia</i>)	10.5	10.5/69=15%	no	FAC*
Saplings:				
Eastern white pine (<i>Pinus strobus</i>)	20.5	20.5/31=66%	yes	FACU
northern red oak (<i>Quercus rubra</i>)	10.5	20.5/31=34%	yes	FACU
Shrubs:				
Eastern white pine (<i>Pinus strobus</i>)	20.5	20.5/51.5= 37%	yes	FACU
black cherry (<i>Prunus serotina</i>)	20.5	20.5/51.5= 37%	yes	FACU
low-bush blueberry (<i>Vaccinium angustifolium</i>)	10.5	10.5/51.5=26%	yes	FACU-
Herb:				
haircap moss (<i>Polytrichum</i> spp.)	10.5	10.5/13.5= 78%	yes	NI-FACU
hay-scented fern (<i>Dennstaedtia punctilobula</i>)	3	3/13.5=22%	yes	NI-FACU
Vines:				
NA				

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Upland Plant Community
 Number of dominant wetland indicator plants: 0
 Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 0 % yes no

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Upland Series G/H

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA– USDA NRCS Web Soil Survey (2019)**
map number: **N/A**

soil type mapped: **101E - Brimfield-Brookfield-Rock outcrop complex, 15 to 35 percent slopes**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	0.5 – 0”	-	OM
O_a	0 – 1”	10YR 2/1	OM
B	1 – 2”	7.5YR 3/2	loam
C	2 – 16+”	7.5YR 5/6	sandy loam

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: _____
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: _____

Vegetation and Hydrology Conclusion

	yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present:		
hydric soil present	<input type="checkbox"/>	<input checked="" type="checkbox"/>
other indicators of hydrology present	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample location is in BVW	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Wetland I Transect Number: Flag WFI - 14/15 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Trees:				
red maple (<i>Acer rubrum</i>)	63	63/83.5=75%	yes	FAC*
northern red oak (<i>Quercus rubra</i>)	20.5	20.5/83.5=25%	yes	FACU
Saplings:				
red maple (<i>Acer rubrum</i>)	20.5	20.5/44.5=46%	yes	FAC*
yellow birch (<i>Betula alleghaniensis</i>)	10.5	10.5/44.5=24%	yes	FAC*
green ash (<i>Fraxinus pennsylvanica</i>)	10.5	10.5/44.5=24%	yes	FACW*
slippery elm (<i>Ulmus rubra</i>)	3	3/44.5=6%	no	FAC*
Shrubs:				
common winterberry (<i>Ilex verticillata</i>)	20.5	20.5/41.5=50%	yes	FACW+*
yellow birch (<i>Betula alleghaniensis</i>)	10.5	10.5/41.5=25%	yes	FAC*
highbush blueberry (<i>Vaccinium corymbosum</i>)	10.5	10.5/41.5=25%	yes	FACW-*
Herb:				
cinnamon fern (<i>Osmunda cinnamomea</i>)	20.5	20.5/51.5=40%	yes	FACW
sphagnum moss (<i>Sphagnum, spp.</i>)	20.5	20.5/51.5=40%	yes	OBL*
hay-scented fern (<i>Dennstaedtia punctilobula</i>)	10.5	10.5/51.5=20%	yes	NI - FACU
Vines:	NA			

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW+, FACW-, FACW-, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Hydrophytic Plant Community
 Number of dominant wetland indicator plants: 9
 Number of dominant non-wetland indicator plants: 2
 Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 82% yes no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent.

Section II. Indicators of Hydrology

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: 2 "
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Wetland Series I

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA– USDA NRCS Web Soil Survey (2019)**

map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	1 - 0"	-	OM
O_a	0 - 14"	10YR 2/1	OM

Rock Refusal

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Vegetation and Hydrology Conclusion		yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present:			
hydric soil present		<input checked="" type="checkbox"/>	<input type="checkbox"/>
other indicators of hydrology present		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample location is in BVW		<input checked="" type="checkbox"/>	<input type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: West Brookfield DPW Prepared by: CHA Consulting, Inc. Project Location: Ware Rd., W. Brookfield DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Upland I Transect Number: Flag WFI - 14/15 Date of Delineation: 11/09/11

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
<u>Trees:</u> northern red oak (<i>Quercus rubra</i>)	63	63/73.5= 86%	yes	FACU
yellow birch (<i>Betula alleghaniensis</i>)	10.5	10.5/73.5=14%	no	FAC*
<u>Saplings:</u> northern red oak (<i>Quercus rubra</i>)	10.5	10.5/21= 50%	yes	FACU
American beech (<i>Fagus grandifolia</i>)	10.5	10.5/21= 50%	yes	FACU
<u>Shrubs:</u> northern red oak (<i>Quercus rubra</i>)	20.5	20.5/31= 66%	yes	FACU
American beech (<i>Fagus grandifolia</i>)	10.5	10.5/31=34%	yes	FACU
<u>Herb:</u> Eastern white pine (<i>Pinus strobus</i>)	10.5	10.5/31.5=33%	yes	FACU
haircap moss (<i>Polytrichum</i> spp.)	10.5	10.5/31.5=33%	yes	NI-FACU
hay-scented fern (<i>Dennstaedtia punctilobula</i>)	10.5	10.5/31.5=33%	yes	NI-FACU

Vines: NA

* Use an asterisk to mark indicator plants: plant species listed in the wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion: Upland Plant Community

Number of dominant wetland indicator plants: 0

Number of dominant non-wetland indicator plants: 8

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants: 0 % yes no

Section II. Indicators of Hydrology

Hydric Soil Interpretation

Upland Series I

1. Soil Survey

Is there a published soil survey for this site? Yes no

title/date: **Soil Survey of Worcester County, MA– USDA NRCS Web Soil Survey (2019)**
 map number: **N/A**

soil type mapped: **422C - Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

hydric soil inclusions: **NA**

Are field observations consistent with soil survey? Yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
O_i	0.5 – 0"	-	OM
O_a	0 – 1"	10YR 2/1	OM
B	1 – 5"	10YR 3/3	loam
C₁	5 – 8"	10YR 4/4	sandy loam
C₂	8 – 18+"	10YR 5/6	sandy loam

Remarks:

3. Other:

Conclusion: Is soil hydric? Yes No

Other Indicators of Hydrology: (check all that apply and describe)

- Site inundated: _____
- Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment deposits: _____
- Drainage patterns in BVW: _____
- Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded data (stream, lake, or tidal gauge; aerial photo; other): _____

Other: _____

Vegetation and Hydrology Conclusion		yes	no
Number of wetland indicator plants greater than or equal to number of non-wetland indicator plants		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present:			
hydric soil present		<input type="checkbox"/>	<input checked="" type="checkbox"/>
other indicators of hydrology present		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample location is in BVW		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

Appendix G

Wetland Replication/Restoration Spec



INLAND WETLAND REPLICATION/RESTORATION AREA (ITEM 755.35)

Work shall include furnishing material and the construction and maintenance of inland wetland replication areas as shown on the drawings and as required by the Engineer. Inland Wetland Replication Area shall hereafter be referred to as Replication Area. All work shall be in coordination with an approved Wetland Specialist.

The Replication Area shall be constructed prior to wetland impacts unless otherwise approved by the Engineer, specified herein, or specified in permit conditions and approvals. Construction schedule shall be appropriate to planting and seeding season (see below). Changes to this schedule will require written approval from the Engineer.

DESCRIPTION OF WORK

Construction of the Replication/Restoration Areas shall be completed as shown on the drawings at the following location(s):

Area G at Station: ≈ Sta. 58+90 (Phase 1)	Area = 300 sf. (Replicated)
Area Hat Station: ≈ Sta. 61+00 (Phase 1)	Area = 77 sf. (Restored)
Area K at Station: ≈ Sta. 75+50 (Phase 2)	Area = 91 sf. (Restored)
Area L at Station: ≈ Sta. 81+00 (Phase 2)	Area = 70 sf. (Restored)
Area N/O at Station: ≈ Sta. 88+00 (Phase 2)	Area = 154 sf. (Restored)
Area T at Station: ≈ Sta. 115+50 (Phase 2)	Area = 56 sf. (Restored)

The intent of the proposed wetland replication area is to provide for the functional replacement of vegetated wetlands altered during Route 9/West Main Street roadway improvements. Impacted areas will be mitigated by replicating new wetlands at a minimum ratio of 1:1 as required by the Department of Environmental Protection (DEP). Approximately 283 square feet (s.f.) of Bordering Vegetated Wetlands will be impacted as a result of work associated with grading and culvert/headwall replacement proposed under this project.

Table 1					
<u>Proposed Wetland Impacts & Restoration/Replication</u>					
West Main Street/Route 9					
Approx. Milepost (midpoint)	Wetland Series	Wetland Class.¹	Proposed Impacts & Repl./Rest./ (sf)		Comments
			Permanent/Temporary	Replication/Restoration/	
Phase 1					
58+90	G	PFO	0 sf / 0 sf	300 sf/ 0 sf	Associated with CH-3
61+00	H	PFO	63 sf / 77sf	0 sf/ 77sf	No associated channel
Phase 2					
75+50	K	PFO	22 sf/ 91 sf	0 sf/ 91 sf	No associated channel
81+00	L	PFO	181 sf/70 sf	0 sf/ 70 sf	No associated channel
88+00	N/O	PFO	17 sf /154 sf	0 sf/ 154 sf	No associated channel
115+50	T	PFO	0 sf / 56 sf	0 sf/ 56 sf	No associated channel
Total			283 s.f.⁵/ 448 sf	300 sf/ 448 sf	

¹Classification: PFO = Palustrine Forested

This area will be mitigated by replicating approximately 300 square feet (s.f.) of new wetlands within Wetland G (58 + 90) from wetland impacts in both of the Phase 1 and Phase 2 projects as identified in Table 1. The 300 square feet (s.f.) wetland replication area will be revegetated with indigenous tree and shrub species specific to the hydrophytic communities associated with each resource area altered and will be seeded with an indigenous emergent wetland seed mix as identified in Table 2. A Professional Wetland Scientist (PWS), Wetland Ecologist, Restoration Ecologist, or other professional with similar qualifications, hereafter referred to as the “Wetland Specialist,” approved by the Resident Engineer or West Brookfield Highway Department Superintendent, will be present on-site to oversee the replication processes per MassDOT standard requirements.

The Replication Area shall be constructed to meet the requirements of all associated permits and certifications, including relevant performance standards of the Massachusetts Wetlands Protection Act (MGL C. 131, s40) and Section 404, U.S. Army Corps of Engineers Permit.

The Contractor is responsible for protection and preservation of natural areas adjacent to the Replication Area both within and outside the project limits and for the duration of the Contract; including but not limited to damage to soils or vegetation due to erosion, sedimentation, compaction, trampling, vehicles, storage of materials, or other negligence shall be repaired to the satisfaction of the Engineer and at the Contractor’s expense.

The Wetland Specialist overseeing the Wetland Replication construction work shall not be from the same company as that which is performing planting, seeding, or participating in any aspect of the Wetland Replication construction.

SUBMITTALS - DOCUMENTS

Request for Conditional Acceptance: As specified below, a letter requesting Conditional Acceptance of the work and the site conditions shall be submitted to the Engineer.

Request for Certificate of Compliance (Partial or Full): As specified below, shall be submitted to the Engineer for distribution to appropriate regulatory agencies.

Request for Final Acceptance: As specified below, a letter requesting Final Acceptance of the work and the site conditions shall be submitted to the Engineer.

Monitoring Reports: Reports shall be submitted to the Engineer as specified below.

SUBMITTALS - MATERIAL

Soil and Amendments

No soil, compost, or other soil amendment imported to the work site shall contain seeds, roots, stems, or other viable parts of invasive plants or other noxious plants.

At least sixty (60) days prior to installation and prior to ordering, the Contractor shall submit for approval sources of soil, compost, and amendments. Submittal shall include the supplier and

location of the source. Off-site sources shall be identified and available for inspection by the Wetland Specialist prior to transport of material to the site to verify that they are likely to be free of invasive plant species, including all viable plant parts.

Samples of tested and approved wetland soil and soil amendments for soil texture, organic carbon content or other routine soil analysis parameters (e.g., pH, Cation Exchange Capacity, Percent Base Saturation) and Soil Organic Matter Analysis will be required if requested by the Engineer. The grab samples shall be collected by the Contractor or Wetland Specialist from multiple representative locations in the wetland topsoil mix following the "UMass Soil and Plant Tissue Testing Laboratory Sampling and Collection Protocols" (or equivalent certification paperwork provided by the soil supplier). The lab analysis shall be provided to the Engineer along with written certification from the Contractor or Wetland Specialist that the wetland topsoil was collected per the referenced protocol and meets the desired specification. The analysis and written certification of same shall be provided to the Engineer prior to placing the wetland topsoil in the Replication Area.

Seed Mix

Certificate of Materials from the supplier shall be submitted 30 days prior to seeding and must be approved prior to ordering materials. Seed species listed on the certificate shall include ecotype region (i.e., *Asclepias incarnata*, PA Ecotype).

Seed tag from the bag of seed used shall be submitted to the Engineer at the time of seeding. Seed tag shall include ecotype region and species, guaranteed percentages of purity, weed content and germination of the seed, and the net weight. Seed tag shall match the Certificate of Materials, include the name of the supplier, and date material was sent.

Bill of lading or notarized Certificate of Compliance from the Supplier serving as proof of purchase shall be submitted if requested by the Engineer. Document shall include date of sale, quantity, lot number, and address of Supplier. This shall match the seed tag. Notary shall not work for either the contractor or seed supplier.

Plant Certification

Plant Certification and the nursery source shall certify the provenance or origin of all plants.

MATERIALS

Sediment Control Barrier and Erosion Prevention Measures

Erosion prevention measures for disturbed areas adjacent to the Replication Area shall include but not necessarily be limited to compost blankets, jute mesh, seeding, and/or combinations thereof as approved by the Engineer.

Wetland Soil

Soil appropriate for the Replication Area may be either hydric soil excavated from the impacted wetland, a manufactured mix of compost and on-site borrow, or a combination thereof, as approved by the Engineer.

Hydric soil from the impacted wetland area may be spread on the surface of the constructed Replication Area as an inoculant or can be placed in a bulk fashion in a roughly 1:1 ratio of area and depth. Soil shall be handled such that the original soil structure is preserved and shall not be compacted, screened, or otherwise processed.

Hydric soil from the impacted wetland that is infested with invasive plant species identified on the Massachusetts Invasive Plant Advisory Group (MIPAG) shall not be used in the Replication Area unless approved by the Wetland Specialist and Engineer. To the extent possible, infested soil shall be disposed of within the project limits in an upland area outside of regulated areas and as approved by the Invasive Plant Management Strategy or by the Engineer.

A manufactured mix suitable for wetlands shall consist of on-site borrow from the proposed Replication Area (if approved by the Wetland Specialist and Engineer) thoroughly mixed with compost to achieve a target organic carbon content of 10-12% (up to 21% percent organic matter) by dry weight. The organic material used for mixing shall be well or partially decomposed. Clean leaf compost is the preferred soil amendment to achieve these standards though other materials may be used if approved by the Wetland Specialist and Engineer. Note that "clean" refers both to a negligible amount (<1%) of physical contaminants such as plastic and to the lack of chemical contaminants that might pose a hazard to plants or animals. Off-site borrow may be used for mixing if approved in advance by the Engineer.

No soil or soil amendment shall be brought on site without approval of the material source by the Wetland Specialist and the Engineer. Soils used in the replacement area shall be free of rocks greater than 4 inches in diameter.

Plants

Plants shall be native species, not cultivars. To the extent possible, plants shall originate from the applicable EPA Level III Ecoregion.

Plant species and sizes to be included in the Replication Area are as specified on the Site Plans and as follows:

Wetland replication areas will be revegetated such that vegetation layers will simulate those of existing vegetated wetlands in adjacent undisturbed areas. Species to be planted within the wetland replication area will include red maple (*Acer rubrum*), northern arrow-wood (*Viburnum dentatum*) and spicebush (*Lindera benzoin*). The replication area will be supplemented with an indigenous wetland seed mix at a rate of 1 pound per 2,175 square feet to establish hydrophytic ground cover. Table 2 represents the composition and abundance of species to be planted within the proposed Wetland G replication area. The restoration areas (Wetlands H, K, L, N/O & T - Table 3) will be



supplemented with an indigenous wetland seed mix at a rate of 1 pound per 2,175 square feet to establish hydrophytic ground cover.

Table 2. – Proposed Vegetation to be Planted in Phase 1 Wetland Replication Area G (300 s.f.)

Common Name	Latin Name	Status	Planting Density/Comments	Number Wetland G/N
Shrubs				
Red maple	<i>Acer rubrum</i>	FAC	1 plant / 225 sf Provides food and cover for wildlife	1
northern arrow-wood	<i>Viburnum dentatum</i>	FAC	1 plant / 100 sf Provides food and cover for wildlife	2
spicebush	<i>Lindera benzoin</i>	FACW-	1 plant / 100 sf One of most highly regarded species for wildlife	1
Ground Cover				
Wetland/Basin Mix – Seasonally Flooded		Species and indicator status variable (1.0 lbs/2,175 ft ²)		≈ 0.15 lbs
Roadside-Riverfront Mix (Buffer Zone)		Species and indicator status variable (1.0 lbs/2,175 ft ²)		≈ 0.15 lbs

Table 3. – Proposed Vegetation to be Planted in Phase 1 & 2 Wetland Restoration Areas H, K, L, N/O & T (448 s.f.)

Common Name	Latin Name	Status	Planting Density/Comments	Number Wetland G/N
Ground Cover				
Wetland seed mix		Species and indicator status variable (1 lbs/2,175 ft ²)		≈ 0.25 lbs
Roadside-Riverfront Mix (Buffer Zone)		Species and indicator status variable (1.0 lbs/2,175 ft ²)		≈ 0.25 lbs

Requests for substitutions shall be submitted in writing to the Engineer for review by the Wetland Specialist, MassDOT Landscape Architect, and, if required, the relevant regulatory agency at least thirty (30) days prior to planting. All proposed substitutes shall be in conformance with the requirements herein and suitable for the site conditions.

Transplanting and plant material collected from the wild is prohibited unless approved in writing by the Engineer. Plants shall be selected from certified nurseries that have been inspected by state and/or federal agencies.

Seed Mix

Wetland/Basin Mix – Seasonally Flooded

<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS By Weight</u>
Grass		
<i>Elymus riparius</i>	Riverbank Wild Rye	20.00%
<i>Andropogon gerardii NY Eco</i>	Big Bluestem NY Eco	12.00%
<i>Carex lupulina</i>	Hop Sedge	10.00%



<i>Panicum clandestinum 'Tioga'</i>	Deer Tongue 'Tioga'	10.00%
<i>Carex vulpinoidea</i>	Fox Sedge	10.00%
<i>Carex scoparia</i>	Broom sedge	8.00%
<i>Sorghastrum nutans NY Eco</i>	Indiangrass NY Ecotype	8.00%
<i>Panicum virgatum</i>	Switch Grass	8.00%
<i>Juncus effusus</i>	Soft Rush	2.00%
<i>Juncus tenuis</i>	Path Rush	1.00%

89.00%

% PLS By

Weight

Herb/Forb

<u>Botanical Name</u>	<u>Common Name</u>	<u>Weight</u>
<i>Verbena hastata</i>	Blue Vervain	4.00%
<i>Desmodium canadense</i>	Showy Tick Trefoil	2.00%
<i>Eupatorium maculatum</i>	Joe-pye Weed	1.00%
<i>Asclepias incarnata</i>	Swamp Milkweed	1.00%
<i>Aster novae-angliae</i>	New England Aster	1.00%
<i>Eupatorium perfoliatum</i>	Boneset	0.70%
<i>Helenium autumnale</i>	Common Sneezeweed	0.50%
<i>Aster puniceus</i>	Aster - Swamp	0.50%
<i>Mimulus ringens</i>	Monkey Flower	0.20%
<i>Vernonia noveboracensis</i>	New York Ironweed	0.10%

11.00%

100.00%

Seeding Rate:

Species ecotype shall be as native to New England region as possible. Apply this mix at 20 lbs PLS/acre (1.0 lbs/2,175 ft²).

Fertilizers shall not be use

Buffer Zone: Roadside Riverbank –Part Shade Mix

<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS By Weight</u>
Grass		
<i>Elymus virginicus</i>	Virginia Wild Rye	25.00%
<i>Elymus canadensis</i>	Canada Wild Rye	20.00%
<i>Schizachyrium scoparium</i>		
'Albany Pine'	Little Bluestem 'Albany Pine'	20.00%
<i>Festuca rubra</i>	Creeping Red Fescue	12.00%
<i>Dichanthelium clandestinum</i>		
'Tioga'	Deertongue grass 'Tioga'	8.00%
<i>Agrostis perennans</i>	Upland Bentgrass	6.00%



	<i>Carex vulpinoidea</i>	Fox Sedge	2.00%
	<i>Juncus tenuis</i>	Path Rush	2.00%
	<i>Juncus effusus</i>	Soft Rush	0.10%
			<u>4.90%</u>
	<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS By Weight</u>
Herb/Forb			
	<i>Penstemon digitalis</i>	Beard-tongue	2.00%
	<i>Aster novae-angliae</i>	New England Aster	1.00%
	<i>Solidago caesia</i>	Woodland Goldenrod	0.50%
	<i>Aster cordifolius</i>	Blue Wood Aster	0.50%
	<i>Eupatorium maculatum</i>	Joe-pye Weed	0.30%
	<i>Geum canadense</i>	White Avens	0.30%
	<i>Solidago rigida</i>	Rigid Goldenrod	0.20%
	<i>Rudbeckia hirta</i>	Black-eyed Susan	0.10%
			<u>4.90%</u>
			100.00%

Seeding Rate:

Apply this mix at 20 lbs PLS/acre (1.0 lbs/2,175 ft²) on areas of less than 3:1 slope and 25 lbs PLS on areas of greater than 3:1 slope.

Water

The Contractor shall provide water and all equipment required at no extra cost. Water shall be suitable for irrigation and free from ingredients harmful to plants and wildlife. Water from the adjacent water bodies or waterways shall not be utilized. It is the Contractor's responsibility to correct injury or damage due to the lack of water, too much water, or use of contaminated water.

Mulch/Compost Blanket for Seeding

Hydromulch shall be per the manufacturer's recommendations and shall be wood fiber or straw mulch only. Mulch shall be incidental to seeding.

Compost Blanket may be used in lieu of mulch for seeding.

CONSTRUCTION METHODS & SEQUENCE

SITE PROTECTION MEASURES

Minimizing Damage

The Contractor shall plan and execute operations in a manner minimizing the amount of excavated and exposed fill or other foreign materials that could be washed or otherwise carried into Replication Area and nearby resource areas.

Construction of and access to the Replication Area shall minimize damage to existing vegetation and soils as specified herein. Damage to soils or vegetation shall be repaired to the satisfaction of the Engineer and at the Contractor's expense. If required for soil remediation, tilling and the addition of compost shall be at the Contractor's expense.

Wetland topsoil shall be deposited and graded in the Replication Area in a manner that minimizes travel and subsequent compaction of the subgrade (including any specified pit and mound topography) to the extent practicable, including use of track mounted excavators as appropriate. Should soils be compacted, they shall be loosened by a method such as disking, spring-tooth harrowing and/or rototilling. The Contractor shall use boards, timber or composite mats, or other approved materials as necessary, to protect existing and/or new wetlands from compaction due to heavy foot traffic or if equipment is required to travel over wetland soil..

Stockpiling of Soil

Stockpiling of soil, including hydric soil for replication, shall be at least 100 feet from the edge of the bordering and isolated vegetated wetlands and inland banks, unless approved otherwise by the Engineer. Stockpiled soils shall be securely stabilized and contained. Any areas of exposed soil or stockpiles within and adjacent to the Replication Area that will remain inactive for more than 7 calendar days shall be sown with a mix of rapid germinating annual grasses (e.g., annual rye) covered with a layer of straw mulch applied at a rate of 90 pounds per 1,000 square feet. As necessary, the mulch shall be anchored with a tacking coat (non-tar) applied by a hydro seeder or other method recommended by the Wetland Specialist in consultation with the Engineer.

Sediment Barriers

Placement: Sediment barriers shall be installed along the downslope perimeter of the Replication Area beginning and ending in the surrounding upland so that no excavated material or disturbed soil can enter adjacent wetlands or waters. Where construction work is immediately upgradient of the wetland, barriers shall be located so as to protect the Replication Area until slopes are stabilized. Sediment barriers shall be in place and approved by the Engineer prior to excavation work. No work shall take place outside the barriers.

Maintenance: The Contractor shall ensure that all sediment barriers function as intended and at all times.

Existing Trees to Remain

Tree protection shall be per the relevant specifications and as shown on the plans or as required by the Engineer. To protect root systems of existing trees to remain, the limits of the Replication Area may be adjusted, but, the total area of replication required by the permits shall not be reduced. Access route may be adjusted as required.

Trees to be retained as snags (upright dead or dying trees left for wildlife habitat) within or adjacent to the Replication Area shall be as shown on the plans or as directed by the Wetland Specialist or Landscape Architect during the initial site walk. Trees to remain as snags shall be clearly marked prior to clearing. Trees that pose a potential fall hazard (i.e., are near a roadway) should have limbs and trunk cut such that the tree does not pose a fall hazard.

Coarse woody debris in the form of cut trees, stumps, logs, and brush shall be incorporated as shown on the plans or as directed by the Wetland Specialist or Landscape Architect. On site material shall be selected and marked by the Wetland Specialist, retained on the project site, and placed as specified below under Incorporation of Coarse Woody Debris.

All trees, stumps, or brush not specified to remain shall be removed and shall not be stockpiled in the wetland resource areas while awaiting disposal.

Work shall be coordinated with Clearing or Tree Removal.

PRE-WETLAND CONSTRUCTION SITE WALK

Delineating the Replication Area and Access Route. The Contractor shall stake out the Replication Area boundaries and the intended access route and set grade stakes for approval by the Wetland Specialist and Engineer. Following staking and demarcation of areas, the Engineer and Wetland Specialist shall approve or modify as necessary the limits of work, the access route, final location and configuration of replication, grade stake elevations, proposed location of sediment barriers, and review proposed construction methods.

As part of the delineation and approval process, the Wetland Specialist shall mark trees to be converted to snags, select coarse woody debris to be retained for re-use, and select rocks or other elements to be used for habitat features.

Invasive Plants: As part of the initial site walk, the wetland to be impacted and the proposed replication site shall be inspected for the presence of invasive plants. If invasive plants are found they shall be addressed as described herein under Invasive Plants.

SOIL WORK

Final grades in the Replication Area shall meet the target elevations as shown on the Plans or as adjusted by the Wetland Specialist to achieve the desired hydrology and micro-habitat. If adjustments are required, a Request for Information (RFI) shall be submitted to the Engineer for approval. Adjustments shall be documented and included in the As-Built plans (if required) and/or other applicable required documents.

Excavation & Grading

When required by permits, the Wetland Specialist shall notify MADEP and the ACOE (as applicable) at least 72 hours prior to excavation.

Soil in the proposed wetland areas that must be removed for grades to conform to the proposed elevations shall be stripped and disposed of, or, if suitable for reuse, be stockpiled in an approved location. Stockpiled soils shall be kept wet and not allowed to dry out. Procedures for maintaining appropriate moisture levels shall be documented by the Wetland Specialist and provided to the Engineer and the Contractor.

Replication area shall be excavated as shown on the drawings. Where replication area is adjacent to existing reference wetland, finish grade of replication shall generally match existing grades and micro-topography, notwithstanding any deviations that are necessary to achieve the desired hydrology and habitat in the Replication Area.

Prior to placement of backfill, scarify subgrade to a depth of 4 to 6 inches.

Placement of Wetland Soil

Following excavation, scarification, and grading of sub-grade, and after the sub-grade elevations are approved by the Wetland Specialist, suitable soil previously removed or an evenly mixed organic/mineral soil created on-site shall be spread to the design depth and thickness over the proposed wetland areas as shown on the plans and as directed by the Wetland Specialist.

Vehicles used to transport soil from offsite shall be washed or cleaned with air pressure to prevent exotic or invasive seeds or root fragments from contaminating the Replication Area.

Final Grading

The finished grade of the Replication Area shall be at an elevation that will provide an unrestricted hydrologic connection between the Replication Area and adjacent resource areas. The hydrologic connection should be in keeping with restoring the intended function of the replacement wetland relative to the impacted reference wetland. The Contractor shall verify that this elevation is not at a level that could negatively alter the hydrology of an adjacent wetland. Microtopography in the form of hummocks, pits and mounds shall be as shown on the plans or as adjusted by the Wetland Specialist. Final elevations and grading of wetland soil shall be approved by the Wetland Specialist and the Engineer.

To avoid compaction once soil has been placed, no heavy equipment shall travel across placed soil and no work shall occur in wet or moist soil. Soil that is compacted due to construction activities shall be replaced with soil as specified herein and at the Contractor's expense.

RESTORING VEGETATION

Placement of Coarse Woody Material

If specified within this Contract or if directed by the Wetland Specialist or Landscape Architect during the initial site walk, woody debris shall be placed in the Replication Area and/or adjacent upland buffer. Material shall be placed as shown on the plans or as directed following placement of wetland soil and prior to application of compost and/or seed. Woody material shall cover a minimum of 5-20 percent of the Replication Area, depending on whether it is a meadow or woodland wetland and how much wood is available from construction clearing. Where trees are cut for construction purposes, logs of a minimum length of 8 feet must comprise a minimum of 50% of the woody material left on site. Brush shall be included along with logs and stumps as directed. Woody material shall be placed in a deliberate and naturalistic manner.

Planting

Following placement of wetland soil and approval of final grade and conditions, Replication Area shall be planted.

Planting Season shall be May 15-June 15 and September 1-November 1 unless otherwise specified in applicable permit conditions.

Prior to planting, the Wetland Specialist shall approve the condition of the plant material and the method of installation and shall oversee the planting work. Replication Area shall be planted in the dry. Plants shall be placed according to the planting details and within the range of target elevations and at the spacing shown on the Plans or, if spacing is not indicated on the Plans, at the direction of the Wetland Specialist. Unless otherwise noted on the Plans, final plant locations shall be determined on site and located with regard to expected hydrology, plant growth characteristics, habitat desired, and water protection.

Plant material shall be installed as soon as possible after delivery. Plants stored on-site prior to installation shall be stored in the shade and watered twice daily up until time of installation. Plants showing signs of stress or compromised health may be rejected by the Engineer or Wetland Specialist and shall be replaced at the Contractor's expense.

Plant material shall be furnished and installed as indicated including all labor, materials, plants, equipment, incidentals, re-setting of plants (frost heaves, etc), irrigation, re-planting and clean up. If previously approved species are not available at the time of planting, the Wetland Specialist may propose substitutions relative to species, size, and quantities for review and approval by the MassDOT Landscape Architect. Upon approval by MassDOT, substitutions shall be approved by the regulating authority, if and as necessary. Provisions shall be made for a growth warranty of at least two (2) calendar years from the date of Conditional Acceptance as described below or as required by permits.

Seeding

Following placement of wetland soil and planting (if included), the Replication Area shall be seeded using one of the following methods:

- Broadcast by hand or with a hand-held spreader followed by application of straw mulch. If necessary, seed shall be lightly raked to insure good seed-to-soil contact.
- Hydro-seeded with hydro mulch per the Standard Specifications and per the manufacturer's directions.
- Hand broadcast seed with Compost Blanket pneumatically applied at the same time to ensure light cover of soil topdressing over seed.

If spring conditions are drier than usual, supplemental watering may be required. If sowing during the summer months, supplemental watering will likely be required until germination.

If required, seeding limits for different seed mixes shall be determined by the Wetland Specialist.

PLANT ESTABLISHMENT AND INVASIVE MANAGEMENT

Plants shall be watered as necessary to maintain healthy establishment. Plants that fail by September 1 after spring planting or by May 15 after fall planting shall be replaced within the immediate or next planting period and at the Contractor's expense.

Seeding that fails to established according to the conditions of acceptance below shall be over-seeded as required by the Engineer. Washouts and channels shall be repaired and stabilized prior to overseeding. Excessive weed growth shall be pulled out by the roots or, with approval from the Engineer, cut prior to over-seeding.

Invasive Plants: Corrective measures shall be taken to remove or treat invasive plant species in the Replication Areas. Invasive plants shall include those listed as invasive by Massachusetts Invasive Plant Advisory Group (MIPAG) and the US Army Corp of Engineer's New England District's Compensatory Mitigation Guidance

The strategy for chemical and/or manual removal shall be as directed by the Wetland Specialist, shall continue for the duration of the monitoring period.

CONDITIONAL ACCEPTANCE OF WORK

Conditional Acceptance shall indicate approval of the wetland construction work and agreement that work has been done according to plan or modified as approved.

Upon completion of construction, the Contractor shall submit a Request for Conditional Acceptance that includes a brief narrative from the Wetland Specialist demonstrating that the wetland replication construction work was done according to plans (or how modified) and meets required permit conditions. The narrative shall include, photo-documentation of pre-construction conditions as well as soil work, planting, and seeding. Seed tags shall be submitted as part of the Request for Conditional Acceptance.

Upon receipt of a Request for Conditional Acceptance, the Engineer, the Wetland Specialist, and regulatory representative (if required) shall assess the Replication Area and surrounding areas. At a minimum, the following conditions shall be included in the narrative and reviewed as part of the on-site assessment of whether:

- The final finished target elevations have been met and maintained relative to the approved plans and reference wetland. Areas that are too high or too low should be identified along with suggested corrective measures.
- Hydrology meets performance standards.
- Specified seed mix has been seeded. If inspected 30 or more days after seeding, seeded species in the wetland and adjacent upland shall show signs of good germination and healthy growth.
- Planted woody and herbaceous species meet specifications and are establishing well.
- Soils are stabilized and there is no sediment in the wetland and no channeling of slopes.
- There are no invasive plants visible in the replication area.

Upon approval that the work meets the above conditions, MassDOT will issue a letter of Conditional Acceptance. If the Wetland Replication work is not approved, MassDOT will issue a

rejection letter requiring corrective actions. The Wetland Specialist shall recommend corrective actions. Work not approved shall be addressed by the Contractor at no extra cost.

Erosion of adjacent slopes or the flow of sediments into the wetland between Conditional and Final Acceptance shall be immediately addressed by the Contractor.

FINAL ACCEPTANCE OF WORK

Following one full growing season, the Contractor shall submit a Request for Final Acceptance. Submittal shall include a brief narrative of conditions. Upon receiving the Request, the Engineer, Wetland Specialist, West Brookfield Highway Department Superintendent or regulatory representative (if required) shall assess the Replication Area. Final Acceptance will initiate the start of the Wetland Monitoring Period.

The following conditions shall be inspected and approved for acceptance and payment.

- Hydrology is functioning as intended.
- The desired seeded species are establishing well and cover at least 95 percent of the Replication Area, excluding areas of open water areas or planned bare soil.
- No sediments have entered the wetland.
- Adjacent slopes are stabilized with desirable vegetation.
- All planted species (if included) are living and establishing well.
- There are no visible invasive plants.
- Silt fence and non-biodegradable sediment barrier materials have been removed.

If the mitigation work does not meet the above condition and is not approved, MassDOT will issue a rejection letter requiring corrective action. The Wetland Specialist shall recommend corrective actions. Work not approved will be addressed by the Contractor at no extra cost.

MONITORING REPORTS FOR REGULATORY COMPLIANCE

Post wetland construction Monitoring Reports shall be completed and submitted by the Wetland Specialist at the end of the second full growing season per the WPA to the Resident Engineer or West Brookfield Highway Department Superintendent for review and approval.

Generally, the following conditions shall be met upon each inspection:

- Hydrology is functioning as intended.
- The desired seeded species are establishing well and cover 95 percent of the area, excluding areas of open water areas or planned bare soil.
- No sediments have entered into wetland.
- Adjacent slopes are stabilized with desirable vegetation.
- All planted species (if included) are living and establishing well.
- There are no visible invasive plants.

If, at the end of the required monitoring period, the requirements have not been met and success of the wetland replication area has not been achieved as determined by the Monitoring Reports, the Contractor shall provide corrective measures.

REQUEST FOR CERTIFICATE OF COMPLIANCE

If required, a request for a Certificate of Compliance (Partial or Full) pursuant to the Massachusetts Wetlands Protection Act regulations shall be prepared and submitted to MassDOT within 30 days following Conditional Acceptance.

The Request for Certificate of Compliance shall include the following:

- A brief narrative of the work on company letterhead signed by the Wetland Specialist. Narrative shall be prepared as a MS Word document and shall include substantive explanation that demonstrates compliance with EACH relevant permit condition. Narrative shall note variations from the originally permitted design.
- As-built Drawings signed by the Contractor's PE registered in the Commonwealth of Massachusetts. As-built drawings shall show hydrologic conditions, status of plantings and seeding, and shall include a narrative and minimum of 4 photographs documenting site conditions. Plans should note variations from the originally permitted design.

When required, drawings shall meet the Army Corp of Engineer's New England District's Compensatory Replication Guidance, including: scale in the range of 1"=20' to 1" = 100', contours at 1' intervals, spot elevations for intermediate elevations, and polygons outlining each Replication Area, and, as applicable, plant community types. The As-built Drawings shall be provided to the Engineer electronically in Portable Document Format (PDF). If requested by the Engineer, the Drawings shall be provided in printed paper format (11" x 17" sheets, unless otherwise directed). Drawings must be scalable.

- Other documents as required.

Appendix H

Stormwater Engineering Report

STORMWATER MANAGEMENT REPORT

Resurfacing and Related Work For West Main Street (MA Route 9) Ware Town Line to Pierce Road

West Brookfield, Massachusetts

Project File No. 606517 & 609049

Prepared for:

Town of West Brookfield
2 East Main Street (PO Box 372)
West Brookfield, MA 01585



Prepared by:

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141 Longwater Drive
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November 2023

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Section 1

Narrative

1.1 EXECUTIVE SUMMARY

Purpose and Need

The West Main Street (MA Route 9) Resurfacing Project in West Brookfield, MA is a 2.1-mile corridor improvement project to be constructed in two phases (MassDOT Project #606517 and #609049) with the goal of rehabilitating the roadway, improving drainage, and enhancing bicycle accommodations. The project is needed to improve roadway conditions and safety along West Main Street from the Ware Town Line to Pierce Road. Drainage improvements and pavement rehabilitation will increase the life of the roadway.

Existing Conditions

West Main Street (MA Route 9) is a two-lane rural principal arterial. It provides direct access to the heart of both cities and small town centers from Pittsfield to Boston. The 2.1-mile section of MA Route 9 that this project focuses on runs from the Ware Town Line just east of the Route 9 at Gilbertville Road (Route 32) intersection to Pierce Road. Route 9 is part of the National Highway System (NHS) and is a primary road within the Town of West Brookfield. This specific section of MA Route 9 is mostly undeveloped with wooded areas and single-family development. The posted speed limit on MA Route 9 is 40 mph.

The existing cross section of MA Route 9 consists of two travel lanes with narrow paved shoulders. Within the project limits, roadway widths vary between 24'-26' wide with 11.5' lanes and 1'-2' paved shoulders and no sidewalks. Passing along this portion of the corridor is prohibited. Line of sight is limited due to the narrow roadway and the winding characteristic causes unsafe conditions for bicyclists. Most of the signage along the roadway is in fair to poor condition, with many of the signs needing to be replaced. Guardrail is provided where the roadway passes through forested land with steep slope, streams, and wetlands. The pavement on MA Route 9 is in fair condition. Along the roadway there are sections of light to moderate cracking including alligator, edge, longitudinal, and transverse. There is also shoulder deterioration where there is no edge treatment present.

Minor intersections within the project limits include Shoreline Drive and Coy Hill Road. Shoreline Drive serves primarily residential properties. Coy Hill Road serves the Coy Hill Wildlife Management Area and also provides connection to MA Route 67 and the Town of Warren. All minor intersections are stop-controlled.

The existing drainage system is primarily curb and gutter with paved waterways, catch basins, or open culverts directing surface runoff to low-lying areas, many of which are wetland areas. There are forty-five (45) existing discharge points identified within the project limits. A summary of these discharge points is provided in Table 1a on the following page. There are also some areas of country drainage throughout the project area. The lack of properly placed drainage infrastructures and substandard shoulders result in poorly drained conditions along the edge of roadway, which causes erosion and deterioration in certain areas. This also leads to icy conditions during winter months.

Table 1a – Existing Outlets

Outlet	Station	Pipe Size	System Type	Notes
1	11+85 ± Lt	8" CMP	Closed system	Outlet unknown
2	13+38 ± Lt	8" RCP	Drop Inlet	
3	14+57 ± Lt	Unknown	Drop Inlet	Outlet unknown
4	16+60 ± Lt	12" RCP	Drop Inlet	
5	19+92 ± Lt	30" RCP	Culvert w/ DI	
6	24+41 ± Lt	18" RCP	Drop Inlet	
7	27+95 ± Lt	n/a	Paved Swale	
8	28+17 ± Lt	2' x 2' Box	Culvert	
9	30+39 ± Lt	n/a	Paved Swale	
10	32+32 ± Lt	12" RCP	Unknown	
11	32+97 ± Lt	4' x 6' Box	Culvert	
12	33+61 ± Lt	n/a	Paved Swale	
13	35+54 ± Rt	n/a	Paved Swale	
14	36+54 ± Rt	n/a	Paved Swale	
15	39+18 ± Rt	n/a	Paved Swale	
16	41+32 ± Rt	2' x 2' Box	Culvert	Also paved swale
17	42+87 ± Rt	n/a	Paved Swale	
18	43+40 ± Lt	8" CMP	Drop Inlet	
19	45+55 ± Rt	n/a	Paved Swale	
20	48+94 ± Rt	n/a	Paved Swale	
21	53+59 ± Rt	n/a	Paved Swale	
22	55+23 ± Rt	24" RCP	Culvert	
23	58+00 ± Rt	30" RCP	Culvert	
24	60+81 ± Rt	24" RCP	Culvert	
25	67+10 ± Lt	18" RCP	Culvert	Outlet unknown
26	70+45 ± Rt	18" RCP	Culvert	Begin Phase 2
27	75+58 ± Lt	30" RCP	Culvert	
28	80+83 ± Lt	18" RCP	Culvert	
29	82+65 ± Lt	24" RCP	Culvert	
30	87+99 ± Lt	18" RCP	Culvert	
31	91+14 ± Lt	18" RCP	Drop Inlet	
32	92+46 ± Lt	12" CPP	Drop Inlet	
33	93+62 ± Lt	18" RCP	Culvert	Inlet unknown
34	95+36 ± Lt	30" RCP	Culvert	
35	95+89 ± Lt	n/a	Paved Swale	
36	96+77 ± Lt	Unknown	Drop Inlet	
37	97+84 ± Lt	30" RCP	Culvert	
38	98+49 ± Lt	18" RCP	Culvert	Inlet unknown
39	99+85 ± Lt	18" RCP	Culvert	
40	105+91 ± Lt	12" RCP	Culvert	Also paved swale
41	107+55 ± Lt	18" RCP	Culvert	
42	108+56 ± Lt	18" RCP	Culvert	
43	115+55 ± Lt	2' x 2' Box	Culvert	
44	117+36 ± Lt	18" RCP	Culvert	
45	121+57 ± Lt	18" RCP	Culvert	

Table 1b – Proposed Outlets

Outlet	Station	Pipe Size	System Type	Notes
1	11+79 ± Lt	12" RCP	Closed system	New outlet pipe
2	13+38 ± Lt	12" RCP	Closed system	New outlet pipe
3	14+57 ± Lt	n/a	n/a	To Outlet 2
4	16+60 ± Lt	12" RCP	Closed system	New outlet pipe
5	19+92 ± Lt	30" RCP	Culvert w/ DI	
6	24+41 ± Lt	18" RCP	Closed system	
7	27+95 ± Lt	n/a	n/a	To Outlet 6
8	28+17 ± Lt	2' x 2' Box	Culvert	
9	29+00 ± Lt	12" RCP	Catch Basin	New outlet pipe
10	32+32 ± Lt	12" RCP	Closed system	New outlet pipe
11	32+97 ± Lt	4' x 6' Box	Culvert	
12	33+61 ± Lt	n/a	n/a	To Outlet 10
13	35+30 ± Lt	12" RCP	Closed system	New outlet pipe
14	36+54 ± Rt	n/a	n/a	To Outlet 13
15	39+18 ± Rt	12" RCP	Catch Basin	New outlet pipe
16	41+32 ± Rt	2' x 2' Box	Culvert	
17	42+87 ± Rt	n/a	n/a	To Outlet 18
18	43+08 ± Lt	12" RCP	Closed system	New outlet pipe
19	45+55 ± Rt	n/a	n/a	To Outlet 18
20	48+85 ± Rt	12" RCP	Closed system	New outlet pipe
21	53+59 ± Rt	n/a	n/a	To Outlet 22
22	55+23 ± Rt	24" RCP	Culvert w/ CB	
23	58+00 ± Rt	30" RCP	Culvert w/ CBs	
24	60+81 ± Rt	24" RCP	Culvert	
25	67+10 ± Lt	18" RCP	Culvert	Outlet unknown
26	70+45 ± Rt	18" RCP	Culvert w/ CBs	Begin Phase 2
27	75+58 ± Lt	30" RCP	Culvert w/ CBs	
28	80+80 ± Lt	18" RCP	Culvert w/ CBs	New outlet pipe
29	82+65 ± Lt	24" RCP	Culvert w/ CB	
30	87+99 ± Lt	18" RCP	Culvert w/ CBs	
31	91+14 ± Lt	18" RCP	Closed system	
32	92+46 ± Lt	12" CPP	Catch Basin	
33	93+62 ± Lt	18" RCP	Culvert w/ CB	Inlet unknown
34	95+36 ± Lt	30" RCP	Culvert	
35	95+89 ± Lt	n/a	n/a	To Outlet 36
36	96+77 ± Lt	Unknown	Catch Basin	
37	97+84 ± Lt	30" RCP	Culvert	
38	98+49 ± Lt	18" RCP	Culvert w/ CBs	Inlet unknown
39	99+85 ± Lt	18" RCP	Culvert w/ CB	
40	105+91 ± Lt	12" RCP	Culvert w/ CB	
41	107+55 ± Lt	18" RCP	Culvert w/ CBs	
42	108+56 ± Lt	18" RCP	Culvert	
43	115+55 ± Lt	2' x 2' Box	Culvert	Adjacent 12" RCP
44	117+36 ± Lt	18" RCP	Culvert w/ CBs	New outlet pipe
45	121+57 ± Lt	18" RCP	Culvert w/ CBs	

Proposed Improvements

I. Modified Geometry

The proposed roadway closely follows the existing alignment in order to minimize impacts to adjacent properties and environmental resource areas. Vertically, only minor grade adjustments are proposed. Based on the large amount of ledge present, significant vertical alignment change would likely result in increased cost. Box widening to 34' will make the roadway width more consistent compared to current conditions.

a. Proposed Pavement Improvement Program

The existing pavement thickness and conditions on MA Route 9 are adequate with surface wear and tear. Therefore, the proposed pavement rehabilitation method will primarily be mill and overlay. Proposed mill and overlay will consist of variable depth pavement standard milling and resurfacing with 1.5 inches superpave surface course over 2 inches of superpave intermediate course. The proposed pavement structure for the full depth reconstruction and box widening areas has been designed to meet MassDOT's minimum pavement section for arterial roadways and is as follows: 1.5 inches superpave surface course over 2 inches superpave intermediate course over 4 inches superpave base course over 4 inches dense graded crushed stone for sub-base over 8 inches of gravel borrow – Type B.

b. Proposed Cross Section

The proposed MA Route 9 roadway from the Ware town line to Pierce road will consist of 12-foot-wide travel lanes and 5-foot-wide shoulders in both directions resulting in a 34-foot-wide roadway. Asphalt berm is also proposed along both sides of the roadway for significant portions of the project.

Superelevation is proposed for significant portions of the roadway. In these areas the high side shoulder will have a grade break one foot from the edge of travel allowing the outer 4 feet of the shoulder to grade towards the adjacent edge of pavement. This will help to prevent snowmelt or stormwater runoff from flowing across the roadway travel lanes.

2. Safety Enhancements

The proposed roadway work will widen the existing pavement width in order to fully accommodate both vehicular and bicycle users. Superelevated roadway sections will have a high side shoulder break to limit snow melt or stormwater runoff flowing across the roadway. Solid white edge lines will be painted to better define the 12-foot-wide travel lanes and provide a minimum 5-foot-wide shoulder for bicyclists at the edge of the roadway. All roadway striping will be recessed polyurea for traveler visibility. All signs will be replaced in accordance with Manual on Uniform Traffic Control Devices (MUTCD) standards. Broken guardrail will be removed and new guardrail will be installed where needed along the roadway for vehicle safety. Additional curbing and

closed drainage will be installed to better control pavement spread on the roadway and limit erosion at the edge of pavement and on adjacent slopes.

3. Work By Others

There are overhead telephone, electrical and cable lines running between utility poles along the eastern most 3000 feet of the project. Utility poles will need to be relocated due to the proposed roadway widening. The work required to relocate utility poles and overhead wires is proposed to be done by the respective utility purveyors.

1.2 OBJECTIVE OF STORMWATER CALCULATIONS

The purpose of this stormwater analysis is to examine the stormwater runoff from the proposed site based upon the Stormwater Management Policy as revised in February 2008.

Stormwater management will be provided according to latest policy established by the Massachusetts Department of Environmental Protection Stormwater Management Policy as revised, and the applicable requirements of the Town of West Brookfield. The goal of the stormwater management system design on this project is to provide water quality improvements and protect the surrounding area from any potential flooding and/or environmental impacts associated with the unmitigated condition.

1.3 METHODOLOGY

To evaluate the potential impacts associated with the construction of the proposed roadway, post-development condition hydrographs were generated for the site using a type III rainfall distribution. The 24-hour rainfall amounts for the 2-, 10-, 25-, 50-, and 100-year design storms in West Brookfield, Massachusetts are 3.05, 4.83, 5.94, 6.75, and 7.65 inches, respectively. In addition, the future projected 50- year 24-hour rainfall amounts for the 2050 and 2070 planning horizons using Resilient MA Action Team's (RMAT) Climate Resilience Design Standards Tool were found to be 8.5 and 9.1 inches, respectively.

Runoff curve numbers and times of concentration were computed using standard NRCS TR-55 methodology. Additionally, peak stormwater flows and hydrographs for the existing and post-development conditions were computed using HydroCAD (Version 10.00) stormwater modeling software.

Based on a review of the USDA NRCS Web Soil Survey of Worcester County, Massachusetts, soils within the study watershed consist of fine sandy loams with rock outcrops. A summary of the soil composition is shown in Table 2 on the following page and surficial mapping is included in Figure 3 –Soil Map.

Table 2 - Soil Analysis Summary

USDA Map Symbol	Soil Name	Hydrologic Soil Group
71A	Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony	D
101E	Brimfield-Brookfield-Rock outcrop complex, 15 to 35 percent slopes	D
401C	Brookfield fine sandy loam, 8 to 15 percent slopes, extremely stony	A
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	B
422E	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	B

The USDA Natural Resource Conservation Service (NRCS), as part of their soil classification system, assigns each soil series to a hydrologic soil group (HSG). The HSG is a four-letter index (A-D) that is intended to show the relative potential for a soil to generate runoff. HSG D soils have a very slow infiltration rate and thus a high runoff potential when thoroughly wet. HSG A soils have a high infiltration rate and thus a low runoff potential when thoroughly wet. HSG B soils have a moderate soil infiltration rate when thoroughly wet. They consist chiefly of soils that have moderately fine texture to moderately coarse texture. They have a moderate rate of water transmission. HSG B soils are most prevalent in the project area.

1.4 COMPLIANCE WITH STORMWATER MANAGEMENT STANDARDS

The following is an explanation on how the proposed project meets the Stormwater Management Standards as prepared by the Massachusetts Department of Environmental Protection, Revised February 2008. Please refer to the Stormwater Checklist and Certification in Section 4 for additional documentation related to the site.

Standard 1: No New Untreated Discharges - No new stormwater system conveyances will discharge untreated runoff into the resource or buffer areas or cause erosion in the onsite resource area. The project adds additional closed drainage system infrastructure and removes or consolidates eight (8) of the forty-five (45) existing discharges. Eight (8) of the thirty-seven (37) proposed discharges are existing cross culverts with no closed drainage connections which are not altered from the existing condition. The remaining twenty-nine (29) proposed discharges have pre-treatment via deep sump catch basins. The project is in full compliance with this standard.

Standard 2: Peak Rate Attenuation –The project scope includes widening the existing roadway. The result will be approximately a 2.3 acre increase in impervious surfaces over the 2.1-mile-long project. The roadway widening will yield a small increase in the flow and volume to the outlets. The project meets Standard 2 to the maximum extent practicable.

Peak Runoff Flow Rate (cfs)								
Control Point	Location	Description	2 Year		10 Year		100 Year	
			Exist	Post	Exist	Post	Exist	Post
1P		Ware River	6.7	8.9	15.7	18.7	31.8	35.2
2P	33+65 Right	4' x 6' culvert inlet	3.7	4.8	8.3	9.7	16.2	18.0
3P	41+52 Left	2' x 2' culvert inlet	0.9	1.6	2.3	3.3	4.8	6.0
4P	61+10 Left	24" culvert inlet	0.4	0.5	0.7	0.9	1.3	1.6
5P	98+07 Left	Pierce Brook	5.6	7.7	13.0	15.7	26.0	28.7
6P		Brookhaven Lake	8.8	11.9	20.4	24.4	40.6	44.9

Standard 3: Recharge – Recharge to groundwater is limited due to right-of-way constraints, proximity to wetlands, depth to ledge, and adjacent steep topography. As a result of these constraints, no structural infiltrative practices are proposed as part of the project. However, country drainage has been proposed to the maximum extent practicable to include repairing areas of country drainage which no longer function as such.

Standard 4: Water Quality - The proposed stormwater management system improves upon the existing drainage by eliminating direct discharges to wetlands via paved waterways. These discharges will now be directed to proposed catch basins. Along the project corridor, all proposed catch basins will have deep sumps which will provide TSS removal for pretreatment of discharges to associated wetlands. The project meets Standard 4 to the maximum extent practicable.

Standard 5: Land Uses with Higher Pollutant Loads – The project is not a land use with higher potential pollutant loads. Therefore, the standard is not applicable for this project.

Standard 6: Critical Areas – The project limits do not fall in any critical areas defined by Standard 6 stormwater standards.

Standard 7: Redevelopment and Other Projects Subject to the Standards only to the maximum extent practicable – The project is a redevelopment and the design is intended to improve existing conditions. The project as designed has met Stormwater Management Standards #2, #3, and #4 to the maximum extent practicable. Standards #5 and #6 are not applicable to this project. The project does comply with Standards #1, #8, #9, and #10.

Standard 8: Construction Period Pollution Prevention Plan and Erosion and Sedimentation Control - The Contractor will be required to obtain a NPDES Construction General Permit prior to the start of construction.

Standard 9: Operation and Maintenance Plan - An Operation and Maintenance plan has been customized to fit the design of the road improvements. Provisions to maintain runoff control devices have been assured through structural, non-structural, and construction management approaches. See Section 3: Long-Term Pollution Prevention Plan. The project is in full compliance with the standard.

Standard 10: Prohibition of Illicit Discharges – The Operation and Maintenance plan required by Standard 9 includes measures to prevent illicit discharges. Illicit discharges will be discontinued where the elimination of these discharges will not result in stormwater damages to contributing parcels. An Illicit Discharge Compliance Statement is included within this report. See Section 4: Stormwater Management Checklist. The project is in full compliance with this standard.

1.5 BEST MANAGEMENT PRACTICES (BMPs)

A system of deep sump catch basins will be used to treat stormwater runoff. See Section 5: Stormwater Management Calculations. A description of the devices incorporated is indicated below.

1. Deep Sump Catch Basins

Deep sump catch basins are modified versions of inlet structures typically installed on highways. The deep sumps, with a 4 ft minimum, are all proposed to be placed “off-line”, that is they don’t have inlet pipes. Deep sumps provide capacity for sediment accumulation and can serve as pretreatment for other downstream BMPs.

1.6 LOW IMPACT DEVELOPMENT (LID) MEASURES

As outlined on page 3 of 8 of the stormwater checklist, low impact development techniques were evaluated for use on this project. The following is an explanation of how the project employs LID techniques or why it could not be incorporated into this project.

No Disturbance to Wetland Resource Areas

The project includes roadway that passes through the buffer zone of bordering vegetated wetlands (BVW) adjacent to Pierce Brook and unnamed tributaries to the Ware River. The project does result in direct impacts to BVW of approximately 283 square feet and 80 linear feet of temporary impacts to channel banks and 30 linear feet of permanent impacts to channel banks.

Reduced Impervious Area

This project increases the total impervious area by approximately 2.3 acres which is primarily associated with the construction of bike lanes/shoulders in order to satisfy MassDOT's Healthy Transportation Policy Directive.

Minimizing disturbance to existing trees and shrubs

This project minimizes disturbance to existing vegetation by grading to meet existing conditions as quickly as possible at the limit of work. Retaining walls are also proposed in some locations. Tree protection is included in the plans to minimize disturbance to existing trees.

Use of "country drainage" versus curb and gutter conveyance and pipe

Country drainage has been incorporated in the project to the maximum extent practical. This will include regrading roadway shoulders throughout the project corridor which have aggraded over time and thus no longer allow sheet flow off the pavement as intended. Country drainage has been proposed for approximately 775 feet of the westbound roadway and 1450 feet of the eastbound roadway.

1.7 CLOSED DRAINAGE SYSTEMS

The roadway closed drainage system infrastructure was designed to collect and convey the 10-year frequency design storm event via open channel flow. Refer to the calculations in Section 2.

Pipe hydraulic design was completed using Manning’s full flow capacity equation for circular pipe with a typical n-value of 0.013 for concrete, 0.011 for HDPE or 0.025 for corrugated metal.

$$Q = 1.49/n AR^{2/3} S^{1/2}$$

where,

n is coefficient depending on channel roughness

A is area of flow

R is the hydraulic radius

S is the channel slope

Gutter flow and catch basin inlet capacity was calculated using Hydraulic Engineering Circular 22 (HEC-22), Third Edition – Urban Drainage Design Manual. Pavement spread was limited to 8 feet (5-foot shoulder width plus 3 feet of travel lane) for a rural principal arterial with a design speed less than or equal to 45 mph. Pavement spread was limited to 4 feet on the high shoulder in superelevated sections. Catch basins were placed in order to limit bypass flows to 30 percent of the total flow to the extent practicable.

1.8 CLIMATE RESILIENCE

The project was evaluated for 20-year and 40-year asset useful life in the RMAT tool providing planning horizons of 2050 and 2070. The project rainfall was input into HydroCAD for analysis - See Table 3 for Peak Runoff Flow Rate. The individual outfalls were analyzed, and it was determined 7 of the 29 proposed outlets have potential flooding in the future 50-year storm scenarios. Those outlets are 1,2,3,4,9,10, and 27.

Table 3 – Future Runoff Projections

Peak Runoff Flow Rate (cfs)						
Control Point	Location	Description	2050 - 50 Year		2070 - 50 Year	
			Exist	Post	Exist	Post
1P		Ware River	36.8	40.3	40.4	43.9
2P	33+65 Right	4' x 6' culvert inlet	18.7	20.6	20.4	22.4
3P	41+52 Left	2' x 2' culvert inlet	5.6	6.8	6.2	7.4

4P	61+10 Left	24" culvert inlet	1.5	1.8	1.7	1.9
5P	98+07 Left	Pierce Brook	29.9	32.7	32.7	35.4
6P		Brookhaven Lake	46.8	51.1	51.2	55.5

Table 4 – Projected Peak Flood Elevations

Peak Flood Elevations (ft)						
Outlet	Location	Description	2050 - 50 Year		2070 - 50 Year	
			Outlet Elev.	Peak Elev.	Outlet Elev.	Peak Elev.
1	11+50 Left	12" Round Culvert	537.30	540.86	537.30	541.69
2	14+59 Left	12" Round Culvert	554.80	557.81	554.80	558.55
3	16+60 Left	12" Round Culvert	565.65	583.13	565.65	588.32
4	19+92 Left	30" Round Culvert	581.37	590.95	581.37	593.58
9	43+00 Left	12" Round Culvert	675.60	677.27	675.60	677.44
10	48+85 Right	12" Round Culvert	712.40	714.79	712.40	715.09
27	115+15 Left	12" Round Culvert	680.65	682.49	680.65	682.68

1.9 SUMMARY OF STORMWATER CALCULATIONS

The overall project will result in a net increase of impervious surfaces of approximately 2.3 acres over the 2.1-mile corridor. Stormwater runoff is primarily treated by deep sump catch basins (25% TSS removal).

To guard against possible impacts from the proposed improvements, erosion and sedimentation control measures will be incorporated into the sequence of construction. Erosion/sedimentation control installations include placement of compost filter tubes around disturbed areas and silt sacks at storm drainage inlet points. On-going stabilization of disturbed areas should be completed as the work progresses. Restoration/stabilization measures include seeding, mulching, and placement of stabilization fabric where required. The Owner is aware that the project will be subject to the United States Environmental Protection Agency (EPA) Phase II Stormwater Program for land disturbances greater than one acre. The Contractor will be required to file a NPDES Construction General Permit.

1.10 CONCLUSION

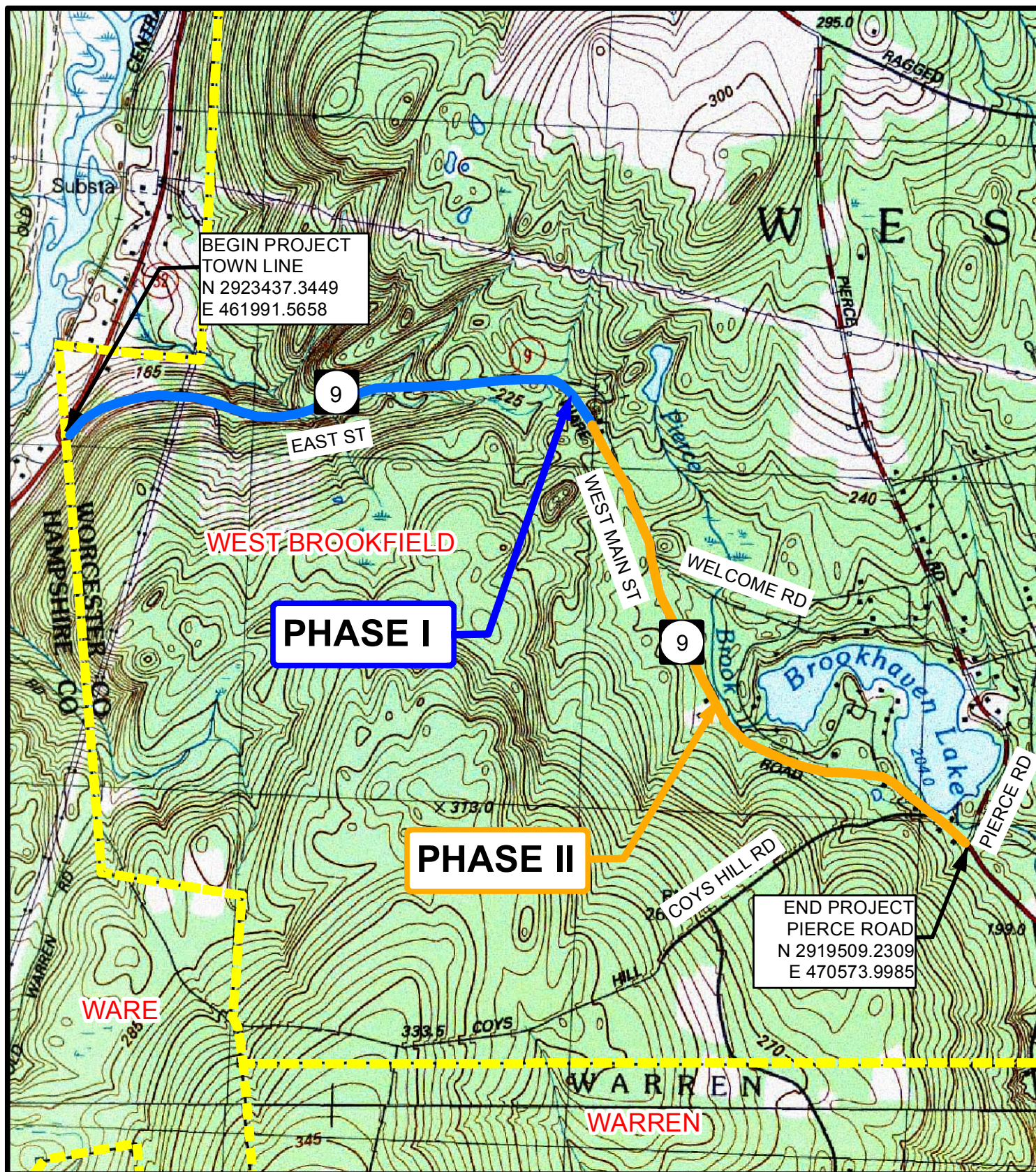
The primary goals of the West Main Street (MA Route 9) Resurfacing project are to improve bicycle and vehicular safety. In addition to the widened roadway, the Town seeks to improve drainage along the corridor. This report to include all associated calculations has been prepared to illustrate that the proposed improvements meet the required standards for this redevelopment project to the maximum extent practicable.

1.11 REFERENCES

1. Commonwealth of Massachusetts, Department of Environmental Protection, Office of Coastal Zone Management. Stormwater Management Policy Handbook. Volumes 1&2, 1997 (DEP Stormwater Management Policy 1997).
2. Commonwealth of Massachusetts, Department of Environmental Protection, Stormwater Management Standards Handbook. Volumes 1-3 February 2008 (DEP Stormwater Management Policy 2008).
3. Commonwealth of Massachusetts, Department of Environmental Protection. 310 CMR 10.00: Massachusetts Wetlands Protection Act Regulations. 2008.
4. Commonwealth of Massachusetts, Department of Environmental Protection. 314 CMR 6.00: Massachusetts Groundwater Quality Standards. 1990.
5. Commonwealth of Massachusetts, Department of Environmental Protection. 314 CMR 9.00: Massachusetts Water Quality Regulations 2008.

Section 1 .12

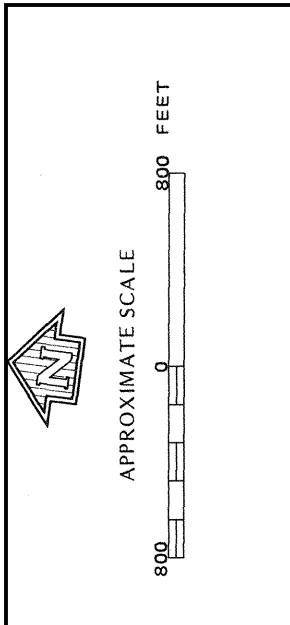
Figures



TOWN OF WEST BROOKFIELD, MA
ROUTE 9 RESURFACING AND RELATED WORK

Figure 1 - Locus Map





NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
WEST BROOKFIELD,
MASSACHUSETTS
WORCESTER COUNTY

PANEL 10 OF 20
(SEE MAP INDEX FOR PANELS NOT PRINTED)

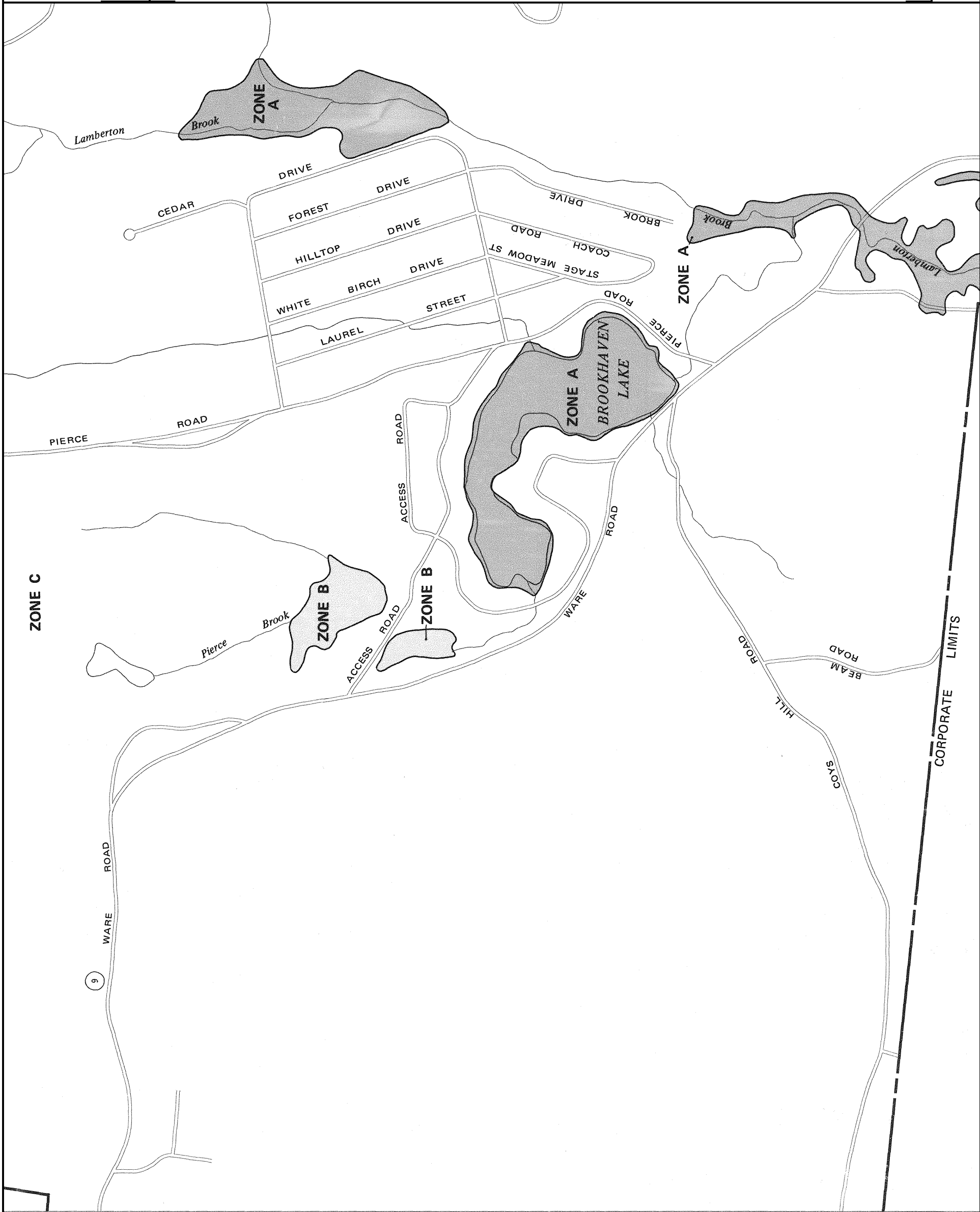
COMMUNITY-PANEL NUMBER
250346 0010 B

EFFECTIVE DATE:
JUNE 1, 1982



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



Soil Map—Hampden and Hampshire Counties, Massachusetts, Eastern Part; and Worcester County, Massachusetts, Southern Part
(Figure 3 - West Brookfield (MA Route 9))

MAP LEGEND

Area of Interest (AOI)	Spoil Area
Soils	Stony Spot
Soil Map Unit Polygons	Very Stony Spot
Soil Map Unit Lines	Wet Spot
Soil Map Unit Points	Other
Special Point Features	Special Line Features
Blowout	Streams and Canals
Borrow Pit	Transportation
Clay Spot	RAILS
Closed Depression	Interstate Highways
Gravel Pit	US Routes
Gravelly Spot	Major Roads
Landfill	Local Roads
Lava Flow	Background
Marsh or swamp	Aerial Photography
Mine or Quarry	
Miscellaneous Water	
Perennial Water	
Rock Outcrop	
Saline Spot	
Sandy Spot	
Severely Eroded Spot	
Sinkhole	
Slide or Slip	
Sodic Spot	

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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: Hampden and Hampshire Counties, Massachusetts, Eastern Part
Survey Area Data: Version 14, Sep 13, 2019

Soil Survey Area: Worcester County, Massachusetts, Southern Part
Survey Area Data: Version 12, Sep 12, 2019

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 18, 2019—Jul 9, 2019

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.

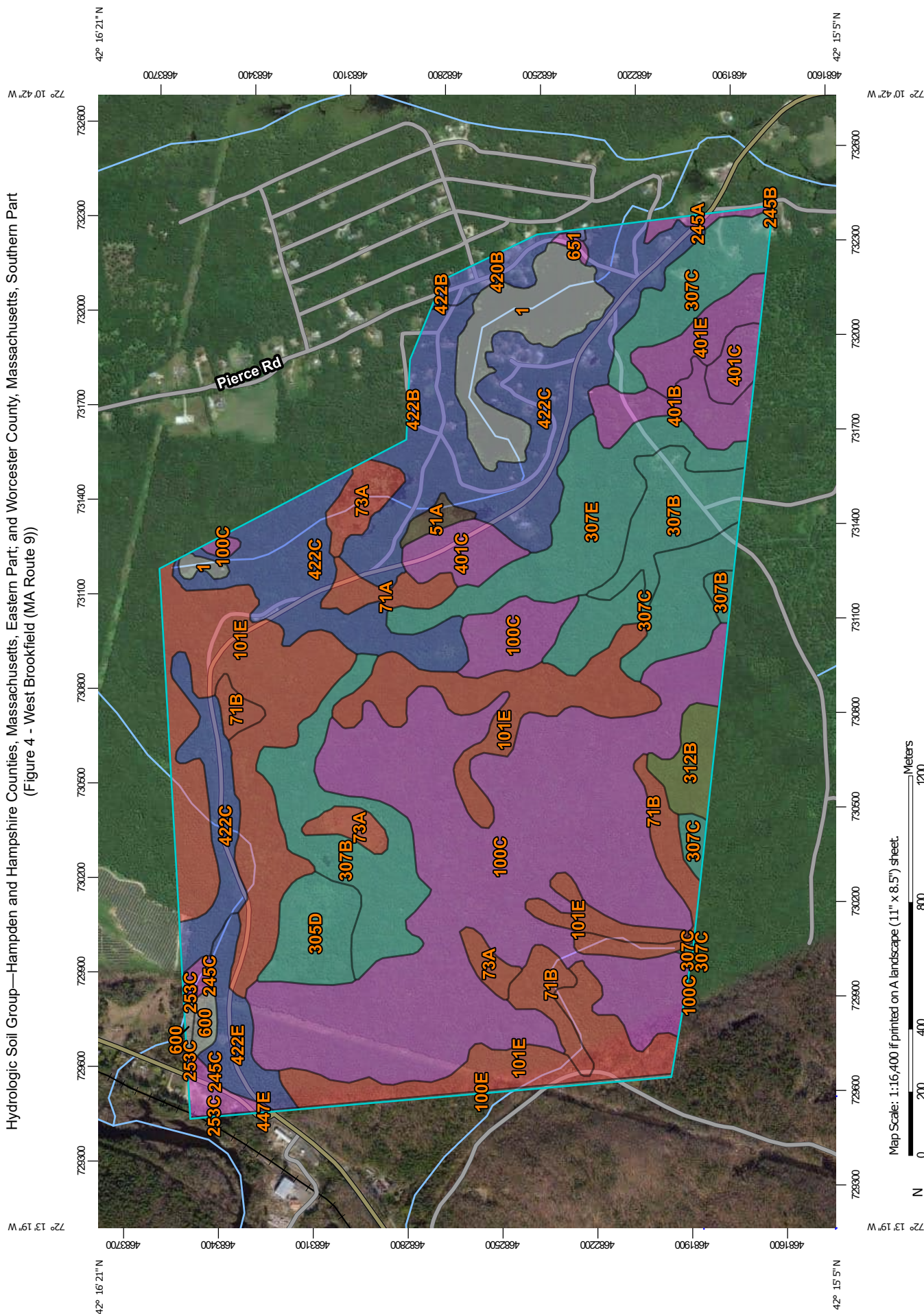
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
100C	Brookfield-Brimfield-Rock outcrop complex, strongly sloping	0.0	0.0%
100E	Brookfield-Brimfield-Rock outcrop complex, steep	2.2	0.2%
253C	Hinckley loamy sand, 8 to 15 percent slopes	0.7	0.1%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	0.0	0.0%
447E	Gloucester and Canton soils, steep, extremely stony	0.3	0.0%
600	Pits, gravel	1.1	0.1%
Subtotals for Soil Survey Area		4.3	0.4%
Totals for Area of Interest		1,020.8	100.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	36.4	3.6%
51A	Swansea muck, 0 to 1 percent slopes	3.7	0.4%
71A	Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony	9.4	0.9%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	27.8	2.7%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	19.9	2.0%
100C	Brookfield-Brimfield-Rock outcrop complex, 3 to 15 percent slopes	264.5	25.9%
101E	Brimfield-Brookfield-Rock outcrop complex, 15 to 35 percent slopes	173.8	17.0%
245A	Hinckley loamy sand, 0 to 3 percent slopes	3.0	0.3%
245B	Hinckley loamy sand, 3 to 8 percent slopes	0.0	0.0%
245C	Hinckley loamy sand, 8 to 15 percent slopes	7.8	0.8%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	20.5	2.0%

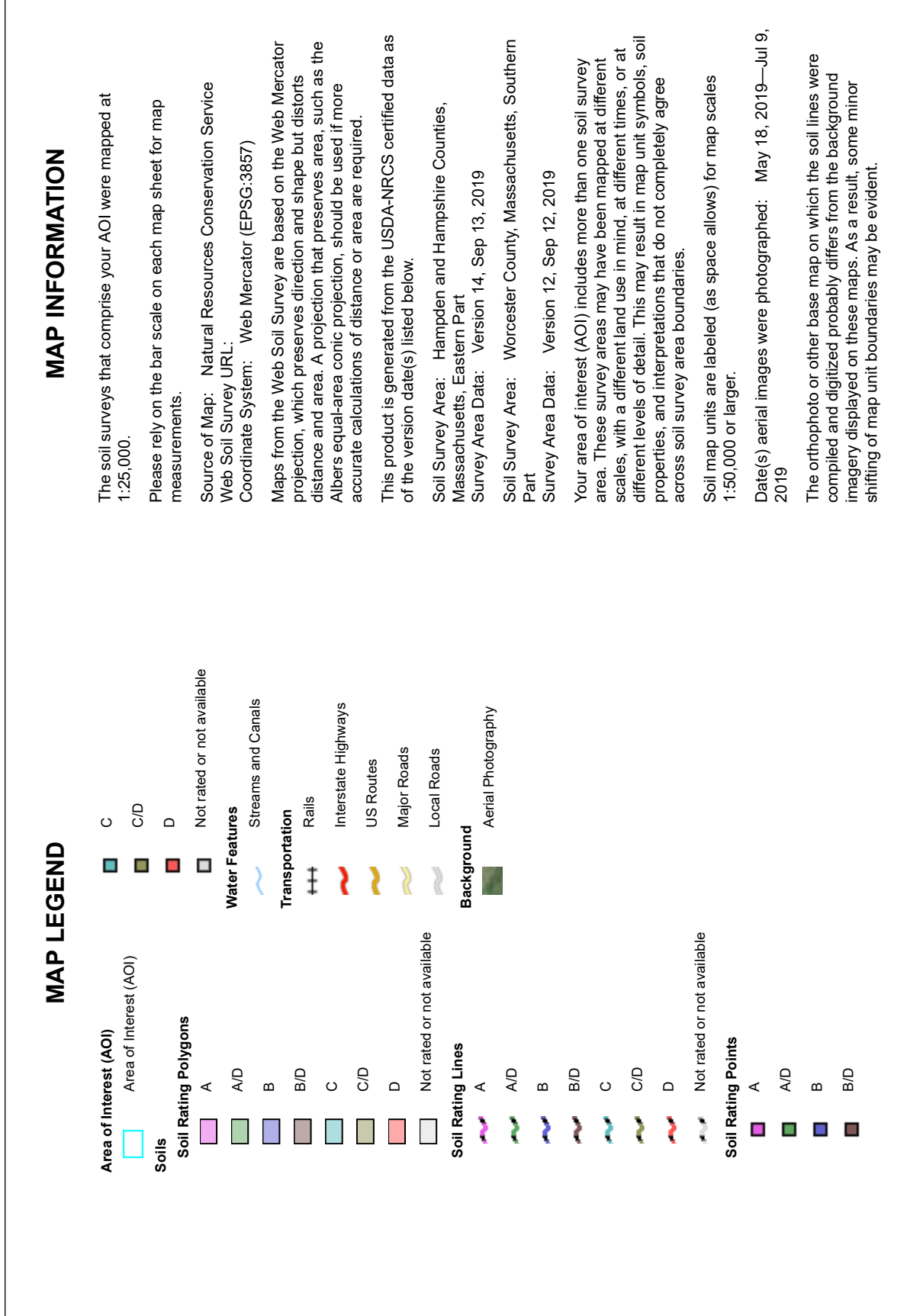
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	72.7	7.1%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	63.2	6.2%
307E	Paxton fine sandy loam, 15 to 35 percent slopes, extremely stony	51.0	5.0%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	11.9	1.2%
401B	Brookfield fine sandy loam, 3 to 8 percent slopes, extremely stony	17.5	1.7%
401C	Brookfield fine sandy loam, 8 to 15 percent slopes, extremely stony	20.9	2.0%
401E	Brookfield fine sandy loam, 15 to 35 percent slopes, extremely stony	15.0	1.5%
420B	Canton fine sandy loam, 3 to 8 percent slopes	8.7	0.9%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	1.4	0.1%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	166.5	16.3%
422E	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	16.5	1.6%
600	Pits, gravel	3.2	0.3%
651	Udorthents, smoothed	1.2	0.1%
Subtotals for Soil Survey Area		1,016.4	99.6%
Totals for Area of Interest		1,020.8	100.0%

Hydrologic Soil Group—Hampden and Hampshire Counties, Massachusetts, Eastern Part; and Worcester County, Massachusetts, Southern Part
(Figure 4 - West Brookfield (MA Route 9))



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey



Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
100C	Brookfield-Brimfield-Rock outcrop complex, strongly sloping		0.0	0.0%
100E	Brookfield-Brimfield-Rock outcrop complex, steep		2.2	0.2%
253C	Hinckley loamy sand, 8 to 15 percent slopes	A	0.7	0.1%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	C	0.0	0.0%
447E	Gloucester and Canton soils, steep, extremely stony	A	0.3	0.0%
600	Pits, gravel		1.1	0.1%
Subtotals for Soil Survey Area			4.3	0.4%
Totals for Area of Interest			1,020.8	100.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		36.4	3.6%
51A	Swansea muck, 0 to 1 percent slopes	B/D	3.7	0.4%
71A	Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony	D	9.4	0.9%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	D	27.8	2.7%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	D	19.9	2.0%
100C	Brookfield-Brimfield-Rock outcrop complex, 3 to 15 percent slopes	A	264.5	25.9%
101E	Brimfield-Brookfield-Rock outcrop complex, 15 to 35 percent slopes	D	173.8	17.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
245A	Hinckley loamy sand, 0 to 3 percent slopes	A	3.0	0.3%
245B	Hinckley loamy sand, 3 to 8 percent slopes	A	0.0	0.0%
245C	Hinckley loamy sand, 8 to 15 percent slopes	A	7.8	0.8%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	C	20.5	2.0%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	C	72.7	7.1%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	C	63.2	6.2%
307E	Paxton fine sandy loam, 15 to 35 percent slopes, extremely stony	C	51.0	5.0%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	C/D	11.9	1.2%
401B	Brookfield fine sandy loam, 3 to 8 percent slopes, extremely stony	A	17.5	1.7%
401C	Brookfield fine sandy loam, 8 to 15 percent slopes, extremely stony	A	20.9	2.0%
401E	Brookfield fine sandy loam, 15 to 35 percent slopes, extremely stony	A	15.0	1.5%
420B	Canton fine sandy loam, 3 to 8 percent slopes	B	8.7	0.9%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	B	1.4	0.1%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	B	166.5	16.3%
422E	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	B	16.5	1.6%
600	Pits, gravel		3.2	0.3%
651	Udorthents, smoothed	A	1.2	0.1%
Subtotals for Soil Survey Area			1,016.4	99.6%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Totals for Area of Interest			1,020.8	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

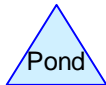
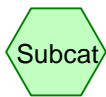
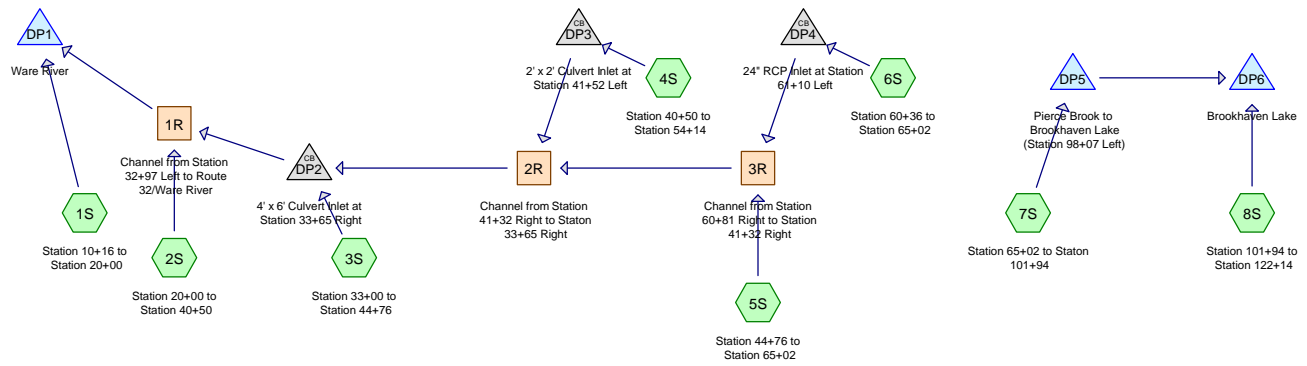
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Section 2

Hydrologic & Hydraulic Calculations



Routing Diagram for 25485_PRE
 Prepared by CHA Companies, Inc., Printed 1/4/2022
 HydroCAD® 10.00-20 s/n 00409 © 2017 HydroCAD Software Solutions LLC

25485_PRE

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.509	98	Paved parking, HSG B (1S, 4S, 5S, 7S, 8S)
1.475	98	Paved parking, HSG D (2S, 3S, 6S)
6.186	58	Woods/grass comb., Good, HSG B (1S, 2S, 4S, 5S, 7S, 8S)
2.623	79	Woods/grass comb., Good, HSG D (2S, 3S, 5S, 6S, 7S)
15.793	79	TOTAL AREA

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	DP2	612.80	609.92	98.0	0.0294	0.012	72.0	48.0	0.0
2	DP3	660.58	660.00	58.0	0.0100	0.012	24.0	24.0	0.0
3	DP4	749.28	748.38	90.0	0.0100	0.012	24.0	0.0	0.0

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Type III 24-hr 2 Year Rainfall=3.05"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Station 10+16 to Station	Runoff Area=1.356 ac 47.05% Impervious Runoff Depth>1.10" Tc=5.0 min CN=77 Runoff=1.76 cfs 0.125 af
Subcatchment 2S: Station 20+00 to Station	Runoff Area=2.551 ac 39.32% Impervious Runoff Depth>1.42" Tc=5.0 min CN=82 Runoff=4.37 cfs 0.301 af
Subcatchment 3S: Station 33+00 to Station	Runoff Area=0.917 ac 48.53% Impervious Runoff Depth>1.86" Tc=5.0 min CN=88 Runoff=2.07 cfs 0.142 af
Subcatchment 4S: Station 40+50 to Station	Runoff Area=0.880 ac 37.50% Impervious Runoff Depth>0.89" Tc=5.0 min CN=73 Runoff=0.88 cfs 0.065 af
Subcatchment 5S: Station 44+76 to Station	Runoff Area=1.849 ac 46.89% Impervious Runoff Depth>1.56" Tc=5.0 min CN=84 Runoff=3.50 cfs 0.240 af
Subcatchment 6S: Station 60+36 to Station	Runoff Area=0.203 ac 13.30% Impervious Runoff Depth>1.42" Tc=5.0 min CN=82 Runoff=0.35 cfs 0.024 af
Subcatchment 7S: Station 65+02 to Staton	Runoff Area=5.139 ac 44.74% Impervious Runoff Depth>1.10" Tc=10.0 min CN=77 Runoff=5.60 cfs 0.472 af
Subcatchment 8S: Station 101+94 to Station	Runoff Area=2.898 ac 47.45% Impervious Runoff Depth>1.10" Tc=5.0 min CN=77 Runoff=3.77 cfs 0.267 af
Reach 1R: Channel from Station 32+97 Left	Avg. Flow Depth=0.43' Max Vel=4.48 fps Inflow=7.42 cfs 0.768 af n=0.030 L=2,000.0' S=0.0450 '/ Capacity=159.37 cfs Outflow=5.89 cfs 0.762 af
Reach 2R: Channel from Station 41+32	Avg. Flow Depth=0.29' Max Vel=4.10 fps Inflow=3.19 cfs 0.326 af n=0.030 L=767.0' S=0.0615 '/ Capacity=186.45 cfs Outflow=3.08 cfs 0.325 af
Reach 3R: Channel from Station 60+81	Avg. Flow Depth=0.30' Max Vel=3.57 fps Inflow=3.85 cfs 0.264 af n=0.030 L=1,949.0' S=0.0453 '/ Capacity=159.97 cfs Outflow=2.77 cfs 0.261 af
Pond DP1: Ware River	Inflow=6.72 cfs 0.887 af Primary=6.72 cfs 0.887 af
Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right	Peak Elev=613.14' Inflow=3.74 cfs 0.467 af 72.0" x 48.0" Box Culvert n=0.012 L=98.0' S=0.0294 '/ Outflow=3.74 cfs 0.467 af
Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left	Peak Elev=660.85' Inflow=0.88 cfs 0.065 af 24.0" x 24.0" Box Culvert n=0.012 L=58.0' S=0.0100 '/ Outflow=0.88 cfs 0.065 af
Pond DP4: 24" RCP Inlet at Station 61+10 Left	Peak Elev=749.52' Inflow=0.35 cfs 0.024 af 24.0" Round Culvert n=0.012 L=90.0' S=0.0100 '/ Outflow=0.35 cfs 0.024 af
Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)	Inflow=5.60 cfs 0.472 af Primary=5.60 cfs 0.472 af

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Type III 24-hr 2 Year Rainfall=3.05"

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Pond DP6: Brookhaven Lake

Inflow=8.76 cfs 0.739 af

Primary=8.76 cfs 0.739 af

Total Runoff Area = 15.793 ac Runoff Volume = 1.636 af Average Runoff Depth = 1.24"
55.78% Pervious = 8.809 ac 44.22% Impervious = 6.984 ac

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Type III 24-hr 2 Year Rainfall=3.05"

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Summary for Subcatchment 1S: Station 10+16 to Station 20+00

Runoff = 1.76 cfs @ 12.08 hrs, Volume= 0.125 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
0.638	98	Paved parking, HSG B
0.718	58	Woods/grass comb., Good, HSG B
1.356	77	Weighted Average
0.718		52.95% Pervious Area
0.638		47.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 2S: Station 20+00 to Station 40+50

Runoff = 4.37 cfs @ 12.08 hrs, Volume= 0.301 af, Depth> 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
1.003	98	Paved parking, HSG D
0.998	79	Woods/grass comb., Good, HSG D
0.550	58	Woods/grass comb., Good, HSG B
2.551	82	Weighted Average
1.548		60.68% Pervious Area
1.003		39.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 3S: Station 33+00 to Station 44+76

Runoff = 2.07 cfs @ 12.07 hrs, Volume= 0.142 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
0.445	98	Paved parking, HSG D
0.472	79	Woods/grass comb., Good, HSG D
0.917	88	Weighted Average
0.472		51.47% Pervious Area
0.445		48.53% Impervious Area

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Type III 24-hr 2 Year Rainfall=3.05"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 4S: Station 40+50 to Station 54+14

Runoff = 0.88 cfs @ 12.08 hrs, Volume= 0.065 af, Depth> 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG B
0.550	58	Woods/grass comb., Good, HSG B
0.880	73	Weighted Average
0.550		62.50% Pervious Area
0.330		37.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 5S: Station 44+76 to Station 65+02

Runoff = 3.50 cfs @ 12.08 hrs, Volume= 0.240 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
0.867	98	Paved parking, HSG B
0.614	79	Woods/grass comb., Good, HSG D
0.368	58	Woods/grass comb., Good, HSG B
1.849	84	Weighted Average
0.982		53.11% Pervious Area
0.867		46.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 6S: Station 60+36 to Station 65+02

Runoff = 0.35 cfs @ 12.08 hrs, Volume= 0.024 af, Depth> 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

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Type III 24-hr 2 Year Rainfall=3.05"

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Area (ac)	CN	Description
0.027	98	Paved parking, HSG D
0.176	79	Woods/grass comb., Good, HSG D
0.203	82	Weighted Average
0.176		86.70% Pervious Area
0.027		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 7S: Station 65+02 to Station 101+94

Runoff = 5.60 cfs @ 12.15 hrs, Volume= 0.472 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
2.299	98	Paved parking, HSG B
0.363	79	Woods/grass comb., Good, HSG D
2.477	58	Woods/grass comb., Good, HSG B
5.139	77	Weighted Average
2.840		55.26% Pervious Area
2.299		44.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 8S: Station 101+94 to Station 122+14

Runoff = 3.77 cfs @ 12.08 hrs, Volume= 0.267 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
1.375	98	Paved parking, HSG B
1.523	58	Woods/grass comb., Good, HSG B
2.898	77	Weighted Average
1.523		52.55% Pervious Area
1.375		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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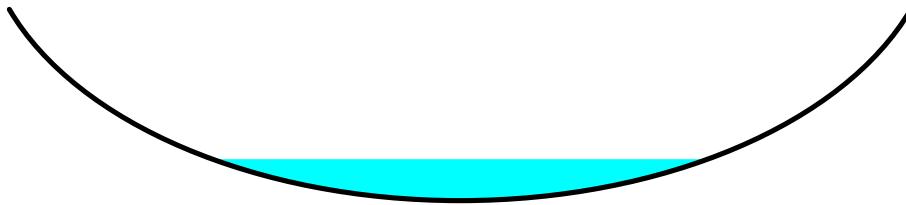
Summary for Reach 1R: Channel from Station 32+97 Left to Route 32/Ware River

Inflow Area = 6.400 ac, 41.75% Impervious, Inflow Depth > 1.44" for 2 Year event
 Inflow = 7.42 cfs @ 12.08 hrs, Volume= 0.768 af
 Outflow = 5.89 cfs @ 12.28 hrs, Volume= 0.762 af, Atten= 21%, Lag= 12.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.48 fps, Min. Travel Time= 7.4 min
 Avg. Velocity = 1.79 fps, Avg. Travel Time= 18.6 min

Peak Storage= 2,632 cf @ 12.16 hrs
 Average Depth at Peak Storage= 0.43'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.37 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 2,000.0' Slope= 0.0450 '/
 Inlet Invert= 609.92', Outlet Invert= 520.00'



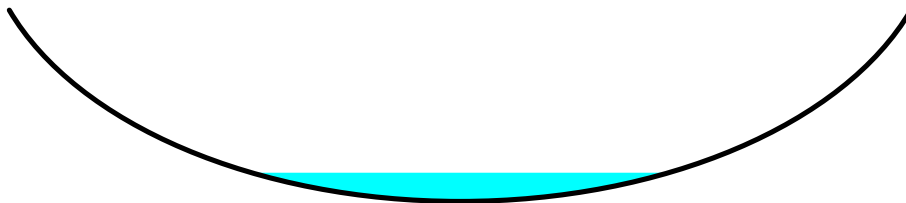
Summary for Reach 2R: Channel from Station 41+32 Right to Staton 33+65 Right

Inflow Area = 2.932 ac, 41.75% Impervious, Inflow Depth > 1.33" for 2 Year event
 Inflow = 3.19 cfs @ 12.30 hrs, Volume= 0.326 af
 Outflow = 3.08 cfs @ 12.39 hrs, Volume= 0.325 af, Atten= 4%, Lag= 5.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.10 fps, Min. Travel Time= 3.1 min
 Avg. Velocity = 1.65 fps, Avg. Travel Time= 7.8 min

Peak Storage= 575 cf @ 12.33 hrs
 Average Depth at Peak Storage= 0.29'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 186.45 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 767.0' Slope= 0.0615 '/
 Inlet Invert= 660.00', Outlet Invert= 612.80'



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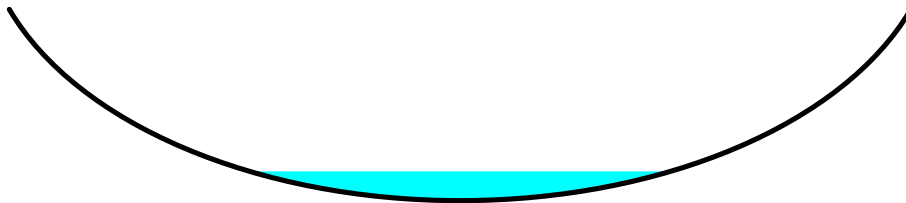
Summary for Reach 3R: Channel from Station 60+81 Right to Station 41+32 Right

Inflow Area = 2.052 ac, 43.57% Impervious, Inflow Depth > 1.54" for 2 Year event
 Inflow = 3.85 cfs @ 12.08 hrs, Volume= 0.264 af
 Outflow = 2.77 cfs @ 12.30 hrs, Volume= 0.261 af, Atten= 28%, Lag= 13.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.57 fps, Min. Travel Time= 9.1 min
 Avg. Velocity = 1.38 fps, Avg. Travel Time= 23.6 min

Peak Storage= 1,511 cf @ 12.15 hrs
 Average Depth at Peak Storage= 0.30'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.97 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 1,949.0' Slope= 0.0453 '/
 Inlet Invert= 748.28', Outlet Invert= 660.00'



Summary for Pond DP1: Ware River

Inflow Area = 7.756 ac, 42.68% Impervious, Inflow Depth > 1.37" for 2 Year event
 Inflow = 6.72 cfs @ 12.28 hrs, Volume= 0.887 af
 Primary = 6.72 cfs @ 12.28 hrs, Volume= 0.887 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right

Inflow Area = 3.849 ac, 43.36% Impervious, Inflow Depth > 1.46" for 2 Year event
 Inflow = 3.74 cfs @ 12.37 hrs, Volume= 0.467 af
 Outflow = 3.74 cfs @ 12.37 hrs, Volume= 0.467 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.74 cfs @ 12.37 hrs, Volume= 0.467 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 613.14' @ 12.37 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	612.80'	72.0" W x 48.0" H Box Culvert L= 98.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 612.80' / 609.92' S= 0.0294 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 24.00 sf

Primary OutFlow Max=3.74 cfs @ 12.37 hrs HW=613.14' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 3.74 cfs @ 1.86 fps)

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Summary for Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left

Inflow Area = 0.880 ac, 37.50% Impervious, Inflow Depth > 0.89" for 2 Year event
 Inflow = 0.88 cfs @ 12.08 hrs, Volume= 0.065 af
 Outflow = 0.88 cfs @ 12.08 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.88 cfs @ 12.08 hrs, Volume= 0.065 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 660.85' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	660.58'	24.0" W x 24.0" H Box Culvert L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.58' / 660.00' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.00 sf

Primary OutFlow Max=0.88 cfs @ 12.08 hrs HW=660.85' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 0.88 cfs @ 1.65 fps)

Summary for Pond DP4: 24" RCP Inlet at Station 61+10 Left

Inflow Area = 0.203 ac, 13.30% Impervious, Inflow Depth > 1.42" for 2 Year event
 Inflow = 0.35 cfs @ 12.08 hrs, Volume= 0.024 af
 Outflow = 0.35 cfs @ 12.08 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.35 cfs @ 12.08 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 749.52' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	749.28'	24.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 749.28' / 748.38' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=0.35 cfs @ 12.08 hrs HW=749.52' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 0.35 cfs @ 1.66 fps)

Summary for Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)

Inflow Area = 5.139 ac, 44.74% Impervious, Inflow Depth > 1.10" for 2 Year event
 Inflow = 5.60 cfs @ 12.15 hrs, Volume= 0.472 af
 Primary = 5.60 cfs @ 12.15 hrs, Volume= 0.472 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Summary for Pond DP6: Brookhaven Lake

Inflow Area = 8.037 ac, 45.71% Impervious, Inflow Depth > 1.10" for 2 Year event
Inflow = 8.76 cfs @ 12.12 hrs, Volume= 0.739 af
Primary = 8.76 cfs @ 12.12 hrs, Volume= 0.739 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 10 Year Rainfall=4.83"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Station 10+16 to Station	Runoff Area=1.356 ac 47.05% Impervious Runoff Depth>2.48" Tc=5.0 min CN=77 Runoff=4.09 cfs 0.280 af
Subcatchment 2S: Station 20+00 to Station	Runoff Area=2.551 ac 39.32% Impervious Runoff Depth>2.92" Tc=5.0 min CN=82 Runoff=9.06 cfs 0.622 af
Subcatchment 3S: Station 33+00 to Station	Runoff Area=0.917 ac 48.53% Impervious Runoff Depth>3.50" Tc=5.0 min CN=88 Runoff=3.83 cfs 0.268 af
Subcatchment 4S: Station 40+50 to Station	Runoff Area=0.880 ac 37.50% Impervious Runoff Depth>2.15" Tc=5.0 min CN=73 Runoff=2.28 cfs 0.157 af
Subcatchment 5S: Station 44+76 to Station	Runoff Area=1.849 ac 46.89% Impervious Runoff Depth>3.11" Tc=5.0 min CN=84 Runoff=6.96 cfs 0.480 af
Subcatchment 6S: Station 60+36 to Station	Runoff Area=0.203 ac 13.30% Impervious Runoff Depth>2.92" Tc=5.0 min CN=82 Runoff=0.72 cfs 0.049 af
Subcatchment 7S: Station 65+02 to Station	Runoff Area=5.139 ac 44.74% Impervious Runoff Depth>2.48" Tc=10.0 min CN=77 Runoff=13.04 cfs 1.060 af
Subcatchment 8S: Station 101+94 to Station	Runoff Area=2.898 ac 47.45% Impervious Runoff Depth>2.48" Tc=5.0 min CN=77 Runoff=8.73 cfs 0.599 af
Reach 1R: Channel from Station 32+97 Left	Avg. Flow Depth=0.63' Max Vel=5.79 fps Inflow=16.14 cfs 1.571 af n=0.030 L=2,000.0' S=0.0450 '/ Capacity=159.37 cfs Outflow=13.76 cfs 1.562 af
Reach 2R: Channel from Station 41+32	Avg. Flow Depth=0.43' Max Vel=5.24 fps Inflow=7.07 cfs 0.683 af n=0.030 L=767.0' S=0.0615 '/ Capacity=186.45 cfs Outflow=6.89 cfs 0.681 af
Reach 3R: Channel from Station 60+81	Avg. Flow Depth=0.43' Max Vel=4.51 fps Inflow=7.68 cfs 0.529 af n=0.030 L=1,949.0' S=0.0453 '/ Capacity=159.97 cfs Outflow=5.99 cfs 0.525 af
Pond DP1: Ware River	Inflow=15.72 cfs 1.842 af Primary=15.72 cfs 1.842 af
Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right	Peak Elev=613.37' Inflow=8.30 cfs 0.949 af 72.0" x 48.0" Box Culvert n=0.012 L=98.0' S=0.0294 '/ Outflow=8.30 cfs 0.949 af
Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left	Peak Elev=661.08' Inflow=2.28 cfs 0.157 af 24.0" x 24.0" Box Culvert n=0.012 L=58.0' S=0.0100 '/ Outflow=2.28 cfs 0.157 af
Pond DP4: 24" RCP Inlet at Station 61+10 Left	Peak Elev=749.62' Inflow=0.72 cfs 0.049 af 24.0" Round Culvert n=0.012 L=90.0' S=0.0100 '/ Outflow=0.72 cfs 0.049 af
Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)	Inflow=13.04 cfs 1.060 af Primary=13.04 cfs 1.060 af

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Pond DP6: Brookhaven Lake

Inflow=20.40 cfs 1.659 af

Primary=20.40 cfs 1.659 af

Total Runoff Area = 15.793 ac Runoff Volume = 3.515 af Average Runoff Depth = 2.67"
55.78% Pervious = 8.809 ac 44.22% Impervious = 6.984 ac

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Type III 24-hr 10 Year Rainfall=4.83"

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Summary for Subcatchment 1S: Station 10+16 to Station 20+00

Runoff = 4.09 cfs @ 12.08 hrs, Volume= 0.280 af, Depth> 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
0.638	98	Paved parking, HSG B
0.718	58	Woods/grass comb., Good, HSG B
1.356	77	Weighted Average
0.718		52.95% Pervious Area
0.638		47.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 2S: Station 20+00 to Station 40+50

Runoff = 9.06 cfs @ 12.07 hrs, Volume= 0.622 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
1.003	98	Paved parking, HSG D
0.998	79	Woods/grass comb., Good, HSG D
0.550	58	Woods/grass comb., Good, HSG B
2.551	82	Weighted Average
1.548		60.68% Pervious Area
1.003		39.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 3S: Station 33+00 to Station 44+76

Runoff = 3.83 cfs @ 12.07 hrs, Volume= 0.268 af, Depth> 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
0.445	98	Paved parking, HSG D
0.472	79	Woods/grass comb., Good, HSG D
0.917	88	Weighted Average
0.472		51.47% Pervious Area
0.445		48.53% Impervious Area

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Type III 24-hr 10 Year Rainfall=4.83"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 4S: Station 40+50 to Station 54+14

Runoff = 2.28 cfs @ 12.08 hrs, Volume= 0.157 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG B
0.550	58	Woods/grass comb., Good, HSG B
0.880	73	Weighted Average
0.550		62.50% Pervious Area
0.330		37.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 5S: Station 44+76 to Station 65+02

Runoff = 6.96 cfs @ 12.07 hrs, Volume= 0.480 af, Depth> 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
0.867	98	Paved parking, HSG B
0.614	79	Woods/grass comb., Good, HSG D
0.368	58	Woods/grass comb., Good, HSG B
1.849	84	Weighted Average
0.982		53.11% Pervious Area
0.867		46.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 6S: Station 60+36 to Station 65+02

Runoff = 0.72 cfs @ 12.07 hrs, Volume= 0.049 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

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Type III 24-hr 10 Year Rainfall=4.83"

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Area (ac)	CN	Description
0.027	98	Paved parking, HSG D
0.176	79	Woods/grass comb., Good, HSG D
0.203	82	Weighted Average
0.176		86.70% Pervious Area
0.027		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 7S: Station 65+02 to Station 101+94

Runoff = 13.04 cfs @ 12.14 hrs, Volume= 1.060 af, Depth> 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
2.299	98	Paved parking, HSG B
0.363	79	Woods/grass comb., Good, HSG D
2.477	58	Woods/grass comb., Good, HSG B
5.139	77	Weighted Average
2.840		55.26% Pervious Area
2.299		44.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 8S: Station 101+94 to Station 122+14

Runoff = 8.73 cfs @ 12.08 hrs, Volume= 0.599 af, Depth> 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
1.375	98	Paved parking, HSG B
1.523	58	Woods/grass comb., Good, HSG B
2.898	77	Weighted Average
1.523		52.55% Pervious Area
1.375		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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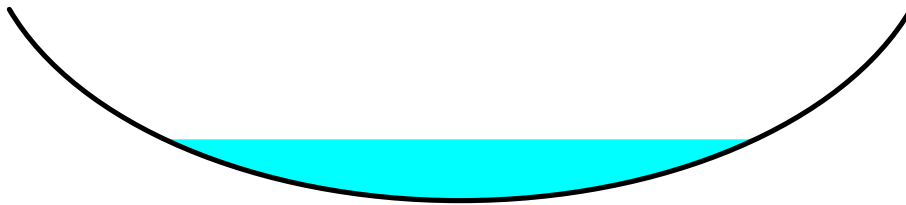
Summary for Reach 1R: Channel from Station 32+97 Left to Route 32/Ware River

Inflow Area = 6.400 ac, 41.75% Impervious, Inflow Depth > 2.94" for 10 Year event
 Inflow = 16.14 cfs @ 12.08 hrs, Volume= 1.571 af
 Outflow = 13.76 cfs @ 12.24 hrs, Volume= 1.562 af, Atten= 15%, Lag= 9.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.79 fps, Min. Travel Time= 5.8 min
 Avg. Velocity = 2.10 fps, Avg. Travel Time= 15.8 min

Peak Storage= 4,758 cf @ 12.14 hrs
 Average Depth at Peak Storage= 0.63'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.37 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 2,000.0' Slope= 0.0450 '/'
 Inlet Invert= 609.92', Outlet Invert= 520.00'



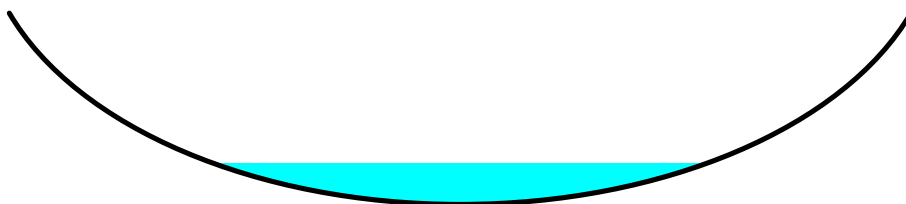
Summary for Reach 2R: Channel from Station 41+32 Right to Staton 33+65 Right

Inflow Area = 2.932 ac, 41.75% Impervious, Inflow Depth > 2.79" for 10 Year event
 Inflow = 7.07 cfs @ 12.25 hrs, Volume= 0.683 af
 Outflow = 6.89 cfs @ 12.32 hrs, Volume= 0.681 af, Atten= 3%, Lag= 4.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.24 fps, Min. Travel Time= 2.4 min
 Avg. Velocity = 1.94 fps, Avg. Travel Time= 6.6 min

Peak Storage= 1,009 cf @ 12.28 hrs
 Average Depth at Peak Storage= 0.43'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 186.45 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 767.0' Slope= 0.0615 '/'
 Inlet Invert= 660.00', Outlet Invert= 612.80'



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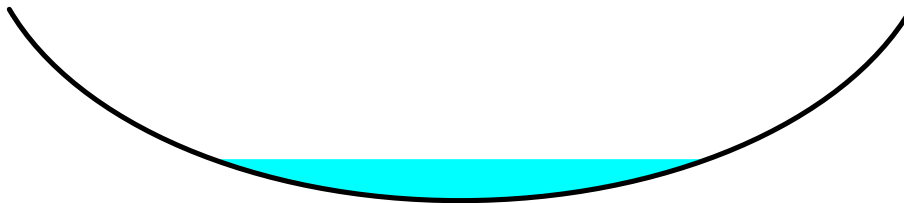
Summary for Reach 3R: Channel from Station 60+81 Right to Station 41+32 Right

Inflow Area = 2.052 ac, 43.57% Impervious, Inflow Depth > 3.09" for 10 Year event
 Inflow = 7.68 cfs @ 12.07 hrs, Volume= 0.529 af
 Outflow = 5.99 cfs @ 12.25 hrs, Volume= 0.525 af, Atten= 22%, Lag= 10.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.51 fps, Min. Travel Time= 7.2 min
 Avg. Velocity = 1.61 fps, Avg. Travel Time= 20.2 min

Peak Storage= 2,586 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.43'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.97 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 1,949.0' Slope= 0.0453 '/
 Inlet Invert= 748.28', Outlet Invert= 660.00'



Summary for Pond DP1: Ware River

Inflow Area = 7.756 ac, 42.68% Impervious, Inflow Depth > 2.85" for 10 Year event
 Inflow = 15.72 cfs @ 12.23 hrs, Volume= 1.842 af
 Primary = 15.72 cfs @ 12.23 hrs, Volume= 1.842 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right

Inflow Area = 3.849 ac, 43.36% Impervious, Inflow Depth > 2.96" for 10 Year event
 Inflow = 8.30 cfs @ 12.31 hrs, Volume= 0.949 af
 Outflow = 8.30 cfs @ 12.31 hrs, Volume= 0.949 af, Atten= 0%, Lag= 0.0 min
 Primary = 8.30 cfs @ 12.31 hrs, Volume= 0.949 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 613.37' @ 12.31 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	612.80'	72.0" W x 48.0" H Box Culvert L= 98.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 612.80' / 609.92' S= 0.0294 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 24.00 sf

Primary OutFlow Max=8.30 cfs @ 12.31 hrs HW=613.37' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 8.30 cfs @ 2.42 fps)

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Summary for Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left

Inflow Area = 0.880 ac, 37.50% Impervious, Inflow Depth > 2.15" for 10 Year event
 Inflow = 2.28 cfs @ 12.08 hrs, Volume= 0.157 af
 Outflow = 2.28 cfs @ 12.08 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.28 cfs @ 12.08 hrs, Volume= 0.157 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 661.08' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	660.58'	24.0" W x 24.0" H Box Culvert L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.58' / 660.00' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.00 sf

Primary OutFlow Max=2.27 cfs @ 12.08 hrs HW=661.08' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 2.27 cfs @ 2.27 fps)

Summary for Pond DP4: 24" RCP Inlet at Station 61+10 Left

Inflow Area = 0.203 ac, 13.30% Impervious, Inflow Depth > 2.92" for 10 Year event
 Inflow = 0.72 cfs @ 12.07 hrs, Volume= 0.049 af
 Outflow = 0.72 cfs @ 12.07 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.72 cfs @ 12.07 hrs, Volume= 0.049 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 749.62' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	749.28'	24.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 749.28' / 748.38' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=0.72 cfs @ 12.07 hrs HW=749.62' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 0.72 cfs @ 2.00 fps)

Summary for Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)

Inflow Area = 5.139 ac, 44.74% Impervious, Inflow Depth > 2.48" for 10 Year event
 Inflow = 13.04 cfs @ 12.14 hrs, Volume= 1.060 af
 Primary = 13.04 cfs @ 12.14 hrs, Volume= 1.060 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Summary for Pond DP6: Brookhaven Lake

Inflow Area = 8.037 ac, 45.71% Impervious, Inflow Depth > 2.48" for 10 Year event
Inflow = 20.40 cfs @ 12.11 hrs, Volume= 1.659 af
Primary = 20.40 cfs @ 12.11 hrs, Volume= 1.659 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Station 10+16 to Station	Runoff Area=1.356 ac 47.05% Impervious Runoff Depth>4.95" Tc=5.0 min CN=77 Runoff=8.11 cfs 0.559 af
Subcatchment 2S: Station 20+00 to Station	Runoff Area=2.551 ac 39.32% Impervious Runoff Depth>5.52" Tc=5.0 min CN=82 Runoff=16.79 cfs 1.174 af
Subcatchment 3S: Station 33+00 to Station	Runoff Area=0.917 ac 48.53% Impervious Runoff Depth>6.22" Tc=5.0 min CN=88 Runoff=6.59 cfs 0.475 af
Subcatchment 4S: Station 40+50 to Station	Runoff Area=0.880 ac 37.50% Impervious Runoff Depth>4.50" Tc=5.0 min CN=73 Runoff=4.81 cfs 0.330 af
Subcatchment 5S: Station 44+76 to Station	Runoff Area=1.849 ac 46.89% Impervious Runoff Depth>5.76" Tc=5.0 min CN=84 Runoff=12.57 cfs 0.887 af
Subcatchment 6S: Station 60+36 to Station	Runoff Area=0.203 ac 13.30% Impervious Runoff Depth>5.52" Tc=5.0 min CN=82 Runoff=1.34 cfs 0.093 af
Subcatchment 7S: Station 65+02 to Staton	Runoff Area=5.139 ac 44.74% Impervious Runoff Depth>4.95" Tc=10.0 min CN=77 Runoff=25.95 cfs 2.118 af
Subcatchment 8S: Station 101+94 to Station	Runoff Area=2.898 ac 47.45% Impervious Runoff Depth>4.95" Tc=5.0 min CN=77 Runoff=17.34 cfs 1.195 af
Reach 1R: Channel from Station 32+97 Left	Avg. Flow Depth=0.88' Max Vel=7.14 fps Inflow=31.19 cfs 2.952 af n=0.030 L=2,000.0' S=0.0450 '/' Capacity=159.37 cfs Outflow=27.74 cfs 2.940 af
Reach 2R: Channel from Station 41+32	Avg. Flow Depth=0.58' Max Vel=6.43 fps Inflow=13.78 cfs 1.305 af n=0.030 L=767.0' S=0.0615 '/' Capacity=186.45 cfs Outflow=13.53 cfs 1.302 af
Reach 3R: Channel from Station 60+81	Avg. Flow Depth=0.58' Max Vel=5.48 fps Inflow=13.91 cfs 0.980 af n=0.030 L=1,949.0' S=0.0453 '/' Capacity=159.97 cfs Outflow=11.42 cfs 0.975 af
Pond DP1: Ware River	Inflow=31.80 cfs 3.499 af Primary=31.80 cfs 3.499 af
Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right	Peak Elev=613.69' Inflow=16.19 cfs 1.778 af 72.0" x 48.0" Box Culvert n=0.012 L=98.0' S=0.0294 '/' Outflow=16.19 cfs 1.778 af
Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left	Peak Elev=661.41' Inflow=4.81 cfs 0.330 af 24.0" x 24.0" Box Culvert n=0.012 L=58.0' S=0.0100 '/' Outflow=4.81 cfs 0.330 af
Pond DP4: 24" RCP Inlet at Station 61+10 Left	Peak Elev=749.75' Inflow=1.34 cfs 0.093 af 24.0" Round Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=1.34 cfs 0.093 af
Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)	Inflow=25.95 cfs 2.118 af Primary=25.95 cfs 2.118 af

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Pond DP6: Brookhaven Lake

Inflow=40.61 cfs 3.313 af

Primary=40.61 cfs 3.313 af

Total Runoff Area = 15.793 ac Runoff Volume = 6.832 af Average Runoff Depth = 5.19"
55.78% Pervious = 8.809 ac 44.22% Impervious = 6.984 ac

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Summary for Subcatchment 1S: Station 10+16 to Station 20+00

Runoff = 8.11 cfs @ 12.07 hrs, Volume= 0.559 af, Depth> 4.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
0.638	98	Paved parking, HSG B
0.718	58	Woods/grass comb., Good, HSG B
1.356	77	Weighted Average
0.718		52.95% Pervious Area
0.638		47.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 2S: Station 20+00 to Station 40+50

Runoff = 16.79 cfs @ 12.07 hrs, Volume= 1.174 af, Depth> 5.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
1.003	98	Paved parking, HSG D
0.998	79	Woods/grass comb., Good, HSG D
0.550	58	Woods/grass comb., Good, HSG B
2.551	82	Weighted Average
1.548		60.68% Pervious Area
1.003		39.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 3S: Station 33+00 to Station 44+76

Runoff = 6.59 cfs @ 12.07 hrs, Volume= 0.475 af, Depth> 6.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
0.445	98	Paved parking, HSG D
0.472	79	Woods/grass comb., Good, HSG D
0.917	88	Weighted Average
0.472		51.47% Pervious Area
0.445		48.53% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 4S: Station 40+50 to Station 54+14

Runoff = 4.81 cfs @ 12.07 hrs, Volume= 0.330 af, Depth> 4.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG B
0.550	58	Woods/grass comb., Good, HSG B
0.880	73	Weighted Average
0.550		62.50% Pervious Area
0.330		37.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 5S: Station 44+76 to Station 65+02

Runoff = 12.57 cfs @ 12.07 hrs, Volume= 0.887 af, Depth> 5.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
0.867	98	Paved parking, HSG B
0.614	79	Woods/grass comb., Good, HSG D
0.368	58	Woods/grass comb., Good, HSG B
1.849	84	Weighted Average
0.982		53.11% Pervious Area
0.867		46.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 6S: Station 60+36 to Station 65+02

Runoff = 1.34 cfs @ 12.07 hrs, Volume= 0.093 af, Depth> 5.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

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Area (ac)	CN	Description
0.027	98	Paved parking, HSG D
0.176	79	Woods/grass comb., Good, HSG D
0.203	82	Weighted Average
0.176		86.70% Pervious Area
0.027		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 7S: Station 65+02 to Station 101+94

Runoff = 25.95 cfs @ 12.14 hrs, Volume= 2.118 af, Depth> 4.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
2.299	98	Paved parking, HSG B
0.363	79	Woods/grass comb., Good, HSG D
2.477	58	Woods/grass comb., Good, HSG B
5.139	77	Weighted Average
2.840		55.26% Pervious Area
2.299		44.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 8S: Station 101+94 to Station 122+14

Runoff = 17.34 cfs @ 12.07 hrs, Volume= 1.195 af, Depth> 4.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
1.375	98	Paved parking, HSG B
1.523	58	Woods/grass comb., Good, HSG B
2.898	77	Weighted Average
1.523		52.55% Pervious Area
1.375		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 100 Year Rainfall=7.65"

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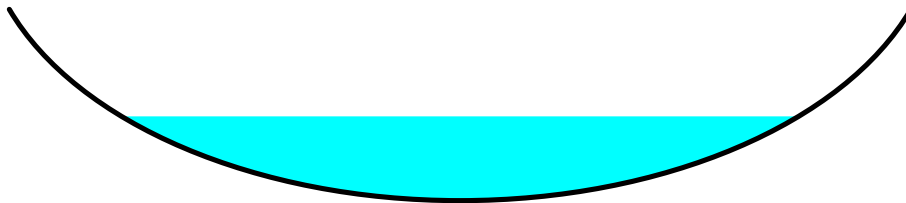
Summary for Reach 1R: Channel from Station 32+97 Left to Route 32/Ware River

Inflow Area = 6.400 ac, 41.75% Impervious, Inflow Depth > 5.53" for 100 Year event
 Inflow = 31.19 cfs @ 12.08 hrs, Volume= 2.952 af
 Outflow = 27.74 cfs @ 12.21 hrs, Volume= 2.940 af, Atten= 11%, Lag= 7.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 7.14 fps, Min. Travel Time= 4.7 min
 Avg. Velocity = 2.47 fps, Avg. Travel Time= 13.5 min

Peak Storage= 7,773 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.88'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.37 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 2,000.0' Slope= 0.0450 '/
 Inlet Invert= 609.92', Outlet Invert= 520.00'



Summary for Reach 2R: Channel from Station 41+32 Right to Staton 33+65 Right

Inflow Area = 2.932 ac, 41.75% Impervious, Inflow Depth > 5.34" for 100 Year event
 Inflow = 13.78 cfs @ 12.22 hrs, Volume= 1.305 af
 Outflow = 13.53 cfs @ 12.27 hrs, Volume= 1.302 af, Atten= 2%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 6.43 fps, Min. Travel Time= 2.0 min
 Avg. Velocity = 2.25 fps, Avg. Travel Time= 5.7 min

Peak Storage= 1,616 cf @ 12.24 hrs
 Average Depth at Peak Storage= 0.58'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 186.45 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 767.0' Slope= 0.0615 '/
 Inlet Invert= 660.00', Outlet Invert= 612.80'



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Type III 24-hr 100 Year Rainfall=7.65"

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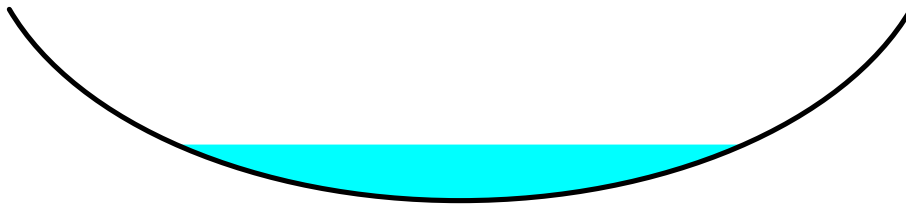
Summary for Reach 3R: Channel from Station 60+81 Right to Station 41+32 Right

Inflow Area = 2.052 ac, 43.57% Impervious, Inflow Depth > 5.73" for 100 Year event
 Inflow = 13.91 cfs @ 12.07 hrs, Volume= 0.980 af
 Outflow = 11.42 cfs @ 12.22 hrs, Volume= 0.975 af, Atten= 18%, Lag= 9.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.48 fps, Min. Travel Time= 5.9 min
 Avg. Velocity = 1.86 fps, Avg. Travel Time= 17.5 min

Peak Storage= 4,059 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.58'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.97 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 1,949.0' Slope= 0.0453 '/
 Inlet Invert= 748.28', Outlet Invert= 660.00'



Summary for Pond DP1: Ware River

Inflow Area = 7.756 ac, 42.68% Impervious, Inflow Depth > 5.41" for 100 Year event
 Inflow = 31.80 cfs @ 12.20 hrs, Volume= 3.499 af
 Primary = 31.80 cfs @ 12.20 hrs, Volume= 3.499 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right

Inflow Area = 3.849 ac, 43.36% Impervious, Inflow Depth > 5.54" for 100 Year event
 Inflow = 16.19 cfs @ 12.26 hrs, Volume= 1.778 af
 Outflow = 16.19 cfs @ 12.26 hrs, Volume= 1.778 af, Atten= 0%, Lag= 0.0 min
 Primary = 16.19 cfs @ 12.26 hrs, Volume= 1.778 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 613.69' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	612.80'	72.0" W x 48.0" H Box Culvert L= 98.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 612.80' / 609.92' S= 0.0294 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 24.00 sf

Primary OutFlow Max=16.18 cfs @ 12.26 hrs HW=613.69' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 16.18 cfs @ 3.03 fps)

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Type III 24-hr 100 Year Rainfall=7.65"

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Summary for Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left

Inflow Area = 0.880 ac, 37.50% Impervious, Inflow Depth > 4.50" for 100 Year event
 Inflow = 4.81 cfs @ 12.07 hrs, Volume= 0.330 af
 Outflow = 4.81 cfs @ 12.07 hrs, Volume= 0.330 af, Atten= 0%, Lag= 0.0 min
 Primary = 4.81 cfs @ 12.07 hrs, Volume= 0.330 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 661.41' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	660.58'	24.0" W x 24.0" H Box Culvert L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.58' / 660.00' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.00 sf

Primary OutFlow Max=4.80 cfs @ 12.07 hrs HW=661.40' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 4.80 cfs @ 2.91 fps)

Summary for Pond DP4: 24" RCP Inlet at Station 61+10 Left

Inflow Area = 0.203 ac, 13.30% Impervious, Inflow Depth > 5.52" for 100 Year event
 Inflow = 1.34 cfs @ 12.07 hrs, Volume= 0.093 af
 Outflow = 1.34 cfs @ 12.07 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.34 cfs @ 12.07 hrs, Volume= 0.093 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 749.75' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	749.28'	24.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 749.28' / 748.38' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=1.33 cfs @ 12.07 hrs HW=749.75' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 1.33 cfs @ 2.34 fps)

Summary for Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)

Inflow Area = 5.139 ac, 44.74% Impervious, Inflow Depth > 4.95" for 100 Year event
 Inflow = 25.95 cfs @ 12.14 hrs, Volume= 2.118 af
 Primary = 25.95 cfs @ 12.14 hrs, Volume= 2.118 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 100 Year Rainfall=7.65"

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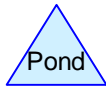
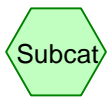
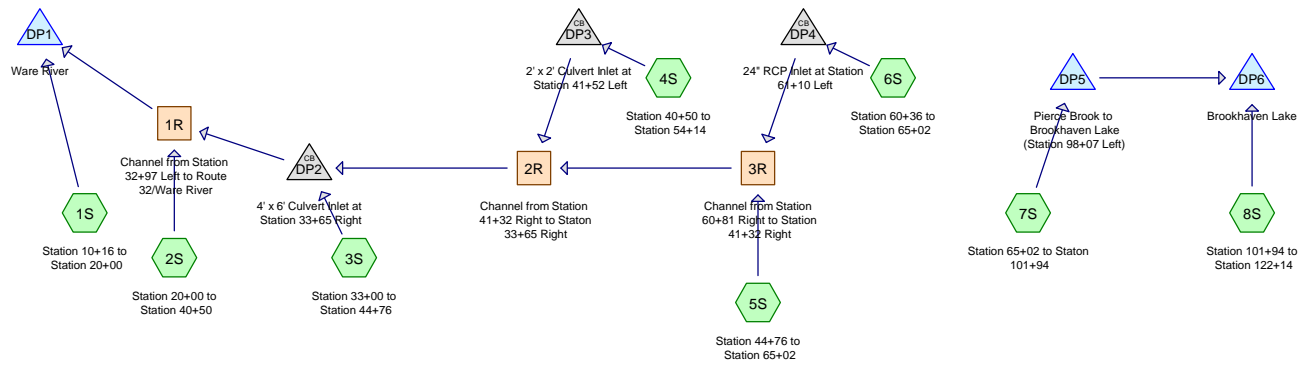
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Summary for Pond DP6: Brookhaven Lake

Inflow Area = 8.037 ac, 45.71% Impervious, Inflow Depth > 4.95" for 100 Year event
Inflow = 40.61 cfs @ 12.11 hrs, Volume= 3.313 af
Primary = 40.61 cfs @ 12.11 hrs, Volume= 3.313 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



Routing Diagram for 25485_POST
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.189	98	Paved parking, HSG B (1S, 4S, 5S, 7S, 8S)
2.101	98	Paved parking, HSG D (2S, 3S, 6S)
4.462	58	Woods/grass comb., Good, HSG B (1S, 2S, 4S, 5S, 7S, 8S)
2.041	79	Woods/grass comb., Good, HSG D (2S, 3S, 5S, 6S, 7S)
15.793	84	TOTAL AREA

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	DP2	612.80	609.92	98.0	0.0294	0.012	72.0	48.0	0.0
2	DP3	660.58	660.00	58.0	0.0100	0.012	24.0	24.0	0.0
3	DP4	749.28	748.38	90.0	0.0100	0.012	24.0	0.0	0.0

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Type III 24-hr 2 Year Rainfall=3.05"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Station 10+16 to Station	Runoff Area=1.356 ac 57.74% Impervious Runoff Depth>1.35" Tc=5.0 min CN=81 Runoff=2.21 cfs 0.153 af
Subcatchment 2S: Station 20+00 to Station	Runoff Area=2.405 ac 57.42% Impervious Runoff Depth>1.78" Tc=5.0 min CN=87 Runoff=5.21 cfs 0.357 af
Subcatchment 3S: Station 33+00 to Station	Runoff Area=1.088 ac 57.08% Impervious Runoff Depth>2.03" Tc=5.0 min CN=90 Runoff=2.66 cfs 0.184 af
Subcatchment 4S: Station 40+50 to Station	Runoff Area=0.896 ac 61.50% Impervious Runoff Depth>1.49" Tc=5.0 min CN=83 Runoff=1.61 cfs 0.111 af
Subcatchment 5S: Station 44+76 to Station	Runoff Area=1.847 ac 57.55% Impervious Runoff Depth>1.78" Tc=5.0 min CN=87 Runoff=4.00 cfs 0.274 af
Subcatchment 6S: Station 60+36 to Station	Runoff Area=0.222 ac 44.59% Impervious Runoff Depth>1.78" Tc=5.0 min CN=87 Runoff=0.48 cfs 0.033 af
Subcatchment 7S: Station 65+02 to Station	Runoff Area=5.081 ac 60.38% Impervious Runoff Depth>1.48" Tc=10.0 min CN=83 Runoff=7.71 cfs 0.628 af
Subcatchment 8S: Station 101+94 to Station	Runoff Area=2.898 ac 59.49% Impervious Runoff Depth>1.42" Tc=5.0 min CN=82 Runoff=4.97 cfs 0.342 af
Reach 1R: Channel from Station 32+97 Left	Avg. Flow Depth=0.49' Max Vel=4.90 fps Inflow=9.61 cfs 0.955 af n=0.030 L=2,000.0' S=0.0450 '/ Capacity=159.37 cfs Outflow=7.91 cfs 0.949 af
Reach 2R: Channel from Station 41+32	Avg. Flow Depth=0.33' Max Vel=4.40 fps Inflow=4.00 cfs 0.415 af n=0.030 L=767.0' S=0.0615 '/ Capacity=186.45 cfs Outflow=3.88 cfs 0.414 af
Reach 3R: Channel from Station 60+81	Avg. Flow Depth=0.33' Max Vel=3.77 fps Inflow=4.48 cfs 0.307 af n=0.030 L=1,949.0' S=0.0453 '/ Capacity=159.97 cfs Outflow=3.30 cfs 0.304 af
Pond DP1: Ware River	Inflow=8.93 cfs 1.101 af Primary=8.93 cfs 1.101 af
Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right	Peak Elev=613.19' Inflow=4.78 cfs 0.598 af 72.0" x 48.0" Box Culvert n=0.012 L=98.0' S=0.0294 '/ Outflow=4.78 cfs 0.598 af
Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left	Peak Elev=660.98' Inflow=1.61 cfs 0.111 af 24.0" x 24.0" Box Culvert n=0.012 L=58.0' S=0.0100 '/ Outflow=1.61 cfs 0.111 af
Pond DP4: 24" RCP Inlet at Station 61+10 Left	Peak Elev=749.56' Inflow=0.48 cfs 0.033 af 24.0" Round Culvert n=0.012 L=90.0' S=0.0100 '/ Outflow=0.48 cfs 0.033 af
Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)	Inflow=7.71 cfs 0.628 af Primary=7.71 cfs 0.628 af

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Type III 24-hr 2 Year Rainfall=3.05"

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Pond DP6: Brookhaven Lake

Inflow=11.89 cfs 0.970 af

Primary=11.89 cfs 0.970 af

Total Runoff Area = 15.793 ac Runoff Volume = 2.082 af Average Runoff Depth = 1.58"
41.18% Pervious = 6.503 ac 58.82% Impervious = 9.290 ac

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Summary for Subcatchment 1S: Station 10+16 to Station 20+00

Runoff = 2.21 cfs @ 12.08 hrs, Volume= 0.153 af, Depth> 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
0.783	98	Paved parking, HSG B
0.573	58	Woods/grass comb., Good, HSG B
1.356	81	Weighted Average
0.573		42.26% Pervious Area
0.783		57.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 2S: Station 20+00 to Station 40+50

Runoff = 5.21 cfs @ 12.07 hrs, Volume= 0.357 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
1.381	98	Paved parking, HSG D
0.747	79	Woods/grass comb., Good, HSG D
0.277	58	Woods/grass comb., Good, HSG B
2.405	87	Weighted Average
1.024		42.58% Pervious Area
1.381		57.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 3S: Station 33+00 to Station 44+76

Runoff = 2.66 cfs @ 12.07 hrs, Volume= 0.184 af, Depth> 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
0.621	98	Paved parking, HSG D
0.467	79	Woods/grass comb., Good, HSG D
1.088	90	Weighted Average
0.467		42.92% Pervious Area
0.621		57.08% Impervious Area

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Type III 24-hr 2 Year Rainfall=3.05"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 4S: Station 40+50 to Station 54+14

Runoff = 1.61 cfs @ 12.08 hrs, Volume= 0.111 af, Depth> 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
0.551	98	Paved parking, HSG B
0.345	58	Woods/grass comb., Good, HSG B
0.896	83	Weighted Average
0.345		38.50% Pervious Area
0.551		61.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 5S: Station 44+76 to Station 65+02

Runoff = 4.00 cfs @ 12.07 hrs, Volume= 0.274 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
1.063	98	Paved parking, HSG B
0.493	79	Woods/grass comb., Good, HSG D
0.291	58	Woods/grass comb., Good, HSG B
1.847	87	Weighted Average
0.784		42.45% Pervious Area
1.063		57.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 6S: Station 60+36 to Station 65+02

Runoff = 0.48 cfs @ 12.07 hrs, Volume= 0.033 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

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Type III 24-hr 2 Year Rainfall=3.05"

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Area (ac)	CN	Description
0.099	98	Paved parking, HSG D
0.123	79	Woods/grass comb., Good, HSG D
0.222	87	Weighted Average
0.123		55.41% Pervious Area
0.099		44.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 7S: Station 65+02 to Station 101+94

Runoff = 7.71 cfs @ 12.14 hrs, Volume= 0.628 af, Depth> 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
3.068	98	Paved parking, HSG B
0.211	79	Woods/grass comb., Good, HSG D
1.802	58	Woods/grass comb., Good, HSG B
5.081	83	Weighted Average
2.013		39.62% Pervious Area
3.068		60.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 8S: Station 101+94 to Station 122+14

Runoff = 4.97 cfs @ 12.08 hrs, Volume= 0.342 af, Depth> 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.05"

Area (ac)	CN	Description
1.724	98	Paved parking, HSG B
1.174	58	Woods/grass comb., Good, HSG B
2.898	82	Weighted Average
1.174		40.51% Pervious Area
1.724		59.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 2 Year Rainfall=3.05"

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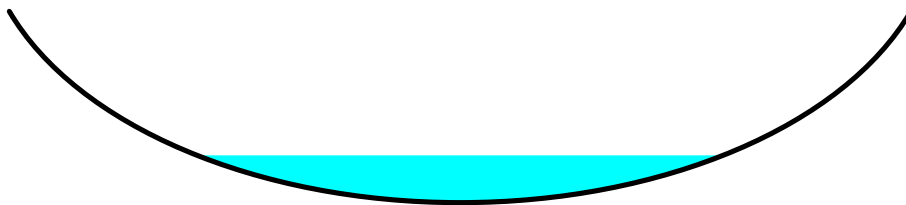
Summary for Reach 1R: Channel from Station 32+97 Left to Route 32/Ware River

Inflow Area = 6.458 ac, 57.53% Impervious, Inflow Depth > 1.77" for 2 Year event
 Inflow = 9.61 cfs @ 12.08 hrs, Volume= 0.955 af
 Outflow = 7.91 cfs @ 12.27 hrs, Volume= 0.949 af, Atten= 18%, Lag= 11.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.90 fps, Min. Travel Time= 6.8 min
 Avg. Velocity = 1.87 fps, Avg. Travel Time= 17.8 min

Peak Storage= 3,231 cf @ 12.15 hrs
 Average Depth at Peak Storage= 0.49'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.37 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 2,000.0' Slope= 0.0450 '/
 Inlet Invert= 609.92', Outlet Invert= 520.00'



Summary for Reach 2R: Channel from Station 41+32 Right to Staton 33+65 Right

Inflow Area = 2.965 ac, 57.77% Impervious, Inflow Depth > 1.68" for 2 Year event
 Inflow = 4.00 cfs @ 12.28 hrs, Volume= 0.415 af
 Outflow = 3.88 cfs @ 12.36 hrs, Volume= 0.414 af, Atten= 3%, Lag= 4.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.40 fps, Min. Travel Time= 2.9 min
 Avg. Velocity = 1.72 fps, Avg. Travel Time= 7.4 min

Peak Storage= 676 cf @ 12.31 hrs
 Average Depth at Peak Storage= 0.33'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 186.45 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 767.0' Slope= 0.0615 '/
 Inlet Invert= 660.00', Outlet Invert= 612.80'



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Type III 24-hr 2 Year Rainfall=3.05"

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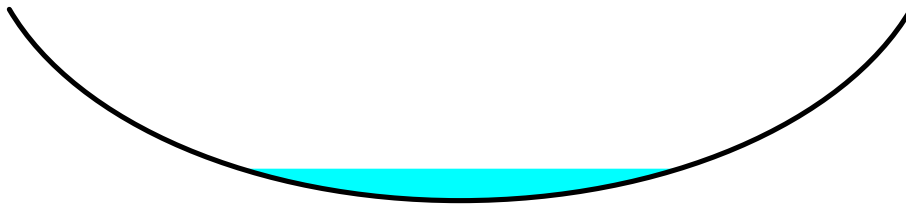
Summary for Reach 3R: Channel from Station 60+81 Right to Station 41+32 Right

Inflow Area = 2.069 ac, 56.16% Impervious, Inflow Depth > 1.78" for 2 Year event
 Inflow = 4.48 cfs @ 12.07 hrs, Volume= 0.307 af
 Outflow = 3.30 cfs @ 12.29 hrs, Volume= 0.304 af, Atten= 26%, Lag= 12.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.77 fps, Min. Travel Time= 8.6 min
 Avg. Velocity = 1.40 fps, Avg. Travel Time= 23.2 min

Peak Storage= 1,709 cf @ 12.14 hrs
 Average Depth at Peak Storage= 0.33'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.97 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 1,949.0' Slope= 0.0453 '/
 Inlet Invert= 748.28', Outlet Invert= 660.00'



Summary for Pond DP1: Ware River

Inflow Area = 7.814 ac, 57.56% Impervious, Inflow Depth > 1.69" for 2 Year event
 Inflow = 8.93 cfs @ 12.26 hrs, Volume= 1.101 af
 Primary = 8.93 cfs @ 12.26 hrs, Volume= 1.101 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right

Inflow Area = 4.053 ac, 57.59% Impervious, Inflow Depth > 1.77" for 2 Year event
 Inflow = 4.78 cfs @ 12.35 hrs, Volume= 0.598 af
 Outflow = 4.78 cfs @ 12.35 hrs, Volume= 0.598 af, Atten= 0%, Lag= 0.0 min
 Primary = 4.78 cfs @ 12.35 hrs, Volume= 0.598 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 613.19' @ 12.35 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	612.80'	72.0" W x 48.0" H Box Culvert L= 98.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 612.80' / 609.92' S= 0.0294 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 24.00 sf

Primary OutFlow Max=4.77 cfs @ 12.35 hrs HW=613.19' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 4.77 cfs @ 2.02 fps)

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Type III 24-hr 2 Year Rainfall=3.05"

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Summary for Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left

Inflow Area = 0.896 ac, 61.50% Impervious, Inflow Depth > 1.49" for 2 Year event
 Inflow = 1.61 cfs @ 12.08 hrs, Volume= 0.111 af
 Outflow = 1.61 cfs @ 12.08 hrs, Volume= 0.111 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.61 cfs @ 12.08 hrs, Volume= 0.111 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 660.98' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	660.58'	24.0" W x 24.0" H Box Culvert L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.58' / 660.00' S= 0.0100 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.00 sf

Primary OutFlow Max=1.61 cfs @ 12.08 hrs HW=660.98' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 1.61 cfs @ 2.02 fps)

Summary for Pond DP4: 24" RCP Inlet at Station 61+10 Left

Inflow Area = 0.222 ac, 44.59% Impervious, Inflow Depth > 1.78" for 2 Year event
 Inflow = 0.48 cfs @ 12.07 hrs, Volume= 0.033 af
 Outflow = 0.48 cfs @ 12.07 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.48 cfs @ 12.07 hrs, Volume= 0.033 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 749.56' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	749.28'	24.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 749.28' / 748.38' S= 0.0100 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=0.48 cfs @ 12.07 hrs HW=749.56' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 0.48 cfs @ 1.80 fps)

Summary for Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)

Inflow Area = 5.081 ac, 60.38% Impervious, Inflow Depth > 1.48" for 2 Year event
 Inflow = 7.71 cfs @ 12.14 hrs, Volume= 0.628 af
 Primary = 7.71 cfs @ 12.14 hrs, Volume= 0.628 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 2 Year Rainfall=3.05"

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Summary for Pond DP6: Brookhaven Lake

Inflow Area = 7.979 ac, 60.06% Impervious, Inflow Depth > 1.46" for 2 Year event
Inflow = 11.89 cfs @ 12.11 hrs, Volume= 0.970 af
Primary = 11.89 cfs @ 12.11 hrs, Volume= 0.970 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 10 Year Rainfall=4.83"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Station 10+16 to Station	Runoff Area=1.356 ac 57.74% Impervious Runoff Depth>2.83" Tc=5.0 min CN=81 Runoff=4.67 cfs 0.320 af
Subcatchment 2S: Station 20+00 to Station	Runoff Area=2.405 ac 57.42% Impervious Runoff Depth>3.40" Tc=5.0 min CN=87 Runoff=9.80 cfs 0.682 af
Subcatchment 3S: Station 33+00 to Station	Runoff Area=1.088 ac 57.08% Impervious Runoff Depth>3.71" Tc=5.0 min CN=90 Runoff=4.74 cfs 0.336 af
Subcatchment 4S: Station 40+50 to Station	Runoff Area=0.896 ac 61.50% Impervious Runoff Depth>3.02" Tc=5.0 min CN=83 Runoff=3.28 cfs 0.225 af
Subcatchment 5S: Station 44+76 to Station	Runoff Area=1.847 ac 57.55% Impervious Runoff Depth>3.40" Tc=5.0 min CN=87 Runoff=7.52 cfs 0.524 af
Subcatchment 6S: Station 60+36 to Station	Runoff Area=0.222 ac 44.59% Impervious Runoff Depth>3.40" Tc=5.0 min CN=87 Runoff=0.90 cfs 0.063 af
Subcatchment 7S: Station 65+02 to Staton	Runoff Area=5.081 ac 60.38% Impervious Runoff Depth>3.02" Tc=10.0 min CN=83 Runoff=15.68 cfs 1.277 af
Subcatchment 8S: Station 101+94 to Station	Runoff Area=2.898 ac 59.49% Impervious Runoff Depth>2.92" Tc=5.0 min CN=82 Runoff=10.29 cfs 0.706 af
Reach 1R: Channel from Station 32+97 Left	Avg. Flow Depth=0.69' Max Vel=6.11 fps Inflow=18.97 cfs 1.825 af n=0.030 L=2,000.0' S=0.0450 '/ Capacity=159.37 cfs Outflow=16.43 cfs 1.816 af
Reach 2R: Channel from Station 41+32	Avg. Flow Depth=0.46' Max Vel=5.47 fps Inflow=8.12 cfs 0.808 af n=0.030 L=767.0' S=0.0615 '/ Capacity=186.45 cfs Outflow=7.94 cfs 0.807 af
Reach 3R: Channel from Station 60+81	Avg. Flow Depth=0.45' Max Vel=4.66 fps Inflow=8.43 cfs 0.587 af n=0.030 L=1,949.0' S=0.0453 '/ Capacity=159.97 cfs Outflow=6.64 cfs 0.583 af
Pond DP1: Ware River	Inflow=18.66 cfs 2.137 af Primary=18.66 cfs 2.137 af
Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right	Peak Elev=613.43' Inflow=9.72 cfs 1.143 af 72.0" x 48.0" Box Culvert n=0.012 L=98.0' S=0.0294 '/ Outflow=9.72 cfs 1.143 af
Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left	Peak Elev=661.22' Inflow=3.28 cfs 0.225 af 24.0" x 24.0" Box Culvert n=0.012 L=58.0' S=0.0100 '/ Outflow=3.28 cfs 0.225 af
Pond DP4: 24" RCP Inlet at Station 61+10 Left	Peak Elev=749.67' Inflow=0.90 cfs 0.063 af 24.0" Round Culvert n=0.012 L=90.0' S=0.0100 '/ Outflow=0.90 cfs 0.063 af
Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)	Inflow=15.68 cfs 1.277 af Primary=15.68 cfs 1.277 af

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Type III 24-hr 10 Year Rainfall=4.83"

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Pond DP6: Brookhaven Lake

Inflow=24.38 cfs 1.983 af

Primary=24.38 cfs 1.983 af

Total Runoff Area = 15.793 ac Runoff Volume = 4.134 af Average Runoff Depth = 3.14"
41.18% Pervious = 6.503 ac 58.82% Impervious = 9.290 ac

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Summary for Subcatchment 1S: Station 10+16 to Station 20+00

Runoff = 4.67 cfs @ 12.07 hrs, Volume= 0.320 af, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
0.783	98	Paved parking, HSG B
0.573	58	Woods/grass comb., Good, HSG B
1.356	81	Weighted Average
0.573		42.26% Pervious Area
0.783		57.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 2S: Station 20+00 to Station 40+50

Runoff = 9.80 cfs @ 12.07 hrs, Volume= 0.682 af, Depth> 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
1.381	98	Paved parking, HSG D
0.747	79	Woods/grass comb., Good, HSG D
0.277	58	Woods/grass comb., Good, HSG B
2.405	87	Weighted Average
1.024		42.58% Pervious Area
1.381		57.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 3S: Station 33+00 to Station 44+76

Runoff = 4.74 cfs @ 12.07 hrs, Volume= 0.336 af, Depth> 3.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
0.621	98	Paved parking, HSG D
0.467	79	Woods/grass comb., Good, HSG D
1.088	90	Weighted Average
0.467		42.92% Pervious Area
0.621		57.08% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 4S: Station 40+50 to Station 54+14

Runoff = 3.28 cfs @ 12.07 hrs, Volume= 0.225 af, Depth> 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
0.551	98	Paved parking, HSG B
0.345	58	Woods/grass comb., Good, HSG B
0.896	83	Weighted Average
0.345		38.50% Pervious Area
0.551		61.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 5S: Station 44+76 to Station 65+02

Runoff = 7.52 cfs @ 12.07 hrs, Volume= 0.524 af, Depth> 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
1.063	98	Paved parking, HSG B
0.493	79	Woods/grass comb., Good, HSG D
0.291	58	Woods/grass comb., Good, HSG B
1.847	87	Weighted Average
0.784		42.45% Pervious Area
1.063		57.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 6S: Station 60+36 to Station 65+02

Runoff = 0.90 cfs @ 12.07 hrs, Volume= 0.063 af, Depth> 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

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Type III 24-hr 10 Year Rainfall=4.83"

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Area (ac)	CN	Description
0.099	98	Paved parking, HSG D
0.123	79	Woods/grass comb., Good, HSG D
0.222	87	Weighted Average
0.123		55.41% Pervious Area
0.099		44.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 7S: Station 65+02 to Station 101+94

Runoff = 15.68 cfs @ 12.14 hrs, Volume= 1.277 af, Depth> 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
3.068	98	Paved parking, HSG B
0.211	79	Woods/grass comb., Good, HSG D
1.802	58	Woods/grass comb., Good, HSG B
5.081	83	Weighted Average
2.013		39.62% Pervious Area
3.068		60.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 8S: Station 101+94 to Station 122+14

Runoff = 10.29 cfs @ 12.07 hrs, Volume= 0.706 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.83"

Area (ac)	CN	Description
1.724	98	Paved parking, HSG B
1.174	58	Woods/grass comb., Good, HSG B
2.898	82	Weighted Average
1.174		40.51% Pervious Area
1.724		59.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 10 Year Rainfall=4.83"

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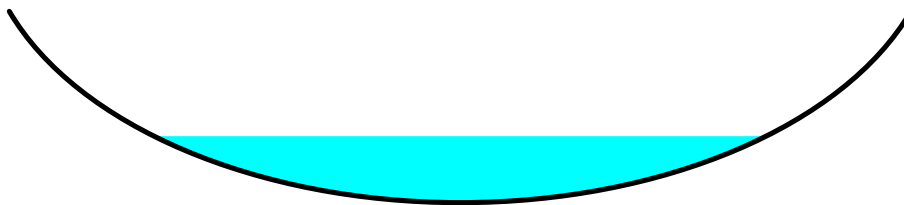
Summary for Reach 1R: Channel from Station 32+97 Left to Route 32/Ware River

Inflow Area = 6.458 ac, 57.53% Impervious, Inflow Depth > 3.39" for 10 Year event
 Inflow = 18.97 cfs @ 12.08 hrs, Volume= 1.825 af
 Outflow = 16.43 cfs @ 12.23 hrs, Volume= 1.816 af, Atten= 13%, Lag= 8.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 6.11 fps, Min. Travel Time= 5.5 min
 Avg. Velocity = 2.18 fps, Avg. Travel Time= 15.3 min

Peak Storage= 5,384 cf @ 12.14 hrs
 Average Depth at Peak Storage= 0.69'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.37 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 2,000.0' Slope= 0.0450 '/'
 Inlet Invert= 609.92', Outlet Invert= 520.00'



Summary for Reach 2R: Channel from Station 41+32 Right to Staton 33+65 Right

Inflow Area = 2.965 ac, 57.77% Impervious, Inflow Depth > 3.27" for 10 Year event
 Inflow = 8.12 cfs @ 12.24 hrs, Volume= 0.808 af
 Outflow = 7.94 cfs @ 12.30 hrs, Volume= 0.807 af, Atten= 2%, Lag= 3.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.47 fps, Min. Travel Time= 2.3 min
 Avg. Velocity = 1.99 fps, Avg. Travel Time= 6.4 min

Peak Storage= 1,114 cf @ 12.27 hrs
 Average Depth at Peak Storage= 0.46'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 186.45 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 767.0' Slope= 0.0615 '/'
 Inlet Invert= 660.00', Outlet Invert= 612.80'



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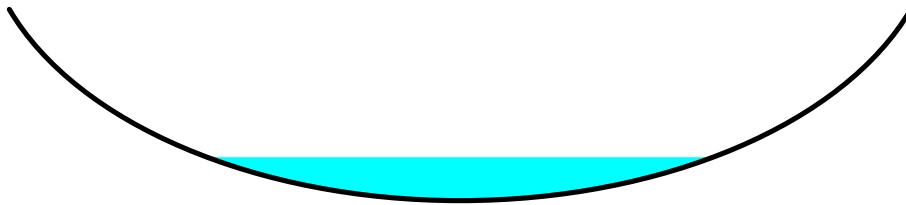
Summary for Reach 3R: Channel from Station 60+81 Right to Station 41+32 Right

Inflow Area = 2.069 ac, 56.16% Impervious, Inflow Depth > 3.40" for 10 Year event
 Inflow = 8.43 cfs @ 12.07 hrs, Volume= 0.587 af
 Outflow = 6.64 cfs @ 12.25 hrs, Volume= 0.583 af, Atten= 21%, Lag= 10.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.66 fps, Min. Travel Time= 7.0 min
 Avg. Velocity = 1.62 fps, Avg. Travel Time= 20.0 min

Peak Storage= 2,780 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.45'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.97 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 1,949.0' Slope= 0.0453 '/
 Inlet Invert= 748.28', Outlet Invert= 660.00'



Summary for Pond DP1: Ware River

Inflow Area = 7.814 ac, 57.56% Impervious, Inflow Depth > 3.28" for 10 Year event
 Inflow = 18.66 cfs @ 12.23 hrs, Volume= 2.137 af
 Primary = 18.66 cfs @ 12.23 hrs, Volume= 2.137 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right

Inflow Area = 4.053 ac, 57.59% Impervious, Inflow Depth > 3.38" for 10 Year event
 Inflow = 9.72 cfs @ 12.29 hrs, Volume= 1.143 af
 Outflow = 9.72 cfs @ 12.29 hrs, Volume= 1.143 af, Atten= 0%, Lag= 0.0 min
 Primary = 9.72 cfs @ 12.29 hrs, Volume= 1.143 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 613.43' @ 12.29 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	612.80'	72.0" W x 48.0" H Box Culvert L= 98.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 612.80' / 609.92' S= 0.0294 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 24.00 sf

Primary OutFlow Max=9.72 cfs @ 12.29 hrs HW=613.43' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 9.72 cfs @ 2.56 fps)

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Summary for Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left

Inflow Area = 0.896 ac, 61.50% Impervious, Inflow Depth > 3.02" for 10 Year event
 Inflow = 3.28 cfs @ 12.07 hrs, Volume= 0.225 af
 Outflow = 3.28 cfs @ 12.07 hrs, Volume= 0.225 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.28 cfs @ 12.07 hrs, Volume= 0.225 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 661.22' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	660.58'	24.0" W x 24.0" H Box Culvert L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.58' / 660.00' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.00 sf

Primary OutFlow Max=3.27 cfs @ 12.07 hrs HW=661.22' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 3.27 cfs @ 2.56 fps)

Summary for Pond DP4: 24" RCP Inlet at Station 61+10 Left

Inflow Area = 0.222 ac, 44.59% Impervious, Inflow Depth > 3.40" for 10 Year event
 Inflow = 0.90 cfs @ 12.07 hrs, Volume= 0.063 af
 Outflow = 0.90 cfs @ 12.07 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.90 cfs @ 12.07 hrs, Volume= 0.063 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 749.67' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	749.28'	24.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 749.28' / 748.38' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=0.90 cfs @ 12.07 hrs HW=749.67' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 0.90 cfs @ 2.12 fps)

Summary for Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)

Inflow Area = 5.081 ac, 60.38% Impervious, Inflow Depth > 3.02" for 10 Year event
 Inflow = 15.68 cfs @ 12.14 hrs, Volume= 1.277 af
 Primary = 15.68 cfs @ 12.14 hrs, Volume= 1.277 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 10 Year Rainfall=4.83"

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Summary for Pond DP6: Brookhaven Lake

Inflow Area = 7.979 ac, 60.06% Impervious, Inflow Depth > 2.98" for 10 Year event
Inflow = 24.38 cfs @ 12.11 hrs, Volume= 1.983 af
Primary = 24.38 cfs @ 12.11 hrs, Volume= 1.983 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 100 Year Rainfall=7.65"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Station 10+16 to Station	Runoff Area=1.356 ac 57.74% Impervious Runoff Depth>5.41" Tc=5.0 min CN=81 Runoff=8.77 cfs 0.611 af
Subcatchment 2S: Station 20+00 to Station	Runoff Area=2.405 ac 57.42% Impervious Runoff Depth>6.10" Tc=5.0 min CN=87 Runoff=17.07 cfs 1.223 af
Subcatchment 3S: Station 33+00 to Station	Runoff Area=1.088 ac 57.08% Impervious Runoff Depth>6.46" Tc=5.0 min CN=90 Runoff=8.01 cfs 0.585 af
Subcatchment 4S: Station 40+50 to Station	Runoff Area=0.896 ac 61.50% Impervious Runoff Depth>5.64" Tc=5.0 min CN=83 Runoff=6.00 cfs 0.421 af
Subcatchment 5S: Station 44+76 to Station	Runoff Area=1.847 ac 57.55% Impervious Runoff Depth>6.10" Tc=5.0 min CN=87 Runoff=13.11 cfs 0.940 af
Subcatchment 6S: Station 60+36 to Station	Runoff Area=0.222 ac 44.59% Impervious Runoff Depth>6.10" Tc=5.0 min CN=87 Runoff=1.58 cfs 0.113 af
Subcatchment 7S: Station 65+02 to Staton	Runoff Area=5.081 ac 60.38% Impervious Runoff Depth>5.63" Tc=10.0 min CN=83 Runoff=28.73 cfs 2.386 af
Subcatchment 8S: Station 101+94 to Station	Runoff Area=2.898 ac 59.49% Impervious Runoff Depth>5.52" Tc=5.0 min CN=82 Runoff=19.07 cfs 1.334 af
Reach 1R: Channel from Station 32+97 Left	Avg. Flow Depth=0.92' Max Vel=7.37 fps Inflow=34.37 cfs 3.275 af n=0.030 L=2,000.0' S=0.0450 '/' Capacity=159.37 cfs Outflow=30.77 cfs 3.262 af
Reach 2R: Channel from Station 41+32	Avg. Flow Depth=0.61' Max Vel=6.60 fps Inflow=14.98 cfs 1.468 af n=0.030 L=767.0' S=0.0615 '/' Capacity=186.45 cfs Outflow=14.75 cfs 1.466 af
Reach 3R: Channel from Station 60+81	Avg. Flow Depth=0.60' Max Vel=5.59 fps Inflow=14.69 cfs 1.053 af n=0.030 L=1,949.0' S=0.0453 '/' Capacity=159.97 cfs Outflow=12.12 cfs 1.047 af
Pond DP1: Ware River	Inflow=35.16 cfs 3.873 af Primary=35.16 cfs 3.873 af
Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right	Peak Elev=613.76' Inflow=18.03 cfs 2.051 af 72.0" x 48.0" Box Culvert n=0.012 L=98.0' S=0.0294 '/' Outflow=18.03 cfs 2.051 af
Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left	Peak Elev=661.54' Inflow=6.00 cfs 0.421 af 24.0" x 24.0" Box Culvert n=0.012 L=58.0' S=0.0100 '/' Outflow=6.00 cfs 0.421 af
Pond DP4: 24" RCP Inlet at Station 61+10 Left	Peak Elev=749.80' Inflow=1.58 cfs 0.113 af 24.0" Round Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=1.58 cfs 0.113 af
Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)	Inflow=28.73 cfs 2.386 af Primary=28.73 cfs 2.386 af

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Type III 24-hr 100 Year Rainfall=7.65"

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Pond DP6: Brookhaven Lake

Inflow=44.92 cfs 3.720 af

Primary=44.92 cfs 3.720 af

Total Runoff Area = 15.793 ac Runoff Volume = 7.613 af Average Runoff Depth = 5.78"
41.18% Pervious = 6.503 ac 58.82% Impervious = 9.290 ac

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Type III 24-hr 100 Year Rainfall=7.65"

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Summary for Subcatchment 1S: Station 10+16 to Station 20+00

Runoff = 8.77 cfs @ 12.07 hrs, Volume= 0.611 af, Depth> 5.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
0.783	98	Paved parking, HSG B
0.573	58	Woods/grass comb., Good, HSG B
1.356	81	Weighted Average
0.573		42.26% Pervious Area
0.783		57.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 2S: Station 20+00 to Station 40+50

Runoff = 17.07 cfs @ 12.07 hrs, Volume= 1.223 af, Depth> 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
1.381	98	Paved parking, HSG D
0.747	79	Woods/grass comb., Good, HSG D
0.277	58	Woods/grass comb., Good, HSG B
2.405	87	Weighted Average
1.024		42.58% Pervious Area
1.381		57.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 3S: Station 33+00 to Station 44+76

Runoff = 8.01 cfs @ 12.07 hrs, Volume= 0.585 af, Depth> 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
0.621	98	Paved parking, HSG D
0.467	79	Woods/grass comb., Good, HSG D
1.088	90	Weighted Average
0.467		42.92% Pervious Area
0.621		57.08% Impervious Area

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Type III 24-hr 100 Year Rainfall=7.65"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 4S: Station 40+50 to Station 54+14

Runoff = 6.00 cfs @ 12.07 hrs, Volume= 0.421 af, Depth> 5.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
0.551	98	Paved parking, HSG B
0.345	58	Woods/grass comb., Good, HSG B
0.896	83	Weighted Average
0.345		38.50% Pervious Area
0.551		61.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 5S: Station 44+76 to Station 65+02

Runoff = 13.11 cfs @ 12.07 hrs, Volume= 0.940 af, Depth> 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
1.063	98	Paved parking, HSG B
0.493	79	Woods/grass comb., Good, HSG D
0.291	58	Woods/grass comb., Good, HSG B
1.847	87	Weighted Average
0.784		42.45% Pervious Area
1.063		57.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 6S: Station 60+36 to Station 65+02

Runoff = 1.58 cfs @ 12.07 hrs, Volume= 0.113 af, Depth> 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

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Type III 24-hr 100 Year Rainfall=7.65"

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Area (ac)	CN	Description
0.099	98	Paved parking, HSG D
0.123	79	Woods/grass comb., Good, HSG D
0.222	87	Weighted Average
0.123		55.41% Pervious Area
0.099		44.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Summary for Subcatchment 7S: Station 65+02 to Station 101+94

Runoff = 28.73 cfs @ 12.14 hrs, Volume= 2.386 af, Depth> 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
3.068	98	Paved parking, HSG B
0.211	79	Woods/grass comb., Good, HSG D
1.802	58	Woods/grass comb., Good, HSG B
5.081	83	Weighted Average
2.013		39.62% Pervious Area
3.068		60.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 8S: Station 101+94 to Station 122+14

Runoff = 19.07 cfs @ 12.07 hrs, Volume= 1.334 af, Depth> 5.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=7.65"

Area (ac)	CN	Description
1.724	98	Paved parking, HSG B
1.174	58	Woods/grass comb., Good, HSG B
2.898	82	Weighted Average
1.174		40.51% Pervious Area
1.724		59.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 100 Year Rainfall=7.65"

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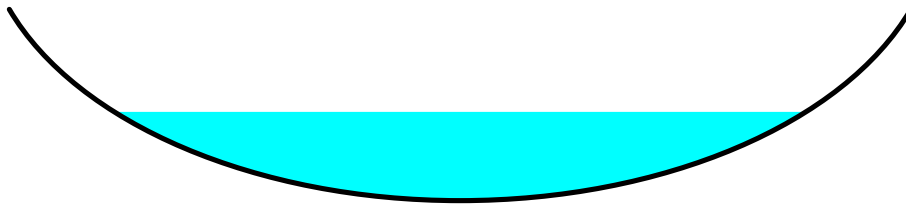
Summary for Reach 1R: Channel from Station 32+97 Left to Route 32/Ware River

Inflow Area = 6.458 ac, 57.53% Impervious, Inflow Depth > 6.08" for 100 Year event
 Inflow = 34.37 cfs @ 12.08 hrs, Volume= 3.275 af
 Outflow = 30.77 cfs @ 12.21 hrs, Volume= 3.262 af, Atten= 10%, Lag= 7.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 7.37 fps, Min. Travel Time= 4.5 min
 Avg. Velocity = 2.56 fps, Avg. Travel Time= 13.0 min

Peak Storage= 8,361 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.92'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.37 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 2,000.0' Slope= 0.0450 '/
 Inlet Invert= 609.92', Outlet Invert= 520.00'



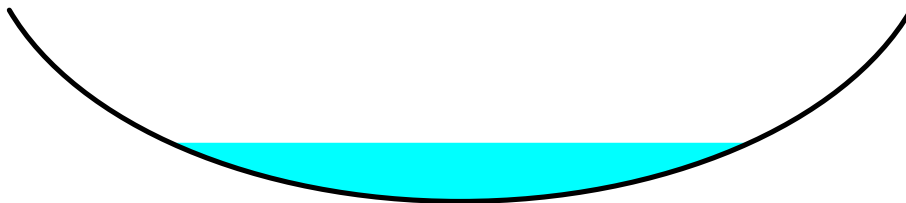
Summary for Reach 2R: Channel from Station 41+32 Right to Staton 33+65 Right

Inflow Area = 2.965 ac, 57.77% Impervious, Inflow Depth > 5.94" for 100 Year event
 Inflow = 14.98 cfs @ 12.21 hrs, Volume= 1.468 af
 Outflow = 14.75 cfs @ 12.26 hrs, Volume= 1.466 af, Atten= 2%, Lag= 3.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 6.60 fps, Min. Travel Time= 1.9 min
 Avg. Velocity = 2.31 fps, Avg. Travel Time= 5.5 min

Peak Storage= 1,716 cf @ 12.23 hrs
 Average Depth at Peak Storage= 0.61'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 186.45 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 767.0' Slope= 0.0615 '/
 Inlet Invert= 660.00', Outlet Invert= 612.80'



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Type III 24-hr 100 Year Rainfall=7.65"

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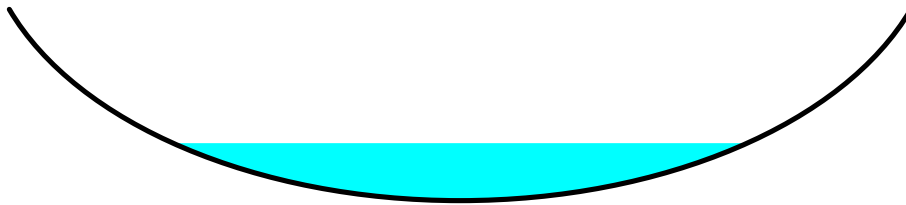
Summary for Reach 3R: Channel from Station 60+81 Right to Station 41+32 Right

Inflow Area = 2.069 ac, 56.16% Impervious, Inflow Depth > 6.10" for 100 Year event
 Inflow = 14.69 cfs @ 12.07 hrs, Volume= 1.053 af
 Outflow = 12.12 cfs @ 12.22 hrs, Volume= 1.047 af, Atten= 17%, Lag= 8.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.59 fps, Min. Travel Time= 5.8 min
 Avg. Velocity = 1.87 fps, Avg. Travel Time= 17.3 min

Peak Storage= 4,233 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.60'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.97 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 1,949.0' Slope= 0.0453 '/
 Inlet Invert= 748.28', Outlet Invert= 660.00'



Summary for Pond DP1: Ware River

Inflow Area = 7.814 ac, 57.56% Impervious, Inflow Depth > 5.95" for 100 Year event
 Inflow = 35.16 cfs @ 12.20 hrs, Volume= 3.873 af
 Primary = 35.16 cfs @ 12.20 hrs, Volume= 3.873 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right

Inflow Area = 4.053 ac, 57.59% Impervious, Inflow Depth > 6.07" for 100 Year event
 Inflow = 18.03 cfs @ 12.25 hrs, Volume= 2.051 af
 Outflow = 18.03 cfs @ 12.25 hrs, Volume= 2.051 af, Atten= 0%, Lag= 0.0 min
 Primary = 18.03 cfs @ 12.25 hrs, Volume= 2.051 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 613.76' @ 12.25 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	612.80'	72.0" W x 48.0" H Box Culvert L= 98.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 612.80' / 609.92' S= 0.0294 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 24.00 sf

Primary OutFlow Max=18.02 cfs @ 12.25 hrs HW=613.76' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 18.02 cfs @ 3.14 fps)

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Summary for Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left

Inflow Area = 0.896 ac, 61.50% Impervious, Inflow Depth > 5.64" for 100 Year event
 Inflow = 6.00 cfs @ 12.07 hrs, Volume= 0.421 af
 Outflow = 6.00 cfs @ 12.07 hrs, Volume= 0.421 af, Atten= 0%, Lag= 0.0 min
 Primary = 6.00 cfs @ 12.07 hrs, Volume= 0.421 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 661.54' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	660.58'	24.0" W x 24.0" H Box Culvert L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.58' / 660.00' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.00 sf

Primary OutFlow Max=5.99 cfs @ 12.07 hrs HW=661.53' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 5.99 cfs @ 3.14 fps)

Summary for Pond DP4: 24" RCP Inlet at Station 61+10 Left

Inflow Area = 0.222 ac, 44.59% Impervious, Inflow Depth > 6.10" for 100 Year event
 Inflow = 1.58 cfs @ 12.07 hrs, Volume= 0.113 af
 Outflow = 1.58 cfs @ 12.07 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.58 cfs @ 12.07 hrs, Volume= 0.113 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 749.80' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	749.28'	24.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 749.28' / 748.38' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=1.57 cfs @ 12.07 hrs HW=749.80' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 1.57 cfs @ 2.45 fps)

Summary for Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)

Inflow Area = 5.081 ac, 60.38% Impervious, Inflow Depth > 5.63" for 100 Year event
 Inflow = 28.73 cfs @ 12.14 hrs, Volume= 2.386 af
 Primary = 28.73 cfs @ 12.14 hrs, Volume= 2.386 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Summary for Pond DP6: Brookhaven Lake

Inflow Area = 7.979 ac, 60.06% Impervious, Inflow Depth > 5.59" for 100 Year event
Inflow = 44.92 cfs @ 12.10 hrs, Volume= 3.720 af
Primary = 44.92 cfs @ 12.10 hrs, Volume= 3.720 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

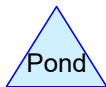
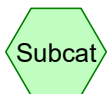
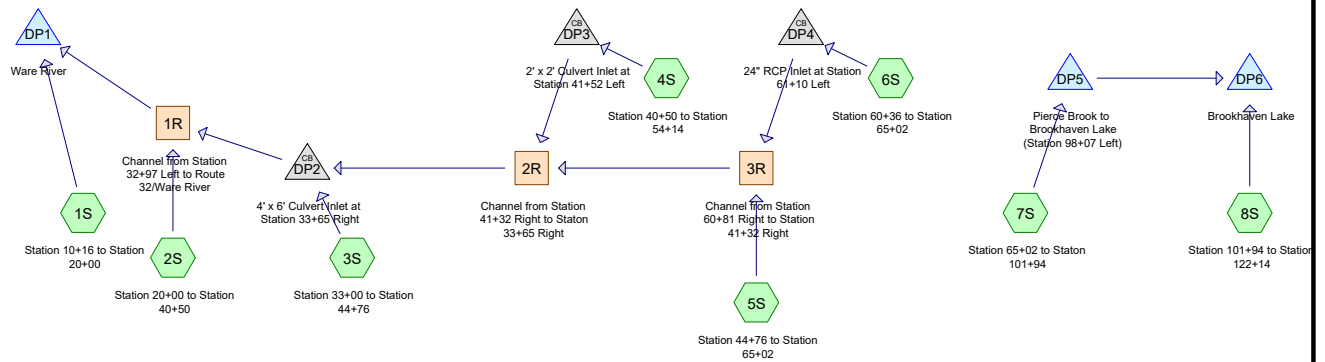
PAVEMENT DRAINAGE ANALYSIS
West Brookfield - Route 9

MassDOT Project #: 606517
CHA Project #: 25485
By: KDT
Date: December 29, 2021
10-Year Design Storm = 4.83 inches
10-Year Design Rainfall Intensity (I) = 5.7 inches per hour
Manning's Roughness Coefficient (n) = 0.016
Grate Length (L) = 2.0 feet
Grate Width (W) = 2.0 feet
Splash-over Velocity (Vo) = 4.5 feet per second (per HEC 22 Chart 5B for 30 Degree Tilt-bar Grate)

Equations per HEC 22 Chapter 4 (Pavement Drainage) Revised August 2013
Eq. 4-2 $T = [(O * n) / (0.56 * (S_x^{*1.67} * (S_i^{*0.5}))^{*0.375})]$
Eq. 4-13 $V = (1.11 / n) * (S_i^{*0.5}) * (S_x^{*1.67}) * (T^{*0.67})$
Eq. 4-18 $R_i = 1 - 0.09 * (V - V_o)$ [cannot exceed 1]
Eq. 4-19 $R_s = 1 / [1 + (0.15 * V^{*1.8}) / (S_x * L^{*2.3})]$
Eq. 4-16 $E_o = 1 - (1 - (W / T))^{*2.67}$
Eq. 4-20 $E = R_i * E_o + R_s * (1 - E_o)$

C	A	Allowable Spread	HMA Berm Depth	Station	Flow (Tributary)	Flow (Total)	Qt	SL	Sx	T	d	V	Ri	Rs	Eo	E	Qi	Ob	Allowable Bypass
Coef	Area	ft	in		cfs	cfs		%	%	ft	in	ft/s	Flow Ratio	Flow Ratio	Flow Ratio	%	cfs	cfs	cfs
MA Route 9 Westbound (Left)																			
* 0.90	0.113	4.0	n/a	57+95	0.58	0.58		3.054%	2.00%	4.78	1.15	2.52	1.000	0.111	0.764	79.1%	0.46	0.12	0.21
* 0.90	0.167	8.0	1.0	51+00	0.86	0.98		6.450%	2.00%	5.06	1.21	3.80	1.000	0.056	0.739	75.3%	0.74	0.24	0.36
* 0.90	0.093	8.0	1.0	48+76	0.47	0.72		6.450%	2.00%	4.50	1.08	3.51	1.000	0.064	0.791	80.5%	0.58	0.14	0.26
* 0.90	0.282	8.0	2.0	44+09	1.44	1.58		6.450%	2.00%	6.07	1.46	4.29	1.000	0.046	0.656	67.2%	1.06	0.52	0.58
* 0.90	0.174	8.0	1.0	32+12	0.89	0.89		1.900%	6.00%	3.09	2.23	3.09	1.000	0.205	0.938	95.1%	0.85	0.04	0.33
* 0.90	0.222	8.0	1.0	29+00	1.14	1.18		2.340%	4.20%	4.13	2.08	3.28	1.000	0.140	0.829	85.3%	1.01	0.17	0.44
* 0.90	0.167	8.0	1.0	26+65	0.86	1.03		2.216%	2.67%	5.27	1.69	2.78	1.000	0.122	0.720	75.5%	0.78	0.25	0.38
* 0.90	0.016	4.0	n/a	24+30	0.08	0.34		2.190%	2.00%	4.15	1.00	1.94	1.000	0.166	0.827	85.6%	0.29	0.05	0.12
* 0.90	0.072	4.0	n/a	16+50	0.37	0.42		5.486%	2.00%	3.79	0.91	2.88	1.000	0.089	0.865	87.7%	0.36	0.05	0.15
MA Route 9 Eastbound (Right)																			
* 0.90	0.444	8.0	2.0	58+10	2.28	2.28		3.263%	6.00%	3.97	2.86	4.79	0.974	0.105	0.846	84.0%	1.91	0.36	0.84
* 0.90	0.217	8.0	2.0	55+14	1.12	1.48		2.670%	6.00%	3.51	2.53	3.99	1.000	0.140	0.895	91.0%	1.35	0.13	0.55
* 0.90	0.287	8.0	1.0	48+76	1.47	1.61		6.450%	2.00%	6.10	1.46	4.30	1.000	0.045	0.654	67.0%	1.08	0.53	0.59
* 0.90	0.141	8.0	2.0	43+08	0.72	1.25		6.450%	3.20%	4.14	1.59	4.55	0.996	0.064	0.828	83.6%	1.05	0.21	0.46
* 0.90	0.285	8.0	2.0	39+20	1.46	1.67		6.700%	5.40%	3.30	2.14	5.65	0.896	0.073	0.917	82.8%	1.38	0.29	0.61
* 0.90	0.199	8.0	2.0	35+59	1.02	1.31		5.500%	2.00%	5.82	1.40	3.85	1.000	0.055	0.675	69.3%	0.91	0.40	0.48
* 0.90	0.008	8.0	2.0	35+41	0.04	0.44		5.500%	2.00%	3.87	0.93	2.93	1.000	0.087	0.856	86.9%	0.38	0.06	0.16
* 0.90	0.058	4.0	n/a	32+02	0.30	0.35		1.900%	2.00%	4.35	1.04	1.86	1.000	0.177	0.807	84.1%	0.30	0.06	0.13
* 0.90	0.195	8.0	6.0	24+00	1.00	1.06		2.190%	5.50%	3.39	2.24	3.33	1.000	0.171	0.907	92.3%	0.98	0.08	0.39
** SCS																			
** 0.90	0.025	8.0	6.0	16+85	3.76	3.76		5.206%	3.20%	6.51	2.50	5.53	0.907	0.046	0.625	58.4%	2.20	1.56	1.39
** SCS																			
** 0.90	0.013	8.0	6.0	14+50	0.06	1.98		5.486%	3.10%	4.87	1.81	4.58	0.993	0.062	0.756	76.6%	1.29	0.40	0.62
** SCS																			
** 0.90	0.080	8.0	6.0	11+68	0.41	0.67		6.030%	3.00%	3.36	1.21	3.66	1.000	0.087	0.911	91.8%	0.57	0.05	0.23
** SCS																			
** 0.90	0.080	8.0	6.0	13+00	1.28	1.33		5.550%	3.00%	4.54	1.63	4.30	1.000	0.067	0.788	80.2%	1.07	0.26	0.49
** SCS																			
** 0.90	0.080	8.0	6.0	11+68	0.41	0.67		5.550%	3.00%	3.51	1.26	3.62	1.000	0.089	0.895	90.4%	0.61	0.06	0.25

* Tributary flow represents worst case scenario for adjacent open drainage areas blocked due to winter conditions.
** Tributary flow calculated utilizing SCS method due to large offsite contributing area



Routing Diagram for 25485_PRE
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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	50 Year - 2050	Type III 24-hr		Default	24.00	1	8.50	2
2	50 Year - 2070	Type III 24-hr		Default	24.00	1	9.10	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.509	98	Paved parking, HSG B (1S, 4S, 5S, 7S, 8S)
1.475	98	Paved parking, HSG D (2S, 3S, 6S)
6.186	58	Woods/grass comb., Good, HSG B (1S, 2S, 4S, 5S, 7S, 8S)
2.623	79	Woods/grass comb., Good, HSG D (2S, 3S, 5S, 6S, 7S)
15.793	79	TOTAL AREA

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	DP2	612.80	609.92	98.0	0.0294	0.012	72.0	48.0	0.0
2	DP3	660.58	660.00	58.0	0.0100	0.012	24.0	24.0	0.0
3	DP4	749.28	748.38	90.0	0.0100	0.012	0.0	24.0	0.0

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Station 10+16 to Station Runoff Area=1.356 ac 47.05% Impervious Runoff Depth>5.73"
 Tc=5.0 min CN=77 Runoff=9.35 cfs 0.647 af

Subcatchment2S: Station 20+00 to Station Runoff Area=2.551 ac 39.32% Impervious Runoff Depth>6.33"
 Tc=5.0 min CN=82 Runoff=19.12 cfs 1.346 af

Subcatchment3S: Station 33+00 to Station Runoff Area=0.917 ac 48.53% Impervious Runoff Depth>7.05"
 Tc=5.0 min CN=88 Runoff=7.42 cfs 0.539 af

Subcatchment4S: Station 40+50 to Station Runoff Area=0.880 ac 37.50% Impervious Runoff Depth>5.25"
 Tc=5.0 min CN=73 Runoff=5.61 cfs 0.385 af

Subcatchment5S: Station 44+76 to Station Runoff Area=1.849 ac 46.89% Impervious Runoff Depth>6.57"
 Tc=5.0 min CN=84 Runoff=14.26 cfs 1.013 af

Subcatchment6S: Station 60+36 to Station Runoff Area=0.203 ac 13.30% Impervious Runoff Depth>6.33"
 Tc=5.0 min CN=82 Runoff=1.52 cfs 0.107 af

Subcatchment7S: Station 65+02 to Staton Runoff Area=5.139 ac 44.74% Impervious Runoff Depth>5.72"
 Tc=10.0 min CN=77 Runoff=29.92 cfs 2.452 af

Subcatchment8S: Station 101+94 to Runoff Area=2.898 ac 47.45% Impervious Runoff Depth>5.73"
 Tc=5.0 min CN=77 Runoff=19.99 cfs 1.384 af

Reach 1R: Channel from Station 32+97 Avg. Flow Depth=0.94' Max Vel=7.46 fps Inflow=35.83 cfs 3.381 af
 n=0.030 L=2,000.0' S=0.0450 '/' Capacity=159.37 cfs Outflow=32.10 cfs 3.368 af

Reach 2R: Channel from Station 41+32 Avg. Flow Depth=0.62' Max Vel=6.71 fps Inflow=15.85 cfs 1.499 af
 n=0.030 L=767.0' S=0.0615 '/' Capacity=186.45 cfs Outflow=15.60 cfs 1.496 af

Reach 3R: Channel from Station 60+81 Avg. Flow Depth=0.62' Max Vel=5.72 fps Inflow=15.78 cfs 1.120 af
 n=0.030 L=1,949.0' S=0.0453 '/' Capacity=159.97 cfs Outflow=13.07 cfs 1.114 af

Pond DP1: Ware River Inflow=36.84 cfs 4.015 af
 Primary=36.84 cfs 4.015 af

Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right Peak Elev=613.78' Inflow=18.65 cfs 2.035 af
 72.0" x 48.0" Box Culvert n=0.012 L=98.0' S=0.0294 '/' Outflow=18.65 cfs 2.035 af

Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left Peak Elev=661.49' Inflow=5.61 cfs 0.385 af
 24.0" x 24.0" Box Culvert n=0.012 L=58.0' S=0.0100 '/' Outflow=5.61 cfs 0.385 af

Pond DP4: 24" RCP Inlet at Station 61+10 Left Peak Elev=749.79' Inflow=1.52 cfs 0.107 af
 24.0" Round Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=1.52 cfs 0.107 af

Pond DP5: Pierce Brook to BrookhavenLake (Station 98+07 Left) Inflow=29.92 cfs 2.452 af
 Primary=29.92 cfs 2.452 af

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Pond DP6: Brookhaven Lake

Inflow=46.83 cfs 3.835 af

Primary=46.83 cfs 3.835 af

Total Runoff Area = 15.793 ac Runoff Volume = 7.872 af Average Runoff Depth = 5.98"
55.78% Pervious = 8.809 ac 44.22% Impervious = 6.984 ac

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Summary for Subcatchment 1S: Station 10+16 to Station 20+00

Runoff = 9.35 cfs @ 12.07 hrs, Volume= 0.647 af, Depth> 5.73"
 Routed to Pond DP1 : Ware River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
0.638	98	Paved parking, HSG B
0.718	58	Woods/grass comb., Good, HSG B
1.356	77	Weighted Average
0.718		52.95% Pervious Area
0.638		47.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 2S: Station 20+00 to Station 40+50

Runoff = 19.12 cfs @ 12.07 hrs, Volume= 1.346 af, Depth> 6.33"

Routed to Reach 1R : Channel from Station 32+97 Left to Route 32/Ware River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
1.003	98	Paved parking, HSG D
0.998	79	Woods/grass comb., Good, HSG D
0.550	58	Woods/grass comb., Good, HSG B
2.551	82	Weighted Average
1.548		60.68% Pervious Area
1.003		39.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 3S: Station 33+00 to Station 44+76

Runoff = 7.42 cfs @ 12.07 hrs, Volume= 0.539 af, Depth> 7.05"

Routed to Pond DP2 : 4' x 6' Culvert Inlet at Station 33+65 Right

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
0.445	98	Paved parking, HSG D
0.472	79	Woods/grass comb., Good, HSG D
0.917	88	Weighted Average
0.472		51.47% Pervious Area
0.445		48.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 4S: Station 40+50 to Station 54+14

Runoff = 5.61 cfs @ 12.07 hrs, Volume= 0.385 af, Depth> 5.25"

Routed to Pond DP3 : 2' x 2' Culvert Inlet at Station 41+52 Left

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG B
0.550	58	Woods/grass comb., Good, HSG B
0.880	73	Weighted Average
0.550		62.50% Pervious Area
0.330		37.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 5S: Station 44+76 to Station 65+02

Runoff = 14.26 cfs @ 12.07 hrs, Volume= 1.013 af, Depth> 6.57"

Routed to Reach 3R : Channel from Station 60+81 Right to Station 41+32 Right

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
0.867	98	Paved parking, HSG B
0.614	79	Woods/grass comb., Good, HSG D
0.368	58	Woods/grass comb., Good, HSG B
1.849	84	Weighted Average
0.982		53.11% Pervious Area
0.867		46.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 6S: Station 60+36 to Station 65+02

Runoff = 1.52 cfs @ 12.07 hrs, Volume= 0.107 af, Depth> 6.33"
 Routed to Pond DP4 : 24" RCP Inlet at Station 61+10 Left

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
0.027	98	Paved parking, HSG D
0.176	79	Woods/grass comb., Good, HSG D
0.203	82	Weighted Average
0.176		86.70% Pervious Area
0.027		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 7S: Station 65+02 to Station 101+94

Runoff = 29.92 cfs @ 12.14 hrs, Volume= 2.452 af, Depth> 5.72"

Routed to Pond DP5 : Pierce Brook to Brookhaven Lake (Station 98+07 Left)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
2.299	98	Paved parking, HSG B
0.363	79	Woods/grass comb., Good, HSG D
2.477	58	Woods/grass comb., Good, HSG B
5.139	77	Weighted Average
2.840		55.26% Pervious Area
2.299		44.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 8S: Station 101+94 to Station 122+14

Runoff = 19.99 cfs @ 12.07 hrs, Volume= 1.384 af, Depth> 5.73"
 Routed to Pond DP6 : Brookhaven Lake

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
1.375	98	Paved parking, HSG B
1.523	58	Woods/grass comb., Good, HSG B
2.898	77	Weighted Average
1.523		52.55% Pervious Area
1.375		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Reach 1R: Channel from Station 32+97 Left to Route 32/Ware River

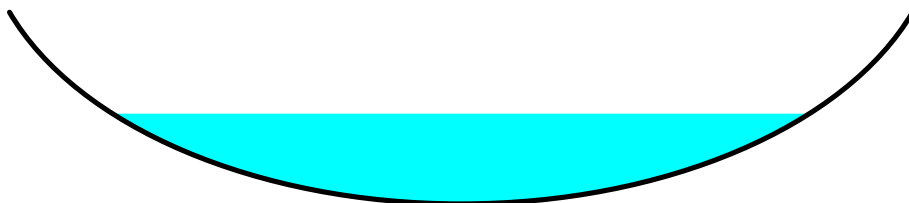
[79] Warning: Submerged Pond DP2 Primary device # 1 OUTLET by 0.94'

Inflow Area = 6.400 ac, 41.75% Impervious, Inflow Depth > 6.34" for 50 Year - 2050 event
 Inflow = 35.83 cfs @ 12.08 hrs, Volume= 3.381 af
 Outflow = 32.10 cfs @ 12.21 hrs, Volume= 3.368 af, Atten= 10%, Lag= 7.5 min
 Routed to Pond DP1 : Ware River

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 7.46 fps, Min. Travel Time= 4.5 min
 Avg. Velocity = 2.57 fps, Avg. Travel Time= 13.0 min

Peak Storage= 8,613 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.94' , Surface Width= 6.86'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.37 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 2,000.0' Slope= 0.0450 '/'
 Inlet Invert= 609.92', Outlet Invert= 520.00'



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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Reach 2R: Channel from Station 41+32 Right to Station 33+65 Right

[62] Hint: Exceeded Reach 3R OUTLET depth by 0.11' @ 12.28 hrs

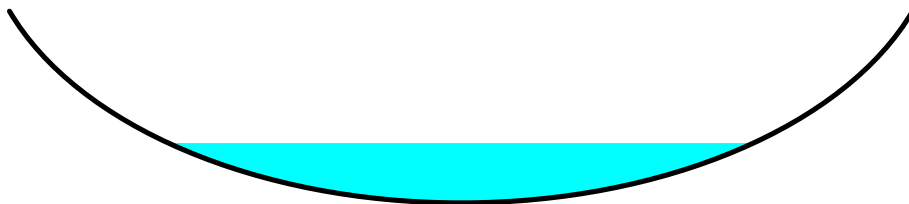
[79] Warning: Submerged Pond DP3 Primary device # 1 INLET by 0.04'

Inflow Area = 2.932 ac, 41.75% Impervious, Inflow Depth > 6.13" for 50 Year - 2050 event
 Inflow = 15.85 cfs @ 12.21 hrs, Volume= 1.499 af
 Outflow = 15.60 cfs @ 12.26 hrs, Volume= 1.496 af, Atten= 2%, Lag= 3.1 min
 Routed to Pond DP2 : 4' x 6' Culvert Inlet at Station 33+65 Right

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 6.71 fps, Min. Travel Time= 1.9 min
 Avg. Velocity = 2.33 fps, Avg. Travel Time= 5.5 min

Peak Storage= 1,784 cf @ 12.23 hrs
 Average Depth at Peak Storage= 0.62' , Surface Width= 5.59'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 186.45 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 767.0' Slope= 0.0615 '/'
 Inlet Invert= 660.00', Outlet Invert= 612.80'



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Summary for Reach 3R: Channel from Station 60+81 Right to Station 41+32 Right

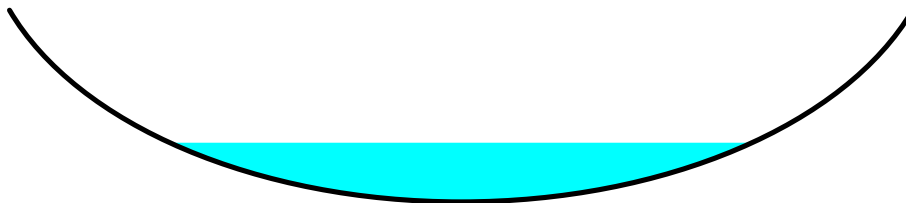
[79] Warning: Submerged Pond DP4 Primary device # 1 OUTLET by 0.52'

Inflow Area = 2.052 ac, 43.57% Impervious, Inflow Depth > 6.55" for 50 Year - 2050 event
 Inflow = 15.78 cfs @ 12.07 hrs, Volume= 1.120 af
 Outflow = 13.07 cfs @ 12.22 hrs, Volume= 1.114 af, Atten= 17%, Lag= 8.7 min
 Routed to Reach 2R : Channel from Station 41+32 Right to Staton 33+65 Right

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.72 fps, Min. Travel Time= 5.7 min
 Avg. Velocity = 1.92 fps, Avg. Travel Time= 16.9 min

Peak Storage= 4,463 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.62' , Surface Width= 5.56'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.97 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 1,949.0' Slope= 0.0453 '/'
 Inlet Invert= 748.28', Outlet Invert= 660.00'



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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Pond DP1: Ware River

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 7.756 ac, 42.68% Impervious, Inflow Depth > 6.21" for 50 Year - 2050 event
Inflow = 36.84 cfs @ 12.20 hrs, Volume= 4.015 af
Primary = 36.84 cfs @ 12.20 hrs, Volume= 4.015 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right

[57] Hint: Peaked at 613.78' (Flood elevation advised)

[62] Hint: Exceeded Reach 2R OUTLET depth by 0.39' @ 12.09 hrs

Inflow Area = 3.849 ac, 43.36% Impervious, Inflow Depth > 6.35" for 50 Year - 2050 event
 Inflow = 18.65 cfs @ 12.25 hrs, Volume= 2.035 af
 Outflow = 18.65 cfs @ 12.25 hrs, Volume= 2.035 af, Atten= 0%, Lag= 0.0 min
 Primary = 18.65 cfs @ 12.25 hrs, Volume= 2.035 af

Routed to Reach 1R : Channel from Station 32+97 Left to Route 32/Ware River

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 613.78' @ 12.25 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	612.80'	72.0" W x 48.0" H Box Culvert L= 98.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 612.80' / 609.92' S= 0.0294 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 24.00 sf

Primary OutFlow Max=18.64 cfs @ 12.25 hrs HW=613.78' (Free Discharge)

↑**1=Culvert** (Inlet Controls 18.64 cfs @ 3.17 fps)

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left

Inverts estimated due to sediment buildup

[57] Hint: Peaked at 661.49' (Flood elevation advised)

Inflow Area = 0.880 ac, 37.50% Impervious, Inflow Depth > 5.25" for 50 Year - 2050 event
 Inflow = 5.61 cfs @ 12.07 hrs, Volume= 0.385 af
 Outflow = 5.61 cfs @ 12.07 hrs, Volume= 0.385 af, Atten= 0%, Lag= 0.0 min
 Primary = 5.61 cfs @ 12.07 hrs, Volume= 0.385 af
 Routed to Reach 2R : Channel from Station 41+32 Right to Staton 33+65 Right

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 661.49' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	660.58'	24.0" W x 24.0" H Box Culvert L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.58' / 660.00' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.00 sf

Primary OutFlow Max=5.59 cfs @ 12.07 hrs HW=661.49' (Free Discharge)
 ←1=Culvert (Inlet Controls 5.59 cfs @ 3.07 fps)

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Pond DP4: 24" RCP Inlet at Station 61+10 Left

Assumed slope - outlet not found

[57] Hint: Peaked at 749.79' (Flood elevation advised)

Inflow Area = 0.203 ac, 13.30% Impervious, Inflow Depth > 6.33" for 50 Year - 2050 event
 Inflow = 1.52 cfs @ 12.07 hrs, Volume= 0.107 af
 Outflow = 1.52 cfs @ 12.07 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.52 cfs @ 12.07 hrs, Volume= 0.107 af
 Routed to Reach 3R : Channel from Station 60+81 Right to Station 41+32 Right

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 749.79' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	749.28'	24.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 749.28' / 748.38' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=1.52 cfs @ 12.07 hrs HW=749.79' (Free Discharge)
 ←1=Culvert (Inlet Controls 1.52 cfs @ 2.42 fps)

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.139 ac, 44.74% Impervious, Inflow Depth > 5.72" for 50 Year - 2050 event
Inflow = 29.92 cfs @ 12.14 hrs, Volume= 2.452 af
Primary = 29.92 cfs @ 12.14 hrs, Volume= 2.452 af, Atten= 0%, Lag= 0.0 min
Routed to Pond DP6 : Brookhaven Lake

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Pond DP6: Brookhaven Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 8.037 ac, 45.71% Impervious, Inflow Depth > 5.73" for 50 Year - 2050 event
Inflow = 46.83 cfs @ 12.11 hrs, Volume= 3.835 af
Primary = 46.83 cfs @ 12.11 hrs, Volume= 3.835 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Station 10+16 to Station Runoff Area=1.356 ac 47.05% Impervious Runoff Depth>6.29"
 Tc=5.0 min CN=77 Runoff=10.23 cfs 0.710 af

Subcatchment2S: Station 20+00 to Station Runoff Area=2.551 ac 39.32% Impervious Runoff Depth>6.90"
 Tc=5.0 min CN=82 Runoff=20.77 cfs 1.468 af

Subcatchment3S: Station 33+00 to Station Runoff Area=0.917 ac 48.53% Impervious Runoff Depth>7.64"
 Tc=5.0 min CN=88 Runoff=8.00 cfs 0.584 af

Subcatchment4S: Station 40+50 to Station Runoff Area=0.880 ac 37.50% Impervious Runoff Depth>5.79"
 Tc=5.0 min CN=73 Runoff=6.17 cfs 0.425 af

Subcatchment5S: Station 44+76 to Station Runoff Area=1.849 ac 46.89% Impervious Runoff Depth>7.15"
 Tc=5.0 min CN=84 Runoff=15.45 cfs 1.102 af

Subcatchment6S: Station 60+36 to Station Runoff Area=0.203 ac 13.30% Impervious Runoff Depth>6.90"
 Tc=5.0 min CN=82 Runoff=1.65 cfs 0.117 af

Subcatchment7S: Station 65+02 to Staton Runoff Area=5.139 ac 44.74% Impervious Runoff Depth>6.28"
 Tc=10.0 min CN=77 Runoff=32.73 cfs 2.690 af

Subcatchment8S: Station 101+94 to Runoff Area=2.898 ac 47.45% Impervious Runoff Depth>6.29"
 Tc=5.0 min CN=77 Runoff=21.86 cfs 1.518 af

Reach 1R: Channel from Station 32+97 Avg. Flow Depth=0.98' Max Vel=7.67 fps Inflow=39.11 cfs 3.686 af
 n=0.030 L=2,000.0' S=0.0450 '/' Capacity=159.37 cfs Outflow=35.22 cfs 3.672 af

Reach 2R: Channel from Station 41+32 Avg. Flow Depth=0.65' Max Vel=6.89 fps Inflow=17.33 cfs 1.637 af
 n=0.030 L=767.0' S=0.0615 '/' Capacity=186.45 cfs Outflow=17.07 cfs 1.634 af

Reach 3R: Channel from Station 60+81 Avg. Flow Depth=0.64' Max Vel=5.87 fps Inflow=17.10 cfs 1.219 af
 n=0.030 L=1,949.0' S=0.0453 '/' Capacity=159.97 cfs Outflow=14.25 cfs 1.212 af

Pond DP1: Ware River Inflow=40.44 cfs 4.383 af
 Primary=40.44 cfs 4.383 af

Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right Peak Elev=613.84' Inflow=20.41 cfs 2.218 af
 72.0" x 48.0" Box Culvert n=0.012 L=98.0' S=0.0294 '/' Outflow=20.41 cfs 2.218 af

Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left Peak Elev=661.55' Inflow=6.17 cfs 0.425 af
 24.0" x 24.0" Box Culvert n=0.012 L=58.0' S=0.0100 '/' Outflow=6.17 cfs 0.425 af

Pond DP4: 24" RCP Inlet at Station 61+10 Left Peak Elev=749.81' Inflow=1.65 cfs 0.117 af
 24.0" Round Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=1.65 cfs 0.117 af

Pond DP5: Pierce Brook to BrookhavenLake (Station 98+07 Left) Inflow=32.73 cfs 2.690 af
 Primary=32.73 cfs 2.690 af

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Pond DP6: Brookhaven Lake

Inflow=51.24 cfs 4.208 af

Primary=51.24 cfs 4.208 af

Total Runoff Area = 15.793 ac Runoff Volume = 8.613 af Average Runoff Depth = 6.54"
55.78% Pervious = 8.809 ac 44.22% Impervious = 6.984 ac

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Summary for Subcatchment 1S: Station 10+16 to Station 20+00

Runoff = 10.23 cfs @ 12.07 hrs, Volume= 0.710 af, Depth> 6.29"
 Routed to Pond DP1 : Ware River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
0.638	98	Paved parking, HSG B
0.718	58	Woods/grass comb., Good, HSG B
1.356	77	Weighted Average
0.718		52.95% Pervious Area
0.638		47.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Subcatchment 2S: Station 20+00 to Station 40+50

Runoff = 20.77 cfs @ 12.07 hrs, Volume= 1.468 af, Depth> 6.90"

Routed to Reach 1R : Channel from Station 32+97 Left to Route 32/Ware River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
1.003	98	Paved parking, HSG D
0.998	79	Woods/grass comb., Good, HSG D
0.550	58	Woods/grass comb., Good, HSG B
2.551	82	Weighted Average
1.548		60.68% Pervious Area
1.003		39.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Subcatchment 3S: Station 33+00 to Station 44+76

Runoff = 8.00 cfs @ 12.07 hrs, Volume= 0.584 af, Depth> 7.64"
 Routed to Pond DP2 : 4' x 6' Culvert Inlet at Station 33+65 Right

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
0.445	98	Paved parking, HSG D
0.472	79	Woods/grass comb., Good, HSG D
0.917	88	Weighted Average
0.472		51.47% Pervious Area
0.445		48.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Subcatchment 4S: Station 40+50 to Station 54+14

Runoff = 6.17 cfs @ 12.07 hrs, Volume= 0.425 af, Depth> 5.79"

Routed to Pond DP3 : 2' x 2' Culvert Inlet at Station 41+52 Left

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG B
0.550	58	Woods/grass comb., Good, HSG B
0.880	73	Weighted Average
0.550		62.50% Pervious Area
0.330		37.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Summary for Subcatchment 5S: Station 44+76 to Station 65+02

Runoff = 15.45 cfs @ 12.07 hrs, Volume= 1.102 af, Depth> 7.15"

Routed to Reach 3R : Channel from Station 60+81 Right to Station 41+32 Right

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
0.867	98	Paved parking, HSG B
0.614	79	Woods/grass comb., Good, HSG D
0.368	58	Woods/grass comb., Good, HSG B
1.849	84	Weighted Average
0.982		53.11% Pervious Area
0.867		46.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Subcatchment 6S: Station 60+36 to Station 65+02

Runoff = 1.65 cfs @ 12.07 hrs, Volume= 0.117 af, Depth> 6.90"

Routed to Pond DP4 : 24" RCP Inlet at Station 61+10 Left

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
0.027	98	Paved parking, HSG D
0.176	79	Woods/grass comb., Good, HSG D
0.203	82	Weighted Average
0.176		86.70% Pervious Area
0.027		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Summary for Subcatchment 7S: Station 65+02 to Station 101+94

Runoff = 32.73 cfs @ 12.14 hrs, Volume= 2.690 af, Depth> 6.28"

Routed to Pond DP5 : Pierce Brook to Brookhaven Lake (Station 98+07 Left)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
2.299	98	Paved parking, HSG B
0.363	79	Woods/grass comb., Good, HSG D
2.477	58	Woods/grass comb., Good, HSG B
5.139	77	Weighted Average
2.840		55.26% Pervious Area
2.299		44.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

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Summary for Subcatchment 8S: Station 101+94 to Station 122+14

Runoff = 21.86 cfs @ 12.07 hrs, Volume= 1.518 af, Depth> 6.29"
 Routed to Pond DP6 : Brookhaven Lake

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
1.375	98	Paved parking, HSG B
1.523	58	Woods/grass comb., Good, HSG B
2.898	77	Weighted Average
1.523		52.55% Pervious Area
1.375		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Summary for Reach 1R: Channel from Station 32+97 Left to Route 32/Ware River

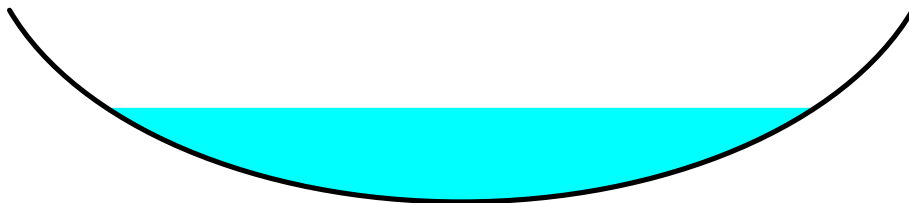
[79] Warning: Submerged Pond DP2 Primary device # 1 OUTLET by 0.98'

Inflow Area = 6.400 ac, 41.75% Impervious, Inflow Depth > 6.91" for 50 Year - 2070 event
 Inflow = 39.11 cfs @ 12.08 hrs, Volume= 3.686 af
 Outflow = 35.22 cfs @ 12.20 hrs, Volume= 3.672 af, Atten= 10%, Lag= 7.3 min
 Routed to Pond DP1 : Ware River

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 7.67 fps, Min. Travel Time= 4.3 min
 Avg. Velocity = 2.63 fps, Avg. Travel Time= 12.7 min

Peak Storage= 9,190 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.98' , Surface Width= 7.01'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.37 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 2,000.0' Slope= 0.0450 '/'
 Inlet Invert= 609.92', Outlet Invert= 520.00'



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Summary for Reach 2R: Channel from Station 41+32 Right to Staton 33+65 Right

[62] Hint: Exceeded Reach 3R OUTLET depth by 0.11' @ 12.27 hrs

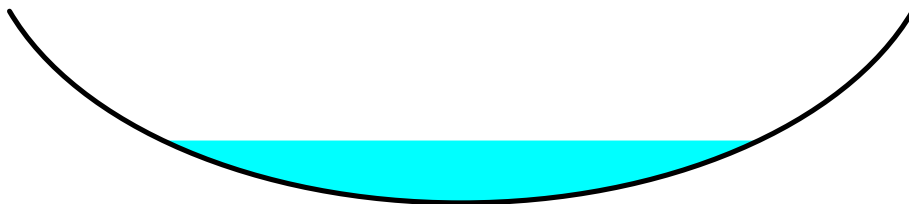
[79] Warning: Submerged Pond DP3 Primary device # 1 INLET by 0.07'

Inflow Area = 2.932 ac, 41.75% Impervious, Inflow Depth > 6.70" for 50 Year - 2070 event
 Inflow = 17.33 cfs @ 12.21 hrs, Volume= 1.637 af
 Outflow = 17.07 cfs @ 12.26 hrs, Volume= 1.634 af, Atten= 1%, Lag= 3.0 min
 Routed to Pond DP2 : 4' x 6' Culvert Inlet at Station 33+65 Right

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 6.89 fps, Min. Travel Time= 1.9 min
 Avg. Velocity = 2.38 fps, Avg. Travel Time= 5.4 min

Peak Storage= 1,900 cf @ 12.23 hrs
 Average Depth at Peak Storage= 0.65' , Surface Width= 5.71'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 186.45 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 767.0' Slope= 0.0615 '/'
 Inlet Invert= 660.00', Outlet Invert= 612.80'



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Summary for Reach 3R: Channel from Station 60+81 Right to Station 41+32 Right

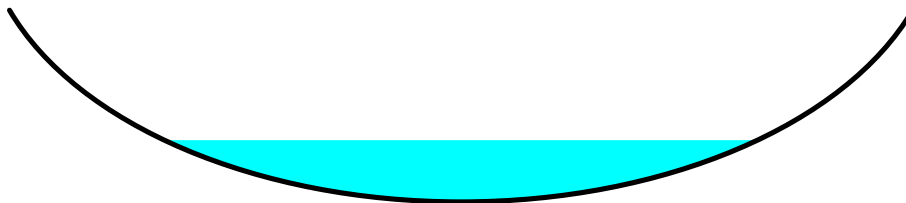
[79] Warning: Submerged Pond DP4 Primary device # 1 OUTLET by 0.54'

Inflow Area = 2.052 ac, 43.57% Impervious, Inflow Depth > 7.13" for 50 Year - 2070 event
 Inflow = 17.10 cfs @ 12.07 hrs, Volume= 1.219 af
 Outflow = 14.25 cfs @ 12.21 hrs, Volume= 1.212 af, Atten= 17%, Lag= 8.5 min
 Routed to Reach 2R : Channel from Station 41+32 Right to Staton 33+65 Right

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.87 fps, Min. Travel Time= 5.5 min
 Avg. Velocity = 1.96 fps, Avg. Travel Time= 16.5 min

Peak Storage= 4,740 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.64' , Surface Width= 5.67'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.97 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 1,949.0' Slope= 0.0453 '/'
 Inlet Invert= 748.28', Outlet Invert= 660.00'



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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Pond DP1: Ware River

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 7.756 ac, 42.68% Impervious, Inflow Depth > 6.78" for 50 Year - 2070 event
Inflow = 40.44 cfs @ 12.20 hrs, Volume= 4.383 af
Primary = 40.44 cfs @ 12.20 hrs, Volume= 4.383 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Summary for Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right

[57] Hint: Peaked at 613.84' (Flood elevation advised)

[62] Hint: Exceeded Reach 2R OUTLET depth by 0.42' @ 12.09 hrs

Inflow Area = 3.849 ac, 43.36% Impervious, Inflow Depth > 6.92" for 50 Year - 2070 event
 Inflow = 20.41 cfs @ 12.25 hrs, Volume= 2.218 af
 Outflow = 20.41 cfs @ 12.25 hrs, Volume= 2.218 af, Atten= 0%, Lag= 0.0 min
 Primary = 20.41 cfs @ 12.25 hrs, Volume= 2.218 af

Routed to Reach 1R : Channel from Station 32+97 Left to Route 32/Ware River

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 613.84' @ 12.25 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	612.80'	72.0" W x 48.0" H Box Culvert L= 98.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 612.80' / 609.92' S= 0.0294 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 24.00 sf

Primary OutFlow Max=20.40 cfs @ 12.25 hrs HW=613.84' (Free Discharge)

↑1=Culvert (Inlet Controls 20.40 cfs @ 3.27 fps)

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left

Inverts estimated due to sediment buildup

[57] Hint: Peaked at 661.55' (Flood elevation advised)

Inflow Area = 0.880 ac, 37.50% Impervious, Inflow Depth > 5.79" for 50 Year - 2070 event
 Inflow = 6.17 cfs @ 12.07 hrs, Volume= 0.425 af
 Outflow = 6.17 cfs @ 12.07 hrs, Volume= 0.425 af, Atten= 0%, Lag= 0.0 min
 Primary = 6.17 cfs @ 12.07 hrs, Volume= 0.425 af
 Routed to Reach 2R : Channel from Station 41+32 Right to Staton 33+65 Right

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 661.55' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	660.58'	24.0" W x 24.0" H Box Culvert L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.58' / 660.00' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.00 sf

Primary OutFlow Max=6.16 cfs @ 12.07 hrs HW=661.55' (Free Discharge)

↑**1=Culvert** (Inlet Controls 6.16 cfs @ 3.17 fps)

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Pond DP4: 24" RCP Inlet at Station 61+10 Left

Assumed slope - outlet not found

[57] Hint: Peaked at 749.81' (Flood elevation advised)

Inflow Area = 0.203 ac, 13.30% Impervious, Inflow Depth > 6.90" for 50 Year - 2070 event
 Inflow = 1.65 cfs @ 12.07 hrs, Volume= 0.117 af
 Outflow = 1.65 cfs @ 12.07 hrs, Volume= 0.117 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.65 cfs @ 12.07 hrs, Volume= 0.117 af
 Routed to Reach 3R : Channel from Station 60+81 Right to Station 41+32 Right

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 749.81' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	749.28'	24.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 749.28' / 748.38' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=1.65 cfs @ 12.07 hrs HW=749.81' (Free Discharge)

↑**1=Culvert** (Inlet Controls 1.65 cfs @ 2.48 fps)

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Summary for Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.139 ac, 44.74% Impervious, Inflow Depth > 6.28" for 50 Year - 2070 event
Inflow = 32.73 cfs @ 12.14 hrs, Volume= 2.690 af
Primary = 32.73 cfs @ 12.14 hrs, Volume= 2.690 af, Atten= 0%, Lag= 0.0 min
Routed to Pond DP6 : Brookhaven Lake

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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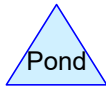
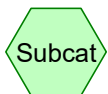
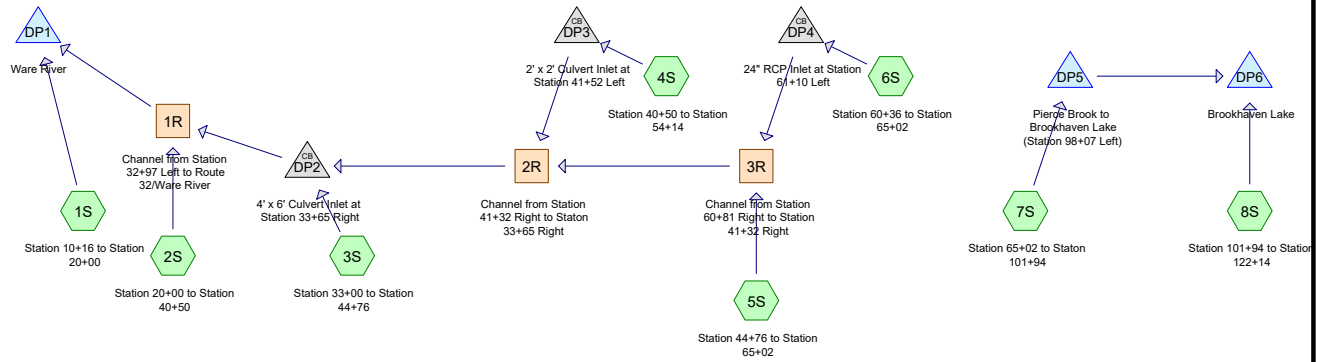
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Summary for Pond DP6: Brookhaven Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 8.037 ac, 45.71% Impervious, Inflow Depth > 6.28" for 50 Year - 2070 event
Inflow = 51.24 cfs @ 12.11 hrs, Volume= 4.208 af
Primary = 51.24 cfs @ 12.11 hrs, Volume= 4.208 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



Routing Diagram for 25485_POST
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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.189	98	Paved parking, HSG B (1S, 4S, 5S, 7S, 8S)
2.101	98	Paved parking, HSG D (2S, 3S, 6S)
4.462	58	Woods/grass comb., Good, HSG B (1S, 2S, 4S, 5S, 7S, 8S)
2.041	79	Woods/grass comb., Good, HSG D (2S, 3S, 5S, 6S, 7S)
15.793	84	TOTAL AREA

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	DP2	612.80	609.92	98.0	0.0294	0.012	72.0	48.0	0.0
2	DP3	660.58	660.00	58.0	0.0100	0.012	24.0	24.0	0.0
3	DP4	749.28	748.38	90.0	0.0100	0.012	0.0	24.0	0.0

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Station 10+16 to Station Runoff Area=1.356 ac 57.74% Impervious Runoff Depth>6.21"
 Tc=5.0 min CN=81 Runoff=10.01 cfs 0.702 af

Subcatchment2S: Station 20+00 to Station Runoff Area=2.405 ac 57.42% Impervious Runoff Depth>6.93"
 Tc=5.0 min CN=87 Runoff=19.25 cfs 1.389 af

Subcatchment3S: Station 33+00 to Station Runoff Area=1.088 ac 57.08% Impervious Runoff Depth>7.29"
 Tc=5.0 min CN=90 Runoff=8.98 cfs 0.661 af

Subcatchment4S: Station 40+50 to Station Runoff Area=0.896 ac 61.50% Impervious Runoff Depth>6.45"
 Tc=5.0 min CN=83 Runoff=6.81 cfs 0.482 af

Subcatchment5S: Station 44+76 to Station Runoff Area=1.847 ac 57.55% Impervious Runoff Depth>6.93"
 Tc=5.0 min CN=87 Runoff=14.78 cfs 1.067 af

Subcatchment6S: Station 60+36 to Station Runoff Area=0.222 ac 44.59% Impervious Runoff Depth>6.93"
 Tc=5.0 min CN=87 Runoff=1.78 cfs 0.128 af

Subcatchment7S: Station 65+02 to Staton Runoff Area=5.081 ac 60.38% Impervious Runoff Depth>6.45"
 Tc=10.0 min CN=83 Runoff=32.66 cfs 2.729 af

Subcatchment8S: Station 101+94 to Runoff Area=2.898 ac 59.49% Impervious Runoff Depth>6.33"
 Tc=5.0 min CN=82 Runoff=21.72 cfs 1.529 af

Reach 1R: Channel from Station 32+97 Avg. Flow Depth=0.98' Max Vel=7.67 fps Inflow=39.05 cfs 3.719 af
 n=0.030 L=2,000.0' S=0.0450 '/' Capacity=159.37 cfs Outflow=35.19 cfs 3.705 af

Reach 2R: Channel from Station 41+32 Avg. Flow Depth=0.65' Max Vel=6.86 fps Inflow=17.09 cfs 1.671 af
 n=0.030 L=767.0' S=0.0615 '/' Capacity=186.45 cfs Outflow=16.85 cfs 1.668 af

Reach 3R: Channel from Station 60+81 Avg. Flow Depth=0.63' Max Vel=5.81 fps Inflow=16.56 cfs 1.195 af
 n=0.030 L=1,949.0' S=0.0453 '/' Capacity=159.97 cfs Outflow=13.79 cfs 1.189 af

Pond DP1: Ware River Inflow=40.27 cfs 4.407 af
 Primary=40.27 cfs 4.407 af

Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right Peak Elev=613.85' Inflow=20.60 cfs 2.330 af
 72.0" x 48.0" Box Culvert n=0.012 L=98.0' S=0.0294 '/' Outflow=20.60 cfs 2.330 af

Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left Peak Elev=661.62' Inflow=6.81 cfs 0.482 af
 24.0" x 24.0" Box Culvert n=0.012 L=58.0' S=0.0100 '/' Outflow=6.81 cfs 0.482 af

Pond DP4: 24" RCP Inlet at Station 61+10 Left Peak Elev=749.83' Inflow=1.78 cfs 0.128 af
 24.0" Round Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=1.78 cfs 0.128 af

Pond DP5: Pierce Brook to BrookhavenLake (Station 98+07 Left) Inflow=32.66 cfs 2.729 af
 Primary=32.66 cfs 2.729 af

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Pond DP6: Brookhaven Lake

Inflow=51.12 cfs 4.258 af

Primary=51.12 cfs 4.258 af

Total Runoff Area = 15.793 ac Runoff Volume = 8.687 af Average Runoff Depth = 6.60"
41.18% Pervious = 6.503 ac 58.82% Impervious = 9.290 ac

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 1S: Station 10+16 to Station 20+00

Runoff = 10.01 cfs @ 12.07 hrs, Volume= 0.702 af, Depth> 6.21"
 Routed to Pond DP1 : Ware River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
0.783	98	Paved parking, HSG B
0.573	58	Woods/grass comb., Good, HSG B
1.356	81	Weighted Average
0.573		42.26% Pervious Area
0.783		57.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 2S: Station 20+00 to Station 40+50

Runoff = 19.25 cfs @ 12.07 hrs, Volume= 1.389 af, Depth> 6.93"

Routed to Reach 1R : Channel from Station 32+97 Left to Route 32/Ware River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
1.381	98	Paved parking, HSG D
0.747	79	Woods/grass comb., Good, HSG D
0.277	58	Woods/grass comb., Good, HSG B
2.405	87	Weighted Average
1.024		42.58% Pervious Area
1.381		57.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 3S: Station 33+00 to Station 44+76

Runoff = 8.98 cfs @ 12.07 hrs, Volume= 0.661 af, Depth> 7.29"

Routed to Pond DP2 : 4' x 6' Culvert Inlet at Station 33+65 Right

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
0.621	98	Paved parking, HSG D
0.467	79	Woods/grass comb., Good, HSG D
1.088	90	Weighted Average
0.467		42.92% Pervious Area
0.621		57.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 4S: Station 40+50 to Station 54+14

Runoff = 6.81 cfs @ 12.07 hrs, Volume= 0.482 af, Depth> 6.45"

Routed to Pond DP3 : 2' x 2' Culvert Inlet at Station 41+52 Left

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
0.551	98	Paved parking, HSG B
0.345	58	Woods/grass comb., Good, HSG B
0.896	83	Weighted Average
0.345		38.50% Pervious Area
0.551		61.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 5S: Station 44+76 to Station 65+02

Runoff = 14.78 cfs @ 12.07 hrs, Volume= 1.067 af, Depth> 6.93"

Routed to Reach 3R : Channel from Station 60+81 Right to Station 41+32 Right

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
1.063	98	Paved parking, HSG B
0.493	79	Woods/grass comb., Good, HSG D
0.291	58	Woods/grass comb., Good, HSG B
1.847	87	Weighted Average
0.784		42.45% Pervious Area
1.063		57.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 6S: Station 60+36 to Station 65+02

Runoff = 1.78 cfs @ 12.07 hrs, Volume= 0.128 af, Depth> 6.93"

Routed to Pond DP4 : 24" RCP Inlet at Station 61+10 Left

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
0.099	98	Paved parking, HSG D
0.123	79	Woods/grass comb., Good, HSG D
0.222	87	Weighted Average
0.123		55.41% Pervious Area
0.099		44.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 7S: Station 65+02 to Station 101+94

Runoff = 32.66 cfs @ 12.14 hrs, Volume= 2.729 af, Depth> 6.45"

Routed to Pond DP5 : Pierce Brook to Brookhaven Lake (Station 98+07 Left)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
3.068	98	Paved parking, HSG B
0.211	79	Woods/grass comb., Good, HSG D
1.802	58	Woods/grass comb., Good, HSG B
5.081	83	Weighted Average
2.013		39.62% Pervious Area
3.068		60.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Subcatchment 8S: Station 101+94 to Station 122+14

Runoff = 21.72 cfs @ 12.07 hrs, Volume= 1.529 af, Depth> 6.33"
 Routed to Pond DP6 : Brookhaven Lake

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2050 Rainfall=8.50"

Area (ac)	CN	Description
1.724	98	Paved parking, HSG B
1.174	58	Woods/grass comb., Good, HSG B
2.898	82	Weighted Average
1.174		40.51% Pervious Area
1.724		59.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Reach 1R: Channel from Station 32+97 Left to Route 32/Ware River

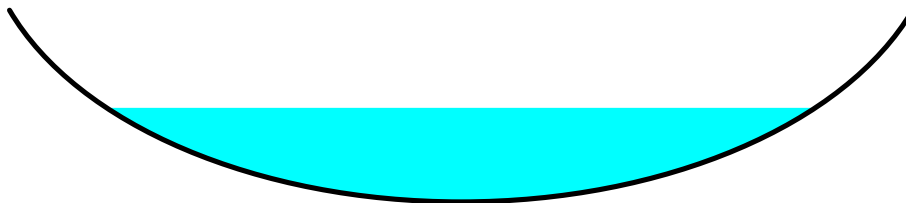
[79] Warning: Submerged Pond DP2 Primary device # 1 OUTLET by 0.98'

Inflow Area = 6.458 ac, 57.53% Impervious, Inflow Depth > 6.91" for 50 Year - 2050 event
 Inflow = 39.05 cfs @ 12.08 hrs, Volume= 3.719 af
 Outflow = 35.19 cfs @ 12.20 hrs, Volume= 3.705 af, Atten= 10%, Lag= 7.2 min
 Routed to Pond DP1 : Ware River

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 7.67 fps, Min. Travel Time= 4.3 min
 Avg. Velocity = 2.65 fps, Avg. Travel Time= 12.6 min

Peak Storage= 9,185 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.98' , Surface Width= 7.01'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.37 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 2,000.0' Slope= 0.0450 '/'
 Inlet Invert= 609.92', Outlet Invert= 520.00'



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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Reach 2R: Channel from Station 41+32 Right to Staton 33+65 Right

[62] Hint: Exceeded Reach 3R OUTLET depth by 0.12' @ 12.27 hrs

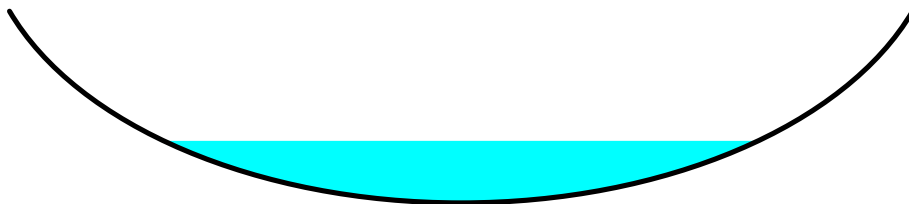
[79] Warning: Submerged Pond DP3 Primary device # 1 INLET by 0.07'

Inflow Area = 2.965 ac, 57.77% Impervious, Inflow Depth > 6.76" for 50 Year - 2050 event
 Inflow = 17.09 cfs @ 12.20 hrs, Volume= 1.671 af
 Outflow = 16.85 cfs @ 12.26 hrs, Volume= 1.668 af, Atten= 1%, Lag= 3.0 min
 Routed to Pond DP2 : 4' x 6' Culvert Inlet at Station 33+65 Right

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 6.86 fps, Min. Travel Time= 1.9 min
 Avg. Velocity = 2.39 fps, Avg. Travel Time= 5.3 min

Peak Storage= 1,883 cf @ 12.22 hrs
 Average Depth at Peak Storage= 0.65' , Surface Width= 5.69'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 186.45 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 767.0' Slope= 0.0615 '/'
 Inlet Invert= 660.00', Outlet Invert= 612.80'



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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Reach 3R: Channel from Station 60+81 Right to Station 41+32 Right

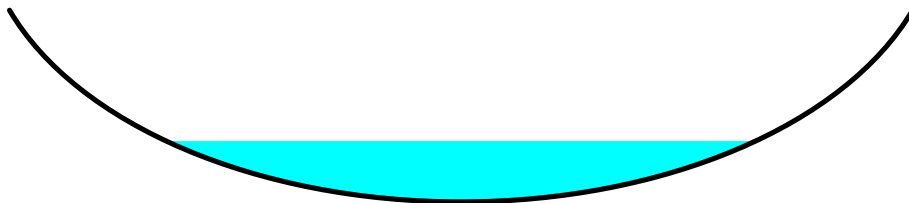
[79] Warning: Submerged Pond DP4 Primary device # 1 OUTLET by 0.53'

Inflow Area = 2.069 ac, 56.16% Impervious, Inflow Depth > 6.93" for 50 Year - 2050 event
 Inflow = 16.56 cfs @ 12.07 hrs, Volume= 1.195 af
 Outflow = 13.79 cfs @ 12.21 hrs, Volume= 1.189 af, Atten= 17%, Lag= 8.6 min
 Routed to Reach 2R : Channel from Station 41+32 Right to Staton 33+65 Right

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.81 fps, Min. Travel Time= 5.6 min
 Avg. Velocity = 1.94 fps, Avg. Travel Time= 16.8 min

Peak Storage= 4,632 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.63' , Surface Width= 5.63'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.97 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 1,949.0' Slope= 0.0453 '/'
 Inlet Invert= 748.28', Outlet Invert= 660.00'



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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Pond DP1: Ware River

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 7.814 ac, 57.56% Impervious, Inflow Depth > 6.77" for 50 Year - 2050 event
Inflow = 40.27 cfs @ 12.19 hrs, Volume= 4.407 af
Primary = 40.27 cfs @ 12.19 hrs, Volume= 4.407 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right

[57] Hint: Peaked at 613.85' (Flood elevation advised)

[62] Hint: Exceeded Reach 2R OUTLET depth by 0.46' @ 12.09 hrs

Inflow Area = 4.053 ac, 57.59% Impervious, Inflow Depth > 6.90" for 50 Year - 2050 event
 Inflow = 20.60 cfs @ 12.24 hrs, Volume= 2.330 af
 Outflow = 20.60 cfs @ 12.24 hrs, Volume= 2.330 af, Atten= 0%, Lag= 0.0 min
 Primary = 20.60 cfs @ 12.24 hrs, Volume= 2.330 af

Routed to Reach 1R : Channel from Station 32+97 Left to Route 32/Ware River

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 613.85' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	612.80'	72.0" W x 48.0" H Box Culvert L= 98.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 612.80' / 609.92' S= 0.0294 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 24.00 sf

Primary OutFlow Max=20.59 cfs @ 12.24 hrs HW=613.85' (Free Discharge)

↑**1=Culvert** (Inlet Controls 20.59 cfs @ 3.28 fps)

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left

Inverts estimated due to sediment buildup

[57] Hint: Peaked at 661.62' (Flood elevation advised)

Inflow Area = 0.896 ac, 61.50% Impervious, Inflow Depth > 6.45" for 50 Year - 2050 event
 Inflow = 6.81 cfs @ 12.07 hrs, Volume= 0.482 af
 Outflow = 6.81 cfs @ 12.07 hrs, Volume= 0.482 af, Atten= 0%, Lag= 0.0 min
 Primary = 6.81 cfs @ 12.07 hrs, Volume= 0.482 af
 Routed to Reach 2R : Channel from Station 41+32 Right to Staton 33+65 Right

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 661.62' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	660.58'	24.0" W x 24.0" H Box Culvert L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.58' / 660.00' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.00 sf

Primary OutFlow Max=6.81 cfs @ 12.07 hrs HW=661.62' (Free Discharge)

↑**1=Culvert** (Inlet Controls 6.81 cfs @ 3.27 fps)

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Pond DP4: 24" RCP Inlet at Station 61+10 Left

Assumed slope - outlet not found

[57] Hint: Peaked at 749.83' (Flood elevation advised)

Inflow Area = 0.222 ac, 44.59% Impervious, Inflow Depth > 6.93" for 50 Year - 2050 event
 Inflow = 1.78 cfs @ 12.07 hrs, Volume= 0.128 af
 Outflow = 1.78 cfs @ 12.07 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.78 cfs @ 12.07 hrs, Volume= 0.128 af
 Routed to Reach 3R : Channel from Station 60+81 Right to Station 41+32 Right

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 749.83' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	749.28'	24.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 749.28' / 748.38' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=1.77 cfs @ 12.07 hrs HW=749.83' (Free Discharge)
 ←1=Culvert (Inlet Controls 1.77 cfs @ 2.53 fps)

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.081 ac, 60.38% Impervious, Inflow Depth > 6.45" for 50 Year - 2050 event
Inflow = 32.66 cfs @ 12.14 hrs, Volume= 2.729 af
Primary = 32.66 cfs @ 12.14 hrs, Volume= 2.729 af, Atten= 0%, Lag= 0.0 min
Routed to Pond DP6 : Brookhaven Lake

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 50 Year - 2050 Rainfall=8.50"

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Summary for Pond DP6: Brookhaven Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 7.979 ac, 60.06% Impervious, Inflow Depth > 6.40" for 50 Year - 2050 event
Inflow = 51.12 cfs @ 12.10 hrs, Volume= 4.258 af
Primary = 51.12 cfs @ 12.10 hrs, Volume= 4.258 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Station 10+16 to Station Runoff Area=1.356 ac 57.74% Impervious Runoff Depth>6.78"
 Tc=5.0 min CN=81 Runoff=10.89 cfs 0.766 af

Subcatchment2S: Station 20+00 to Station Runoff Area=2.405 ac 57.42% Impervious Runoff Depth>7.52"
 Tc=5.0 min CN=87 Runoff=20.78 cfs 1.507 af

Subcatchment3S: Station 33+00 to Station Runoff Area=1.088 ac 57.08% Impervious Runoff Depth>7.88"
 Tc=5.0 min CN=90 Runoff=9.67 cfs 0.715 af

Subcatchment4S: Station 40+50 to Station Runoff Area=0.896 ac 61.50% Impervious Runoff Depth>7.03"
 Tc=5.0 min CN=83 Runoff=7.39 cfs 0.525 af

Subcatchment5S: Station 44+76 to Station Runoff Area=1.847 ac 57.55% Impervious Runoff Depth>7.52"
 Tc=5.0 min CN=87 Runoff=15.96 cfs 1.157 af

Subcatchment6S: Station 60+36 to Station Runoff Area=0.222 ac 44.59% Impervious Runoff Depth>7.52"
 Tc=5.0 min CN=87 Runoff=1.92 cfs 0.139 af

Subcatchment7S: Station 65+02 to Staton Runoff Area=5.081 ac 60.38% Impervious Runoff Depth>7.02"
 Tc=10.0 min CN=83 Runoff=35.44 cfs 2.973 af

Subcatchment8S: Station 101+94 to Runoff Area=2.898 ac 59.49% Impervious Runoff Depth>6.90"
 Tc=5.0 min CN=82 Runoff=23.59 cfs 1.667 af

Reach 1R: Channel from Station 32+97 Avg. Flow Depth=1.02' Max Vel=7.87 fps Inflow=42.35 cfs 4.034 af
 n=0.030 L=2,000.0' S=0.0450 '/' Capacity=159.37 cfs Outflow=38.34 cfs 4.020 af

Reach 2R: Channel from Station 41+32 Avg. Flow Depth=0.67' Max Vel=7.04 fps Inflow=18.59 cfs 1.815 af
 n=0.030 L=767.0' S=0.0615 '/' Capacity=186.45 cfs Outflow=18.35 cfs 1.812 af

Reach 3R: Channel from Station 60+81 Avg. Flow Depth=0.66' Max Vel=5.95 fps Inflow=17.88 cfs 1.296 af
 n=0.030 L=1,949.0' S=0.0453 '/' Capacity=159.97 cfs Outflow=14.97 cfs 1.290 af

Pond DP1: Ware River Inflow=43.91 cfs 4.786 af
 Primary=43.91 cfs 4.786 af

Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right Peak Elev=613.91' Inflow=22.44 cfs 2.527 af
 72.0" x 48.0" Box Culvert n=0.012 L=98.0' S=0.0294 '/' Outflow=22.44 cfs 2.527 af

Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left Peak Elev=661.68' Inflow=7.39 cfs 0.525 af
 24.0" x 24.0" Box Culvert n=0.012 L=58.0' S=0.0100 '/' Outflow=7.39 cfs 0.525 af

Pond DP4: 24" RCP Inlet at Station 61+10 Left Peak Elev=749.85' Inflow=1.92 cfs 0.139 af
 24.0" Round Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=1.92 cfs 0.139 af

Pond DP5: Pierce Brook to BrookhavenLake (Station 98+07 Left) Inflow=35.44 cfs 2.973 af
 Primary=35.44 cfs 2.973 af

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Pond DP6: Brookhaven Lake

Inflow=55.49 cfs 4.640 af

Primary=55.49 cfs 4.640 af

Total Runoff Area = 15.793 ac Runoff Volume = 9.449 af Average Runoff Depth = 7.18"
41.18% Pervious = 6.503 ac 58.82% Impervious = 9.290 ac

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Subcatchment 1S: Station 10+16 to Station 20+00

Runoff = 10.89 cfs @ 12.07 hrs, Volume= 0.766 af, Depth> 6.78"
 Routed to Pond DP1 : Ware River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
0.783	98	Paved parking, HSG B
0.573	58	Woods/grass comb., Good, HSG B
1.356	81	Weighted Average
0.573		42.26% Pervious Area
0.783		57.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Subcatchment 2S: Station 20+00 to Station 40+50

Runoff = 20.78 cfs @ 12.07 hrs, Volume= 1.507 af, Depth> 7.52"

Routed to Reach 1R : Channel from Station 32+97 Left to Route 32/Ware River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
1.381	98	Paved parking, HSG D
0.747	79	Woods/grass comb., Good, HSG D
0.277	58	Woods/grass comb., Good, HSG B
2.405	87	Weighted Average
1.024		42.58% Pervious Area
1.381		57.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Subcatchment 3S: Station 33+00 to Station 44+76

Runoff = 9.67 cfs @ 12.07 hrs, Volume= 0.715 af, Depth> 7.88"

Routed to Pond DP2 : 4' x 6' Culvert Inlet at Station 33+65 Right

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
0.621	98	Paved parking, HSG D
0.467	79	Woods/grass comb., Good, HSG D
1.088	90	Weighted Average
0.467		42.92% Pervious Area
0.621		57.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Subcatchment 4S: Station 40+50 to Station 54+14

Runoff = 7.39 cfs @ 12.07 hrs, Volume= 0.525 af, Depth> 7.03"
 Routed to Pond DP3 : 2' x 2' Culvert Inlet at Station 41+52 Left

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
0.551	98	Paved parking, HSG B
0.345	58	Woods/grass comb., Good, HSG B
0.896	83	Weighted Average
0.345		38.50% Pervious Area
0.551		61.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Subcatchment 5S: Station 44+76 to Station 65+02

Runoff = 15.96 cfs @ 12.07 hrs, Volume= 1.157 af, Depth> 7.52"

Routed to Reach 3R : Channel from Station 60+81 Right to Station 41+32 Right

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
1.063	98	Paved parking, HSG B
0.493	79	Woods/grass comb., Good, HSG D
0.291	58	Woods/grass comb., Good, HSG B
1.847	87	Weighted Average
0.784		42.45% Pervious Area
1.063		57.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Subcatchment 6S: Station 60+36 to Station 65+02

Runoff = 1.92 cfs @ 12.07 hrs, Volume= 0.139 af, Depth> 7.52"

Routed to Pond DP4 : 24" RCP Inlet at Station 61+10 Left

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
0.099	98	Paved parking, HSG D
0.123	79	Woods/grass comb., Good, HSG D
0.222	87	Weighted Average
0.123		55.41% Pervious Area
0.099		44.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Subcatchment 7S: Station 65+02 to Station 101+94

Runoff = 35.44 cfs @ 12.14 hrs, Volume= 2.973 af, Depth> 7.02"

Routed to Pond DP5 : Pierce Brook to Brookhaven Lake (Station 98+07 Left)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
3.068	98	Paved parking, HSG B
0.211	79	Woods/grass comb., Good, HSG D
1.802	58	Woods/grass comb., Good, HSG B
5.081	83	Weighted Average
2.013		39.62% Pervious Area
3.068		60.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Subcatchment 8S: Station 101+94 to Station 122+14

Runoff = 23.59 cfs @ 12.07 hrs, Volume= 1.667 af, Depth> 6.90"
 Routed to Pond DP6 : Brookhaven Lake

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50 Year - 2070 Rainfall=9.10"

Area (ac)	CN	Description
1.724	98	Paved parking, HSG B
1.174	58	Woods/grass comb., Good, HSG B
2.898	82	Weighted Average
1.174		40.51% Pervious Area
1.724		59.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Reach 1R: Channel from Station 32+97 Left to Route 32/Ware River

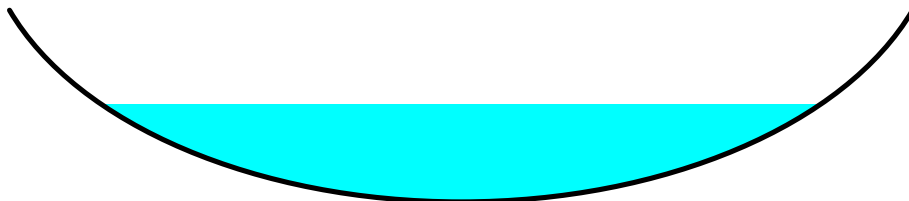
[79] Warning: Submerged Pond DP2 Primary device # 1 OUTLET by 1.02'

Inflow Area = 6.458 ac, 57.53% Impervious, Inflow Depth > 7.50" for 50 Year - 2070 event
 Inflow = 42.35 cfs @ 12.08 hrs, Volume= 4.034 af
 Outflow = 38.34 cfs @ 12.20 hrs, Volume= 4.020 af, Atten= 9%, Lag= 7.1 min
 Routed to Pond DP1 : Ware River

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 7.87 fps, Min. Travel Time= 4.2 min
 Avg. Velocity = 2.72 fps, Avg. Travel Time= 12.3 min

Peak Storage= 9,751 cf @ 12.13 hrs
 Average Depth at Peak Storage= 1.02' , Surface Width= 7.15'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.37 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 2,000.0' Slope= 0.0450 '/'
 Inlet Invert= 609.92', Outlet Invert= 520.00'



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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Reach 2R: Channel from Station 41+32 Right to Staton 33+65 Right

[62] Hint: Exceeded Reach 3R OUTLET depth by 0.12' @ 12.27 hrs

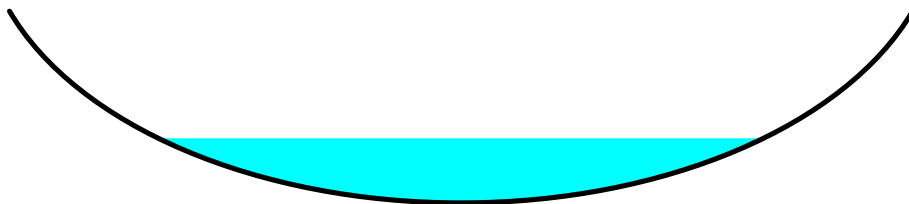
[79] Warning: Submerged Pond DP3 Primary device # 1 INLET by 0.09'

Inflow Area = 2.965 ac, 57.77% Impervious, Inflow Depth > 7.35" for 50 Year - 2070 event
 Inflow = 18.59 cfs @ 12.20 hrs, Volume= 1.815 af
 Outflow = 18.35 cfs @ 12.25 hrs, Volume= 1.812 af, Atten= 1%, Lag= 3.0 min
 Routed to Pond DP2 : 4' x 6' Culvert Inlet at Station 33+65 Right

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 7.04 fps, Min. Travel Time= 1.8 min
 Avg. Velocity = 2.44 fps, Avg. Travel Time= 5.2 min

Peak Storage= 1,998 cf @ 12.22 hrs
 Average Depth at Peak Storage= 0.67' , Surface Width= 5.80'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 186.45 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 767.0' Slope= 0.0615 '/'
 Inlet Invert= 660.00', Outlet Invert= 612.80'



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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Reach 3R: Channel from Station 60+81 Right to Station 41+32 Right

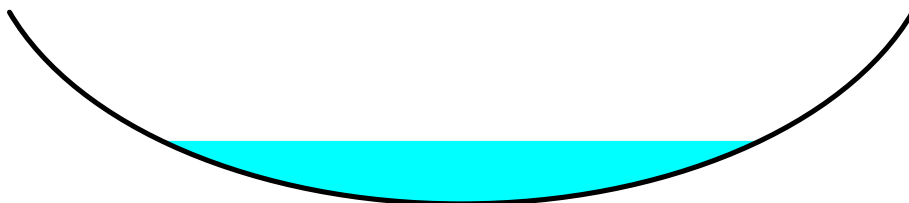
[79] Warning: Submerged Pond DP4 Primary device # 1 OUTLET by 0.56'

Inflow Area = 2.069 ac, 56.16% Impervious, Inflow Depth > 7.52" for 50 Year - 2070 event
 Inflow = 17.88 cfs @ 12.07 hrs, Volume= 1.296 af
 Outflow = 14.97 cfs @ 12.21 hrs, Volume= 1.290 af, Atten= 16%, Lag= 8.4 min
 Routed to Reach 2R : Channel from Station 41+32 Right to Staton 33+65 Right

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.95 fps, Min. Travel Time= 5.5 min
 Avg. Velocity = 1.98 fps, Avg. Travel Time= 16.4 min

Peak Storage= 4,905 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.66' , Surface Width= 5.74'
 Bank-Full Depth= 2.00' Flow Area= 13.3 sf, Capacity= 159.97 cfs

10.00' x 2.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
 Length= 1,949.0' Slope= 0.0453 '/'
 Inlet Invert= 748.28', Outlet Invert= 660.00'



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Summary for Pond DP1: Ware River

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 7.814 ac, 57.56% Impervious, Inflow Depth > 7.35" for 50 Year - 2070 event
Inflow = 43.91 cfs @ 12.19 hrs, Volume= 4.786 af
Primary = 43.91 cfs @ 12.19 hrs, Volume= 4.786 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

25485_POST

Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Pond DP2: 4' x 6' Culvert Inlet at Station 33+65 Right

[57] Hint: Peaked at 613.91' (Flood elevation advised)

[62] Hint: Exceeded Reach 2R OUTLET depth by 0.50' @ 12.09 hrs

Inflow Area = 4.053 ac, 57.59% Impervious, Inflow Depth > 7.48" for 50 Year - 2070 event
 Inflow = 22.44 cfs @ 12.24 hrs, Volume= 2.527 af
 Outflow = 22.44 cfs @ 12.24 hrs, Volume= 2.527 af, Atten= 0%, Lag= 0.0 min
 Primary = 22.44 cfs @ 12.24 hrs, Volume= 2.527 af

Routed to Reach 1R : Channel from Station 32+97 Left to Route 32/Ware River

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 613.91' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	612.80'	72.0" W x 48.0" H Box Culvert L= 98.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 612.80' / 609.92' S= 0.0294 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 24.00 sf

Primary OutFlow Max=22.43 cfs @ 12.24 hrs HW=613.91' (Free Discharge)

↑**1=Culvert** (Inlet Controls 22.43 cfs @ 3.38 fps)

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Pond DP3: 2' x 2' Culvert Inlet at Station 41+52 Left

Inverts estimated due to sediment buildup

[57] Hint: Peaked at 661.68' (Flood elevation advised)

Inflow Area = 0.896 ac, 61.50% Impervious, Inflow Depth > 7.03" for 50 Year - 2070 event
 Inflow = 7.39 cfs @ 12.07 hrs, Volume= 0.525 af
 Outflow = 7.39 cfs @ 12.07 hrs, Volume= 0.525 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.39 cfs @ 12.07 hrs, Volume= 0.525 af
 Routed to Reach 2R : Channel from Station 41+32 Right to Staton 33+65 Right

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 661.68' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	660.58'	24.0" W x 24.0" H Box Culvert L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 660.58' / 660.00' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.00 sf

Primary OutFlow Max=7.38 cfs @ 12.07 hrs HW=661.68' (Free Discharge)
 ←1=Culvert (Inlet Controls 7.38 cfs @ 3.36 fps)

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Pond DP4: 24" RCP Inlet at Station 61+10 Left

Assumed slope - outlet not found

[57] Hint: Peaked at 749.85' (Flood elevation advised)

Inflow Area = 0.222 ac, 44.59% Impervious, Inflow Depth > 7.52" for 50 Year - 2070 event
 Inflow = 1.92 cfs @ 12.07 hrs, Volume= 0.139 af
 Outflow = 1.92 cfs @ 12.07 hrs, Volume= 0.139 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.92 cfs @ 12.07 hrs, Volume= 0.139 af
 Routed to Reach 3R : Channel from Station 60+81 Right to Station 41+32 Right

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 749.85' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	749.28'	24.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 749.28' / 748.38' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=1.92 cfs @ 12.07 hrs HW=749.85' (Free Discharge)
 ←1=Culvert (Inlet Controls 1.92 cfs @ 2.58 fps)

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Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Pond DP5: Pierce Brook to Brookhaven Lake (Station 98+07 Left)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.081 ac, 60.38% Impervious, Inflow Depth > 7.02" for 50 Year - 2070 event
Inflow = 35.44 cfs @ 12.14 hrs, Volume= 2.973 af
Primary = 35.44 cfs @ 12.14 hrs, Volume= 2.973 af, Atten= 0%, Lag= 0.0 min
Routed to Pond DP6 : Brookhaven Lake

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

25485_POST

Type III 24-hr 50 Year - 2070 Rainfall=9.10"

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Summary for Pond DP6: Brookhaven Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 7.979 ac, 60.06% Impervious, Inflow Depth > 6.98" for 50 Year - 2070 event
Inflow = 55.49 cfs @ 12.10 hrs, Volume= 4.640 af
Primary = 55.49 cfs @ 12.10 hrs, Volume= 4.640 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Section 3

Long-Term Pollution Prevention and Operation & Maintenance Plan

West Main Street (MA Route 9)
West Brookfield, Massachusetts

RECOMMENDED LONG-TERM STORMWATER POLLUTION PREVENTION PLAN FOR WEST MAIN STREET

OWNER AND RESPONSIBLE PARTY:

Owner: Town of West Brookfield

Responsible Party: Town of West Brookfield

PROJECT OVERVIEW:

The West Main Street (MA Route 9) Resurfacing Project in West Brookfield, MA is a 2.1-mile corridor improvement project with the goal of rehabilitating the existing roadway, improving drainage, and enhancing bicycle accommodations. The project is needed to improve roadway conditions and safety for all roadway users along West Main Street from the Ware Town Line to Pierce Road. Drainage improvements and pavement rehabilitation will increase the life of the roadway.

CONSTRUCTION MANAGEMENT:

A construction manager with adequate knowledge and experience on projects of similar size and scope shall be employed to oversee all site work related construction. The contractor shall incorporate the appropriate techniques to control sediment and erosion pollution during construction in accordance with the *Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas*. The project will be subject to the United States Environmental Protection Agency (EPA) Phase II Stormwater Program as land disturbances are greater than 1 acre of disturbance. Refer to the SWPPP prepared for additional information regarding construction related erosion & sedimentation control.

During construction, silt-laden runoff or discharge from dewatering operations (if necessary) will be prevented from entering wetlands and resource areas untreated. Siltation barriers consisting of compost filter tubes will be erected in advance of construction along the downstream edge of all disturbed areas and maintained throughout the construction period. Check dams/Silt socks/Sand Bag dikes will be used in temporary constructed drainage ways as necessary to reduce erosion.

If dewatering is required during construction, runoff will discharge through a temporary sedimentation basin and washed stone prior to discharging into vegetated areas. Outflow of silt-laden runoff shall not be permitted to flow directly into the wetlands or resource areas. Upon completion of site stabilization, the catch basins and existing conveyance system shall be thoroughly cleaned of silt and sediment and made ready for the proposed operation.

Siltation barriers, temporary sedimentation basins, and coffer dams shall be constructed and inspected by the resident project Engineer on a monthly basis or

West Main Street (MA Route 9)
West Brookfield, Massachusetts

as necessary, after any significant (0.5" or more) storm event and daily while dewatering operations are proceeding.

Care should be taken when constructing stormwater control structures. Light earth-moving equipment shall be used to excavate in the vicinity of the infiltration areas. Use of heavy-equipment causes excessive compaction of the soils beneath the basin resulting in reduced infiltration capacity. At no time shall temporary infiltration areas or settling basins be constructed in the vicinity of the proposed infiltration system in order to prevent the soils from becoming clogged with sediment.

ON-GOING MAINTENANCE CONTRACT

The Owner and responsible party will be required to contract with a maintenance company or hire appropriate staff to complete the following non-structural and structural approaches. The maintenance company will be required to provide adequate personnel and access to proper equipment to complete the tasks.

NON-STRUCTURAL APPROACHES:

GRADING

Fuller Road is an existing roadway with an existing profile that is not proposed to be modified significantly. Slopes will be permanently vegetated to dissipate energy and reduce potential erosion. No constructed vegetated slopes should exceed 2H:1V. Steep slopes may require soil reinforcement and additional vegetation. Slopes that exceed 2H:1V are proposed to be reinforced with modified rockfill.

FLOW OVER VEGETATED AREAS

Wherever possible, runoff from paved areas and snowmelt shall be directed over vegetated areas to promote settlement of suspended solids before entering a wetland or resource area.

SNOW STORAGE AND DEICING

Designated snow storage will be provided within the Right-of-Way. When the snow piles exceed the allotted space, the Town may load and truck the snow offsite for disposal. The snow will be placed such that melt water will be directed towards the drainage system for treatment.

STRUCTURAL BEST MANAGEMENT PRACTICES:

Prior to final completion of the roadway construction, a representative of the contractor and/or Engineer at the Responsible Parties request shall properly instruct the Town of the required maintenance responsibilities to maintain the effectiveness of the drainage system. These frequencies and requirements are recommendations

West Main Street (MA Route 9)
West Brookfield, Massachusetts

to maintain minimum effectiveness. Ultimately, the Town will implement the procedures and frequencies as they see fit under their current plan and inspect the systems as needed to maintain minimum effectiveness.

DEEP SUMP CATCH BASINS AND MANHOLE STRUCTURES

Catch basins shall be cleaned, in dry weather, when half of the sump capacity is filled or at a minimum of once per year or as required through periodic inspection. Cleaning will take place at the completion of construction and in early spring after sanding of roadways has ceased or as needed depending on the frequency of major storm events (> 1" of rainfall). All manholes shall be inspected at least once annually or as dictated by the responsible party. Any obstructions, sediment, and debris that could potentially cause clogs shall be removed within the conveyance system as necessary. Inverts, grates, and hoods shall be checked and replaced as necessary to maintain hydraulic effectiveness.

Section 4

Stormwater Management 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 8²
- 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.

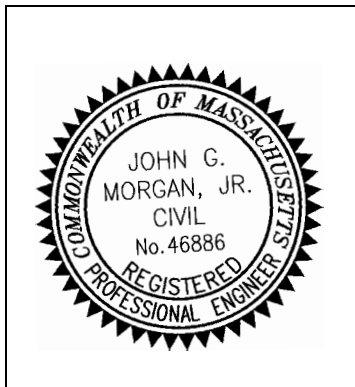
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the 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



John G. Morgan, Jr. 11-21-23

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 Field¹
- 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.



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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
Bureau of Resource Protection - Wetlands Program

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.



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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.


ILLICIT DISCHARGE COMPLIANCE STATEMENT

Standard 10: Massachusetts Stormwater Standards Handbook

Illicit discharges are defined as discharges into waters of the State or municipal separate stormwater system (MS4) that are not entirely comprised of stormwater. Exclusions for non-stormwater discharges into drainage systems include activities or facilities for firefighting, water line flushing, landscape irrigation, uncontaminated groundwater discharge, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, water used to clean residential buildings without detergents, water used for street washing, and flows from riparian habitats/wetlands. These exclusions are subject to change and are under the discretion of the local governing authority.

To the best of our knowledge and professional belief no illicit discharges to the stormwater system, surface waters, or wetland resource areas will remain on the site after construction. We will agree to implement a pollution prevention plan to prevent illicit discharges into the stormwater management system. The design of the site based on the plans and specifications entitled "West Main Street (Route 9)" prepared by CHA Consulting, Inc., 141 Longwater Drive, Suite 104, Norwell, Massachusetts show a separation and no direct connection between the stormwater management systems and the wastewater and/ or groundwater on the site. To the maximum extent practicable, the design prevents entry of illicit discharges into the stormwater management system.

Engineer's Name: John G. Morgan Jr.
(please print)

Engineer's Signature:  Date: 11-21-23

Company: CHA Consulting, Inc.

Section 5

Stormwater Management Calculations

Version 1, Automated: Mar. 4, 2008

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: All proposed outlets excluding existing culverts (typ.)

B	C	D	E	F
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
	0.00	0.75	0.00	0.75
	0.00	0.75	0.00	0.75
	0.00	0.75	0.00	0.75
	0.00	0.75	0.00	0.75

Total TSS Removal = 25%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 606517 and 609049
Prepared By: CHA Consulting
Date: Jan-22

*Equals remaining load from previous BMP (E) which enters the BMP

TSS Removal Calculation Worksheet

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

STANDARD #3 – GROUNDWATER RECHARGE
West Main Street (MA Route 9)
WEST BROOKFIELD, MA

WATER QUALITY VOLUME (WQV)

Phase 1 (Sta. 10+16 to Sta. 69+33)

Total Proposed Impervious = 4.881 acres = 212,610 sq. ft.

Total Existing Impervious = 3.599 acres = 156,761 sq. ft.

Total Additional Impervious = 1.282 acres = 55,849 sq. ft.

Phase 2 (Sta.69+33 to Sta. 122+14)

Total Proposed Impervious = 4.409 acres = 192,070 sq. ft.

Total Existing Impervious = 3.385 acres = 147,461 sq. ft.

Total Additional Impervious = 1.024 acres = 44,609 sq. ft.

$$WQV = 1'' * 0.95 * 55,849 \text{ sq. ft.} / 12 = 4,421 \text{ ft}^3$$

$$WQV = 1'' * 0.95 * 44,609 \text{ sq. ft.} / 12 = 3,532 \text{ ft}^3$$

GROUNDWATER RECHARGE

Soils are classified as mostly HSG B with some areas of HSG D where rock outcrops are present. There are also some minor areas of HSG A based on published soil surveys. Soils are estimated to be 75% HSG B and 25% HSG D for Phase 1 and 20% HSG A and 80% HSG B for Phase 2.

Total Additional Impervious = 1.282 acres = 55,849 sq. ft. (Phase 1)

Total Additional Impervious = 1.024 acres = 44,609 sq. ft. (Phase 2)

Recharge Volume = F * Impervious Area

F = 0.60'' for HSG A

F = 0.35'' for HSG B

F = 0.10'' for HSG D

$$Rv = (((0.35 * 0.75) + (0.10 * 0.25)) * 55,849 \text{ sq. ft.}) / 12 = 1,338 \text{ ft}^3$$

$$Rv = (((0.60 * 0.20) + (0.35 * 0.80)) * 44,609 \text{ sq. ft.}) / 12 = 1,487 \text{ ft}^3$$

Appendix I

Shade Tree Form & Instructions

August 25, 2023

Patricia Leavenworth
District Highway Director
MassDOT Highway Division
District 2
811 North King Street
Northampton, MA 01060

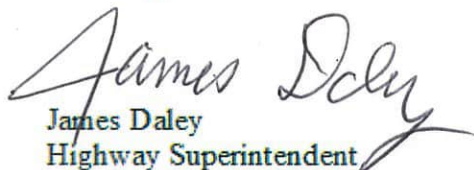
Re: Project File No.: 606517 and 609049
Resurfacing & Related Work on West Main Street (Route 9)
West Brookfield, Massachusetts

Dear Ms. Leavenworth:

This letter acknowledges the general expectation for plant care for planting and seeding following the one-year MassDOT contract plant warranty for the Resurfacing & Related Work on West Main Street (Route 9). The Town of West Brookfield has reviewed MassDOT's Basic Plant Care for Healthy Establishment and agrees to perform maintenance as required and as shown on the associated Maintenance Plans.

Please feel free to call me at 508-867-¹⁴¹⁷~~9678~~ with any questions or comments.

Sincerely,


James Daley
Highway Superintendent

Cc: Carrie Lavalley, P.E., Chief Engineer
Adam Kiel, MassDOT Project Manager
John Morgan, CHA
Tara Mitchell, MassDOT Landscape Section

BASIC PLANT CARE FOR HEALTHY ESTABLISHMENT

New plantings need extra care to adapt to a new location and to develop new roots and foliage so that they can be self-sustaining and out-compete weeds. Good care following planting (considered the plant establishment phase) will reduce plant loss and future weed infestation. The two most critical requirements for care during this period are watering and weed management.

It takes 2-3 years after planting for trees and mixed planting beds to become well-established (self-sufficient). Several factors affect the duration. Smaller sized trees and shrubs establish more quickly. Regular watering helps plants establish more quickly. A higher density of plants in mixed beds will reduce weed pressures more quickly, allowing a planting bed to be self-sustaining sooner.

Watering

- The amount and frequency of watering will depend on size of plants when installed, soil conditions, and the weather. A week of significant rain will substitute for watering, whereas drought conditions may increase the amount of water needed.
- A 5 gallon contractor bucket is a quick and easy way to measure water (or the time required per gallon).
- Watering beyond the area of the root ball encourages roots to spread outward and increase future access to nutrients and moisture.
- If watering bags are used, they should be placed on a minimum of 2 stakes adjacent to the trees, not on the tree trunk. Bags placed on the tree trunks for an extended time can damage the bark and surface roots and cause rot. Create a simple system to monitor the bags to ensure that they are kept filled during the growing season and removed during the winter months or when they are no longer needed.

Recommended Schedule (May 15 - September 15)		
Gallons/Week/Per Plant	Duration of Routine Watering for Establishment (Minimum)	Watering After Plants are Well-Established (Minimum)
Trees: 15-25	3 years	During drought*
Shrubs: 10-15	1-2 years (depending on species & size)	During drought*
Perennials: 3-5	1 year	As necessary (i.e, drought)

* Drought is defined herein as any 2-5 week period without at least 1 inch of water

Weed Management

- Weed removal or cutting should be prior to weed species going to seed. See [Weed Management](#) for recommendations regarding types of weeds. At a minimum the following schedule is recommended:
 - ◆ Late spring (May-June) to remove cool season weeds
 - ◆ Mid-summer (August) to remove warm season weeds
- Dense, healthy desirable plants are the best prevention against weed competition. Encourage healthy growth. Infill if planting is too sparse. This may cost will be more initially, but will be cheaper long-term.
- Mulch to reduce weed growth during establishment. For woody plants, apply wood chips or bark mulch at a depth no greater than 3 inches. Apply 1 inch of bark mulch or, preferably, straw mulch for perennials. Pull mulch back from the base of all plants. See [Mulching](#) for additional recommendations.
- Weed fabric is not recommended as silt and soil accumulate on top of the fabric providing a growing medium for weeds. Exposed fabric is also unsightly.
- See [Perennial Care](#) for management specific to perennials.

BASIC LONG-TERM PLANT CARE FOR MANAGED LANDSCAPES

All landscape plantings require some level of care over time, particularly those in urban environments. With a good design and proper plant selection, once plants are well-established, long-term plant and planting bed care should be minimal. However, as a living system, the landscape will change over time. Weeds may encroach and plants will grow, change, and die. Therefore, care requirements will change. Below are basic expectations and recommendations for long-term general plant and planting bed care once plants are established (typically 2-3 years after planting).

Watering

- Plan to water plants during **drought** (2-5 week period without at least an inch of water) .
- Ideally plants should be watered during **dry periods** (any 10-day period without rain).
- See [Watering Schedule](#) under Establishment for quantity of water required per plant.
- Mixed planting beds will typically need less water than isolated trees or shrubs.
- Street trees may need more water due to heat from pavement and less moisture in tree pit soils.

Weed Management

- **Single Trees:** Aged pine bark mulch or wood chips applied annually will help prevent weed growth around trees and protect trees from mower damage to the trunk. Planting low-maintenance groundcovers around trees (i.e., Pennsylvania sedge or low shrubs) eliminates the need for annual mulching, protects the trunk from mowers, and creates a healthier and more attractive landscape.
- **Mixed Planting Beds:** When properly designed (dense, layered planting) mulching for weed control should not be necessary after 2-3 years except for new plants or for gaps while slower growing plants mature. If plant spacing is too far apart, weeds will be problematic in the gaps. In-fill with additional plants to reduce the need for and cost of annual mulching. See [Mulching](#) for additional information.
- Learning to distinguish aggressive weeds (i.e., mugwort, Japanese knotweed) from less problematic and early successional species (annuals) will help prioritize the need.
- See [Perennial Care](#) for weed management specific to perennials.

Fertilizing

- With proper plant selection (using plants adapted to site and soil conditions) and a good design, plants should not require synthetic fertilizers. If additional nutrients are needed, apply a 1/2-1 inch of compost (compost blanket) around the plants.
- Leaving naturally occurring organic matter (twigs, leaf litter, dead wood) will provide nutrients for free. As material is broken down by fungi and micro-organisms over time, nutrients are released. Organic matter also provides good habitat for beneficial insects.

Plant Replacement for Mixed Planting Beds

- Naturalized, mixed planting beds should tolerate some plant loss without creating weed problems or significant visual impact. Substantial loss should be replanted with appropriate species to prevent weeds from invading. If designs are dependent on specific plants or a formal pattern or are highly visible, dead plants should be replaced as soon as possible during the appropriate season.

Tree Pruning

- Tree limbs should be properly pruned if broken or damaged to prevent rot from entering the wood.

Landscape Repairs

- Urban landscapes are susceptible to damage from errant vehicles, utility work, or other activities. Dead plants should be immediately replaced and bare soils mulched to prevent the encroachment of weed species. Neglecting to repair the damage can jeopardize the entire planting area.

Mulch: Purpose and Benefits

Mulch helps with plant establishment by retaining moisture, protecting soil, and by inhibiting the growth of weeds. Mulches should be applied for plant establishment rather than for ornamental purposes.

- ◆ **Trees lawns:** Applying bark mulch or wood chips will protect tree trunks from mower damage as well as reduce weed growth and retain moisture. A cover of bark mulch or wood chips provides more optimal conditions than turf grasses as moisture is retained in the wood whereas lawn grasses take up moisture at the soil surface. A larger area of wood chips or mulch may also encourage greater root expansion.

Wood chips are generally cheaper than bark mulch and provide the additional benefit of slowly feeding a tree's root system as the wood breaks down and nutrients are release for uptake.

- ◆ **Mixed planting beds:** Once there is sufficient shrub and/or perennial groundcover to outcompete weeds, applying annual mulch is no longer be necessary. Plant litter and twigs that accumulate over time will provide a natural layer of mulch—as well as provide habitat for insects and beneficial fungi.
- ◆ **Living Mulches:** If the planting is too sparse to provide sufficient groundcover over time, consider infilling with additional low-growing shrubs or perennials to fill the gaps. Drought tolerant, rapid spreaders such as 'Gro-Low' sumac or Pennsylvania sedge are a great way to create an understory groundcover. Junipers are excellent as a long-term evergreen groundcover, but are slow growing. Infilling between junipers with perennials is a good way to reduce weed growth while the junipers grow.

Mulching Recommendations

- 👉 **Woody plants:** Apply bark mulch or wood chips to a depth of 3 inches.
- 👉 **Perennials:** Straw or leaf mulch is preferable over bark mulch. If using bark mulch, mulch should be carefully placed and at a depth no deeper than 1 inch. Over-mulching will smother shoots and discourage the growth of perennials.
- 👉 Pull mulch back from the crowns of all plants, particularly perennials.
- 👉 Use natural bark mulches or wood chips for woody plants. Avoid dyed mulch.
- 👉 Replace lost plants rather than convert the planting bed into a mulch bed.
- 👉 **Don't use mulch made from wood palette and recycled wood product.** These can create anaerobic conditions which will kill the root systems of plants, particularly perennials.
- 👉 **Don't use pre-emergence herbicides** with mulch. Pre-emergence herbicides will prevent desirable shrubs and perennials from spreading vegetatively and prevent desirable perennials from spreading by re-seeding. Colonization and re-seeding by desirable plants provides long-term groundcover, eliminating the need for costly annual applications of bark mulch.
- 👉 **Don't over-mulch.** "Mulch volcanos" create excessive moisture and heat leaving the bark susceptible to disease and decay. Over-mulching can also suffocate roots and block rain from reaching the soil.
- 👉 **Don't turn the landscape into a mulchscape.** Mulch should be used to help plants establish and grow, not to replace plants that die. Mulchscaping is costly and does not provide stormwater management, insect habitat, or the natural beauty that living plants provide.

Weed Management

- ◆ **Annuals**, which die at the end of the season, may be pulled (roots are typically shallow) or cut prior to flowering to prevent re-seeding. Annual plants are not so much a concern as is their capacity to spread by re-seeding.
- ◆ **Perennials, vines, and many woody species** may spread vegetatively, by seed, or both. Those that resprout will require removal or killing of the root system to prevent regrowth. Girdling or repeat cutting to deplete the root system over time can be used in lieu of herbicides. Plants that spread by seed should be cut or removed prior to reseeding.
- ◆ **Invasive plants** with deep or extensive root systems, such as Japanese knotweed, may require herbicide to completely eradicate the plant or population. Invasive plants should be addressed as quickly and effectively as possible and while populations are small and still manageable. Those that spread by seed should be cut, treated, or removed prior to going to seed to prevent spread.
- ◆ Herbicide treatment should only be done by a licensed and knowledgeable applicator.

Caring for Perennial Plantings

The following are recommendations for low maintenance perennial plantings where the goal is to allow the plants to completely fill in the area to create a perennial garden, “pocket meadow”, or perennial edge rather than maintaining the plants as isolated clumps in a mulch bed.

- ◆ **Watering:** Once established, properly selected grasses and perennials should not require watering except perhaps during drought. If aesthetics is a priority, watering will help plants look fuller and may result in better blooms.
- ◆ **Weed Management:** Perennial beds need weeding primarily during the first 3 years of establishment. When planted densely and allowed to reseed and expand, weeding should be minimal after the third year (but will still be necessary). Differentiating weeds from desired plants is necessary for management that allows perennials to infill naturally over time.
- ◆ **Mulching:** Mulching perennials is helpful for weed control and moisture retention immediately after planting. After the first growing season plants will spread vegetatively and by re-seeding (if allowed) and mulch should no longer be needed. Straw mulch or a similar light mulch is best for perennials. Bark mulch prevents desirable seeds from germinating and, if applied too deep and too close to the crowns, will rot stems and smother new shoots. Leaving cut foliage on the soil at the end of the season is the best and cheapest method of mulching perennials.
- ◆ **End of Season Cut:** Grasses and perennials may need to be cut back in spring or at the end of the season for neatness or to allow for healthy regrowth. The following is recommended:
 - Cut foliage in the spring rather than fall as the foliage provides habitat and visual interest.
 - Cut high if cutting in fall or very early spring in order to preserve insect nesting habitat.
 - Leave cut stems and foliage on site to serve as mulch and to provide habitat. Allow seed heads to remain on site if re-seeding is desired.
- ◆ **Replacements:** Plants that die or that are eaten by animals should be replaced to avoid bare soil which will be susceptible to weeds. Replant with species that are less likely to be eaten. Planting densely and having a high diversity of plants will reduce the visual and ecological damage to the landscape (and thus the need for replacements) when plants are lost.

Section V

Project Plans

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION

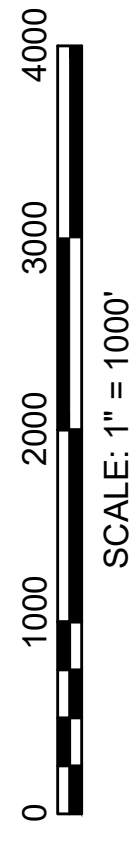
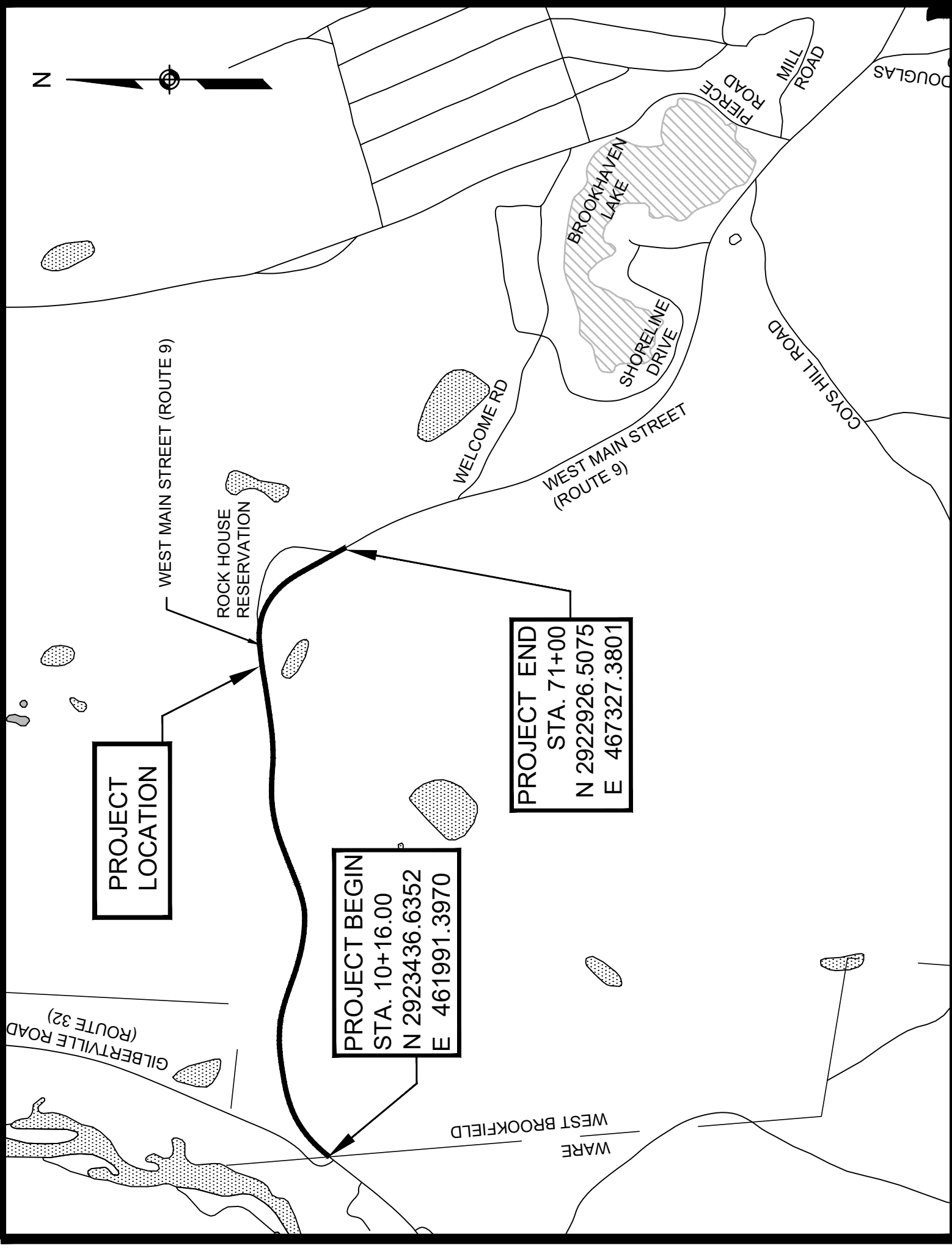
PLAN AND PROFILE OF
WEST MAIN STREET (ROUTE 9) - PHASE 1

IN THE TOWN OF
WEST BROOKFIELD
WORCESTER COUNTY
FEDERAL AID PROJECT NO.

PERMITTING PLANS

SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
2	LEGEND & ABBREVIATIONS
3	KEY PLAN, GENERAL NOTES & PAVEMENT CORE LOGS
4-6	TYPICAL SECTIONS
7-17	PERMITTING PLANS
18-23	PROFILE - WEST MAIN STREET
24-26	CONSTRUCTION DETAILS

INDEX



LENGTH OF PROJECT = 6,084.00 FEET = 1.152 MILES

WEST BROOKFIELD WEST MAIN STREET (ROUTE 9)		TOTAL SHEETS	
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	26
PROJECT FILE NO. 606517			

TITLE SHEET & INDEX

PERMITTING PLANS
NOVEMBER 2023

THESE PLANS ARE SUPPLEMENTED BY THE OCTOBER 2017 CONSTRUCTION STANDARD DETAILS, THE 2015 OVERHEAD, SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1988 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK.



11/21/2023

DATE	DESCRIPTION	REV #
11/21/2023	NOI SUBMISSION	-

GENERAL SYMBOLS		TRAFFIC SYMBOLS		ABBREVIATIONS	
EXISTING	PROPOSED	EXISTING	PROPOSED	GENERAL	TRAFFIC SIGNAL ABBREVIATIONS
				AADT	ANNUAL AVERAGE DAILY TRAFFIC
				ABAN	ABANDON
				ADJ	ADJUST
				APPROX.	APPROXIMATE
				A.C.	ASPHALT CONCRETE
				ACOM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
				BC	BITUMINOUS
				BD	BOTTOM OF CURB
				BL	BOUND
				BLDG	BASELINE
				BM	BUILDING
				BO	BENCHMARK
				BOS	BOTTOM OF SLOPE
				BR	BRIDGE
				BR	BORDERING VEGETATED WETLAND
				BVW	BORDERING VEGETATED WETLAND
				CB	CATCH BASIN
				CC	CATCH BASIN WITH CURB INLET
				CC	CEMENT CONCRETE
				CCM	CEMENT CONCRETE MASONRY
				CEM	CEMENT
				CI	CURB INLET
				CIP	CAST IRON PIPE
				CLF	CHAIN LINK FENCE
				CL	CENTERLINE
				CLM	CORRUGATED METAL PIPE
				CSP	CORRUGATED STEEL PIPE
				CO.	COUNTY
				CONC	CONCRETE
				CONC	CONCRETE
				CONT	CONTINUOUS
				CONST	CONSTRUCTION
				CR GR	CROWN GRADE
				CR GR	CROWN GRADE
				DI	DROP INLET
				DIA	DIAMETER
				DIP	DUCTILE IRON PIPE
				DW	STEADY DON'T WALK - PORTLAND ORANGE
				DWY	DRIVEWAY
				ELEV (or EL)	ELEVATION
				EMB	EMBANKMENT
				EOP	EDGE OF PAVEMENT
				EM	EXISTING
				EXIST (or EX)	EXISTING
				F&C	EXCAVATION
				F&G	FRAME AND COVER
				F&G	FRAME AND GRATE
				FDN	FOUNDATION
				FDS	FIELDSTONE
				GAR	GARAGE
				GD	GROUND
				GG	GAS GATE
				GI	GUTTER INLET
				GIP	GALVANIZED IRON PIPE
				GRAN	GRANITE
				GRAV	GRAVEL
				GRD	GRAVEL
				HDW	HEADWALL
				HMA	HOT MIX ASPHALT
				HOR	HORIZONTAL
				HT	HUB AND TACK
				HYD	HYDRANT
				INV	INVERT
				JCT	JUNCTION
				L	LENGTH OF CURVE
				LB	LEACH BASIN
				LP	LIGHT POLE
				LT	LEFT
				LUW	LAND UNDER WATER
				MAX	MAXIMUM
				MB	MAILBOX
				MH	MANHOLE
				MHB	MASSACHUSETTS HIGHWAY BOUND
				MIN	MINIMUM
				NIC	NOT IN CONTRACT
				NO.	NUMBER
				OHW	OVERHEAD WIRE
				PC	POINT OF CURVATURE
				PCC	POINT OF COMPOUND CURVATURE
				P.G.L.	PROFILE GRADE LINE
				PL	POINT OF INTERSECTION
				POC	POINT ON CURVE
				POT	POINT ON TANGENT
				PRC	POINT OF REVERSE CURVATURE
				PROJ	PROJECT
				PROP	PROPOSED
				PSB	PLANTABLE SOIL BORROW
				PT	POINT OF TANGENCY
				PVC	POINT OF VERTICAL CURVATURE

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	26
PROJECT FILE NO.		606517	

LEGEND & ABBREVIATIONS

ABBREVIATIONS	DESCRIPTION
GENERAL	POINT OF VERTICAL INTERSECTION
PVI	POINT OF VERTICAL TANGENCY
PVT	PAVEMENT
PVMT	PAVED WATERWAY
PWW	RADIUS OF CURVATURE
R	REMOVE AND DISPOSE
R&D	REINFORCED CONCRETE PIPE
RCP	ROAD
RD	ROADWAY
RDWY	REMOVE
REM	RETAIN
RET	RETAINING WALL
RET WALL	RIGHT OF WAY
ROW	RAILROAD
RR	REMOVE AND RESET
R&R	REMOVE AND STACK
R&S	RIGHT
RT	STONE BOUND
SB	SHOULDER
SHLD	SEWER MANHOLE
SMH	STREET
ST	STATION
STA	STOPPING SIGHT DISTANCE
SSD	STATE HIGHWAY LAYOUT LINE
SHLO	SIDEWALK
SW	TANGENT DISTANCE OF CURVE/TRUCK %
T	TANGENT
TAN	TEMPORARY
TEMP	TOP OF CURB
TC	TOP OF SLOPE
TOS	TYPICAL
TYP	UTILITY POLE
UP	VARIABLE
VAR	VERTICAL
VERT	VERTICAL CURVE
VC	WHEEL CHAIR RAMP
WCR	WATER GATE
WG	WROUGHT IRON PIPE
WIP	WATER METER/WATER MAIN
WM	CROSS SECTION
X-SECT	TRAFFIC SIGNAL ABBREVIATIONS
CAB	CABINET
CCVE	CLOSED CIRCUIT VIDEO EQUIPMENT
DW	STEADY UPRAISED HAND
FDW	FLASHING UPRAISED HAND
FR	FLASHING CIRCULAR RED
FRL	FLASHING RED LEFT ARROW
FRR	FLASHING RED RIGHT ARROW
FY	FLASHING CIRCULAR YELLOW
FYL	FLASHING YELLOW LEFT ARROW
FYR	FLASHING YELLOW RIGHT ARROW
G	STEADY CIRCULAR GREEN
GL	STEADY GREEN LEFT ARROW
GR	STEADY GREEN RIGHT ARROW
GSL	STEADY GREEN SLASH LEFT ARROW
GSR	STEADY GREEN SLASH RIGHT ARROW
GV	STEADY GREEN VERTICAL ARROW
OL	OVERLAP
PED	PEDESTRIAN
PTZ	PAN, TILT, ZOOM
R	STEADY CIRCULAR RED
RL	STEADY RED LEFT ARROW
RR	STEADY RED RIGHT ARROW
RR SIG	TRAFFIC SIGNAL CONDUIT
TSC	TRAFFIC SIGNAL
W	STEADY WALKING PERSON
Y	STEADY CIRCULAR YELLOW
YL	STEADY YELLOW LEFT ARROW

ABBREVIATIONS	DESCRIPTION
GENERAL	ANNUAL AVERAGE DAILY TRAFFIC
AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACOM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BC	BOTTOM OF CURB
BD	BOUND
BL	BASELINE
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CMP	CORRUGATED METAL PIPE
CSP	CORRUGATED STEEL PIPE
CO.	COUNTY
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CONST	CONSTRUCTION
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DHV	DESIGN HOURLY VOLUME
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DW	STEADY DON'T WALK - PORTLAND ORANGE
DWY	DRIVEWAY
ELEV (or EL)	ELEVATION
EMB	EMBANKMENT
EOP	EDGE OF PAVEMENT
EM	EXISTING
EXIST (or EX)	EXISTING
F&C	EXCAVATION
F&G	FRAME AND COVER
F&G	FRAME AND GRATE
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GAR	GARAGE
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P.G.L.	PROFILE GRADE LINE
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POC	POINT ON CURVE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROJ	PROJECT
PROP	PROPOSED
PSB	PLANTABLE SOIL BORROW
PT	POINT OF TANGENCY
PVC	POINT OF VERTICAL CURVATURE

GENERAL SYMBOLS	TRAFFIC SYMBOLS	DESCRIPTION
		JERSEY BARRIER
		CATCH BASIN
		CATCH BASIN CURB INLET
		FLAG POLE
		GAS PUMP
		MAIL BOX
		POST SQUARE
		POST CIRCULAR
		WELL
		ELECTRIC HANDHOLE
		FENCE GATE POST
		GAS GATE
		BORING HOLE
		MONITORING WELL
		TEST PIT
		HYDRANT
		LIGHT POLE
		COUNTY BOUND
		GPS POINT
		CABLE MANHOLE
		DRAINAGE MANHOLE
		ELECTRIC MANHOLE
		MISC MANHOLE
		SEWER MANHOLE
		TELEPHONE MANHOLE
		WATER MANHOLE
		MASSACHUSETTS HIGHWAY BOUND
		MONUMENT
		STONE BOUND
		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
		TROLLEY POLE OR GUY POLE
		TRANSMISSION POLE
		UTILITY POLE W/ FIREBOX
		UTILITY POLE WITH DOUBLE LIGHT
		UTILITY POLE W/ 1 LIGHT</

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	26
PROJECT FILE NO. 606517			

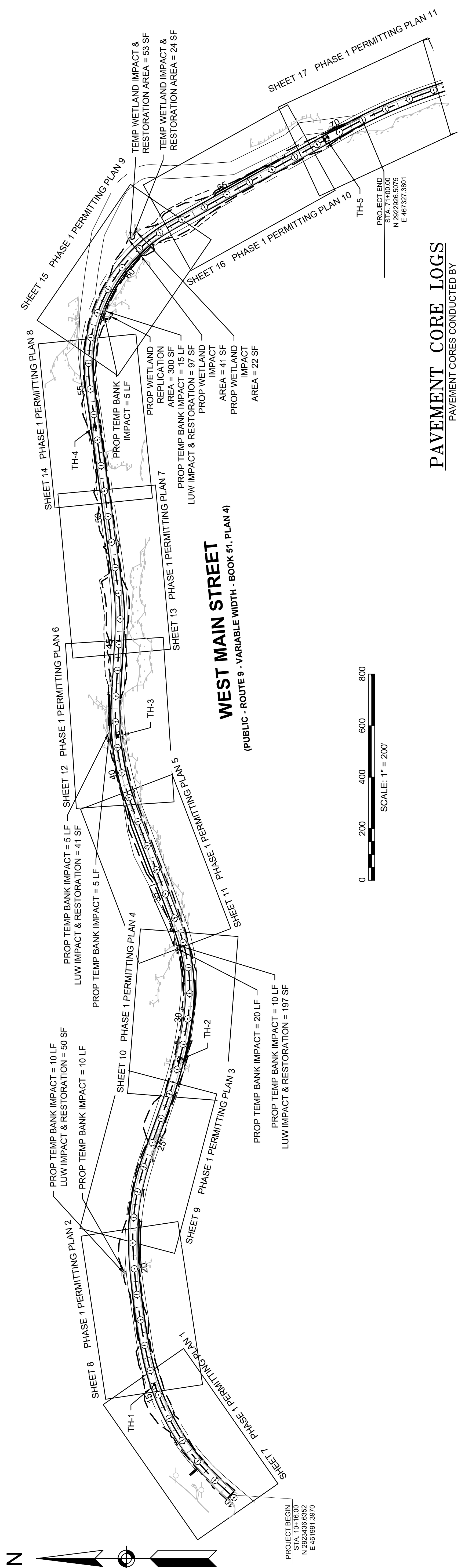
KEY PLAN, GENERAL NOTES & PAVEMENT CORE LOGS

11. THE CONTRACTOR SHALL CAUSE AS LITTLE INTERFERENCE AND INCONVENIENCE TO ABUTTERS AS POSSIBLE. THE CONTRACTOR SHALL MAINTAIN SAFE AND CONVENIENT ACCESS TO PRIVATE PROPERTIES AT ALL TIMES.
12. THE FLOW OF TRAFFIC THROUGH CONSTRUCTION ZONES IN EXISTING PUBLIC WAYS SHALL BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE SPECIFIED ON THE PLANS AND IN THE SPECIAL PROVISIONS.
13. ALL PAVEMENT MARKINGS SHALL BE RECESSED POLYUREA.
14. BASED UPON THE SUBSURFACE CONDITIONS ENCOUNTERED IN THE BORINGS AND IN ACCORDANCE WITH THE ASHTO LBFD BRIDGE DESIGN SPECIFICATIONS SECTION 3.1, THE SITE CLASS FOR EACH CONCRETE RETAINING WALL LOCATION WAS DETERMINED AS FOLLOWS:

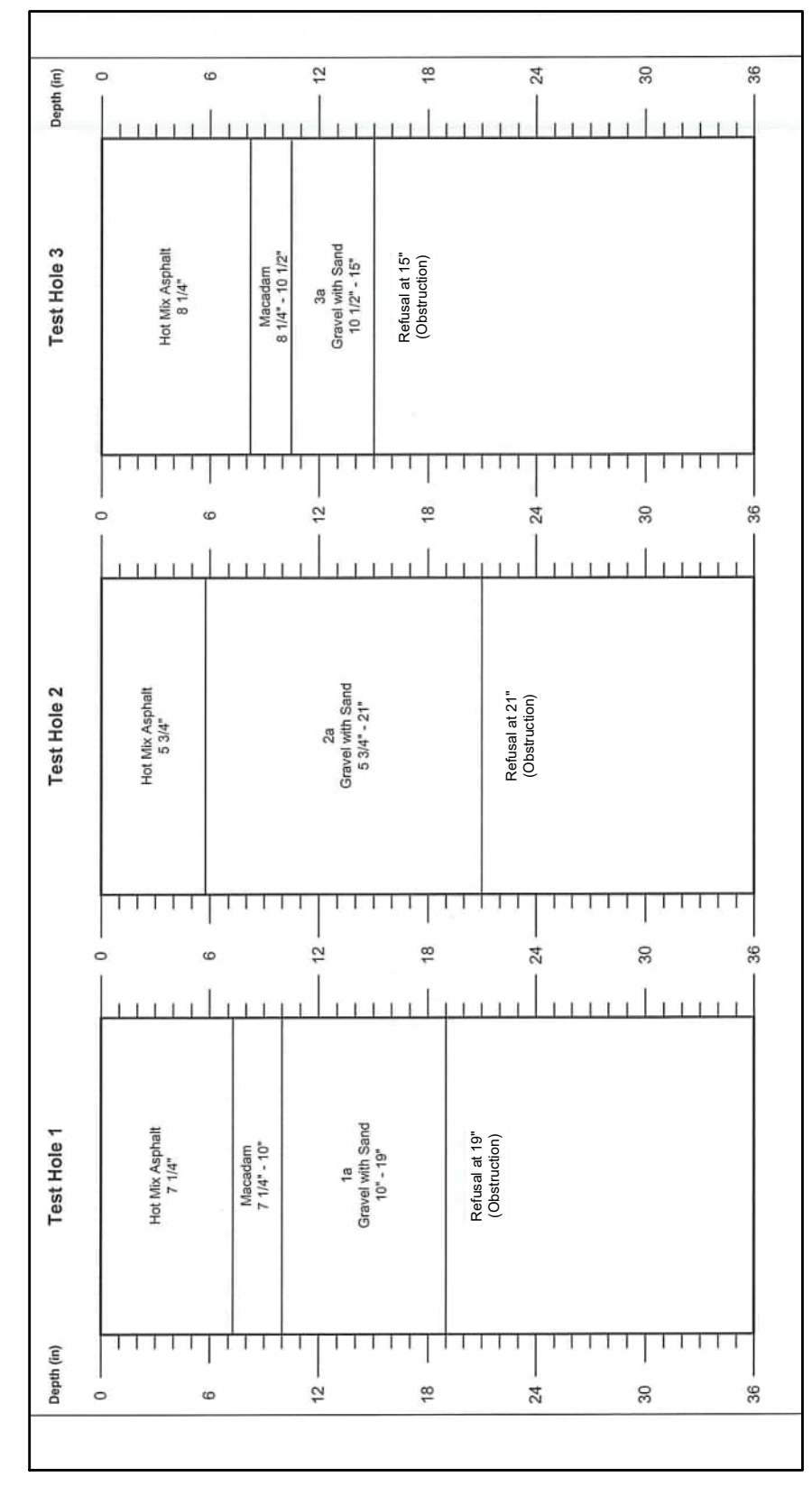
RETAINING WALL LOCATION	SEISMIC SITE CLASS
STA 31+10 TO STA 32+50 LT	C
STA 41+05 TO STA 43+02 LT	D
STA 57+60 TO STA 61+40 RT	C
15. FOR OTHER NOTES, REFER TO SPECIFIC PLANS AND DETAILS.

7. PLAN REFERENCES:
 - 1928 COUNTY LAYOUT PLAN BOOK 49, PLAN 44
 - 1927 COUNTY LAYOUT PLAN BOOK 51, PLAN 4
 - 1986 COUNTY LAYOUT PLAN BOOK 302, PLAN 19
 - STATE HIGHWAY LAYOUT NO. 4990
 - STATE HIGHWAY LAYOUT NO. 5001
 - PLAN BOOK 781, PLAN 102
 - PLAN BOOK 760, PLAN 54
 - PLAN BOOK 777, PLAN 12
 - PLAN BOOK 302, PLAN 36
 - PLAN BOOK 318, PLAN 10
 - PLAN BOOK 302, PLAN 35
 - PLAN BOOK 300, PLAN 46
8. THE CONTRACTOR WILL COORDINATE ALL PRIVATE CASTINGS AND POLES THAT ARE TO BE ADJUSTED, RESET OR RELOCATED WITH THE APPROPRIATE UTILITY PURVEYOR. THE RELOCATION, INSTALLATION OR REMOVAL OF PRIVATE UTILITIES SHALL BE ACCOMPLISHED BY THEIR OWNER. THE CONTRACTOR SHALL COOPERATE WITH THE PRIVATE UTILITY PURVEYORS AND ALLOW THEM ADEQUATE TIME TO COMPLETE THEIR WORK IN ADVANCE OF PERFORMING ANY PAVING OPERATIONS OR OTHER FINISH WORK.
9. DRAINAGE ELEVATIONS ARE PROVIDED FOR DESIGN PURPOSES ONLY. THE CONTRACTOR SHALL VERIFY BY TEST PIT, THE LOCATIONS OF EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED DRAINAGE DESIGN. ANY FIELD ADJUSTMENTS REQUIRED WILL BE MADE AS APPROVED OR DIRECTED BY THE ENGINEER. ONLY AFTER THE CONTRACTOR VERIFIES ELEVATIONS FOR THE CONSTRUCTIBILITY OF THE DRAINAGE SYSTEM SHALL ANY STRUCTURES BE ORDERED. ANY FIELD ADJUSTMENTS TO LINE & GRADE UP TO A DEPTH OF 5 FEET SHALL BE INCLUDED IN THE COST OF THE PIPE. PIPE EXCAVATION GREATER THAN 5 FEET WILL BE PAID UNDER CLASS B TRENCH EXCAVATION.
10. THE CONTRACTOR SHALL MAKE DETERMINATIONS OF SUBSURFACE CONDITIONS, INCLUDING THE LOCATION OF ROCK AND THE ACTUAL LOCATION OF UTILITIES OR OTHER FEATURES WHICH MAY AFFECT THE WORK.

1. ALL CONSTRUCTION IS TO BE IN ACCORDANCE WITH MASSDOT STANDARD DETAILS AND SPECIFICATIONS.
2. TOPOGRAPHY AND DETAIL SHOWN HEREON ARE A RESULT OF AN ON-THE-GROUND SURVEY PERFORMED BY COLER & COLANTONIO INC. (NOW CHA CONSULTING) DURING NOVEMBER AND DECEMBER OF 2011.
3. PRIMARY GEODETIC SURVEY CONTROL WAS ESTABLISHED FROM AN ON-THE-GROUND SURVEY USING GLOBAL POSITIONING SYSTEM (GPS) SURVEY METHODS ON SEPTEMBER 28, 2011. THE HORIZONTAL REFERENCED DATUM IS THE NAD 83 BASED ON THE GRS 80 REFERENCE ELLIPSOID. THE GRID COORDINATES ARE BASED ON THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM OF 1983 (MAINLAND 2001). ELEVATIONS ARE REFERENCED TO THE NAVD 88 VERTICAL DATUM.
RIM AND INVERT ELEVATIONS AND SPOT ELEVATIONS ARE PUBLISHED FOR DESIGN PURPOSES ONLY. VERTICAL BENCHMARKS SHOWN ON THE PLAN ARE TO BE USED FOR CONSTRUCTION EFFORTS.
IN THE EVENT THAT BENCHMARKS (TBMS), ESTABLISHED FOR THIS PROJECT AND PUBLISHED ON THIS SURVEY, ARE DESTROYED, NOT RECOVERABLE OR A DISCREPANCY IS FOUND, THE USER SHOULD NOTIFY THIS FIRM IN WRITING PRIOR TO COMMENCING OR CONTINUING ANY WORK.
4. LOCATIONS OF SUBSURFACE UTILITIES SHOWN HEREON ARE APPROXIMATE AND ADDITIONAL UTILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS PLAN. LOCATIONS ARE COMPILED FROM UTILITY PLANS OF RECORD AND DIG-SAFE FIELD MARKINGS. THIS INFORMATION IS NOT TO BE USED FOR CONSTRUCTION. PRIOR TO ANY CONSTRUCTION, CONTACT DIG-SAFE AT (1-800-344-7233) TO FIELD VERIFY LOCATION OF ALL UTILITIES.
5. THE LOCUS AREA LIES WITHIN A FEMA NON-PRINTED PANEL(S) REFERENCE ID NUMBER 25027C0540E, COMMUNITY ID NUMBER 25027C, TOWN OF WEST BROOKFIELD IN WORCESTER COUNTY.
6. WETLAND AND CHANNEL LINES WERE DELINEATED IN NOVEMBER OF 2011 BY COLER & COLANTONIO, INC. (NOW CHA CONSULTING) AND CHECKED IN MARCH OF 2023 BY CHA CONSULTING.



PAVEMENT CORE LOGS
PAVEMENT CORES CONDUCTED BY
ATC ASSOCIATES, INC.
FEBRUARY 29, 2012

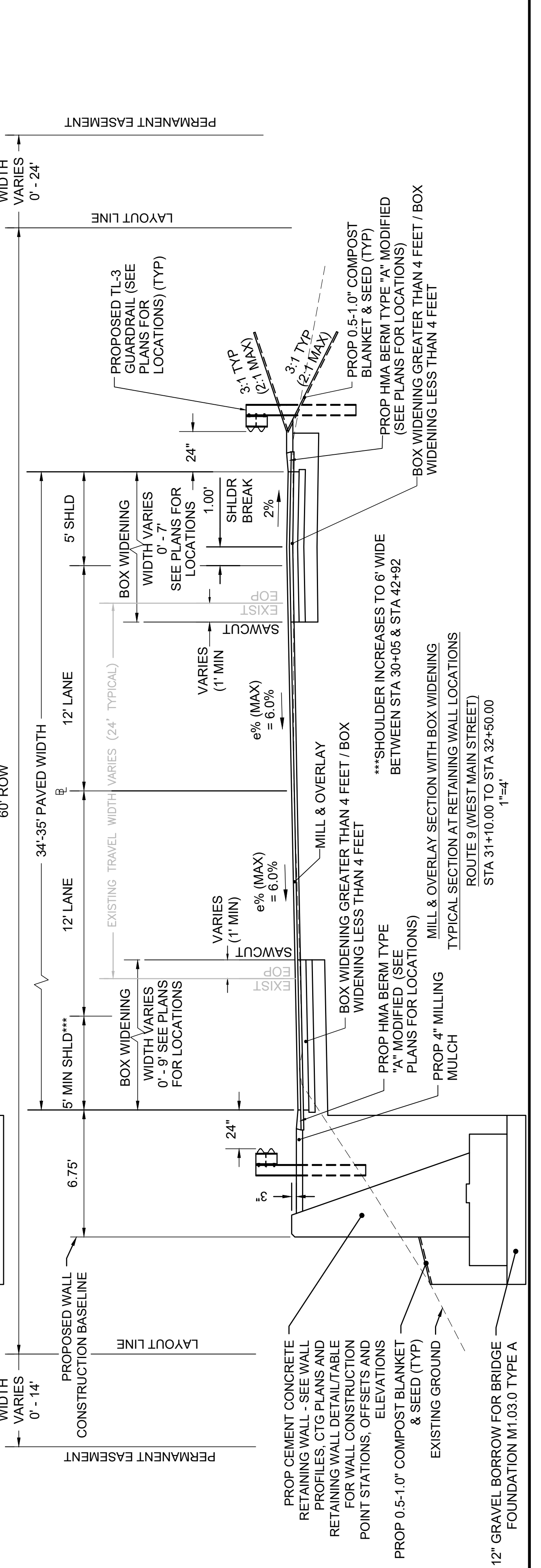
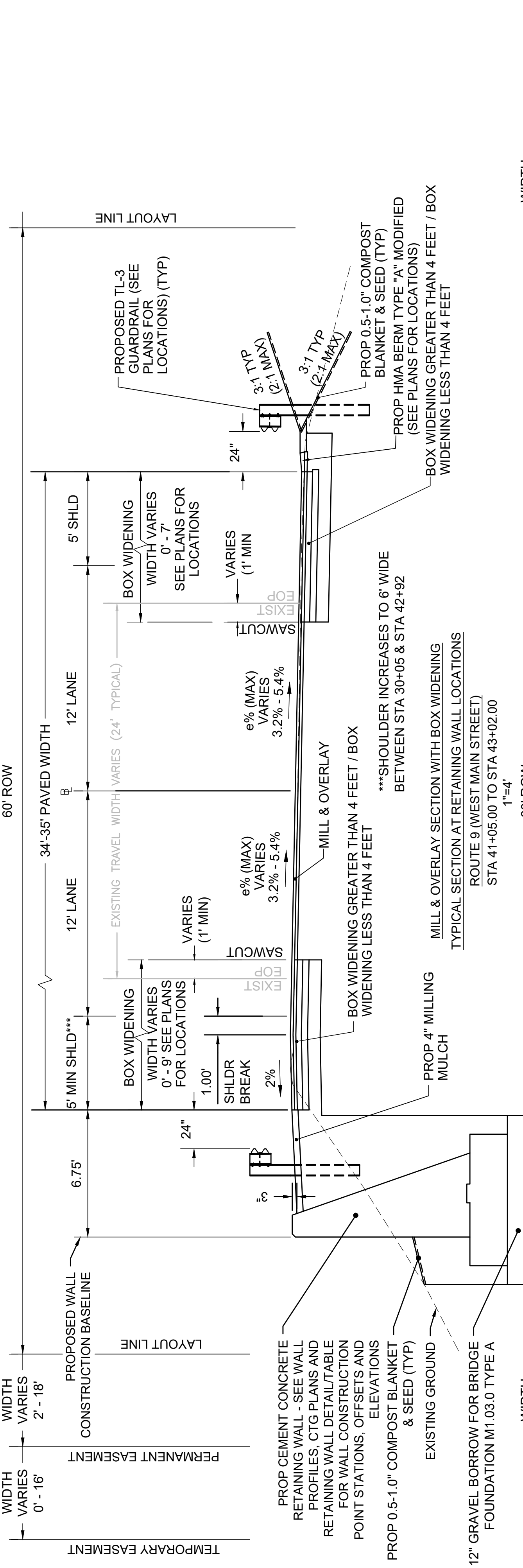
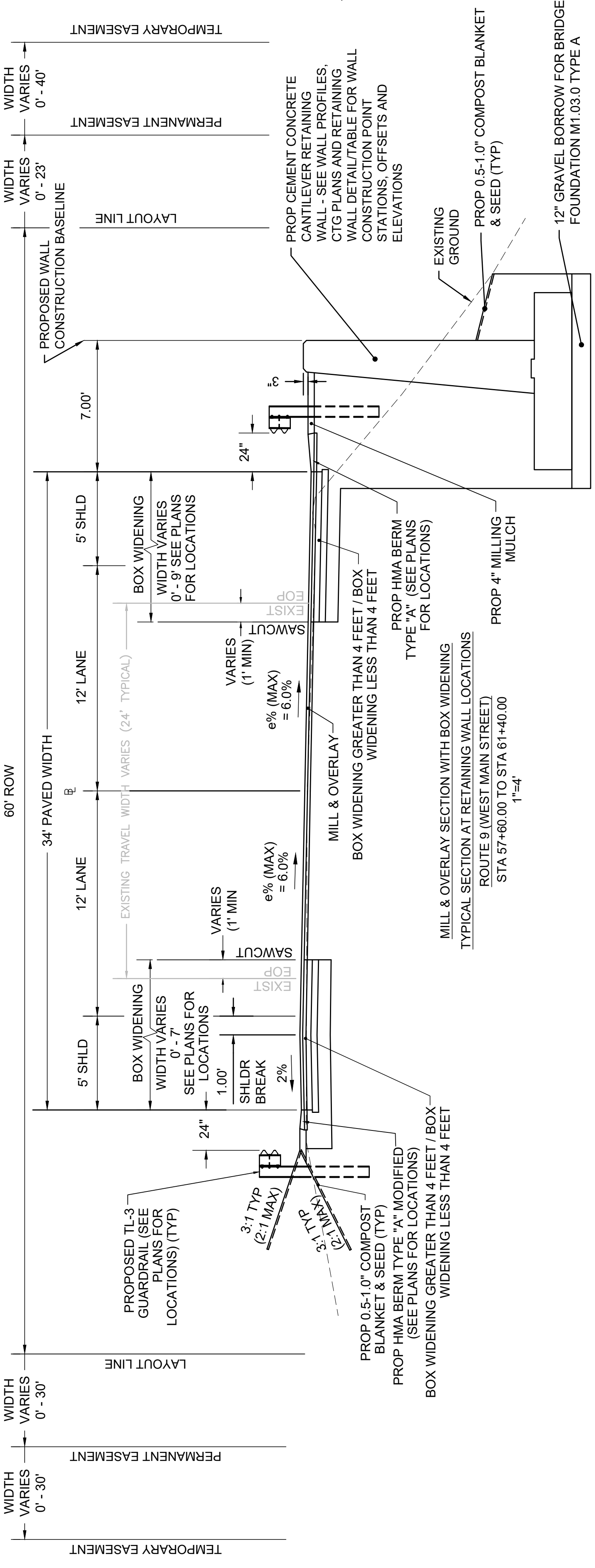
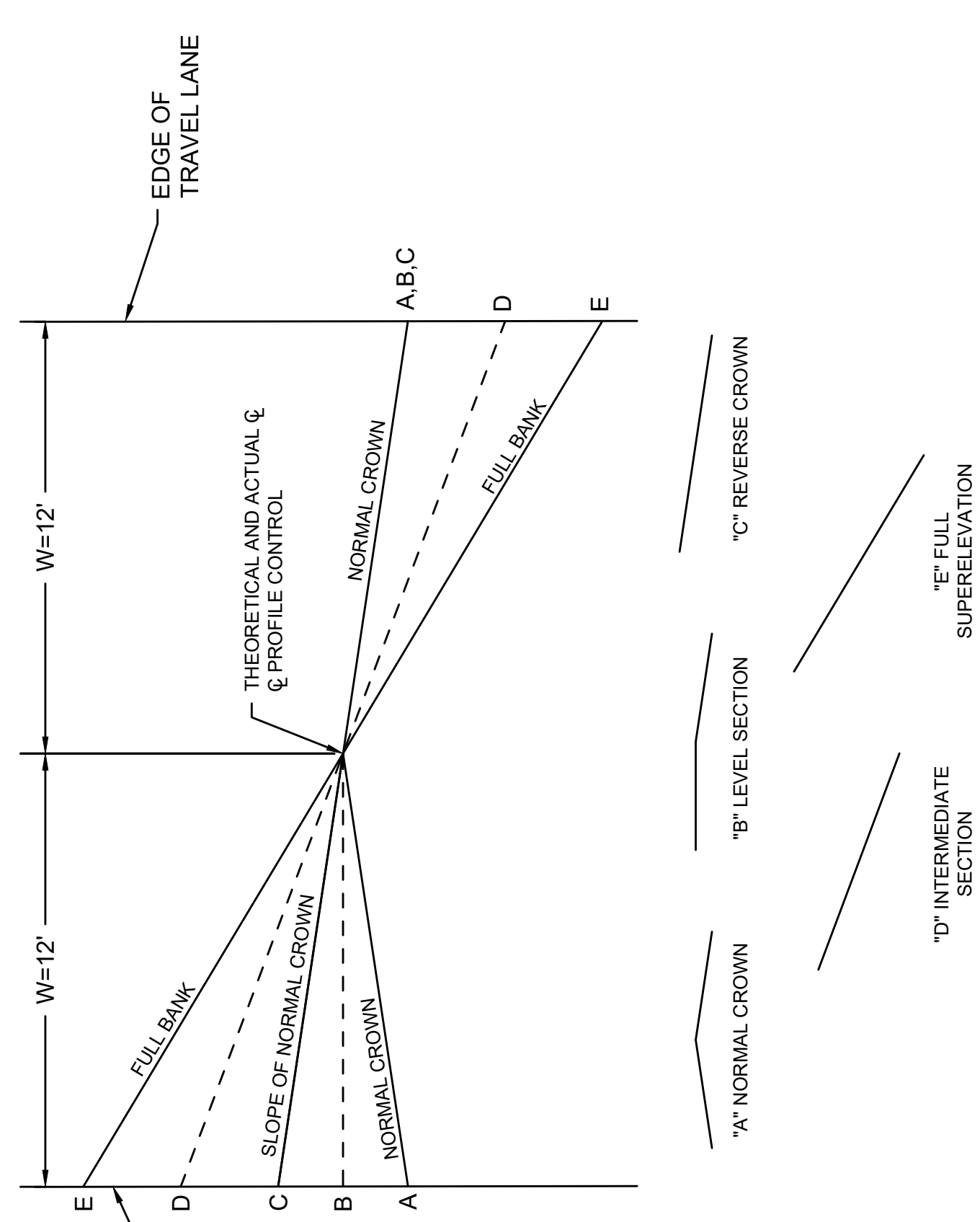


IMPACT SUMMARY							
LOCATION	PERM WETLAND IMPACT (SQ. FEET)	WETLAND REPLICATION (SQ. FEET)	TEMP WETLAND IMPACT & RESTORATION (SQ. FEET)	TEMP LUW IMPACT & RESTORATION (SQ. FEET)	PERM LUW IMPACT (SQ. FEET)	PERMANENT BANK IMPACT (LINEAR FEET)	TEMPORARY BANK IMPACT (LINEAR FEET)
STA 19+95+4 LT			50				20
STA 32+80+4 LT			197				20
STA 41+50+4 LT		300	41			10	
STA 58+00+2 RT			97			20	
STA 61+00+4 LT	41						
STA 61+40+2 LT	22		77				
TOTAL	63	300	385	385			80

WEST BROOKFIELD WEST MAIN STREET (ROUTE 9)	
STATE	MA
FED AID PROJ. NO.	-
SHEET NO.	5
TOTAL SHEETS	26
PROJECT FILE NO.	606517

TYPICAL SECTIONS - 2

METHOD OF BANKING
UNDIVIDED HIGHWAY
ROTATION AROUND CENTERLINE



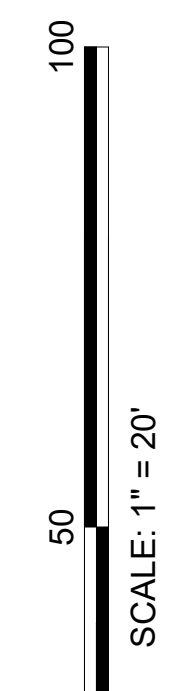
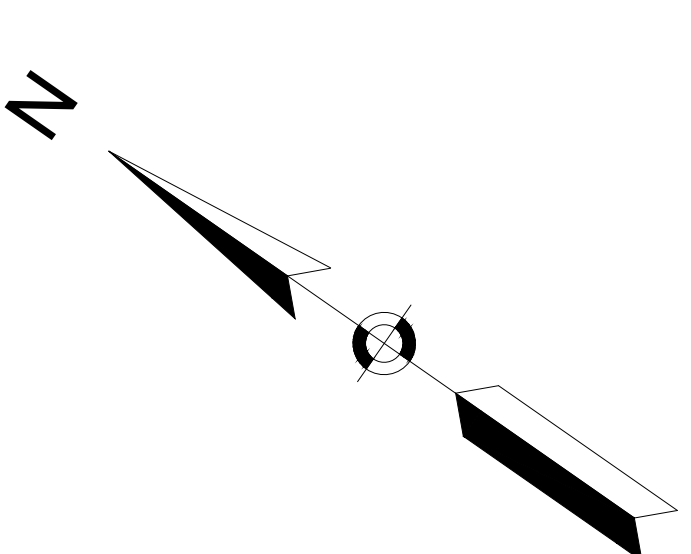
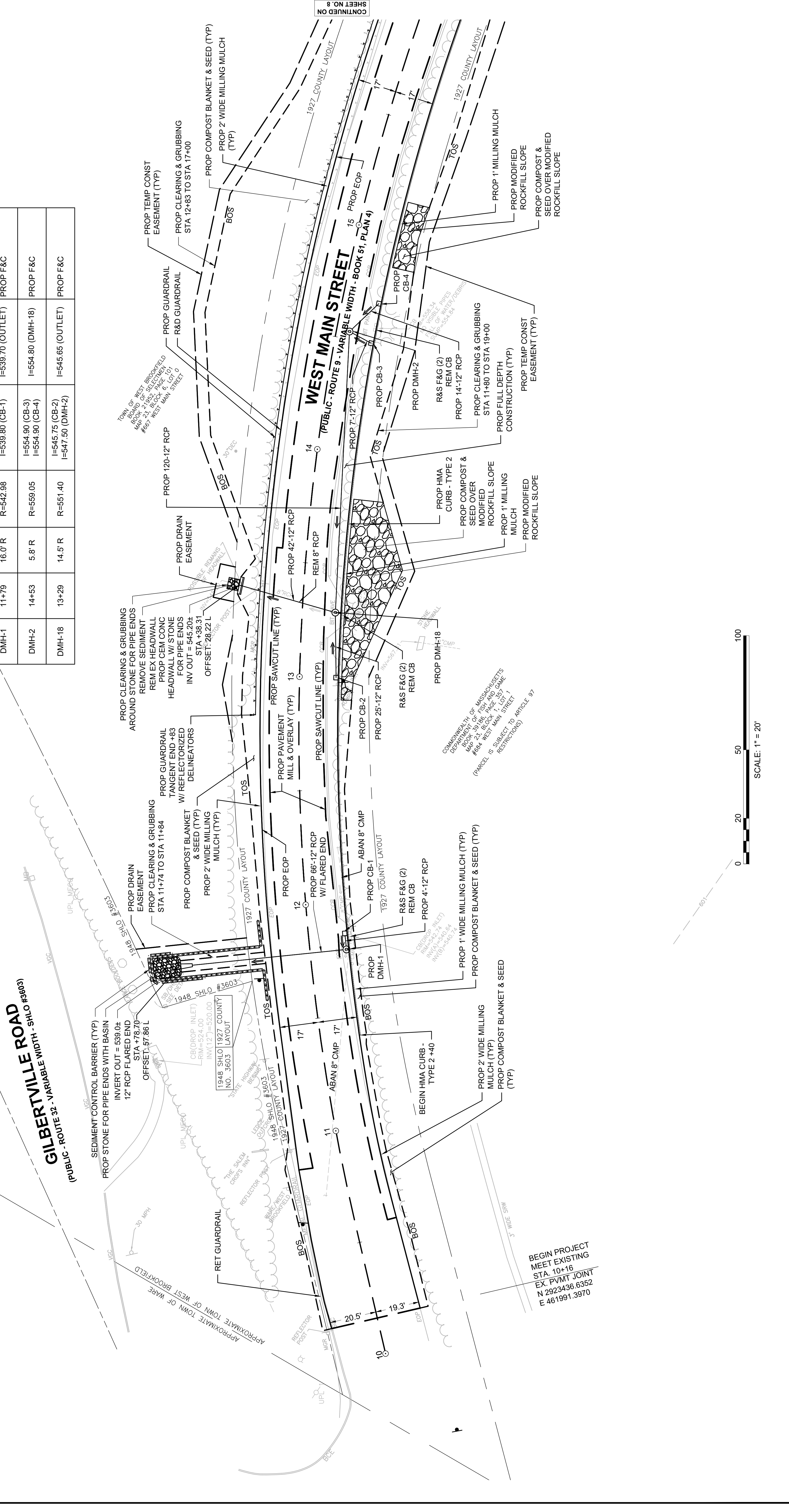
WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)

STATE	FED AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	26
PROJECT FILE NO. 606517			

PERMITTING PLAN - 1

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
CB-1	11+86	16.0' R	R=543.35	I=539.85 (DMH-1)	I=539.85 (DMH-1)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-2	13+00	16.0' R	R=549.67	I=546.00 (DMH-18)	I=546.00 (DMH-18)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-3	14+50	16.0' R	R=558.50	I=555.00 (DMH-2)	I=555.00 (DMH-2)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-4	14+68	16.0' R	R=559.60	I=555.60 (DMH-2)	I=555.60 (DMH-2)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
DMH-1	11+79	16.0' R	R=542.98	I=539.80 (CB-1)	I=539.70 (OUTLET)	PROP F&C
DMH-2	14+53	5.8' R	R=559.05	I=554.90 (CB-3) I=554.90 (CB-4)	I=554.80 (DMH-18)	PROP F&C
DMH-18	13+29	14.5' R	R=551.40	I=545.75 (CB-2) I=547.50 (DMH-2)	I=545.65 (OUTLET)	PROP F&C



CONTINUED ON SHEET NO. 8

BEGIN PROJECT MEET EXISTING STA. 10+16 EX. PVTMT JOINT N 2923436.6352 E 461991.3970

COMMUNALITY OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION MAP 23, BLOCK 1, LOT 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		8	26
PROJECT FILE NO. 606517			

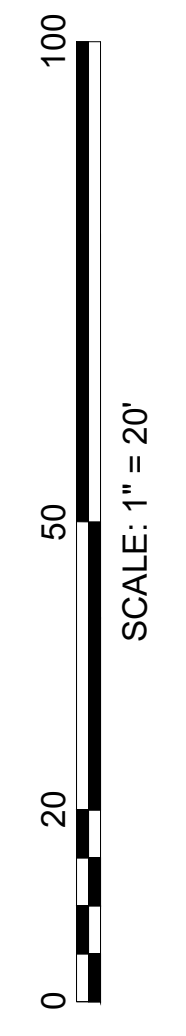
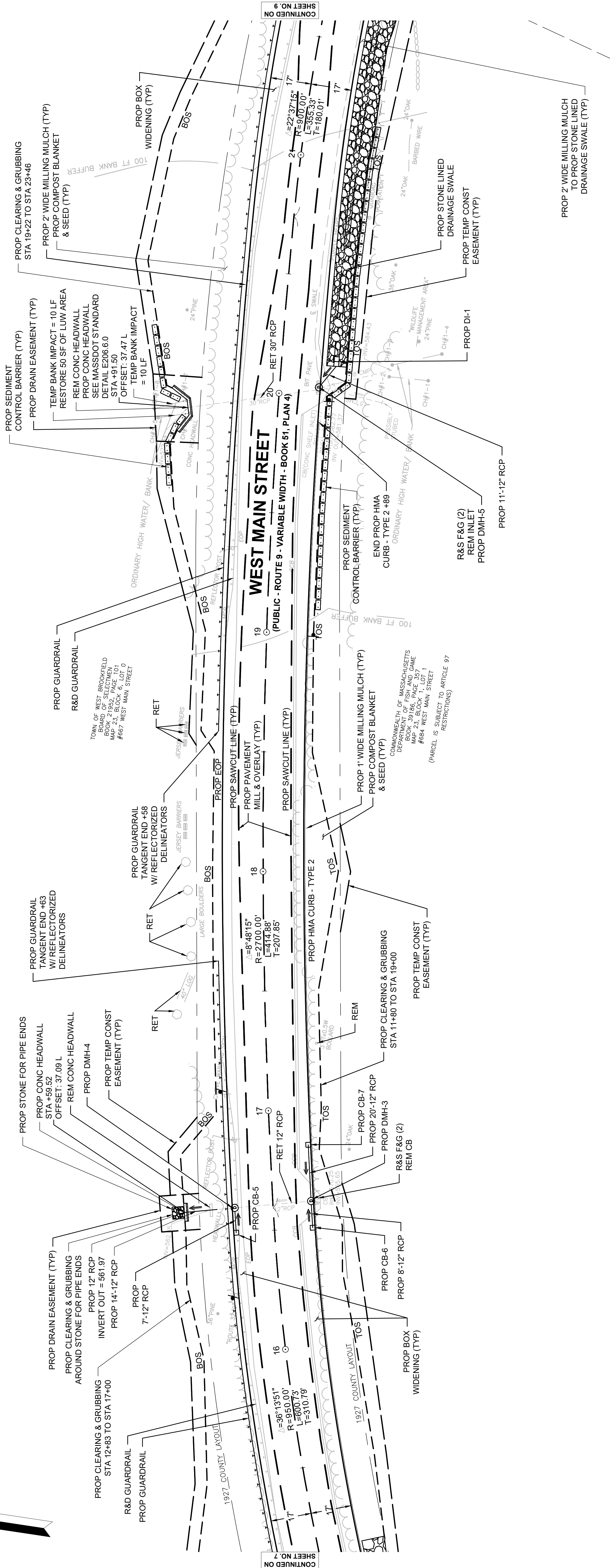
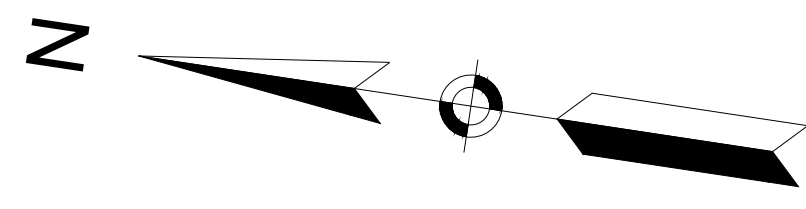
PERMITTING PLAN - 2

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
CB-5	16+50	16.0' L	R=571.21	I=567.50 (DMH-4)	I=585.6 EX. (DMH-4)	PROP F&G. CONSTRUCT OVER EXIST 12" RCP
CB-6	16+50	16.0' R	R=570.37	I=567.00 (DMH-3)	I=583.6 EX. (OUTLET)	PROP F&G. CONSTRUCT OVER EXIST 12" RCP
CB-7	16+85	16.0' R	R=572.22	I=568.22 (DMH-3)	I=581.37 EX. (OUTLET)	PROP F&G. 6" DIAMETER DMH. CONSTRUCT OVER 30" RCP. RET 15" CMP & 18" CMP INLETS
DI-1	20+15	23.0' R	R=586.54	I=583.71 (DMH-5)		

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
DMH-3	16+61	16.0' R	R=571.00	I=566.90 (CB-6) I=567.25 (CB-7)	I=585.6 EX. (DMH-4)	PROP F&G. CONSTRUCT OVER EXIST 12" RCP
DMH-4	16+60	16.0' L	R=571.79	I=567.40 (CB-5)	I=583.6 EX. (OUTLET)	PROP F&G. CONSTRUCT OVER EXIST 12" RCP
DMH-5	20+03	16.0' R	R=587.08	I=582.57 EX. (18" CMP) I=582.77 EX. (15" CMP) I=583.51 (DI-1)	I=581.37 EX. (OUTLET)	PROP F&G. 6" DIAMETER DMH. CONSTRUCT OVER 30" RCP. RET 15" CMP & 18" CMP INLETS



CONTINUED ON SHEET NO. 7

CONTINUED ON SHEET NO. 9

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	10	26
PROJECT FILE NO. 606517			

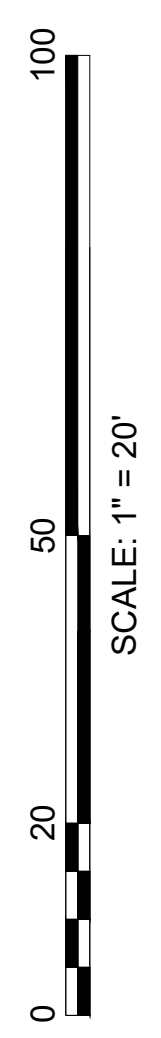
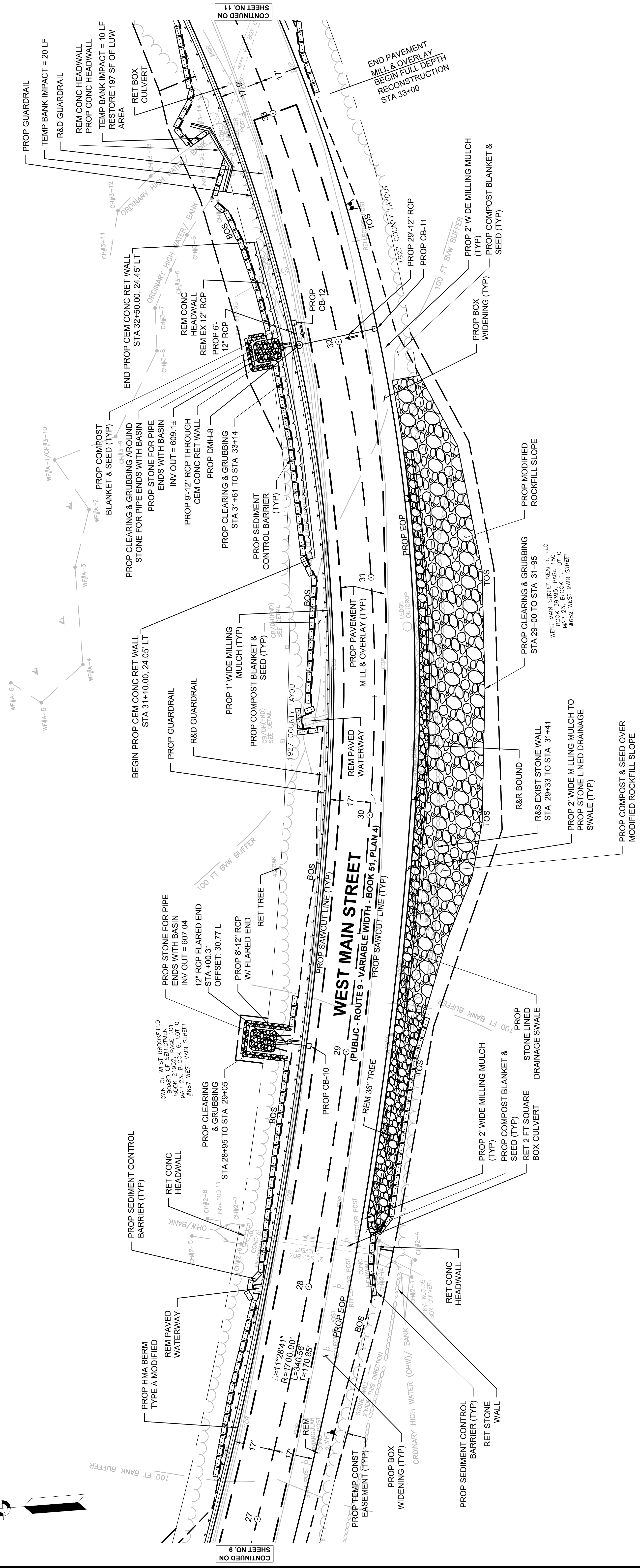
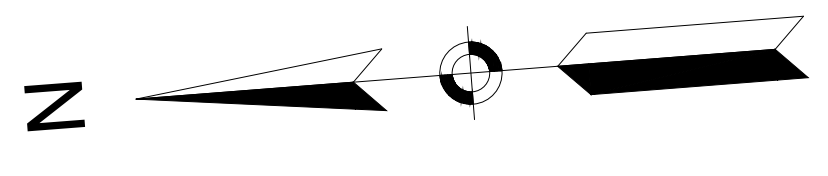
PERMITTING PLAN - 4

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
DMH-8	32+02	16.0' L	R=617.65	I=614.84 (CB-11) I=613.69 (CB-12)	I=609.20 (OUTLET)	PROP F&C

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
CB-10	29+00	16.0' L	R=611.17	I=607.17 (OUTLET)	I=615.34 (DMH-8)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-11	32+02	16.0' R	R=619.34	I=613.79 (DMH-8)	I=613.79 (DMH-8)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-12	32+12	16.0' L	R=617.79	I=613.79 (DMH-8)	I=613.79 (DMH-8)	CASCADE GRATE, HOOK LOCK, DEEP SUMP



CONTINUED ON SHEET NO. 9

CONTINUED ON SHEET NO. 11

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	26
PROJECT FILE NO. 606517			

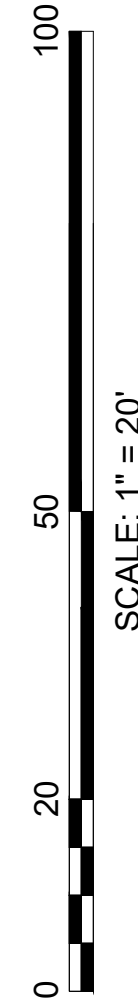
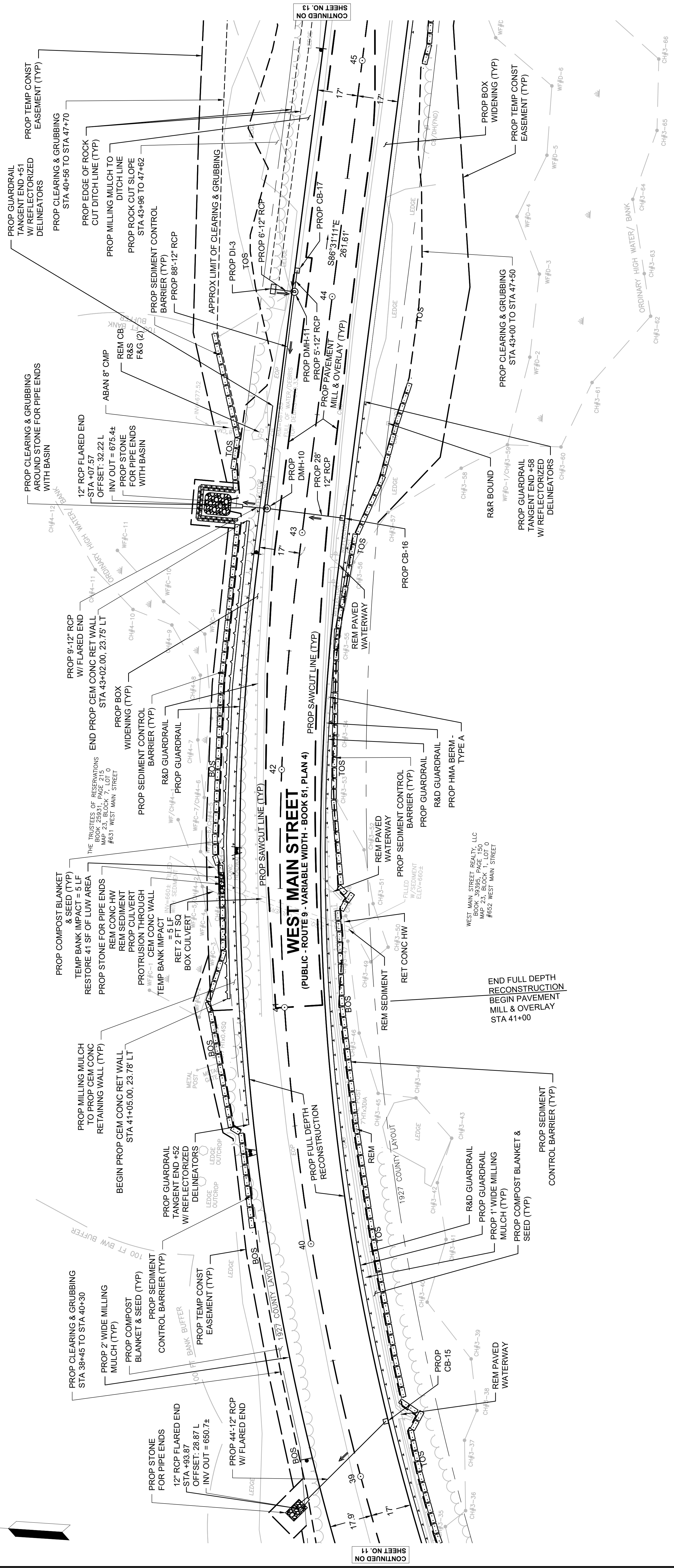
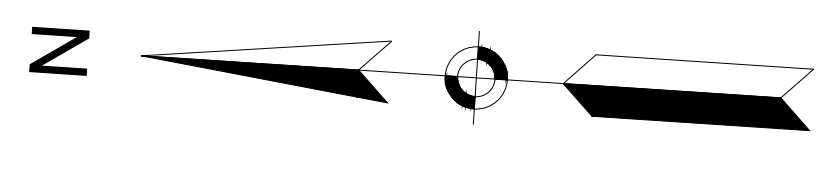
PERMITTING PLAN - 6

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
CB-15	39+20	16.0' R	R=654.15	I=650.92 (OUTLET)	I=676.52 (OUTLET)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-16	43+08	16.0' R	R=679.84	I=676.34 (DMH-10)	I=679.50 (DMH-10)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-17	44+09	16.0' L	R=686.52	I=682.00 (DMH-11)	I=682.16 (DI-3)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
DI-3	44+00	25.0' L	R=685.26	I=682.26 (DMH-11)		TYPE AF DROP INLET GRATES

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
DMH-10	43+08	16.0' L	R=680.82	I=676.62 (CB-16) I=676.62 (DMH-11)	I=676.62 (OUTLET)	PROP F&C
DMH-11	44+00	16.0' L	R=686.01	I=681.90 (CB-17) I=682.16 (DI-3)	I=679.50 (DMH-10)	PROP F&C



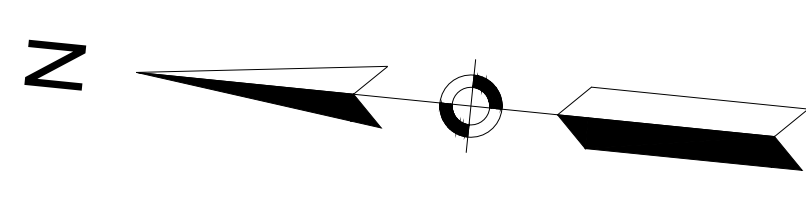
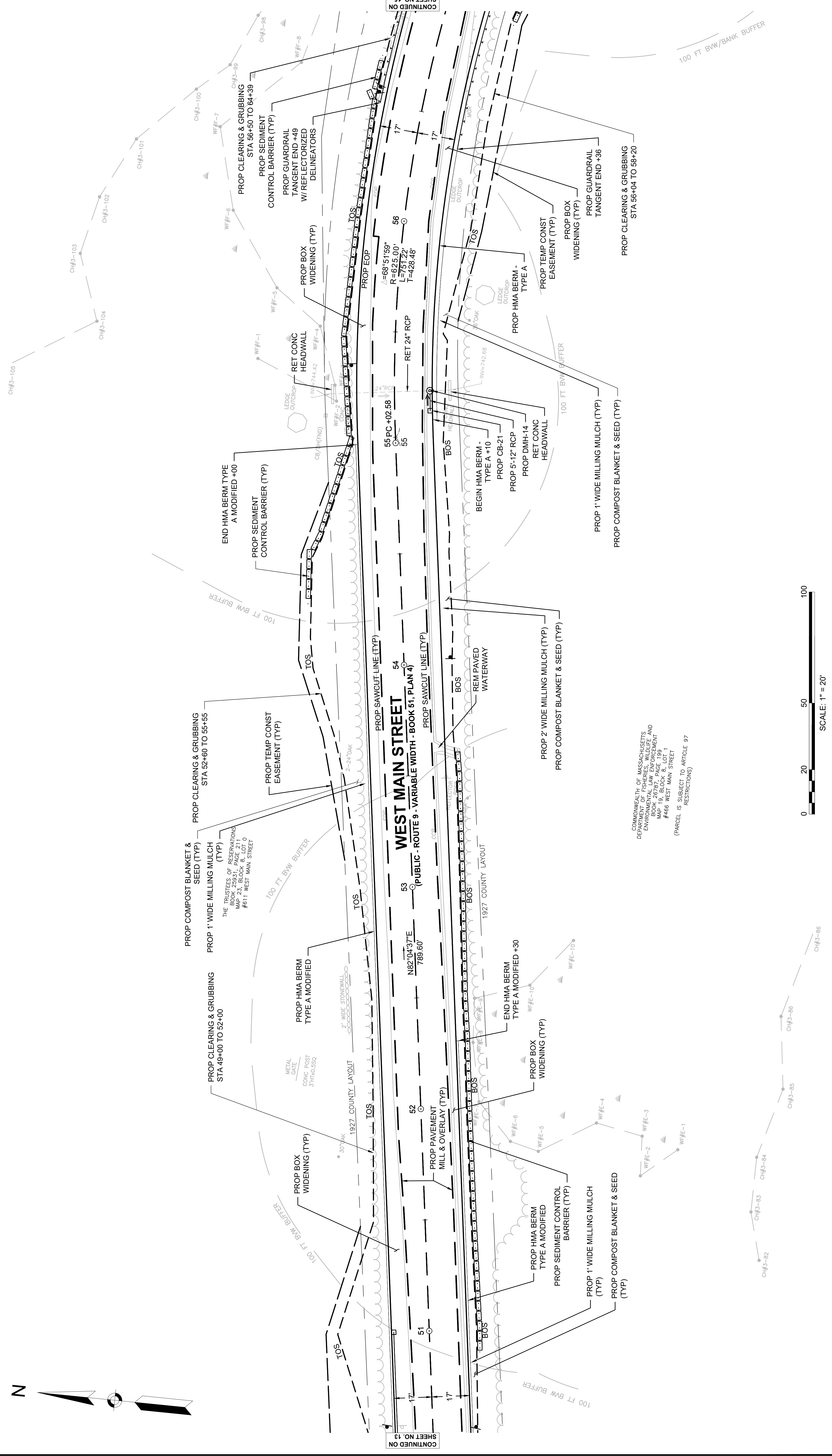
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**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

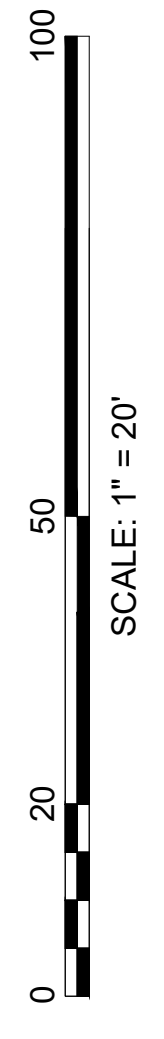
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	14	26
PROJECT FILE NO. 606517			

PERMITTING PLAN - 8

DRAINAGE STRUCTURE TABLE		DRAINAGE STRUCTURE TABLE											
NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS	NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
CB-21	55+14	16.0' R	R=747.84				DMH-14	55+23	16.0' R	R=748.08	I=743.74 (CB-21) I=743.0 EX. (INLET)	I=743.0 EX. (OUTLET)	PROP 5% CONC CONSTRUCT OVER 24" RCP



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF HIGHWAYS, WILDLIFE AND
ENVIRONMENTAL RECREATION
BOOK 26787, PAGE 17
#466 WEST MAIN STREET
(PARCEL IS SUBJECT TO ARTICLE 97
RESTRICTIONS)



CONTINUED ON SHEET NO. 15

CONTINUED ON SHEET NO. 13

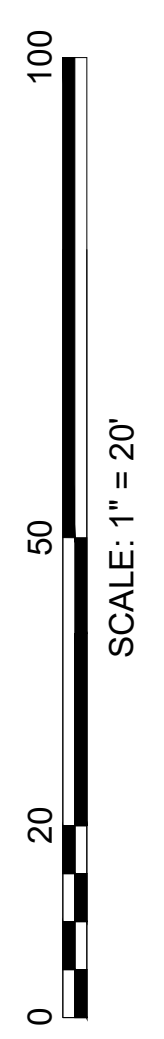
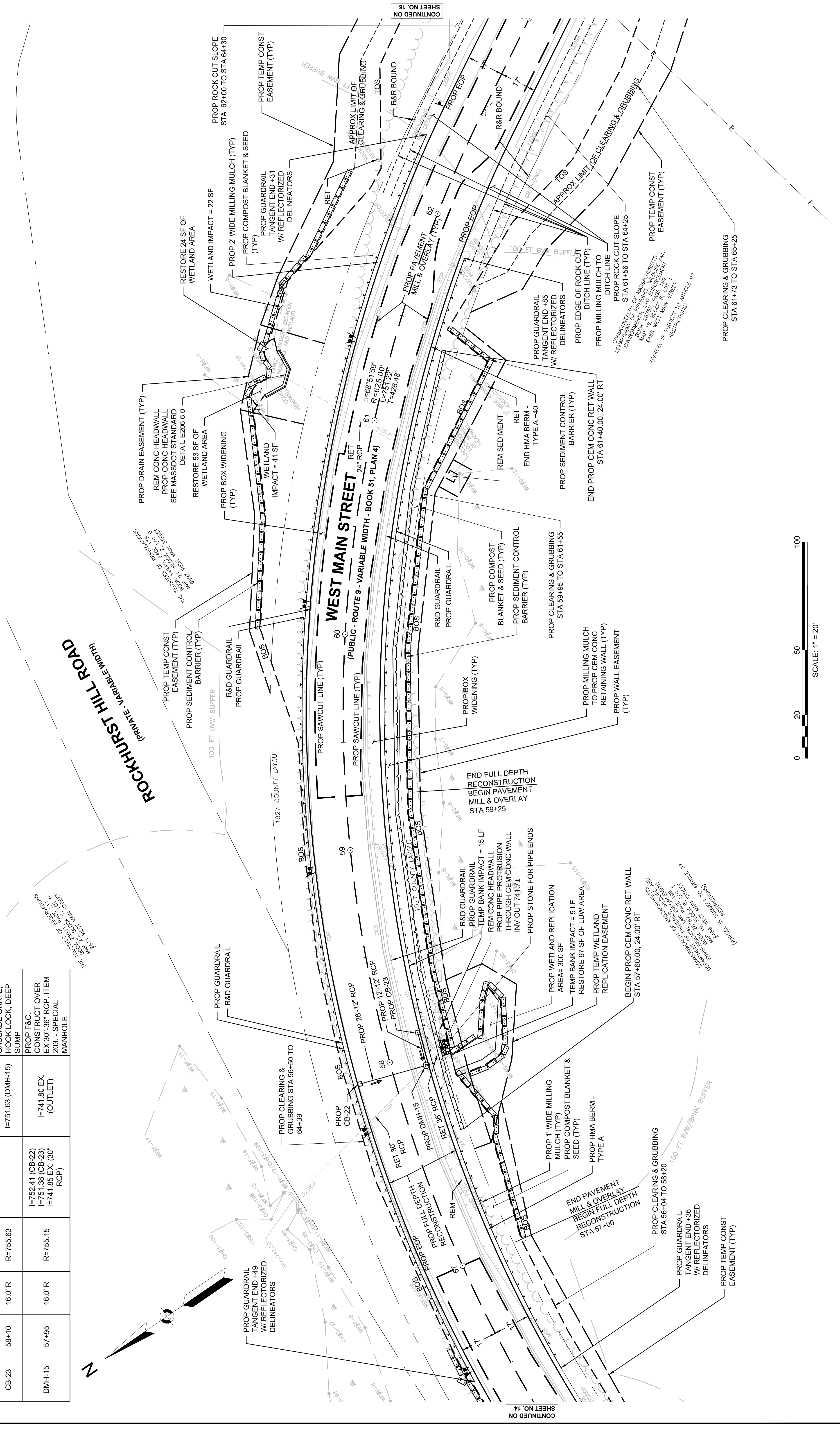
**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		15	26
PROJECT FILE NO. 606517			

PERMITTING PLAN - 9

DRAINAGE STRUCTURE TABLE

NAME	STATION	OFFSET	RIM ELEVATION	INVERT IN ELEVATION	INVERT OUT ELEVATION	REMARKS
CB-22	57+95	16.0' L	R=756.81	I=752.81 (DMH-15)	I=752.81 (DMH-15)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
CB-23	58+10	16.0' R	R=755.63	I=751.63 (DMH-15)	I=751.63 (DMH-15)	CASCADE GRATE, HOOK LOCK, DEEP SUMP
DMH-15	57+95	16.0' R	R=755.15	I=752.41 (CB-22) I=751.38 (CB-23) I=741.85 EX. (30" RCP)	I=741.80 EX. (OUTLET)	PROP F&C. CONSTRUCT OVER EX 30"-36" RCP. ITEM 203. - SPECIAL MANHOLE



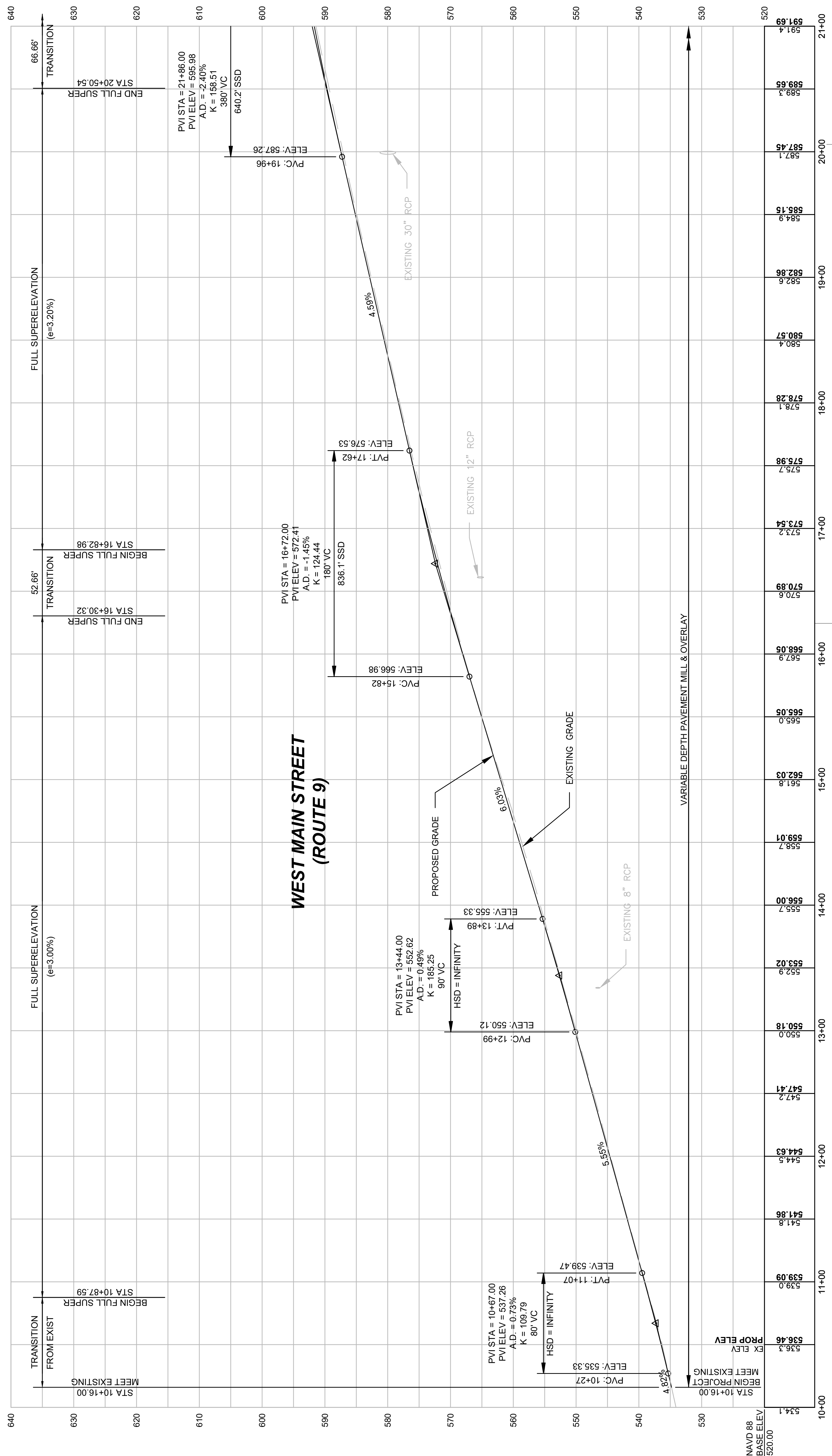
CONTINUED ON SHEET NO. 14

CONTINUED ON SHEET NO. 16

WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)

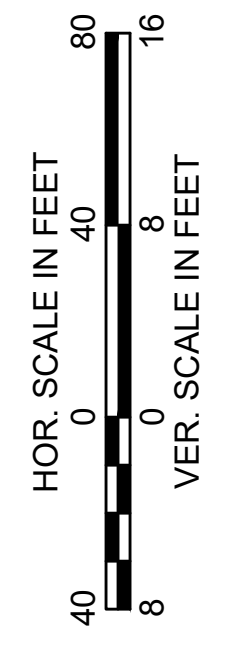
STATE	FED AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	18	26
PROJECT FILE NO. 606517			

WEST MAIN STREET - ROUTE 9
PROFILE - 1



TBM #3
 X-CUT in
 Cast-In-Place Concrete
 Elevation = 586.15 (NAVD89)
 Sta. 20+02.64, 17.40 RT

TBM #2
 Cast Square in
 Concrete Sign Base
 Elevation = 563.52 (NAVD89)
 Sta. 16+24.33, 21.02 LT



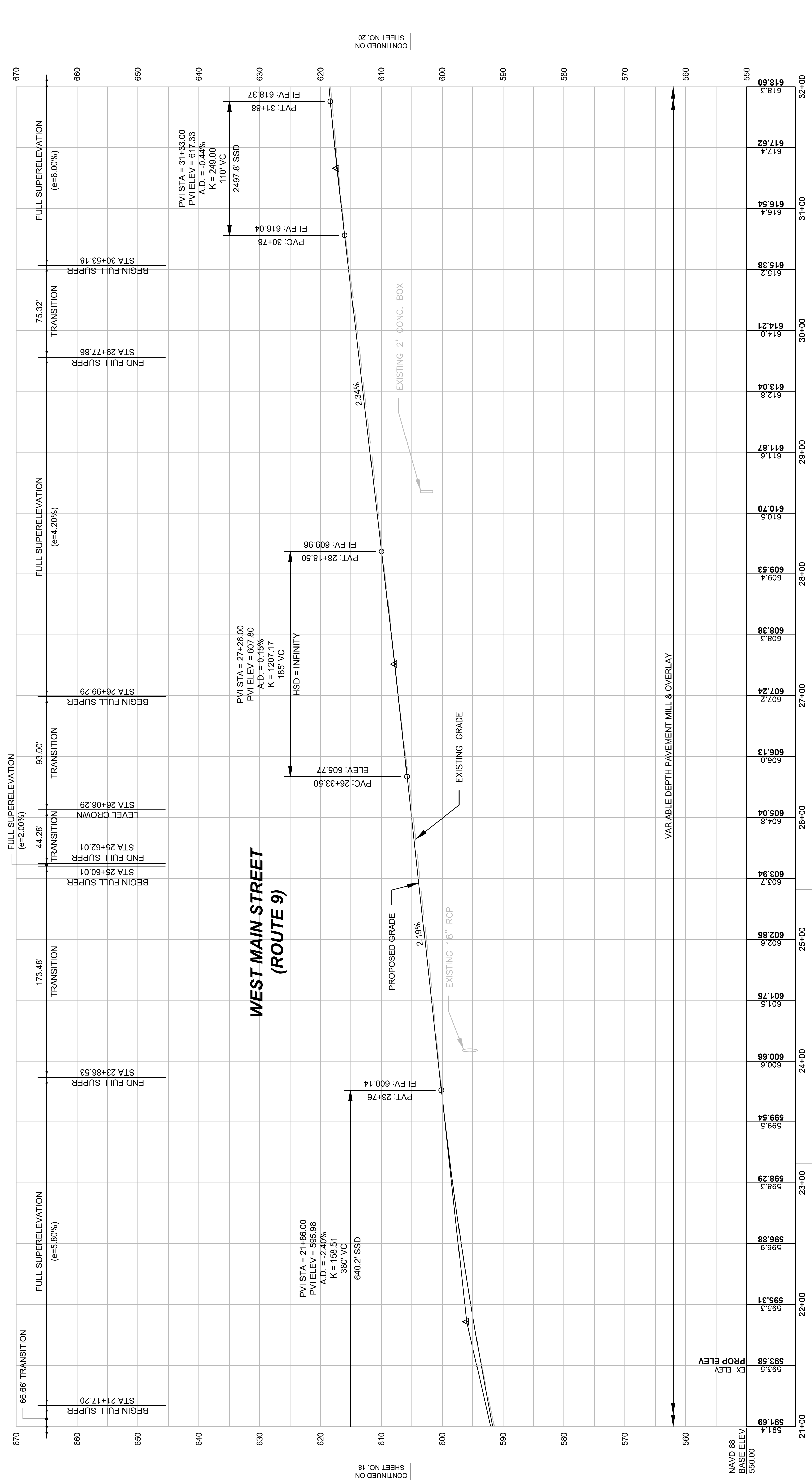
FOR PERMITTING PLANS SEE SHEETS 7-8

CONTINUED ON SHEET NO. 19

WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)

STATE	FED AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	19	26
PROJECT FILE NO. 606517			

WEST MAIN STREET - ROUTE 9
PROFILE - 2



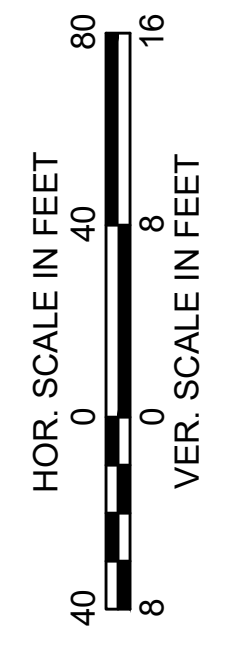
CONTINUED ON SHEET NO. 18

CONTINUED ON SHEET NO. 20

TBM #5
 Duplex Nail in
 36 inch Oak
 Elevation = 613.79 (NAVD88)
 Sta. 29+02.20, 21.97 FT

TBM #6
 Duplex Nail in
 36 inch Oak
 Elevation = 607.00 (NAVD88)
 Sta. 25+40.81, 19.63 FT

TBM #4
 X-CUT Top of
 Guard Rail Post
 Elevation = 607.25 (NAVD88)
 Sta. 23+16.13, 15.69 FT

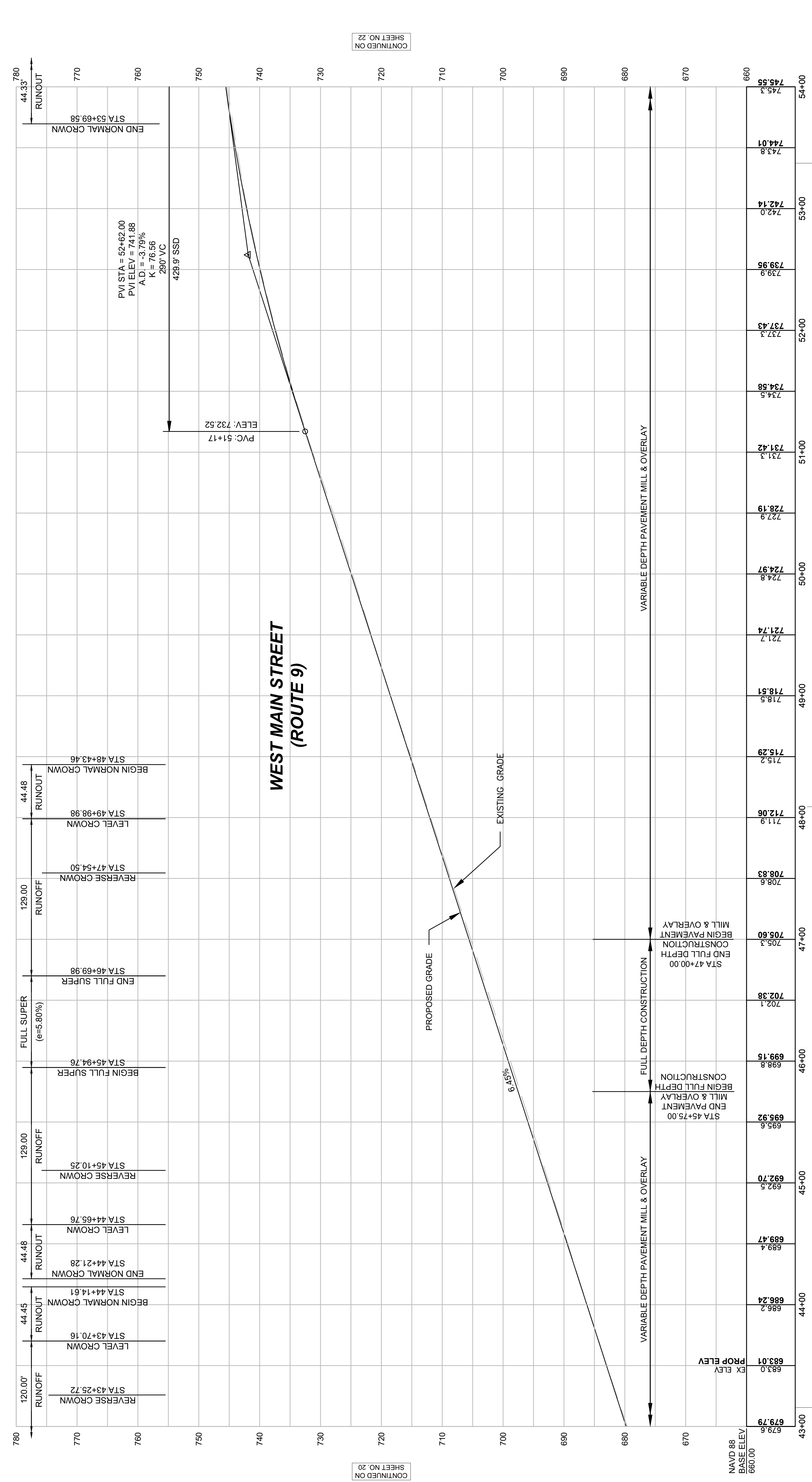


FOR PERMITTING PLANS SEE SHEETS 9-10

WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)

STATE	FED AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	21	26
PROJECT FILE NO. 606517			

WEST MAIN STREET - ROUTE 9
PROFILE - 4



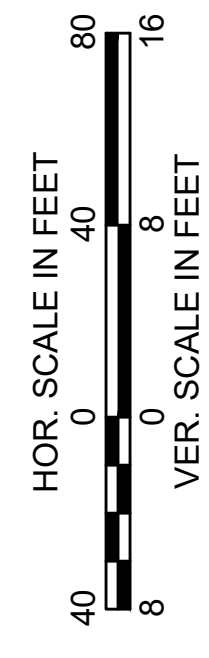
CONTINUED ON SHEET NO. 20

CONTINUED ON SHEET NO. 22

BM #8
 Mass Centre
 Station = 684.21 (MVD/88) (Record)
 Elevation = 684.21 (MVD/88) (Record)
 Sta. 43+15.55, 19.94 LT

BM #10
 X-CUT Top of
 Station = 714.45 (MVD/88)
 Elevation = 714.45 (MVD/88)
 Sta. 48+08.88, 14.17 RT

BM #11
 Capstone
 Station = 742.59 (MVD/88)
 Elevation = 742.59 (MVD/88)
 Sta. 53+17.28, 24.57 RT



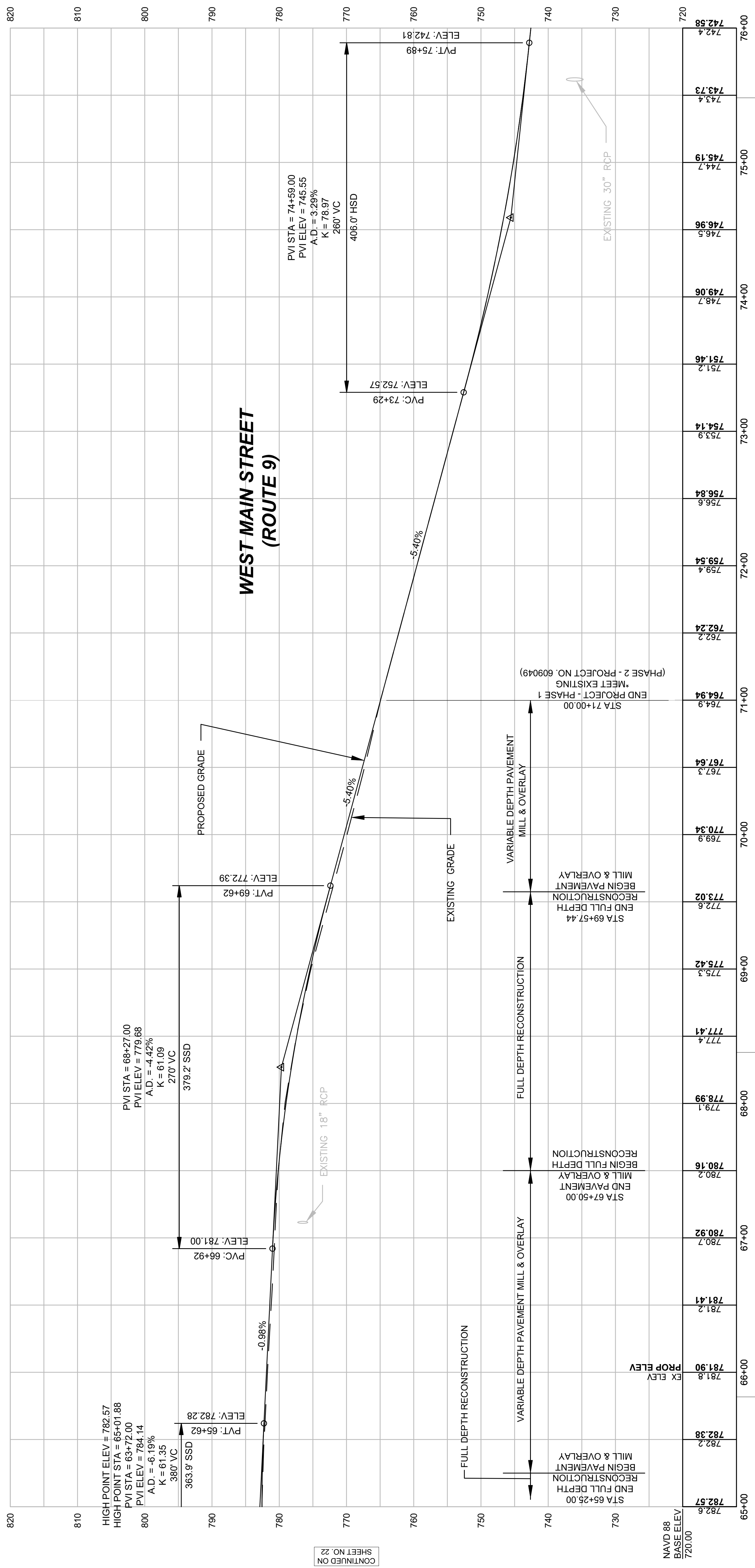
FOR PERMITTING PLANS SEE SHEETS 12-13

WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)

STATE	FED AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	23	26
PROJECT FILE NO. 606517			

WEST MAIN STREET - ROUTE 9
PROFILE - 6

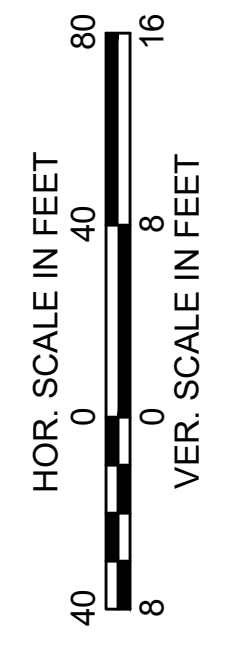
NOTE:
 1. THE PROPOSED PROFILE SHOWN BELOW SHOWS THE FINAL COMBINED PROFILE OF PHASE 1 AND PHASE 2. SINCE PHASE 1 WILL BE CONSTRUCTED PRIOR TO PHASE 2, THE CONTRACTOR SHALL PROVIDE A 20' PAVEMENT TRANSITION FROM STATION 70+80 TO STATION 71+00 TO MEET THE EXISTING PROFILE GRADE AT THE LIMIT OF WORK FOR PHASE 1.



BM #14
 Mass Graded
 Staff 7200 Brass Rivet in Lodge
 Elevation = 783.38 (NAVD83) (Record)
 Sta. 65+91.67, 21.97 RT

BM #15
 Chisel Square
 on Ledger
 Elevation = 780.67 (NAVD83)
 Sta. 68+37.94, 13.87 LT

BM #17
 High point on
 Conc. Post
 Elevation = 745.81 (NAVD83)
 Sta. 75+48.09, 23.15 RT



FOR PERMITTING PLANS SEE SHEETS 16-17

CONTINUED ON SHEET NO. 22

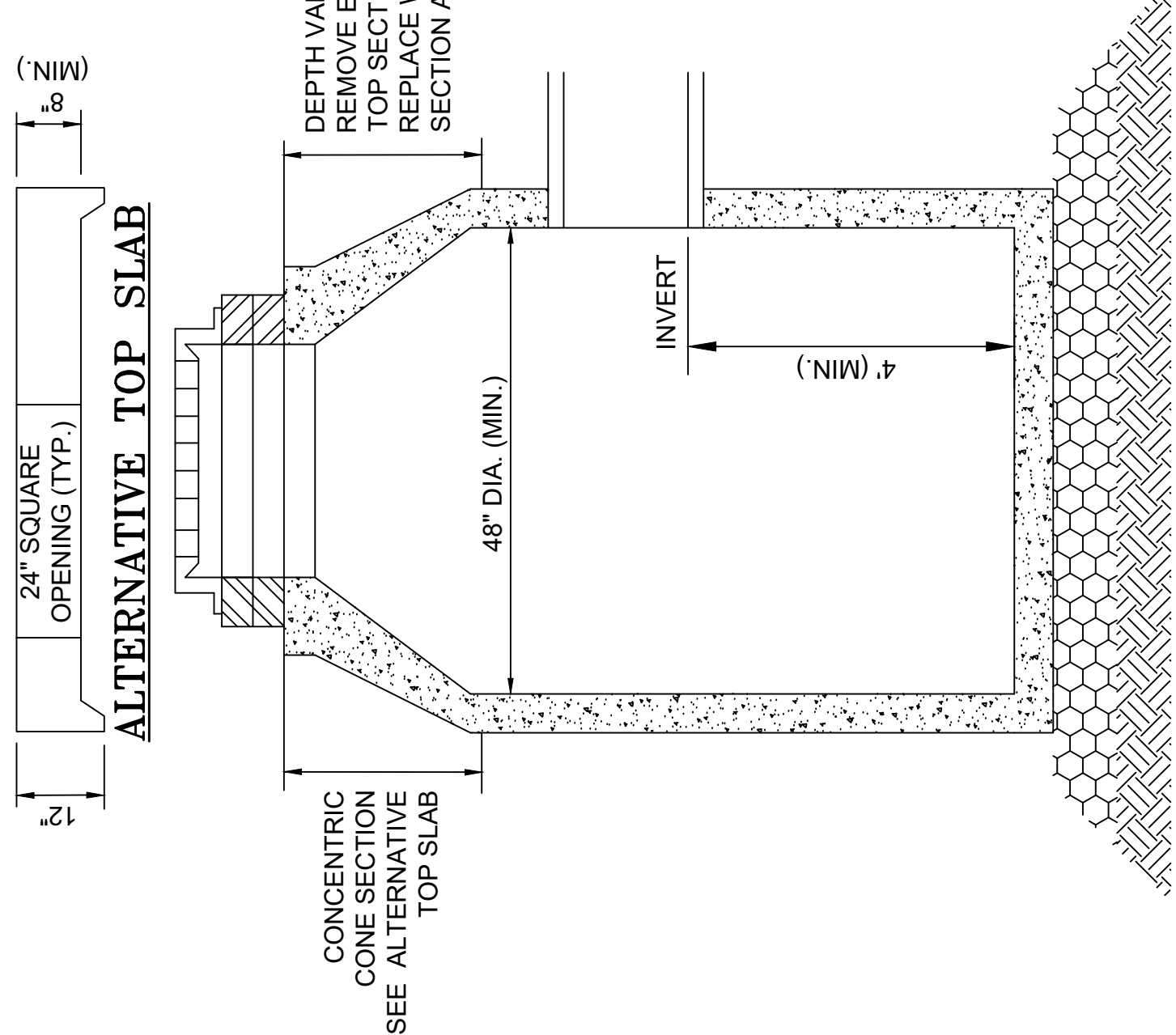
**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		24	26
PROJECT FILE NO. 606517			

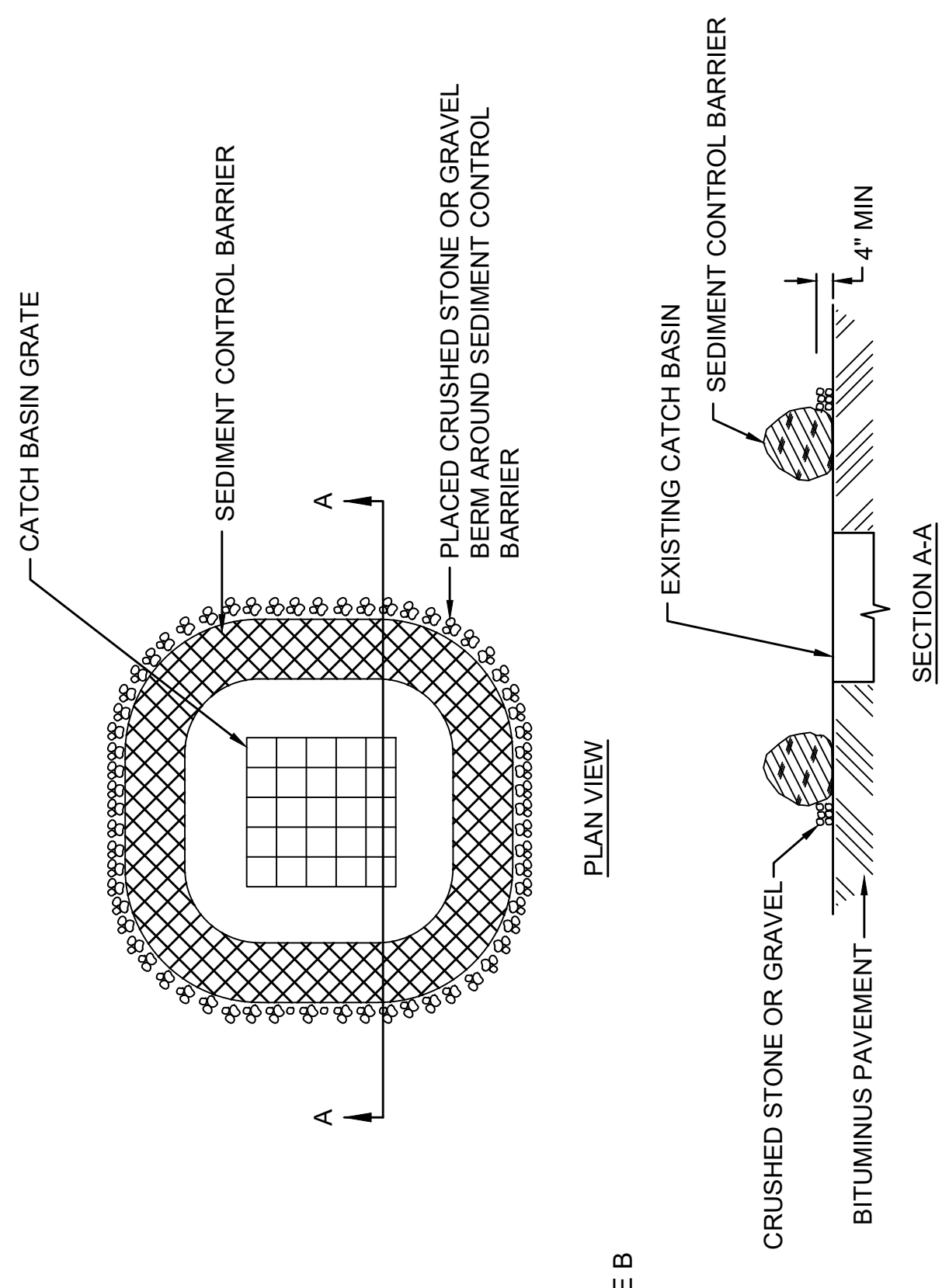
CONSTRUCTION DETAILS - 1

NOTES:
1. BASED ON ACTUAL FIELD CONDITIONS, THE CONTRACTOR SHALL DETERMINE WHICH STYLE OF TOP SECTION SHOULD BE USED

ALTERNATIVE ECCENTRIC CONE SECTION

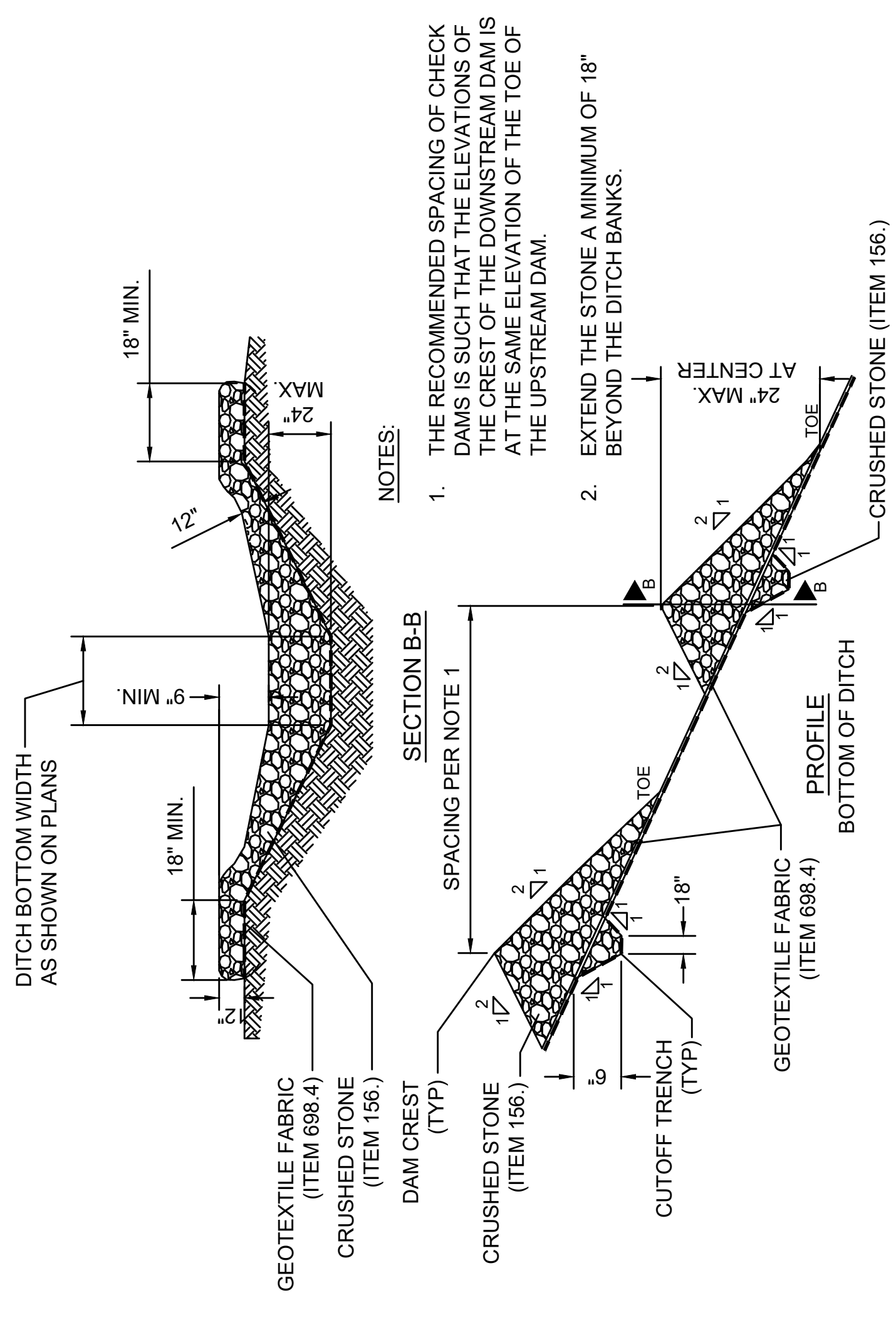


CATCH BASIN DETAIL
NOT TO SCALE

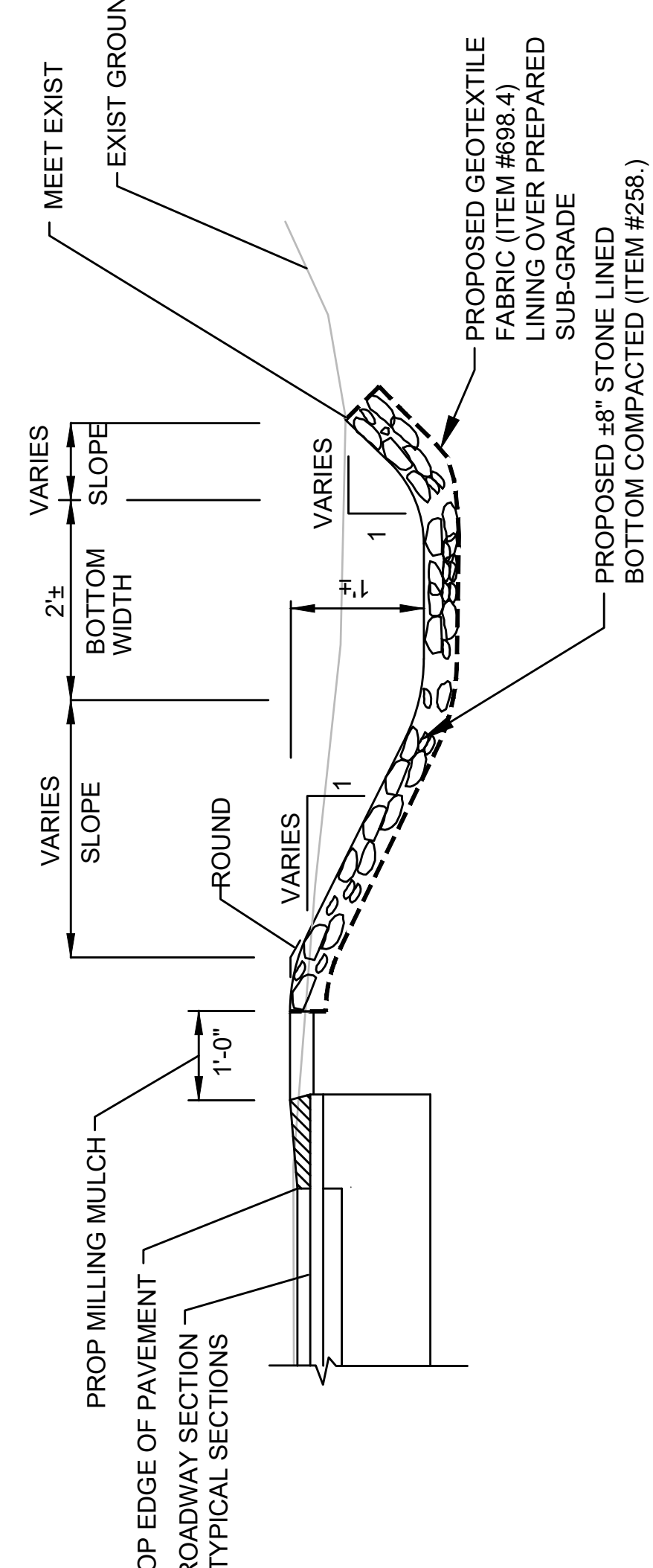


NOTES:
1. SURROUND DRAINAGE STRUCTURE INLET WITH SEDIMENT CONTROL BARRIER PRIOR TO CONSTRUCTION AND MAINTAIN UNTIL CONSTRUCTION IS COMPLETED.
2. 4" MIN GRAVEL BERM AROUND BOTTOM OF SEDIMENT CONTROL BARRIER.

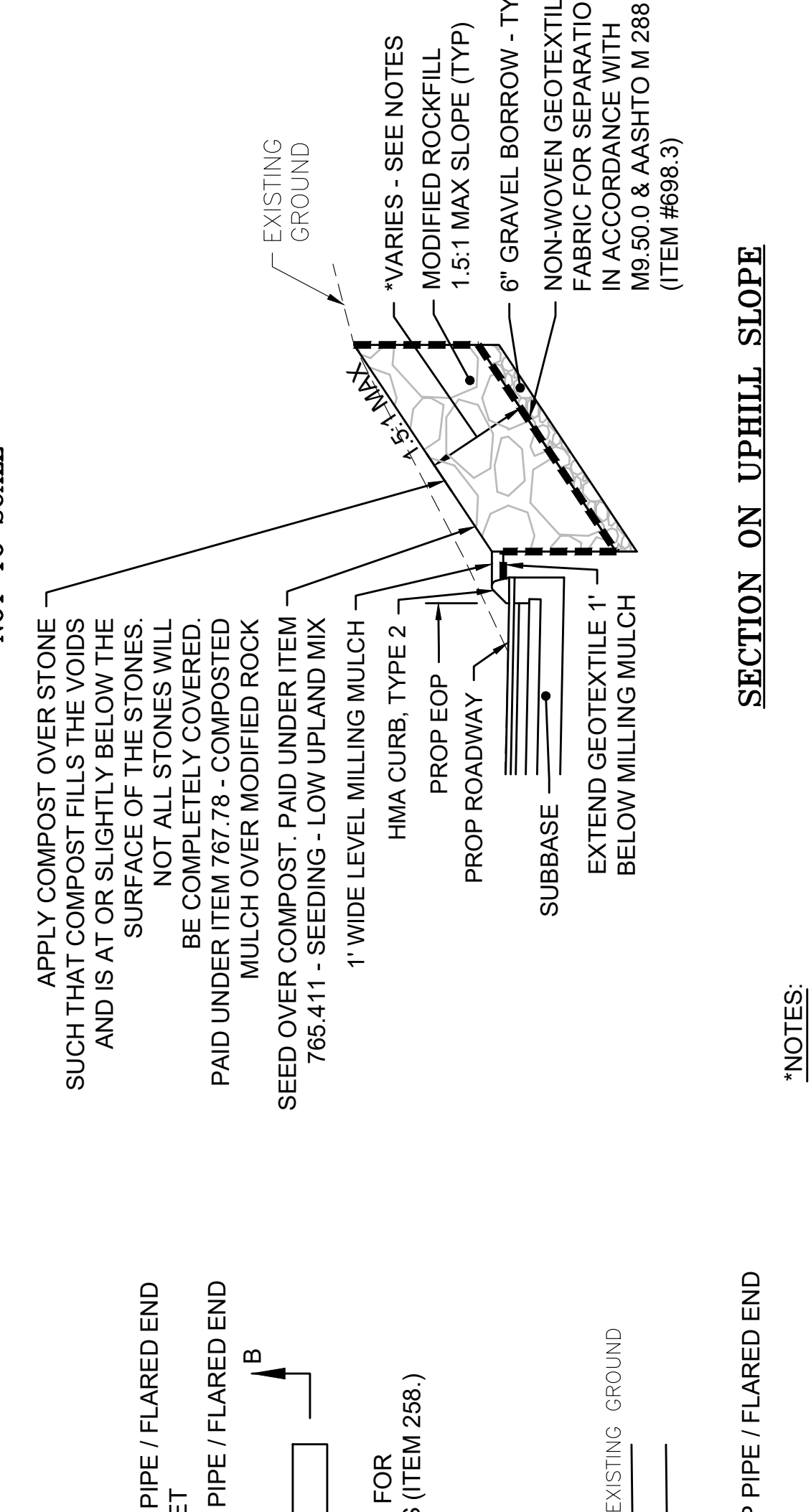
OFF ROADWAY CATCH BASIN/DROP INLET
EROSION CONTROL MEASURE
NOT TO SCALE



STONE CHECK DAM DETAIL
NOT TO SCALE

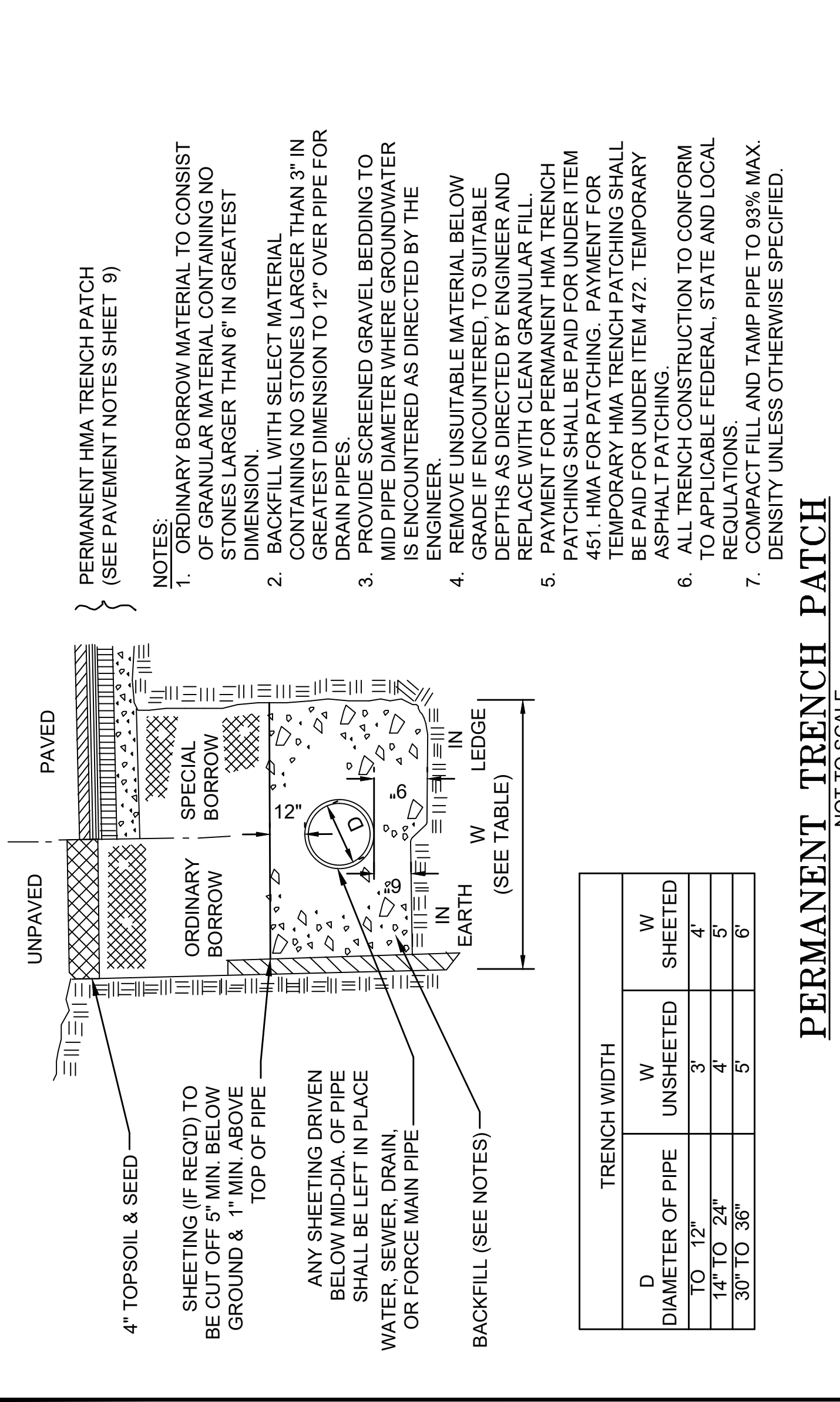


STONE SWALE
NOT TO SCALE

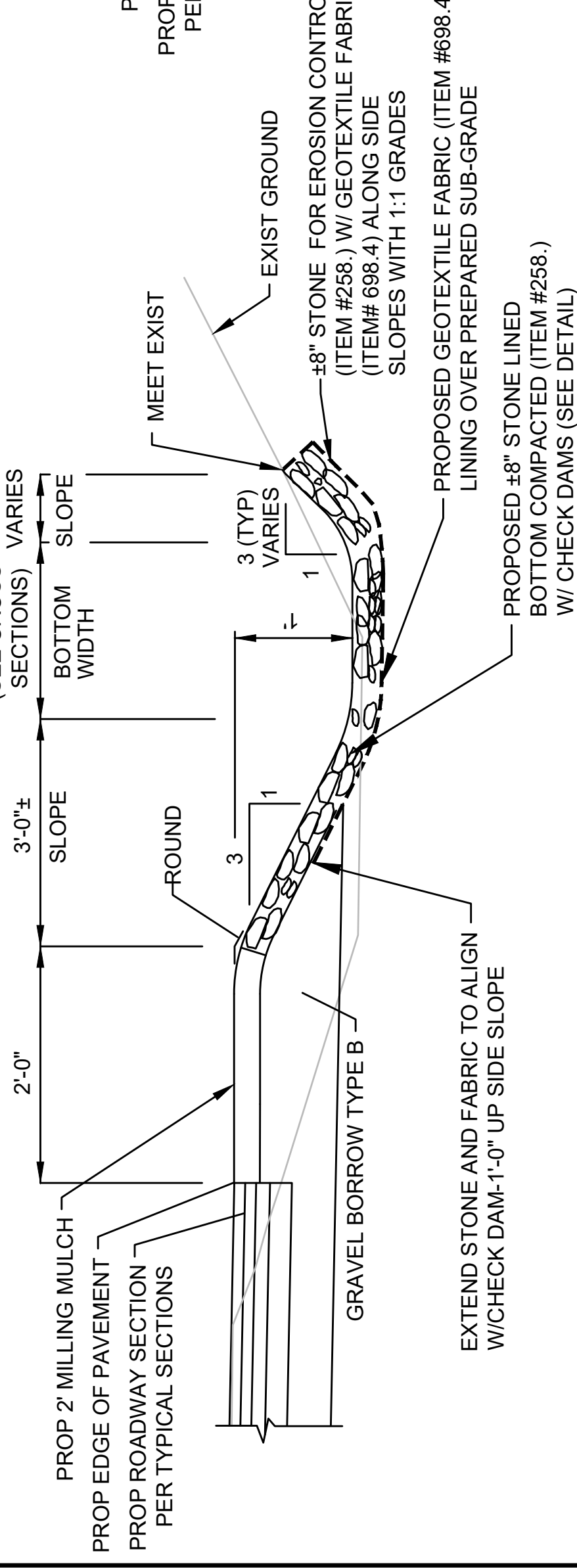


NOTES:
1. THE MODIFIED ROCKFILL SLOPE FROM STATION 23+15 RT TO 24+30 RT SHALL BE 4' DEEP.
2. ALL OTHER MODIFIED ROCKFILL AREAS SHALL BE 3' DEEP.

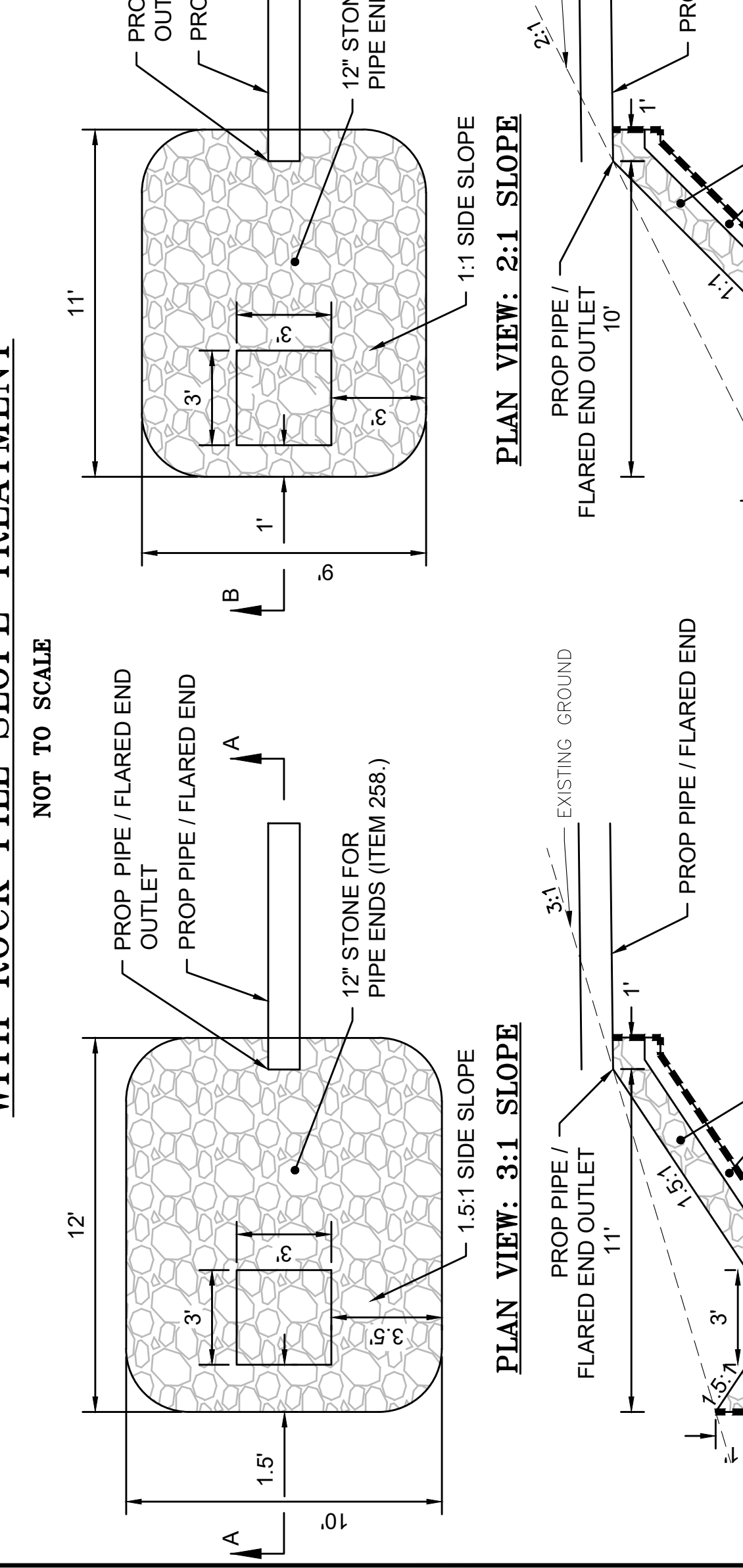
TYPICAL MODIFIED ROCKFILL DETAIL
WITH COMPOST AND SEED
NOT TO SCALE



PERMANENT TRENCH PATCH
NOT TO SCALE



SECTION AT STONE LINED DRAINAGE SWALE
WITH ROCK FILL SLOPE TREATMENT
NOT TO SCALE



NOTE: FOR STONE FOR PIPE ENDS ON SLOPES LESS THAN 4:1 REFER TO MASSDOT STANDARD DETAIL E 206.7.0.

STONE FOR PIPE ENDS WITH BASIN
NOT TO SCALE

PERMANENT HMA TRENCH PATCH (SEE PAVEMENT NOTES SHEET 9)

NOTES:
1. ORDINARY BORROW MATERIAL TO CONSIST OF GRANULAR MATERIAL CONTAINING NO STONES LARGER THAN 6" IN GREATEST DIMENSION.
2. BACKFILL WITH SELECT MATERIAL CONTAINING NO STONES LARGER THAN 3" IN GREATEST DIMENSION TO 12" OVER PIPE FOR DRAIN PIPES.
3. PROVIDE SCREENED GRAVEL BEDDING TO MID PIPE DIAMETER WHERE GROUNDWATER IS ENCOUNTERED AS DIRECTED BY THE ENGINEER.
4. REMOVE UNSUITABLE MATERIAL BELOW GRADE IF ENCOUNTERED, TO SUITABLE DEPTHS AS DIRECTED BY ENGINEER AND REPLACE WITH CLEAN GRANULAR FILL.
5. PAYMENT FOR PERMANENT HMA TRENCH PATCHING SHALL BE PAID FOR UNDER ITEM 451. HMA FOR PATCHING. PAYMENT FOR TEMPORARY HMA TRENCH PATCHING SHALL BE PAID FOR UNDER ITEM 472. TEMPORARY ASPHALT PATCHING.
6. ALL TRENCH CONSTRUCTION TO CONFORM TO APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.
7. COMPACT FILL AND TAMP PIPE TO 95% MAX. DENSITY UNLESS OTHERWISE SPECIFIED.

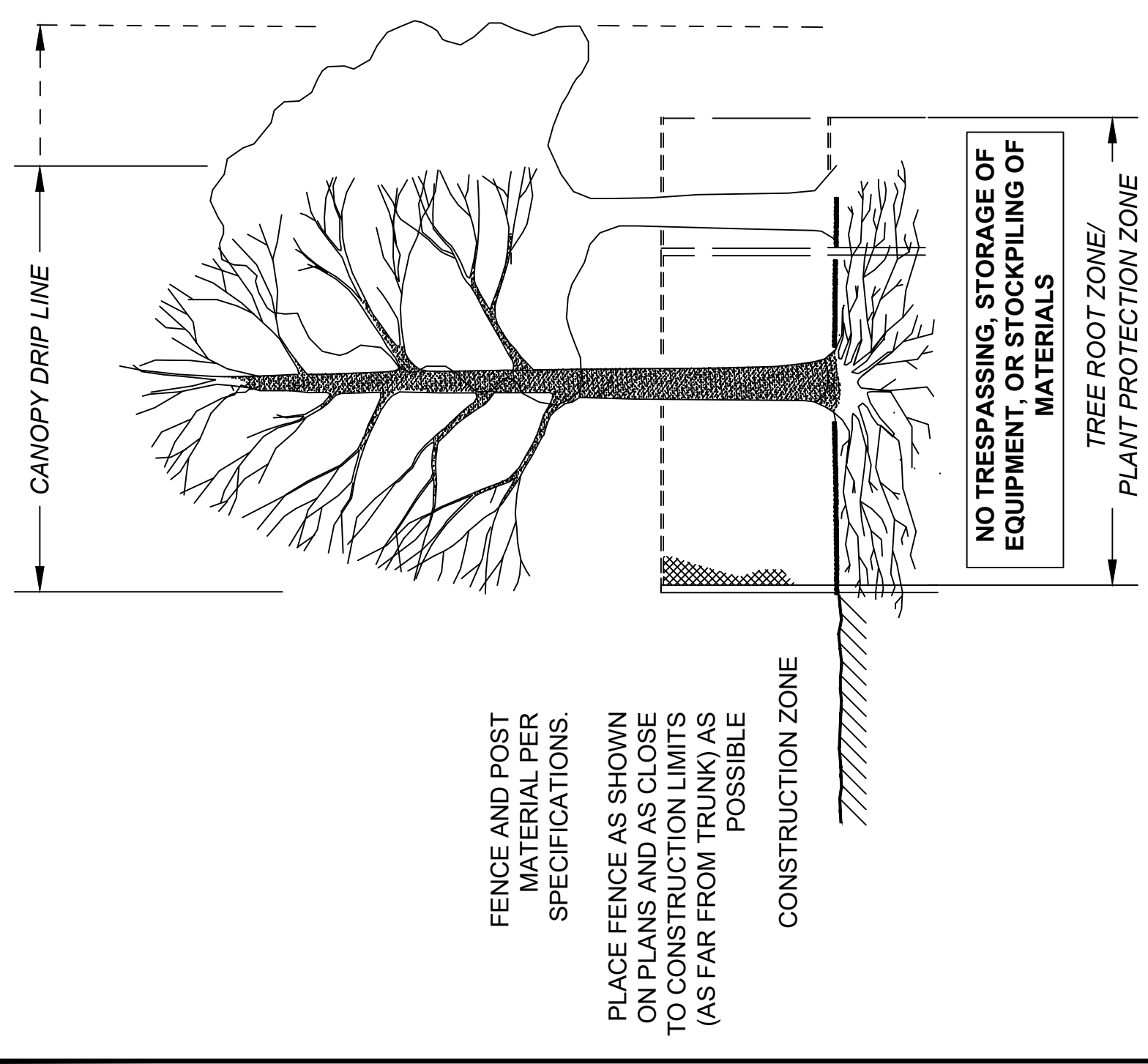
TRENCH WIDTH	
D	W
DIAMETER OF PIPE TO 12"	UNSHREETED
14" TO 24"	4'
30" TO 36"	5'
	6'

4" TOPSOIL & SEED
SHEETING (IF REQ'D) TO BE CUT OFF 5" MIN. BELOW GROUND & 1" MIN. ABOVE TOP OF PIPE
ANY SHEETING DRIVEN BELOW MID-DIA. OF PIPE SHALL BE LEFT IN PLACE WATER, SEWER, DRAIN, OR FORCE MAIN PIPE
BACKFILL (SEE NOTES)

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	25	26
PROJECT FILE NO.		606517	

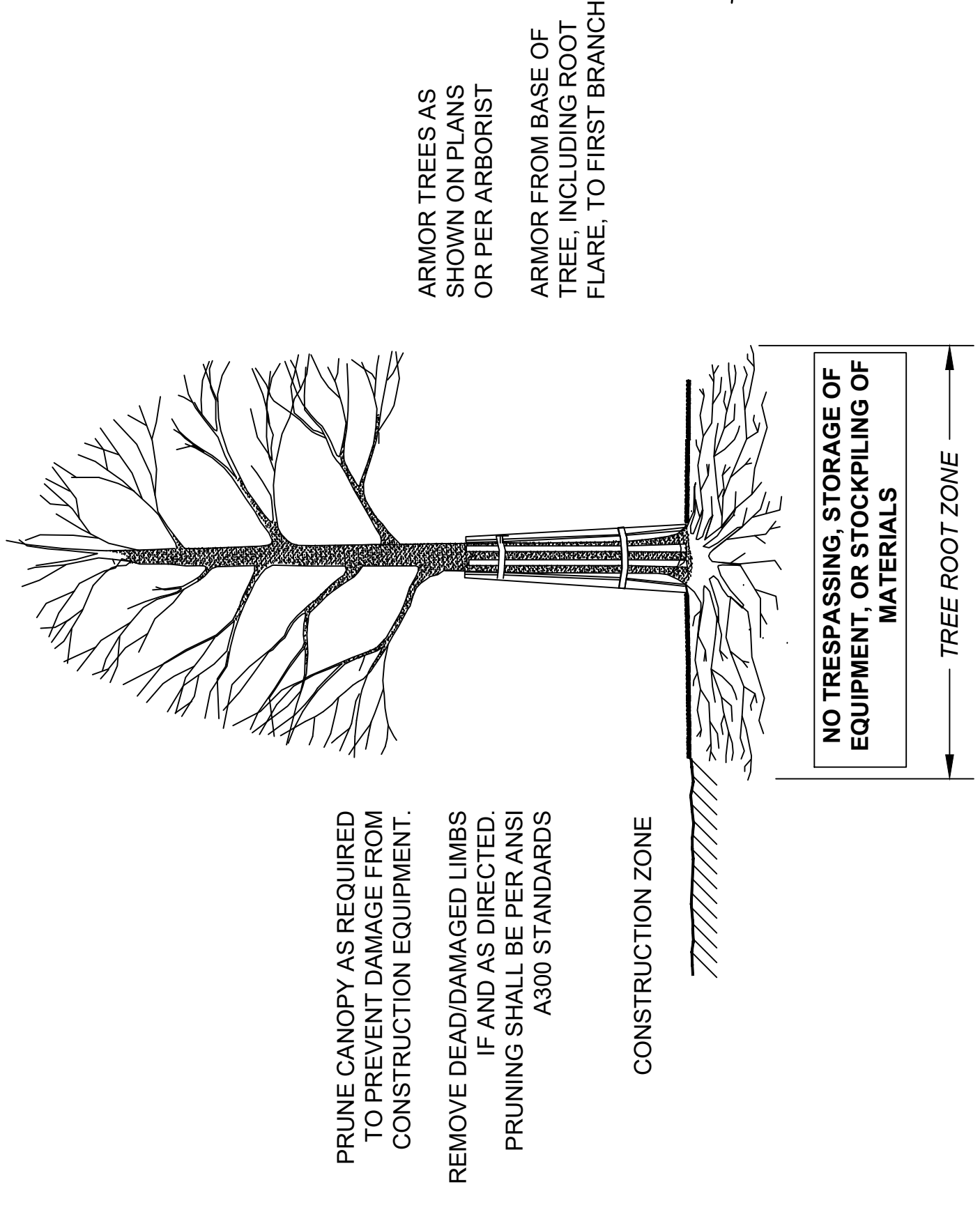
CONSTRUCTION DETAILS - 2



SECTION - FENCE PROTECTION OF ROOT ZONE

TREE PROTECTION ROOT ZONE

NOT TO SCALE



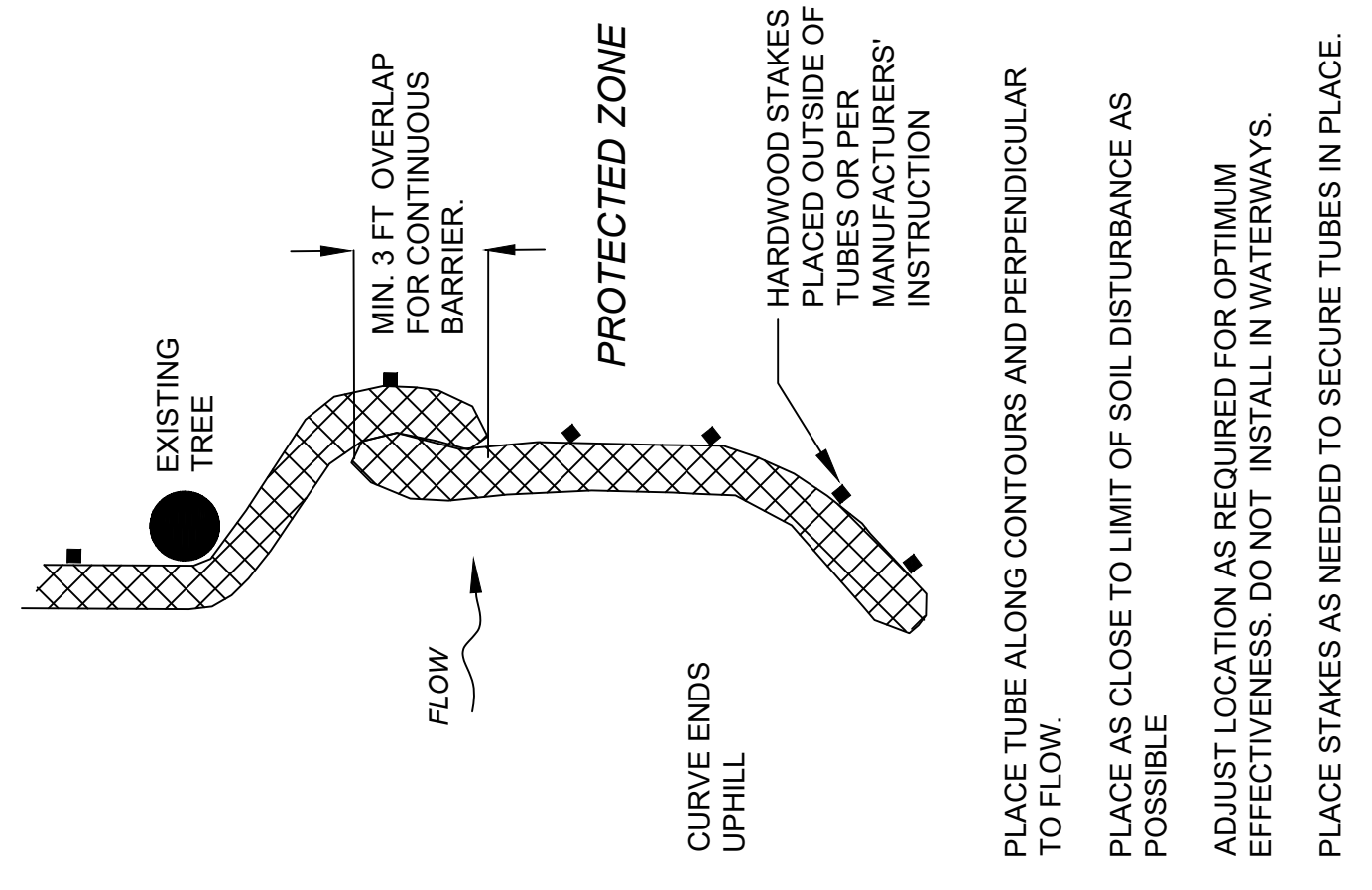
SECTION - TRUNK ARMORING & PRUNING

TREE PROTECTION TRUNK

SILT SACK

NOT TO SCALE

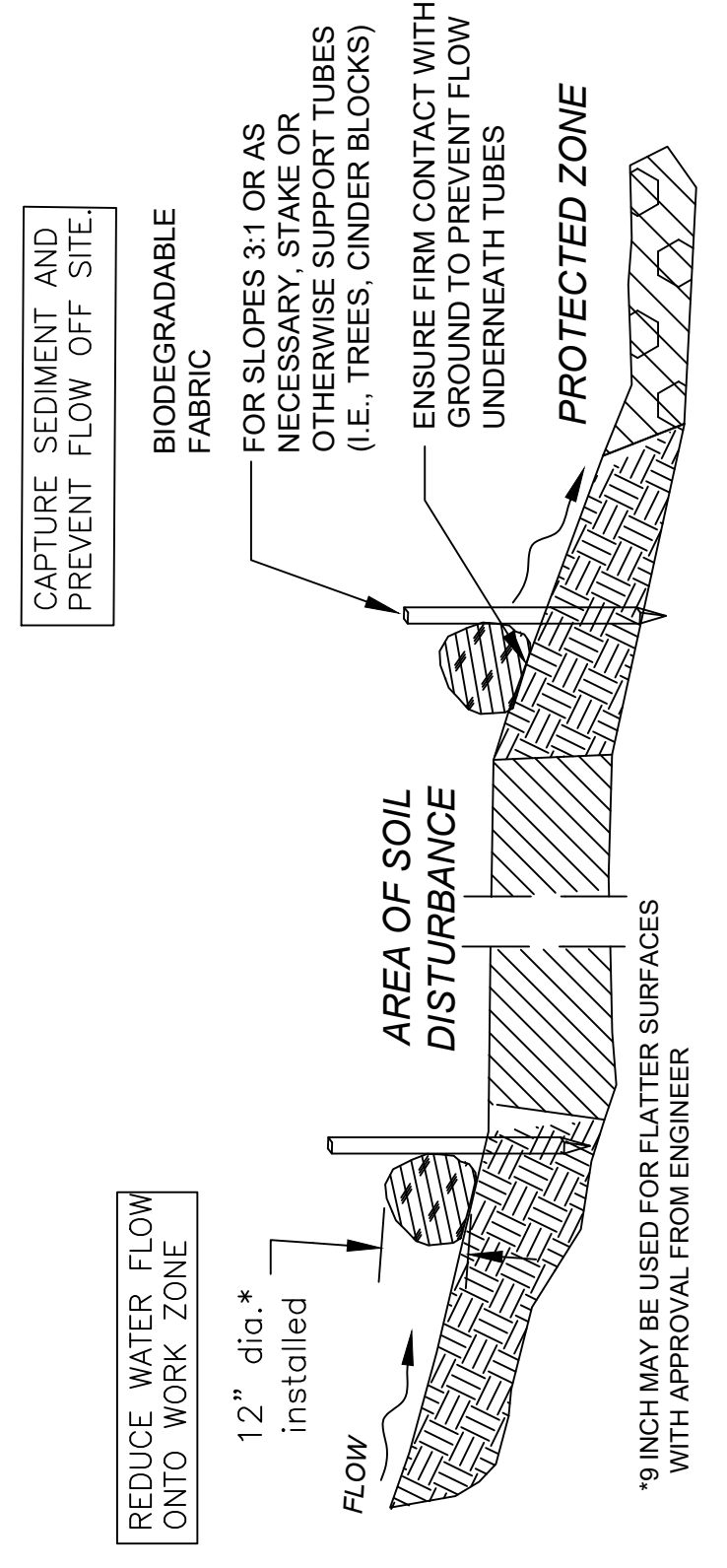
- NOTES:
1. REMOVE ACCUMULATED SEDIMENTS AS REQUIRED TO MAINTAIN DRAINAGE
 2. INSPECT FABRIC EVERY WEEK DURING CONSTRUCTION.



PLAN VIEW

SEDIMENT BARRIERS

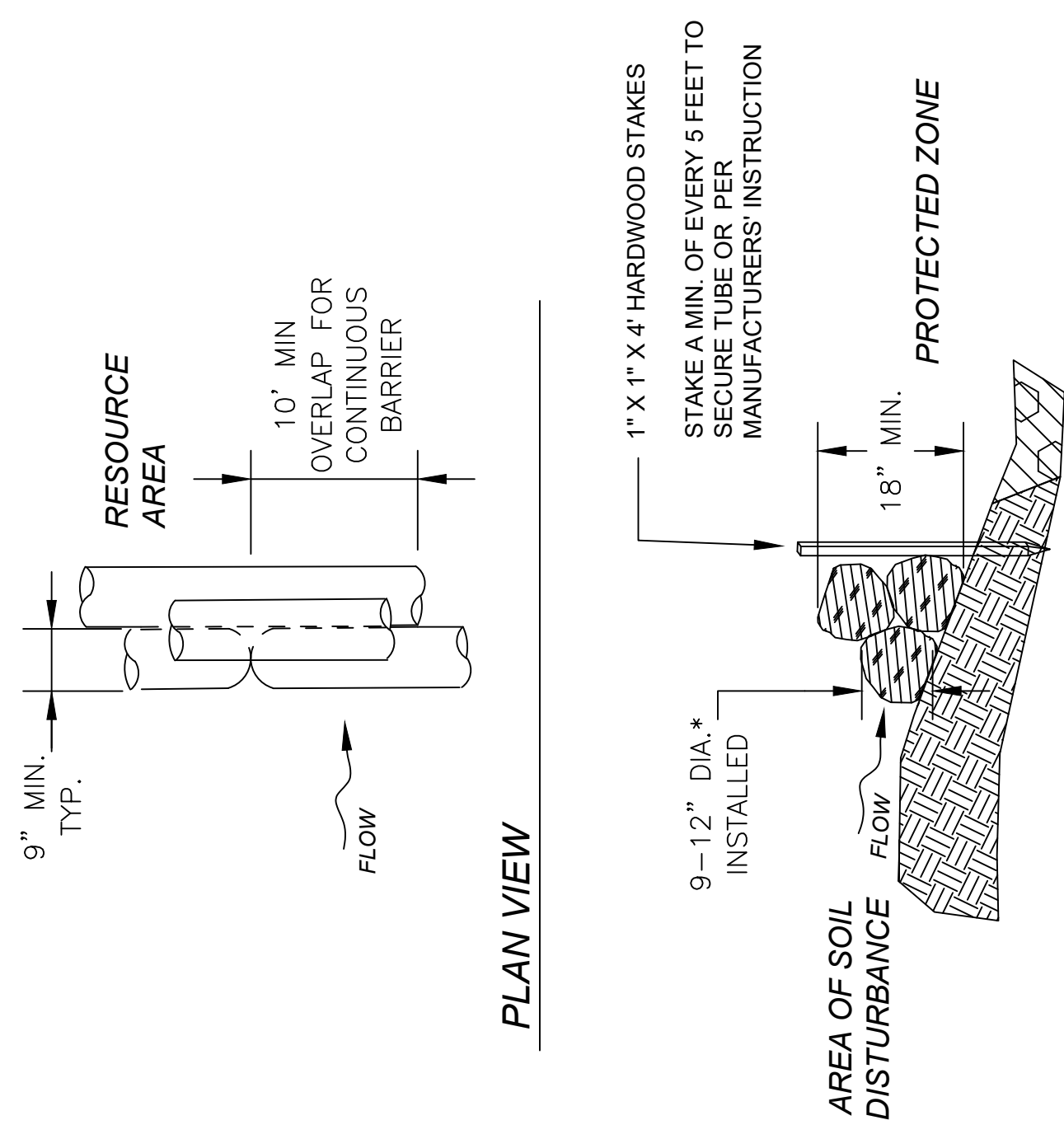
NOT TO SCALE



SECTION

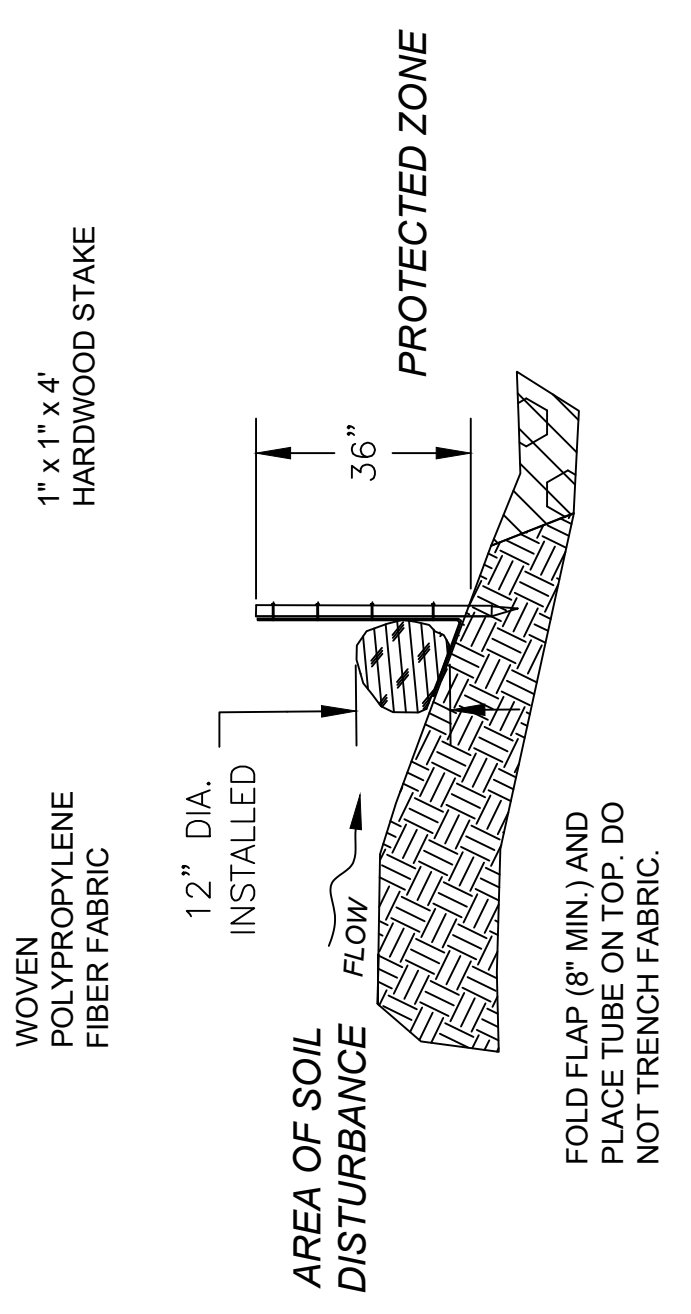
SEDIMENT BARRIERS - COMPOST FILTER TUBES

NOT TO SCALE



COMPOST FILTER TUBE BERM (SLOPES 2:1 OR STEEPER)

NOT TO SCALE



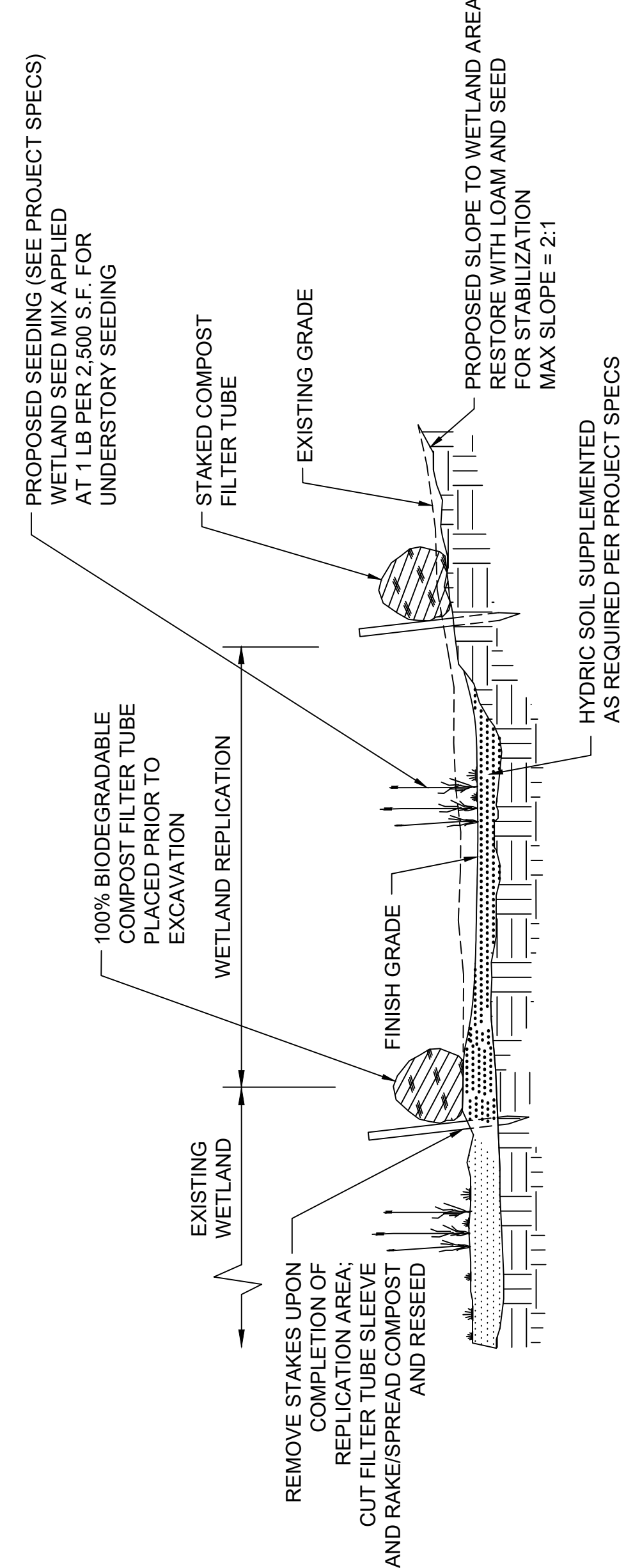
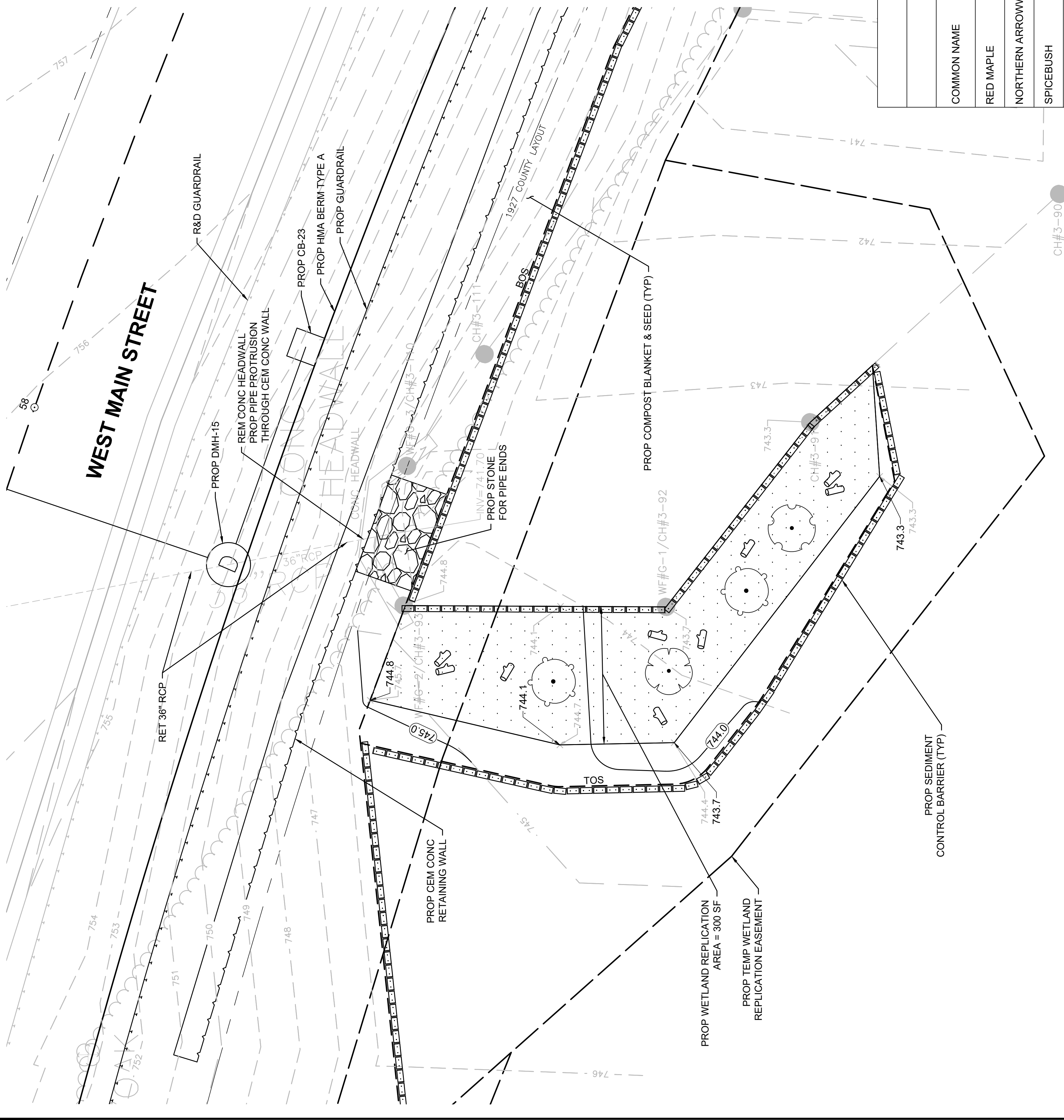
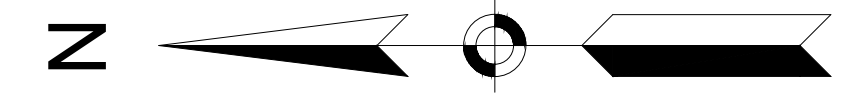
COMPOST FILTER TUBE & SILT FENCE

NOT TO SCALE

**WEST BROOKFIELD
WEST MAIN STREET (ROUTE 9)**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		26	26
PROJECT FILE NO. 606517			

CONSTRUCTION DETAILS - 3

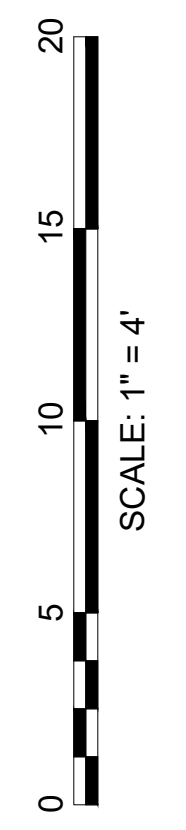


**WETLAND REPLICATION AREA
TYPICAL DETAIL
STA 58+00 RT
NOT TO SCALE**

COMMON NAME		LATIN NAME	STATUS	PLANTING DENSITY/COMMENTS	NUMBER WETLAND G/N
RED MAPLE		Acer rubrum	FAC	1 PLANT / 225 S.F., PROVIDES FOOD AND COVER FOR WILDLIFE	1
NORTHERN ARROWWOOD		Viburnum dentatum	FAC	1 PLANT / 100 S.F., PROVIDES FOOD AND COVER FOR WILDLIFE	2
SPICEBUSH		Lindera benzoin	FACW-	1 PLANT / 100 S.F., ONE OF THE MOST HIGHLY REGARDED SPECIES FOR WILDLIFE	1
GROUND COVER					
WETLAND / BASIN MIX - SEASONALLY FLOODED					0.15 LBS
ROADSIDE-RIVERFRONT MIX (BUFFER ZONE)					0.15 LBS

**WETLAND REPLICATION AREA
STA 58+00 RT**

1" = 10'



DOCUMENT A00861

MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL PROTECTION

ORDER OF CONDITIONS

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TOWN OF WEST BROOKFIELD

CONSERVATION COMMISSION

DATE:

RE: Order of Conditions

DEP#

Dear

West Brookfield Highway Dept.

Enclosed is your original copy of the Order of Conditions, issued pursuant to the Wetlands Protection Act, General Laws, Ch. 131, Sec. 40 and the West Brookfield Wetland Bylaw for the above referenced project. This is the permit from the Conservation Commission that outlines your responsibilities to the Conservation Commission. Please take the time to carefully read all requirements that the commission has listed. The Order of Conditions lists standards that must be followed before, during and after project construction.

No work on the project may begin until the following requirements have been satisfied:

- The applicant has signed and returned the attached Certificate of Understanding. (This DOES NOT need to be recorded at the Registry of Deeds.)
- The 10-business day appeal period has elapsed. The appeal period begins on the date of issuance of this Order.
- You must record this original copy of your Order of Conditions in the chain of title of the property at the Worcester County Registry of Deeds. This is required and is explained on Page 13 of this Order. Please bring this original copy of the Order to the Registry and return page 13, completed and stamped, to the Conservation Commission. Proof of recording must be provided to the Commission before any work begins.
- The DEP file number sign(s) have been erected at the project entrance (as required in General Condition 10 of the Order and is facing the lake.
- It is also important for the erosion control measures to be followed and for a preconstruction meeting to be scheduled.
- The owner has read and understands the enclosed Order of Conditions. It is the responsibility of the owner/applicant to ensure that all conditions and approved plans are complied with. Deviation from the approved plans or conditions may result in a stop work order or further enforcement, as well as the inability to obtain a Certificate of Compliance at the project completion. The commission will be closely monitoring your compliance with all Order of Conditions. An Enforcement Order may be issued or the Order of Conditions may be revoked if work does not comply with any of the enclosed conditions.
- Please note that there are other requirements in the Order of Conditions that must occur before work may be initiated on the site. Please be sure to read the whole Order before beginning work. It is the owner's responsibility to comply with all aspects of the order.



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
32 9- 0237
MassDEP File #

eDEP Transaction #
West Brookfield
City/Town

A. General Information

Please note:
this form has
been modified
with added
space to
accommodate
the Registry
of Deeds
Requirements

Important:
When filling
out forms on
the
computer,
use only the
tab key to
move your
cursor - do
not use the
return key.



1. From: West Brookfield
Conservation Commission

2. This issuance is for
(check one): a. Order of Conditions b. Amended Order of Conditions

3. To: Applicant:

James a. First Name Daley b. Last Name

West Brookfield Highway Department c. Organization

2 East Main Street / P.O.Box 372 d. Mailing Address

West Brookfield e. City/Town MA f. State 01585 g. Zip Code

4. Property Owner (if different from applicant):

a. First Name _____ b. Last Name _____

c. Organization _____

d. Mailing Address _____

e. City/Town _____ f. State _____ g. Zip Code _____

5. Project Location:

Rte. 9 - Ware Town Line to Rock House a. Street Address West Brookfield, MA 01585 b. City/Town

Maps 23 & 24 c. Assessors Map/Plat Number _____ d. Parcel/Lot Number _____

Latitude and Longitude, if known: 42d16m07s d. Latitude 72d12m20s e. Longitude



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
9- 0237
MassDEP File #

eDEP Transaction #
West Brookfield
City/Town

A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):
Worcester
 a. County _____ b. Certificate Number (if registered land) _____
 c. Book _____ d. Page _____
7. Dates: a. Date Notice of Intent Filed _____ b. Date Public Hearing Closed _____ c. Date of Issuance _____
8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):
Conservation Commission Plan
 a. Plan Title _____
 b. Prepared By _____ c. Signed and Stamped by _____
 d. Final Revision Date _____ e. Scale _____
 f. Additional Plan or Document Title _____ g. Date _____

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:
 Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:
- | | | |
|--|---|--|
| a. <input type="checkbox"/> Public Water Supply | b. <input type="checkbox"/> Land Containing Shellfish | c. <input type="checkbox"/> Prevention of Pollution |
| d. <input type="checkbox"/> Private Water Supply | e. <input type="checkbox"/> Fisheries | f. <input type="checkbox"/> Protection of Wildlife Habitat |
| g. <input type="checkbox"/> Groundwater Supply | h. <input type="checkbox"/> Storm Damage Prevention | i. <input type="checkbox"/> Flood Control |
2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

- a. the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
 9- 0237
 MassDEP File #

eDEP Transaction #
West Brookfield
 City/Town

B. Findings (cont.)

Denied because:

- b. the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**
- c. the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**
- 3. Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a)

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. <input checked="" type="checkbox"/> Bank	80 a. linear feet		80 restoration	
5. <input checked="" type="checkbox"/> Bordering Vegetated Wetland	140 a. square feet		300 replication	
6. <input checked="" type="checkbox"/> Land Under Waterbodies and Waterways	385 a. square feet		385 restoration	
7. <input type="checkbox"/> Bordering Land Subject to Flooding	e. c/y dredged	f. c/y dredged		
Cubic Feet Flood Storage	a. square feet	b. square feet	c. square feet	d. square feet
8. <input type="checkbox"/> Isolated Land Subject to Flooding	e. cubic feet	f. cubic feet	g. cubic feet	h. cubic feet
Cubic Feet Flood Storage	a. square feet	b. square feet		
9. <input type="checkbox"/> Riverfront Area	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
Sq ft within 100 ft	a. total sq. feet	b. total sq. feet		
Sq ft between 100-200 ft	c. square feet	d. square feet	e. square feet	f. square feet
	g. square feet	h. square feet	i. square feet	j. square feet



**Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands**

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

9- 0237

MassDEP File #

eDEP Transaction #

West Brookfield

City/Town

B. Findings (cont.)

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. <input type="checkbox"/> Designated Port Areas				
11. <input type="checkbox"/> Land Under the Ocean	Indicate size under Land Under the Ocean, below			
	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. <input type="checkbox"/> Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. <input type="checkbox"/> Coastal Beaches	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
14. <input type="checkbox"/> Coastal Dunes	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
15. <input type="checkbox"/> Coastal Banks	a. linear feet	b. linear feet		
16. <input type="checkbox"/> Rocky Intertidal Shores	a. square feet	b. square feet		
17. <input type="checkbox"/> Salt Marshes	a. square feet	b. square feet	c. square feet	d. square feet
18. <input type="checkbox"/> Land Under Salt Ponds	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. <input type="checkbox"/> Land Containing Shellfish	a. square feet	b. square feet	c. square feet	d. square feet
20. <input type="checkbox"/> Fish Runs	a. square feet	b. square feet	c. square feet	d. square feet
	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
21. <input type="checkbox"/> Land Subject to Coastal Storm Flowage	a. c/y dredged	b. c/y dredged		
	a. square feet	b. square feet		
22. <input type="checkbox"/> Riverfront Area	a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet



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B. Findings (cont.)

* #23. If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c (BVW) or B.17.c (Salt Marsh) above, please enter the additional amount here.

23. Restoration/Enhancement *:

a. square feet of BVW _____

b. square feet of salt marsh _____

24. Stream Crossing(s):

a. number of new stream crossings _____

b. number of replacement stream crossings _____

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
 - a. The work is a maintenance dredging project as provided for in the Act; or
 - b. The time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
 - c. If the work is for a Test Project, this Order of Conditions shall be valid for no more than one year.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order. An Order of Conditions for a Test Project may be extended for one additional year only upon written application by the applicant, subject to the provisions of 310 CMR 10.05(11)(f).
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on _____ unless extended in writing by the Department.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.



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C. General Conditions Under Massachusetts Wetlands Protection Act

8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.
9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.
10. A sign shall be displayed at the site not less than two square feet or more than three square feet in size bearing the words,

"Massachusetts Department of Environmental Protection" [or, "MassDEP"]
 "File Number 329-0237"
11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.
12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.
13. The work shall conform to the plans and special conditions referenced in this order.
14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.
15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.
16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.



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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.
18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.
19. The work associated with this Order (the "Project")
 - (1) is subject to the Massachusetts Stormwater Standards
 - (2) is NOT subject to the Massachusetts Stormwater Standards

If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:

- a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.
- b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
 - i. all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
 - ii. as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
 - iii. any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;



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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

- iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;
- v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.
- c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement") for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following:
- i.) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and
- ii.) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.
- d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.
- e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 18(f) through 18(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 18(f) through 18(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.
- f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.



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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

- g) The responsible party shall:
 - 1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
 - 2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
 - 3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.
 - h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.
 - i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.
 - j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.
 - k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.
 - l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.
- Special Conditions (if you need more space for additional conditions, please attach a text document):

See Attachment 5

- 20. For Test Projects subject to 310 CMR 10.05(11), the applicant shall also implement the monitoring plan and the restoration plan submitted with the Notice of Intent. If the conservation commission or Department determines that the Test Project threatens the public health, safety or the environment, the applicant shall implement the removal plan submitted with the Notice of Intent or modify the project as directed by the conservation commission or the Department.



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D. Findings Under Municipal Wetlands Bylaw or Ordinance

- 1. Is a municipal wetlands bylaw or ordinance applicable? Yes No
- 2. The Conservation Commission hereby finds (check one that applies):

a. that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw, specifically:

1. Municipal Ordinance or Bylaw _____ 2. Citation _____

Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

b. that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

1. Municipal Ordinance or Bylaw _____ 2. Citation _____

- 3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):



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E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance. Please indicate the number of members who will sign this form. This Order must be signed by a majority of the Conservation Commission.

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

1. Date of Issuance
3 SC
2. Number of Signers

Signature <u><i>Richard Provencher</i></u>	Richard Provencher / Chair preson	3-13-24
Signature _____	Printed Name	
Signature <u><i>Brian Silva</i></u>	Brian Silva	
Signature _____	Printed Name	
Signature <u><i>Steve Carol</i></u>	Steve Carol	3/13/24 SC
Signature _____	Printed Name	
Signature <u><i>Paul Lussier</i></u>	Paul Lussier	3-13-24
Signature _____	Printed Name	
Signature _____	Printed Name	
Signature _____	Printed Name	
Signature _____	Printed Name	
Signature _____	Printed Name	

by hand delivery on

Date _____

by certified mail, return receipt requested, on

Date _____



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F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request for Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.



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G. Recording Information

Prior to commencement of work, this Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

West Brookfield
Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:
West Brookfield
Conservation Commission

Please be advised that the Order of Conditions for the Project at:

Project Location 329-
MassDEP File Number

Has been recorded at the Registry of Deeds of:

County Book Page

for: Property Owner

and has been noted in the chain of title of the affected property in:

Book Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

Special Conditions for DEP Project Number 329-0237.

1. All work will be limited to the notice of intent dated 3-6-24 and associated plans, which shall be deemed part of the notice of intent. All the documents submitted and presented will become part of the notice of intent.
2. It is the responsibility of the applicant and/or successors to ensure that these conditions are met. Any changes or errors in the plans or information submitted must be approved by the conservation commission prior to implementation.
3. The owner or agent must schedule a preconstruction meeting with a member of the conservation commission to validate that erosion control measures are installed according to the site plan and that a DEP Project number is properly posted.
4. Prior to any work on the site all erosion control measures shall be installed in accordance with the site plan. This shall include a silt fence and straw wattles. The conservation commission may require additional or modified erosion control measures at any time during the project.
5. All erosion and sediment control measures are to be maintained in good repair by the owner or designee until the disturbed areas are fully stabilized with vegetation or other meas. At no time may sediments be deposited in a wetland area. The conservation commission reserves the right to determine whether erosion and sediment control measures are no longer needed, at which time they may be removed.
6. Members and agents or the conservation commission shall have the right to enter and inspect the property to evaluate and ensure compliance with this order, the act and 310 CMR 10.0 as well as DEP policies. The commission may acquire any information measurements, photographs, observations and/or materials or may request the submittal of any data or information deemed necessary for that evaluation.
7. No clearing or trees or disturbing of soil prior to the preconstruction meeting, except that minimal disturbance of shrubs and herbaceous plants necessary to place erosion control measures.
8. Any proposed changes to the plans approved under this order of conditions shall require a new notice of intent or have written approval of the conservation commission.
9. All disturbed areas shall be permanently stabilized with rapidly growing cover and sufficient topsoil and/or landscaping material to assure long term stabilization of the disturbed areas. Maintenance of these areas in a manner that assures permanent stabilization and precludes any soil erosion shall be the responsibility of the owner of record of the property subject to this order.
10. Any damage caused as a direct result of this project to any wetland resource area shall be the responsibility of the owner or applicant to repair or restore.
11. Dumping prohibited: there shall be no dumping of leaves, grass clippings, brush or other debris into the wetland resource area. This condition shall survive the expiration of this order and shall be included as continuing condition in perpetuity on the certificate of compliance.

12. Prior to the start of work a plan shall be developed and submitted to the conservation commission for review for the protection of trees in the buffer zone during construction activities. The plan shall address how trees and tree roots will be protected throughout the construction. Any damage shall be reported to the conservation commission and shall require a suitable replacement.
13. Applicant must deliver to the conservation commission the completed recording information within ten business days from the date of receipt of the order of conditions.
14. Upon completion of the work covered by this order the applicant is responsible to submit a for 8A request for certificate of completion along with a written statement of work completed for the order to the conservation commission.

Route 9/West Main Street Rehabilitation & Related Work Notice of Intent

Response to DEP Comments (DEP CERO #CE 329-0237)

Peak discharge rates will increase at all control points during all storms. The applicant should evaluate whether these increases will cause or exacerbate downstream flooding. Can additional detention be incorporated into the project design to better meet Stormwater Standard 2?

CHA has reviewed peak discharge rates at control points during storm events. Increases will be minor (less than 5 c.f.s). and are not anticipated to impact downstream flooding. Additional detention would not be practicable due to the limitations of available right-of-way and impacts to the environment that would result (impacts to trees and wetlands).

Sizing should be provided for all areas of stone pipe end protection to demonstrate that velocities will be adequately dissipated during storm events.

Stone pipe end protection has been designed in accordance with MassDOT standards and available right-of-way.

The site plans should include the locations of proposed treelines.

The limits of clearing & grubbing depicted on the site plans represent the proposed treelines.

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DOCUMENT A00870

**UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
CONCURRENCE VERIFICATION LETTER**

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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:

August 21, 2023

Project code: 2023-0005804

Project Name: 606517 - WEST BROOKFIELD- RESURFACING & RELATED WORK ON RE 9, FROM WARE T.L. TO WELCOME ROAD

Subject: Concurrence verification letter for the '606517 - WEST BROOKFIELD- RESURFACING & RELATED WORK ON RE 9, FROM WARE T.L. TO WELCOME ROAD' 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 August 21, 2023 to verify that the **606517 - WEST BROOKFIELD- RESURFACING & RELATED WORK ON RE 9, FROM WARE T.L. TO WELCOME ROAD** (Proposed Action) may rely on the concurrence provided in 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 (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 is within the scope and adheres to the criteria of the PBO, including the adoption of applicable avoidance and minimization measures, and may affect, but is not likely to adversely affect (NLAA) the endangered Indiana bat (*Myotis sodalis*) and/or the endangered northern long-eared bat (*Myotis septentrionalis*). Consultation with the Service pursuant to section 7(a)(2) of ESA (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) is required.

The Service has 14 calendar days to notify the lead Federal action agency or designated non-federal representative if we determine that the Proposed Action does not meet the criteria for a NLAA determination under the PBO. If we do not notify the lead Federal action agency or designated non-federal representative within that timeframe, you may proceed with the Proposed Action under the terms of the NLAA concurrence provided in the PBO. 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.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities: If your initial bridge/culvert or structure assessment documented signs of bat use or occupancy, or an assessment failed to detect Indiana bats and/or NLEBs, yet are 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 any potential take. In these instances, potential incidental take of Indiana bats and/or NLEBs is covered under the Incidental Take Statement in the 2018 FHWA, FRA, FTA PBO (provided that the take is reported to the Service).

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 assessments failed to detect Indiana bats and/or NLEB use or occupancy, yet bats are 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 any 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 contact this Service Office.

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Candidate

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

606517 - WEST BROOKFIELD- RESURFACING & RELATED WORK ON RE 9, FROM WARE T.L. TO WELCOME ROAD

DESCRIPTION

606517 - WEST BROOKFIELD- RESURFACING & RELATED WORK ON ROUTE 9, FROM WARE T.L. TO 850' WEST OF WELCOME ROAD (1.1 MILES - PHASE I)
Route 9 between the Ware Town Line and 850' west of Welcome Road (1.1 miles) will be widened to provide appropriate bicycle accommodation and resurfaced. Drainage improvements are proposed to remove stormwater runoff and snowmelt from the highway. Guardrail will be replaced as required and new signage and pavement markings will be included.

Monarch Butterfly: Candidate Species only, no conservation measures at this time.

DETERMINATION KEY RESULT

Based on your answers provided, this project(s) may affect, but is not likely to adversely affect the endangered Indiana bat and/or the endangered northern long-eared 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 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.

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. Which Federal Agency is the lead for the action?

A) *Federal Highway Administration (FHWA)*

4. Are *all* project activities limited to non-construction^[1] activities only? (examples of non-construction activities include: bridge/abandoned structure assessments, surveys, planning and technical studies, property inspections, and property sales)

[1] Construction refers to activities involving ground disturbance, percussive noise, and/or lighting.

No

5. Does the project include *any* activities that are **greater than** 300 feet from existing road/rail surfaces^[1]?

[1] Road surface is defined as the actively used [e.g. motorized vehicles] driving surface and shoulders [may be pavement, gravel, etc.] and rail surface is defined as the edge of the actively used rail ballast.

No

6. Does the project include *any* activities **within** 0.5 miles of a known Indiana bat and/or NLEB hibernaculum^[1]?

[1] For the purpose of this consultation, a hibernaculum is a site, most often a cave or mine, where bats hibernate during the winter (see suitable habitat), but could also include bridges and structures if bats are found to be hibernating there during the winter.

No

7. Is the project located **within** a karst area?

No

8. Is there *any* suitable^[1] summer habitat for Indiana Bat or NLEB **within** the project action area^[2]? (includes any trees suitable for maternity, roosting, foraging, or travelling habitat)

[1] See the Service's [summer survey guidance](#) for our current definitions of suitable habitat.

[2] The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR Section 402.02). Further clarification is provided by the [User's Guide for the Range-wide Programmatic Consultation for Indiana Bat and Northern Long-eared Bat](#).

Yes

9. Will the project remove *any* suitable summer habitat^[1] and/or remove/trim any existing trees **within** suitable summer habitat?

[1] See the Service's [summer survey guidance](#) for our current definitions of suitable habitat.

Yes

10. Will the project clear more than 20 acres of suitable habitat per 5-mile section of road/rail?

No

11. Have presence/probable absence (P/A) summer surveys^{[1][2]} been conducted^{[3][4]} **within** the suitable habitat located within your project action area?

[1] See the Service's [summer survey guidance](#) for our current definitions of suitable habitat.

[2] Presence/probable absence summer surveys conducted within the fall swarming/spring emergence home range of a documented Indiana bat hibernaculum (contact local Service Field Office for appropriate distance from hibernacula) that result in a negative finding requires additional consultation with the local Service Field Office to determine if clearing of forested habitat is appropriate and/or if seasonal clearing restrictions are needed to avoid and minimize potential adverse effects on fall swarming and spring emerging Indiana bats.

[3] For projects within the range of either the Indiana bat or NLEB in which suitable habitat is present, and no bat surveys have been conducted, the transportation agency will assume presence of the appropriate species. This assumption of presence should be based upon the presence of suitable habitat and the capability of bats to occupy it because of their mobility.

[4] Negative presence/probable absence survey results obtained using the [summer survey guidance](#) are valid for a minimum of two years from the completion of the survey unless new information (e.g., other nearby surveys) suggest otherwise.

Yes

SUBMITTED DOCUMENTS

- 606517_rpt_westbrookfield_nleb_survey_20221011.pdf <https://ipac.ecosphere.fws.gov/project/ZAIH6X6VGIJGNHD4D53HELCM/projectDocuments/118205133>

12. Did the presence/probable absence (P/A) summer surveys detect Indiana bats and/or NLEB^[1]?

[1] P/A summer surveys conducted within the fall swarming/spring emergence home range of a documented Indiana bat hibernaculum (contact local Service Field Office for appropriate home range) that result in a negative finding requires additional consultation with the local Service Field Office to determine if clearing of forested habitat is appropriate and/or if seasonal clearing restrictions are needed to avoid and minimize potential adverse effects on fall swarming and spring emerging Indiana bats.

No

13. Were the P/A summer surveys conducted **within** the fall swarming/spring emergence range of a documented Indiana bat hibernaculum^[1]?

[1] Contact the local Service Field Office for appropriate distance from hibernacula.

No

14. Does the project include activities **within documented NLEB habitat**^{[1][2]}?

[1] Documented roosting or foraging habitat – for the purposes of this consultation, we are considering documented habitat as that where Indiana bats and/or NLEB have actually been captured and tracked using (1) radio telemetry to roosts; (2) radio telemetry biangulation/triangulation to estimate foraging areas; or (3) foraging areas with repeated use documented using acoustics. Documented roosting habitat is also considered as suitable summer habitat within 0.25 miles of documented roosts.)

[2] For the purposes of this key, we are considering documented corridors as that where Indiana bats and/or NLEB have actually been captured and tracked to using (1) radio telemetry; or (2) treed corridors located directly between documented roosting and foraging habitat.

No

15. Will the removal or trimming of habitat or trees occur **within** suitable but **undocumented NLEB** roosting/foraging habitat or travel corridors?

Yes

16. What time of year will the removal or trimming of habitat or trees **within** suitable but **undocumented NLEB** roosting/foraging habitat or travel corridors occur?

C) During both the active and inactive seasons

17. Will *any* tree trimming or removal occur **within** 100 feet of existing road/rail surfaces?

Yes

18. Will *any* tree trimming or removal occur **between** 100-300 feet of existing road/rail surfaces?

No

19. Are *all* trees that are being removed clearly demarcated?

Yes

20. Will the removal of habitat or the removal/trimming of trees involve the use of **temporary** lighting?

Yes

21. Will the removal of habitat or the removal/trimming of trees include installing new or replacing existing **permanent** lighting?

No

22. Does the project include wetland or stream protection activities associated with compensatory wetland mitigation?

Yes

23. Does the project include slash pile burning?

No

24. Does the project include *any* bridge removal, replacement, and/or maintenance activities (e.g., any bridge repair, retrofit, maintenance, and/or rehabilitation work)?

No

25. Does the project include the removal, replacement, and/or maintenance of *any* structure other than a bridge? (e.g., rest areas, offices, sheds, outbuildings, barns, parking garages, etc.)

No

26. Will the project involve the use of *any* **temporary** lighting in addition to the lighting already indicated for habitat removal (including the removal or trimming of trees), or bridge/structure removal, replacement or maintenance activities?

Yes

27. Is there *any* suitable habitat **within** 1,000 feet of the location(s) where **temporary** lighting (other than the lighting already indicated for habitat removal (including the removal or trimming of trees) or bridge/structure removal, replacement or maintenance activities) will be used?

Yes

28. Will the project install new or replace existing **permanent** lighting?

No

29. Does the project include percussives or other activities (**not including tree removal/trimming or bridge/structure work**) that will increase noise levels above existing traffic/background levels?

Yes

30. Will the activities that use percussives (**not including tree removal/trimming or bridge/structure work**) and/or increase noise levels above existing traffic/background levels be conducted *during* the active season^[1]?

[1] Coordinate with the local Service Field Office for appropriate dates.

Yes

31. Will *any* activities that use percussives (**not including tree removal/trimming or bridge/structure work**) and/or increase noise levels above existing traffic/background levels be conducted *during* the inactive season^[1]?

[1] Coordinate with the local Service Field Office for appropriate dates.

Yes

32. Are *all* project activities that are **not associated with** habitat removal, tree removal/trimming, bridge and/or structure activities, temporary or permanent lighting, or use of percussives, limited to actions that DO NOT cause any additional stressors to the bat species?

Examples: lining roadways, unlighted signage , rail road crossing signals, signal lighting, and minor road repair such as asphalt fill of potholes, etc.

Yes

33. Will the project raise the road profile **above the tree canopy**?

No

34. Are the wetland or stream protection activities associated with compensatory wetland/stream mitigation portion of this project consistent with a Not Likely to Adversely Affect determination in this key?

Automatically answered

Yes, because your activities associated with compensatory wetland/stream mitigation activities do not clear suitable summer habitat and are not within 0.5 miles of Indiana bat or NLEB hibernaculum.

35. Are the project activities that use percussives (not including tree removal/trimming or bridge/structure work) consistent with a Not Likely to Adversely Affect determination in this key?

Automatically answered

Yes, because the activities are within 300 feet of the existing road/rail surface, greater than 0.5 miles from a hibernacula, and conducted during the active season within undocumented habitat.

36. Are the project activities that use percussives (not including tree removal/trimming or bridge/structure work) and/or increase noise levels above existing traffic/background levels consistent with a No Effect determination in this key?

Automatically answered

Yes, because the activities are within 300 feet of the existing road/rail surface, greater than 0.5 miles from a hibernacula, and conducted during the inactive season

37. Is the location of this project consistent with a Not Likely to Adversely Affect determination in this key?

Automatically answered

Yes, because no bats were detected during presence/probable absence surveys conducted during the summer survey season and outside of the fall swarming/spring emergence periods. Additionally, all activities were at least 0.5 miles from any hibernaculum.

38. **General AMM 1**

Will the project ensure *all* operators, employees, and contractors working in areas of known or presumed bat habitat are aware of *all* FHWA/FRA/FTA (Transportation Agencies) environmental commitments, including all applicable Avoidance and Minimization Measures?

Yes

PROJECT QUESTIONNAIRE

1. Have you made a No Effect determination for *all* other species indicated on the FWS IPaC generated species list?

N/A

2. Have you made a May Affect determination for *any* other species on the FWS IPaC generated species list?

N/A

3. How many acres^[1] of trees are proposed for removal between 0-100 feet of the existing road/rail surface?

[1] If described as number of trees, multiply by 0.09 to convert to acreage and enter that number.

2.8

AVOIDANCE AND MINIMIZATION MEASURES (AMMS)

This determination key result includes the commitment to implement the following Avoidance and Minimization Measures (AMMs):

GENERAL AMM 1

Ensure all operators, employees, and contractors working in areas of known or presumed bat habitat are aware of all FHWA/FRA/FTA (Transportation Agencies) environmental commitments, including all applicable AMMs.

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING NLEB OR INDIANA BAT

This key was last updated in IPaC on July 27, 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: Trevor Burns

Address: 10 Park Plaza

City: Boston

State: MA

Zip: 02116

Email: trevor.b.burns@dot.state.ma.us

Phone: 8574885122

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration



Stantec Consulting Services Inc.
5 Dartmouth Drive Suite 200, Auburn NH 03032-3984

October 11, 2022

Attention: Tim Dexter
Fish & Wildlife Program Coordinator
Massachusetts Department of Transportation – Highway Division
Ten Park Plaza, Room 4260
Boston, MA 02116-3973

Dear Tim,

Project	Northern Long-eared Bat (NLEB) Presence/Absence Survey
MassDOT Project #	606517
Town	West Brookfield, Massachusetts
Surveyor Name/Firm	Stantec Consulting Services Inc.
Detector Operation Dates	July 21–24, 2022
Survey Results	NLEB DETECTED BUT NOT CONFIRMED

The attached report contains the results of the Massachusetts Department of Transportation northern long-eared bat (*Myotis septentrionalis*; NLEB) summer presence/absence survey performed for proposed resurfacing and related work on Route 9 (MassDOT # 606517) in West Brookfield, Massachusetts. Acoustic detectors deployed by Stantec Consulting Services Inc. recorded one or more files identified as NLEB. Automated U.S. Fish and Wildlife Service-approved software (Kaleidoscope Pro version 5.4.7 [KPro]) identified 12 NLEB passes but did not indicate presence based on nightly maximum likelihood estimate scores. Presence of NLEB was not confirmed based on our qualitative assessment. Nine hundred ninety-nine individual bat passes were autotyped by KPro as the state-endangered little brown bat (*Myotis lucifugus*), and 170 passes were autotyped as the state-endangered tricolored bat (*Perimyotis subflavus*); presence of both species was confirmed during visual vetting. Five passes were autotyped as the state-endangered eastern small-footed bat (*Myotis leibii*) but were not confirmed during visual vetting. The required USFWS Region 5 Bat Reporting Form and 2022_MassDOT_Batsurvey_Stantec shapefile will be provided to you under separate cover.

Regards,

Stantec Consulting Services Inc.

Alex Pries
Project Manager
Phone: (603) 260-7434
Fax: (207) 729-2715
Alex.Pries@stantec.com

Attachment: NLEB Survey Report for West Brookfield, 606517

Design with community in mind



To: Tim Dexter, Fish and Wildlife Program Coordinator From: Alex Pries
 Massachusetts Department of Transportation Auburn, New Hampshire Office
 File: 179410726 Date: October 11, 2022

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

INTRODUCTION

The Massachusetts Department of Transportation (MassDOT) retained Stantec Consulting Services Inc. (Stantec) to conduct an acoustic survey for the presence or probable absence of populations of the federally threatened and state-listed endangered northern long-eared bat (*Myotis septentrionalis*; NLEB) for proposed resurfacing and related work on Route 9 in West Brookfield, Massachusetts (Project). The Project includes potential tree clearing along 2.89 kilometers (km) of forested habitat (Figure 1). The purpose of the survey was to determine if this species was using these forested areas at the Project during the 2022 summer maternity season. The survey was conducted according to methods outlined in the U.S. Fish and Wildlife Service's (USFWS) March 2022 *Range-wide Indiana Bat and Northern Long-eared Bat Summer Survey Guidelines* (USFWS Guidelines).¹ Stantec provided a Study Plan (Appendix A) for this acoustic survey to MassDOT on June 22, 2022, and USFWS on June 27, 2022, based on USFWS Guidelines. After USFWS indicated on July 11, 2022, that review of the Study Plan would be delayed, MassDOT approved commencement of field surveys on July 12, 2022, and Stantec conducted surveys on July 21–24. The USFWS Guidelines identified a survey window of May 15 to August 15 for acoustic surveys. This memorandum summarizes methods and results of the acoustic bat survey for the Project.

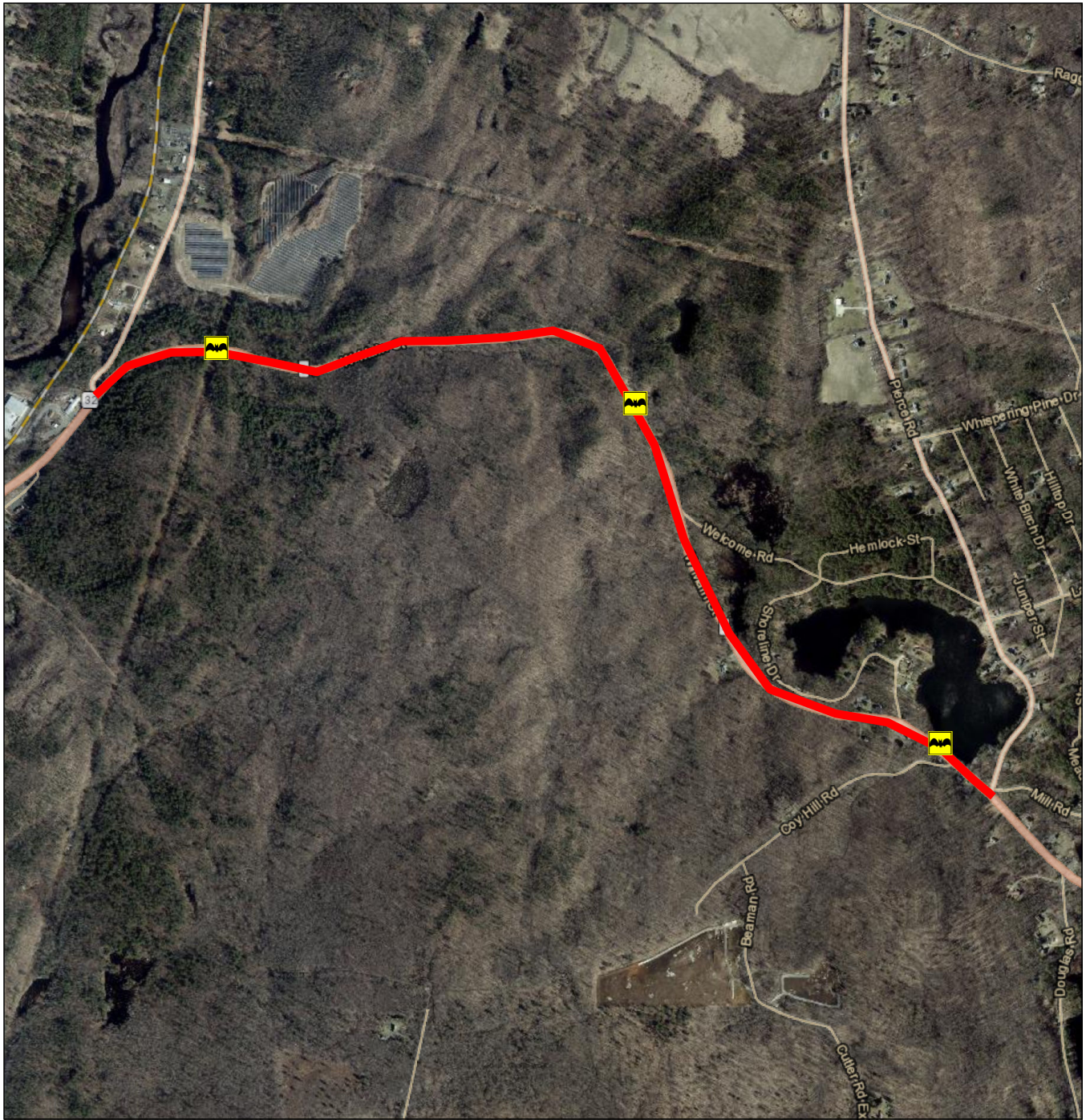
METHODS



FIELD SURVEY

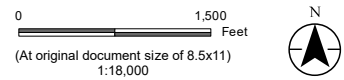
Surveys were conducted according to the methods outlined in the Study Plan (Appendix A). The USFWS Guidelines specify survey effort for acoustic surveys based either on an area method or a linear method. Stantec determined that the linear method was appropriate for this Project given the linear nature of potential tree clearing limits. Per survey efforts outlined in the USFWS Guidelines: Phase 2 Acoustic Surveys for linear projects, at least four detector-nights per km of suitable summer habitat were required for the Project. For the purposes of this survey, we have conservatively assumed that all forested areas immediately adjacent to the Project provide potential roost habitat for NLEB (e.g., suitable summer habitat) and may potentially be cleared during project construction. Accordingly, Stantec conducted 12 detector-nights (3 detectors deployed for 4 nights each) of acoustic surveys as outlined in the Study Plan.

Stantec identified three survey locations based on review of aerial imagery during desktop analysis, taking into consideration land permission access to the MassDOT right-of-way associated with the Project. Stantec biologists determined detector placement in the field according to USFWS Guidelines, positioning the detectors in locations that could be suitable as potential NLEB foraging habitat and appropriate for recording search-phase bat echolocations appropriate for identification. The detectors were positioned along forested edges next to clearings and a pond (Figure 1). We recorded the locations of the survey sites and habitat information using the Survey123 mobile app on an iPhone and photographed the sites (Appendix B).

¹ <https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines>



- Legend**
-  Acoustic Survey Location
 -  Project Area



Project Location
West Brookfield, Massachusetts

Prepared by MM on 2022-08-22
TR by KWH on 2022-08-22
IR Review by LJ on 2022-08-22

Client/Project
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

179410726

Figure No.
1

Title
Northern Long-eared Bat Acoustic Survey Location – West Brookfield

- Notes**
1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

C:\Irx V:\1956\A\dtive\Task Owner and other Non-BC\1956 Jobs\179410726\03_data\gis_cad\gis\mxds\179410726_DetectorsStudyPlan.mxd Revised: 2022-08-19 By: memason

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator

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Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

Stantec used three full-spectrum acoustic bat detectors (Wildlife Acoustics® Song Meter Mini Bat) for the survey, inspecting the detectors and ensuring the built-in omnidirectional microphones met manufacturer calibration standards before deployment. The microphones were tested again in the field with the use of ultrasonic noise and inspection of proper microphone response. Each detector was deployed in an area with minimal vegetation within 10 meters (m) and at least 3 m away from obstructions in any direction. Detectors were placed at least 200 m apart from one another. Each detector was mounted approximately 3 m above ground level and oriented horizontally to the ground to sample an optimal volume of air space in accordance with the USFWS Guidelines. The audio and data storage settings on each detector were set according to defaults recommended by the manufacturer (e.g., detectors will operate in “triggered.wav” mode using default trigger threshold settings). Each detector was set to record from 30 minutes before sunset until 30 minutes after sunrise and was powered with alkaline batteries.

DATA ANALYSIS

Although acoustic surveys focused on detecting NLEB, bat detectors are designed to detect all bats vocalizing in the vicinity of the detectors. Therefore, additional listed bat species can be detected, including eastern small-footed bat (*Myotis leibii*; state-listed endangered), little brown bat (*Myotis lucifugus*; state-listed endangered), and tricolored bat (*Perimyotis subflavus*; state-listed endangered). Though the federally endangered Indiana bat (*Myotis sodalis*) is listed as endangered in Massachusetts, the state occurs outside the known range of this species and Stantec does not believe that this species occurs at the Project. Therefore, Indiana bat was not included in acoustic analysis.

Stantec performed an initial coarse visual analysis of data to confirm that high frequency bats were recorded. Data were then analyzed using Kaleidoscope Pro Software version 5.4.7 (KPro; classifier version 5.4.0), using a “-1” sensitivity setting and selecting the appropriate species list for the Massachusetts region (excluding Indiana bat). This analysis method has been approved by the USFWS as suitable for analyzing full-spectrum bat data collected by SM4 units.

KPro analyzes each acoustic file and assigns it a bat species identification if the program determines it contains a bat call (pass) opposed to acoustic static. KPro also assigns a maximum likelihood estimate (MLE) to each species identified, at each detector site, for each night surveyed. According to the USFWS Guidelines, presence or probable absence of NLEB is based on the species’ MLE generated by KPro for each detector site for each night surveyed. An MLE of less than 0.05 indicates probable presence and an MLE greater than 0.05 indicates probable absence of that species at that detector site for that night.

Stantec visually vetted all files recorded on nights with probable NLEB presence (MLE of less than 0.05) to evaluate the plausibility of NLEB presence on those nights. We also reviewed all high frequency files identified as any state-listed bat species by the program to evaluate the plausibility of additional bat species of interest.

RESULTS

HABITAT SURVEY

The Project area includes a rural road traversing forested habitat and isolated residences. The Project area also includes a wetland edge next to a large pond, a few small open fields, and a transmission line corridor (Figure 1). The forested habitat consists of mixed forest dominated by eastern white pine (*Pinus strobus*), red maple (*Acer rubrum*), white birch (*Betula papyrifera*), yellow birch (*Betula alleghaniensis*), and northern

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Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

red oak (*Quercus rubra*), with minimal to moderate canopy closure. Many potential bat flight and foraging corridors and potential roost habitat exist within the site and the surrounding area.

FIELD SURVEY

Stantec deployed acoustic detectors on July 21, 2022, and surveys took place during the nights of July 21–24. Stantec monitored weather conditions at weather station KMAWESTB51 (Weather Underground, located approximately 2.1 miles east-southeast of the Project) after each night and confirmed that weather met the following parameters outlined in the USFWS Guidelines during the first 5 hours surveyed after sunset:

- Temperatures exceeded 50°F
- No precipitation or fog for 30 minutes or more
- Sustained wind speeds did not exceed 9 miles/hour for 30 minutes or more

The detectors were inspected in the field on July 25, 2022, to confirm proper operation during four nights of deployment. The detectors operated successfully during all nights of survey and were retrieved.

ACOUSTIC ANALYSIS

Coarse visual analysis confirmed presence of high-frequency bat passes at the site. We analyzed only the data from the first four nights of survey that met weather conditions, meeting the minimal level of survey effort according to the USFWS Guidelines. Analysis with KPro software identified three passes as NLEB but did not indicate presence of NLEB based on nightly MLE scores. Visual QA/QC, performed by Laura Berube and Caroline Byrne (see resumes in Appendix C), indicated no presence of NLEB; instead, these passes were determined to be state-endangered little brown bats or other high-frequency bat passes that could not be identified to species (Table 1).

KPro identified 999 other passes as state-endangered little brown bat and indicated presence for the species based on nightly MLE scores. Visual QA/QC determined presence of this species at all three detector sites (Table 1).

KPro identified 170 passes as state-endangered tricolored bat and indicated presence for the species based on nightly MLE scores. Visual QA/QC determined presence at all three detector sites (Table 1).

KPro also identified five passes as state-endangered eastern small-footed bat but did not indicate presence of the species based on nightly MLE scores. Visual QA/QC did not determine presence at the Project (Table 1).

Additional species recorded at the Project included big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), and eastern red bat (*Lasiurus borealis*). Overall, big brown bats accounted for most recorded bat activity, followed by little brown bats and then silver-haired bats. Of the three detector sites, site WB-1 had the most bat activity overall.

See Appendix D for examples of bat passes documented at the Project. Original full-spectrum and converted zero-crossing data files have been archived electronically and can be made available upon request. We have populated the USFWS Region 5 Bat Reporting Form and the 2022_MassDOT_Batsurvey_Stantec shapefile as electronic attachments.

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Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

Table 1. Acoustic analysis results for state- and/or federally listed bat species based on KPro software and visual QA/QC for acoustic surveys for Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts.

Species	Night	Detector Site			Visual QA/QC Notes
		KPro Analysis			
		# Passes (Nightly MLE Score)			
		WB-1	WB-2	WB-3	
northern long-eared bat	21-Jul	1 (1.00)	0 (1.00)	8 (1.00)	Presence not confirmed. Pass at WB-1 determined to be little brown bat pass and passes at WB-3 determined to be either little brown bat or high-frequency bat passes that could not be identified to species based on visual QA/QC
	22-Jul	0 (1.00)	0 (1.00)	0 (1.00)	No passes/No presence
	23-Jul	1 (1.00)	0 (1.00)	0 (1.00)	Presence not confirmed. Pass at WB-1 determined to be a high-frequency bat pass that could not be identified to species based on visual QA/QC
	24-Jul	0 (1.00)	0 (1.00)	2 (1.00)	Presence not confirmed. Passes at WB-3 determined to be high-frequency bat passes that could not be identified to species based on visual QA/QC
eastern small-footed bat	21-Jul	0 (1.00)	0 (1.00)	0 (1.00)	No passes/No presence
	22-Jul	2 (0.16)	0 (1.00)	1 (1.00)	Presence not confirmed. Passes at WB-1 determined to be either eastern red bat or little brown bat passes and pass at WB-3 determined to be little brown bat pass based on visual QA/QC
	23-Jul	0 (1.00)	0 (1.00)	0 (1.00)	No passes/No presence
	24-Jul	0 (1.00)	2 (0.01)	0 (1.00)	Presence not confirmed. Passes at WB-2 determined likely to be a little brown bat and a <i>Myotis</i> that could not be identified to species based on visual QA/QC
little brown bat	21-Jul	23 (0.00)	2 (0.78)	260 (0.00)	Presence confirmed based on visual QA/QC
	22-Jul	23 (<0.01)	9 (0.06)	129 (0.00)	Presence confirmed based on visual QA/QC
	23-Jul	23 (0.00)	9 (0.13)	299 (0.00)	Presence confirmed based on visual QA/QC
	24-Jul	16 (<0.01)	6 (0.03)	200 (0.00)	Presence confirmed based on visual QA/QC
tri-colored bat	21-Jul	7 (0.63)	16 (0.00)	9 (0.57)	Presence confirmed based on visual QA/QC
	22-Jul	10 (0.93)	26 (0.00)	5 (1.00)	Presence confirmed based on visual QA/QC
	23-Jul	9 (0.85)	42 (0.00)	5 (1.00)	Presence confirmed based on visual QA/QC
	24-Jul	9 (0.32)	8 (0.01)	24 (<0.01)	Presence confirmed based on visual QA/QC

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator

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Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

CONCLUSIONS

Acoustic surveys for the Project were conducted according to requirements outlined by the USFWS Guidelines and the approved Study Plan submitted to the USFWS and MassDOT prior to fieldwork. Although files recorded during the survey were identified via automated analysis as NLEB, visual vetting did not confirm these identifications, indicating probable absence of maternity colonies of the species at the Project during the 2022 field season. Little brown bat and tricolored bat presence was documented at the Project based on autotclassification, nightly MLE scores, and visual analysis. Eastern small-footed bat was identified based on autotclassification but not confirmed through visual vetting. Bat activity occurred at all surveyed sites, consisting primarily of big brown bats, little brown bats, and silver-haired bats.

Stantec Consulting Services Inc.



Alex Pries

Project Manager

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Alex.Pries@ Stantec.com

Attachments: APPENDIX A Study Plan
APPENDIX B Acoustic Detector Photographs
APPENDIX C Resumes of Laura Berube and Caroline Byrne
APPENDIX D Screenshots of Bat Passes

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
Attachments

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

APPENDIX A Study Plan



**2022 MassDOT Northern Long-Eared
Bat Acoustic Surveys Study Plan**

June 21, 2022

Prepared for:

Massachusetts Department of
Transportation
10 Park Plaza, Room 4260
Boston, MA 02116

Prepared by:

Stantec Consulting Services Inc.
30 Park Drive
Topsham, ME 04086

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1.0 INTRODUCTION

The Massachusetts Department of Transportation (MassDOT) has retained Stantec Consulting Services Inc. (Stantec) to conduct acoustic surveys for the presence of northern long-eared bats (*Myotis septentrionalis*; NLEB) along the following 20 linear transportation improvement projects requiring tree clearing:

- Orange, MA: Reconstruction of North Main Street, from School Street to Lincoln Avenue, includes relocation of Fall Hill Brook culvert (MassDot Project #603371)
- West Brookfield, MA: Resurfacing and related work on Route 9, from Ware T.L. to 850 feet west of Welcome Road (MassDot Project #606517)
- Wales, MA (1): Reconstruction and improvements on Monson Road, from the Monson T.L. to Reed Hill Road (MassDot Project #608163)
- Wales, MA (2): Bridge replacement, W-02-002, Holland Road over Wales Brook (MassDot Project #608847)
- Hampden, MA: Bridge replacement, H-04-004, Rockadundee Bridge over Scantic River (MassDot Project #610779)
- Monson, MA: Bridge replacement, M-27-015, Old Wales Road over Conant Brook (MassDot Project #608846)
- Leverett, MA: Bridge replacement, L-09-003, Millers Road over Roaring Brook (MassDot Project #608849)
- Ludlow, MA: Bridge replacement, L-16-026, Piney Lane over Broad Brook (MassDot Project #609120)
- Hubbardston, MA: Bridge replacement, H-24-003, Williamsville Road over the Burnshirt River (MassDot Project #609187)
- Longmeadow, MA: Blueberry Hill Elementary School improvements (SRTS) (MassDot Project #609517)
- Andover, MA: Bridge rehabilitation – A-09-036, I-495 over 28 (SB); A-09-037, I-495 over B&M and MBTA; A-09-041, I-495 over 28 (NB) (MassDot Project #606522)
- Hamilton-Ipswich, MA: Superstructure replacement, H-03-002, I-01-006, Winthrop Street over Ipswich River (MassDot Project #609467)
- Wellfleet, MA: Intersection improvements and related work at Route 6 and Main Street (MassDot Project #607397)
- Cohasset, MA: Corridor improvements and related work on Justice Cushing Highway (Route 3a) from Beechwood Street to Henry Turner Bailey Road (MassDot Project #608007)

- North Andover, MA: Corridor improvements on Route 114 between Waverly Road & Willow/Mill Street (MassDot Project #608095)
- Beverly, MA: Reconstruction of Bridge Street (MassDot Project #608348)
- Middleton, MA: Bridge replacement, M-20-003, Route 62 (Maple Street) over Ipswich River (MassDot Project #608522)
- Provincetown, MA: Corridor improvements and related work on Shank Painter Road, from Route 6 to Bradford Street (MassDot Project #608744)
- Lawrence, MA: Lawrence Manchester Rail Corridor (LMRC) rail trail (MassDot Project #608930)
- Peabody, MA: Independence Greenway extension (MassDot Project #609211)

This study plan describes the proposed methods and level of effort for the acoustic survey to be conducted at each of the 20 project areas to determine the presence or probable absence of breeding populations of NLEB at each area using the methods described in the U.S. Fish and Wildlife Service's (USFWS) *March 2022 Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines* (USFWS Guidelines).¹ Although acoustic surveys will focus on detecting NLEB, bat detectors are designed to detect all bats vocalizing in the vicinity of the detectors. Therefore, additional listed bat species may be detected during surveys, including eastern small-footed bat (*Myotis leibii*; state-listed endangered), little brown bat (*M. lucifugus*; state-listed endangered), and tricolored bat (*Perimyotis subflavus*; state-listed endangered). Though the federally endangered Indiana bat (*Myotis sodalis*) is also listed as state-endangered in Massachusetts, the state occurs outside the known range of this species. Therefore, Stantec does not believe that this species occurs within the project areas and Indiana bat will not be included in acoustic analysis at these projects. The goal of the study is to assess if NLEB are utilizing potential habitat along each project location during the 2022 summer maternity season.

In addition to acoustic surveys, MassDOT has requested Stantec conduct bridge assessments for all projects involving bridge work, including bridge replacement, rehabilitation, and preservation. For bridge projects that do not require tree clearing (i.e., preservation projects), Stantec will conduct bridge assessments only, and no acoustic surveys. Bridge projects that meet this criteria include the following:

- Oxford, MA: Structural steel cleaning, painting, and various repairs of overhead bridges on I-395: O-06-033, O-06-034, O-06-035, and O-06-040
- Tewksbury, MA: Bridge preservation of T-03-014, I-495 over Route 133, and T-03-015, I-495 over route 38

¹ United States Fish and Wildlife Service (USFWS). 2022. Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines. March 2020.

2.0 SURVEY METHODS

2.1 DESKTOP ANALYSIS

Stantec conducted a desktop review of each project area to estimate the need and level of effort for acoustic surveys and/or bridge assessments. As outlined in the USFWS Guidelines, bridges and other human-made structures can provide artificial roosting habitat for NLEB, although acoustic detectors are to be placed at least 15 meters (m) from bridges when conducting acoustic presence/absence surveys. The USFWS Guidelines also indicate that projects less than 1 kilometer (km) in length should be considered non-linear, which would require 14 detector-nights and at least 2 survey sites no less than 200 m apart. Based on recent correspondence between MassDOT and the USFWS,² Stantec will include portions of the linear road corridors on either side of the bridges to be assessed (up to 1 km survey envelope total) in our survey to categorize the projects as linear and to allow for greater flexibility in acoustic detector placement. Stantec will consider all projects as linear projects and will allocate 4 detector-nights of survey per km per USFWS Guidelines. Figures for these project locations and proposed detector placements are included in Appendix A.

2.2 FIELD SURVEYS

2.2.1 Acoustic Surveys

Stantec will conduct the acoustic surveys at each study area within the USFWS approved survey dates (15 May–15 August) in 2022. Per the minimum survey efforts outlined in the USFWS Guidelines: Phase 2 Acoustic Surveys for linear projects, 4 detector-nights per km of suitable summer habitat that may be impacted are required for each study area. Finally, for the purposes of this study plan, Stantec has conservatively assumed that non-excluded forested areas immediately adjacent to each linear area provide potential roost habitat for NLEB (suitable summer habitat) and may potentially be cleared during project construction. Therefore, Stantec has determined the following level of effort for each project based on the amount of linear tree clearing.

Central Massachusetts Sites (Group 1):

- Orange, MA: (0.795 km of potential tree clearing), 4 detector-nights (1 detector deployed for 4 nights)
- West Brookfield, MA: (2.89 km [round up to 3.0 km] of potential tree clearing), 12 detector-nights (3 detectors deployed for 4 nights each)
- Oxford, MA: (no potential tree clearing, work at four bridges), bridge assessments only
- Wales, MA (1): (1.89 km [round up to 2.0 km] of potential tree clearing), 8 detector-nights (2 detectors deployed for 4 nights each)

² MassDOT Technical Memorandum to Susi Van Oettingen, USFWS. Re: NLEB Survey Protocol for Small Projects and Bridges. June 6, 2022. 2pp.

- Wales, MA (2): (0.212 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Hampden, MA: (0.122 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Monson, MA: (0.143 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Leverett, MA: (0.05 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Ludlow, MA: (0.137 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Hubbardston, MA: (0.195 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Longmeadow, MA: (0.673 km of potential tree clearing), 4 detector-nights (1 detector deployed for 4 nights)

Eastern Massachusetts Sites (Group 2):

- Tewksbury, MA: (no potential tree clearing, work at two bridges), bridge assessments only
- Andover, MA: (0.792 km of potential tree clearing), 4 detector-nights (1 detector deployed for 4 nights)
- Hamilton-Ipswich, MA: (0.145 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Wellfleet, MA: (1.02 km of potential tree-clearing), 4 detector-nights (1 detector deployed for 4 nights)
- Cohasset, MA: (1.54 km [round up to 2.0 km] of potential tree-clearing), 8 detector-nights (2 detectors deployed for 4 nights each)
- North Andover, MA: (3.64 km [round up to 4.0 km] of potential tree-clearing), 16 detector-nights (4 detectors deployed for 4 nights each)
- Beverly, MA: (2.05 km [round down to 0.13 km] of potential tree clearing), 4 detector-nights (1 detector deployed for 4 nights)
- Middleton, MA: (0.102 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Provincetown, MA: (2.32 km [round down to 2.0 km] of potential tree clearing), 8 detector-nights (2 detectors deployed for 4 nights each)
- Lawrence, MA: (2.59 km [round down to 2.0 km] of potential tree clearing), 8 detector-nights (2 detectors deployed for 4 nights each)
- Peabody, MA: (1.83 km [round up to 2.0 km] of potential tree clearing), 8 detector-nights (2 detectors deployed for 4 nights each)

Based on this proposed level of effort, Stantec will deploy a total of 13 detectors (52 detector-nights) at Central Massachusetts sites and 17 detectors (68 detector-nights) at Eastern Massachusetts sites. Biologists will complete initial deployment in 2 days per site group (Days 1 and 2). Biologists will then retrieve all detectors over the course of 2 days per site group (Days 5 and 6) upon meeting the USFWS-required number of detector-nights under suitable weather conditions. This strategy of detector mobilization and demobilization assumes that nightly weather conditions remain appropriate during each night of survey according to USFWS Guidelines. If weather conditions do not meet USFWS Guidelines (e.g., 30 or more minutes of rain, excessive wind, and/or cold temperatures), additional day(s) will be required.

Stantec will use full-spectrum (e.g., Wildlife Acoustics® SM4BAT-FS) acoustic bat detectors for the surveys. Each detector will be fitted with an SMM-U1 or SMM-U2 ultrasonic omnidirectional microphone. Stantec will deploy detectors according to the criteria in the USFWS Guidelines, positioning detectors in potential flight corridors that could provide suitable NLEB foraging habitat. As USFWS Guidelines recommend, microphones will be deployed in areas without vegetation or with minimal vegetation within 10 m of the microphone, obstructions will be located at least 3 m away from microphones in any direction, and detectors will be placed at least 200 m apart.

Based on review of aerial imagery during the initial desktop analysis and assuming access to the right-of-way (ROW) associated with each area, Stantec has identified proposed detector locations for each project (Appendix A; Figures 1–22). The proposed locations along the edge of the ROW and adjacent to tree clearing areas are spread out across each area to target either large segments of forest or forested areas near a wetland, field, or bridge. Final detector deployment will be determined by the biologist in the field and is also subject to landowner permission and access. In areas without landowner permission or suitable access, final detector placement will be in the closest appropriate location within a town, municipal, or state ROW depending on the project. Final detector locations will also be based on a field assessment, following criteria in the USFWS Guidelines. Stantec will record coordinates of the final detector locations using a GPS unit, document the approximate accuracy of the location, and photograph each detector to show scale (e.g., include a vehicle or person in the photo) and the surrounding habitat and the “detector-view.” For each detector site, Stantec will document relevant deployment and habitat information on a Stantec field datasheet and on the USFWS Guidelines Appendix A Phase 1 Summer Habitat Assessments datasheet (Appendix B).

Stantec will mount each detector so that the microphone is approximately 3 m above ground level and oriented horizontally to the ground to sample an optimal volume of air space in accordance with the USFWS Guidelines. Stantec will set the audio and data storage settings on each detector according to defaults recommended by the manufacturer (e.g., detectors will operate in “triggered .wav” mode using default trigger threshold settings recommended by the manufacturer). Stantec will program each detector to record from 30 minutes before sunset until 30 minutes after sunrise and will power each detector with alkaline batteries.

Stantec will leave detectors in place at each survey site until at least 4 calendar nights have been successfully surveyed during weather conditions that meet the parameters outlined in the USFWS Guidelines:

- Temperatures remain above 50° F during the first 5 hours of each survey night;
- Precipitation/fog persists for no more than 30 minutes during the first 5 hours of each survey night; and
- Sustained wind speeds do not exceed 9 miles/hour for 30 minutes or more during the first 5 hours of each survey night.

Stantec will verify weather conditions by reviewing hourly data recorded at the nearest weather station to each detector site, accessed online via Weather Underground (www.wunderground.com). Stantec will record the weather station ID for each station used on the corresponding field datasheet. Following the first four weather-appropriate nights of data collection, Stantec will inspect each detector as soon as practicable in the field to confirm that each operated for 4 nights (i.e., check battery voltage, verify presence of recorded files, and view system status log files). Once confirmed, Stantec will remove the detectors from the field. Stantec will analyze only those data from the first 4 nights that meet the weather criteria.

2.2.2 Bridge Assessments

To determine if bat species are using bridges, bridge assessments will be conducted at each bridge following the guidance available in the User's Guide for the *Range-wide Programmatic Consultation for Indiana Bat and Northern Long-eared Bat*, version 5.0. Biologists will document favorable characteristics of bridges that support bats, including cracks in concrete, expansion joints, dark cave-like environments, and presence of waterbodies. Surveys will also include visual assessments to determine the presence of flying or roosting bats, guano, and staining on concrete, and auditory assessments for high-pitched squeaking or chirping. Biologists will use a flashlight or headlamp and may use binoculars when viewing higher areas. If a bridge assessment is not feasible due to safety or access issues (e.g., due to bridge height, traffic volume, fencing, or other safety considerations), the viability of following the non-linear project survey effort for these projects (e.g., 2 detectors deployed for a combined 14 detector-nights) will be discussed with MassDOT. For each bridge location, biologists will complete the USFWS Bridge/Structure Bat Assessment Form (Appendix C).

3.0 ANALYSIS

Stantec bat biologists will perform a coarse visual analysis of the data to confirm that high frequency bat calls were recorded; if so, Stantec will then analyze data using Kaleidoscope Pro Software version 5.4.1 or newer (Kaleidoscope),³ with classifier version 5.4.0 using a "0" sensitivity setting and by selecting for the Massachusetts region. This analysis method has been approved by the USFWS as suitable for analyzing full-spectrum bat data collected by SM4 units once the data have been converted to zero-

³ <https://www.wildlifeacoustics.com/release-notes/kaleidoscope-pro>

crossing format. Stantec will base presence or probable absence of NLEB on the maximum likelihood estimate (MLE) generated by Kaleidoscope for each night. An MLE of less than 0.05 indicates probable presence and an MLE greater than 0.05 indicates probable absence. Original full-spectrum and converted zero-crossing data files will be archived electronically and made available upon request.

Stantec will manually inspect each file recorded for each detector site/night that Kaleidoscope calculates probable presence (an MLE of less than 0.05) for NLEB. Stantec will also visually inspect each high frequency call sequence recorded by detectors, thereby manually vetting all high frequency call identification determinations (or lack of identification) made by Kaleidoscope. Though acoustic surveys will primarily focus on detecting NLEB and other high frequency species, calls from all bat species will be analyzed by the software and manually inspected. Stantec biologists with relevant experience and training in acoustic bat identification will conduct the manual vetting. Credentials and experience of biologists performing the manual vetting will be indicated in the survey report and are included in Appendix D.

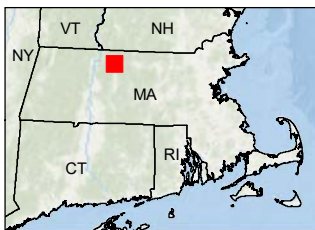
4.0 REPORTING

As requested by MassDOT, Stantec will prepare a single report for each project area describing the methods and results of the acoustic surveys as soon as possible after field work to ensure MassDOT meets their targeted transmittal to USFWS in late fall 2022. Each report will include completed Stantec and USFWS datasheets for the detector sites, maps showing the locations of each detector site, photos of the detector setups, screenshots of representative listed bat species' calls identified during analysis, tables summarizing the output from Kaleidoscope for all species identified, results of manual vetting, the resume of the biologist who conducted the manual vetting, the USFWS R5 Bat Reporting Form, and other information required by the USFWS Guidelines. Associated Geographic Information System (GIS) data, original acoustic data, status or log files, and software output will be retained and made available upon request. Stantec will also provide MassDOT with the results of the survey in excel format based on the 2022 MassDOT Bat Survey Consultant format. Additionally, Stantec will format acoustic data into a template suitable for inclusion into the North American Bat Monitoring Program database.



In addition, and as requested by MassDOT, Stantec will prepare a separate memo for each bridge site describing the methods and results of the bridge assessments as soon as possible after field work. Each memo will include maps showing the locations of the bridge sites, photos of the bridge characteristics and the completed USFWS Bridge/Structure Bat Assessment Form. As requested by MassDOT, memos will be submitted at least 15 days prior to the advertising date per project to allow for the minimal clearance time of 14 days. The memo for the Oxford project will be treated as higher priority because this project's advertising date has been moved up to July 9, 2022.

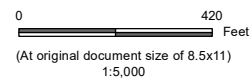
APPENDICES

APPENDIX A PROPOSED SURVEY LOCATION MAPS



Legend

-  Proposed Acoustic Survey Location
-  Project Area



Project Location: Orange, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20

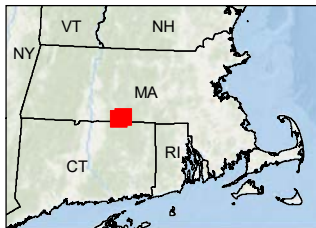
Client/Project: Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726



Figure No. **1**
 Title
**Northern Long-eared Bat Acoustic Survey
 Proposed Location – Orange**

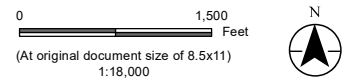
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 Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color
 Orthom imagery



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- Legend**
-  Proposed Acoustic Survey Location
 -  Project Area



Project Location
Wales, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

179410726

Figure No.
3

Title
**Northern Long-eared Bat Acoustic Survey
Proposed Location – Wales 1**

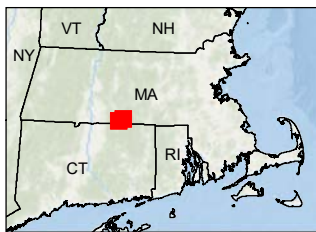
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3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

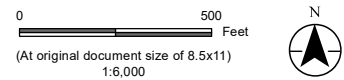
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- Legend**
- Proposed Acoustic Survey Location
 - Project Area
 - Expanded Project Area



Project Location
Wales, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

179410726

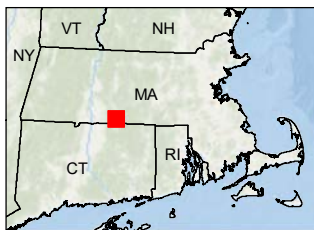
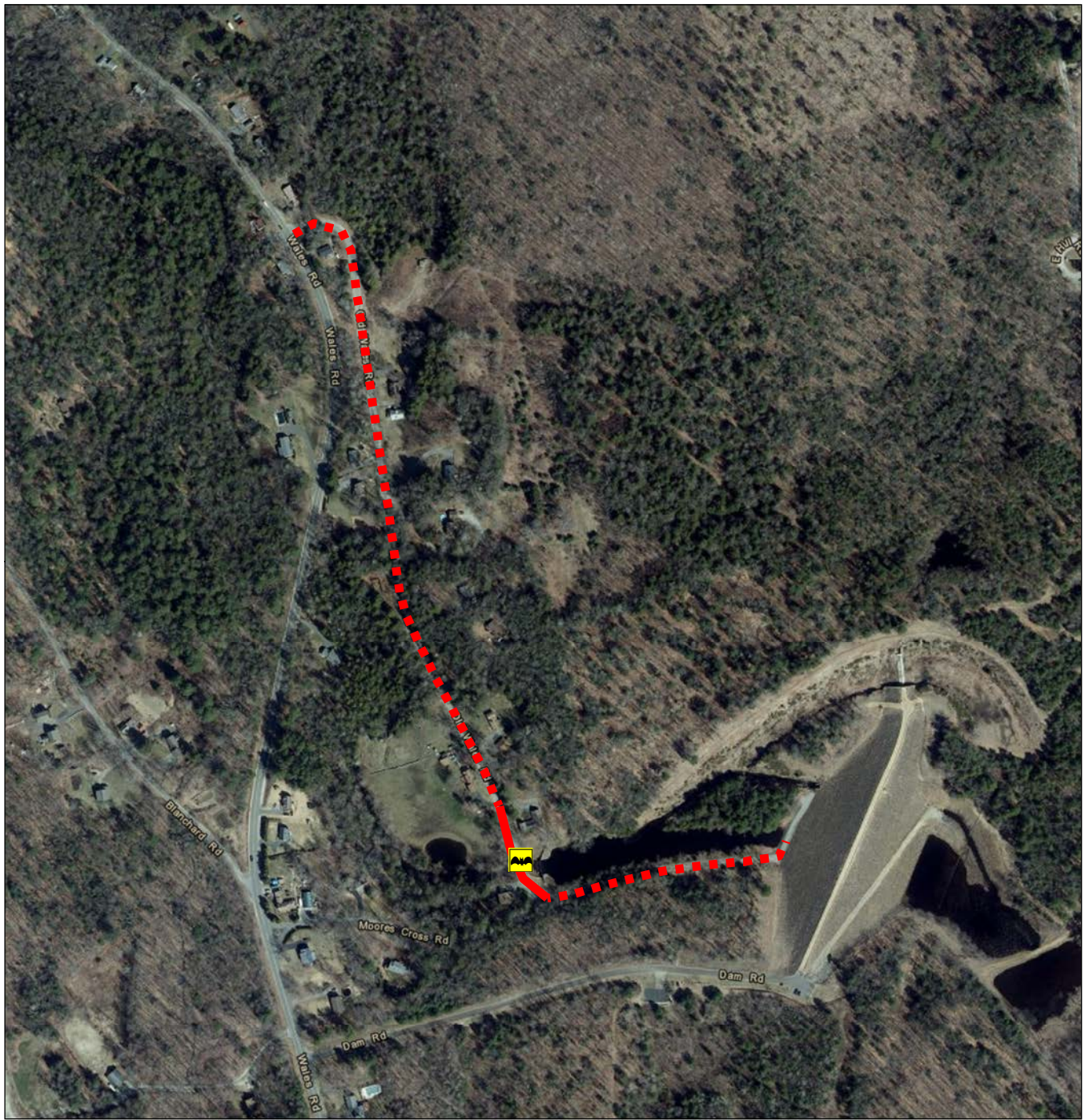
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Title
**Northern Long-eared Bat Acoustic Survey
Proposed Location – Wales 2**




Notes

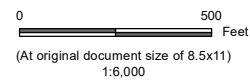
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2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

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Legend

-  Proposed Acoustic Survey Location
-  Project Area
-  Expanded Project Area

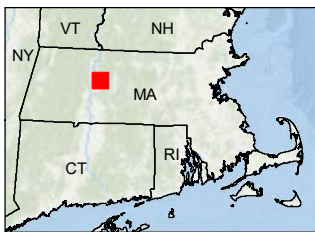


Project Location: Monson, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20




Client/Project: Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726

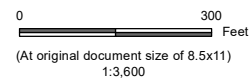
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**Northern Long-eared Bat Acoustic Survey
 Proposed Location – Monson**

Notes
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 Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color
 Orthomimagery



Legend

-  Proposed Acoustic Survey Location
-  Project Area
-  Expanded Project Area



Project Location
Leverett, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

179410726

Figure No.

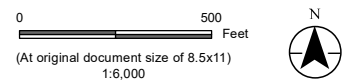
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Title
**Northern Long-eared Bat Acoustic Survey
Proposed Location – Leverett**

Notes
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 Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color
 Orthoimagery



- Legend**
- Proposed Acoustic Survey Location
 - Project Area
 - Expanded Project Area



Project Location: Ludlow, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20

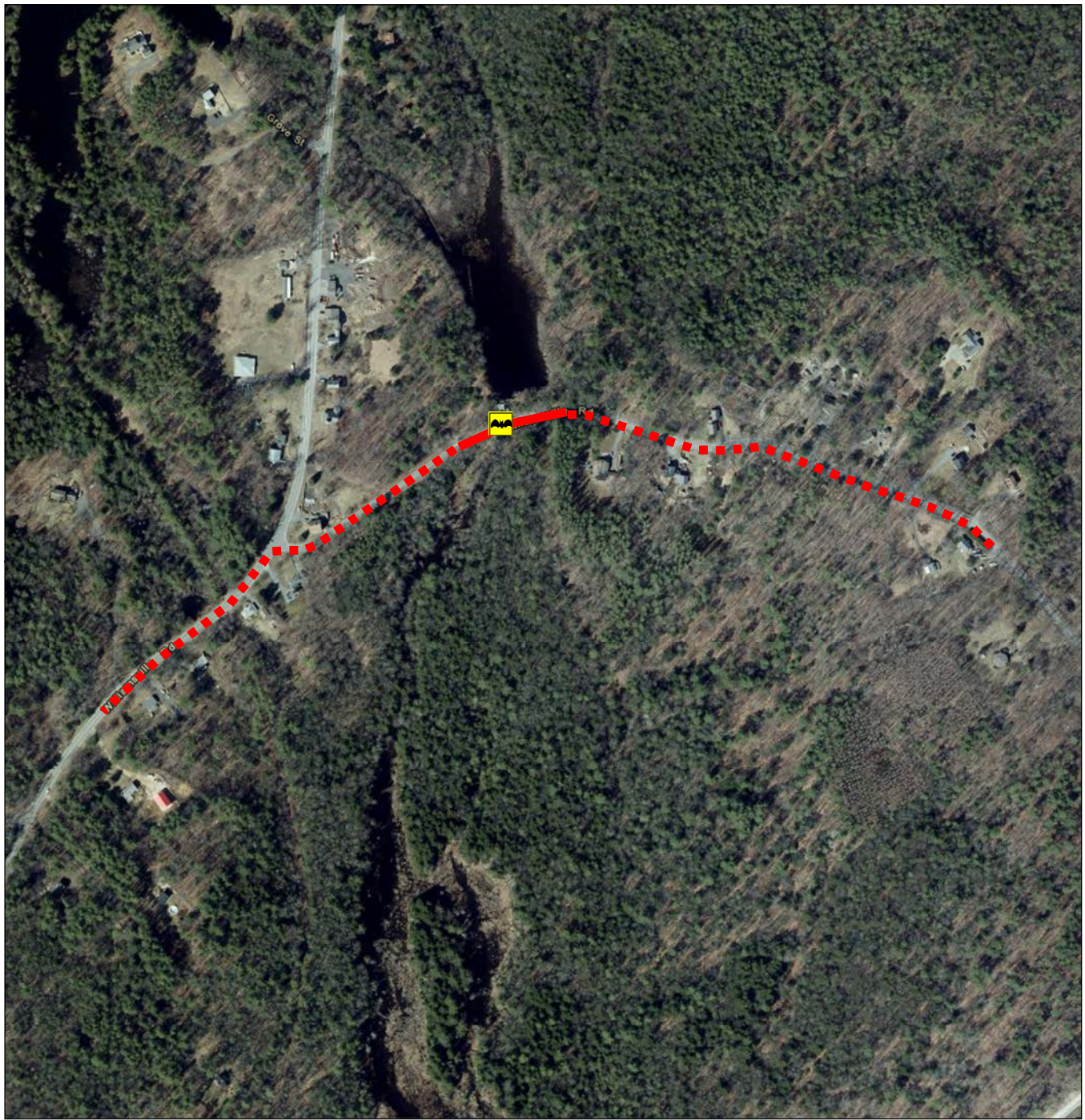
Client/Project: Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726

Figure No. **8**
 Title
**Northern Long-eared Bat Acoustic Survey
 Proposed Location – Ludlow**

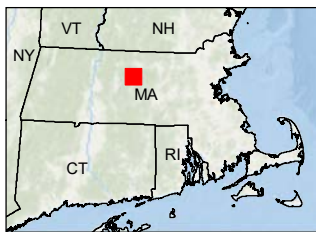
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 2. Data Sources: MassDOT, Stantec
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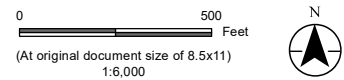
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- Legend**
-  Proposed Acoustic Survey Location
 -  Project Area
 -  Expanded Project Area



Project Location
Hubbardston, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

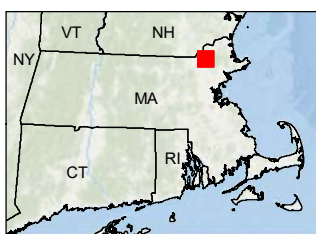
Figure No.
9



Title
**Northern Long-eared Bat Acoustic Survey
Proposed Location – Hubbardston**

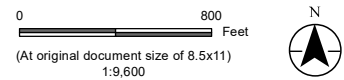
Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

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Legend
 Proposed Acoustic Survey Location
 Project Area



Project Location: Andover, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20

Client/Project: Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726

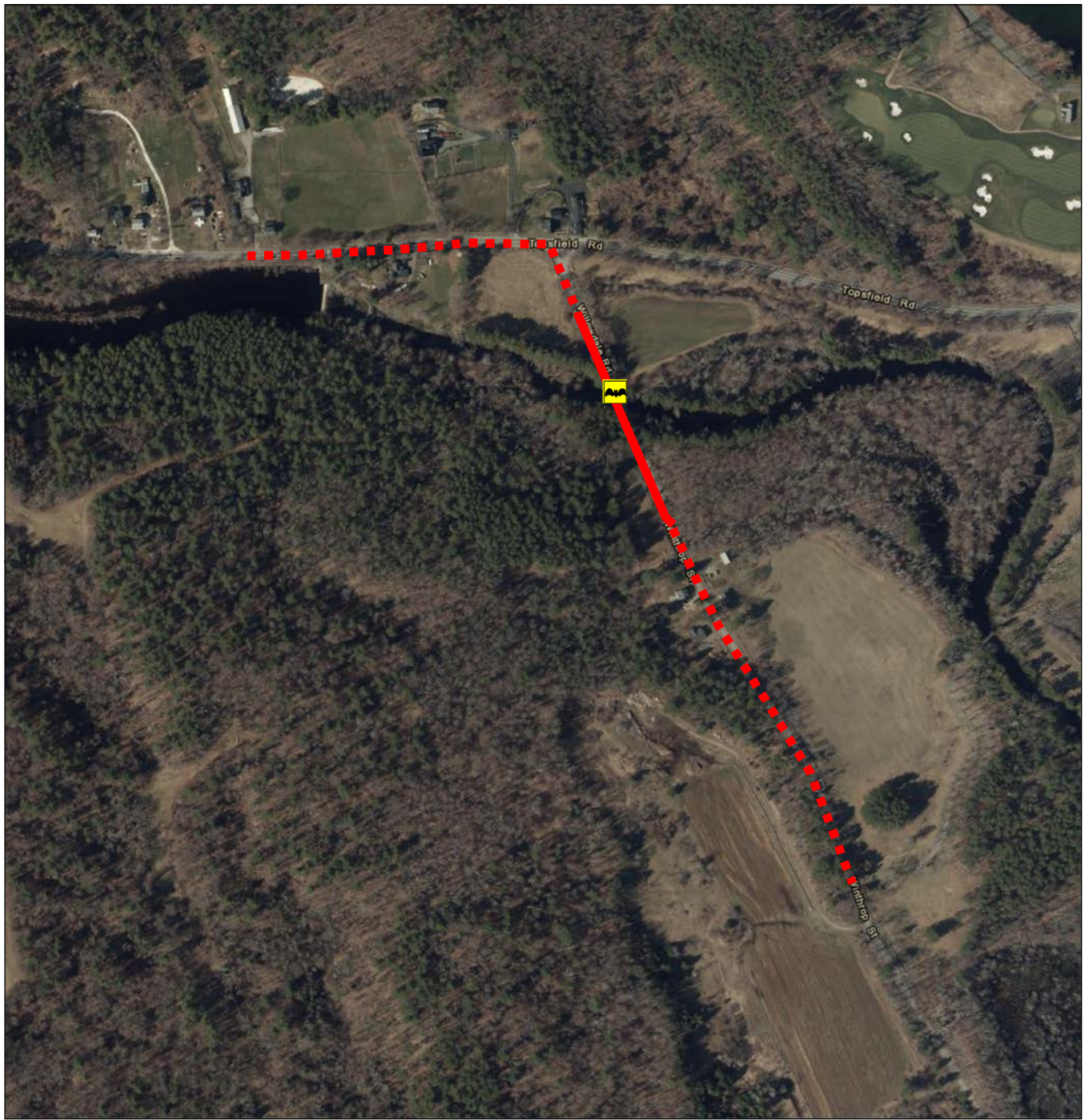
Figure No. **11**

**Northern Long-eared Bat Acoustic Survey
 Proposed Location – Andover**

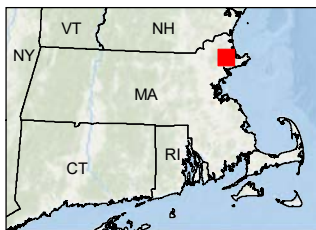
Notes
 1. Coordinate System: NAD 1983 StatePlane
 Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color
 Orthoimagery




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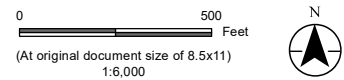
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- Legend**
-  Proposed Acoustic Survey Location
 -  Project Area
 -  Expanded Project Area



Project Location
Hamilton-Ipswich, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

179410726

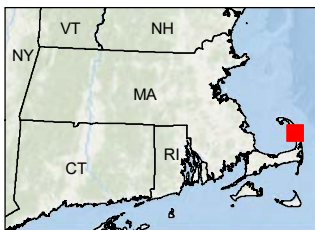
Figure No.
12



Title
**Northern Long-eared Bat Acoustic Survey
Proposed Location – Hamilton-Ipswich**

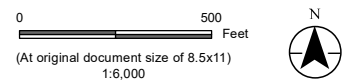
Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

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- Legend**
-  Proposed Acoustic Survey Location
 -  Project Area

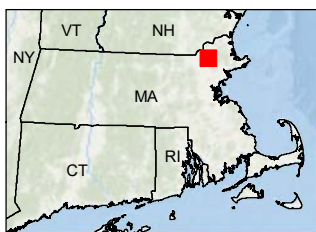
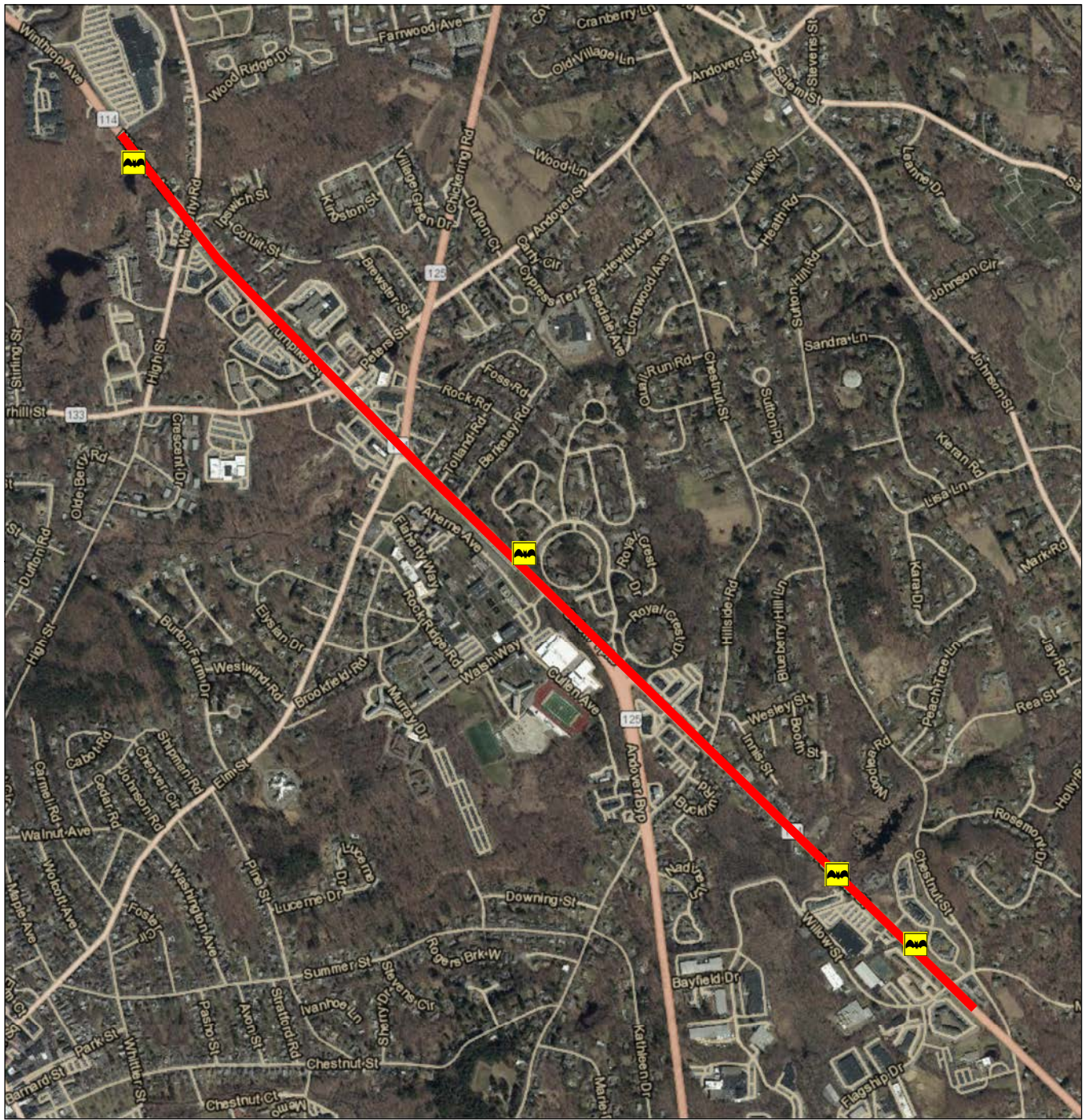


Project Location: Wellfleet, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20

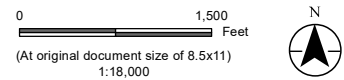
Client/Project: Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726

Figure No. **13**
**Northern Long-eared Bat Acoustic Survey
 Proposed Location – Wellfleet**

- Notes**
1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color Orthoimagery



- Legend**
- Proposed Acoustic Survey Location
 - Project Area

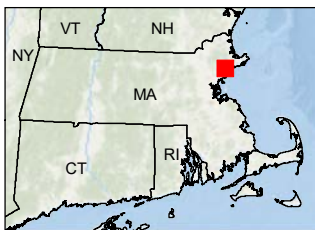
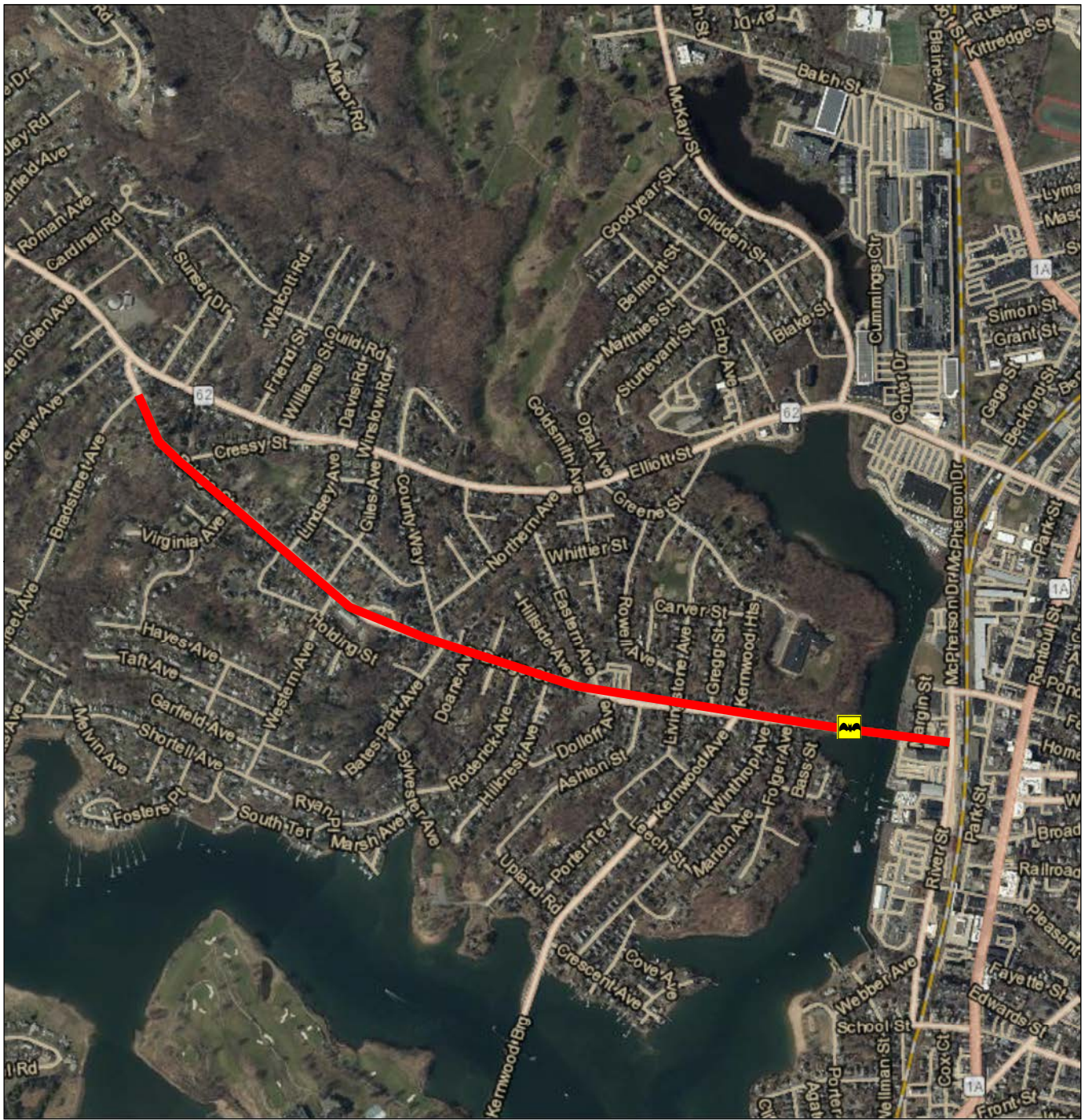




Project Location: North Andover, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20

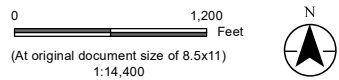
Client/Project: Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726

Figure No. **15**
 Title
**Northern Long-eared Bat Acoustic Survey
 Proposed Location – North Andover**

- Notes**
1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color Orthimagery



Legend
 Proposed Acoustic Survey Location
 Project Area



Project Location: Beverly, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20

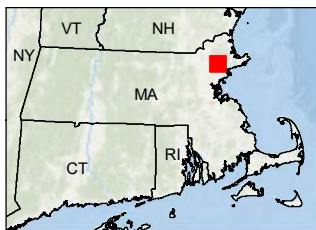
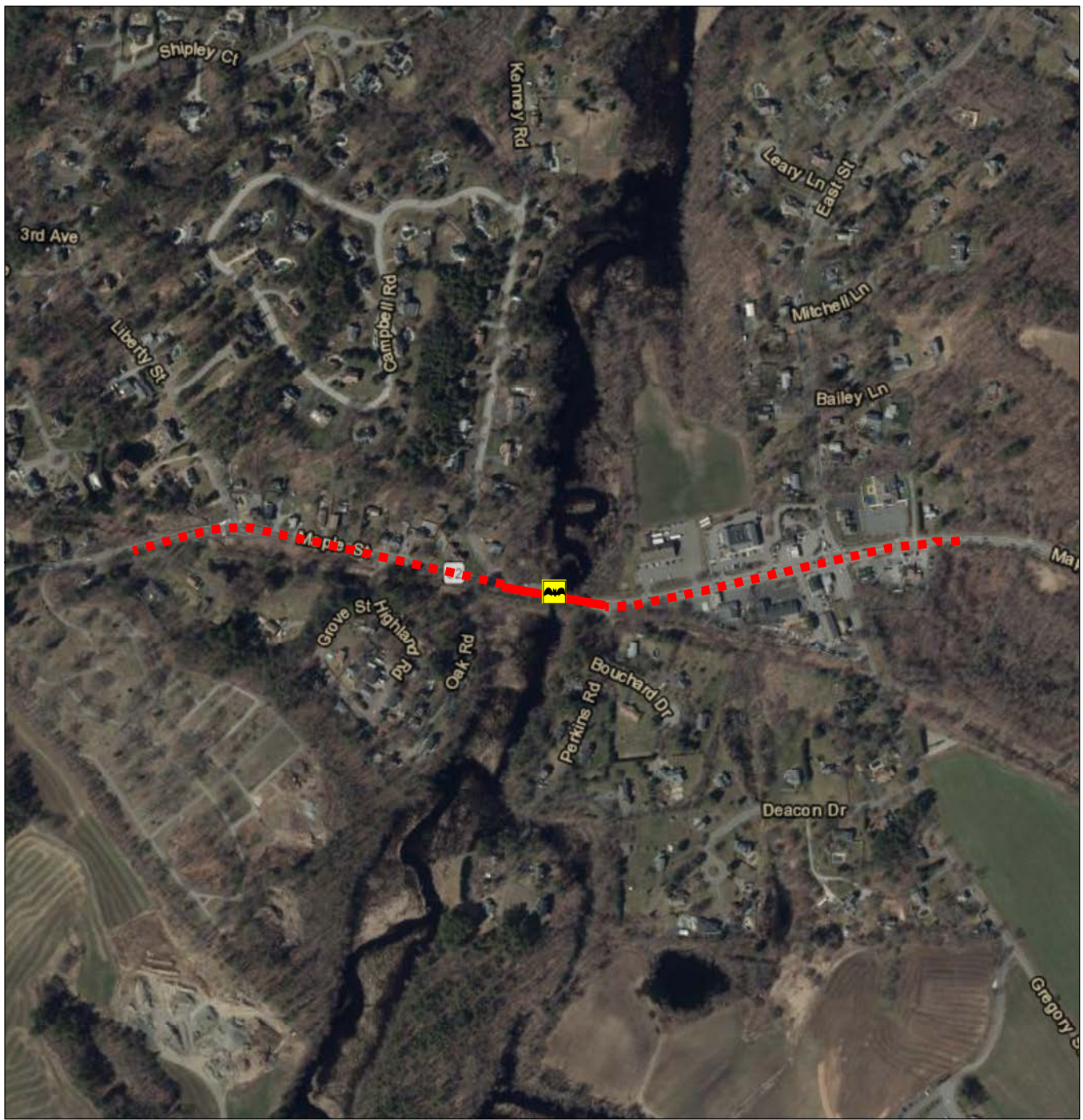
Client/Project: Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726

Figure No. **16**
 Title
**Northern Long-eared Bat Acoustic Survey
 Proposed Location – Beverly**




Notes
 1. Coordinate System: NAD 1983 StatePlane
 Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color
 Orthimagery

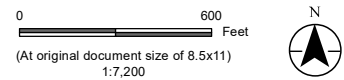
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Legend

-  Proposed Acoustic Survey Location
-  Project Area
-  Expanded Project Area



Project Location: Middleton, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20

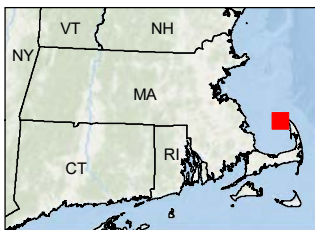
Client/Project: Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726

Figure No. **17**
**Northern Long-eared Bat Acoustic Survey
 Proposed Location – Middleton**



Notes
 1. Coordinate System: NAD 1983 StatePlane
 Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color
 Orthom imagery

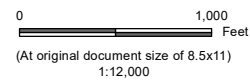
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Legend

-  Proposed Acoustic Survey Location
-  Project Area

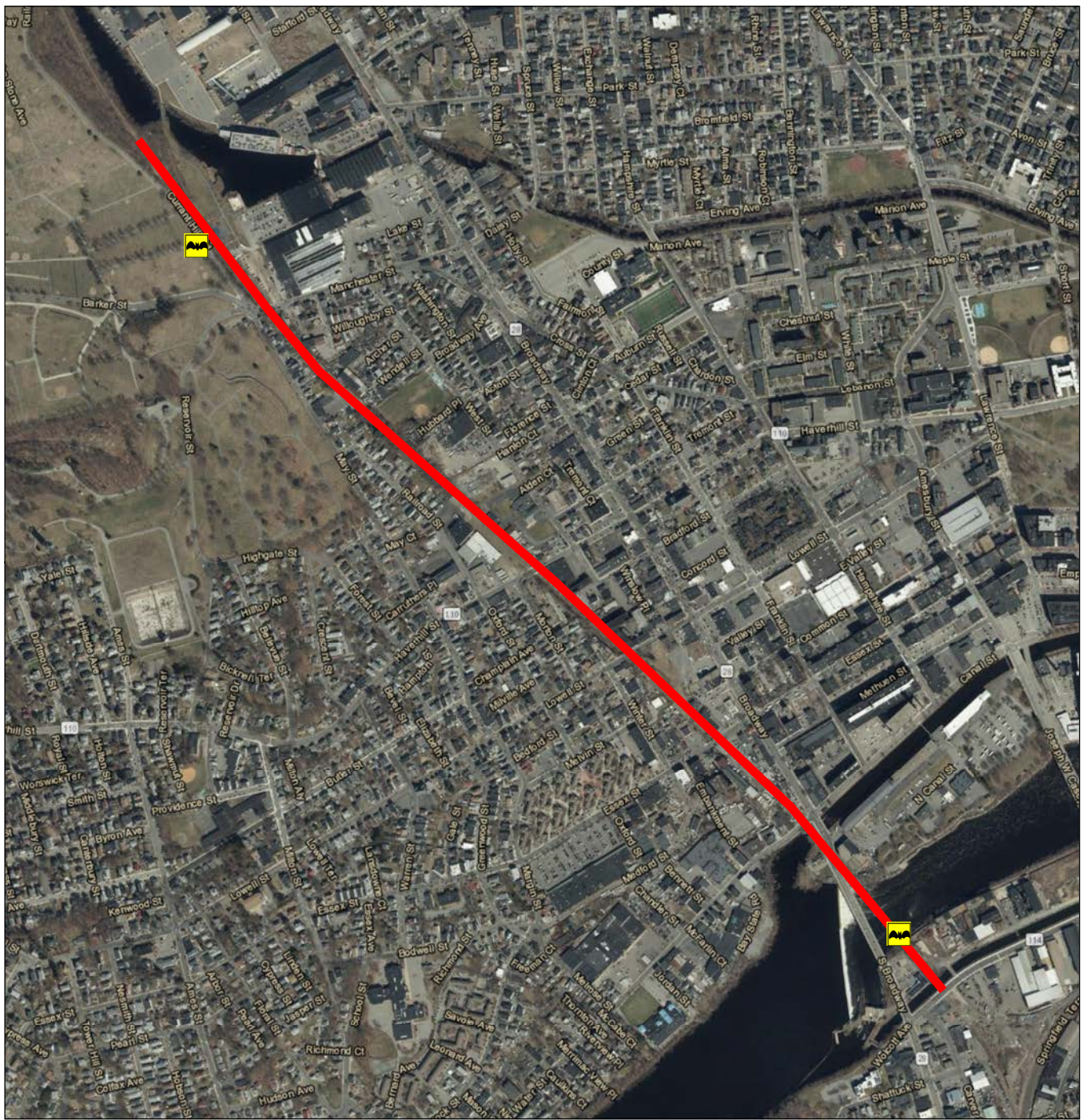


Project Location Provincetown, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20

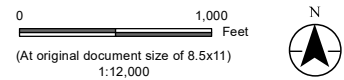
Client/Project Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726

Figure No. **18**
 Title
**Northern Long-eared Bat Acoustic Survey
 Proposed Location – Provincetown**

Notes
 1. Coordinate System: NAD 1983 StatePlane
 Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color
 Orthoimagery



- Legend**
- Proposed Acoustic Survey Location
 - Project Area



Project Location: Lawrence, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20

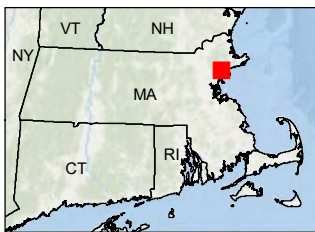
Client/Project: Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726



Figure No. **19**
 Title
**Northern Long-eared Bat Acoustic Survey
 Proposed Location – Lawrence**

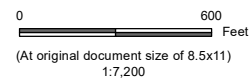
- Notes**
1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

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- Legend**
-  Proposed Acoustic Survey Location
 -  Project Area

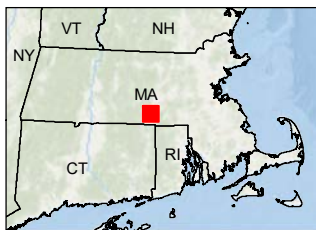
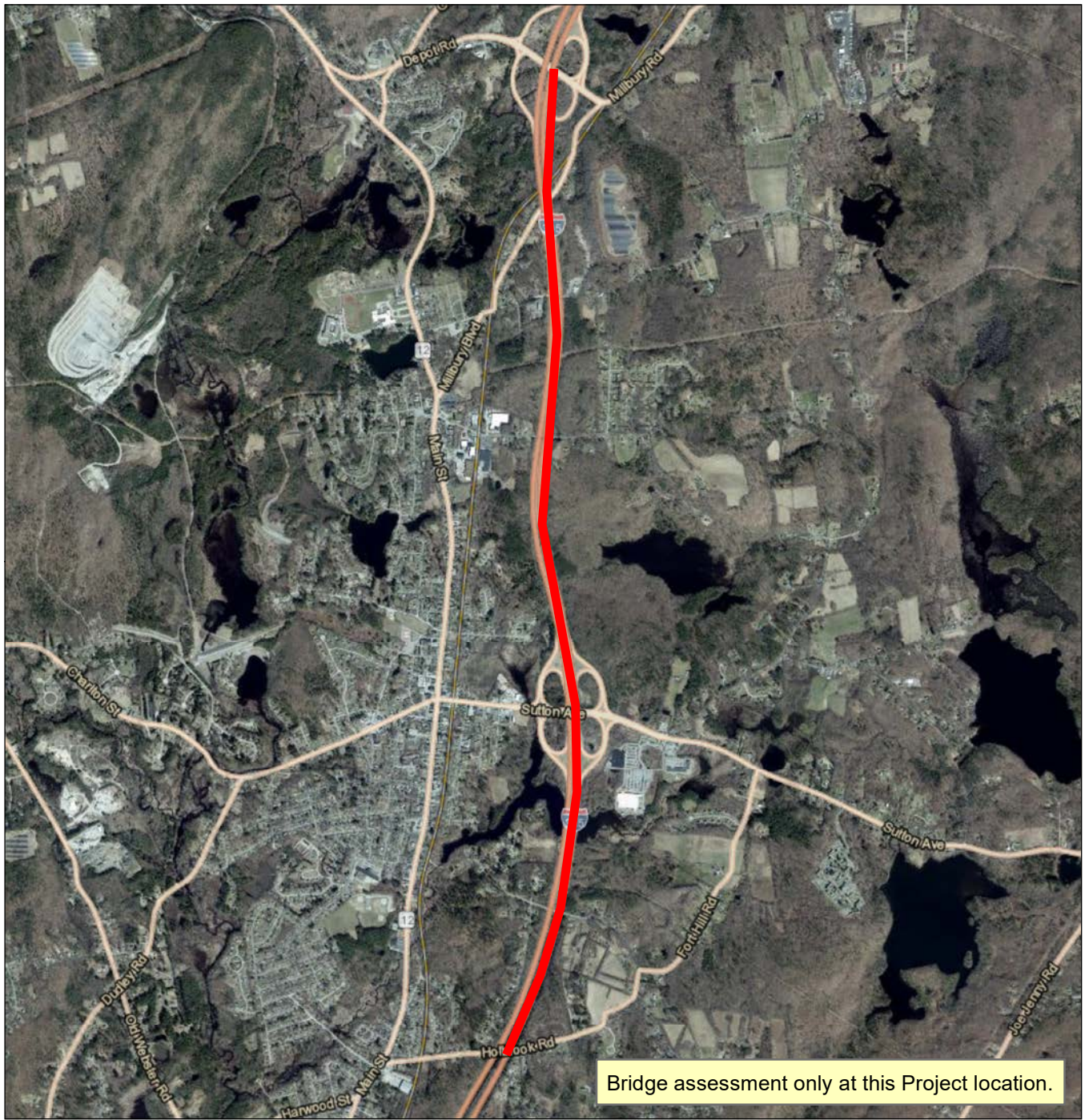




Project Location: Peabody, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20

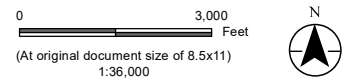
Client/Project: Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726

Figure No. **20**
 Title
**Northern Long-eared Bat Acoustic Survey
 Proposed Location – Peabody**

- Notes**
1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color Orthoimagery



- Legend**
-  Proposed Acoustic Survey Location
 -  Project Area

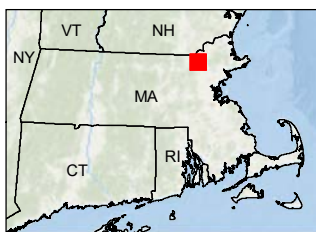


Project Location: Oxford, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20

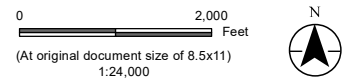
Client/Project: Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726

Figure No. **21**
 Title
**Northern Long-eared Bat Acoustic Survey
 Proposed Location – Oxford**

- Notes**
1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color Orthoimagery



- Legend**
- Proposed Acoustic Survey Location
 - Project Area



Project Location: Tewksbury, Massachusetts
 Prepared by MM on 2022-06-14
 TR by KWH on 2022-06-20
 IR Review by LJ on 2022-06-20

Client/Project: Massachusetts Department of Transportation
 Northern Long-eared Bat Acoustic Survey
 179410726

Figure No. **22**
 Title
**Northern Long-eared Bat Acoustic Survey
 Proposed Location – Tewksbury**

- Notes**
1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
 2. Data Sources: MassDOT, Stantec
 3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

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**APPENDIX B STANTEC NLEB BAT PRESENCE/ABSENCE
ACOUSTIC SURVEY DATASHEET AND USFWS
PHASE 1 SUMMER HABITAT ASSESSMENTS
DATASHEET**

Stantec Ground-Based Acoustic Bat Detector Datasheet

Site ID:	Project Number:		Project Name:			
	State:	County:		Acoustic Survey Type		
Site Selector:	Lat:	Long:		Summer Acoustic		
Deployer:	Notes: NA					
Date Deployed:						
Deploy Duration:						
Detector #:						

Detector Setup

Detector Make:	Detector Model:	Dist to Obstruct (m):
Microphone Model:	Directionality:	Mic Height (AGL; m):
Weatherproofing:	Mic Angle:	Call Data Type:
Mic Direction (deg):	In-Field Calibration:	Notes:

HABITAT DESCRIPTION

<u>VEGETATION CHARACTERISTICS</u>	<u>STREAM CHARACTERISTICS</u>
Habitat Type: Canopy Closure (%): Habitat Description:	Est. Distance to Water Source (m):
	Type of Water:
	Detector Startup Notes:
	Detector Startup:
Habitat Use:	Card In A:
Habitat Notes:	Card In B:
	Memory A:
	Memory B:
	Battery:
	Temperature:
	Mic 0:
	Cal Ch 0:
	Going to Sleep Until:

Additional Site Notes:

USFWS accepted answers:

Mic Angle: 0 = parallel to ground, 45 = angled up, 90 = straight up, 315 = angled down, 270 = pointed down

Habitat Type: creek/riparian, pond, mine portal, field edge, bottomland forest, cave entrance, bridge, open field, upland forest, structure, other

If collecting data on paper, please add site diagram to back.

BAT HABITAT ASSESSMENT DATASHEET

Project Name: _____ Date: _____

Township/Range/Section: _____

Lat Long/UTM/ Zone: _____ Surveyor: _____

Brief Project Description

--

Project Area

	Total Acres	Forest Acres		Open Acres
Project				
Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing	

Vegetation Cover Types

Pre-Project	Post-Project

Landscape within 5 mile radius

Flight corridors to other forested areas?
Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)

Proximity to Public Land

What is the distance (mi.) from the project area to forested public lands (e.g., national or state forests, national or state parks, conservation areas, wildlife management areas)?
--

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area

A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): _____

Water Resources at Sample Site				
Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
Pools/Ponds (# and size)	Open and accessible to bats?			
Wetlands (approx. ac.)	Permanent	Seasonal		

Forest Resources at Sample Site				
Closure/Density	Canopy (> 50%)	Midstory (20-50%)	Understory (<20%)	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
Dominant Species of Mature Trees				
% Trees w/ Exfoliating Bark				
Size Composition of Live Trees (%)	Small (3-8 m)	Med (9-15 m)	Large (>15 m)	
No. of Suitable Snags				

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable

IS THE HABITAT SUITABLE FOR INDIANA BATS? _____

IS THE HABITAT SUITABLE FOR NORTHERN LONG-EARED BATS? _____

Additional Comments:

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

APPENDIX C BRIDGE/STRUCTURE BAT ASSESSMENT FORM

APPENDIX D: Bridge/Structure Bat Assessment Form

Bridge/Structure Bat Assessment Form Instructions

- This form will be completed to document bat occupancy or bat use of bridges, culverts, and other structures. This form shall be submitted to the appropriate personnel within the DOT and USFWS for recordkeeping (or uploaded into the Information, Planning, and Consultation (IPaC) Determination Key for use of the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat) prior to conducting: any activities below the deck surface either from the underside or from above the deck surface that bore down to the underside; any activities that could impact expansion joints; any activities involving deck removal on bridges; or any activities involving structure demolition for bridges, culverts, and/or other structures.
- Assessments must be completed within two (2) years of conducting any work (see the above bullet), regardless of whether assessments have been conducted in the past. Assessments must be completed in appropriate weather conditions, suitable for the assessor to observe common signs of bat use.
- Evidence of bat use may include visual observation (live and/or dead), presence of guano, presence of staining, audible observation, and/or odor observation. Presence of one or more indicators is sufficient evidence that bats may be using the bridge, culvert, and/or other structure.
- If bat use of a bridge, culvert, and/or other structure is noted, additional studies may be undertaken during bat active season to identify the specific bat species utilizing the structure, or protected bat species presence can be assumed, in order to comply with threatened and endangered species regulations. Bat active season dates, typically between April and November, vary regionally and by species, so assessors should consult with their local USFWS Field Office for more specific active season dates.
- For use of the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat – If the bridge/structure is 1,000 feet or more from suitable bat habitat¹ (e.g., an urban or agricultural area without suitable foraging habitat or corridors linking the bridge to suitable foraging habitat), check the appropriate box and fill out the table below. **No further assessment is required.**

Date & Time of Assessment	DOT Project #	Route/Facility Carried	County
Federal Structure ID	Structure Coordinates (latitude and longitude)	<input type="checkbox"/> This bridge/structure is 1,000 feet or more from suitable bat habitat ² Name: _____ Signature: _____	

- Any questions pertaining to assessments or this form should be directed to the local USFWS Field Office.

¹ Refer to the USFWS's summer survey guidance for the definition of suitable habitat (<http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html>).

² This condition is only for use of the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat

Date & Time of Assessment		DOT Project Number		Route/Facility Carried		County	
Federal Structure ID		Structure Coordinates (latitude and longitude)		Structure Height (approximate)		Structure Length	
Structure Type (check one)				Structure Material (check all that apply)			
Bridge Construction Style				Deck Material		Beam Material	
Cast-in-place		Pre-stressed Girder		Metal		None	
Flat Slab/Box		Steel I-beam		Concrete		Concrete	
Truss		Covered		Timber		Steel	
Parallel Box Beam		Other:		Open grid		Timber	
				Other:		Other:	
						Creosote Evidence	
				Culvert Material		Yes <input type="checkbox"/> No <input type="checkbox"/>	
				Metal		Unknown	
				Concrete		Notes:	
				Plastic			
				Stone/Masonry			
				Other:			
Culvert Type				Other Structure			
Box							
Pipe/Round							
Other:							
Crossings Traversed (check all that apply)				Surrounding Habitat (check all that apply)			
Bare ground		Open vegetation		Agricultural		Grassland	
Rip-rap		Closed vegetation		Commercial		Ranching	
Flowing water		Railroad		Residential-urban		Riparian/wetland	
Standing water		Road/trail - Type:		Residential-rural		Mixed use	
Seasonal water		Other:		Woodland/forested		Other:	
Areas Assessed (check all that apply)							
Check all areas that apply. If an area is not present in the structure, check the "not present" box.							
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.							
Area (check if assessed)		Assessment Notes		Evidence of Bats (include photos if present)			
<input type="checkbox"/> All crevices and cracks: Bridges/culverts: rough surfaces or imperfections in concrete Other structures: soffits, rafters, attic areas		Not present		Visual - live # dead #		Audible <input type="checkbox"/> Species	
				Guano		Odor <input type="checkbox"/>	
				Staining		Photos <input type="checkbox"/>	
<input type="checkbox"/> Concrete surfaces (open roosting on concrete)		Not present		Visual - live # dead #		Audible <input type="checkbox"/> Species	
				Guano		Odor <input type="checkbox"/>	
				Staining		Photos <input type="checkbox"/>	
<input type="checkbox"/> Spaces between concrete end walls and the bridge deck		Not present		Visual - live # dead #		Audible <input type="checkbox"/> Species	
				Guano		Odor <input type="checkbox"/>	
				Staining		Photos <input type="checkbox"/>	
<input type="checkbox"/> Crack between concrete railings on top of the bridge deck		Not present		Visual - live # dead #		Audible <input type="checkbox"/> Species	
				Guano		Odor <input type="checkbox"/>	
				Staining		Photos <input type="checkbox"/>	
<input type="checkbox"/> Vertical surfaces on concrete I-beams		Not present		Visual - live # dead #		Audible <input type="checkbox"/> Species	
				Guano		Odor <input type="checkbox"/>	
				Staining		Photos <input type="checkbox"/>	
<input type="checkbox"/> Spaces between walls, ceiling joists		Not present		Visual - live # dead #		Audible <input type="checkbox"/> Species	
				Guano		Odor <input type="checkbox"/>	
				Staining		Photos <input type="checkbox"/>	
<input type="checkbox"/> Weep holes, scupper drains, and inlets/pipes		Not present		Visual - live # dead #		Audible <input type="checkbox"/> Species	
				Guano		Odor <input type="checkbox"/>	
				Staining		Photos <input type="checkbox"/>	
<input type="checkbox"/> All guiderails		Not present		Visual - live # dead #		Audible <input type="checkbox"/> Species	
				Guano		Odor <input type="checkbox"/>	
				Staining		Photos <input type="checkbox"/>	
<input type="checkbox"/> All expansion joints		Not present		Visual - live # dead #		Audible <input type="checkbox"/> Species	
				Guano		Odor <input type="checkbox"/>	
				Staining		Photos <input type="checkbox"/>	
Name:				Signature:			

**APPENDIX D RESUME OF BIOLOGIST TO PERFORM MANUAL
VETTING OF RARE SPECIES CALLS**

Dr. Peterson is a senior wildlife biologist and project manager specializing in renewable energy projects, bird and bat migration, and rare species assessments. He focuses on solutions to quantify and manage turbine-related wildlife impacts at terrestrial and offshore commercial wind projects. Since joining the company in 2003, Trevor's project experience has included a wide range of wide range of wildlife surveys at proposed and existing wind projects, rare bat surveys, breeding bird surveys, raptor surveys, nocturnal radar surveys, vernal pool water quality and ecological monitoring, rare turtle telemetry and demographic studies, natural community characterization, and vegetation monitoring. He earned his PhD in Ecology and Environmental Sciences from the University of Maine for his research on the use of long-term acoustic bat data to study bat migration and predict and manage potential impacts from land-based and offshore wind projects. Before working at Stantec, Trevor worked seasonally for the National Park Service at Acadia National Park and Isle Royale National Park and as an island caretaker for the Maine Island Trail Association. Dr. Peterson serves as Stantec's technical lead for acoustic bat surveys, responsible for updating equipment, survey methods, and data analysis/reporting methods.

EDUCATION

PhD Ecology and Environmental Sciences , University of Maine, Orono, ME, 2020

McMillan Offshore Survival Training, Castine, Maine, 2016

AB, Biology/Environmental Studies, Summa cum Laude, Phi Beta Kappa, Bowdoin College, Brunswick, Maine, 2002

Semester Program in Costa Rica, Tropical Field Biology, Environmental Studies, and Spanish, Duke University, Durham, North Carolina, 2000

CERTIFICATIONS & TRAINING

CPR, AED, and Basic First Aid, American Safety & Health Institute, Topsham, ME, 2019

Habitat Conservation Plan Training, US Fish and Wildlife Service National Conservation Training Center, Shepherdstown, WV, 2010

MEMBERSHIPS

Member, Northeast Regional Migration Monitoring Network

Member, Northeast Bat Working Group

Member, The Wildlife Society, Maine, May 2011-present

PROJECT EXPERIENCE

RENEWABLE ENERGY, OFFSHORE

Block Island Offshore Wind Farm | Block Island, Rhode Island | 2018-Present | Senior Scientist

Regional Offshore Acoustic Bat Monitoring | Gulf of Maine, mid-Atlantic, Great lakes

Tracking Bats using Nanotag Telemetry in the Gulf of Maine

RENEWABLE ENERGY

Activity-based Informed Curtailment: Using Acoustics to Design and Validate Smart Curtailment at Wind Farms | 2019 - 2022 | Principal Investigator

Avian and Bat Surveys at New Creek Wind Energy Project | Grant County, West Virginia

Avian and Bat Surveys at Laurel Mountain Wind Energy Project | Randolph and Barbour Counties, West Virginia

NATURAL RESOURCE SERVICES

Natural Community Surveys and Resource Inventory | Moosehead Lake Region, Maine

Spotted Turtle and Vernal Pool Monitoring on Greenbush Railroad | Southeastern Massachusetts

Indiana Bat and Rare Bird Surveys at Proposed Wind Energy Project | Jefferson and Oswego Counties, New York

Acoustic Bat Surveys: Proposed Road Corridors | Tennessee

PUBLICATIONS

Peterson, T.. *Predicting and managing risk to bats at commercial wind farms using acoustics. A dissertation submitted in partial fulfillment of the requirements for the degree of doctor of philosophy, University of Maine., 2020.*

Pelletier, S.K., K.S. Omland, K.S. Watrous and T.S. Peterson, Information synthesis on the potential for bat interactions with offshore wind facilities - final report. *US Department of the Interior, Bureau of Ocean Energy Management, Headquarters. Herndon, Virginia. OCS Study BOEM 2013-01163. 119 pp, 2013.*

Hildt, S. and T. Peterson. Surveying the damage: tools and techniques. *Invited Presentation at the NRDA Short Course, University of Massachusetts*, 2014.

Peterson, T.S., S.K. Pelletier, S.A. Boyden, and K.S. Watrous. Offshore acoustic monitoring of bats in the Gulf of Maine. *Northeastern Naturalist* 21(1): 86-107, 2014.

Johnson, J.S., L.E. Dodd, J.D. Kiser, T.S. Peterson, and K.S. Watrous. Food Habits of *Myotis leibii* along a Forested Ridgetop in West Virginia. *Northeastern Naturalist* 19(4): 665-672, 2012.

Johnson, J.S., K.S. Watrous, G.J. Giumarro, T.S. Peterson, S.A. Boyden, and M.J. Lacki. Seasonal and geographic trends in acoustic detection of tree-roosting bats. *Acta Chiropterologica*, 13(1): 157-168, 2011.

Peterson, T.S., A. Uesugi, and J. Lichter. Tree recruitment limitation by introduced snowshoe hares, *Lepus americanus*, on Kent Island, New Brunswick. *Canadian Field Naturalist* 119 (4). 569-572, 2005.

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
Attachments

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

APPENDIX B Acoustic Detector Photographs

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
Attachments

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report



Photo 1. View of the WB-1 detector set up facing north (left) and east (right).

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
Attachments

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report



Photo 2. View of the WB-1 View of detector set up facing south (left) and west (right).

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
Attachments

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report



Photo 3. View of the WB-2 detector set up facing north (left) and east (right).

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
Attachments

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report



Photo 4. View of the WB-2 detector set up facing south (left) and west (right).

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
Attachments

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report



Photo 5. View of the WB-3 detector set up facing north (left) and east (right).

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
Attachments

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report



Photo 6. View of the WB-3 detector set up facing south (left) and west (right).

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
Attachments

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

APPENDIX C Resumes of Laura Berube and Caroline Byrne



Laura Berube

Project Scientist

Laura is a Project Scientist for projects involving avian studies for pre- and post-construction projects in the Northeastern United States. Laura is a wildlife biologist with strong bird identification skills and the ability to identify bird species by both sight and sound. She has recently performed diverse avian studies for a number of renewable energy projects in the Northeastern United States, with field work including visual raptor surveys, eagle point count surveys, nocturnal migrant radar surveys, breeding bird surveys, and acoustic bat surveys. Laura is proficient in data management, analysis, summary, and vigorous QAQC for a variety of avian wildlife surveys. Laura is also proficient in acoustic bat analysis including the use of automated analysis programs: Kaleidoscope, BCID, EchoClass, and Sonobat.

Laura is also responsible for conducting vernal pool surveys and natural resource assessments and supporting wetland delineations to assist with the preparation of local, state, and federal permit applications. She has worked on a variety of natural community and rare plant surveys and projects ranging from general reconnaissance observations to quantitative community- and species-specific surveys. These projects have involved natural community mapping and analysis for transportation projects, utility corridors, and development sites.

PROFESSIONAL EXPERIENCE

- Stantec Consulting. 2010-present. Project Scientist.
- University of Maine. 2009. Wildlife Department Field Assistant.

EDUCATION

Bat Conservation and Management - Acoustic Data Management Workshop, Bat Survey Solutions, LLC - Janet Tyburec and John Chenger, Fairfield, Maine, 2015

Bachelor of Science, Wildlife Ecology, University of Maine, Orono, Maine, 2010

Wilderness First Aid Certified, SOLO, Topsham, Maine, 2014

40-Hour HAZWOPER Certification, Topsham, Maine, 2014

OSHA 10-Hour Construction Certification, ClickSafety, Topsham, Maine, 2012

MEMBERSHIPS

Secretary/Treasurer, 2014-2019, The Wildlife Society, Maine

PROJECT EXPERIENCE

NATURAL RESOURCE SERVICES

Record Hill Wind Farm Raptor Surveys, Roxbury, Maine

Conducted raptor surveys to determine species, locations, and behavior in relation to proposed wind turbines. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Rollins Wind Farm Post-Construction Mortality Monitoring and Raptor Surveys, Maine

Conducted bird and bat mortality ground searches (a requirement of utility-scale wind power developments in Maine). Evaluated as having high searcher efficiency scores for the on-the-ground trials. Responsible for scavenger surveys, which involved the placement and monitoring of carcasses and use of game cameras. Also conducted raptor surveys to determine species, locations, and behavior in relation to proposed wind turbines. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Eastern Box Turtle Protection Plan and Construction, Brewster, Massachusetts

Conducted regular fence inspection in accordance with and NHESP-approved Eastern Box Turtle Protection Plan designed to protect box turtles in compliance with MESA during construction of a pump station development project. Responsible for documenting the presence of any box turtles in the vicinity of the fencing and reporting deficiencies in the fencing to appropriate personnel.

Stetson I and II Wind Farms Post-Construction Monitoring, Maine

Conducted bird and bat mortality ground searches (a requirement of utility-scale wind power developments in Maine). Evaluated as having high searcher efficiency scores for the on-the-ground trials. Responsible for scavenger surveys, which involved the placement and monitoring of carcasses and use of game cameras.

Oakfield Wind Project Avian Studies | Maine

Conducted raptor surveys to determine species, locations, and behavior in relation to proposed wind turbines. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Ecological Characterizations | Coos County, New Hampshire

Conducted surveys for rare, threatened, and endangered species of plants and wildlife, assessments of existing

wildlife habitat values, and mapping of wetland and stream resources in a remote area of New Hampshire.

Hand Analysis of Bat Data | Topsham, Maine

Conducted analysis of bat detector data to determine species of bats for multiple project sites. Analysis results were then provided to clients to assist with their project planning and permit applications in compliance with applicable local, state, and federal natural resource regulations.

Wind Project | Eastern Maine

Project scientist responsible for organization, progress, and safety of field staff through the field work phase (wetland delineations, vernal pool surveys, and other natural resource mapping) of large-scale wind power development. Responsible for data management and associated reporting of findings to accompany state and federal permit applications.

Natural Resource Advisory Role in Oil Spill Response | Large Interstate Oil Spill in Gulf of Mexico | Natural Resource Advisor

Natural Resource Advisor (NRA) conducting environmental oversight of oil spill cleanup activities in compliance with an emergency consultation under Section 7 of the Endangered Species Act. NRAs worked directly with operational cleanup crews to implement Best Management Practices (BMPs). These BMPs served as the formal technical guidance issued under the emergency consultation. The objective of this work was to minimize secondary impacts of the cleanup activities on protected resources, including sea turtles, migratory and nesting shorebirds, beach mice, mangrove wetlands, estuaries, coastal wetlands, and dune systems. Implemented BMPs and conducted surveys for piping plover and sea turtles within designated critical habitats. Conducted training and oversight of cleanup crews and prepared daily reports documenting NRA activities. Worked closely with cleanup operations to provide education on BMPs and documenting daily compliance for use in USFWS consultation process and evaluation of secondary impacts to protected resources as part of the Natural Resources Damage Assessment (NRDA).

Proposed Wind Project Bird and Bat Surveys, Coye Hill, Connecticut

Conducted pre-construction wind project development surveys and impact assessments for a proposed wind project in Connecticut. These assessments included raptor surveys, acoustic bat surveys, and breeding bird surveys.

Beech Hill Wind Project | Aroostook County, Maine

Assisted in wetland delineations, vernal pool surveys, and Global Positioning System surveys for a proposed 34-turbine wind project and associated 67-mile transmission line. Identified streams and Wetlands of Special Significance based on the criteria in the Maine Department of Environmental Protection's Natural Resource Protection Act. Characterized wetland and waterbody resources based the U.S. Fish and Wildlife Service Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et. al 1979).

Documented the biological and physical characteristics of potential vernal pool habitat based on the criteria of the Maine Department of Inland Fisheries and Wildlife.

Proposed Wind Project | Central Maine

Conducted wetland delineations, vernal pool surveys, and Global Positioning System surveys over an area totaling approximately 6,800 acres for a proposed 55-turbine wind project in Central Maine. Determined wetland boundaries using the technical criteria described in the U.S. Army Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987). Identified streams and Wetlands of Special Significance based on the criteria in the Maine Department of Environmental Protection's Natural Resource Protection Act. Characterized wetland and waterbody resources based the U.S. Fish and Wildlife Service Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et. al 1979). Documented the biological and physical characteristics of potential vernal pool habitat based on the criteria of the Maine Department of Inland Fisheries and Wildlife.

Orangeville, Marsh Hill, and Sheldon Wind Projects, Post-Construction Monitoring | Western New York | Technician Supervisor

Supervised four post-construction monitoring technicians. Responsible for timecard and expense approval, tracking completion of safety trainings, and communicating with staff about needs while in the field.

Proposed Solar and Infrastructure Update Projects | Vermont | Project Manager

Wrote the proposals and was Project Manager for proposed projects requiring northern long-eared bat (*Myotis septentrionalis*) surveys. Responsible for client and agency communication, managing of field staff and field survey completion, and the completion of final reports and delivery to client to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Proposed Wind Project | Maine | Project Manager

Project Manager for proposed wind project requiring pre-construction avian and wildlife surveys. Responsible for client and agency communication, managing of field staff and field survey completion, and the completion of final reports and delivery to client to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Proposed Wind Project, Down East Maine

Conducted pre-construction wind project development surveys and impact assessments for a proposed wind project in Maine. These assessments included raptor surveys, eagle point count surveys, acoustic bat surveys, nocturnal radar surveys, and breeding bird surveys. Analyzed and reported on data for reporting purposes related to impact assessment and permitting efforts.

Post-construction Avian Fatality Monitoring at a Developed Wind Project | New Hampshire | Project Manager

Project Manager of the post-construction monitoring survey conducted at a developed wind project in New

Hampshire. Responsible for client and agency communication, managing of field staff and field survey completion, and the completion of final reports and delivery to client and applicable state and federal natural resource agencies to assist with the compliance of the permit.

Automated Program Analysis of Bat Data | Topsham, Maine

Conducted analysis of bat detector data using Kaleidoscope, BCID, and Sonabat software to determine species of bats for multiple project sites. Analysis results were provided to clients to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Agency Meeting and Site Visit for Proposed Wind Project, Down East Maine

Attended a pre-application agency consultation meeting for a proposed wind project in Down East Maine. Attended a site visit at proposed project area with client and agency representatives. Provided information on pre-construction wildlife field surveys conducted by Stantec at proposed wind project.

Data Manager | Topsham, Maine

Responsible for managing data related to bird and bat studies conducted by the office. Responsible for the retrieval, and placement of data to assist in effective report writing and limiting of possible liability.

Rollins Wind Project Invasive Species Monitoring | Lincoln, Maine

Conducted invasive species surveys along a recently constructed transmission line right-of-way according to the standards and methods developed in the Invasive Species Management Plan.

Ichthyoplankton Sampling | Field Technician

Assisted in ichthyoplankton field sampling to characterize the marine egg and larvae community present and potentially susceptible to impingement and entrainment at the cooling water intake structure of a facility withdrawing cooling water from Penobscot Bay, in support of the Clean Water Act 316(b) for a confidential client. The results of the sampling will be included in 316b report and would be used to inform the design of the impingement control system to be eventually installed.

Schedule Coordinator | Topsham, Maine

Proposed Wind Project, Western New York

Conducted eagle point count surveys to determine eagle locations and behavior in relation to proposed wind turbines. Assisted in survey design, mapping, and implementation. Performed quality assurance and control on data to inform potential collision risk of eagles as a result of the project.

Proposed Linear Project | New Brunswick, Canada

Conducted surveys for rare, threatened, and endangered species of plants and wildlife, assessments of existing

wildlife habitat values, and mapping of wetland and stream resources.

Groton Wind Farm, Raptor Surveys, Breeding Bird Surveys, Nocturnal Migrant Radar Surveys | Grafton County, New Hampshire | Task Manager

Responsible for the staffing and scheduling of field surveys. Also responsible for task managing the completion of sections of the final report to be delivered to the client. Conducted raptor, breeding bird, and nocturnal migrant radar surveys.. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Bull Hill Wind Farm Post-Construction Monitoring, Maine

Conducted bird and bat mortality ground searches (a requirement of utility-scale wind power developments in Maine). Responsible for scavenger surveys, which involved the placement and monitoring of carcasses and use of game cameras. Responsible for searcher efficiency trials, which involved the placement and monitoring of carcass retrieval by other surveyors.

Proposed Wind Projects | Maine | Task Manager

Responsible for the staffing and scheduling of field surveys including visual raptor surveys, eagle point count surveys, breeding bird surveys, and acoustic bat surveys. Also responsible for task managing the completion of sections of the final reports to be delivered to clients to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Proposed Wind Project | Northern California

Analyzed crepuscular radar data targeting federally threatened and state endangered marbled murrelets (*Brachyramphus marmoratus*) and reviewed and managed acoustic bat survey data for reporting purposes related to impact assessment and permitting efforts.

Block Island Wind Farm, Offshore | Rhode Island

Conducted analysis of bat detector data using Kaleidoscope software and provided quality review of bat call determinations by the software to determine species of bats. Analysis results were provided to the client to assist with the project's compliance of applicable state and federal natural resource regulations.

Proposed Wind Project, Offshore | Northeast and Mid-Atlantic US

Conducted analysis of bat detector data using Kaleidoscope software and provided quality review of bat call determinations by the software to determine species of bats. Analysis results were provided to the client to assist with planning and permit applications in compliance with applicable state and federal natural resource regulations.



Caroline Byrne

Wildlife Biologist

Caroline Byrne is a project scientist and bat biologist, specializing in rare species assessments and bioacoustics. She has a wide range of experience with wildlife assessments for birds, bats, turtles, cave fauna, and vegetation. She has conducted extensive mist netting, acoustic, and telemetry surveys and is a federally permitted bat biologist. Caroline has project experience in various sectors including commercial (renewable energy and development), Federal (Department of Defense, Environmental Protection Agency US Fish and Wildlife) and state agencies. Caroline will be working with the emerging EchoPitch program and related research projects funded by the US Department of Energy, National Renewable Energy Laboratory, Renewable Energy and Wildlife Institute, and private clients. Caroline has a BS from Binghamton University and a MS from Indiana State, where she researched Indiana bat social calls and behavior. She has conducted extensive mist netting, acoustic, and telemetry surveys and is a federally permitted bat biologist. Most recently, she has worked as a wildlife research biologist for Biodiversity Research Institute in Portland, Maine.

EDUCATION

Master of Science, Biology, Indiana State University, Terre Haute, Indiana , 2015

Bachelors of Science, Environmental Science: Ecosystems , Binghamton University, Vestal, New York, 2010

CERTIFICATIONS & TRAINING

30-hour Construction Safety and Health , Occupational Safety and Health Administration, San Diego, California, 2022

Wilderness First Aid, Wilderness Medical Associates International, Portland, Maine, 2021

Soundscape Analysis: From Data to Graphs, Wildlife Acoustics, Inc., Maynard, Massachusetts, 2021

Bat Acoustics Training and Analysis Course, Wildlife Acoustics, Maynard, Massachusetts, 2016

Raven Sound Analysis Workshop, Cornell Lab of Ornithology, Ithaca, New York, 2013

Acoustic Techniques Workshop, Bat Conservation Managment, Newburyport, Massachusetts, 2011

Bat Automatic Identification Software Workshop , Western EcoSystems Technology, Inc., Pikeville,

Tennessee, 2013

Properties of Sound: How Bat Detectors Work, Wildlife Acoustics, Inc., Maynard, Massachusetts, 2020

MEMBERSHIPS

President-elect, Northeast Bat Working Group, 2009-Present

Past President, The Wildlife Society, Maine, 2015-Present

PROJECT EXPERIENCE

MILITARY

Rare, Threatened, and Endangered Bat Surveys at US Naval Installations | Field Coordinator, Federally Permitted Biologist at Biodiversity Research Institute

While at Biodiversity Research Institute, Caroline performed rare, threatened, and endangered bat surveys throughout the eastern United States, including acoustics: deployment, automated analysis and qualitative review, mist-netting, homing telemetry, foraging telemetry, and hibernacula surveys.

BAT BIOLOGY

Threatened and Endangered Bat Surveys at Ely Mine | Vershire, Vermont | Federally Permitted Biologist, Biodiversity Research Institute

Performed mist-netting surveys, acoustics (deployment, automated analysis, and qualitative analysis), day roost telemetry, automated foraging, and home range telemetry. Compiled results into reports to client and permitting agencies.

Indianapolis International Airport Indiana Bat Project | Indianapolis, Indiana | Graduate Researcher-Indiana State University

Lead a long-term Indiana bat monitoring project. Long-term monitoring of local bat populations included mist netting long-term netting sites with a minimum of 12 per month, radio telemetry and transmitter attachment in order to track foraging bats and locate day roosts, spotlight checks, and emergence count to monitor roost use.

- Vegetation surveys
- Report preparation: Prepared biweekly and annual reports of study results
- Thesis research: Describing the social behavior of Indiana bats (*Myotis sodalis*) at day roost sites.
- Deployed Pettersson D500X and night vision video to record social behavior at maternity roosts
- Developed ethogram detailing visual and acoustic behaviors
- Coded video for behaviors and analyzed acoustic behaviors in Raven Pro

EMPLOYMENT HISTORY

Biodiversity Research Institute Mammal Program Field Coordinator

2015 - 2022 · 7 years

Project Management:

- Staffing: Supervise and manage all field staff including other field leads

Permitting: Application, management, and reporting for permits on both the state and federal level

Development: study plans, scopes of work, and standard operating procedures, worked directly with numerous clients including DOD (Navy, Air Force, Army, and Marines), EPA, State Agencies, USFWS, USNPS, Army National Guard, Army Core of Engineers, Air National Guard, and renewable energy companies (i.e., solar and offshore wind)

Logistics: arranged vehicles, lodging, equipment, and staffing schedules

Field Program Work:

- Overseeing all aspects of the capture and radio tracking of Eastern bat species.
- As of 2020, I have identified 13 bat species in North America totaling >1,700 individual bats in hand. In North America, from Maine to South Carolina to Illinois.
- Supervise and participate in the live capture of bats, and monitor and take samples according to the scope of work and approved protocols.
- Daytime radio telemetry to locate roosting sites, nighttime telemetry with up to five teams for simultaneous foraging telemetry for home range analysis.
- Development, siting, production, and execution of nano-telemetry towers for MOTUS network monitoring, captured and tagged bats with MOTUS transmitters during migration
- Hibernacula and anthropogenic structure surveys
- Surveys for Canada Lynx with the use of camera traps and scent stations
- Assisted in drafting bat portions of Construction and Operations Plans (COP) for offshore wind development

Acoustics (birds and bats):

- Develop standard operating procedures for acoustic monitoring with various detectors, software, and deployment types
- Deployment and analysis of acoustic monitoring methods for bats
- Deployed Pettersson D500X, 240X, and M500, Anabat SD2, Binary Acoustics AR125, Wildlife Acoustics SM2, SM3, and SM4 to record bat activity
- Post-processing analysis with SonoBat, Kaleidoscope Pro., EchoClass, Sonobat, Raven, and Audacity
- Manual vetting: extensive experience in manual vetting of recordings of eastern bat species
- Offshore wind energy acoustic deployments and acoustic processing and vetting

Indiana State University

Graduate Student

2013 - 2015 · 3 years

Long term monitoring of local bat populations: Mist netting long term netting sites, radio telemetry and transmitter attachment in order to track foraging bats and locate day roosts, spotlight checks and emergence count to monitor roost use. Vegetation surveys. Report preparation. Deployed acoustic monitors and night vision video to record acoustic and visual behavior at maternity roosts, analyzed hundreds of hours of acoustic and video data. Developed ethogram detailing visual, through behavioral coding of video and acoustic behaviors through qualitative and statistically analysis of acoustic behaviors.

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
Attachments

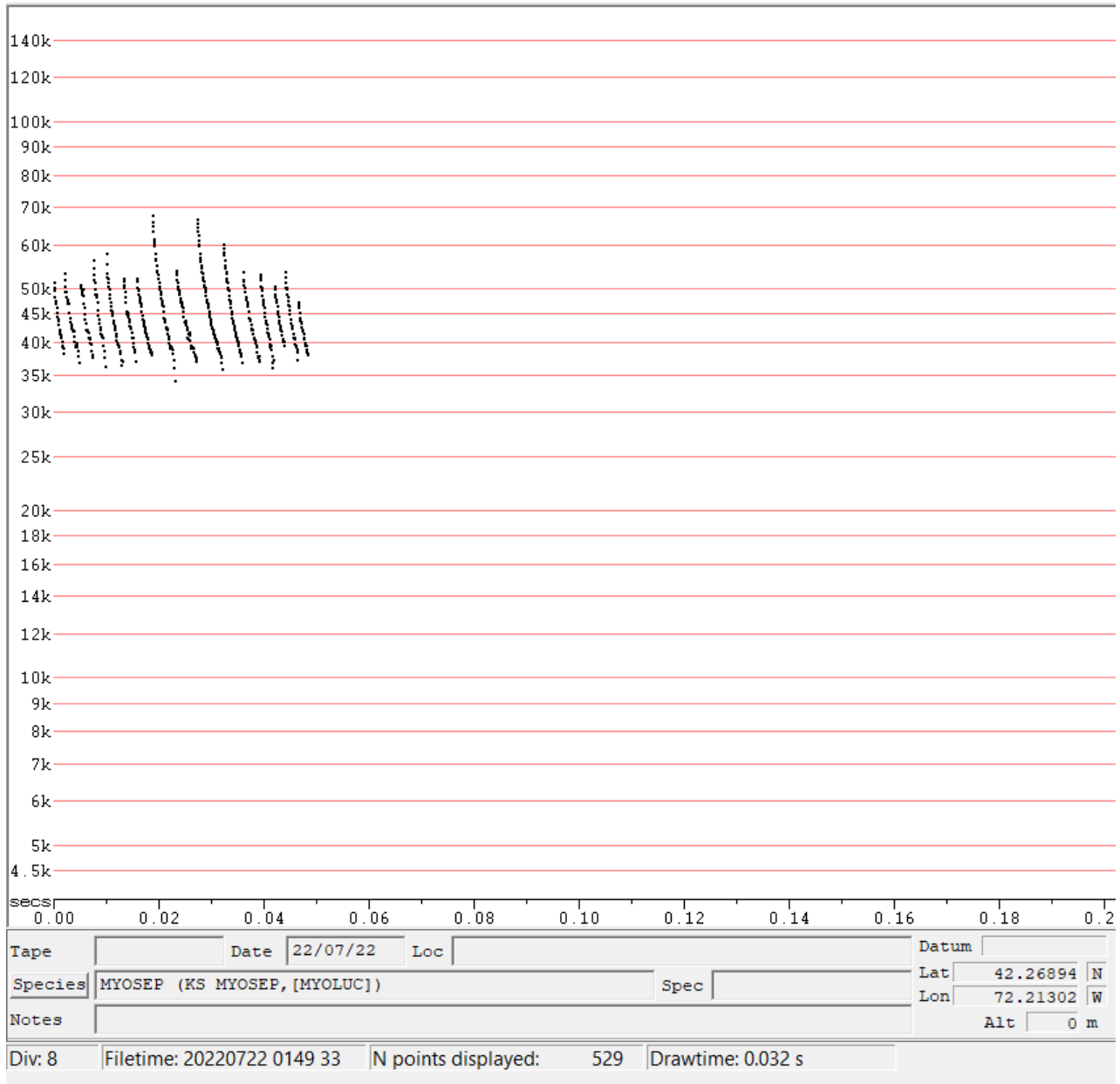
Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

APPENDIX D Screenshots of Bat Passes

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
 Attachments

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

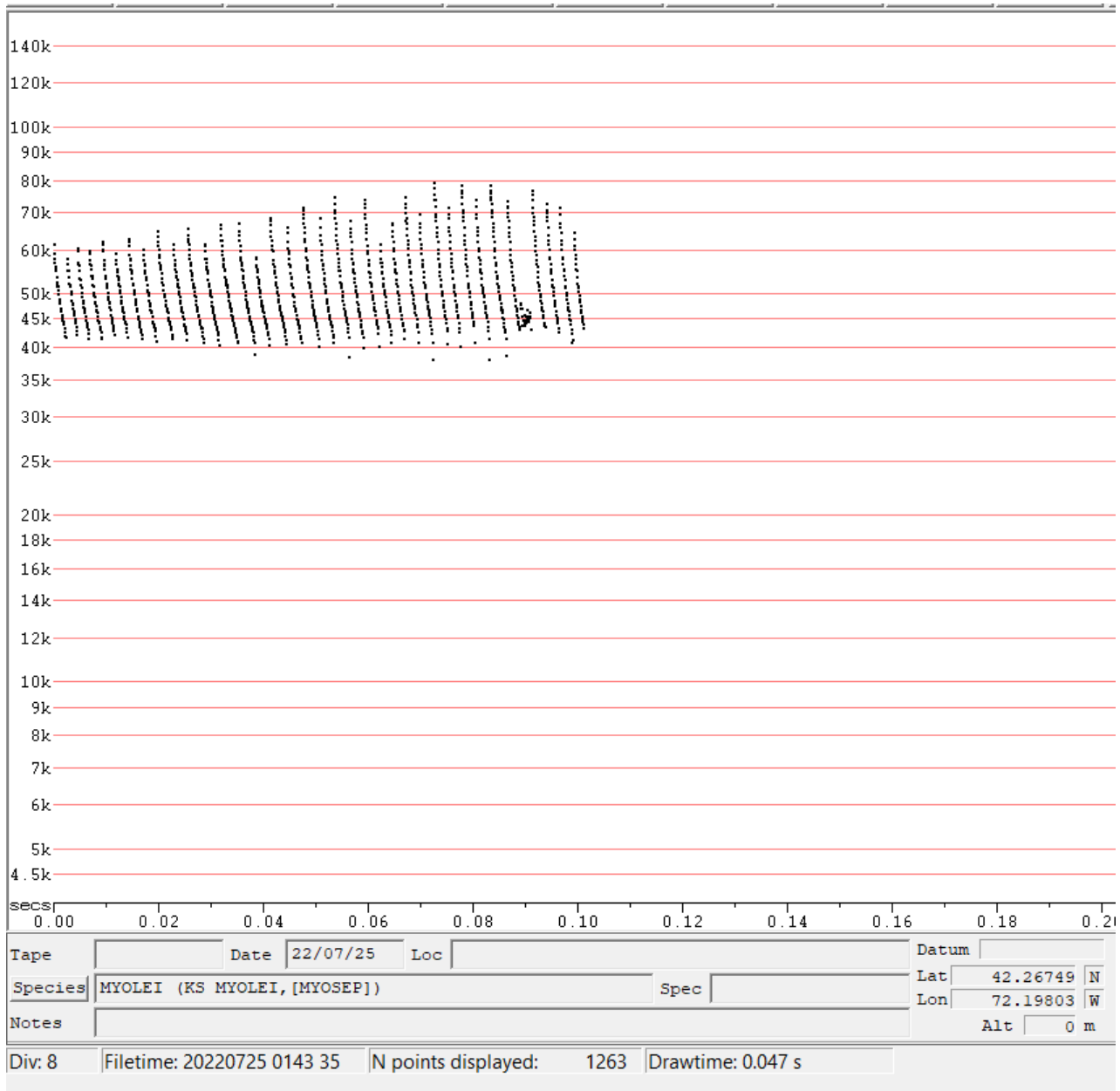


Appendix D. Figure 1. Screenshot of a little brown bat pass recorded on the night of July 21, 2022, and autoclassified as a northern long-eared bat by KPro for the Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts, site WB-1.

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
 Attachments

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

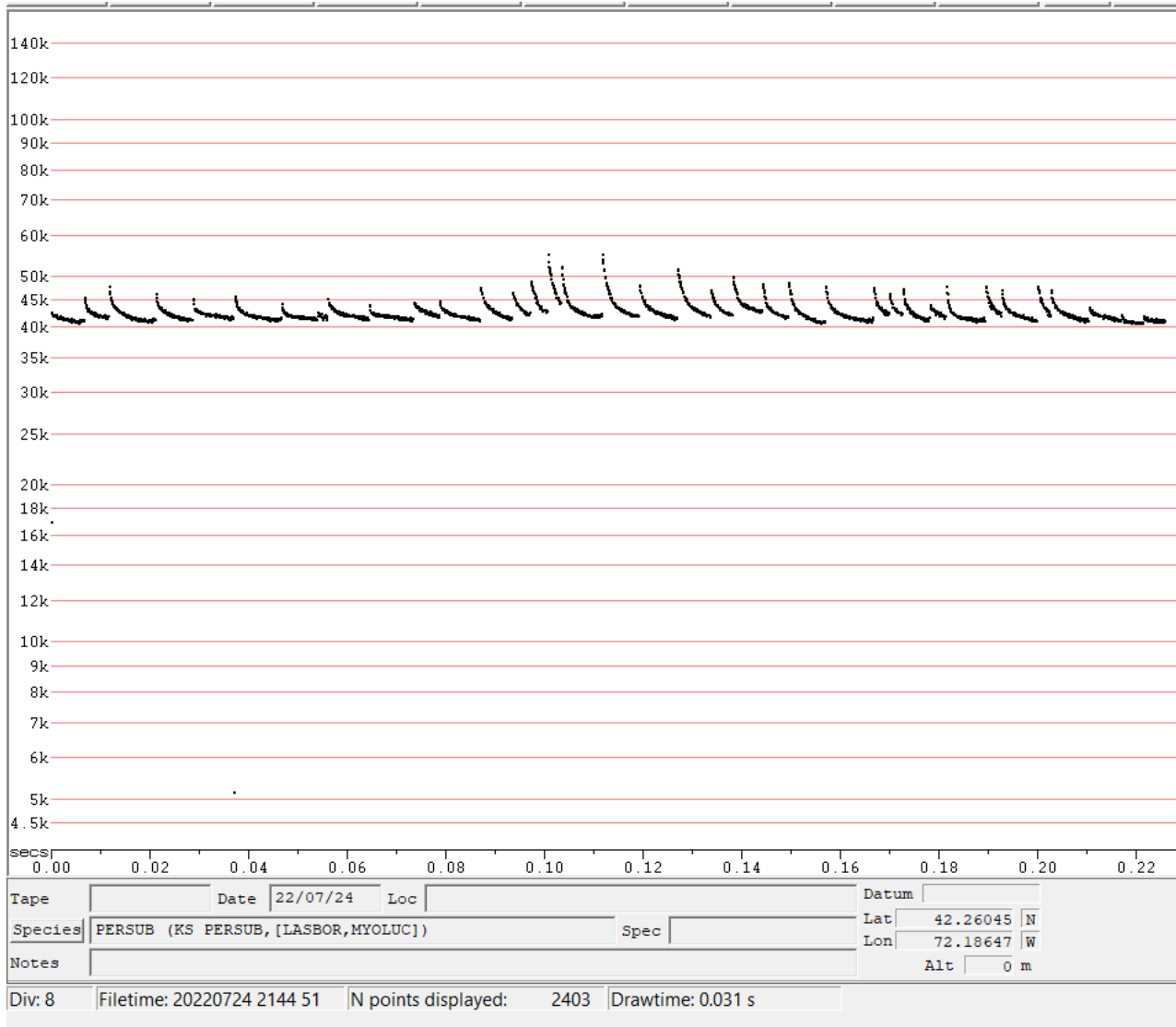


Appendix D. Figure 2. Screenshot of a bat pass recorded on the night of July 24, 2022, and autocalssified as an eastern small-footed bat by KPro for the Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts, site WB-2. Pass is of poor enough quality that eastern small-footed bat presence cannot be confirmed based on this pass, but the pass is assumed to be a *Myotis* species based on visual QA/QC.

October 11, 2022

Tim Dexter, Fish and Wildlife Program Coordinator
 Attachments

Reference: Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts – Northern Long-eared Bat Acoustic Survey Report



Appendix D. Figure 3. Screenshot of a tri-colored bat pass recorded on the night of July 24, 2022, for the Resurfacing and Related Work on Route 9, West Brookfield, Massachusetts, site WB-3.

DOCUMENT A00875

**POLICY DIRECTIVE P-22-001
AND
POLICY DIRECTIVE P-22-002**

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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

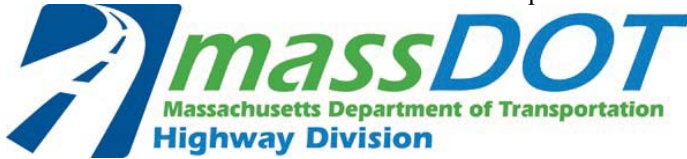
- a. The Contractor shall provide proposed off-site storage locations to the Engineer for approval at least 30 days prior to transporting soil off site. Off-site storage locations should be in the same municipality as the work site.
- b. The Contractor shall keep excavated soil on site until adequately 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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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

WEST BROOKFIELD

For: **Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)**

COMMONWEALTH OF MASSACHUSETTS

LOCATION

The work referred to herein is in the Town of WEST BROOKFIELD in Worcester 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 9 (West Main Street)

Beginning – Station 10+16.00 +/-
Ending –Station 71+00.00 +/-

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 **641 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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Project # 606517		Contract # 125780		
Location : WEST BROOKFIELD				
Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
100.	1	SCHEDULE OF OPERATIONS - FIXED PRICE \$64500 AT Sixty Four Thousand Five Hundred Dollars LUMP SUM	\$64,500.00	\$64,500.00
100.002	24	LABORER AT _____ PER HOUR		
101.	2.6	CLEARING AND GRUBBING AT _____ PER ACRE		
102.3	8	HERBICIDE TREATMENT OF INVASIVE PLANTS AT _____ PER HOUR		
102.33	16	INVASIVE PLANT MANAGEMENT STRATEGY AT _____ PER HOUR		
102.511	5	TREE PROTECTION - ARMORING AND PRUNING AT _____ EACH		
102.521	50	TREE AND PLANT PROTECTION FENCE AT _____ PER FOOT		
102.523	100	TREE AND PLAN PROTECTION - VISIBILITY STAKES AT _____ PER FOOT		
104.	1	TREE REMOVED - DIAMETER 24 INCHES AND OVER AT _____ EACH		

Project # 606517 Contract # 125780

Location : WEST BROOKFIELD

Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)

ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
120.	12,500	EARTH EXCAVATION AT _____ PER CUBIC YARD		
121.	5,300	CLASS A ROCK EXCAVATION AT _____ PER CUBIC YARD		
122.	1,110	PRESPLITTING ROCK AT _____ PER SQUARE YARD		
123.	50	MUCK EXCAVATION AT _____ PER CUBIC YARD		
140.	2,180	BRIDGE EXCAVATION AT _____ PER CUBIC YARD		
141.	23	CLASS A TRENCH EXCAVATION AT _____ PER CUBIC YARD		
141.1	80	TEST PIT FOR EXPLORATION AT _____ PER CUBIC YARD		
144.	970	CLASS B ROCK EXCAVATION AT _____ PER CUBIC YARD		
146.	8	DRAINAGE STRUCTURE REMOVED AT _____ EACH		

Project # 606517		Contract # 125780		
Location : WEST BROOKFIELD				
Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
151.	6,570	GRAVEL BORROW AT _____ PER CUBIC YARD		
151.1	240	GRAVEL BORROW FOR BRIDGE FOUNDATION AT _____ PER CUBIC YARD		
151.2	2,550	GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AT _____ PER CUBIC YARD		
156.	1,170	CRUSHED STONE AT _____ PER TON		
170.	10,600	FINE GRADING AND COMPACTING - SUBGRADE AREA AT _____ PER SQUARE YARD		
180.01	1	ENVIRONMENTAL HEALTH AND SAFETY PROGRAM AT _____ LUMP SUM		
180.02	80	PERSONAL PROTECTION LEVEL C UPGRADE AT _____ PER HOUR		
180.03	40	LICENSED SITE PROFESSIONAL SERVICES AT _____ PER HOUR		
181.11	10,900	DISPOSAL OF UNREGULATED SOIL AT _____ PER TON		

Project # 606517 Contract # 125780

Location : WEST BROOKFIELD

Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)

ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
181.12	500	DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY AT _____ PER TON		
181.13	10	DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY AT _____ PER TON		
181.14	10	DISPOSAL OF HAZARDOUS WASTE AT _____ PER TON		
201.	32	CATCH BASIN AT _____ EACH		
202.	16	MANHOLE AT _____ EACH		
203.	1	SPECIAL MANHOLE AT _____ EACH		
206.1	3	DROP INLET, TYPE AF AT _____ EACH		
209.1	1	DROP INLET, TYPE DF AT _____ EACH		
220.	40	DRAINAGE STRUCTURE ADJUSTED AT _____ EACH		

Project # 606517 Contract # 125780

Location : WEST BROOKFIELD

Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)

ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
221.	16	FRAME AND COVER AT _____ EACH		
222.1	24	FRAME AND GRATE - MASSDOT CASCADE TYPE AT _____ EACH		
222.2	4	FRAME AND GRATE - MASSDOT DROP INLET AT _____ EACH		
223.1	16	FRAME AND GRATE (OR COVER) REMOVED AND STACKED AT _____ EACH		
227.3	20	REMOVAL OF DRAINAGE STRUCTURE SEDIMENT AT _____ PER CUBIC YARD		
227.31	410	REMOVAL OF DRAINAGE PIPE SEDIMENT AT _____ PER FOOT		
241.12	1,280	12 INCH REINFORCED CONCRETE PIPE CLASS III AT _____ PER FOOT		
242.12	5	12 INCH REINFORCED CONCRETE PIPE FLARED END AT _____ EACH		
258.	400	STONE FOR PIPE ENDS AT _____ PER SQUARE YARD		

Project # 606517 Contract # 125780

Location : WEST BROOKFIELD

Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)

ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
280.	16	HOT MIX ASPHALT WATERWAY AT _____ PER SQUARE YARD		
402.	1,490	DENSE GRADED CRUSHED STONE FOR SUB-BASE AT _____ PER CUBIC YARD		
402.13	7,700	PAVEMENT MILLING MULCH FOR SHOULDERS AT _____ PER FOOT		
415.1	10,250	PAVEMENT STANDARD MILLING AT _____ PER SQUARE YARD		
430.	210	CEMENT CONCRETE BASE COURSE AT _____ PER SQUARE YARD		
443.	11	WATER FOR ROADWAY DUST CONTROL AT _____ PER 1000 GALLONS		
450.221	2,000	SUPERPAVE SURFACE COURSE – 9.5 POLYMER (SSC – 9.5 - P) AT _____ PER TON		
450.31	2,700	SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC -12.5) AT _____ PER TON		
450.42	2,950	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5) AT _____ PER TON		

Project # 606517 Contract # 125780

Location : WEST BROOKFIELD

Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)

ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
450.53	170	SUPERPAVE LEVELING COURSE - 12.5 (SLC - 12.5) AT _____ PER TON		
451.	30	HMA FOR PATCHING AT _____ PER TON		
452.	2,230	ASPHALT EMULSION FOR TACK COAT AT _____ PER GALLON		
453.	40,800	HMA JOINT ADHESIVE AT _____ PER FOOT		
470.	100	HOT MIX ASPHALT BERM AT _____ PER TON		
470.2	2,000	HOT MIX ASPHALT BERM, TYPE A - MODIFIED AT _____ PER FOOT		
472.	540	TEMPORARY ASPHALT PATCHING AT _____ PER TON		
477.2	6,100	MILLED RUMBLE STRIP (TYPE C) AT _____ PER FOOT		
482.5	8,800	SAWCUTTING ASPHALT PAVEMENT FOR BOX WIDENING AT _____ PER FOOT		

Project # 606517 Contract # 125780

Location : WEST BROOKFIELD

Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)

ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
570.2	1,160	HOT MIX ASPHALT CURB TYPE 2 AT _____ PER FOOT		
620.13	1,320	GUARDRAIL, TL-3 (SINGLE FACED) AT _____ PER FOOT		
620.131	3,070	GUARDRAIL, DEEP POST (SINGLE FACED) AT _____ PER FOOT		
627.83	16	GUARDRAIL TANGENT END TREATMENT, TL-3 AT _____ EACH		
628.305	2	TEMPORARY IMPACT ATTENUATOR, NON-REDIRECTIVE, TL-3 AT _____ EACH		
628.4	4	TEMPORARY IMPACT ATTENUATOR, REMOVED AND RESET AT _____ EACH		
630.2	4,300	HIGHWAY GUARD REMOVED AND DISCARDED AT _____ PER FOOT		
691.1	300	BALANCE STONE WALL REMOVED AND STACKED AT _____ PER FOOT		
697.1	44	SILT SACK AT _____ EACH		

Project # 606517 Contract # 125780

Location : WEST BROOKFIELD

Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)

ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
698.3	80	GEOTEXTILE FABRIC FOR SEPARATION AT _____ PER SQUARE YARD		
698.31	50	GEOTEXTILE FABRIC FOR TEMPORARY SOIL PROTECTION AT _____ PER SQUARE YARD		
698.4	370	GEOTEXTILE FABRIC FOR PERMANENT EROSION CONTROL AT _____ PER SQUARE YARD		
702.	15	HOT MIX ASPHALT SIDEWALK OR DRIVEWAY AT _____ PER TON		
711.	4	BOUND REMOVED AND RESET AT _____ EACH		
740.	22	ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) AT _____ PER MONTH		
748.	1	MOBILIZATION AT _____ LUMP SUM		
751.	40	LOAM FOR ROADSIDES AT _____ PER CUBIC YARD		
751.7	260	COMPOST BLANKET AT _____ PER CUBIC YARD		

Project # 606517 Contract # 125780

Location : WEST BROOKFIELD

Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)

ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
751.765	80	COMPOST AND SEED OVER MODIFIED ROCK AT _____ PER CUBIC YARD		
755.35	1	INLAND WETLAND REPLICATION AREA AT _____ LUMP SUM		
755.45	10	WETLAND RESTORATION AT _____ PER SQUARE YARD		
755.50	1	LAND UNDER WATER & BANK RESTORATION AT _____ LUMP SUM		
755.75	15	WETLAND SPECIALIST AT _____ PER HOUR		
755.76	1	WETLANDS MONITORING REPORTS AT _____ LUMP SUM		
756.	1	NPDES STORMWATER POLLUTION PREVENTION PLAN AT _____ LUMP SUM		
765.	330	SEEDING AT _____ PER SQUARE YARD		
765.21	70	ANNUAL COVER CROP FOR NATIVE SEEDING AT _____ PER POUND		

Project # 606517 Contract # 125780

Location : WEST BROOKFIELD

Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)

ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
765.411	120	SEEDING - LOW UPLAND MIX AT _____ PER POUND		
765.635	10,300	NATIVE SEEDING AND ESTABLISHMENT AT _____ PER SQUARE YARD		
767.121	14,200	SEDIMENT CONTROL BARRIER AT _____ PER FOOT		
767.122	60	SEDIMENT BARRIER - COIR LOG AT _____ PER FOOT		
767.9	2,100	JUTE MESH AT _____ PER SQUARE YARD		
769.	5,000	PAVEMENT MILLING MULCH UNDER GUARD RAIL AT _____ PER FOOT		
799.21	6	TREE - DECIDUOUS 4-5 FT AT _____ EACH		
816.81	1	TEMPORARY TRAFFIC CONTROL SIGNAL AT _____ LUMP SUM		
829.	50	ROADSIDE GUIDE SIGN (G) - ALUMINUM PANEL (TYPE B) AT _____ PER SQUARE FOOT		

Project # 606517 Contract # 125780

Location : WEST BROOKFIELD

Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)

ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
832.	260	WARNING-REGULATORY AND ROUTE MARKER - ALUMINUM PANEL (TYPE A) AT _____ PER SQUARE FOOT		
841.8	1	SUPPORTS FOR GUIDE SIGN (D6 - SPECIAL DESIGN) STEEL AT _____ EACH		
847.1	47	SIGN SUP (N/GUIDE)+RTE MKR W/1 BRKWAY POST ASSEMBLY - STEEL AT _____ EACH		
850.41	230	ROADWAY FLAGGER AT _____ PER HOUR		
851.1	70	TRAFFIC CONES FOR TRAFFIC MANAGEMENT AT _____ PER DAY		
852.	350	SAFETY SIGNING FOR TRAFFIC MANAGEMENT AT _____ PER SQUARE FOOT		
853.1	4	PORTABLE BREAKAWAY BARRICADE TYPE III AT _____ EACH		
853.21	720	TEMPORARY BARRIER REMOVED AND RESET AT _____ PER FOOT		
853.33	500	TEMPORARY BARRIER - LIMITED DEFLECTION (TL-3) AT _____ PER FOOT		

Project # 606517 Contract # 125780

Location : WEST BROOKFIELD

Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)

ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
854.016	53,900	TEMPORARY PAVING MARKINGS - 6 INCH (PAINTED) AT _____ PER FOOT		
854.036	1,300	TEMPORARY PAVING MARKINGS - 6 INCH (TAPE) AT _____ PER FOOT		
854.1	5,300	PAVEMENT MARKING REMOVAL AT _____ PER SQUARE FOOT		
856.12	720	PORTABLE CHANGEABLE MESSAGE SIGN AT _____ PER DAY		
859.	42,100	REFLECTORIZED DRUM AT _____ PER DAY		
859.1	1,060	REFLECTORIZED DRUMS WITH SEQUENTIAL FLASHING WARNING LIGHTS AT _____ PER DAY		
864.35	305	SLOTTED PAVEMENT MARKER TWO-WAY YELLOW/YELLOW AT _____ EACH		
866.206	12,200	6 INCH REFLECTORIZED WHITE LINE (POLYUREA) (RECESSED) AT _____ PER FOOT		
867.306	12,200	6 INCH REFLECTORIZED YELLOW LINE (POLYUREA) AT _____ PER FOOT		

Project # 606517 Contract # 125780

Location : WEST BROOKFIELD

Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)

ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
874.2	1	TRAFFIC SIGN REMOVED AND RESET AT _____ EACH		
874.4	5	TRAFFIC SIGN REMOVED AND STACKED AT _____ EACH		
874.41	26	TRAFFIC SIGN REMOVED AND DISCARDED AT _____ EACH		
901.	50	4000 PSI, 1.5 INCH, 565 CEMENT CONCRETE AT _____ PER CUBIC YARD		
910.1	510	STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED AT _____ PER POUND		
912.101	20	PASSIVE ROCK DOWELS AT _____ EACH		
912.102	4	PROOF TESTING OF PASSIVE ROCK DOWELS AT _____ EACH		
912.103	120	ROCK MECHANICS ENGINEER AT _____ PER HOUR		
986.	1,650	MODIFIED ROCKFILL AT _____ PER TON		

Project # 606517		Contract # 125780		
Location : WEST BROOKFIELD				
Description : Resurfacing & Related Work on Route 9, From Ware T.L. To 850' West of Welcome Road (1.1 Miles – Phase I)				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
996.01	1	WALL STRUCTURE, WALL NO. 1 AT _____ LUMP SUM		
996.02	1	WALL STRUCTURE, WALL NO. 2 AT _____ LUMP SUM		
996.03	1	WALL STRUCTURE, WALL NO. 3 AT _____ LUMP SUM		
Total Qty:		322,524.6		

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DOCUMENT B00853

SCHEDULE OF PARTICIPATION BY DISADVANTAGED BUSINESS ENTERPRISES (DBES)

PRIME BIDDER: _____

DATE OF BID OPENING: _____ PROJECT NO.: 606517

FEDERAL AID PROJECT NO. STP/TAP-0032(040)

PROJECT LOCATION: WEST BROOKFIELD

Name, Address, and Phone Number(s) of DBE	Name of Activity	(a)† DBE Contractor Activity Amount <i>Construction Work</i>	(b) DBE Other Business Amount <i>Services, Supplies, Material</i>	(c) Total amount eligible for credit under rules in Section 6 of Document 00719 - DBE Special Provisions
Total Bid Amount	TOTALS:	\$	\$	\$
\$	DBE Percentage of Total Bid:	%	%	%

†Column (a) must be at least one-half of the DBE participation goal. Attach additional sheets as necessary.

Is MassDOT Document B00855 (Joint Check Approval) being submitted for any of the above? Yes No

Not Known at This Time

Will any of the contractors listed above be using a third party (i.e. manufacturer) to deliver materials or perform any portion of work by a third party? Yes No

CERTIFICATION: I HEREBY DECLARE, TO THE BEST OF MY KNOWLEDGE, THAT I HAVE READ THE SPECIAL PROVISIONS FOR PARTICIPATION BY DISADVANTAGED BUSINESS ENTERPRISES - DOCUMENT 00719. BOTH THIS SCHEDULE AND THE RELEVANT AND ACCOMPANYING LETTER(S) OF INTENT ARE IN FULL COMPLIANCE WITH THE PROVISIONS OF, AND IN ACCORDANCE WITH, TITLE 49 CODE OF FEDERAL REGULATIONS, PART 26 (49 CFR Part 26).

SIGNATURE: _____ DATE _____

NAME AND TITLE (PRINT): _____

EMAIL ADDRESS: _____ TEL NO.: _____

*** END OF DOCUMENT ***

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DOCUMENT B00854

DISADVANTAGED BUSINESS ENTERPRISES (DBE) PARTICIPATION
LETTER OF INTENT

(To be completed by the DBE – Page 1 of 2)

TO: _____ (Prime Bidder)

FROM: _____ (DBE Firm)

RE: PROJECT NO.: 606517 FEDERAL AID PROJECT NO.: STP/TAP-0032(040)

PROJECT LOCATION: WEST BROOKFIELD

DATE OF BID OPENING: _____

I, _____, authorized signatory of the above-referenced DBE firm hereby declare:
Print Name

1. My company is currently certified as a Disadvantaged Business Enterprise (DBE) by the Massachusetts Supplier Diversity Office (“SDO”), formerly known as the State Office of Minority and Women Business Assistance (SOMWBA), as a: (check all applicable, see Section 1 of the Special Provisions For Participation By Disadvantaged Business Enterprises, MassDOT Document 00719 additional guidance is available at Title 49, Code of Federal Regulations, Part 26.55 (49 CFR Part 26.55)):

- CONTRACTOR REGULAR DEALER BROKER
- MANUFACTURER TRUCKING OPERATIONS PROFESSIONAL SERVICES

2. My firm has the ability to manage, supervise and perform the activity described on page 2 of this Letter of Intent. If you are awarded the contract, my company intends to enter into a contract with your firm to perform the items of work or other activity described on the following sheet for the prices indicated.

3. There have been no changes affecting the ownership, control or independence of my company since my last certification review on _____, 20___. If any such change is planned or occurs prior to my company's completion of this proposed work, I will give prior written notification to your firm and to the Massachusetts Department of Transportation (“MassDOT”) Office of Civil Rights and SDO.

4. I have read the MassDOT proposal for the Project which may be entitled “Project Contract Documents and Special Provisions” or the draft “Contract” which includes MassDOT Document 00719, and acknowledge that my company will comply with that document and the requirements of 49 CFR Part 26.

5. For the purpose of obtaining subcontractor approval from MassDOT, my firm will provide to you:

A. The following construction work:

- (i) a resume, stating the qualifications and experience, of the superintendent or foreperson who will supervise on site-work;
- (ii) a list of equipment owned or leased by my firm for use on this project; and
- (iii) a list of all projects (public or private) upon which my firm is currently performing, is committed to perform, or intends to make a commitment to perform. I shall also include, for each project: the name and telephone number of a contact person for the contracting authority, person, or organization; the dollar value of the work; a description of the work; and my firm's work schedule for the project.

B. The following services, materials or supplies:

- (i) a written agreement and invoices for the materials or supplies, and any other documents evidencing the terms of providing such items;
- (ii) information concerning brokers fees and commissions for providing services or materials; and
- (iii) a statement concerning whether my firm intends or will be required to use a joint check arrangement; and any other documents that may be required by MassDOT.

DBE Company Authorized Signature

Date _____

DISADVANTAGED BUSINESS ENTERPRISES (DBE) PARTICIPATION
LETTER OF INTENT
(To be completed by the DBE – Page 2 of 2)

DATE OF BID OPENING: _____

PROJECT NUMBER: XXX

FEDERAL AID PROJECT NUMBER: XXX

PROJECT LOCATION: XXX

PRIME BIDDER: _____

DBE COMPANY NAME: _____

<u>Item number</u> if applicable	<u>NAICS</u> <u>Code</u>	<u>Description of Activity</u> with notations such as Services, or Brokerage, Installation Only, Material Only, or Complete	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
TOTAL AMOUNT:					

Please give full explanations, attach additional sheets if necessary.

I HEREBY VERIFY THAT _____ WILL SOLELY
(DBE company name)
PERFORM THE WORK, OR PROVIDE THE SERVICES OR MATERIALS, AS DESCRIBED ABOVE.

DBE AUTHORIZED SIGNATURE: _____

NAME AND TITLE (PRINT): _____

TELEPHONE NUMBER: _____ FAX NUMBER: _____

EMAIL ADDRESS: _____

*** END OF DOCUMENT ***

Rev'd 9/20/19

DOCUMENT B00855

DBE JOINT CHECK ARRANGEMENT APPROVAL FORM

(to be submitted by Prime Contractor)

Contract No: 125780 Project No. 606517 Federal Aid No.: STP/TAP-0032(040)

Location: WEST BROOKFIELD Bid Opening Date:

Project Description: Resurfacing & Related Work on Route 9, from Ware T.L. to 850' West of Welcome Road (1.1 miles – Phase I)

We have received the attached request for the use of a joint check arrangement from _____, a DBE on the above- referenced Contract and _____, a Material Supplier/Vendor for the subject Contract. The DBE has complied with the requirements of 49 CFR Part 26.55(c)(1). In particular, the DBE has:

- a written agreement with the material supplier/vendor;
• applied for credit with the subject material supplier and has supplied the vendor's response;
• shown that it will place all orders to the subject material supplier/vendor;
• made and retains all decision-making responsibilities concerning the materials; and
• provided a Joint Check Agreement that is acceptable to MassDOT;

As the Contractor for the Project, we agree to issue joint checks (made payable to the Material Supplier/Vendor and the DBE) for payment of sums due pursuant to invoices from the Supplier/Vendor and DBE.

Contractor:

Company Name Signature Duly Authorized
Printed Name
Date Title

SubContractor:

Company Name Signature – Duly Authorized
Printed Name
Date Title

*** END OF DOCUMENT ***

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DOCUMENT B00856

JOINT VENTURE AFFIDAVIT

(All Firms)

- All Information Requested By This Schedule Must Be Answered. Additional Sheets May Be Attached.
- If, there is any change in the information submitted, the Joint Venture parties must inform MassDOT Pre-Qualifications Office (and, if one of the companies is a DBE, the Director of Contract Compliance, Office of Civil Rights) *prior* to such change, in writing, either directly or through the Prime Contractor if the Joint Venture is a subcontractor.
- If the Joint Venture Entity will be the bidder on a prime Contract, it must bid and submit all required documents (insurance, worker’s compensation, bonds, etc.) in the name of the Joint Venture Entity.

I. Name of Joint Venture: _____

Type of Entity if applicable (Corp., LLC): _____ Filing State _____

Address of joint venture: _____

Phone No(s) for JV Entity: _____ E-mail: _____

Contact Person(s) _____

Tax ID/EIN of Joint Venture: _____ Vendor Code: _____

II. Identify each firm or party to the Joint Venture:

Name of Firm: _____

Address: _____

Phone : _____ E-mail: _____

Contact person(s) _____

Name of Firm: _____

Address: _____

Phone: _____ E-mail: _____

Contact Person(s) _____

III. Describe the role(s) of the each party to the Joint Venture:

- IV. Attach a copy of the Joint Venture Agreement.** The proposed Joint Venture Agreement should include specific details including, but not limited to: (1) the contributions of capital and equipment; (2) work items to be performed by each company’s forces, (3) work items to be performed under the supervision of any DBE Venturer; (4) the commitment of management, supervisory and operative personnel employed by the DBE to be dedicated to the performance of the Project; and (5) warranty, guaranty, and indemnification clauses.

V. Attach any applicable Corporate or LLC Votes, Authorizations, etc.

VI. Ownership of the Joint Venture:

A. What is the percentage(s) of each company’s ownership in the Joint Venture?

ownership percentage(s): _____

ownership percentage(s): _____

B. Specify percentages for each of the following (provide narrative descriptions and other detail as applicable):

1. Sharing of profit and loss: _____

2. Capital contributions:

(a) Dollar amounts of initial contribution: _____

(b) Dollar amounts of anticipated on-going contributions: _____

(c) Contributions of equipment (specify types, quality and quantities of equipment to be provided by each firm): _____

4. Other applicable ownership interests, including ownership options or other agreements, which restrict or limit ownership and/or control:

5. Provide copies of all other written agreements between firms concerning bidding and operation of this Project or projects or contracts.

6. Identify all current contracts and contracts completed during the past two (2) years by either of the Joint Venture partners to this Joint Venture:

VII. Control of and Participation in the Joint Venture. Identify by name and firm those individuals who are, or will be, responsible for and have the authority to engage in the following management functions and policy decisions. (Indicate any limitations to their authority such as dollar limits and co-signatory requirements.):

A. Joint Venture check signing:

B. Authority to enter Contracts on behalf of the Joint Venture:

C. Signing, co-signing and/or collateralizing loans:

D. Acquisition of lines of credit:

E. Acquisition and indemnification of payment and performance bonds:

F. Negotiating and signing labor agreements:

G. Management of contract performance. *(Identify by name and firm only):*

1. Supervision of field operations: _____
2. Major purchases: _____
3. Estimating: _____
4. Engineering: _____

VIII. Financial Controls of Joint Venture:

A. Which firm and/or individual will be responsible for keeping the books of account?

B. Identify the "Managing Partner," if any, and describe the means and measure of their compensation:

C. What authority does each firm have to commit or obligate the other to insurance and bonding companies, financing institutions, suppliers, subcontractors, and/or other parties participating in the performance of this Contract or the work of this Project?

IX. Personnel of Joint Venture: State the approximate number of personnel (by trade) needed to perform the Joint Venture's work under this Contract. Indicate whether they will be employees of the majority firm, DBE firm, or the Joint Venture.

	Firm 1 (number)	Firm 2 (number)	Joint Venture (number)
Trade			
Professional			
Administrative/Clerical			
Unskilled Labor			

Will any personnel proposed for this Project be employees of the Joint Venture?: _____

If so, who: _____

A. Are any proposed Joint Venture employees currently employed by either firm?

Employed by Firm 1: _____ Employed by firm 2 _____

B. Identify by name and firm the individual who will be responsible for Joint Venture hiring: _____

X. Additional Information. Please state any material facts and additional information pertinent to the control and structure of this Joint Venture.

XI. AFFIDAVIT OF JOINT VENTURE PARTIES. The undersigned affirm that the foregoing statements and attached documents are correct and include all material information necessary to identify and explain the terms and operations of our Joint Venture and the intended participation of each firm in the undertaking. Further, the undersigned covenant and agree to provide to MassDOT current, complete and accurate information regarding actual Joint Venture work, payments, and any proposed changes to any provisions of the Joint Venture, or the nature, character of each party to the Joint Venture. We understand that any material misrepresentation will be grounds for terminating any Contract awarded and for initiating action under Federal or State laws concerning false statements.

Firm 1

Firm 2

Signature
Duly Authorized

Signature
Duly Authorized

Printed Name and Title

Printed Name and Title

Date

Date

*** END OF DOCUMENT ***