jmr

COMMONWEALTH OF MASSACHUSETTS

CONTRACT DOCUMENTS AND SPECIAL PROVISIONS

PROPOSAL NO.	613358-129897
P.V. =	$7,894,000.00
PLANS	YES

FOR

Federal Aid Project No. NHP(NHS)-003S(829)
Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)

in the Town of

STOUGHTON

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

This Proposal to be opened and read: **TUESDAY, MAY 6, 2025, at 2:00 P.M.**

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DOCUMENT 00010

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DOCUMENT 00104

NOTICE TO CONTRACTORS

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

TUESDAY, MAY 6, 2025, at 2:00 P.M. **
STOUGHTON
Federal Aid Project No. NHP(NHS)-003S(829)
Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)
****Date Subject to Change**

PROJECT VALUE = $7,894,000.00

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.

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 $622.50 per ton, Portland cement $425.53 per ton, diesel fuel $2.759 per gallon, and gasoline $2.346 per gallon, and Steel Base Price Index 356.2. 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 5, 2025

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DOCUMENT 00210

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

July 1, 1981, updated October 2016

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(2) transactions are recorded as necessary

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

ii. to maintain accountability for assets;

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

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

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

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

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

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

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

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

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

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

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

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

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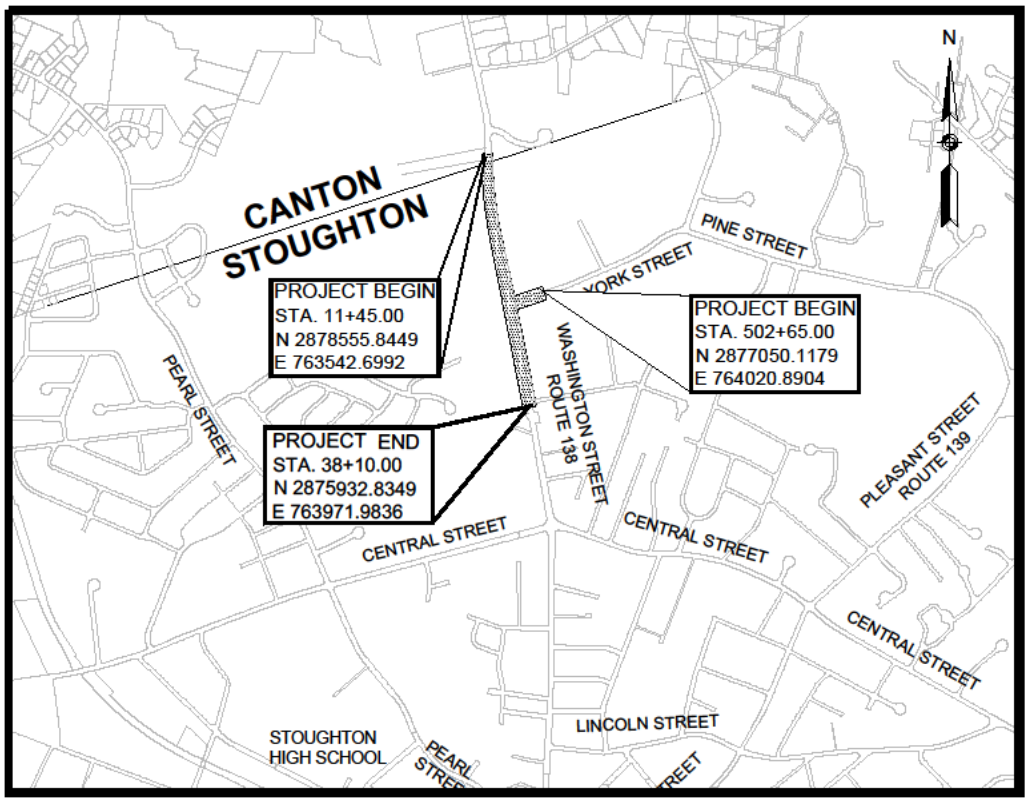
DOCUMENT 00331

LOCUS MAP

STOUGHTON
FAP No. NHP(NHS)-003S(829)
Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)



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DOCUMENT 00439

Final Report ☐

Interim Report ☐

CONTRACTOR PROJECT EVALUATION FORM

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

Date: _____

City/Town: _____ Contractor: _____

Project: _____ Address: _____

F.A. No. _____ Contract Number: _____

Bid Price: _____ Notice to Proceed: _____

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

Date Work Started: _____ Date Work Completed*: _____

Contractor's Superintendent: _____

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

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

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

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

_____ _____

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

_____

Contractor's Signature Acknowledging Report/Date

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

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

_____

_____

CONTRACTOR PROJECT EVALUATION FORM (Continued)

Date: _____ Contract Number:_____

INFORMATION FOR DISTRICT HIGHWAY DIRECTORS RELATING TO PREQUALIFICATION

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

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

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

I recommend a deduction for project completed late:_____

Signed: _____
District Highway Director

EXPLANATION OF RATINGS 1 – 9:_____

WORK NOT COMPLETED WITHIN SPECIFIED TIME: _____

Revised: 04/28/17

*** END OF DOCUMENT ***

DOCUMENT 00440

Final Report ☐

Interim Report ☐

SUBCONTRACTOR PROJECT EVALUATION FORM

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

Date: _____

City/Town: _____ Subcontractor: _____

Project: _____ Address: _____

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

Prime Contractor _____ Current Contract Completion Date: _____

Date Work Started: _____ Date Work Completed*: _____

Subcontractor's Superintendent: _____

Type of Work Performed by Subcontractor: _____

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

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

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

_____ _____

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

_____ _____

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

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

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

_____

_____

Contractor's Comments: _____

_____

SUBCONTRACTOR PROJECT EVALUATION FORM (Continued)

Date: _____ Contract Number:_____

INFORMATION FOR DISTRICT HIGHWAY DIRECTORS RELATING TO PREQUALIFICATION

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

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

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

I recommend a deduction for project completed late:_____

Signed: _____
District Highway Director

EXPLANATION OF RATINGS 1 – 8: _____

WORK NOT COMPLETED WITHIN SPECIFIED TIME: _____

Revised: 04/28/17

*** END OF DOCUMENT ***

DOCUMENT 00710
GENERAL CONTRACT PROVISIONS
Revised: 05/06/24

NOTICE OF AVAILABILITY

The STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES dated 2024, the SUPPLEMENTAL SPECIFICATIONS, 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)

Section: Page 00719-

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:

Type of Info	***Website***	***Description***
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 ____**%**
(*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 the 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 a use 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)

*** END OF DOCUMENT ***

DOCUMENT 00760

FHWA-1273 – Revised October 23, 2023

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

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 reprocurement costs;

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

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

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

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

3. Records and certified payrolls (29 CFR 5.5)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

b. *Equal employment opportunity.* The use of apprentices and journeyworkers under this part must be in conformity with

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 reprocurement costs;

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

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

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

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

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

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

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

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

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

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

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

March 19, 2025

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	$0.55
2	ASTM A27 (AASHTO M103) Steel Castings, H-Pile Points & Pipe Pile Shoes (See Note below.)	$0.77
3	ASTM A668 / A668M (AASHTO M102) Steel Forgings	$0.77
4	ASTM A108 (AASHTO M169) Steel Forgings for Shear Studs	$0.79
5	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Plate	$0.83
6	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Shapes	$0.78
7	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Plate	$0.83
8	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Shapes	$0.78
9	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Plate	$0.86
10	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Shapes	$0.79
11	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W 345W Structural Steel Plate	$0.86
12	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W or 345W Structural Steel Shapes	$0.79
13	ASTM A709/A709M Grade HPS 50W / AASHTO M270M/M270 Grade HPS 50W or 345W Structural Steel Plate	$0.90
14	ASTM A709/A709M Grade HPS 70W / AASHTO M270M/M270 Grade HPS 70W or 485W Structural Steel Plate	$0.97
15	ASTM A514/A514M-05 Grade HPS 100W / AASHTO M270M/M270 Grade HPS 100W or 690W Structural Steel Plate	$1.48
16	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Plate	$0.86
17	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Shapes	$0.79
18	ASTM A276 Type 316 Stainless Steel	$4.44
19	ASTM A240 Type 316 Stainless Steel	$4.44
20	ASTM A148 Grade 80/50 Steel Castings (See Note below.)	$1.52
21	ASTM A53 Grade B Structural Steel Pipe	$0.97
22	ASTM A500 Grades A, B, 36 & 50 Structural Steel Pipe	$0.97
23	ASTM A252, Grades 240 (36 KSI) & 414 (60 KSI) Pipe Pile	$0.77
24	ASTM 252, Grade 2 Permanent Steel Casing	$0.77
25	ASTM A36 (AASHTO M183) for H-piles, steel supports and sign supports	$0.81
26	ASTM A328 / A328M, Grade 50 (AASHTO M202) Steel Sheetpiling	$1.46
27	ASTM A572 / A572M, Grade 50 Sheetpiling	$1.46
28	ASTM A36/36M, Grade 50	$0.83
29	ASTM A570, Grade 50	$0.81
30	ASTM A572 (AASHTO M223), Grade 50 H-Piles	$0.83
31	ASTM A1085 Grade A (50 KSI) Steel Hollow Structural Sections (HSS), heat-treated per ASTM A1085 Supplement S1	$0.97
32	AREA 140 LB Rail and Track Accessories	$0.50

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

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DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

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

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

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

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

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

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

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

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

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

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DOCUMENT 00820

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

I. Definitions

For purposes of this contract,

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

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

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

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

II. Equal Opportunity, Non-Discrimination and Affirmative Action

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

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

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

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

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

III. Minority and Women Workforce Participation

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

IV. Liaison Committee

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

V. Reports and Records

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

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

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

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

VI. Access to Work Site

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

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

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

VIII. Sanctions

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

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

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

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

IX. Severability

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

X. Contractor's Certification

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

XI. Subcontractor Requirements

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

Rev'd 03/07/14

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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: 129897 **Project No.** 613358 **Federal Aid No.:** NHP(NHS)-003S(829)

Location: STOUGHTON

Project Description: Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)

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

_____
(Print Name and Title)

_____
(Authorized Signature)

_____
(Date)

Rev'd 09/02/22

*** END OF DOCUMENT ***

DOCUMENT 00860

COMMONWEALTH OF MASSACHUSETTS PUBLIC EMPLOYMENT LAWS

Revised February 20, 2019

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

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

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

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

The Prevailing Wage Rate generally includes the following:

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

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

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

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

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

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

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

STATEMENT OF COMPLIANCE

Date: _____

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

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

_____
(Contractor or Subcontractor)

on the _____
(MassDOT Project Location and Contract Number)

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

Signature _____

Title _____

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

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

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

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

*** END OF DOCUMENT ***

DOCUMENT 00861

STATE PREVAILING WAGE RATES

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Proposal No. 613358-129897

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

MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

LAUREN JONES
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: MassDOT Highway

Contract Number: 129897 **City/Town:** STOUGHTON

Description of Work: STOUGHTON: Federal Aid Project No. NHP(NHS)-003S(829) Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue
(PHASE 2)

Job Location: Along Route 138

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 updated wage schedule must be provided to all contractors, including general and sub-contractors, working on the construction project.

• This annual update requirement is generally not applicable to 27F "rental of equipment" contracts. For such contracts, the prevailing wage rates issued by DLS shall remain in effect for the duration of the contract term. However, if the prevailing wage rate sheet issued does not contain wage rates for each year covered by the contract term, the Awarding Authority must request updated rate sheets from DLS and provide them to the contractor to ensure the correct rates are being paid throughout the duration of the contract. Additionally, if an Awarding Authority exercises an option to renew or extend the contract term, they must request updated rate sheets form DLS and provide them to the contractor.

• 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 within90 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: 04/04/2025 **Wage Request Number:** 20250404-002

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	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 *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	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 *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	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 *PILE DRIVER LOCAL 56 (ZONE 1)*	01/01/2024	$117.16	$10.08	$24.29	$0.00	$151.53
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	12/01/2024	$39.70	$9.90	$18.36	$0.00	$67.96
	06/01/2025	$41.09	$9.90	$18.36	$0.00	$69.35
	12/01/2025	$42.47	$9.90	$18.36	$0.00	$70.73
	06/01/2026	$43.91	$9.90	$18.36	$0.00	$72.17
	12/01/2026	$45.35	$9.90	$18.36	$0.00	$73.61
	06/01/2027	$46.80	$9.90	$18.36	$0.00	$75.06
	12/01/2027	$48.25	$9.90	$18.36	$0.00	$76.51
	06/01/2028	$49.75	$9.90	$18.36	$0.00	$78.01
	12/01/2028	$51.25	$9.90	$18.36	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.70	$9.90	$18.46	$0.00	$68.06
	06/01/2025	$41.09	$9.90	$18.46	$0.00	$69.45
	12/01/2025	$42.47	$9.90	$18.46	$0.00	$70.83
	06/01/2026	$43.91	$9.90	$18.46	$0.00	$72.27
	12/01/2026	$45.35	$9.90	$18.46	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ASPHALT RAKER *LABORERS - ZONE 2*	12/01/2024	$39.20	$9.90	$18.36	$0.00	$67.46
	06/01/2025	$40.59	$9.90	$18.36	$0.00	$68.85
	12/01/2025	$41.97	$9.90	$18.36	$0.00	$70.23
	06/01/2026	$43.41	$9.90	$18.36	$0.00	$71.67
	12/01/2026	$44.85	$9.90	$18.36	$0.00	$73.11
	06/01/2027	$46.30	$9.90	$18.36	$0.00	$74.56
	12/01/2027	$47.75	$9.90	$18.36	$0.00	$76.01
	06/01/2028	$49.25	$9.90	$18.36	$0.00	$77.51
	12/01/2028	$50.75	$9.90	$18.36	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.20	$9.90	$18.46	$0.00	$67.56
	06/01/2025	$40.59	$9.90	$18.46	$0.00	$68.95
	12/01/2025	$41.97	$9.90	$18.46	$0.00	$70.33
	06/01/2026	$43.41	$9.90	$18.46	$0.00	$71.77
	12/01/2026	$44.85	$9.90	$18.46	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$57.03	$15.55	$16.50	$0.00	$89.08
	06/01/2025	$58.33	$15.55	$16.50	$0.00	$90.38
	12/01/2025	$59.78	$15.55	$16.50	$0.00	$91.83
	06/01/2026	$61.08	$15.55	$16.50	$0.00	$93.13
	12/01/2026	$62.53	$15.55	$16.50	$0.00	$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$57.03	$15.55	$16.50	$0.00	$89.08
	06/01/2025	$58.33	$15.55	$16.50	$0.00	$90.38
	12/01/2025	$59.78	$15.55	$16.50	$0.00	$91.83
	06/01/2026	$61.08	$15.55	$16.50	$0.00	$93.13
	12/01/2026	$62.53	$15.55	$16.50	$0.00	$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	12/01/2024	$39.20	$9.90	$18.36	$0.00	$67.46
	06/01/2025	$40.59	$9.90	$18.36	$0.00	$68.85
	12/01/2025	$41.97	$9.90	$18.36	$0.00	$70.23
	06/01/2026	$43.41	$9.90	$18.36	$0.00	$71.67
	12/01/2026	$44.85	$9.90	$18.36	$0.00	$73.11
	06/01/2027	$46.30	$9.90	$18.36	$0.00	$74.56
	12/01/2027	$47.75	$9.90	$18.36	$0.00	$76.01
	06/01/2028	$49.25	$9.90	$18.36	$0.00	$77.51
	12/01/2028	$50.75	$9.90	$18.36	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	12/01/2024	$39.70	$9.90	$18.36	$0.00	$67.96
	06/01/2025	$41.09	$9.90	$18.36	$0.00	$69.35
	12/01/2025	$42.47	$9.90	$18.36	$0.00	$70.73
	06/01/2026	$43.91	$9.90	$18.36	$0.00	$72.17
	12/01/2026	$45.35	$9.90	$18.36	$0.00	$73.61
	06/01/2027	$46.80	$9.90	$18.36	$0.00	$75.06
	12/01/2027	$48.25	$9.90	$18.36	$0.00	$76.51
	06/01/2028	$49.75	$9.90	$18.36	$0.00	$78.01
	12/01/2028	$51.25	$9.90	$18.36	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.70	$9.90	$18.46	$0.00	$68.06
	06/01/2025	$41.09	$9.90	$18.46	$0.00	$69.45
	12/01/2025	$42.47	$9.90	$18.46	$0.00	$70.83
	06/01/2026	$43.91	$9.90	$18.46	$0.00	$72.27
	12/01/2026	$45.35	$9.90	$18.46	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2024	$48.12	$7.07	$20.60	$0.00	$75.79

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) *BRICKLAYERS LOCAL 3 (QUINCY)*	02/01/2025	$65.80	$11.49	$23.59	$0.00	$100.88
	08/01/2025	$67.95	$11.49	$23.59	$0.00	$103.03
	02/01/2026	$69.30	$11.49	$23.59	$0.00	$104.38
	08/01/2026	$71.50	$11.49	$23.59	$0.00	$106.58
	02/01/2027	$72.90	$11.49	$23.59	$0.00	$107.98

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Quincy*

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.90	$11.49	$23.59	$0.00	$67.98
2	60	$39.48	$11.49	$23.59	$0.00	$74.56
3	70	$46.06	$11.49	$23.59	$0.00	$81.14
4	80	$52.64	$11.49	$23.59	$0.00	$87.72
5	90	$59.22	$11.49	$23.59	$0.00	$94.30

Effective Date - 08/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$33.98	$11.49	$23.59	$0.00	$69.06
2	60	$40.77	$11.49	$23.59	$0.00	$75.85
3	70	$47.57	$11.49	$23.59	$0.00	$82.65
4	80	$54.36	$11.49	$23.59	$0.00	$89.44
5	90	$61.16	$11.49	$23.59	$0.00	$96.24

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2024	$47.35	$9.90	$19.05	$0.00	$76.30
	06/01/2025	$48.85	$9.90	$19.05	$0.00	$77.80
	12/01/2025	$50.35	$9.90	$19.05	$0.00	$79.30
	06/01/2026	$51.90	$9.90	$19.05	$0.00	$80.85
	12/01/2026	$53.40	$9.90	$19.05	$0.00	$82.35
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2024	$46.20	$9.90	$19.05	$0.00	$75.15
	06/01/2025	$47.70	$9.90	$19.05	$0.00	$76.65
	12/01/2025	$49.20	$9.90	$19.05	$0.00	$78.15
	06/01/2026	$50.75	$9.90	$19.05	$0.00	$79.70
	12/01/2026	$52.25	$9.90	$19.05	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2024	$46.53	$9.90	$19.05	$0.00	$75.48
	06/01/2025	$48.03	$9.90	$19.05	$0.00	$76.98
	12/01/2025	$49.53	$9.90	$19.05	$0.00	$78.48
	06/01/2026	$51.08	$9.90	$19.05	$0.00	$80.03
	12/01/2026	$52.58	$9.90	$19.05	$0.00	$81.53
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2024	$39.20	$9.90	$18.36	$0.00	$67.46
	06/01/2025	$40.59	$9.90	$18.36	$0.00	$68.85
	12/01/2025	$41.97	$9.90	$18.36	$0.00	$70.23
	06/01/2026	$43.41	$9.90	$18.36	$0.00	$71.67
	12/01/2026	$44.85	$9.90	$18.36	$0.00	$73.11
	06/01/2027	$46.30	$9.90	$18.36	$0.00	$74.56
	12/01/2027	$47.75	$9.90	$18.36	$0.00	$76.01
	06/01/2028	$49.25	$9.90	$18.36	$0.00	$77.51
	12/01/2028	$50.75	$9.90	$18.36	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	03/01/2025	$49.62	$9.83	$19.97	$0.00	$79.42
	09/01/2025	$50.87	$9.83	$19.97	$0.00	$80.67
	03/01/2026	$52.12	$9.83	$19.97	$0.00	$81.92
	09/01/2026	$53.37	$9.83	$19.97	$0.00	$83.17
	03/01/2027	$54.62	$9.83	$19.97	$0.00	$84.42

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$22.33	$9.83	$1.73	$0.00	$33.89
2	45	$22.33	$9.83	$1.73	$0.00	$33.89
3	55	$27.29	$9.83	$3.40	$0.00	$40.52
4	55	$27.29	$9.83	$3.40	$0.00	$40.52
5	70	$34.73	$9.83	$16.51	$0.00	$61.07
6	70	$34.73	$9.83	$16.51	$0.00	$61.07
7	80	$39.70	$9.83	$18.24	$0.00	$67.77
8	80	$39.70	$9.83	$18.24	$0.00	$67.77

Effective Date - 09/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$22.89	$9.83	$1.73	$0.00	$34.45
2	45	$22.89	$9.83	$1.73	$0.00	$34.45
3	55	$27.98	$9.83	$3.40	$0.00	$41.21
4	55	$27.98	$9.83	$3.40	$0.00	$41.21
5	70	$35.61	$9.83	$16.51	$0.00	$61.95
6	70	$35.61	$9.83	$16.51	$0.00	$61.95
7	80	$40.70	$9.83	$18.24	$0.00	$68.77
8	80	$40.70	$9.83	$18.24	$0.00	$68.77

Notes:

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
All Aspects of New Wood Frame Work						

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

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

Effective Date - 10/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$16.65	$7.02	$0.00	$0.00	$23.67
2	60	$16.65	$7.02	$0.00	$0.00	$23.67
3	65	$18.04	$7.02	$1.00	$0.00	$26.06
4	70	$19.43	$7.02	$1.00	$0.00	$27.45
5	75	$20.81	$7.02	$4.80	$0.00	$32.63
6	80	$22.20	$7.02	$4.80	$0.00	$34.02
7	85	$23.59	$7.02	$4.80	$0.00	$35.41
8	90	$24.98	$7.02	$4.80	$0.00	$36.80

Notes:

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (QUINCY)*	07/01/2024	$49.19	$13.35	$24.21	$1.80	$88.55

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CEMENT MASONRY/PLASTERING - Eastern Mass (Quincy)*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.60	$13.35	$16.43	$0.00	$54.38
2	60	$29.51	$13.35	$19.21	$1.80	$63.87
3	65	$31.97	$13.35	$20.21	$1.80	$67.33
4	70	$34.43	$13.35	$21.21	$1.80	$70.79
5	75	$36.89	$13.35	$22.21	$1.80	$74.25
6	80	$39.35	$13.35	$23.21	$1.80	$77.71
7	90	$44.27	$13.35	$24.21	$1.80	$83.63

Notes:

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

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR *LABORERS - ZONE 2*	12/01/2024	$39.20	$9.90	$18.36	$0.00	$67.46
	06/01/2025	$40.59	$9.90	$18.36	$0.00	$68.85
	12/01/2025	$41.97	$9.90	$18.36	$0.00	$70.23
	06/01/2026	$43.41	$9.90	$18.36	$0.00	$71.67
	12/01/2026	$44.85	$9.90	$18.36	$0.00	$73.11
	06/01/2027	$46.30	$9.90	$18.36	$0.00	$74.56
	12/01/2027	$47.75	$9.90	$18.36	$0.00	$76.01
	06/01/2028	$49.25	$9.90	$18.36	$0.00	$77.51
	12/01/2028	$50.75	$9.90	$18.36	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$58.18	$15.55	$16.50	$0.00	$90.23
	06/01/2025	$59.51	$15.55	$16.50	$0.00	$91.56
	12/01/2025	$60.98	$15.55	$16.50	$0.00	$93.03
	06/01/2026	$62.31	$15.55	$16.50	$0.00	$94.36
	12/01/2026	$63.79	$15.55	$16.50	$0.00	$95.84
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$36.67	$15.55	$16.50	$0.00	$68.72
	06/01/2025	$37.52	$15.55	$16.50	$0.00	$69.57
	12/01/2025	$38.47	$15.55	$16.50	$0.00	$70.52
	06/01/2026	$39.33	$15.55	$16.50	$0.00	$71.38
	12/01/2026	$40.28	$15.55	$16.50	$0.00	$72.33
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	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 - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$29.23	$9.95	$0.00	$0.00	$39.18
2	55	$32.15	$9.95	$6.66	$0.00	$48.76
3	60	$35.08	$9.95	$7.26	$0.00	$52.29
4	65	$38.00	$9.95	$7.87	$0.00	$55.82
5	70	$40.92	$9.95	$20.32	$0.00	$71.19
6	75	$43.85	$9.95	$20.93	$0.00	$74.73
7	80	$46.77	$9.95	$21.53	$0.00	$78.25
8	90	$52.61	$9.95	$22.74	$0.00	$85.30

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 2*	12/02/2024	$46.25	$9.90	$18.90	$0.00	$75.05
	06/02/2025	$47.75	$9.90	$18.90	$0.00	$76.55
	12/01/2025	$49.25	$9.90	$18.90	$0.00	$78.05
	06/01/2026	$50.80	$9.90	$18.90	$0.00	$79.60
	12/07/2026	$52.30	$9.90	$18.90	$0.00	$81.10
	06/07/2027	$53.90	$9.90	$18.90	$0.00	$82.70
	12/06/2027	$55.50	$9.90	$18.90	$0.00	$84.30
	06/05/2028	$57.18	$9.90	$18.90	$0.00	$85.98
	12/04/2028	$58.85	$9.90	$18.90	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	12/02/2024	$47.25	$9.90	$18.90	$0.00	$76.05
	06/02/2025	$48.75	$9.90	$18.90	$0.00	$77.55
	12/01/2025	$50.25	$9.90	$18.90	$0.00	$79.05
	06/01/2026	$51.80	$9.90	$18.90	$0.00	$80.60
	12/07/2026	$53.30	$9.90	$18.90	$0.00	$82.10
	06/07/2027	$54.90	$9.90	$18.90	$0.00	$83.70
	12/06/2027	$56.50	$9.90	$18.90	$0.00	$85.30
	06/05/2028	$58.18	$9.90	$18.90	$0.00	$86.98
	12/04/2028	$59.85	$9.90	$18.90	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 2*	12/02/2024	$47.00	$9.90	$18.90	$0.00	$75.80
	06/02/2025	$48.50	$9.90	$18.90	$0.00	$77.30
	12/01/2025	$50.00	$9.90	$18.90	$0.00	$78.80
	06/01/2026	$51.55	$9.90	$18.90	$0.00	$80.35
	12/07/2026	$53.05	$9.90	$18.90	$0.00	$81.85
	06/07/2027	$54.65	$9.90	$18.90	$0.00	$83.45
	12/06/2027	$56.25	$9.90	$18.90	$0.00	$85.05
	06/05/2028	$57.93	$9.90	$18.90	$0.00	$86.73
	12/04/2028	$59.60	$9.90	$18.90	$0.00	$88.40

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	12/02/2024	$47.25	$9.90	$18.90	$0.00	$76.05
	06/02/2025	$48.75	$9.90	$18.90	$0.00	$77.55
	12/01/2025	$50.25	$9.90	$18.90	$0.00	$79.05
	06/01/2026	$51.80	$9.90	$18.90	$0.00	$80.60
	12/07/2026	$53.30	$9.90	$18.90	$0.00	$82.10
	06/07/2027	$54.90	$9.90	$18.90	$0.00	$83.70
	12/06/2027	$56.50	$9.90	$18.90	$0.00	$85.30
	06/05/2028	$58.18	$9.90	$18.90	$0.00	$86.98
	12/04/2028	$59.85	$9.90	$18.90	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	12/02/2024	$47.00	$9.90	$18.90	$0.00	$75.80
	06/02/2025	$48.50	$9.90	$18.90	$0.00	$77.30
	12/01/2025	$50.00	$9.90	$18.90	$0.00	$78.80
	06/01/2026	$51.55	$9.90	$18.90	$0.00	$80.35
	12/07/2026	$53.05	$9.90	$18.90	$0.00	$81.85
	06/07/2027	$54.65	$9.90	$18.90	$0.00	$83.45
	12/06/2027	$56.25	$9.90	$18.90	$0.00	$85.05
	06/05/2028	$57.93	$9.90	$18.90	$0.00	$86.73
	12/04/2028	$59.60	$9.90	$18.90	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	12/02/2024	$46.25	$9.90	$18.90	$0.00	$75.05
	06/02/2025	$47.75	$9.90	$18.90	$0.00	$76.55
	12/01/2025	$49.25	$9.90	$18.90	$0.00	$78.05
	06/01/2026	$50.80	$9.90	$18.90	$0.00	$79.60
	12/07/2026	$52.30	$9.90	$18.90	$0.00	$81.10
	06/07/2027	$53.90	$9.90	$18.90	$0.00	$82.70
	12/06/2027	$55.50	$9.90	$18.90	$0.00	$84.30
	06/05/2028	$57.18	$9.90	$18.90	$0.00	$85.98
	12/04/2028	$58.85	$9.90	$18.90	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2024	$78.11	$10.08	$21.66	$0.00	$109.85
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Diver wage 70/80/90 2A $69.83, 3A $91.79,4A $102.14 Total Rate						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2024	$55.79	$10.08	$24.29	$0.00	$90.16
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Piledriver wage 70/80/90 2A $54.20, 3A $73.93,4A $82.05 Total Rate						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2024	$83.69	$10.08	$24.29	$0.00	$118.06
For apprentice rates see "Apprentice- PILE DRIVER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2024	$117.16	$10.08	$24.29	$0.00	$151.53
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 223*	09/01/2024	$50.02	$12.00	$17.72	$0.00	$79.74
	09/01/2025	$52.25	$12.25	$18.61	$0.00	$83.11
	09/01/2026	$54.72	$12.50	$19.56	$0.00	$86.78

Apprentice - *ELECTRICIAN - Local 223*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.01	$12.00	$0.60	$0.00	$32.61
2	45	$22.51	$12.00	$0.68	$0.00	$35.19
3	50	$25.01	$12.00	$0.75	$0.00	$37.76
4	55	$27.51	$12.00	$8.59	$0.00	$48.10
5	60	$30.01	$12.00	$9.15	$0.00	$51.16
6	65	$32.51	$12.00	$9.74	$0.00	$54.25
7	70	$35.01	$12.00	$10.30	$0.00	$57.31
8	75	$37.52	$12.00	$10.89	$0.00	$60.41

Effective Date - 09/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.90	$12.25	$0.63	$0.00	$33.78
2	45	$23.51	$12.25	$0.71	$0.00	$36.47
3	50	$26.13	$12.25	$0.78	$0.00	$39.16
4	55	$28.74	$12.25	$9.11	$0.00	$50.10
5	60	$31.35	$12.25	$9.71	$0.00	$53.31
6	65	$33.96	$12.25	$10.32	$0.00	$56.53
7	70	$36.58	$12.25	$10.91	$0.00	$59.74
8	75	$39.19	$12.25	$11.52	$0.00	$62.96

Notes:

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2022	$65.62	$16.03	$20.21	$0.00	$101.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.81	$16.03	$0.00	$0.00	$48.84
2	55	$36.09	$16.03	$20.21	$0.00	$72.33
3	65	$42.65	$16.03	$20.21	$0.00	$78.89
4	70	$45.93	$16.03	$20.21	$0.00	$82.17
5	80	$52.50	$16.03	$20.21	$0.00	$88.74

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

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.20	$9.90	$18.46	$0.00	$67.56
	06/01/2025	$40.59	$9.90	$18.46	$0.00	$68.95
	12/01/2025	$41.97	$9.90	$18.46	$0.00	$70.33
	06/01/2026	$43.41	$9.90	$18.46	$0.00	$71.77
	12/01/2026	$44.85	$9.90	$18.46	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2024	$51.78	$15.30	$16.40	$0.00	$83.48
	05/01/2025	$53.22	$15.30	$16.40	$0.00	$84.92
	11/01/2025	$54.51	$15.30	$16.40	$0.00	$86.21
	05/01/2026	$55.95	$15.30	$16.40	$0.00	$87.65
	11/01/2026	$57.24	$15.30	$16.40	$0.00	$88.94
	05/01/2027	$58.67	$15.30	$16.40	$0.00	$90.37
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2024	$53.37	$15.30	$16.40	$0.00	$85.07
	05/01/2025	$54.82	$15.30	$16.40	$0.00	$86.52
	11/01/2025	$56.12	$15.30	$16.40	$0.00	$87.82
	05/01/2026	$57.57	$15.30	$16.40	$0.00	$89.27
	11/01/2026	$58.87	$15.30	$16.40	$0.00	$90.57
	05/01/2027	$60.32	$15.30	$16.40	$0.00	$92.02
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2024	$25.37	$15.30	$16.40	$0.00	$57.07
	05/01/2025	$26.22	$15.30	$16.40	$0.00	$57.92
	11/01/2025	$26.98	$15.30	$16.40	$0.00	$58.68
	05/01/2026	$27.83	$15.30	$16.40	$0.00	$59.53
	11/01/2026	$28.59	$15.30	$16.40	$0.00	$60.29
	05/01/2027	$29.44	$15.30	$16.40	$0.00	$61.14
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 223*	09/01/2024	$50.02	$12.00	$17.72	$0.00	$79.74
	09/01/2025	$52.25	$12.25	$18.61	$0.00	$83.11
	09/01/2026	$54.72	$12.50	$19.56	$0.00	$86.78

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING *ELECTRICIANS LOCAL 223*	09/01/2024	$50.02	$12.00	$17.72	$0.00	$79.74
	09/01/2025	$52.25	$12.25	$18.61	$0.00	$83.11
	09/01/2026	$54.72	$12.50	$19.56	$0.00	$86.78
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$45.96	$15.55	$16.50	$0.00	$78.01
	06/01/2025	$47.02	$15.55	$16.50	$0.00	$79.07
	12/01/2025	$48.19	$15.55	$16.50	$0.00	$80.24
	06/01/2026	$49.25	$15.55	$16.50	$0.00	$81.30
	12/01/2026	$50.43	$15.55	$16.50	$0.00	$82.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$27.01	$9.90	$18.46	$0.00	$55.37
	06/01/2025	$28.09	$9.90	$18.46	$0.00	$56.45
	12/01/2025	$28.09	$9.90	$18.46	$0.00	$56.45
	06/01/2026	$29.21	$9.90	$18.46	$0.00	$57.57
	12/01/2026	$29.21	$9.90	$18.46	$0.00	$57.57
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	03/01/2025	$57.73	$8.83	$20.27	$0.00	$86.83
	09/01/2025	$59.23	$8.83	$20.27	$0.00	$88.33
	03/01/2026	$60.73	$8.83	$20.27	$0.00	$89.83
	09/01/2026	$62.23	$8.83	$20.27	$0.00	$91.33
	03/01/2027	$63.73	$8.83	$20.27	$0.00	$92.83

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$25.98	$8.83	$1.76	$0.00	$36.57
2	45	$25.98	$8.83	$1.76	$0.00	$36.57
3	55	$31.75	$8.83	$3.52	$0.00	$44.10
4	55	$31.75	$8.83	$3.52	$0.00	$44.10
5	70	$40.41	$8.83	$16.75	$0.00	$65.99
6	70	$40.41	$8.83	$16.75	$0.00	$65.99
7	80	$46.18	$8.83	$18.51	$0.00	$73.52
8	80	$46.18	$8.83	$18.51	$0.00	$73.52

Effective Date - 09/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$26.65	$8.83	$1.76	$0.00	$37.24
2	45	$26.65	$8.83	$1.76	$0.00	$37.24
3	55	$32.58	$8.83	$3.52	$0.00	$44.93
4	55	$32.58	$8.83	$3.52	$0.00	$44.93
5	70	$41.46	$8.83	$16.75	$0.00	$67.04
6	70	$41.46	$8.83	$16.75	$0.00	$67.04
7	80	$47.38	$8.83	$18.51	$0.00	$74.72
8	80	$47.38	$8.83	$18.51	$0.00	$74.72

Notes: Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$57.03	$15.55	$16.50	$0.00	$89.08
	06/01/2025	$58.33	$15.55	$16.50	$0.00	$90.38
	12/01/2025	$59.78	$15.55	$16.50	$0.00	$91.83
	06/01/2026	$61.08	$15.55	$16.50	$0.00	$93.13
	12/01/2026	$62.53	$15.55	$16.50	$0.00	$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$36.67	$15.55	$16.50	$0.00	$68.72
	06/01/2025	$37.52	$15.55	$16.50	$0.00	$69.57
	12/01/2025	$38.47	$15.55	$16.50	$0.00	$70.52
	06/01/2026	$39.33	$15.55	$16.50	$0.00	$71.38
	12/01/2026	$40.28	$15.55	$16.50	$0.00	$72.33
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 2)*	01/01/2025	$47.96	$9.95	$23.95	$0.00	$81.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 35 Zone 2*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.98	$9.95	$0.00	$0.00	$33.93
2	55	$26.38	$9.95	$6.66	$0.00	$42.99
3	60	$28.78	$9.95	$7.26	$0.00	$45.99
4	65	$31.17	$9.95	$7.87	$0.00	$48.99
5	70	$33.57	$9.95	$20.32	$0.00	$63.84
6	75	$35.97	$9.95	$20.93	$0.00	$66.85
7	80	$38.37	$9.95	$21.53	$0.00	$69.85
8	90	$43.16	$9.95	$22.74	$0.00	$75.85

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$57.03	$15.55	$16.50	$0.00	$89.08
	06/01/2025	$58.33	$15.55	$16.50	$0.00	$90.38
	12/01/2025	$59.78	$15.55	$16.50	$0.00	$91.83
	06/01/2026	$61.08	$15.55	$16.50	$0.00	$93.13
	12/01/2026	$62.53	$15.55	$16.50	$0.00	$94.58

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$31.37	$0.00	$0.00	$0.00	$31.37
2	60	$34.22	$15.55	$16.50	$0.00	$66.27
3	65	$37.07	$15.55	$16.50	$0.00	$69.12
4	70	$39.92	$15.55	$16.50	$0.00	$71.97
5	75	$42.77	$15.55	$16.50	$0.00	$74.82
6	80	$45.62	$15.55	$16.50	$0.00	$77.67
7	85	$48.48	$15.55	$16.50	$0.00	$80.53
8	90	$51.33	$15.55	$16.50	$0.00	$83.38

Effective Date - 06/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$32.08	$0.00	$0.00	$0.00	$32.08
2	60	$35.00	$15.55	$16.50	$0.00	$67.05
3	65	$37.91	$15.55	$16.50	$0.00	$69.96
4	70	$40.83	$15.55	$16.50	$0.00	$72.88
5	75	$43.75	$15.55	$16.50	$0.00	$75.80
6	80	$46.66	$15.55	$16.50	$0.00	$78.71
7	85	$49.58	$15.55	$16.50	$0.00	$81.63
8	90	$52.50	$15.55	$16.50	$0.00	$84.55

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2025	$59.13	$14.91	$28.27	$2.98	$105.29
	08/01/2025	$60.98	$14.91	$28.27	$2.98	$107.14
	02/01/2026	$62.93	$14.91	$28.27	$2.98	$109.09
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 223*	09/01/2024	$50.02	$12.00	$17.72	$0.00	$79.74
	09/01/2025	$52.25	$12.25	$18.61	$0.00	$83.11
	09/01/2026	$54.72	$12.50	$19.56	$0.00	$86.78
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2025	$59.13	$14.91	$28.27	$2.98	$105.29
	08/01/2025	$60.98	$14.91	$28.27	$2.98	$107.14
	02/01/2026	$62.93	$14.91	$28.27	$2.98	$109.09
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PIPEFITTERS LOCAL 537*	03/01/2025	$68.88	$12.70	$21.80	$0.00	$103.38
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PIPEFITTERS LOCAL 537*	03/01/2025	$68.88	$12.70	$21.80	$0.00	$103.38
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HYDRAULIC DRILLS *LABORERS - ZONE 2*	12/01/2024	$39.70	$9.90	$18.36	$0.00	$67.96
	06/01/2025	$41.09	$9.90	$18.36	$0.00	$69.35
	12/01/2025	$42.47	$9.90	$18.36	$0.00	$70.73
	06/01/2026	$43.91	$9.90	$18.36	$0.00	$72.17
	12/01/2026	$45.35	$9.90	$18.36	$0.00	$73.61
	06/01/2027	$46.80	$9.90	$18.36	$0.00	$75.06
	12/01/2027	$48.25	$9.90	$18.36	$0.00	$76.51
	06/01/2028	$49.75	$9.90	$18.36	$0.00	$78.01
	12/01/2028	$51.25	$9.90	$18.36	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.70	$9.90	$18.46	$0.00	$68.06
	06/01/2025	$41.09	$9.90	$18.46	$0.00	$69.45
	12/01/2025	$42.47	$9.90	$18.46	$0.00	$70.83
	06/01/2026	$43.91	$9.90	$18.46	$0.00	$72.27
	12/01/2026	$45.35	$9.90	$18.46	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	09/01/2024	$56.92	$14.75	$19.61	$0.00	$91.28
	09/01/2025	$60.34	$14.75	$19.61	$0.00	$94.70
	09/01/2026	$63.76	$14.75	$19.61	$0.00	$98.12

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.46	$14.75	$14.32	$0.00	$57.53
2	60	$34.15	$14.75	$15.37	$0.00	$64.27
3	70	$39.84	$14.75	$16.43	$0.00	$71.02
4	80	$45.54	$14.75	$17.49	$0.00	$77.78

Effective Date - 09/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$30.17	$14.75	$14.32	$0.00	$59.24
2	60	$36.20	$14.75	$15.37	$0.00	$66.32
3	70	$42.24	$14.75	$16.43	$0.00	$73.42
4	80	$48.27	$14.75	$17.49	$0.00	$80.51

Notes:
Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (BOSTON AREA)*	03/16/2024	$53.97	$8.35	$26.70	$0.00	$89.02

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *IRONWORKER - Local 7 Boston*

Effective Date - 03/16/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$32.38	$8.35	$26.70	$0.00	$67.43
2	70	$37.78	$8.35	$26.70	$0.00	$72.83
3	75	$40.48	$8.35	$26.70	$0.00	$75.53
4	80	$43.18	$8.35	$26.70	$0.00	$78.23
5	85	$45.87	$8.35	$26.70	$0.00	$80.92
6	90	$48.57	$8.35	$26.70	$0.00	$83.62

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	12/01/2024	$39.20	$9.90	$18.36	$0.00	$67.46
	06/01/2025	$40.59	$9.90	$18.36	$0.00	$68.85
	12/01/2025	$41.97	$9.90	$18.36	$0.00	$70.23
	06/01/2026	$43.41	$9.90	$18.36	$0.00	$71.67
	12/01/2026	$44.85	$9.90	$18.36	$0.00	$73.11
	06/01/2027	$46.30	$9.90	$18.36	$0.00	$74.56
	12/01/2027	$47.75	$9.90	$18.36	$0.00	$76.01
	06/01/2028	$49.25	$9.90	$18.36	$0.00	$77.51
	12/01/2028	$50.75	$9.90	$18.36	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 2*	12/01/2024	$38.95	$9.90	$18.36	$0.00	$67.21
	06/01/2025	$40.34	$9.90	$18.36	$0.00	$68.60
	12/01/2025	$41.72	$9.90	$18.36	$0.00	$69.98
	06/01/2026	$43.16	$9.90	$18.36	$0.00	$71.42
	12/01/2026	$44.60	$9.90	$18.36	$0.00	$72.86
	06/01/2027	$46.05	$9.90	$18.36	$0.00	$74.31
	12/01/2027	$47.50	$9.90	$18.36	$0.00	$75.76
	06/01/2028	$49.00	$9.90	$18.36	$0.00	$77.26
	12/01/2028	$50.50	$9.90	$18.36	$0.00	$78.76

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 2*

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$23.37	$9.90	$18.36	$0.00	$51.63
2	70	$27.27	$9.90	$18.36	$0.00	$55.53
3	80	$31.16	$9.90	$18.36	$0.00	$59.42
4	90	$35.06	$9.90	$18.36	$0.00	$63.32

Effective Date - 06/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$24.20	$9.90	$18.36	$0.00	$52.46
2	70	$28.24	$9.90	$18.36	$0.00	$56.50
3	80	$32.27	$9.90	$18.36	$0.00	$60.53
4	90	$36.31	$9.90	$18.36	$0.00	$64.57

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$38.95	$9.90	$18.46	$0.00	$67.31
	06/01/2025	$40.34	$9.90	$18.46	$0.00	$68.70
	12/01/2025	$41.72	$9.90	$18.46	$0.00	$70.08
	06/01/2026	$43.16	$9.90	$18.46	$0.00	$71.52
	12/01/2026	$44.60	$9.90	$18.46	$0.00	$72.96

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$23.37	$9.90	$18.46	$0.00	$51.73
2	70	$27.27	$9.90	$18.46	$0.00	$55.63
3	80	$31.16	$9.90	$18.46	$0.00	$59.52
4	90	$35.06	$9.90	$18.46	$0.00	$63.42

Effective Date - 06/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$24.20	$9.90	$18.46	$0.00	$52.56
2	70	$28.24	$9.90	$18.46	$0.00	$56.60
3	80	$32.27	$9.90	$18.46	$0.00	$60.63
4	90	$36.31	$9.90	$18.46	$0.00	$64.67

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	12/01/2024	$38.95	$9.90	$18.36	$0.00	$67.21
	06/01/2025	$40.34	$9.90	$18.36	$0.00	$68.60
	12/01/2025	$41.72	$9.90	$18.36	$0.00	$69.98
	06/01/2026	$43.16	$9.90	$18.36	$0.00	$71.42
	12/01/2026	$44.60	$9.90	$18.36	$0.00	$72.86
	06/01/2027	$46.05	$9.90	$18.36	$0.00	$74.31
	12/01/2027	$47.50	$9.90	$18.36	$0.00	$75.76
	06/01/2028	$49.00	$9.90	$18.36	$0.00	$77.26
	12/01/2028	$50.50	$9.90	$18.36	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	12/01/2024	$38.95	$9.90	$18.36	$0.00	$67.21
	06/01/2025	$40.34	$9.90	$18.36	$0.00	$68.60
	12/01/2025	$41.72	$9.90	$18.36	$0.00	$69.98
	06/01/2026	$43.16	$9.90	$18.36	$0.00	$71.42
	12/01/2026	$44.60	$9.90	$18.36	$0.00	$72.86
	06/01/2027	$46.05	$9.90	$18.36	$0.00	$74.31
	12/01/2027	$47.50	$9.90	$18.36	$0.00	$75.76
	06/01/2028	$49.00	$9.90	$18.36	$0.00	$77.26
	12/01/2028	$50.50	$9.90	$18.36	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/02/2024	$39.04	$9.90	$18.42	$0.00	$67.36
	06/02/2025	$40.43	$9.90	$18.42	$0.00	$68.75
	12/01/2025	$41.81	$9.90	$18.42	$0.00	$70.13
	06/01/2026	$43.25	$9.90	$18.42	$0.00	$71.57
	12/07/2026	$44.69	$9.90	$18.42	$0.00	$73.01
	06/07/2027	$46.14	$9.90	$18.42	$0.00	$74.46
	12/06/2027	$47.59	$9.90	$18.42	$0.00	$75.91
	06/05/2028	$49.09	$9.90	$18.42	$0.00	$77.41
	12/04/2028	$50.59	$9.90	$18.42	$0.00	$78.91
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	12/01/2024	$39.20	$9.90	$18.36	$0.00	$67.46
	06/01/2025	$40.59	$9.90	$18.36	$0.00	$68.85
	12/01/2025	$41.97	$9.90	$18.36	$0.00	$70.23
	06/01/2026	$43.41	$9.90	$18.36	$0.00	$71.67
	12/01/2026	$44.85	$9.90	$18.36	$0.00	$73.11
	06/01/2027	$46.30	$9.90	$18.36	$0.00	$74.56
	12/01/2027	$47.75	$9.90	$18.36	$0.00	$76.01
	06/01/2028	$49.25	$9.90	$18.36	$0.00	$77.51
	12/01/2028	$50.75	$9.90	$18.36	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.20	$9.90	$18.46	$0.00	$67.56
	06/01/2025	$40.59	$9.90	$18.46	$0.00	$68.95
	12/01/2025	$41.97	$9.90	$18.46	$0.00	$70.33
	06/01/2026	$43.41	$9.90	$18.46	$0.00	$71.77
	12/01/2026	$44.85	$9.90	$18.46	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	12/01/2024	$38.95	$9.90	$18.36	$0.00	$67.21
	06/01/2025	$40.34	$9.90	$18.36	$0.00	$68.60
	12/01/2025	$41.72	$9.90	$18.36	$0.00	$69.98
	06/01/2026	$43.16	$9.90	$18.36	$0.00	$71.42
	12/01/2026	$44.60	$9.90	$18.36	$0.00	$72.86
	06/01/2027	$46.05	$9.90	$18.36	$0.00	$74.31
	12/01/2027	$47.50	$9.90	$18.36	$0.00	$75.76
	06/01/2028	$49.00	$9.90	$18.36	$0.00	$77.26
	12/01/2028	$50.50	$9.90	$18.36	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	12/01/2024	$38.95	$9.90	$18.36	$0.00	$67.21
	06/01/2025	$40.34	$9.90	$18.36	$0.00	$68.60
	12/01/2025	$41.72	$9.90	$18.36	$0.00	$69.98
	06/01/2026	$43.16	$9.90	$18.36	$0.00	$71.42
	12/01/2026	$44.60	$9.90	$18.36	$0.00	$72.86
	06/01/2027	$46.05	$9.90	$18.36	$0.00	$74.31
	12/01/2027	$47.50	$9.90	$18.36	$0.00	$75.76
	06/01/2028	$49.00	$9.90	$18.36	$0.00	$77.26
	12/01/2028	$50.50	$9.90	$18.36	$0.00	$78.76
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 2*	12/01/2024	$39.20	$9.90	$18.36	$0.00	$67.46
	06/01/2025	$40.59	$9.90	$18.36	$0.00	$68.85
	12/01/2025	$41.97	$9.90	$18.36	$0.00	$70.23
	06/01/2026	$43.41	$9.90	$18.36	$0.00	$71.67
	12/01/2026	$44.85	$9.90	$18.36	$0.00	$73.11
	06/01/2027	$46.30	$9.90	$18.36	$0.00	$74.56
	12/01/2027	$47.75	$9.90	$18.36	$0.00	$76.01
	06/01/2028	$49.25	$9.90	$18.36	$0.00	$77.51
	12/01/2028	$50.75	$9.90	$18.36	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.20	$9.90	$18.46	$0.00	$67.56
	06/01/2025	$40.59	$9.90	$18.46	$0.00	$68.95
	12/01/2025	$41.97	$9.90	$18.46	$0.00	$70.33
	06/01/2026	$43.41	$9.90	$18.46	$0.00	$71.77
	12/01/2026	$44.85	$9.90	$18.46	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2025	$50.36	$11.49	$21.62	$0.00	$83.47
	08/01/2025	$52.08	$11.49	$21.62	$0.00	$85.19
	02/01/2026	$53.16	$11.49	$21.62	$0.00	$86.27
	08/01/2026	$54.92	$11.49	$21.62	$0.00	$88.03
	02/01/2027	$56.04	$11.49	$21.62	$0.00	$89.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.18	$11.49	$21.62	$0.00	$58.29
2	60	$30.22	$11.49	$21.62	$0.00	$63.33
3	70	$35.25	$11.49	$21.62	$0.00	$68.36
4	80	$40.29	$11.49	$21.62	$0.00	$73.40
5	90	$45.32	$11.49	$21.62	$0.00	$78.43

Effective Date - 08/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.04	$11.49	$21.62	$0.00	$59.15
2	60	$31.25	$11.49	$21.62	$0.00	$64.36
3	70	$36.46	$11.49	$21.62	$0.00	$69.57
4	80	$41.66	$11.49	$21.62	$0.00	$74.77
5	90	$46.87	$11.49	$21.62	$0.00	$79.98

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	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 - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.91	$11.49	$23.56	$0.00	$67.96
2	60	$39.49	$11.49	$23.56	$0.00	$74.54
3	70	$46.07	$11.49	$23.56	$0.00	$81.12
4	80	$52.66	$11.49	$23.56	$0.00	$87.71
5	90	$59.24	$11.49	$23.56	$0.00	$94.29

Effective Date - 08/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$33.99	$11.49	$23.56	$0.00	$69.04
2	60	$40.78	$11.49	$23.56	$0.00	$75.83
3	70	$47.58	$11.49	$23.56	$0.00	$82.63
4	80	$54.38	$11.49	$23.56	$0.00	$89.43
5	90	$61.17	$11.49	$23.56	$0.00	$96.22

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 1) *MILLWRIGHTS LOCAL 1121 - Zone 1*	01/06/2025	$50.53	$10.08	$21.72	$0.00	$82.33
	01/05/2026	$53.03	$10.08	$21.72	$0.00	$84.83

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MILLWRIGHT - Local 1121 Zone 1*

Effective Date - 01/06/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$27.79	$10.08	$5.64	$0.00	$43.51
2	65	$32.84	$10.08	$6.66	$0.00	$49.58
3	75	$37.90	$10.08	$19.16	$0.00	$67.14
4	85	$42.95	$10.08	$20.18	$0.00	$73.21

Effective Date - 01/05/2026

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$29.17	$10.08	$5.64	$0.00	$44.89
2	65	$34.47	$10.08	$6.66	$0.00	$51.21
3	75	$39.77	$10.08	$19.16	$0.00	$69.01
4	85	$45.08	$10.08	$20.18	$0.00	$75.34

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*	12/01/2024	$39.20	$9.90	$18.36	$0.00	$67.46
	06/01/2025	$40.59	$9.90	$18.36	$0.00	$68.85
	12/01/2025	$41.97	$9.90	$18.36	$0.00	$70.23
	06/01/2026	$43.41	$9.90	$18.36	$0.00	$71.67
	12/01/2026	$44.85	$9.90	$18.36	$0.00	$73.11
	06/01/2027	$46.30	$9.90	$18.36	$0.00	$74.56
	12/01/2027	$47.75	$9.90	$18.36	$0.00	$76.01
	06/01/2028	$49.25	$9.90	$18.36	$0.00	$77.51
	12/01/2028	$50.75	$9.90	$18.36	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$25.37	$15.30	$16.40	$0.00	$57.07
	06/01/2025	$25.97	$15.30	$16.40	$0.00	$57.67
	12/01/2025	$26.63	$15.30	$16.40	$0.00	$58.33
	06/01/2026	$27.22	$15.30	$16.40	$0.00	$58.92
	12/01/2026	$27.89	$15.30	$16.40	$0.00	$59.59
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$31.08	$15.30	$16.40	$0.00	$62.78
	06/01/2025	$31.80	$15.30	$16.40	$0.00	$63.50
	12/01/2025	$32.60	$15.30	$16.40	$0.00	$64.30
	06/01/2026	$33.32	$15.30	$16.40	$0.00	$65.02
	12/01/2026	$34.12	$15.30	$16.40	$0.00	$65.82
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2025	$58.46	$9.95	$23.95	$0.00	$92.36

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$29.23	$9.95	$0.00	$0.00	$39.18
2	55	$32.15	$9.95	$6.66	$0.00	$48.76
3	60	$35.08	$9.95	$7.26	$0.00	$52.29
4	65	$38.00	$9.95	$7.87	$0.00	$55.82
5	70	$40.92	$9.95	$20.32	$0.00	$71.19
6	75	$43.85	$9.95	$20.93	$0.00	$74.73
7	80	$46.77	$9.95	$21.53	$0.00	$78.25
8	90	$52.61	$9.95	$22.74	$0.00	$85.30

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

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

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

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.68	$9.95	$0.00	$0.00	$34.63
2	55	$27.15	$9.95	$6.66	$0.00	$43.76
3	60	$29.62	$9.95	$7.26	$0.00	$46.83
4	65	$32.08	$9.95	$7.87	$0.00	$49.90
5	70	$34.55	$9.95	$20.32	$0.00	$64.82
6	75	$37.02	$9.95	$20.93	$0.00	$67.90
7	80	$39.49	$9.95	$21.53	$0.00	$70.97
8	90	$44.42	$9.95	$22.74	$0.00	$77.11

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2025	$47.42	$9.95	$23.95	$0.00	$81.32

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.71	$9.95	$0.00	$0.00	$33.66
2	55	$26.08	$9.95	$6.66	$0.00	$42.69
3	60	$28.45	$9.95	$7.26	$0.00	$45.66
4	65	$30.82	$9.95	$7.87	$0.00	$48.64
5	70	$33.19	$9.95	$20.32	$0.00	$63.46
6	75	$35.57	$9.95	$20.93	$0.00	$66.45
7	80	$37.94	$9.95	$21.53	$0.00	$69.42
8	90	$42.68	$9.95	$22.74	$0.00	$75.37

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2025	$47.96	$9.95	$23.95	$0.00	$81.86

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.98	$9.95	$0.00	$0.00	$33.93
2	55	$26.38	$9.95	$6.66	$0.00	$42.99
3	60	$28.78	$9.95	$7.26	$0.00	$45.99
4	65	$31.17	$9.95	$7.87	$0.00	$48.99
5	70	$33.57	$9.95	$20.32	$0.00	$63.84
6	75	$35.97	$9.95	$20.93	$0.00	$66.85
7	80	$38.37	$9.95	$21.53	$0.00	$69.85
8	90	$43.16	$9.95	$22.74	$0.00	$75.85

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2025	$46.02	$9.95	$23.95	$0.00	$79.92

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.01	$9.95	$0.00	$0.00	$32.96
2	55	$25.31	$9.95	$6.66	$0.00	$41.92
3	60	$27.61	$9.95	$7.26	$0.00	$44.82
4	65	$29.91	$9.95	$7.87	$0.00	$47.73
5	70	$32.21	$9.95	$20.32	$0.00	$62.48
6	75	$34.52	$9.95	$20.93	$0.00	$65.40
7	80	$36.82	$9.95	$21.53	$0.00	$68.30
8	90	$41.42	$9.95	$22.74	$0.00	$74.11

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$38.95	$9.90	$18.46	$0.00	$67.31
	06/01/2025	$40.34	$9.90	$18.46	$0.00	$68.70
	12/01/2025	$41.72	$9.90	$18.46	$0.00	$70.08
	06/01/2026	$43.16	$9.90	$18.46	$0.00	$71.52
	12/01/2026	$44.60	$9.90	$18.46	$0.00	$72.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2025	$39.78	$15.57	$20.17	$0.00	$75.52
	06/01/2025	$40.78	$15.57	$20.17	$0.00	$76.52
	12/01/2025	$40.78	$15.57	$21.78	$0.00	$78.13
	01/01/2026	$40.78	$16.17	$21.78	$0.00	$78.73
	06/01/2026	$41.78	$16.17	$21.78	$0.00	$79.73
	12/01/2026	$41.78	$16.17	$23.52	$0.00	$81.47
	01/01/2027	$41.78	$16.77	$23.52	$0.00	$82.07
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2024	$55.79	$10.08	$24.29	$0.00	$90.16
For apprentice rates see "Apprentice- PILE DRIVER"						
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2024	$55.79	$10.08	$24.29	$0.00	$90.16

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 1*

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$25.11	$10.08	$2.53	$0.00	$37.72
2	55	$30.68	$10.08	$5.07	$0.00	$45.83
3	70	$39.05	$10.08	$19.22	$0.00	$68.35
4	80	$44.63	$10.08	$21.76	$0.00	$76.47

Notes:

% Indentured BEFORE 8/1/20; 50/60/70/75/80/80/90/90

Step 1 $62.27/ 2 $67.84/3 $73.42/ 4 $76.21/ 5&6 $79.00/ 7&8 $84.58

Apprentice to Journeyworker Ratio:1:5

PIPEFITTER & STEAMFITTER *PIPEFITTERS LOCAL 537*	03/01/2025	$68.88	$12.70	$21.80	$0.00	$103.38

Apprentice - *PIPEFITTER - Local 537*

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$27.55	$12.70	$9.05	$0.00	$49.30
2	45	$31.00	$12.70	$21.80	$0.00	$65.50
3	60	$41.33	$12.70	$21.80	$0.00	$75.83
4	70	$48.22	$12.70	$21.80	$0.00	$82.72
5	80	$55.10	$12.70	$21.80	$0.00	$89.60

Notes:

** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.

Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

PIPELAYER *LABORERS - ZONE 2*	12/01/2024	$39.20	$9.90	$18.36	$0.00	$67.46
	06/01/2025	$40.59	$9.90	$18.36	$0.00	$68.85
	12/01/2025	$41.97	$9.90	$18.36	$0.00	$70.23
	06/01/2026	$43.41	$9.90	$18.36	$0.00	$71.67
	12/01/2026	$44.85	$9.90	$18.36	$0.00	$73.11
	06/01/2027	$46.30	$9.90	$18.36	$0.00	$74.56
	12/01/2027	$47.75	$9.90	$18.36	$0.00	$76.01
	06/01/2028	$49.25	$9.90	$18.36	$0.00	$77.51
	12/01/2028	$50.75	$9.90	$18.36	$0.00	$79.01

For apprentice rates see "Apprentice- LABORER"

PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.20	$9.90	$18.46	$0.00	$67.56
	06/01/2025	$40.59	$9.90	$18.46	$0.00	$68.95
	12/01/2025	$41.97	$9.90	$18.46	$0.00	$70.33
	06/01/2026	$43.41	$9.90	$18.46	$0.00	$71.77
	12/01/2026	$44.85	$9.90	$18.46	$0.00	$73.21

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PLUMBERS & GASFITTERS *PLUMBERS & GASFITTERS LOCAL 12*	03/02/2025	$69.84	$14.32	$20.31	$0.00	$104.47

Apprentice - *PLUMBER/GASFITTER - Local 12*

Effective Date - 03/02/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$24.44	$14.32	$7.41	$0.00	$46.17
2	40	$27.94	$14.32	$8.42	$0.00	$50.68
3	55	$38.41	$14.32	$11.47	$0.00	$64.20
4	65	$45.40	$14.32	$13.50	$0.00	$73.22
5	75	$52.38	$14.32	$15.53	$0.00	$82.23

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr

Step4 with lic$76.49 tot.rate, Step5 with lic. $85.32 tot. rate

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.) *PIPEFITTERS LOCAL 537*	03/01/2025	$68.88	$12.70	$21.80	$0.00	$103.38
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	12/01/2024	$39.70	$9.90	$17.54	$0.00	$67.14
	06/01/2025	$41.09	$9.90	$17.54	$0.00	$68.53
	12/01/2025	$42.47	$9.90	$17.54	$0.00	$69.91
	06/01/2026	$43.91	$9.90	$17.54	$0.00	$71.35
	12/01/2026	$45.35	$9.90	$17.54	$0.00	$72.79
	06/01/2027	$46.80	$9.90	$17.54	$0.00	$74.24
	12/01/2027	$48.25	$9.90	$17.54	$0.00	$75.69
	06/01/2028	$49.75	$9.90	$17.54	$0.00	$77.19
	12/01/2028	$51.25	$9.90	$17.54	$0.00	$78.69
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.20	$9.90	$18.46	$0.00	$67.56
	06/01/2025	$40.59	$9.90	$18.46	$0.00	$68.95
	12/01/2025	$41.97	$9.90	$18.46	$0.00	$70.33
	06/01/2026	$43.41	$9.90	$18.46	$0.00	$71.77
	12/01/2026	$44.85	$9.90	$18.46	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWDERMAN & BLASTER *LABORERS - ZONE 2*	12/01/2024	$39.95	$9.90	$18.36	$0.00	$68.21
	06/01/2025	$41.34	$9.90	$18.36	$0.00	$69.60
	12/01/2025	$42.72	$9.90	$18.36	$0.00	$70.98
	06/01/2026	$44.16	$9.90	$18.36	$0.00	$72.42
	12/01/2026	$45.60	$9.90	$18.36	$0.00	$73.86
	06/01/2027	$47.05	$9.90	$18.36	$0.00	$75.31
	12/01/2027	$48.50	$9.90	$18.36	$0.00	$76.76
	06/01/2028	$50.00	$9.90	$18.36	$0.00	$78.26
	12/01/2028	$51.50	$9.90	$18.36	$0.00	$79.76
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.95	$9.65	$18.46	$0.00	$68.06
	06/01/2025	$41.34	$9.65	$18.46	$0.00	$69.45
	12/01/2025	$42.72	$9.65	$18.46	$0.00	$70.83
	06/01/2026	$44.16	$9.65	$18.46	$0.00	$72.27
	12/01/2026	$45.60	$9.65	$18.46	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$57.03	$15.55	$16.50	$0.00	$89.08
	06/01/2025	$58.33	$15.55	$16.50	$0.00	$90.38
	12/01/2025	$59.78	$15.55	$16.50	$0.00	$91.83
	06/01/2026	$61.08	$15.55	$16.50	$0.00	$93.13
	12/01/2026	$62.53	$15.55	$16.50	$0.00	$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$36.67	$15.55	$16.50	$0.00	$68.72
	06/01/2025	$37.52	$15.55	$16.50	$0.00	$69.57
	12/01/2025	$38.47	$15.55	$16.50	$0.00	$70.52
	06/01/2026	$39.33	$15.55	$16.50	$0.00	$71.38
	12/01/2026	$40.28	$15.55	$16.50	$0.00	$72.33
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 653 - Southeastern Concrete (Weymouth)*	08/01/2023	$25.00	$13.91	$6.90	$0.00	$45.81
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	12/01/2024	$39.20	$9.90	$18.36	$0.00	$67.46
	06/01/2025	$40.59	$9.90	$18.36	$0.00	$68.85
	12/01/2025	$41.97	$9.90	$18.36	$0.00	$70.23
	06/01/2026	$43.41	$9.90	$18.36	$0.00	$71.67
	12/01/2026	$44.85	$9.90	$18.36	$0.00	$73.11
	06/01/2027	$46.30	$9.90	$18.36	$0.00	$74.56
	12/01/2027	$47.75	$9.90	$18.36	$0.00	$76.01
	06/01/2028	$49.25	$9.90	$18.36	$0.00	$77.51
	12/01/2028	$50.75	$9.90	$18.36	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2025	$52.03	$13.28	$21.70	$0.00	$87.01
	08/01/2025	$53.53	$13.28	$21.70	$0.00	$88.51
	02/01/2026	$54.78	$13.28	$21.70	$0.00	$89.76

Apprentice - *ROOFER - Local 33*

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.02	$13.28	$15.55	$0.00	$54.85
2	60	$31.22	$13.28	$21.70	$0.00	$66.20
3	65	$33.82	$13.28	$21.70	$0.00	$68.80
4	75	$39.02	$13.28	$21.70	$0.00	$74.00
5	85	$44.23	$13.28	$21.70	$0.00	$79.21

Effective Date - 08/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.77	$13.28	$15.55	$0.00	$55.60
2	60	$32.12	$13.28	$21.70	$0.00	$67.10
3	65	$34.79	$13.28	$21.70	$0.00	$69.77
4	75	$40.15	$13.28	$21.70	$0.00	$75.13
5	85	$45.50	$13.28	$21.70	$0.00	$80.48

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 *ROOFERS LOCAL 33*	02/01/2025	$52.28	$13.28	$21.70	$0.00	$87.26
	08/01/2025	$53.78	$13.28	$21.70	$0.00	$88.76
	02/01/2026	$55.03	$13.28	$21.70	$0.00	$90.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2025	$59.13	$14.91	$28.27	$2.98	$105.29
	08/01/2025	$60.98	$14.91	$28.27	$2.98	$107.14
	02/01/2026	$62.93	$14.91	$28.27	$2.98	$109.09

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SHEET METAL WORKER - Local 17-A*

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$24.83	$14.91	$6.13	$0.00	$45.87
2	42	$24.83	$14.91	$6.13	$0.00	$45.87
3	47	$27.79	$14.91	$12.26	$1.62	$56.58
4	47	$27.79	$14.91	$12.26	$1.62	$56.58
5	52	$30.75	$14.91	$13.24	$1.74	$60.64
6	52	$30.75	$14.91	$13.49	$1.75	$60.90
7	60	$35.48	$14.91	$14.90	$1.93	$67.22
8	65	$38.43	$14.91	$15.88	$2.04	$71.26
9	75	$44.35	$14.91	$17.84	$2.28	$79.38
10	85	$50.26	$14.91	$19.30	$2.49	$86.96

Effective Date - 08/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$25.61	$14.91	$6.13	$0.00	$46.65
2	42	$25.61	$14.91	$6.13	$0.00	$46.65
3	47	$28.66	$14.91	$12.26	$1.62	$57.45
4	47	$28.66	$14.91	$12.26	$1.62	$57.45
5	52	$31.71	$14.91	$13.24	$1.74	$61.60
6	52	$31.71	$14.91	$13.49	$1.75	$61.86
7	60	$36.59	$14.91	$14.90	$1.93	$68.33
8	65	$39.64	$14.91	$15.88	$2.04	$72.47
9	75	$45.74	$14.91	$17.84	$2.28	$80.77
10	85	$51.83	$14.91	$19.30	$2.49	$88.53

Notes:
Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	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 *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	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 *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	03/01/2025	$72.14	$11.51	$23.80	$0.00	$107.45

Apprentice - *SPRINKLER FITTER - Local 550 (Section A) Zone 1*

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$25.25	$11.51	$13.07	$0.00	$49.83
2	40	$28.86	$11.51	$13.90	$0.00	$54.27
3	45	$32.46	$11.51	$14.73	$0.00	$58.70
4	50	$36.07	$11.51	$15.55	$0.00	$63.13
5	55	$39.68	$11.51	$16.37	$0.00	$67.56
6	60	$43.28	$11.51	$17.20	$0.00	$71.99
7	65	$46.89	$11.51	$18.03	$0.00	$76.43
8	70	$50.50	$11.51	$18.85	$0.00	$80.86
9	75	$54.11	$11.51	$19.67	$0.00	$85.29
10	80	$57.71	$11.51	$20.50	$0.00	$89.72

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 223*	09/01/2024	$40.69	$11.75	$14.53	$0.00	$66.97
	09/01/2025	$42.52	$12.00	$15.30	$0.00	$69.82
	09/01/2026	$44.41	$12.25	$16.09	$0.00	$72.75
	09/01/2027	$46.51	$12.50	$16.93	$0.00	$75.94

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 223*

Effective Date - 09/01/2024

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

Notes: See Electrician Apprentice Wages

Telecom Apprentice Wages shall be the same as the Electrician Apprentice Wages

Apprentice to Journeyworker Ratio:2:3***

TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	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

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.37	$11.49	$23.59	$0.00	$67.45
2	60	$38.84	$11.49	$23.59	$0.00	$73.92
3	70	$45.32	$11.49	$23.59	$0.00	$80.40
4	80	$51.79	$11.49	$23.59	$0.00	$86.87
5	90	$58.27	$11.49	$23.59	$0.00	$93.35

Effective Date - 08/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$33.45	$11.49	$23.59	$0.00	$68.53
2	60	$40.13	$11.49	$23.59	$0.00	$75.21
3	70	$46.82	$11.49	$23.59	$0.00	$81.90
4	80	$53.51	$11.49	$23.59	$0.00	$88.59
5	90	$60.20	$11.49	$23.59	$0.00	$95.28

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	12/01/2024	$50.20	$9.90	$19.05	$0.00	$79.15
	06/01/2025	$51.70	$9.90	$19.05	$0.00	$80.65
	12/01/2025	$53.20	$9.90	$19.05	$0.00	$82.15
	06/01/2026	$54.75	$9.90	$19.05	$0.00	$83.70
	12/01/2026	$56.25	$9.90	$19.05	$0.00	$85.20

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	12/01/2024	$46.32	$9.90	$19.05	$0.00	$75.27
	06/01/2025	$47.82	$9.90	$19.05	$0.00	$76.77
	12/01/2025	$49.32	$9.90	$19.05	$0.00	$78.27
	06/01/2026	$50.87	$9.90	$19.05	$0.00	$79.82
	12/01/2026	$52.37	$9.90	$19.05	$0.00	$81.32
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2024	$46.20	$9.90	$19.05	$0.00	$75.15
	06/01/2025	$47.70	$9.90	$19.05	$0.00	$76.65
	12/01/2025	$49.20	$9.90	$19.05	$0.00	$78.15
	06/01/2026	$50.75	$9.90	$19.05	$0.00	$79.70
	12/01/2026	$52.25	$9.90	$19.05	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	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 *LABORERS (COMPRESSED AIR)*	12/01/2024	$58.43	$9.90	$19.50	$0.00	$87.83
	06/01/2025	$59.93	$9.90	$19.50	$0.00	$89.33
	12/01/2025	$61.43	$9.90	$19.50	$0.00	$90.83
	06/01/2026	$62.98	$9.90	$19.50	$0.00	$92.38
	12/01/2026	$64.48	$9.90	$19.50	$0.00	$93.88
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	12/01/2024	$60.43	$9.90	$19.50	$0.00	$89.83
	06/01/2025	$61.93	$9.90	$19.50	$0.00	$91.33
	12/01/2025	$63.43	$9.90	$19.50	$0.00	$92.83
	06/01/2026	$64.98	$9.90	$19.50	$0.00	$94.38
	12/01/2026	$66.48	$9.90	$19.50	$0.00	$95.88
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	12/01/2024	$50.50	$9.90	$19.50	$0.00	$79.90
	06/01/2025	$52.00	$9.90	$19.50	$0.00	$81.40
	12/01/2025	$53.50	$9.90	$19.50	$0.00	$82.90
	06/01/2026	$55.05	$9.90	$19.50	$0.00	$84.45
	12/01/2026	$56.55	$9.90	$19.50	$0.00	$85.95
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	12/01/2024	$52.50	$9.90	$19.50	$0.00	$81.90
	06/01/2025	$54.00	$9.90	$19.50	$0.00	$83.40
	12/01/2025	$55.50	$9.90	$19.50	$0.00	$84.90
	06/01/2026	$57.05	$9.90	$19.50	$0.00	$86.45
	12/01/2026	$58.55	$9.90	$19.50	$0.00	$87.95
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	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
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2024	$40.61	$9.65	$17.70	$0.00	$67.96
	06/01/2025	$42.00	$9.65	$17.70	$0.00	$69.35
	12/01/2025	$43.38	$9.65	$17.70	$0.00	$70.73
	06/01/2026	$44.82	$9.65	$17.70	$0.00	$72.17
	12/01/2026	$46.26	$9.65	$17.70	$0.00	$73.61
	06/01/2027	$47.71	$9.65	$17.70	$0.00	$75.06
	12/01/2027	$49.16	$9.65	$17.70	$0.00	$76.51
	06/01/2028	$50.66	$9.65	$17.70	$0.00	$78.01
	12/01/2028	$52.16	$9.65	$17.70	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.20	$9.90	$18.46	$0.00	$67.56
	06/01/2025	$40.59	$9.90	$18.46	$0.00	$68.95
	12/01/2025	$41.97	$9.90	$18.46	$0.00	$70.33
	06/01/2026	$43.41	$9.90	$18.46	$0.00	$71.77
	12/01/2026	$44.85	$9.90	$18.46	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$57.03	$15.55	$16.50	$0.00	$89.08
	06/01/2025	$58.33	$15.55	$16.50	$0.00	$90.38
	12/01/2025	$59.78	$15.55	$16.50	$0.00	$91.83
	06/01/2026	$61.08	$15.55	$16.50	$0.00	$93.13
	12/01/2026	$62.53	$15.55	$16.50	$0.00	$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & GASFITTERS LOCAL 12*	03/02/2025	$69.84	$14.32	$20.31	$0.00	$104.47
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
For apprentice rates see "Apprentice- LINEMAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$42.03	$9.25	$14.35	$0.00	$65.63
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$37.09	$9.25	$10.87	$0.00	$57.21
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$22.25	$9.25	$1.82	$0.00	$33.32
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$49.45	$9.25	$17.48	$0.00	$76.18

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*

Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$29.67	$9.25	$3.39	$0.00	$42.31
2	65	$32.14	$9.25	$3.46	$0.00	$44.85
3	70	$34.62	$9.25	$3.54	$0.00	$47.41
4	75	$37.09	$9.25	$5.11	$0.00	$51.45
5	80	$39.56	$9.25	$5.19	$0.00	$54.00
6	85	$42.03	$9.25	$5.26	$0.00	$56.54
7	90	$44.51	$9.25	$7.34	$0.00	$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Additional Apprentice Information:

All apprentices must be registered with the Division of Apprenticeship Training (DAS) in accordance with M.G.L. c. 23, §§ 11E-11L. Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the hourly prevailing wage rate established by the Commissioner under the provisions of M.G.L. c. 149, §§ 26-27D. Apprentice ratios are established by DAS pursuant to M.G.L. c. 23, §§ 11E-11L. Ratios are expressed as the allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified. The ratios listed herein have been taken from relevant private collective bargaining agreements (CBAs) and are provided for illustrative purposes only. They have not been independently verified as being accurate or continuing to be accurate. Parties having questions regarding what ratio to use should contact DAS.

DOCUMENT 00870

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

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

APPENDIX C

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

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

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

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

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

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

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

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

APPENDIX D

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

PERTINENT NON-DISCRIMINATION AUTHORITIES:

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

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

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

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

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

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

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

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

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

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

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

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

*** END OF DOCUMENT ***

DOCUMENT 00875
TRAINEE SPECIAL PROVISIONS
Revised October, 2016

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

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 that 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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General Decision Number: MA20250022 03/21/2025

Superseded General Decision Number: MA20240022

State: Massachusetts

Construction Type: Highway

County: Norfolk County in Massachusetts.

HIGHWAY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $17.75 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2025.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the

Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2025
1	03/14/2025
2	03/21/2025

* ELEC0103-003 03/01/2025

	Rates	Fringes
ELECTRICIAN (Includes Traffic Signalization)	$ 64.26	36.99

ENGI0004-028 12/01/2024

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Group 1	$ 57.03	33.20
Group 2	$ 56.40	33.20

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; Crane; Gradall; Paver (Asphalt, Aggregate, and Concrete); Post Driver (Guardrail/Fences)
Group 2: Bulldozer; Grader/Blade; Milling Machine; Roller

ENGI0004-029 12/01/2024

	Rates	Fringes
POWER EQUIPMENT OPERATOR: (Loader)	$ 57.03	33.20

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

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IRON0007-026 03/16/2024

	Rates	Fringes
IRONWORKER (ORNAMENTAL AND STRUCTURAL)	$ 54.68	36.48

LABO0022-015 12/01/2024

	Rates	Fringes
LABORER		
Common or General	$ 38.95	29.70
Fence Erection	$ 38.95	29.70
Guardrail Installation	$ 38.95	29.70
Landscape	$ 38.95	29.70

LABO0133-001 12/01/2024

	Rates	Fringes
LABORER (Concrete Surfacer)	$ 46.20	29.85

PAIN0035-023 07/01/2024

	Rates	Fringes
PAINTER (Steel)	$ 56.76	36.00

SUMA2014-012 01/11/2017

	Rates	Fringes
CARPENTER, Includes Form Work	$ 43.64	22.09
CEMENT MASON/CONCRETE FINISHER	$ 56.70	21.08
IRONWORKER, REINFORCING	$ 44.52	19.36
LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor	$ 33.65	17.32
LABORER: Concrete Saw (Hand Held/Walk Behind)	$ 44.43	14.18

LABORER: Jack Hammer	$ 38.69	17.33
OPERATOR: Forklift	$ 64.67	0.00
OPERATOR: Mechanic	$ 48.74	11.79
OPERATOR: Piledriver	$ 42.56	17.34
PAINTER: Spray (Linestriping)	$ 47.30	6.42
TRAFFIC CONTROL: Flagger	$ 23.00	20.44
TRAFFIC CONTROL: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper	$ 53.35	12.78
TRUCK DRIVER: Concrete Truck	$ 33.69	15.79
TRUCK DRIVER: Dump Truck	$ 37.74	11.86
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 classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

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

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the

collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

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

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter

d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.

Washington, DC 20210.

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END OF GENERAL DECISION

DOCUMENT A00801

SPECIAL PROVISIONS

STOUGHTON
Federal Aid Project No. NHP(NHS)-003S(829)
Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)

Labor participation goals for this Project shall be 15.3% for minorities and 6.9% for women for each job category. The goals are applicable to both Contractor's and Subcontractor's on-site construction workforce. Refer to Document 00820 for details.

SCOPE OF WORK

The proposed project consists of geometric modification along Washington Street (Route 138) corridor that extends from the Canton Town Line south to Charles Avenue to enhance bicycle and pedestrian accommodations as part of the safety improvement work.

This Contract includes the following:

- Installing new signal equipment at an unsignalized intersection of Washington Street (Route 138) at York Street.
- Construction of American with Disabilities Act (ADA) compliant pedestrian ramps.
- Construction of sidewalks and driveways.
- Full depth box widening.
- Pavement milling and resurfacing.
- Placing new pavement markings and signs.
- Drainage improvements.
- Relocating existing utility pole – performed by others.
- Installing granite curbing.
- Furnishing and placing loam and seed.

All work under this Contract shall be done in conformance with the *2025 Standard Specifications for Highways and Bridges*, the Construction Standard Details in effect as of March 12, 2025, the 1990 Standard Drawings for Signs and Supports, the 2015 Overhead Signal Structure and Foundation Standard Drawings, the 2009 Manual on Uniform Traffic Control Devices (MUTCD) with Revisions 1, 2, and 3 and the November 2022 Massachusetts Amendments to the MUTCD, the 1968 Standard Drawings for Traffic Signals and Highway Lighting, the latest edition of The American Standard for Nursery Stock, the Plans and these Special Provisions.

SUBSECTION 7.05 INSURANCE REQUIREMENTS
B. Public Liability Insurance

The insurance requirements set forth in this subsection 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.

Paragraph 4

Asbestos Liability Insurance shall be obtained for this project. The Contractor and the Massachusetts Department of Transportation 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.

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 Year's 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.

HOLIDAY WORK RESTRICTIONS (Continued)

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.

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.

HOLIDAY WORK RESTRICTIONS (Continued)

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.

WORK SCHEDULE

No work that will disrupt travel on the existing roadways (lane closures, lane shifts, trenching, etc.) shall be done from 6:00 AM to 9:00 AM and from 3:00 PM to 6:00 PM.

The milling and pavement operations shall be restricted to overnight hours. The Contractor will be permitted to perform between 10:00 pm and 5:00 am daily, Monday night through Thursday night. The contractor shall obtain the approval of overnight hours work from the MassDOT. All equipment and personnel must be removed from the roadway prior to 5:00 AM.

The work on this project shall be executed in 1 shift per day, 5 days a week between the hours of 7:00 am and 3:30 pm, Monday to Friday. Work within the roadways that will unduly disrupt travel on the existing roadways (lane closures, trenching, etc.) may only be executed between 9:00 am and 3:00 pm. The Contractor will be required to schedule roadway access with District 5 Operations. District 5 may, at its discretion, adjust the allowed work hours if excessive delays are observed.

No work shall be done on Saturday, Sundays, holidays, and the day before and after holiday without the approval of the Engineer.

The Prime Contractor and all subcontractors shall work the same shift. Set-up and removal of all equipment and materials for construction and/or traffic maintenance shall be done during the prescribed work hours. The roadway shall be free of the Contractor's personnel and operations during other hours.

The Contractor shall coordinate the work schedule with MassDOT and the Town of Stoughton.

2026 FIFA WORLD CUP – BOSTON, MASSACHUSETTS

The 2026 FIFA World Cup will be held at Gillette Stadium in Foxborough and related events will be held throughout the region. Matches and Fan Fest activities are scheduled from June 11, 2026, through July 19, 2026. MassDOT will impose work restrictions as necessary to minimize traffic impacts during FIFA events when the Contractor's operations could impact vehicular traffic, particularly on interstate highways and major arterials throughout the region and local roads near the event site. No additional compensation will be allowed for work restrictions except as determined under Subsection 8.10

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 3.90 Million 18-kip (80-kn) ESALs.

CONTAMINATED SOIL

Soil to be removed from the project area shall not be assumed to be uncontaminated and must be evaluated prior to off-site management for potential contamination with hazardous materials. No soil may be disposed of off-site without proper assessment by the contractor and approval from the Resident Engineer (RE), District Environmental Engineer (DEE), or the project designee.

SOIL STOCKPILING DIRECTIVE P-22-001

Any stockpiling of soil must be performed in compliance with Policy Directive P-22-001, Off-Site Stockpiling of Soil from MassDOT Construction Projects. This directive limits the allowable locations for off-site stockpiling of soil generated during MassDOT projects and includes various requirements that must be satisfied by the contractor prior to off-site stockpiling. The Contractor is responsible for identifying a suitable stockpile location.

TRUCK SAFETY DEVICES

(Supplementing Subsection 7.04: Motor Vehicles)

All motor vehicles subject to section 7 of chapter 90 to be operated under this Contract shall be equipped with safety devices as provided therein and in 540 CMR 4.00.

By December 31, 2025, the contractor shall certify to the Registry of Motor Vehicles, in a manner prescribed by the Registrar, that all applicable vehicles are equipped with Lateral Protective Devices, Convex Mirrors, Cross Over Mirror(s) and Back Up Cameras in accordance with the requirements of 540 CMR 4.00.

TRUCK SAFETY DEVICES (Continued)

The Contractor shall provide evidence satisfactory to the Department to demonstrate compliance with the above certification requirement for all applicable vehicles operated under this contract by the Contractor and its subcontractors and vendors in a manner set forth by the Department. Thereafter, the Contractor shall have an affirmative obligation to continue to provide such evidence of compliance on an ongoing basis and no later than 7 days after certification with the Registry of Motor Vehicles of any additional vehicles operated under this contract by the Contractor and its subcontractors and vendors.

Non-compliance with respect to a vehicle that is subject to 540 CMR 4.00 may subject the Contractor to statutory fines as established in M.G.L. c. 90, § 7 and/or contractual remedies up to and including termination of the contract.

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.

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 298-0880.

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.

NORTHERN LONG-EARED BAT AND TRICOLORED BAT PROTECTION

The U.S. Fish and Wildlife Service (USFWS) has listed the northern long-eared bat (*Myotis septentrionalis*; NLEB) and tricolored bat (*Perimyotis subflavus*; TCB) as federally endangered or proposed endangered, respectfully, under the Endangered Species Act (ESA). USFWS has developed this guidance to address ESA compliance and promote conservation of NLEB and TCB. This project has been consulted with the USFWS through the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and Federal Transit Administration (FTA) Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat revised February 5, 2018 and amended March 31, 2023.

On behalf of FHWA, the lead federal agency for Section 7 consultation, MassDOT submitted a FHWA, FRA, FTA Programmatic Consultation for Transportation Projects affecting NLEB or Indiana Bat to the USFWS through the Information for Planning and Consultation (IPaC) webpage. Therefore, the project has completed Section 7 consultation through the ESA.

In advance of the uplisting of the TCB to endangered under the ESA, the following Avoidance and Minimization Measures (AMMs) must be strictly adhered to in order to protect NLEB and TCB and to be in compliance with the ESA. Contact MassDOT Environmental Services - Wildlife Unit Supervisor (David Paulson, david.j.paulson@dot.state.ma.us, 857-262-3378) for questions about project limits, restrictions, or conservation measures.

General AMM

- The Contractor shall ensure all personnel working in on the project site are aware of all environmental commitments related to NLEB and TCB, including all applicable AMMs. NLEB and TCB information (https://www.fws.gov/midwest/endangered/mammals/nleb/ and https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus) shall be made available to all personnel.

Lighting AMMs

- Direct temporary lighting away from suitable habitat during the active season: **April 1 to October 31.**
- When installing new or replacing existing permanent lights, use downward-facing, full cut-off lens lights (with same intensity or less for replacement lighting); or for those transportation agencies using the BUG system developed by the Illuminating Engineering Society, be as close to 0 for all three ratings with a priority of "uplight" of 0 and "backlight" as low as practicable.

NORTHERN LONG-EARED BAT AND TRICOLORED BAT PROTECTION
(Continued)

Tree Removal AMMs

- *If additional cutting is proposed by the Contractor that is outside the scope of this contract, additional review is required by the MassDOT Highway Division's Environmental Services Section, and additional review and restrictions may be required by the USFWS.*
- Ensure tree removal is limited to that specified in project plans and ensure that contractors understand clearing limits and how they are marked in the field (e.g., install bright colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits).
- No tree cutting shall be conducted during the active season: **April 1 to October 31.**
- No tree cutting shall be conducted during the active season: **April 1 to October 31**, or if cutting inside of this timeframe is required, tree removal is limited to 10 or fewer trees per project at any time of year within 100 feet of existing road/rail surface and outside of documented roosting/foraging habitat or travel corridors; and a visual emergence survey must be conducted by *MassDOT Highway Division's Environmental Services Section or appointed representative* with no bats observed.
- Do not remove **documented** or NLEB and/or TCB roosts that are still suitable for roosting, or trees within 0.25 miles of roosts, or **documented** foraging habitat any time of year.
- The Contractor shall ensure all personnel working in on the project site are aware of all environmental commitments related to NLEB and/or TCB, including the **TOY** restriction. If this restriction needs to be waived at any location(s) the Resident Engineer shall send a locus map of the proposed work to MassDOT Highway Division's Environmental Services Section for review and a determination if the restriction can be waived.

Bridge AMM

- An inspection of the bridge for the presence of, or evidence of use by, bats shall be completed by the MassDOT Wildlife Unit prior to commencing bridge work. The Contractor shall notify the MassDOT Wildlife Unit no later than thirty (30) days prior to the start of work or reinitiating work on the bridge to provide adequate time for inspection. If bats are found to be present, or, if there is evidence of bat usage, work at the bridge shall not commence until the MassDOT Wildlife Unit has completed coordination with the U.S. Fish and Wildlife Service to determine the appropriate follow up or mitigative actions. If bridge work is not complete within 2 years of the initial bridge inspection, another inspection of the bridge for the presence of, or evidence of use by, bats shall be completed.

Structure AMMs

- This category includes manmade structures that may provide bat roosting or hibernation habitat that are not bridges (i.e., buildings, sheds, culverts). An inspection of the structure for the presence of, or evidence of use by, bats shall be completed by a Qualified Bat Consultant or MassDOT Biologist prior to commencing structure work. The Contractor shall notify the MassDOT Wildlife Unit no later than thirty (30) days prior to the start of work or reinitiating work to provide adequate time for inspection. If bats are found to be present, or, if there is evidence of bat usage, work at the bridge shall not commence until the MassDOT Wildlife and Endangered Species Unit has completed coordination with the USFWS to determine the appropriate follow up or mitigative actions.

NORTHERN LONG-EARED BAT AND TRICOLORED BAT PROTECTION
(Continued)

Hibernacula AMMs

- For projects located within karst areas, on-site personnel will use best management practices, secondary containment measures, or other standard spill prevention and countermeasures to avoid impacts to possible hibernacula. Where practicable, a 300 foot buffer will be employed to separate fueling areas and other major containment risk activities from caves, sinkholes, losing streams, and springs in karst topography.

ENVIRONMENTAL PERMITTING

A Negative Determination has been obtained from the Canton Conservation Commission and an Order of Conditions ("Order") has been issued by the Town of Stoughton Conservation Commission under the Wetlands Protection Act.

If the field conditions and/or Contractor-proposed erection, demolition, storage, or other procedures not originally allowed by existing environmental permits require work to occur in or otherwise impact water or wetland resource areas, then the Contractor is advised that no associated work can occur until all required environmental permits have been either amended or obtained allowing such work.

The Contractor must notify the District 5 Highway Director and Resident Engineer in writing at least 60 days prior to desired commencement of the proposed activity.

All environmental submittals, including any contact with Local, State, or Federal environmental agencies, must be coordinated with the District 5 Environmental Engineer.

The Contractor is expected to fully cooperate with requests for information and provide same in a timely manner. The Contractor is further advised that the Department will not entertain a delay claim due to the time required to modify or obtain the environmental permits.

EVERSOURCE EMERGENCY TELEPHONE NUMBERS

GAS:
Outage/ Emergency: 800-592-2000
New Service: 866-678-2744
Customer Support: 800-592-2000

NATIONAL GRID EMERGENCY TELEPHONE NUMBERS

ELECTRIC:
Outage/ Emergency: 1-800-465-1212
New Service: 1-800-375-7405
Customer Support: 1-800-322-3223

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.

NOTICE TO OWNERS OF UTILITIES

All drainage and water system alterations indicated on the Contract Documents or as required by the Engineer, shall be performed by the Contractor unless noted otherwise. The Contractor shall make all necessary alterations under the appropriate items, which shall include the cost of all labor, materials, equipment and other incidental items necessary to perform the work required.

The Contractor shall give written notice to all public service corporations or officials, owning or having charge of public or privately owned utilities, of his intention to commence operations affecting such utilities one week in advance of the commencement of such operations. The Contractor shall, at the same time, file a copy of such notice with the Engineer.

NOTICE TO OWNERS OF UTILITIES (Continued)

Before commencing work on service connections, the Contractor shall contact the serving utility to ensure that proper construction procedures are followed.

The following are the names and addresses of some of the agencies which may be affected and must be notified. Completeness of this list is not guaranteed by the Department. The Contractor shall assure that all affected agencies are notified.

Utility contacts may be found here: hwy.massdot.state.ma.us/webapps/utilities/select.asp
Select District 5.
Select Stoughton.
Locate the proper utility.

National Grid (Electric)
55 Bearfoot Road
Northborough, MA 01532
Attn: Noah Skole
(617) 706-1736
Email: noah.skole@nationalgrid.com

Eversource (Gas)
995 Belmont Street
Brockton, MA 02301
Attn: Brenan Pitts
(508)895-4818
Email: brendan.pitts@Eversource.com

Verizon (Telephone)
385 Myles Standish Blvd.
Taunton, MA 02780
Attn: Karen Mealy
(774) 409-3160
Email: karen.m.mealey@verizon.com

Eversource (Electric – Transmission Engineering)
Attn: Allison Klein
Email: allison.klein@eversource.com
Phone: 781-441-8641 & 914-409-7195 (cell)

Eversource (Electric – Transmission Operations)
Attn: Edward Zdonek & Vinh Dang
Email: edward.zdonek@eversource.com and vinh.dang@eversource.com
Phone (Vinh) 617-669-4970

NOTICE TO OWNERS OF UTILITIES (Continued)

Stoughton Water Department (Water)
950 Central Street
Stoughton, MA 02072
Attn: Phil McNulty
(781) 344-2112
Email: pmcnulty@stoughton-ma.gov

Stoughton Engineering Department (Sewer)
10 Pearl Street (Town Hall)
Stoughton, MA 02072
Attn: William McDowell
(781) 341-1300
Email: wmcdowell@stoughton-ma.gov

Comcast Cable Corporation (Cable)
PO Box 6505, 5 Omni Way
Chelmsford, MA 01824
Attn: Wendy Brown
(978) 848-5163
Email: Wendy_Brown@comcast.com

Crown Castle (Cable)
80 Central Street
Boxborough, MA 01719
Attn: Mark Bonanno
(508) 616-7818
Email: mark.bonanno@crowncastle.com

Stoughton Fire Alarm (Fire Alarm)
1550 Central Street
Stoughton, MA 02072
Attn: Chief Michael Laracy
(781) 344-3170
Email: mlaracy@stoughton-ma.gov

Stoughton Town Engineer (DPW)
10 Pearl Street (Town Hall)
Stoughton, MA 02072
Attn: Thomas Fitzgerald
(508) 646-2835
Email: t.fitzgerald@stoughton.ma.gov
(508) 744-5080

PROVISIONS FOR TRAVEL AND PROSECUTION OF WORK

(Supplementing Subsections 7.09, 7.10 and 8.03)

The Contractor shall be responsible for notifying the Town of Stoughton, in writing, at least two weeks in advance of commencement of work.

The Contractor shall coordinate with the Town of Stoughton, as necessary, throughout the duration of the project to ensure that work on this project, is coordinated with other ongoing projects throughout the Town.

TEMPORARY ACCESS TO AREA MERCHANTS AND BUSINESSES

(Supplementing Subsections 8.02 and 8.06)

The work is in residential and commercial business sections of the Town and access to all residences and businesses must be always maintained.

The Contractor shall provide safe and ready means of ingress and egress to all residences, businesses and professional offices in the project area, both day and night, for the duration of the project.

MISCELLANEOUS ITEMS REMOVED AND STACKED

The Contractor shall remove, and stack items and materials noted on the Plans. The stacked location of the items and materials shall be approved by the Engineer and/or property owner prior to the removal.

If a pay item is not provided for the specific item, then the removing and stacking shall be incidental to Item 120., and no additional measurement and payment will be made for the work. Work includes the dismantling, removal, transporting, and stacking items.

DRAINAGE

The Contractor shall adjust all existing and proposed drainage castings once to intermediate grade and again to finished grade as required by the Engineer.

All drainage castings adjustments in the existing drainage structures will be measured once and paid under Item 220. No separate payment will be made for the required second adjustment to finished grade, but all costs in connection therewith shall be included in the Contract unit price bid for Item 220.

Proposed drainage structures, the first time installation and adjustment of the casting will be incidental to the work of the respective proposed drainage structure bid item, but the second time adjustment to the finished grade, as required by the Engineer, it will be paid under Item 220.

Where new pipe is shown on the drawings to be connected into an existing drainage structure to remain, the existing structures shall be first cleaned to remove all mud, debris, and other material. The existing structure wall shall be carefully and neatly cut to provide the minimum size opening required for insertion of the new pipe. The proposed pipe end shall be set or cut-off flush with the inside face of the existing structure wall and the remaining space around the pipe completely filled with cement grout for the full thickness of the structure wall.

Existing shaped inverts shall be reconstructed as necessary to provide a smooth and uniform flow channel from the new pipe through the existing structure.

No separate payment will be made for the cost of connecting new pipes into existing structures, or necessary alterations of existing structure, but all costs in connection therewith shall be included in the unit prices bid for the various pipe items.

All existing pipes to be abandoned shall be plugged with brick masonry in conformance with the Standard Specifications, Subsection 201.62. The cost of this work shall be incidental the pertinent Item requiring masonry plug work.

CONNECTING TO EXISTING DRAINAGE PIPES

Where new structures, shown on the plans, are to connect to existing pipes to remain, the remaining pipe shall be cleaned from the new structure to the next structure downstream. Test pits to locate and survey the existing pipe shall be performed prior to ordering the structure. The existing pipe or pipes shall be carefully cut or removed to allow the installation of the new drainage system. The existing pipe end shall be cut off flush with the inside face of the proposed structure wall and the remaining space around the pipe completely filled with red brick set in cement grout for the full thickness of the structure wall.

No separate payment will be made for the cost of connecting existing pipes to new structures, but all costs in connection therewith shall be included in the unit price bid for the various structure items. If new pipe or pipe section are required to extend the existing line to and through the new structure wall, the new pipe will be paid for under the unit price per foot established under that item.

PROPERTY BOUNDS

The Contractor shall exercise due care when working around all property bounds that are to remain. If any damage to a bound result from the actions of the Contractor, then the bound shall be replaced and/or realigned by a professional Land Surveyor registered in the Commonwealth of Massachusetts retained by the Contractor as required by the Engineer. No additional compensation will be due the Contractor for the materials and labor required for reestablishing the bound to its proper position.

TREE REMOVAL ADJACENT TO WETLANDS

Prior to performing any clearing and grubbing, the Contractor shall flag all trees for removal directly adjacent to wetland areas for approval. The Contractor shall then coordinate with the Engineer, MassDOT Landscape Section, arborist, and wetland scientist to review the tree removals for approval. The Contractor shall retain large, non-invasive trees, directly adjacent to wetland areas to the extent practicable.

WORK ADJACENT TO EXISTING EVERSOURCE TRANSMISSION DUCT BANK

The Contractor shall coordinate all work adjacent/under the existing Eversource transmission duct bank with Eversource prior to beginning work.

The existing duct bank is located within the southbound travel lane of Route 138 from the northerly limits, Station 11+45, and continues to the York Street intersection terminating at Eversource's sub-station, Station 28+50, Left.

Eversource is expected to have an inspector on-site for work near the duct bank. The Contractor is required to coordinate work with the inspector and Engineer prior to the start of work, including schedule and means and methods.

Fluidized Thermal Backfill (FTB), Item 153.5, is required for backfill for all disturbed soils within 3-feet of the duct bank and as required by the Engineer and Eversource. FTB shall also be used for backfill around drainage structures pipe/conduit, and under concrete barrier within 3 feet of the duct bank. FTB shall meet Eversource's Standards UTRM234, see Item 153.5.

The Contractor shall be required to excavate by means of vacuum excavation within 3-feet (minimum) of the duct bank and as required by the Engineer and Eversource. Excavation by mechanical means will not be accepted within 3-feet of the duct bank. No additional measurement and payment will be made for vacuum excavations, and its price shall be incidental to the applicable contract unit price bid items.

All pipe/conduit crossing the ductbank shall be made under the ductbank providing minimum offsets as shown on the Plans. A full length pipe/conduit shall be used so that joints are not located under the duct bank. FTB shall be used as backfill around the pipes.

WORK ADJACENT TO EXISTING EVERSOURCE TRANSMISSION DUCT BANK
(Continued)

The Contractor shall schedule a meeting with the Engineer, MassDOT District 5 DUCE, and Eversource Transmission group prior to the start of the work. At this meeting, the Contractor shall provide their schedule and means and methods work plan for work near the duct bank.

The Contractor shall prepare and submit to the Engineer and Eversource, a means and methods work plan for the work occurring adjacent to the Eversource duct bank. The work plan shall be submitted prior to any work occurring near the Eversource duct bank.

The work plan shall include means and methods to verify, including calculations, all locations where the duct bank will be exposed will not exceed 0.5-inches maximum deflection with slings at least a foot away from welds (if not encased in concrete).

If the maximum deflection cannot be met, then the Contractor shall include means and methods to support the duct bank, including calculations.

The work plans shall also include excavation methods and temporary earth supports for review and approval. If temporary support of the duct bank is not required based on the Contractor's means and methods work plan and as approved by Eversource, then the Contractor shall still be required to submit calculations demonstrating that support is not required for review and approval by the Engineer and Eversource.

No additional measurement and payment will be made for preparation of work plan, revisions, the construction of the temporary support of the duct bank, temporary earth supports, and its price shall be included in applicable contract unit price bid items.

The Contractor shall coordinate with Eversource Transmission Operations for the adjustment of the electric manhole covers near Station 19+85 RT.

Eversource requires a minimum 2 week notice prior to any adjustment and/or plating of the structures.

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.

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 Contactor must submit this as an intended change, in the form of a Proposal Schedule and in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02. These proposed changes are subject to the approval of the Engineer and the impacted utilities, in the form of this Proposal Schedule and a proposed revision to the PUC form. The Contractor shall not proceed with any changes of this type without written authorization from the Engineer, that references the approved Proposal Schedule and PUC form changes. The submission of the Baseline Schedule should not include any of these types of proposed utility changes and should not delay the submission of the Baseline Schedule. As a prerequisite to the Proposal Schedule submission, and in advance of the utility notification(s) period, the Contractor shall coordinate the proposed utility changes with the Engineer and the utility companies, to develop a mutually agreed upon schedule, prior to the start of construction.

D. UTILITY DELAYS

The Contractor shall notify the Engineer upon becoming aware that a Utility owner is not advancing the work in accordance with the approved utility schedule. Such notice shall be provided to the Engineer no later than seven (7) calendar days after the occurrence of the event that the Contractor believes to be a utility delay. After such notice, the Engineer and the Contractor shall continue to diligently seek the Utility Owner's cooperation in performing their scope of Work.

In order to demonstrate that a critical path delay has been caused by a third-party Utility, the Contractor must demonstrate, through the requirements of the monthly Progress Schedule submissions and the supporting contract records associated with Subsection 8.02, 8.10 and 8.14, that the delays were beyond the control of the Contractor.

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.

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 as defined by the schedule type set forth below. These requirements are in addition to any requirements imposed in other sections.

This section establishes the requirement for scheduling submissions. There are four schedule types identified as types A, B, C and D. The schedule type applicable to this project is established in the project special provisions.

All schedules shall be prepared and submitted in accordance with this specification and 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.

Type A –

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Cost-loaded & Resource Loaded CPM
- Resources Graphic Reporting
- Cash Flow Projections from the CPM
- Cash Flow Charts
- Monthly Projected Spending Report (PSR)
- Contractor-furnished CPM software and computer

Type B –

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

Type C –

- 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 and computer

SECTION 722 (Continued)

Type D -

- Bar chart schedule updated monthly or at the request of the Engineer
- Short-term Construction Schedule
- Monthly Projected Spending Report (PSR)

EQUIPMENT, PERSONNEL

722.40 General

A. **Software Requirements**

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. The computer and software shall be maintained and serviced at no additional cost to the Department.

B. Scheduler Requirements

The Scheduler shall be approved 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.

SCHEDULING METHODS

722.60 General

A. **Schedule Planning Session**

The Contractor shall conduct a schedule planning session 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;

SECTION 722 (Continued)

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 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**

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. Rejected Baseline Schedules shall be resubmitted within fifteen (15) Calendar Days after receipt of the Engineer's comments.
2. Contract Progress Schedule / Monthly Update Reviews / Recovery Schedules
   The Engineer will respond to each submittal within twenty-one (21) Calendar Days. Rejected schedules shall be resubmitted by the Contractor within five (5) Calendar Days after receipt of the Engineer's comments.

The Engineer's review comments shall not be construed as direction to change the Contractor's means and methods. The review and acceptance of the CPM schedule does not relieve the Contractor of the responsibility for accomplishing the work within the contract required completion dates. Omissions and errors in the accepted CPM schedule shall not excuse performance less than that required by the Contract.

722.61 Schedule Content and Preparation Requirements

All schedules 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

and the following:

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.

SECTION 722 (Continued)

B. **ACTIVITIES**

The schedule shall clearly define the progression of the Work from the Notice to Proceed (NTP) to Contractor Field Completion (CFC) by using separate activities, or including attributes within appropriate activities, to address each of the following:

1. Notice to Proceed
2. Work Breakdown Structure
3. The Critical Path is clearly defined and organized.
4. Float shall be clearly identified.
5. Detailed activities to satisfy permit requirements.
6. Subcontractor approvals at fifteen (15) Calendar Days from submittal to response
7. 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.
8. 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.
9. Procurement of fabricated materials and equipment with long lead times, including time for review and approval of submittals required before procuring and fabricating.
10. Each component of the Work defined by specific activities.
11. Right-of-Way (ROW) takings that have been identified in the Contract.
12. Early Utility Relocation (by others) that has been identified in the Contract.
13. Interfaces with adjacent work, utility companies, other public agencies, sensitive abutters, and/or any other third-party work affecting the Contract.
14. 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
15. 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
16. Limitations of Work – time of year restrictions and any other limitations identified in the contract
17. Traffic work zone set-up and removal, night work and phasing
18. Material Certifications
19. Milestones listed in Subsection 8.03 - Prosecution of Work or elsewhere in the Contract Documents
20. For Type A and B Contracts only: All items to be paid for, 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.

SECTION 722 (Continued)

21. Contractor's request for validation of FBU (ready to open to traffic)
22. Full Beneficial Use (FBU) Contract Milestone per the following requirements: The majority of contract Work has been completed and the asset(s) has been opened for full multi-modal transportation use, except for limited contract work items that do not materially impair or hinder the intended public use of the transportation facility. All anticipated lane takings have been completed, except for minor, short term work items and as defined in Subsection 8.03 - Prosecution of Work
23. The Department's confirmation of completed work to allow for FBU.
24. Contractor's request for validation of Substantial Completion
25. Department generated punch list of twenty-one (21) Calendar Days
26. Substantial Completion Contract Milestone as defined in the standard specifications.
27. Punch list 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
28. Contractor confirmation that all punchlist work and documentation has been completed.
29. Physical Completion of the Work Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
30. Documentation Completion per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
31. Contractor Field Completion Contract Milestone (which can also be considered the completion date) per the following requirements: All physical contract Work is complete including punchlist. The Contractor has fully de-mobilized from field operations and as defined in Subsection 5.11

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.

D. **DURATIONS**

Activity durations shall be in Work Days. Planned Original Durations shall be established with consideration of 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.

SECTION 722 (Continued)

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**

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.

G. **ACTIVITY IDENTIFICATION NUMBERS**

The Contractor shall use the activity identification numbering system specified in the MassDOT Highway Division Contractor Construction Schedule Toolkit.

H. **ACTIVITY CODES**

The Contractor shall use the activity codes specified in the MassDOT Highway Division Contractor Construction Schedule Toolkit.

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. All calendars shall extend two years beyond the current project completion date.

Project Special Provisions identify specific calendar restrictions some 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.
- Planting seasons for trees, shrubs and grasses and wetlands mitigation work.

SECTION 722 (Continued)

- 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. 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.
- 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.
- Night-time paving and striping operations, traffic, and temperature 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.
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.

SECTION 722 (Continued)

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.
6. Leads such as leads, lags, SS, SF, & FF relationships without the expressed permission of the Department.

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.

Each Submission shall, at a minimum, include the following:

a. Narrative
b. Schedule submittals shall be signed by the Scheduler
c. Schedule Printout - All Activities
d. Schedule Printout - Critical Path Layout
e. Schedule Printout - Remaining Work
f. Schedule Printout - Top 3 Float Path
g. Work Breakdown Structure (WBS) Summary
h. Project Spending Report (PSR) in Portable Document Format (.PDF)
i. Project Spending Report (PSR) in Microsoft Excel spreadsheet (.XLS)
j. Oracle Primavera P6 Schedule File (.XER)

All digital file submittals will be labeled with the following information.

- Contract Number
- Project Number
- Project locations (i.e., town(s))
- Brief description
- Submittal description (i.e., UP07)
- Data Date (MM-DD-YY)
- File Description (i.e., Critical Path)

Example: C110464 (P606309) - Orange Route 2 over 202 – UP23 (07-15-22) - Critical Path

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.

SECTION 722 (Continued)

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.
13. include and describe any notifications, communications and coordination meetings with third-parties such as utility companies that occurred from the last update including personnel names, job titles and contact information, date of meeting(s)/correspondence(s), topics discussed, and reasons the third party provided for deviations from the PUC form.

SECTION 722 (Continued)

B. **CPM Bar Charts**

One (1) timescaled 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 timescaled 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.

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.

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.
4. 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

A Projected Spending Report (PSR) shall be prepared and submitted monthly. 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. The Projected Spending Report (PSR) shall be depicted in a tabular format and provided in both an .XLS and .PDF.

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

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 two months (approximately 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 asbuilt sequencing and asbuilt dates for completed and inprogress activities. Asbuilt 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 fragnet 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.

Contract Progress Schedules that extend performance beyond the Contract Time or beyond any Contract Milestone shall not be approved by the Engineer. The Contractor shall submit a Recovery Schedule, or a Time Entitlement Analysis, if any Contract Progress Schedule/Monthly Update indicates a failure to meet the Contract Dates.

SECTION 722 (Continued)

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 spreadsheet 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. 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.

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 fifteen (15) 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 a 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 fifteen (15) 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 demonstrate the schedule impacts most efficiently 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 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. 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 or Contract Progress Schedule.

C. Recovery Schedules

The Contractor shall promptly report to the Engineer all schedule delays during the prosecution of the Work. Contract Progress Schedules that predict performance extended beyond the Contract Time or beyond any Contract Milestone shall not be approved as the schedule of record. This requirement is critical to the Department's ability to make informed decisions regarding Contract Time and costs.

The Contractor shall submit a Recovery Schedule within fifteen (15) Calendar Days of a Contract Progress Schedule submission that shows failure to meet the Contract Dates unless a recovery schedule is waived by the Department. Waiving the recovery schedule does not relieve the contractor of the responsibility for the delay. The Department may revoke the waiver of a Recovery Schedule, at which time a Recovery Schedule shall be submitted within fifteen (15) Calendar Days of the Contractor being notified.

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

SECTION 722 (Continued)

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 or 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 acceleration including 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. Proposal Schedules that contain a cost element shall be submitted with a separate Cost Proposal.

Changes represented in the 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.

E. Disputes

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.

The Contractor may dispute a decision by the Engineer by filing a claim notice within seven (7) days after the Contractor's request for additional time has been denied or if the Contractor does not accept the number of days granted in a time extension. The Contractor's claim notice shall include a revised time entitlement analysis that sufficiently explains the basis of the time-related claim. Failure to submit the required time entitlement analysis with the claim notice shall result in denial of the Contractor's claim. A determination on the Contractor’s claim shall be in accordance with Subsection 7.16 Claims of Contractor for Compensation. Pending resolution of any dispute, the last schedule accepted by the Engineer will remain the Contract Schedule of Record.

SECTION 722 (Continued)

722.65 Schedule Type D Requirements

This section is to detail the requirements for Type D Schedules and is separate from the requirements listed above. These schedules are intended for a project in which a more formal schedule would not be practical.

Schedules for Type D projects shall be submitted for each work assignment. The Schedule Type D shall be submitted electronically in .XLS and .PDF format and meet the following requirements.

The schedule requirements for work assignments that are anticipated to last three weeks or less shall conform to the requirements for Short-term Construction Schedules below.

Work assignments that are anticipated to last longer than three weeks shall submit a bar chart baseline and provided update schedules upon request of the engineer as required under Bar Chart Schedule below in addition to meeting the Short-term Construction schedule requirements.

A. **Bar Chart Schedule**

A Bar Chart that shall include the following:

- Work Assignment start date.
- Activities to identify.
  - Major work operations broken down to be no longer than 14 days.
  - Procurement of fabricated materials and equipment with long lead times, including time for review and approval of submittals required before procuring and fabricating.
  - 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.
  - The review and return of shop drawings, procedures, and other required submittals, approved or with comments, the duration of which shall be shown as thirty (30) Calendar Days,
  - Detailed activities to satisfy permit requirements.
  - Subcontractor approvals at fifteen (15) Calendar Days from submittal to response
  - Project Close out activities including a 21-calendar day creation of a punchlist activity and 30 calendar day minimum completion of punchlist activity.
- Interfaces with adjacent work, utility companies, other public agencies, sensitive abutters, and/or any other third-party work affecting the Contract.
- Access Restraints – restrictions on access to areas of the Work
- Traffic work zone set-up and removal, night work and phasing
- Contract Milestones including Full beneficial Use, Substantial Completion and Contractor Field Completion

The Bar Char Schedule shall be provided at the beginning of the project and updated with each work order created for the project.

SECTION 722 (Continued)

B. **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 spreadsheet 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. See schedule toolkit for suggested format.

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 on the assignment for the two week period prior and all planned work for the following three 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.

C. **Project Spending Report (PSR)**

A Projected Spending Report (PSR) shall be prepared and submitted monthly. The PSR shall be for all active work assignments, broken down by work assignment. 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. The Projected Spending Report (PSR) shall be depicted in a tabular format and provided in both an .XLS and .PDF

SECTION 722 (Continued)

COMPENSATION

722.80 Method of Measurement

Schedule of Operations (Type A, B and C)

The project bid documents specify the fixed-price amounts to be paid to the Contractor for the Project Schedule requirements contained herein. Each bidder shall include this fixed price bid item amounts in their bid. Failure to do so may be grounds for the rejection of the bid.

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.

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.

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:

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

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.

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. The monthly payment will be the basis for this Equitable Adjustment.

Schedule of Operations (Type D)

For projects assigned with Type D schedule requirements, all scheduling work shall be considered incidental to the project with no separate payment under this section.

SECTION 722 (Continued)

722.81 Basis of Payment

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.

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 (including monthly progress schedules, short-term schedules, project spending reports, TEAs, recovery schedules or impacted schedules) shall be included in this work.

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. The late submission of Impacted schedules, including TEAs, recovery schedules and proposal schedules will result in the forfeiture of the monthly payment for the month in which they were due and subsequent months until the submission is made. Late submission of missed submittals 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 Engineer withholding of full or partial payments of all work performed.

722.82 Payment Items

722.1	SCHEDULE OF OPERATIONS (TYPE A) - FIXED PRICE $_____	LUMP SUM
722.2	SCHEDULE OF OPERATIONS (TYPE B) - FIXED PRICE $_____	LUMP SUM
722.3	SCHEDULE OF OPERATIONS (TYPE C) - FIXED PRICE $_____	LUMP SUM

ITEM 102.2 TREE TRIMMING LUMP SUM

The work under this item shall conform to the relevant provisions of Subsections 8.08 and 101 of the Standard Specifications and the following:

The work includes removing all living, dead, dying, broken and certain other limbs and branches in areas adjacent to proposed overhead wire relocations, highway lighting, traffic signals, traffic signage, other areas as described on the plans, and as required by the Engineer from trees located within the limits of the Project and the satisfactory disposal of all such removed debris.

Tree trimming shall be done as required by the Engineer. Any tree trimming for overhead wire relocations shall meet the current requirements of each Utility.

Prior to commencing work the Contractor shall verify each location with the proper Utility Companies.

All pruning and tree work shall be in conformance with the most current version of the American National Standards Institute (ANSI) Standard Z-133.1 and A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance.

All tree trimming work within 10 feet of energized power lines and equipment shall be in conformance with the most current version of the United States Department of Labor (DOL) OSHA Standard 1910.269(r) along with Subsections (1) through (8).

All work under this Item shall be performed or supervised by the Massachusetts Certified Arborist.

The Contractor shall be required to provide a crew, consisting of a bucket truck with operator and grounds worker for pruning and removing.

The minimum crew shall consist of the following: a supervisor and three tree-trimmers/laborers. The crew shall be equipped with all necessary equipment needed to complete the work including, but not limited to, pickup trucks, chippers, gas powered chain saws, hand saws, loppers, shears, pruners, branch trimmers, ladders, tree- climbing equipment, etc. Fuel for equipment shall also be considered incidental to this Item. The crew shall be OSHA certified as line-clearance tree trimmers in order to work within 10 feet of energized power lines and equipment.

Submittals
Prior to start of work, the Contractor shall submit to the Engineer the name, certification number and resume of the Massachusetts Certified Arborist referenced herein. Cost for Certified Arborist for all activities pertaining to this Item shall be incidental to this Item.

Incidental to this Item, the Contractor shall provide to the Engineer one (1) copy of the most current version of the American National Standards Institute (ANSI) Standard Z-133.1 and A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance, Part 1: Pruning. These references shall be kept by the Engineer at his/her office for the length of the Contract.

ITEM 102.2 (Continued)

Prior to start of work, the Contractor shall coordinate with the MassDOT Landscape Design Section, the Electric Utility Company, and the Utility Company with pole set in the field to confirm number, location, and extent of selective tree trimming.

DESCRIPTION OF WORK

Line-clearance Tree Trimming: Shall be defined as the pruning, trimming, repairing, maintaining, removing, or clearing of trees or the cutting of brush that is near (within 10 feet of) energized power lines.

TREE: Shall be defined as having a diameter of 4 inches or over, measured at a point 3 feet above the average ground.

LIMBS AND BRANCHES: Shall be defined as wood having a diameter of ½ inch or over and wood that has a diameter of less than ½ inch shall be considered a TWIG.

A DYING LIMB OR BRANCH: May have live growth at some point but shall be removed if found to be in an unhealthy condition.

While it is not the intent that every dead, dying and/or broken twig be removed from trees requiring trimming, the tree worker will be required to remove all such twigs accessible in the areas of the tree in which he/she is working.

If required by the Engineer, specific trees or parts thereof which are so located that damage may result from dropping shall be reduced by rope or cable lowering.

Tree shaping may be required on trees, where up-branching done under this contract has distorted the natural symmetry of the tree. Tree shaping shall consist of the removal of limbs and branches from other locations of the tree where removal is desirable to restore natural symmetry.

All sucker growth on all tree trunks within the limits of the contract shall be removed from the ground level to the beginning of the main branch system.

All trees, branches, or brush conflicting with utility poles, equipment, overhead wires, and service connections, shall be removed and/or cut back using best practices to satisfy the requirements of all Utilities with an attachment to the pole line.

All branches extending directly below a street luminaire as to limit the light reaching the street or path/sidewalk surfaces shall be removed and all branches shall be cut back to afford a minimum of 5-foot clearance on all sides of the luminaire. The path/sidewalk surface shall be considered as the area from the edge of the roadway surface to the edge of the path/sidewalk surface farthest from the roadway.

ITEM 102.2 (Continued)

By cutting nearly, but not quite, flush with the trunk, limb or branch, the "collar" is left at the top of the wound (in the crotch of the union). This will permit the callus growth to cover the wound in a shorter period.

Basis of Payment
Item 102.2 will be paid for at the contract unit price, Lump Sum. This price shall include all labor, certifications, Arborist, materials, equipment, tools and incidentals required to complete the work.

ITEM 102.3 HERBICIDE TREATMENT OF INVASIVE PLANTS HOUR

This work must be performed by persons who meet the qualifications below and are approved by the Landscape Design Section.

Work under this item consists of herbicide treatment of invasive plants currently existing within the project limits and as directed. An Invasive Plant Management Strategy (IPMS) shall be submitted to the Engineer for review and approval and the IPMS shall be implemented on-site. The IPMS shall be written and submitted per Item 102.33 Invasive Plant Management Strategy and shall be measured and paid for under that Item.

Work under this item shall be coordinated with work and schedule for Selective Clearing, Clearing and Grubbing, Mowing, Tree Removal, Planting, and Wetland Mitigation items.

Payment is per hour on-site and shall be compensation for a minimum crew of 2 licensed applicators, 2 back-pack sprayers and mist-blowers, a properly equipped spray truck with spray hoses, and a tank with sufficient capacity for a full day of work. If there is only one applicator, hourly payment shall be adjusted to 50 percent of the unit price.

Date and time stamped photos indicating start and stop time of work must be submitted if requested.

This item is not intended for manual removal of plants.

Management of plants determined to have been introduced to the site via imported loam, compost, mulch, plants, equipment, or other construction activities will be the Contractor’s responsibility and at the Contractor’s expense.

Herbicide shall be applied during daytime hours only.

Measures to prevent the introduction of invasive plant species to the site and to address introduction due to construction-related activities shall be covered under the Standard Specifications, Division I - Subsections 7.01(D) Plant Pest Control and 7.13 Protection and Restoration of Property as amended in these Special Provisions.

Plant species targeted for management under this item shall be as determined in the field per the site walk and as specified in the IPMS.

ITEM 102.3(Continued)

The definition of invasive plant species shall be as described by Massachusetts Invasive Plant Advisory Group (MIPAG): "non-native species that have spread into native or minimally managed plant systems in Massachusetts, causing economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems."

Control of invasive plants shall begin immediately with the initiation of construction activities and prior to any clearing or site disturbance. Treatment areas shall include stockpile locations and may, upon approval of the Engineer, extend outside the project limit. Treatment shall be done each consecutive year for the duration of the contract unless specified otherwise in the IMPS or unless directed otherwise by the MassDOT invasive species contact. Work shall be done during the growing season from May – October unless otherwise specified in the IPMS.

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: Stephanie.Smoot@dot.state.ma.us.

QUALIFICATIONS

The applicators shall submit and meet the qualifications outlined below. A list of contractors specializing in invasive management and approved by MassDOT Landscape Design Section is available on the following website: https://www.mass.gov/lists/landscape-design-and-roadside-maintenance under Invasive Plant Management.

Requirements

1. Company must provide proof of qualifications by providing the following:
    a. Narrative describing company, its expertise and experience with invasive plant control.
    b. Demonstrate experience with herbicide treatment as part of restorations and in sensitive areas.
    c. Describe company's technical qualifications and past performance.
2. Company must meet licensing requirements:
    a. All crew applicators must have a Massachusetts Commercial Applicator License (CORE).
    b. At least one or more applicator must have a ROW certification, if required for work.
    c. Company must provide name(s) of applicator(s) and Applicator License/Certification number for all contractor crew leaders working on the project.
    d. Company must provide documentation of any warnings, penalties or fines received in the last three (3) years.
3. Company must provide proof of experience with invasive plant control and include following:
    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.

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 and the MassDOT Landscape Architect a completed and signed MassDOT Herbicide Use Report.

Photo Documentation
Digital photos with date and time of herbicide application work, showing start time and completion time, are required and must be submitted for measurement of payment upon request.

MATERIALS

All proposed herbicides shall be as approved in the IPMS. Herbicides shall be labeled for the method of treatment and shall meet all federal, state and local regulation requirements. Application rates will depend on herbicide proposed and shall be per the manufacturer's label for specific application.

METHODS

All methods used shall be as approved in the IPMS which shall be determined during the Initial Site Walk as described under Item 102.33 Invasive Plant Management Strategy.

The Contractor shall be responsible for marking delineated areas and plants to be preserved, removed, or otherwise treated. Fencing or other materials needed for marking and delineating protected areas shall be incidental to this item.

The Contractor shall notify the Engineer a minimum of 3 days prior to date of expected herbicide application. Applicators shall notify the Engineer upon arriving on-site and upon leaving the site.

Herbicide Applications
All herbicide application shall conform to Massachusetts Pesticide Laws and Regulations per the Massachusetts Department of Agricultural Resources (MDAR) Pesticide Bureau.

Mixing, applying and/or disposing of herbicides shall always be in accordance with instructions on their labels and all applicable federal, state, and local regulations. Mixing shall not occur within sensitive areas, wetlands, or buffer zones.

ITEM 102.3(Continued)

Contractor shall not spray 2 hours prior to precipitation, during rain, or during windy conditions. The Contractor shall be responsible for monitoring weather conditions and adjusting the work schedule as appropriate for the herbicide and application method to be used.

Targeted vegetation shall be identified and marked prior to treatment. Plants treated by foliar spray, injection or glove application or other methods that leave standing vegetation, as opposed to cut-stump application, shall remain clearly marked for identification through the contract period.

Desirable vegetation shall be protected from both spray and other physical damage.

Contractor is responsible for any damage to vegetation not designated for removal or treatment. Vegetation damaged shall be restored. Cost of replacement plants and/or restoration shall be borne by the Contractor.

Contractor shall ensure that the public does not enter a work area while herbicide application or spraying is underway.

Disposal of Invasive Plant Material
All material to be cleared shall become the property of the Contractor. The satisfactory disposal of all cleared plant material (seeds, roots, woody vegetation, associated soils, etc.) shall be the Contractor's responsibility.

The Contractor shall take measures to prevent viable plant material from leading to further infestations (seeds, roots, woody material, etc.) while stockpiled, in transit, or at final disposal locations. All precautions shall be taken to avoid contamination of natural landscapes with invasive plants or invasive plant material.

Chipping, shredding, or on-site burning of plant material must be approved by the Engineer and included in the IMPS.

For plant material taken to an incinerating facility per the IPMS, a receipt from that facility shall be submitted to the Engineer as proof of disposal.

Where feasible, it is preferable to dispose of plants on-site or to bury them on-site with on-going monitoring for re-sprouting. Disposal locations and methods must be approved and included in the IPMS. Site work such as grading and seeding to stabilize and restore disposal area shall be incidental to this item.

The Contractor shall be responsible for treating or otherwise managing areas of re-growth due to improper disposal. Treatment shall be at the Contractor's expense.

Follow-Up Treatment
Plants and areas shall be re-treated as necessary and as appropriate to the time of year. Treatment shall be for the duration of the contract and per the IPMS.

ITEM 102.3(Continued)

MEASURE OF SUCCESS

The expectation is a minimum of 85-95 percent control achieved after the first treatment, depending on plants targeted and extent of population, and based on the expectations laid out in the IPMS. The expectation for the contract duration is 95-100% eradication by the end of the treatment period, unless otherwise specified in the IPMS.

Method of Measurement
Item 102.3 will be measured for payment by the Hour of verified crew time spent on the project doing herbicide application as and where specified herein and in the IPMS. A crew shall be defined as a minimum of two licensed applicators each equipped with (at minimum) back-pack sprayer and mist blower. The crew shall also have a properly equipped spray truck with hoses and a tank with sufficient capacity for a full day of work.

Basis of Payment
Item 102.3 will be paid at the contract unit price per Hour, which price shall include all labor, materials, equipment, tools, and all incidentals required to complete the work.

Payment will be based upon verified time spent on the project doing herbicide application as and where specified in the IPMS and upon receipt and approval of submittals. Payment will not include travel time to and from the Contractor's place of business and nor time for investigative field trips.

If there is only one applicator, hourly payment shall be adjusted to 50 percent of the unit price.

The Invasive Plant Management Strategy will be paid for under Item 102.33.

ITEM 102.33 INVASIVE PLANT MANAGEMENT STRATEGY HOUR

This item consists of providing an Invasive Plant Management Strategy (IPMS) for the control of invasive plants currently existing on the project site and/or as directed and shall be coordinated with Item 102.3 Herbicide Treatment of Invasive Plants. Unless otherwise approved, the IPMS shall be submitted in the form of the MassDOT Invasive Plant Management Strategy Report Form.

The IPMS shall be submitted for review and approval by the MassDOT Landscape Design Section or their representative, and the IPMS shall be implemented on-site.

The Invasive Plant Management Strategy Report Form is available online at https://www.mass.gov/lists/landscape-design-and-roadside-maintenance under Invasive Plant Management.

Herbicide treatment for invasive plants shall be as described under Item 102.3 Herbicide Treatment of Invasive Plants and shall be compensated per that Item.

Work under this item shall be coordinated with work and schedule for Selective Clearing, Clearing and Grubbing, Mowing, Tree Removal, Planting, and Wetland Mitigation as relevant to the project.

Individual attending the site walk and determining the Invasive Plant Management Strategy must demonstrate expertise with vegetation management and invasive plant control and submit qualifications as described below.

QUALIFICATIONS

Individual shall be from the same company as that providing services for Item 102.3 Herbicide Treatment of Invasive Plants and shall submit the following, if not submitted under Item 102.3:

- Submit copy of current Core license.
- Submit a resume listing five (5) or more years of experience managing invasive plants with a company specializing in vegetation management.
- References shall be submitted if requested.

SUBMITTALS

Task Summary & Reports
For measurement of payment, the contractor shall submit the total sum and a breakdown of hours for the tasks performed. At a minimum, the tasks shall include the Initial Site Walk, submittal of an approved IPMS, and if requested to accommodate project or site changes, a Follow-up Site Inspection and accompanying IPMS Amendment.

Interim Site Monitoring Reports and/or a Final Report shall be submitted if requested by the MassDOT Landscape Design contact. The MassDOT Landscape Design contact must be notified to attend the site inspection walk when an Interim or Final Report has been requested.

ITEM 102.33(Continued)

Invasive Plant Management Strategy (IPMS)
At least thirty (30) days prior to construction activities and/or any proposed treatment, the contractor shall submit the IPMS for approval by the Engineer and MassDOT Landscape Architect. All chemicals and methods proposed shall be consistent with applicable Massachusetts Wetlands Protection Act Order of Conditions.

The IPMS shall be completed in coordination with the Prime Contractor and the Engineer and shall include the following as appropriate and applicable to the project and to the IPMS Report Form questions and Guidance:

I. Project Information
a. Company writing the IPMS and performing the herbicide application.
b. Date of site walk
c. Attendees at site walk
d. Expected end date of contract and expected last treatment (month/season)

II. Brief Description of Conditions
a. Provide a free-hand sketch on construction plans or aerial image showing species, location, and as relevant, show or note extent of population as relevant to Strategy (i.e., population extends off ROW preventing eradication, small population and eradication deemed feasible within contract schedule, etc.).

III. Coordination with Roadway Contractor regarding other work
a. Tree Work: Note coordination to be implemented with tree removal, clearing, and clearing and grubbing as applicable to the project.
b. Wetland Mitigation - Include management proposed for wetland mitigation areas in the IPMS, if and as required.
c. Planting: If there will be planting in areas proposed for treatment, propose treatment and schedule to avoid herbicide damage to plants.
d. Mowing: If coordination is required with state mowers, note need in IPMS.

IV. Soil Management
a. Provide specifics on how soil with invasive plant roots (in particular) or seeds will be handled (i.e., separate stockpiles, plant material will be buried on-site, re-used on-site, disposed off-site and if so, where?).
b. Show stockpile locations on plan and include treatment schedule.
c. Note measures that will be implemented to avoid spread through equipment, including how and where equipment will be cleaned.

V. Invasive Plant Treatment & Management
a. Proposed chemical and methods of treatment for each species or area.
b. Time of treatment based on target plant species.
c. Submit product label including application methods and rates (entire MSDS information need not be submitted if available online).
d. Proposed performance metrics or measure of treatment success if different from that specified under Item 102.3.
e. Method for disposing invasive plant material. This includes material that may result in spread (i.e., seeds, roots) and material that has been treated and/or is not viable (foliage, dead wood, etc.). Methods may include grinding in place, stockpiling and treating, and incinerating offsite.
f. Expected follow-up treatment for duration of contract.

ITEM 102.33(Continued)

VI. Monitoring Schedule if requested by MassDOT.

Note: The IPMS is critical for identifying pre-construction conditions as well as strategies for minimizing import or spread of invasive plants. Failure to provide an approved IPMS may jeopardize this item, in which case, the contractor will be responsible for management of invasive plants found on-site at no cost to the contract.

Photo Documentation
Digital photos of site conditions, typical species, and extent of infestation must be provided with the IPMS and with any follow-up monitoring or reporting. Photos of follow-up monitoring and reporting must be date and time stamped for acceptance.

METHODS

Initial Site Walk
Digital photos of site conditions, typical species, and extent of infestation must be provided with the IPMS and with any follow-up monitoring or reporting. Photos of follow-up monitoring and reporting must be date and time stamped for acceptance.

IPMS Follow-up Amendment
The IPMS may be amended to address additional concerns or adjust to conditions if required by the MassDOT Landscape Architect. The amended IPMS shall be submitted to the Engineer and MassDOT Landscape Architect for approval at least fourteen (14) days prior to any proposed treatment.

Interim Site Monitoring Inspection Reports
If required by the MassDOT Landscape Architect and Engineer, Interim Site Monitoring and an accompanying report shall be conducted. Interim Reports must include time and date stamped photos showing treated locations and species.

Final Inspection
A final inspection and report documenting the status of the invasive control may be required for regulatory purposes or for instances where control will be continued by others. The report shall include photo documentation of pre-construction (existing) and post-treatment conditions, notations on a plan or aerial image of area treated, summary of treatment performed, and control achieved. Final reports submittal must include time and date stamped photos.

Method of Measurement
Item 102.33 will be measured for payment by the Hour. The basis for measurement shall be per the completion of tasks as approved under the Task Summary submittal and acceptance of submittals and photos described above.

Basis of Payment
Item 102.33 will be paid at the contract unit price per Hour, which price shall include all labor, materials, equipment, tools, and all incidentals required to complete the work. Payment shall not include travel time to and from the Contractor's place of business.

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING EACH

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

Tree protection – armoring and pruning shall be used for instances where construction activity (the use of heavy equipment), comes within proximity to potentially damage tree trunk(s) or limbs.

The work shall include the furnishing and installing of temporary tree trunk protection, minor limb pruning, or removal of lower tree limbs to prevent injury to the tree from construction equipment and activities; as shown on the Drawings; and/or as required by the Engineer.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the latest edition of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance: Part 1-Pruning and Part 5-Construction Management Standard. Provision of reference shall be incidental to this item.

MATERIALS

Trunk armoring shall be such that it prevents damage to the trunk from construction equipment. Material used for trunk armoring or mounting shall be such that installation and removal shall not damage the trunk.

Acceptable trunk armoring materials shall include two by four (2x4) wood cladding, mounted with wire or metal strapping, or when duration of construction activities is less than three months, slotted corrugated plastic pipe, mounted with duct tape. Eight (8) once untreated burlap shall be used to wrap the tree trunk prior to installation of cladding.

Alternative armoring methods or materials may be acceptable if approved by the Engineer.

The height of tree trunk cladding shall be measured from the base of the tree (including root flare) to the bottom of the first branch, or to a height of eight (8) feet, or as may be required by the Engineer.

METHODS OF WORK

Prior to construction activities, the Engineer, Contractor, and the Arborist (if item is included in the contract), shall review trees noted on the Drawings to be protected. Final decision and selection of trees to be armored and/or pruned shall be per the Engineer.

Care shall be taken to avoid damage to the bark during installation and removal of armoring. Trunk armoring shall be maintained such that it is effective for as long as required or replaced when materials are found to be damaged or ineffective, as determined by the Engineer. Replacement, if required, shall be incidental to the work. Armoring shall be removed immediately upon completion of work activities adjacent to the protected tree(s).

ITEM 102.511 (Continued)

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

DAMAGES OR LOSS

If trees designated for protection under this item are damaged, including root damage from unapproved trespassing onto the root zone, the Contractor shall, at his own expense, secure the services of an Arborist, described in Item 102.55. The Arborist shall be approved by MassDOT.

If, based on the recommendation of the Arborist, the Engineer determines that damages can be remedied by corrective measures, such as repairing trunk or limb injury; soil compaction remediation; pruning; soil injection fertilization; and/or watering; the damage shall be repaired as soon as possible, within the appropriate season for such work and according to industry standards.

If, based on the recommendation of the Arborist, the Engineer determines that damages are irreparable, or that the damages are such that the tree is sufficiently compromised to pose a future safety hazard, the tree shall be removed. Tree removal shall include cleanup of all wood, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil. Such tree removal(s), grinding, debris removal, and topsoil filling, shall be at the Contractor's expense.

Tree removal from improper or inadequate tree protection shall result in the Engineer assessing the Contractor monetary damages consistent with industry standards for assessed value and/or replacement.

Method of Measurement and Basis of Payment
Item 102.511 will be measured and paid at the contract unit price per EACH tree to be armored and pruned. This will include full compensation for all labor, equipment, materials, and incidentals for the satisfactory completion of the work and the subsequent removal and satisfactory disposal of the protective materials upon completion of the contract or as required by the Engineer.

Payment for work under this item will be scheduled as follows:

- 40% of the value shall be paid upon installation of trunk armoring and completion of pruning work, if required.
- 60% of the value shall be paid at the end of construction operations that would potentially damage the tree and after protection materials have been removed and properly disposed of by the Contractor. In the event of repairable damages, payment shall be made after the completion of remediation measures.

No separate payment will be made for costs of remedial actions, including Arborist services, tree removal, but all costs in connection therewith shall be included in the Contract unit price bid.

Tree damages assessed, due to lack of or improper tree and plant protective measures being taken, shall be deducted from the contract price of the work.

ITEM 102.521 TREE AND PLANT PROTECTION FENCE FOOT

The work under this Item shall conform to the relevant provisions of Subsections 644 and 771 of the Standard Specifications and the following:

Work under this item shall consist of furnishing, installing, and maintaining tree and plant protection fence(s) in a vertical and taut position; removing and resetting fencing as may be required; and final removal of protection fence(s) at the completion of construction activities, or as otherwise required by the Engineer.

The purpose of the fencing is to signify a construction work-free zone and physical barrier, thereby preventing damage to tree roots, tree trunks, soil, and all other vegetation within this delineated Tree and Plant Protection Zone (TPPZ), as shown on the Drawings, as required by the Engineer, and as described herein.

Protection shall be for the duration of the construction activities unless otherwise required by the Engineer.

MATERIALS

Tree and plant protection fence(s) shall provide a minimum forty-eight (48) inch tall barrier, that remains vertical and taut. The Fence shall be orange plastic safety fence (recommended where high visibility is necessary), or wooden snow fencing, or other approved material. Posts and anchoring materials shall be incidental to the work.

Per requirements of the Engineer, additional posts, deeper post depths, and/or additional attachments shall be used if the fabric or fence sags, leans or otherwise is not providing visible or physical protection to the TPPZ.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance Part 1, Pruning and Part 5, Construction Management Standard. Provision of reference shall be incidental to this item.

ESTABLISHMENT OF THE TPPZ

Fencing shall be used to delineate and establish the TPPZ, adjacent to construction areas, staging areas, stockpile areas, as shown on the Drawings, and/or as required by the Engineer.

Fencing shall be located as close to the work zone limit and as far from tree trunk(s) and plants as possible to maximize the area to be protected. Fence shall run parallel and adjacent to construction activity to create a barrier between the work zone and the root zone or designated limit of plants and soils to be protected.

ITEM 102.521 (Continued)

When construction activities surround (or have the potential to surround) trees or plants to be protected, a circular enclosure shall be used. In these instances, the TPPZ limit shall be the drip line of each tree or as close as possible to the drip line, and/or as shown on the Drawings. The drip line is defined as the outermost limit of tree canopy.

The Contractor shall not engage in any construction activity within the TPPZ without the approval of the Engineer. Activities may including operating, moving, or storing equipment, supplies, or materials; and locating temporary facilities, including trailers or portable toilets, Accessing or traversing the TPPZ shall not be permitted.

METHOD OF WORK

TPPZ fencing shall be installed prior to any construction work or staging activities. Fence(s) shall be repositioned where and as necessary for optimum tree and plant protection. Repositioning shall be incidental to this item. TPPZ fencing shall not be moved without prior approval by the Engineer.

The TPPZ shall be protected at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves, and roots of all plants; and contamination of the soil with construction materials, debris, silt, fuels, oils, and any chemicals substance.

After construction activities are completed, or when required by the Engineer, fencing, stakes, and other anchoring materials, if any, shall be removed and disposed off-site by the Contractor.

REQUIRED WORK WITHIN THE TPPZ

In the event that grading, trenching, utility work, or storage is unavoidable within the TPPZ, the Engineer shall be notified. Measures may be required for tree protection and preservations, including air spading; the use of six (6) inch depth of wood chips or approved matting for root protection; pruning of branches; and/or trunk protection. These protection measures shall be paid under applicable contract items.

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

TREE AND PLANT INJURY OR LOSS

If the TPPZ is encroached by construction activity without approval, at the discretion of the Engineer, the Contractor may be required to provide a more durable barrier (e.g., Jersey Barriers, chain link fence (if not already in use) to secure the area. Costs of furnishing and installing additional or more durable barrier(s) shall be borne by the Contractor.

ITEM 102.521 (Continued)

In such cases of encroachment, soils shall be considered compacted and tree root injury will be assumed. Action shall be taken as specified below.

In the event that trees designated for protection under this item are injured, including root injury from unapproved trespassing onto the root zone, the Contractor shall, at his own expense, secure the services of an Arborist, described under Item 102.55. The Arborist shall be approved by MassDOT.

In the event of spills, compaction or injury, the Contractor shall take corrective action immediately using methods approved by the Engineer, in coordination with the Arborist.

If, based on the recommendations of the Arborist, the Engineer determines that injuries can be remedied by corrective measures, such as repairing trunk or limb injury, soil compaction remediation, pruning, and/or watering; the injury shall be repaired as soon as possible, within the appropriate season for such work, and according to industry standards.

If, based on the recommendations of the Arborist, the Engineer determines that injuries are irreparable, or that the injuries are such that the tree is sufficiently compromised to pose a future safety hazard, the tree shall be removed. Tree removal shall include cleanup of all wood, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil. Such tree removal(s), grinding, debris removal, and filling, shall be at the Contractor's expense.

Tree removal from improper or inadequate protection of the TPPZ shall result in the Engineer assessing the Contractor monetary damages consistent with industry standards for assessed value and/or replacement.

Shrubs removals from improper or inadequate protection of the TPPZ shall be replaced with plants of similar species and equal size or the largest size plants reasonably available. The Engineer shall approve the size, quality, and quantity of the replacement plant(s). Each replacement shall include a minimum of one year of watering and establishment care, specified under Section 771.

Method of Measurement and Basis of Payment
Tree and Plant Protection Fence will be measured by the FOOT, complete in place, by the length along the top of the fence.

Tree and plant protection fence will be paid for under the contract unit price per FOOT, complete in place and shall include all materials, labor, and equipment required to furnish, install, anchor, maintain, and remove the fence upon completion, as described herein. Posts, temporary footings, anchoring and removal upon completion, shall be incidental to this item.

No separate payment will be made for costs of remedial actions, including addition of more durable barriers, Arborist services, tree or plant removal, shrub replacement and establishment, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 102.521 (Continued)

Tree damages assessed, due to lack of or improper tree and plant protective measures being taken, shall be deducted from the contract price of the work.

Payment for work under this item will be scheduled as follows:

- Forty (40) percent of the value payment will be made upon installation of fencing.
- Sixty (60) percent of the value payment will be made when fencing materials have been maintained to function as specified, for the intended duration, and removed and disposed off-site at the completion of protection measure requirement.

ITEM 102.55 ARBORIST HOUR

DESCRIPTION

The work under this Item is for the services of a Certified Arborist. Arborist shall be an International Society of Arboriculture (ISA) Certified Arborist or a Massachusetts Certified Arborist. The Arborist shall have at least 10 years of experience in tree care, including tree protection during construction, and shall demonstrate a familiarity with the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance Part 1Pruning, Part 5 Construction Management Standards, and Part 9 Tree Risk Assessment.

The Arborist's general responsibilities include protecting high priority trees within and adjacent to the project limits, stating areas, and access routes; recommending removal of diseased, damaged or otherwise unhealthy trees that pose a potential safety hazard; evaluating effects of construction on future health of trees close to proposed work; and recommending and/or overseeing tree work amd care.

The Arborist for this item shall not be from the same company as the company responsible for selective clearing or tree removal work.

For projects with multiple phases, projects where construction activities (work or stockpiling) shifts, or when otherwise directed by the Engineer, the Arborist shall re-evaluate conditions and provide follow-up recommendations.

SUBMITTALS

- Contractor shall submit to the Engineer for approval by MassDOT Landscape Design the qualifications and experience of the Arborist. Submittal shall include copy of current certification and a resume summarizing specific construction experience (including relevant MassDOT projects) for a minimum of five projects.
- Arborist's Report documenting recommendations shall be submitted to the Engineer and an electronic copy forwarded to MassDOT Landscape Design Section. Report shall include the following:

ITEM 102.55 (Continued)

SCOPE OF WORK

The Arborist shall be responsible for the following tasks:

- Initial Evaluation and Report
  - recommend and prioritize trees that require removal as appropriate to contract scope, project limits, and project intent;
  - review and modify, if necessary, tree protection measures shown on the drawings
  - review and mark limits of protective fencing for trees and groups of trees to be retained;
  - review and recommend protection measures for high priority trees;
  - submit a marked-up Construction Plan that briefly notes recommendations and decisions made in the field;
  - submit a corresponding report including photo documentation;
- Oversight
  - direct or execute pruning of branches and/or roots, air spading, and/or other tree care operations
- Monitoring and Inspections
  - periodically inspect fencing and ensure root zones are properly protected and clear of equipment and materials as required by the Engineer
  - reevaluate tree protection measures for various phases of a project
  - submit inspection notes with relevant and dated photos to the Engineer.

METHODS

Prior to any work, the Arborist shall walk the site with the Contractor, the Engineer, the Town Tree Warden, and, if specified, the MassDOT Landscape Architect, to review trees, limits of construction activities, and other concerns. Where required for proper assessment of tree impacts, limits of work shall be staked or otherwise marked in the field prior to the site walk.

Trees to be removed shall be painted or otherwise marked.

Trees to be retained shall be marked such that it does not mar or damage the tree and such that marker is not easily removed. As applicable to the work and scope of the project, trees designated for removal or to be retained shall be noted on the plan and/or in the arborist's report and photographed.

Trees designated to remain that are damaged or removed by construction activities shall be noted and photographed for inclusion in inspection reports submitted to the Engineer.

Method of Measurement and Basis of Payment
Item 102.55 will be measured for payment by the Hour of time spent onsite.

Item 102.55 will be paid at the contract unit price per hour upon submittal and acceptance of Reports described above.

ITEM 107.48 PREFORMED JOINT FILLER FOOT

The work to be done under this Item shall include furnishing and placing preformed joint fillers at expansion joints in the concrete retaining walls.

MATERIALS

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

Preformed Expansion Joint Filler M9.14.0
Preformed Bituminous Joint Filler for Concrete M3.05.3

Method of Measurement
Item 107.48 will be measured for payment by the Foot of preformed joint filler furnished and placed.

Basis of Payment
Item 107.48 will be paid for at the Contract unit price per Foot. This price shall include all labor, materials, equipment, and all incidentals required to complete the work.

ITEM 127.1 REINFORCED CONCRETE EXCAVATION CUBIC YARD

The work under this item shall conform to the relevant provisions of Subsections 112, 120, and 140 of the Standard Specifications and the following:

The work shall include excavating, removing and properly disposing of the existing concrete slab under the roadway surface for installation of proposed drainage structures and pipes, curbs, and other proposed work within the project limits.

The Contractor shall sawcut the existing concrete slab before its removal. The sawcut shall be made through any reinforcement within the concrete base slab.

The work shall include the removal of concrete, steel reinforcement/rebar or anything incidental to the removal existing concrete slab as required by the Engineer.

The excavation of concrete sidewalks, island, curb, and driveway will be paid for under Item 120.

Method of Measurement
Item 127.1 will be measured for payment by the Cubic Yard. Measurement will be taken of the in-place dimensions of the concrete prior to excavation and as required by the Engineer.

Basis of Payment
Item 127.1 will be measured for payment at the contract unit price per cubic yard of material excavated and removed. This price shall include all labor, materials, equipment, sawcut, disposal, and incidental costs required to complete the work.

ITEM 153. CONTROLLED DENSITY FILL - EXCAVATABLE CUBIC YARD

The work of this Item shall conform to the relevant provisions of Subsection 150 of the Standard Specifications and the following:

The work includes furnishing and placing controlled density fill in areas where the required compaction is not practicable, and/or as required by the Engineer specifically for backfill, as required, around utilities.

The work shall also consist of furnishing and placing controlled density fill around guardrail block outs located in sidewalks within TL-3 environment per MassDOT Standard Detail E 400.5.1.

Controlled density fill shall meet the requirements of Section M4.08.0 of the Supplemental Specifications for Controlled Density Fill – Type 2E.

Steel plates shall be installed over the trench after placement of the controlled density fill as a temporary means of protecting the trench until the controlled density fill has cured for at least 24 hours. Steel plates shall be pinned to the existing pavement surface in at least one location on all sides. A wedge of temporary hot mix asphalt shall be placed around the entire circumference of the plate if it will be exposed to traffic.

Method of Measurement
Item 153. will be measured for payment by the Cubic Yard, complete in place.

Basis of Payment
Item 153. will be paid for at the contract unit price per cubic yard. This price shall include all labor, materials, equipment, installing and removing steel plates, placing temporary hot mix asphalt, and incidentals required to complete the work.

ITEM 153.5 FLUIDIZED THERMAL BACKFILL CUBIC YARD

The work of this Item shall conform to the relevant provisions of Subsection 150 of the Standard Specifications, Eversource Underground Transmission Line Standards, and the following:

The work shall consist of furnishing and placing fluidized thermal backfill (FTB) in areas where excavation and soils are disturbed adjacent to the Eversource Transmission Duct Bank, and/or as directed by the Engineer and Eversource.

FTB shall meet the requirements of Eversource Underground Transmission Line Standards UTRM234 as included in Appendix B of these Special Provisions. The Contractor shall provide material data sheets for review and approval by the Engineer and Eversource prior to the start of work near the duct bank. The Contractor shall be responsible for all testing requirements listed in UTRM234 and as required by the Engineer and Eversource.

ITEM 153.5 (Continued)

FTB shall be placed in all disturbed areas within 3-feet (minimum) of the Eversource Transmission Duct Bank. The exact limits shall be confirmed with the Engineer and Eversource. FTB is required to be used to backfill around drainage structures near the existing duct bank. FTB is also required for backfill around pipe/conduit crossings under the existing duct bank. A thin layaer of FTB is required over the existing duct bank to provide a leveling course prior to concrete barrier construction as detailed on the Plans.

Steel plates shall be installed over the trench after placement of the FTB as a temporary means of protecting the trench until the FTB has cured for at least 24 hours. Steel plates shall be pinned to the existing pavement surface in at least one location on all sides. A wedge of temporary hot mix asphalt shall be placed around the entire circumference of the plate if it will be exposed to traffic.

Method of Measurement
Item 153.5 will be measured for payment by the Cubic Yard complete in place.

Basis of Payment
Item 153.5 will be paid for at the contract unit price per Cubic Yard. This price shall include all labor, materials, equipment, installing and removing steel plates, testing, placing temporary hot mix asphalt, and incidentals required to complete the work.

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.

ITEM 180.01 (Continued)

Health and safety procedures provided by the Contractor shall comply with all the appropriate regulations that address employee working conditions, including but not limited to standards established by OSHA and National Institute for Occupational Safety and Health (NIOSH). Equipment used for the purpose of health and safety shall be approved by and meet pertinent standards and specifications of the appropriate regulatory agencies.

A copy of the most up-to-date version of the EHASP shall be maintained on-site at all times by the Contractor. The on-site copy shall contain the signature of the Engineer and each on-site employee of the MassDOT, Contractor, and Subcontractors involved with on-site activities. The employee's signature on the EHASP shall be deemed prima facie evidence that the employee has read and understands the plan. Updated copies of signature sheets shall be submitted to the Engineer.

The EHASP shall specify a Contractor Site Safety and Health Officer responsible for implementation of the EHASP and to oversee all construction activities, including handling, storage, sampling and transport, which require contact with or exposure to potentially hazardous materials.

The level of protection, required to ensure the health and safety of on-site personnel will be stipulated in the EHASP. The Site Safety and Health Officer shall implement the EHASP based on changing site and weather conditions, type of operation or activity, chemical compounds identified on-site, concentration of the chemicals, air monitoring data, physical state of the hazardous materials, potential duration of exposure to hazardous materials, dexterity required to perform work, decontamination procedures, necessary personnel and type of equipment to be utilized.

During implementation of the EHASP, a daily log shall be kept by the Site Safety and Health Officer and a copy shall be provided weekly to the Engineer. This log shall be used to record a description of the weather conditions, levels of personal protection being employed, screening data and any other information relevant to on-site environmental safety conditions. The Site Safety and Health Officer shall sign and date the daily log.

Method of Measurement and Basis of Payment

Preparation and implementation of the Environmental Health and Safety Program, including the monitoring, protection and storage of all contaminated materials, as well as subsequent modifications to the EHASP, will be measured and paid for at the Lump Sum Bid Price.

Payment of 50% of the Environmental Health and Safety Program contract price will be made upon the initial acceptance of the EHASP by the Engineer. Payment of the remaining 50% of the Environmental Health and Safety Program contract price will be made upon completion of the work. The bid price shall include preparation and implementation of the EHASP as well as the cost for its enforcement by the Site Safety and Health Officer along with any necessary revisions and updates. The work of implementing the Environmental Health and Safety Program includes work involving, but not limited to, the monitoring, protection, and storage of all contaminated materials.

ITEM 180.02 PERSONAL PROTECTION LEVEL C UPGRADE HOUR

The work shall consist of providing appropriate personal protective equipment (PPE) for all personnel in an area either containing or suspected of containing a hazardous environment.

Contingencies for upgrading the level of protection for on-site workers will be identified in the EHASP and the Contractor shall have the capability to implement the personal protection upgrade in a timely manner. The protective equipment and its use shall be in compliance with the EHASP and all appropriate regulations and/or standards for employee working conditions.

Personal Protection Level C Upgrade will be measured and paid only upon upgrade to Level C and will be at the contract unit price, per hour, per worker, required in Level C personal protection. No payment will be made to the Contractor to provide Level D PPE.

ITEM 180.03 LICENSED SITE PROFESSIONAL SERVICES HOUR

Within limited areas of the project site, media (i.e. soils, sediments, surface water and/or groundwater) requiring evaluation and/or management under the Massachusetts Contingency Plan (MCP) may be encountered. A Licensed Site Professional (LSP) shall be required to provide the services necessary to comply with the requirements of the MCP. These services may include a site walk, field screening, sampling, analysis and characterization of potentially contaminated media, preparation and implementation of Immediate Response Action (IRA) Plans, Utility-Related Abatement Measure (URAM) and Release Abatement Measure (RAM) Plans, Imminent Hazard Evaluations, status reports, transmittal forms, release notification forms, risk assessments, completion statements, and related documents required pursuant to the MCP. LSP services shall also be necessary to temporarily move material generated on the project to an off-site storage location.

The name and qualifications of the LSP and all environmental technicians to be assigned to the project shall be submitted to the Engineer for approval at least four weeks prior to initial site activities. The LSP shall have a current, valid license issued by the Massachusetts Board of Registration of Hazardous Waste Site Cleanup Professionals. The LSP shall have significant experience in the oversight of MCP activities at active construction sites. Qualification packages for the LSP and each technician shall include a resume, all recent work assignments with responsibilities identified (previous 5 years), and applicable training and certifications. A list of all Notices of Noncompliance, Notice of Audit Findings and Enforcement Orders issued by the Massachusetts Department of Environmental Protection (DEP) shall be submitted for all work assignments listed for the LSP and environmental technicians. Upon approval of the LSP Qualifications, the LSP will be designated as the LSP of Record unless MassDOT designates in writing otherwise. The LSP of Record will serve as the primary point of contact for all hazardous material matters on the project.

ITEM 180.03 (Continued)

The LSP shall evaluate soil and/or sediment with discoloration, odor, elevated field screening results, presence of petroleum liquid or sheen on the groundwater surface, or any abnormal gas or materials in the ground which are known or suspected to be oil or hazardous materials. Excavated soil and sediment which is suspected of petroleum contamination shall be field screened using the jar headspace procedures according to established DEP Guidance. All field screening equipment must be pre-approved by the Engineer. The LSP shall ensure proper on-site calibration of all field screening instrumentation.

The Engineer shall be contacted immediately when observations or any field screening results verify contamination requiring further analysis, and/or enhanced management of suspect media. Any enhanced management of contaminated soil to ensure proper stockpiling and storage is incidental to the LSP Services item. The LSP shall evaluate the need for confirmatory sampling prior to backfill in areas where contaminated material has been excavated and disposed off-site for compliance with applicable regulatory requirements. The Engineer shall approve the locations of the testing sites prior to the sampling.

Contaminated media shall be handled in accordance with all applicable state and federal statutes, regulations, and policies. The LSP shall adequately evaluate contaminated media for compliance with the requirements of the MCP and Department Policies.

The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations and both shall be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations. The LSP shall maintain written records in a clear and concise tabular format which tracks the excavation, stockpiling, analysis and reuse/disposal of all known/suspect contaminated media. These records shall be up-to-date and submitted to the Engineer on a bi-weekly basis. The LSP shall review and summarize the laboratory data from any analyses performed on contaminated media in a tabular format and compare the results to applicable reporting thresholds. A report shall be delivered to the Engineer outlining the material sampling methods, laboratory analysis results, evaluation of applicable regulatory exemptions, reporting obligations, and proposed course of action. The laboratory report together with Chain of Custody forms for all analytical results shall be submitted to the Engineer within 14 days after completion of such analyses.

The LSP and Contractor shall be held responsible for the submission of all MCP-related documents to the Engineer at least 14 days in advance of any timeframe specified in the MCP and for the timely submission of data and tracking information as noted within this Item. All documents prepared under this Item must be reviewed and signed by the approved LSP. The Contractor and LSP shall be responsible for all fines, damages, and enforcement requirements imposed by applicable regulatory agencies for failure to meet regulatory and contract timeframes. No compensation will be provided for such fines, damages, and enforcement actions.

ITEM 180.03 (Continued)

The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations and shall both be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations.

If the Contractor causes a release of OHM, the Contractor shall be responsible for assessing and remediating the release in accordance with all pertinent State and Federal regulations, including securing the services of a LSP, at his own expense.

The LSP shall coordinate all activities involving both MassDOT and the DEP through the Engineer. Any notification of release shall be approved by the Engineer before submittal to the DEP, except if an imminent hazard condition exists as defined in 309 CMR 4.03(4)(b).

LABORATORY TESTING IN SUPPORT OF LSP SERVICES

Laboratory testing provides for analytical testing in support of LSP services related to maintaining MCP compliance, such as delineating the extent and type of contamination present. Sampling and testing for disposal purposes are not included and are incidental to Items 181.11-181.14.

In order to maintain compliance with the MCP and Department Policies or other regulatory requirements, the LSP shall request approval from the Engineer to obtain samples from various locations and depths within the project area and to perform laboratory analyses on those samples. No sampling shall be conducted without prior approval from the Engineer. The samples shall be delivered to a DEP-certified laboratory using proper chain-of-custody documentation for analyses which, depending upon site conditions and suspected and/or identified contaminants of concern, may include, but are not limited to, metals, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polycyclic aromatic hydrocarbons (PAHs), extractable petroleum hydrocarbons (EPHs) and volatile petroleum hydrocarbons (VPHs). Subsequent testing, depending upon initial results, may be required for Toxicity Characteristic Leaching Procedure (TCLP) analyses (EPA Method 1311) for metals.

Method of Measurement and Basis of Payment
LSP Services for work under this item will be measured per person, per hour of service provided by LSP, Environmental Technicians and other approved personnel. Travel time shall not be included in the billable hours.

The quantity and type of laboratory tests must be approved by the Engineer beforehand. The Contractor will be reimbursed upon satisfactory written evidence of payment. The Contractor may be required to obtain cost estimates from three DEP certified laboratories for the Engineer to choose the service provider.

ITEM 180.03 (Continued)

LSP Services will be paid at the Contractor bid price for each hour, or fraction thereof, spent to perform the work as described above. The bid price shall be a blended rate that includes the cost of the LSP, environmental technicians and other personnel, the performance of all work tasks and field screening, including required equipment, materials and instrumentation, and production of all documentation described above. All requests for payment must be accompanied by the following information: the names of the personnel associated with the work charged under LSP Services, dates and hours worked, work conducted, including, where appropriate, locations as identified on the construction plans, and a copy of the field diary for the dates submitted.

Laboratory testing will be reimbursed upon receipt of paid invoices for testing approved by the Engineer.

This item is for LSP work for compliance with the MCP and Department Policies. LSP hours and any laboratory testing related to off-site disposal of excess soil and sediment is incidental to Items 181.11-181.14 (including, but not limited to, disposal characterization, disposal package preparation, landfill acceptance, shipment paperwork preparation, field screening, and tracking). LSP hours for groundwater management (including characterization, obtaining off-site discharge permits, compliance testing, etc.) is incidental to Item 183.1.

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

The work under these Items shall include the transportation and disposal of contaminated material excavated, or excavated and stockpiled. It shall also include the cost of any additional laboratory analyses required by a particular disposal facility beyond the standard disposal test set.

Excavation of existing subsurface materials may include the excavation of contaminated soils. The Contractor shall be responsible for the proper coordination of characterization, transport and disposal, recycling or reuse of contaminated soils. Disposal, recycling or reuse will be referred to as "disposal" for the purposes of this specification. However, regardless of the use of the term herein, there will be no compensation under these items for reuse within the project limits. The Contractor will be responsible for coordinating the activities 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.

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.

ITEMS 181.11 through **181.14** (Continued)

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.

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.

ITEMS 181.11 through **181.14** (Continued)

All material transported off-site shall be loaded by the Contractor into properly licensed and permitted vehicles and transported directly to the selected disposal or recycling facility and be accompanied by the applicable shipping paper. At a minimum, truck bodies 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.

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 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.

ITEMS 181.11 through **181.14** (Continued)

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.

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.

ITEMS 181.11 through **181.14** (Continued)

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.

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.

ITEMS 181.11 through **181.14** (Continued)

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.

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 182.1 INSPECTION AND TESTING FOR ASBESTOS LUMP SUM

The work shall include the inspecting and testing of all materials suspected of containing asbestos. When any demolition is required to enable the inspection and testing of the suspected material it will be considered incidental to this Item and the Contractor must perform all asbestos handling and testing in accordance with the regulations stated below.

Dust suppression in the form of light water sprays, foams, dust suppressants and calcium chloride will be implemented as required to control dusting during any disturbance of asbestos suspected material. Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions, which in the opinion of the Health and Safety Plan (HASP) may pose a safety hazard to the workers.

The Contractor shall employ the services of a Massachusetts licensed "Asbestos Inspector" to inspect the material to determine whether or not "ITEM 182.2 REMOVAL OF ASBESTOS" is required. Should the asbestos inspector determine laboratory testing is required, a state certified laboratory shall be used to perform all necessary tests.

ITEM 182.1 (Continued)

REGULATIONS

U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:

29 CFR 1910 Section 1001 and 29 CFR 1926 Section 58 Occupational exposure to Asbestos, Tremolite, Anthophyllite and Actinolite, Final Rule

29 CFR 1910 Section 134 Respiration Protection

29 CFR 1926 Construction Industry

29 CFR 1910 Section 2 Access to Employee Exposure and Medical Records

29 CFR 1910 Section 1200 Hazard Communication

29 CFR 1910 Section 145 Specifications for Accident Prevention Signs and Tags

U.S. Environmental Protection Agency, (EPA) including but not limited to:

40 CFR 762, CPTS 62044, FRL 2843-9, Federal Register Vol. 50 no.134, July 12, 1985 p.28530 - 28540 Asbestos Abatement Projects Rule

40 CFR 61 Subpart A Regulation for Asbestos

40 CFR 61 Subpart M (Revised Subpart B) National Emission Standard for Asbestos

U.S. Department of Transportation 49 CFR 172 and 173

Massachusetts Department of Labor Standards Regulations, (DLS) including but not limited to:

454 CMR 28.00 Removal, Containment and Encapsulation of Asbestos

Massachusetts Department of Environmental Protection (DEP) including but not limited to (supplementing subsection 7.01):

310 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise, Section 7.15 Air Pollution Control Regulations

310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

Local Requirements including but not limited to those of Health Departments, Fire Departments and Inspection Services Departments

Wherever there is a conflict or overlap of the above references, the most stringent provision shall apply.

Basis of Payment

Item 182.1 will be paid for at the Contract unit price per Lump Sum, which price shall include all labor, materials, tools, equipment, and all incidental costs required to complete the work as described and as required by the Engineer.

No separate payment will be made for the protection of general public, private property, the proper inspecting and testing of the material, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 182.2 REMOVAL OF ASBESTOS FOOT

The work shall include the removal and satisfactory disposal of existing asbestos. The Contractor's attention is directed to the fact that existing asbestos shall be inspected and tested prior to removal, to determine if special removal and disposal is required. The Contractor shall follow all the rules and regulations stated in "ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS". If asbestos is present, the Contractor shall follow all the rules and regulations stated in the section "REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS", under this item. The Contractor should notify and coordinate his/her efforts with the proper utility accordingly.

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

This section specifies the requirements for the handling and removal of asbestos containing material. The Contractor must perform all asbestos handling and removal work in accordance with these specifications and the following additional requirements.

U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:

29 CFR 1910 Section 1001 and 29 CFR 1926 Section 58
Occupational exposure to Asbestos, Tremolite, Anthophyllite and Actinolite, Final Rule
29 CFR 1910 Section 134 Respiration Protection
29 CFR 1926 Construction Industry
29 CFR 1910 Section 2 Access to Employee Exposure and Medical Records
29 CFR 1910 Section 1200 Hazard Communication
29 CFR 1910 Section 145 Specifications for Accident Prevention Signs and Tags

U.S. Environmental Protection Agency, (EPA) including but not limited to:

40 CFR 762, CPTS 62044, FRL 2843-9, Federal Register Vol. 50 no.134, July 12, 1985 p.28530 - 28540 Asbestos Abatement Projects Rule
40 CFR 61 Subpart A Regulation for Asbestos
40 CFR 61 Subpart M (Revised Subpart B) National Emission Standard for Asbestos

ITEM 182.2 (Continued)

U.S. Department of Transportation 49 CFR 172 and 173

Massachusetts Department of Labor Standards, (DLS) including but not limited to:

454 CMR 28.00 Removal, Containment and Encapsulation of Asbestos

Massachusetts Department of Environmental Protection (DEP) including but not limited to (supplementing subsection 7.01):

310 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise, Section 7.15 Air Pollution Control Regulations
310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

Local Requirements including but not limited to those of Health Departments, Fire Departments and Inspection Services Departments

Wherever there is a conflict or overlap of the above references, the most stringent provision shall apply.

All asbestos material shall be removed and properly disposed of by a contractor or subcontractor with a current Massachusetts Abatement Contractors License issued by the Department of Labor Standards. Work shall be supervised by a competent person as required by OSHA in 29 CFR 1926 to ensure regulatory compliance. This person must have completed a course at an EPA Training Center or equivalent course in asbestos abatement procedures, have had a minimum of four years on-the-job training and meet any additional requirements set forth in 29 CFR 1926 for a Competent Person. This person must also be certified by the Commonwealth as an Asbestos Supervisor and Asbestos Project Designer as required by 454 CMR 28.00.

Asbestos removal work shall be coordinated with all other work under the contract and shall be completed prior to performing any activities which could disturb the asbestos material or produce airborne asbestos fibers.

Dust suppression in the form of light water sprays, foams, dust suppressants and calcium chloride will be implemented as required to control dusting during trenching and excavation. Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions, which in the opinion of the Health and Safety Plan (HASP) may pose a safety hazard to the workers.

ITEM 182.2 (Continued)

NOTIFICATION AND PERMITS

The Contractor shall prepare a formal pre-notification form at least ten (10) days prior to the start of asbestos removal work. This form must be submitted to the appropriate Regional Office of the Massachusetts Department of Environmental Protection and to the U.S. Environmental Protection Agency Region I Air and Hazardous Material Division. A copy of the submitted forms must be provided to the Engineer and kept at the work site.

Prior to starting any work, the Contractor shall also obtain any required asbestos removal permit(s) from the city/town. A copy of the permit(s) must be provided to the Engineer and posted at the work site.

The Contractor shall also obtain and pay all other applicable asbestos waste transportation and disposal permits, licenses and fees.

STANDARD OPERATING PROCEDURES

The standard operating procedure shall ensure the following:

1. Proper site security including posting of warning signs and restricting access to prevent unauthorized entry into the work spaces.

2. Proper protective clothing and respiratory protection prior to entering the work spaces.

3. Safe work practices including provisions for communications; exclusion of eating, drinking, smoking, or use of procedures or equipment that would in any way reduce the effectiveness of respiratory protection or other engineering controls.

4. Proper exit practices from the work space though the showering and decontamination facilities.

5. Removing asbestos containing material in ways that minimize release of fibers.

6. Packing, labeling, loading, transporting and disposing of contaminated material in a way that minimizes or prevents exposure and contamination.

7. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.

8. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces and entanglements in loose hoses and equipment.

9. Provisions for effective supervision and OSHA - specified personnel air monitoring for exposure during work.

ITEM 182.2 (Continued)

REQUIRED SUBMITTALS

The Contractor shall submit to the Engineer the following listed items at least ten (10) calendar days prior to the start of asbestos work. No asbestos removal work activities shall commence until these items are reviewed by the Engineer, unless otherwise waived. Submittals shall be clearly labeled and in sufficient detail to enable the Engineer to form an opinion as to its conformity to the specifications.

1. Name, experience and DLS certification of proposed Supervisors and Foreman responsible for asbestos work.

2. Summary of workforce by disciplines and a notarized statement documenting that all proposed workers, by name, have received all required medical exams and have been properly trained and certified for asbestos removal work, respirator use and appropriate Massachusetts DLS, EPA and OSHA standards.

3. Notarized statement that workers are physically fit and able to wear and use the type of respiratory protection proposed for the project. Notarized certification signed by an officer of the abatement contracting firm that exposure measurements, medical surveillance and worker training records are being kept in conformance with 29 CFR 1926.

4. Written plan of action and standard operating procedures (HASP) to include: location and layout of decontamination areas; sequencing of asbestos work; detailed schedule of work activities by date and interface with other project activities which affect work performance; methods used to assure safety and security; worker protection and exposure monitoring; contingency and emergency evacuation procedures; detailed description of methods to be employed to control pollution; waste handling procedures.

5. Written respiratory protection program specifying level of protection intended for each operation required by the project and details of daily inspection and maintenance elements.

6. Copies of the U.S. EPA, State and local asbestos removal pre-notification forms. If applicable, lists and copies of all permits, licenses, or manifests which will be applied for and used.

7. Name, location and applicable approval certificates for primary and secondary landfill for disposal of asbestos-containing or asbestos contaminated waste. Name, address and licenses number(s) of hauler permitted to transport waste. (Submit copies of completed manifests upon disposal).

The Contractor must provide copies of daily inspection and record logs upon request of the Engineer, at any time during project. This information will include but is not limited to work area entry data, respirator inspections and maintenance, HEPA-exhaust inspections and maintenance and other work applicable activities or reports of accidents or unusual events.

ITEM 182.2 (Continued)

Method of Measurement
ITEM 182.2 will be measured for payment by the Foot for the complete removal and disposal of the asbestos containing material.

Basis of Payment
Item 182.2 will be paid for at the Contract unit price per Foot, which price shall include all labor, materials, tools, equipment, and all incidental costs required to complete the work specified above and as required by the Engineer.

No separate payment will be made for the protection of general public, private property, the proper inspecting and testing of the material, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 195. GROUND MONITORING SURVEY LUMP SUM

The work under this item shall conform to the relevant provisions of Subsection 190 of the Standard Specifications and the following:

The work shall include the preparation of a photographic and/or video log; field survey; furnishing, installing, monitoring, reporting data from and maintaining settlement monitoring points; and replacing damaged, malfunctioning, or worn-out equipment and materials.

The work also includes additional instrumentation and data collection that the Contractor deems necessary to ensure the safety of personnel and the Work. The Contractor shall implement required remedial or modified construction operations and precautionary measures based on the instrumentation data.

The Contractor shall comply with any Right of Entry agreements when installing the proposed monitoring equipment.

Purpose of Program
Purpose of the instrumentation and monitoring program include, but are not limited to, providing:

1. Pre-construction baseline data for comparison with construction and post-construction data.
2. Monitoring of the following building and structures during and after construction, to determine whether they have been adversely affected by construction activities:
    a. 198 Washington Street, existing “A.A. WILL MATERIALS” building. Tan colored building with covered porch located immediately adjacent to the proposed Wall 1, and hereby referred to as Structure #1;
    b. 198 Washington Street, existing paver and patio areas to remain, located directly to the north of Structure #1 and immediately adjacent to the proposed Wall 1;

ITEM 195. (Continued)

c. 198 Washington Street, existing concrete block wall to partially remain, located along the entrance driveway to the property, directly to the north of the existing paver and patio areas, and immediately adjacent to the proposed Wall 1, and hereby referred to as Structure #2;

d. 198 Washington Street, existing steel billboard / sign for "A.A. WILL MATERIALS.COM" located directly behind the concrete block wall and immediately adjacent to the proposed Wall 1, and hereby referred to as Structure #3.

3. A forewarning of unforeseen conditions that may require remedial or precautionary measures.

Responsibilities of the Contractor

A. Install, monitor, and report data from all instruments specified herein. Data shall be reviewed daily during the installation and removal of the temporary earth support and weekly while the temporary earth support is in place throughout excavation and construction phases of the proposed walls.

B. Protect from damage and maintain instruments installed by the Contractor. Repair or replace damaged or inoperative instruments at no additional cost to MassDOT.

C. Furnish and install eleven (11) settlement/deformation points at all locations identified in table below.

Structure Number	Instrument Number	Instrument Location
Structure #1	DMP1	Southwest Corner of Covered Porch
Structure #1	DMP2	Northwest Corner of Covered Porch
Structure #1	DMP3	Top of Stairs on West Side of Covered Porch
Structure #1	DMP4	West End of Stairs on South Side of Covered Porch
Patio/Pavers	DMP5	Southwest Corner of Paver/Patio Area to remain
Patio/Pavers	DMP6	Northwest Corner of Paver/Patio Area to remain
Patio/Pavers	DMP7	Northeast Corner of Paver/Patio Area to remain
Structure #2	DMP8	West end of Portion of Concrete Block Wall to remain
Structure #2	DMP9	East end of Concrete Block Wall
Structure #3	DMP10	West support of billboard
Structure #3	DMP11	East support of billboard

ITEM 195. (Continued)

D. Prepare a pre and post construction survey report identifying any visible cracks, defects, distortion, settlement, and other signs of distress both inside and on the outside of each of the structures to the greatest extent possible.

E. Perform a pre and post construction video survey of the inside of Structure #1.

F. Implement response actions and revised construction operations.

G. Prepare a pre and post construction instrumentation report containing project summary of the monitoring approach and results with an instrument and monitoring point location plan, including photographs, monitoring equipment, vertical monitoring records, revised construction operations, and other pertinent information that may have relevance to the property.

H. Repair all damage that occur to the structures as a result of the Contractor's actions or vibrations in excess of specified thresholds to the satisfaction of the Engineer and owner of the structures with no additional cost to the Commonwealth of Massachusetts.

Qualifications of Contractor's Instrumentation Personnel

A. Instrumentation work involves highly specialized tasks. The Contractor's instrumentation personnel who are responsible for furnishing and installing all instrumentation; maintaining instrumentation as required; and monitoring, reporting and interpreting data; shall have the qualifications specified herein.

B. The Contractor's instrumentation personnel shall include a Supervisor who will be in responsible charge during the Monitoring Program. The Supervisor shall have prior field experience in installation and monitoring of the types of instrumentation specified herein and shall have supervised instrumentation programs of similar magnitude in similar subsurface conditions.

- The Supervisor shall:
  a. Be on site and supervise all instrument installations, and pre-installation and post-installation acceptance tests.
  b. Demonstrate competence with the equipment proposed for the project.
  c. Supervise data collection, reduction, plotting, and reporting, except for survey data.
  d. Interpret data and make recommendations to construction operations.

C. The person in responsible charge of the surveyors shall be a Registered Land Surveyor in the Commonwealth of Massachusetts with experience in measurements of the types and accuracies specified herein. The field survey party chief shall also have experience in survey measurements of the types and accuracies specified herein.

D. The Contractor's instrumentation personnel including the Superintendent, Registered Land Surveyor, field survey party chief, and all other field and office personnel shall be subject to the approval of the Engineer.

ITEM 195. (Continued)

MATERIALS

A. All material shall be new.

B. Whenever any product is specified by brand name and model number, such specifications shall be deemed to be used for the purpose of establishing a standard of quality and facilitating the description of the product desired. The term "acceptable equivalent" shall be understood to indicate that the "acceptable equivalent" product is the same or better than the product named in the specifications in function, performance, reliability, quality, and general configuration. This procedure is not to be construed as eliminating from competition other suitable products of equal quality by other manufacturers. The Contractor may, in such cases, submit complete comparative data to the Engineer for consideration of another product Substitute products shall not be ordered, delivered to the site, or used in the Work unless accepted by the Engineer in writing. The Engineer will be the sole judge of the suitability and equivalency of the proposed substitution.

C. Any request from the Contractor for consideration of a substitution shall clearly state the nature of the deviation from the product specified.

D. The Contractor shall provide Contractor's own readout units as needed for making pre-installation and post-installation acceptance tests, and for taking readings during construction as specified herein.

E. The Contractor shall furnish all installation tools, materials, and miscellaneous instrumentation components.

SURVEYING UNIT AND SURVEY MONITORING POINTS

The optical level or total station unit used for building settlement monitoring shall provide an accuracy of 0.005 foot (1/16 inch) or better. Readings shall be repeatable within 0.005 feet (1/16 inch). Settlement monitoring points shall be reflective prisms suitable for use with the total station unit or optical scales graduated in units of 0.005 feet (1/16 inch).

CONSTRUCTION METHODS

Pre-Construction Survey
The Contractor shall retain and pay an experienced Professional Engineer registered in the Commonwealth of Massachusetts to perform a pre-construction survey of the structures to document the existing condition of the structures prior to start of construction activities.

This survey, as a minimum, shall locate, measure, photograph and otherwise document any visible cracks, defects, distortion, settlement, and other signs of distress both inside and on the outside of each of the structures to the greatest extent possible.

The product shall be an original written report stamped and signed by the Professional Engineer performing the survey and four (4) copies, including photographs, CD's, plans, sketches and attachments, which shall be submitted to the Engineer a minimum of five (5) days prior to commencement of any construction activity.

ITEM 195. (Continued)

The report shall also include a video survey of the interior Structure #1. Copies of the report shall be distributed to the MassDOT Engineer and the structures' owner.

Settlement Surveying

The Contractor shall establish a minimum of eleven (11) deformation monitoring points as identified in the previous table and as shown on the figure at the end of this section. Survey points shall be located at approximately equivalent intervals along the face of the buildings.

The survey points shall be attached using masonry anchors or other methods that provide a secure and stable attachment.

Settlement surveys shall be referenced to the project benchmark to be provided by the Department and maintained by the Contractor in accordance with Subsection 5.07.

The Contractor shall perform a minimum of three (3) initial surveys of the settlement points prior to start of any construction activities within 50 feet of the building. During periods of installation and removal of temporary earth support systems within 50 feet of a structure settlement surveys shall be taken by the Contractor at least once per day. During periods when any construction activities are occurring within 50 feet of a structure and when the excavation for the walls is open, settlement surveys shall be taken by the Contractor at least once per week as long as the total measured settlement is less than the threshold value. If the measured settlement exceeds the threshold value, the frequency of the settlement survey shall be a minimum of twice per week.

Survey measurements shall be submitted to the Engineer within 24 hours after the survey is taken. The survey report shall highlight any survey point and data that exceed the threshold value.

If any settlement point measurement exceeds the threshold value, the Contractor shall immediately evaluate the cause of the settlement. Based on the evaluation, the Contractor shall submit to the Engineer within five (5) days a proposed plan of action to modify the construction procedures so that the settlement will not exceed the limiting value during the completion of construction.

If any settlement point measurement exceeds the limiting value, the Contractor shall immediately stop work in the vicinity of the building and further evaluate the cause of the settlement. Based on the evaluation, the Contractor shall submit to the Engineer within five (5) days a proposed plan of action to modify the construction procedures so that any additional settlement will be prevented or minimized during the completion of construction.

The response values for vertical movement at all settlement/deformation points located on existing building faces and retaining walls are as follows:

Threshold Value:	0.25 inches (1/4 inch)
Limiting Value:	0.50 inches (1/2 inch)

ITEM 195. (Continued)

The response values for horizontal movement at all settlement/deformation points located on existing building faces and retaining walls are as follows:

Threshold Value:	0.25 inches (1/4 inch)
Limiting Value:	0.50 inches (1/2 inch)

Post-Construction Survey
The Contractor shall retain and pay an experienced Professional Engineer registered in the Commonwealth of Massachusetts to perform a post-construction survey of the structures to document the condition of the structures prior to the completion of construction activities.

The purpose of the post-construction survey is to document any changes in the structures condition that may have occurred during the construction period.

This survey, as a minimum, shall locate, measure, photograph and otherwise document any visible cracks, defects, distortion, settlement, and other signs of distress both inside and on the outside each of the structures, including the post-construction condition of items noted during the pre-construction survey to the greatest extent possible.

The product shall be an original written report stamped and signed by the Engineer performing the survey and four (4) copies, including photographs, CD's, plans, sketches and attachments, which shall be submitted to the Engineer no later than two weeks after removal of the temporary earth support.

The report shall also include a video survey of the interior of Structure #1. Copies of the report shall be distributed to the MassDOT Engineer and the structures' owner.

SUBMITTALS

A. Within 4 weeks after Notice to Proceed, submit manufacturers' product data describing all specified instruments to the Engineer for review, including requests for substitutions, if any, together with product data and instruction manuals for requested substitutions. Submit all specified instruments and proposed locations as a single submittal package.

B. Within 2 weeks after Notice to Proceed, submit to the Engineer for review:
   - Resumes of Superintendent, Registered Land Surveyor and field survey party chief, sufficient to define details of relevant site experience.
   - Resumes of other field and office instrumentation personnel to be assigned to the project, other than clerical staff.

C. At least 21 days prior to commencing installation of the first monitoring device, submit to the Engineer for review the following items pertaining to that instrument type:
   - Detailed step-by-step procedure for installation, together with a sample installation record sheet. The procedures shall be bound and shall include:
     a. Method of conducting post-installation acceptance test
     b. Daily/Weekly data report format

ITEM 195. (Continued)

c. A schedule showing the proposed monitoring and reporting frequencies for all monitoring identified for the structures

- Detailed step-by-step procedures for conducting all optical survey measurements to the specified accuracies, including types of surveying instruments, all as specified herein, and data reduction procedures. The manufacturer's stated accuracy and the field procedures such that the resulting accuracies at a 95 percent level of confidence.

D. The Contractor shall submit to the Engineer for review, generalized plans of actions to be implemented in the event that any Threshold Value is obtained. The Threshold Value of 1/4-inch of differential settlement is to be used on this project. The generalized plans of action shall be positive measures by the Contractor to do any or all of the following as applicable:

- Control vibrations
- Maintain the structural integrity of adjacent structures

E. Pre-Construction Instrumentation Report. Report to contain all approved products, monitoring location figures, monitoring procedures and schedule, photographs, and draft data collection forms.

F. Pre-Construction Survey Report. Report shall be prepared and contain all information as required by Construction Methods section of this specification.

G. Post-Construction Instrumentation Report. Report to contain a project summary, the data obtained during construction and any pertinent photographs.

H. Post-Construction Survey Report. Report shall be prepared and contain all information as required by Construction Methods section of this specification.

Basis of Payment

Item 195. will be paid for at the Contract unit price, Lump Sum. This price shall include all labor, materials, equipment and incidental costs required to complete the work.

Partial payment shall be made upon the following percentages:

- 50% upon completion of the pre- construction survey, installation of the monitoring points and approval by the Engineer.
- 25% in equal monthly amounts based on the anticipated schedule of monitoring in accordance with the Contractor's approved schedule.
- 25% will be paid upon satisfactory completion of the post-construction survey, removal of all instrumentation and Engineer's acceptance of final report.

ITEM 201. CATCH BASIN EACH
ITEM 202. MANHOLE EACH

The work under these items shall conform to the relevant provisions of Subsection 201 of the Standard Specifications and the following.

All drainage castings in new pavement areas shall be installed at base or binder course grade and reset to proposed finish surface grade prior to placement of the pavement surface course, as required by the Engineer.

Excavation and backfill shall be included in the cost of the structure.

The top conical sections of manholes and catch basins may need to be replaced with flat top or offset sections as determined by actual field conditions. No additional cost for the use of flat top drainage structures will be accepted.

All frames shall be set in a concrete collar conforming to Standard Detail 202.9.0 prior to placement of top course. All frames shall be set on a minimum of two courses of mortared brick as specified in the Standard Specifications. Cost of such work shall be included in the cost of the structure or item of which it forms a part.

Where new catch basins or manholes are shown on the drawings to be constructed over existing pipes, the work shall also include the connecting of the pipe to the structures and the necessary cutting and removal of the existing pipe within the structures. The existing pipe shall be neatly cut to provide a smooth uniform face flush with the inside wall surface of the structure and totally removed or neatly cut longitudinally and partially removed to retain the lower half of the existing pipe barrel to form the required (manhole) shaped invert.

All proposed catch basins shall be constructed with a minimum 4-foot sump.

Catch Basins
Catch basins shall have an inside diameter of 4 feet. Catch basins shall have a minimum sump of 4 feet measured from the bottom of invert.

Manholes
Manholes shall have an inside diameter of 4 feet. Manholes shall be constructed with a minimum concrete compressive strength of 4,000 PSI.

No separate payment will be made for the cost of connecting new pipes into existing structures, or necessary alterations of existing structure, but all costs in connection therewith shall be included in the unit prices bid for the various pipe items.

All existing pipes to be abandoned shall be plugged with brick masonry in conformance with the Standard Specifications, Subsection 201.62. The cost will be incidental to Contract bid Item that requires masonry plug work.

ITEM 201. and **ITEM 202.** (Continued)

Method of Measurement
Item 201. and Item 202. will be measured for payment respectfully by the Each complete and in place structure as a single unit regardless of depth.

Basis of Payment
Item 201. and Item 202. will be paid for at the respective contract unit price per Each. This price shall include all labor, materials, equipment, sawcutting pavement, and incidentals required to complete the work.

Crushed stone to create a suitable foundation, will be paid under Item 156.

Catch Basin frame and grate, manhole frame and cover will be paid under Items 221, 221.1, and 222.1.

ITEM 204.11 GUTTER INLET - SPECIAL EACH

The work under this item shall conform to the relevant provisions of Subsection 201 of the Standard Specifications and the following.

All castings located within the pavement area shall not be set to finished grade until after the binder course has been placed.

Special gutter inlet shall be precast concrete structure with requirement indicated on the Contract Drawings.

All frames shall be set in a concrete collar conforming to Standard Detail 202.9.0 prior to placement of top course.

All frames shall be set on a minimum of two courses of mortared brick as specified in the Standard Specifications. Cost of such work shall be included in the cost of the structure or item of which it forms a part.

If this item is proposed over the existing water main, then a test pit is required prior to excavation. The Stoughton Water Department shall be provided two weeks advance of notice prior to installation.

The Town Water Department representatives must be present during the excavation and installation of the special gutter inlet on top of existing water lines.

ITEM 204.11 (Continued)

Method of Measurement
Item 204.11 will be measured for payment by the Each, complete and in place, regardless of depth.

Basis of Payment
Item 204.11 will be paid for at the contract unit price per Each. This price shall include all labor, materials, excavation, backfill, removing existing gas pipes, wrapping, bedding material, equipment, and incidentals required to complete the work.

Crushed stone to create suitable foundation, will be measured for payment under Item 156.

Special Gutter Inlet frame and grate will be paid for separately under Item 222.1.

ITEM 221.1 FRAME AND COVER - SECURED EACH

The work under this Item shall conform to the relevant provisions of Subsections 201, 220, and the following:

The work under this Item consists of furnishing and delivering Frame and Cover – Secured to the site, to be used at all drain manholes on Route 138 (State Highway Layout Line), where the posted speed limits is 45 MPH or higher, and as shown on the Plans, and as required by the Engineer.

Frame and Cover - Secured assemblies shall consist of covers and frames that conform to the nominal size, weight, material and load-carrying requirements in MassDOT Construction Standard Details E 202.6.0, E 202.7.0 and E 202.8.0, and are on the relevant MassDOT Qualified Construction Materials list.

Dimensions of secured manhole covers and frames may vary slightly from those shown on the standard details to account for necessary fastening components. The Contractor shall submit shop drawings of all drainage castings for approval prior to ordering.

Covers and frames shall be held securely together by bolting to threaded holes in the frame or to nuts or tumbler devices secured by the frame, by use of hooks attached to the cover or by any other means approved by MassDOT, to prevent being dislodged under traffic loading. Gaskets and other sealing devices will not be allowed.

Method of Measurement
Item 221.1 will be measured by the Each secured frame and cover.

Basis of Payment
Item 221.1 will be paid for at the contract unit price per Each furnished and delivered.

Installation of Frame and Cover – Secured will be paid for under Item 202.

ITEM 281.6 CEMENT CONCRETE PAVERS (WATERWAY) SQUARE YARD

The work under this item shall conform to the relevant provisions of Subsection 280 of the Standard Specifications and the following:

The work includes the installation of new concrete pavers in the proposed sediment forebay paver area as shown on the plans.

The Contractor shall provide a submittal of the pavers to the Engineer for review and approval prior to ordering.

Gravel Borrow shall conform to Section M1.03.0 Type C.

Pavers shall be 6”x12”x6”, made of precast cement concrete.

Pavers shall be grey in color.

The Contractor shall provide pavers meeting the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units.

Sand shall conform to Section M1.04.0.

The 18 inches (18”) of gravel borrow shall be placed and compacted prior to placement of the pavers, in 9” maximum lifts.

The pavers shall be installed on level ground and shall be tamped with a mechanical plate compactor or other method approved by the Engineer.

After a sufficient area of pavers has been laid, the pavement surface shall be tested with a 4-foot straight edge laid parallel with the centerline and any variations exceeding 1/4-inch shall be corrected and brought to proper grade.

The bricks shall be swept with sand. The pavement surface shall be vibrated to insure compaction between the joints. Additional sand shall be uniformly distributed as necessary to fill all the voids. The process shall be repeated for a maximum of five days until all joints are full.

Method of Measurement
Item 281.6 will be measured for payment by the Square Yard of pavers installed, complete in place.

Basis of Payment
Item 281.6 will be paid for at the contract unit price per Square Yard. This price shall include all labor, material, equipment, excavation, gravel borrow type c, sand, grading, and incidental costs required to complete the work.

ITEM 358.1 GATE BOX REMOVED AND STACKED EACH

Work under this item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications and the following:

The work includes removing and stacking gate boxes as shown on the plans and as required by the Engineer.

Gate boxes to be stacked shall be stacked at the Department of Public Works storage yard at 950 Central Street, Stoughton, MA 02072 or as required by the Engineer.

If the gate box removed and stacked is not wanted by the municipality or MassDOT, then the Contractor shall dispose of those items off-site without additional cost.

As required by the Engineer, the Contractor may leave the existing valve in place but will remove and stack the gate box. Any materials damaged during this work due to the Contractor's negligence shall be replaced by the Contractor at no additional cost to the Owner.

Method of Measurement
Item 358.1 will be measured for payment by the Each gate box removed and properly stacked.

Basis of Payment
Item 358.1 will be paid for at the contract unit bid price per Each. This price shall include all labor, equipment, materials, municipal coordination, and incidentals required to complete the work.

ITEM 376.1 HYDRANT – EXCLUDING COST OF HYDRANT EACH

The work under this item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications, and the following:

The Contractor shall coordinate all work with the Town of Stoughton Water Department prior to the working on the water system.

MATERIALS

New hydrants will be supplied by the Town of Stoughton. The Contractor shall coordinate with the Town and shall obtain the hydrant at 950 Central Street, Stoughton, MA.

CONSTRUCTION METHODS

Prior to ordering materials, the Contractor shall submit shop drawings to the Engineer for approval, for pipes, fittings, and all other items required to complete the work.

The Contractor shall have all necessary tools materials and equipment needed to complete the work on site and ready before any hydrant is removed.

ITEM 376.1 (Continued)

The Contractor shall give at least 48 hours written notice to the Stoughton Water Department prior to removing any hydrant.

If the Engineer determines that the existing hydrant is not suitable for reset, then a new hydrant will be supplied by the Town of Stoughton Water Department.

Method of Measurement
Item 376.1 will be measured for payment by the Each complete and in place.

Basis of Payment
Item 376.1 will be paid for at the contract unit price per Each. This price shall include all labor, tools, equipment, materials, municipal coordination, and incidentals required to complete the work.

Concrete for thrust blocks will be paid for under Item 903.

ITEM 376.3 HYDRANT - REMOVED AND STACKED EACH

The work under this item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications, and the following:

The work includes removing and stacking existing hydrants offsite at the locations shown on the Plans, and as required by the Engineer.

The Contractor shall coordinate with the Town to stack the hydrants at 950 Central Street, Stoughton, MA.

Hydrants to be removed and stacked shall remain in service until the new hydrants are available for installation.

Where hydrants are removed and not replaced with a new hydrant in the same location, all holes created by the removal of the hydrant shall be the backfilled with compacted gravel borrow.

Method of Measurement
Item 376.3 will be measured for payment by the Each, gate box removed and properly stacked.

Basis of Payment
Item 376.3 will be paid for at the contract unit price per Each. This price shall include all labor, materials, equipment, storage, transporting and handling of existing hydrants to be stacked and gravel borrow, and incidental costs required to complete the work.

ITEM 693. STONE WALL REMOVED AND STACKED FOOT
ITEM 705.2 PAVERS REMOVED AND STACKED SQUARE YARD

The work under these items shall conform to the relevant provisions of Section 120, 685, and 701 of the Standard Specifications and the following:

The work under Item 693. includes removing, transporting, and stacking the existing stone walls as indicated on the Contract Drawings or as required by the Engineer. The Contractor shall stack the removed stone wall to a location designated by the Engineer, the Town of Stoughton, or the Private Owner.

The work under Item 705.2 includes removing, transporting, and stacking pavers at locations shown on the Plans and as required by the Engineer. The Contractor shall stack the removed pavers to a location designated by the Engineer, the Town of Stoughton, or the Private Owner.

If the Town or MassDOT or Private Owner wishes not to stack those removed stone walls or pavers, the contractors shall dispose of those items off-site with no additional cost.

The Contractor shall safely remove the existing pavers and stone walls.

The Contractor shall exercise caution to not damage any of the pavers and stone wall. Any damages to the pavers and stone wall, caused by the Contractor's negligence, shall be replaced by the Contractor at no cost to the Owner.

The Contractor shall stack the pavers and stone wall in a safe manner as approved by the Engineer.

Method of Measurement
Item 693. will be measured per Foot of stone wall removed and stacked.

Item 705.2 will be measured per Square Yard of pavers removed and stacked.

Basis of Payment
Item 693. will be paid for at the contract unit price per Foot of stone wall removed and stacked. This price shall include all labor, materials, equipment, tools, and incidentals required to complete the work

Item 705.2 will be paid for at the contract unit price per Square Yard. This price shall include all labor, materials, equipment, tools, and incidentals 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

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.

ITEM 698.3 GEOTEXTILE FABRIC FOR SEPARATION SQUARE YARD

Work under this Item consists of furnishing and placing geotextile fabric as an underlayment at proposed compost rockfill slope protection areas.

MATERIAL

Geotextile shall conform to the requirements of Section M9.50.0 of the Standard Specifications.

CONSTRUCTION METHODS

Geotextile fabric shall be installed in accordance with Manufacturer's directions and details.

Method of Measurement
Item 698.3 will be measured for payment by the Square Yard, complete in place.

Basis of Payment
Item 698.3 will be paid for at the contract unit price per Square Yard. This price shall include all labor, furnishing, installing, trenching, tools, equipment, materials, and incidentals required to complete the work.

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

ITEM 740. (Continued)

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.

The Multifunction Printer System shall meet the following minimum criteria or better:

Color laser printer, fax, scanner, email and copier all in one with the following minimum capabilities:

- Estimated volume 8,000 pages per month
- LCD touch panel display
- 50 page reversing automatic document feeder (RADF)
- Reduction/enlargement capability
- Ability to copy and print 11” x 17” paper size
- email and network pc connectivity
- Microsoft and Apple compatibility
- ability to overwrite latent images on hard drive
- 600 x 600 dpi capability
- 30 pages per minute print speed (color),
- 4 Paper Trays Standard (not including the bypass tray)
- Automatic duplexing
- Finisher with staple functions
- Standard Ethernet. Print Controller
- Scan documents to PDF, PC and USB
- ability to print with authenticated access protection

The Contractor shall supply a maintenance contract for next day service, and all supplies (toner, staples, paper) necessary to meet estimated monthly usage.

The Engineer's Field Office and the equipment included herein including the computer system, and printer shall remain the property of the Contractor at the completion of the project. Disks, flash drives, and card readers with cards shall become the property of the Department.

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, Compost, 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 shall meet the requirements for M1.06.0: Compost, Type 2, as referenced in the MassDOT– Highway Division Standard Specifications for Highways and Bridges, Division III: Materials Specifications, latest edition.
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 minimum 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.

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.

ITEM 751.7 (Continued)

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, if utilized, will be compensated for under the appropriate seeding items.

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 Standard Specifications and the following:

Work under this item 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 as specified under that item.

Wetland Restoration work shall be as specified and compensated under that item. Construction of tidal wetlands shall be as specified under the appropriate item for tidal wetland mitigation.

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 Area shall be completed as shown on the drawings at the following location(s):

Wetland Replication Area at Station:	**24+25 LT**	Area = **525** sf.
Flood zone Compensatory Volume at Station:	**24+25 LT**	Area = **900** cf.

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.

ITEM 755.35 (Continued)

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. 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.

ITEM 755.35 (Continued)

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 shall be per the applicable requirements of Subsection 771, PLANTING TREES, SHRUBS AND GROUNDCOVER, 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.

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.

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.

ITEM 755.35 (Continued)

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.

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

Plant material shall conform to the applicable requirements of Subsection 771, PLANTING TREES, SHRUBS AND GROUNDCOVER, of the latest edition of the Standard Specifications and as amended below.

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 shall be as specified on the plans.

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.

ITEM 755.35 (Continued)

Seed Mix
Seeding shall conform to the Standard Specifications Section M6, ROADSIDE DEVELOPMENT MATERIALS.

Seed mix shall conform to MassDOT Item 765.555 – Wetland Seed –Part Shade Mix.

Seed rate shall be one at 20 lbs PLS/acre.

	Botanical Name	Common Name	% PLS By Weight
Grass			
	Poa palustris	Fowl Bluegrass	25%
	Elymus riparius	Riverbank Wild Rye	19%
	Carex lurida	Shallow Sedge	17%
	Carex vulpinoidea	Fox Sedge	10%
	Cinna arundinacea	Sweet Woodread	5%
	Sparganium eurycarpum	Giant Bur Redd Eco PA	4%
	Carex scoparia	Broom Sedge	4%
	Carex lupulina	Hop Sedge	4%
	Scirpus polyphyllus	Many Leaved Bulrush	3%
	Juncus effusus	Soft Rush	3%
	Carex intumescens	Bladder Sedge	2%
	Sparganium americanum	Burrweed	2%
	Scirpus cyperinus	Woolgrass	1%
	Carex crinita	Fringed Sedge	1%
	Juncus tenuis	Path Rush	1%
			100%

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.

Mulch/Compost Blanket for Seeding
Hydro mulch shall be per the manufacturer’s recommendations and shall be wood fiber or straw mulch only. Mulch shall be incidental to seeding.

ITEM 755.35 (Continued)

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 120.1.

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.

ITEM 755.35 (Continued)

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 Placement 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 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 course 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.

ITEM 755.35 (Continued)

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.

ITEM 755.35 (Continued)

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 SUBSECTION 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.

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.

ITEM 755.35 (Continued)

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. 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

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. The Wetland Specialist shall have the option to treat Mugwort.

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

ITEM 755.35 (Continued)

Upon completion of construction, the Contractor shall submit a Request for Conditional Acceptance that includes a brief narrative, as-built plan, 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 or undesirable weeds such as Mugwort

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 and regulatory representative (if required) shall assess the Replication Area. Final Acceptance will initiate the start of the Wetland Monitoring Period.

ITEM 755.35 (Continued)

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.

Wetland Specialist shall be compensated under Item 755.75.

Post wetland construction Monitoring Reports shall be completed and submitted by the Wetland Specialist 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 or undesirable weeds such as Mugwort

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, excavation, monitoring wells, as-built plans, Request for Certificate of Compliance, and all incidental costs necessary to complete the work as required.

ITEM 755.35 (Continued)

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.

Sediment Control Barrier will be paid under Item 767.121.

Wetland Specialist will be paid under Item 755.75.

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

Clearing and grubbing will be measured and paid for under Item 101.

Invasive Plant Management and Treatment will be measured and paid for under Items 102.3 and 102.33.

ITEM 755.45 WETLAND RESTORATION SQUARE YARD

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

The work under this item shall include all labor and furnishing of materials to complete the work specified herein to protect and restore existing inland wetland areas that will be temporarily impacted as shown on the drawings and as required by the Engineer, near **23+50 Left**.

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.

All work shall be in coordination with an approved Wetland Specialist. Wetland Specialist qualifications and requirements shall be per Item 755.75, Wetland Specialist.

SUBMITTALS – DOCUMENTS

Survey: To establish or confirm pre-construction baseline elevation of temporarily impacted area(s), a survey shall be submitted to the Engineer prior to any fill or other land disturbance.

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.

ITEM 755.45 (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.

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

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

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.

Compost Blanket shall be as specified under that item.

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
Prior to any land work, as part of the initial site-walk, the Wetland Specialist shall photo-document the site and provide a summary report of existing conditions as outlined under Item 755.75 Wetland Specialist.

Where and as required vegetation shall be cut flush and area surveyed to establish pre-construction elevations.

ITEM 755.45 (Continued)

Restoration Upon Completion of Roadway Construction Work

Sediment Barriers

If required for sediment control during Restoration work (i.e, tilling is required to restore soil), 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.

If required, grades shall be restored to pre-construction elevations as shown in the baseline survey or as required by the Engineer and Wetland Specialist 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

Soil Tilling with Compost

Two inches of compost shall be applied over the impacted area and soil shall be tilled to a depth of 4 inches below the existing grade. Following tilling, soil shall be raked relatively smooth, or as directed. Upon approval of prepared soil, area shall be seeded and hydromulched.

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 completion of construction, the Contractor shall submit a Request for Conditional Acceptance that includes a brief narrative from the Wetland Specialist (if applicable to project) demonstrating that the wetland restoration work was done according to plans (or how modified) and meets required permit conditions (if applicable). 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.

ITEM 755.45 (Continued)

Upon receipt of a Request for Conditional Acceptance, the Engineer, the Wetland Specialist, 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.
- Planted woody and herbaceous species (if included) meet specifications and are establishing well.
- 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.

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 and regulatory representative (if required) shall assess the Restoration Area. Final Acceptance will initiate the start of the Monitoring Period (if required).

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.
- Planted woody and herbaceous species (if included) meet specifications and are establishing well.
- There are no visible invasive plants.

ITEM 755.45 (Continued)

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.

MONITORING REPORTS FOR REGULATORY COMPLIANCE

Post wetland construction Monitoring Reports shall be completed and submitted by the Wetland Specialist 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, relative to the preexisting condition of the restored wetland.
- Seeded species are establishing well and cover 100 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 755.45 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 120.1

Sediment Control Barrier will be paid under Item 767.121

Compost Blanket will be paid under Item 751.7

Wetland Specialist will be paid under Item 755.75

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

ITEM 755.75 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 and Item 755.45 Wetland 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.

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.

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.

ITEM 755.75 (Continued)

- 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.

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.

ITEM 755.75 (Continued)

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 placement in the Wetland Mitigation, as appropriate.
    - Note invasive plants in and adjacent to Wetland Mitigation.
    - 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.

ITEM 755.75 (Continued)

- Re-vegetation of Mitigation Area
    - Placement of 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.

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.

ITEM 755.75 (Continued)

Method of Measurement
Item 755.75 Wetland Specialist shall 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 shall 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 WETLAND 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:

ITEM 755.76 (Continued)

- 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.

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 for ***3*** years:

- *MassDEP: 3 Reports - (1 end of year).*
- *Conservation Commission: 3 Reports (1 end of year).*

Method of Measurement and Basis of Payment

Item 755.76 Wetland Monitoring Reports and associated inspections shall 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 = *2 Reports*
- Year 2 = *2 Reports*
- *Year 3 = 2 Reports*

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 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.

ITEM 767.121 (Continued)

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.

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.

ITEM 767.121 (Continued)

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.

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.

ITEM 767.121 (Continued)

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.

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.

ITEM 767.121 (Continued)

Method of Measurement and Basis of Payment
Item 767.121 will be measured and paid for at the contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

Additional barrier, such as double or triple stacking of compost filter tubes, will be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damage by construction activities shall be repaired or replaced as directed by the Engineer at the Contractor's expense.

ITEM 767.9 JUTE MESH SQUARE YARD

The work under this item shall conform to the relevant provisions of Section 700 of the Standard Specifications and the following.

The work under this item shall consist of furnishing and installing jute mesh fabric to prevent soil erosion. Jute mesh shall be placed over all areas of exposed soil in locations shown on the plans or as required by the Engineer.

MATERIALS

Jute netting or similar material shall be new, unused, undyed, and unbleached 100% biodegradable yarn (no polypropylene) and of uniform plain weave. The materials should weigh approximately 1.0 (+/- 5%) pounds per linear yard (assuming a 4-foot width).

Shall meet the following minimum requirements:

Open Area:	70-75%
Mesh Size:	approximately 1/2 inch with an open area of 60-65%.
Roll Weight:	approximately 1.0 (+/- 5%) pounds per linear yard
Warp Ends:	78 per linear yard
Weft Ends:	41 per linear yard
Recommended flow:	6 fps (1.8 m/s)
Functional Longevity:	6-9 months

Anchoring devices shall be 11-gauge steel staples 6-inch minimum length. In loose soils the length of the staples shall be 9-inches.

For areas that will be routinely mowed anchoring devices shall consist of minimum 8" wooden stakes. Longer stakes shall be used where loose soils or other conditions obligate, as required by the Engineer.

ITEM 767.9 (Continued)

CONSTRUCTION METHODS

Area shall be seeded prior to installation of jute netting.

Installation shall be such as to ensure continuous contact with soil without folds or wrinkles. Jute netting shall be laid such that upslope fabric is placed over lower slope fabric by a minimum of 3 feet. Adjoining rolls shall be overlapped a minimum 6 inches. The netting shall extend beyond at least 1 foot beyond the edge of the seeded area.

The Contractor shall bury the ends of the jute netting 6-8 inches in anchor trenches at top and bottom of slopes.

Jute netting shall be anchored in place with vertically driven metal staples. The staples shall be driven in until their tops are flush with the soil. Staples shall be placed at 12-inch intervals along the top of a slope and in staggered courses along the face of the slope to achieve a minimum of 3 staples per square yard, or at manufacturer's recommendations for the given site conditions.

Contractor shall reseed all trenched and otherwise disturbed areas with specified seed mix. The Contractor shall maintain the jute netting and make satisfactory repairs of any areas damaged until acceptance of seed establishment.

Method of Measurement
Jute Mesh will be measured by the number of Square Yards complete in place, including anchoring, as measured across the surface of grade and does not include buried or overlapped portions. The quantity measured for payment shall not exceed that shown on the plans or as directed by the Engineer.

Mesh that becomes loose or that is not otherwise functioning to stabilize soil shall be repaired and new or additional jute matting installed as required at the Contractor's expense. Soil erosion shall be repaired, and area shall be raked and reseeded with the original specified mix as required by the Engineer at the Contractors expense.

Basis of Payment
Item 767.9 will be paid for at the contract unit price per Square Yard, which price shall include all labor, materials, equipment, trenching, placing, and stapling of jute fabric, reseeding of trenched and disturbed areas, and all incidental costs required to complete the work.

ITEM 784.101 TREE - CONTINGENCY EACH

Work under this Item shall conform to the relevant provisions of Subsection 771 of the Standard Specifications and the following:

The work includes providing and planting additional trees within the project, primarily along Route 138 - Washington Street, south of the intersection with Central Street, that are not shown on the plans.

Trees under this item are intended for aesthetic enhancement and shade where space permits.

The locations and species of trees will be determined by MassDOT during construction.

MATERIALS

Trees shall be 2" – 2.5" caliper Red-Maple, Redmond Linden, Allegheny Serviceberry, and shall be normally available to the northeast region of the United States.

CONSTRUCTION METHODS

Tree planting locations on plan are schematic and the actual locations may be adjusted in field.

The locations of all proposed trees shall be marked and reviewed for approval by MassDOT Landscape Architect and Town Representative prior to planting.

The work shall be conducted under the supervision of the MassDOT Landscape Architect. The contractor shall contact Stephanie Smoot at (857) 368-9175 to establish coordination for the conduct of the work.

Tree locations shall be recommended by the Landscape Architect and approved by the Town and Engineer. However, the contractor shall verify that there are no conflicts with existing or proposed utilities or the drainage system at the recommended locations.

Contingency tree locations shall not compromise ADA and AAB accessibility requirements. No additional Right of Way or easements will be acquired for contingency trees.

Method of Measurement
Item 784.101 will be measured for payment by the Each tree planted. No measurement will be made for replacement trees for trees that show unsatisfactory evidence of growth.

Basis of Payment
Item 784.101 will be paid for at the contract unit price per Each. This price shall include all labor, materials, and incidentals required to complete the work.

No payment will be made for replacement trees.

ITEM 804.3 3 INCH ELECTRICAL CONDUIT TYPE NM – PLASTIC –(UL) FOOT

The work under this Item shall conform to the relevant provisions of Section 800 of the Standard Specifications and the following:

The work shall include the furnishing and installation of 3-inch non-metallic conduit for traffic signal systems in accordance with the plans and as required by the Engineer. The conduit material shall be Schedule 80 polyvinyl chloride (PVC) plastic conduit. The conduit quantity may be increased or decreased by the Engineer depending upon actual conditions encountered as provided for in Section 4.06 of the Standard Specifications.

Conduit in Grass or in Planted Areas
Where new conduits are installed in grass and planted areas, no separate payment shall be made for the excavation, sand bedding, backfill, including necessary compaction, or incidental materials, but all costs in connection therewith shall be included in the contract unit price for Item 804.3.

Conduit Under Sidewalk or Median Driveways
Where conduit is installed in sidewalk or paved median or asphalt driveway areas, no separate payment shall be made for the excavation, sand bedding, backfill, including necessary compaction, or incidental materials, but all costs in connection therewith shall be included in the contract unit price for Item 804.3. Payment for cement concrete or asphalt pavement shall be paid for under the respective item.

Conduit Crossing Roadways
Where conduit is installed crossing roadways, no separate payment shall be made for the excavation, sand bedding, backfill, including necessary compaction, or incidental materials, but all costs in connection therewith shall be included in the contract unit price for Item 804.3.

After conduit installation, the trench shall be backfilled and controlled density fill (CDF). CDF shall be Type 2E Flowable (Excavatable) and shall be specified in Section M4.08.0 of the Standard Specifications. The finished grade of the CDF shall be below existing pavement surface as shown on the construction details.

Method of Measurement
Item 804.3 will be measured by the Foot of conduit furnished, installed, approved, and maintained in place.

Basis of Payment
Item 804.3 will be paid for at the Contract unit bid price per Foot. This price shall include all labor, equipment, excavation, backfill, conduit, warning tape, spacers, CDF materials and incidentals required to complete the work.

In locations where the conduit crosses roadways, no separate payment shall be made for the sawcutting of pavement, excavation, sand bedding, controlled density fill, or incidental materials, but all costs in connection therewith shall be included in the contract unit price for Item 804.3.

ITEM 815.1 TRAFFIC CONTROL SIGNAL LOCATION NO. 1 LUMP SUM

The work under this Item shall conform to the relevant provisions of Section 800 of the Standard Specifications, the 2009 Manual on Uniform Traffic Control Devices (MUTCD) with Massachusetts Amendments, the December 2015 MassDOT Overhead Signal Structure Standard Drawings (E-16-001), and the following

The work under this item is related to traffic signal installation consists of the installation of new traffic signals at the intersection listed below, complete with vehicle and bicycle loop detectors, signal posts, signal heads, mast arm assemblies, cabinets, foundations, pull boxes, wire and cable, emergency vehicular pre-emption system, communication links for a traffic signal control system, an electrical service connection and all other equipment, materials and incidental costs necessary to furnish, install and program a complete and functioning traffic control signal system as specified herein and as shown in the contract documents for the following intersection in the Town of Stoughton:

Washington Street (Route 138) at York Street

The work includes removing, transporting and stacking all existing traffic signal equipment including the removal and disposal of their foundations and electrical system; providing temporary signal system as necessary, maintaining and modifying to accommodate different phases of construction; removing and disposing or abandoning existing hand holes and signal conduit.

Old cable, all unusable material, existing span wires/supports, and any item rejected by the Engineer for stacking, shall be disposed of legally by the Contractor.

The work shall also include the excavation and backfilling with compacted gravel of the holes resulting from the excavation of the foundations and the replacement, in kind, of any surface material disturbed. The existing mast arm foundations shall be removed to a minimum of 3 feet deep from the finish grade.

Individual items of work shall include furnishing and installing all or part of the following items: P size ATC Controller cabinet and foundation, cabinet concrete pad, remote communication units, coordinating units, amplifiers, mast arm, foundations with anchor bolts, traffic signal posts and housings; pedestrian signals with countdown timers and non-movable accessible push buttons (APS) with signs and saddles, a complete emergency vehicle priority control system(fire pre-emption), roadway loop detectors, and all necessary wiring, mounting assemblies, equipment grounding and bonding, ground rods, and a new service connection. A list of major items required is included in the Contract Drawings.

The cabinet shall be installed complete in place with all connections and programming so that all eight (8) NEMA vehicle phases and sub-phases are programmed even if only some phases are being used. A list of Major Items Required is included on the contract drawing which contains a list of equipment that is included under the lump sum cost and a list of equipment that will be paid for under their respective items.

ITEM 815.1 (Continued)

Once construction of the new signal equipment is complete and the new signals are ready for operation, the Contractor is responsible for removing and stacking of all above ground existing signal equipment.

The Contractor shall deliver the equipment to the MassDOT District 5 storage yard or to a location as required by the Engineer.

The Contractor shall take extra care when removing, transporting, and stacking the existing signal equipment. Any equipment damaged by the Contractor's negligence, shall be replaced at no additional cost to the Department.

The Contractor shall maintain traffic signal system fully operational during the construction. To provide fully operational signal system, the Contractor may need to provide temporary signal system to supplement existing signal system.

Providing temporary signals and maintaining and modifying existing signal system to accommodate different phases of construction shall be incidental to this item.

GENERAL REQUIREMENTS

Within 30 days following the Notice to Proceed, the Contractor shall submit in the form of shop drawings, a list of equipment and manufacturer's equipment specifications, being proposed to be installed, to the Engineer in accordance with the relevant provisions of Subsection 815.20.

The Contractor shall not commence work until approval of the shop drawings has been received in writing from the Engineer. Approval of the shop drawings will be general in character, and it is a conformation that the equipment is consistent with the design documents requirements. The Contractor is responsible for providing a functioning system and fully operational, as approved by the Engineer and the Town of Stoughton.

The Contractor shall deliver to the Engineer a certificate of compliance by manufacturer for all materials purchased.

SPECIFIC REQUIREMENTS

1. Local Intersection Controller
   A. The local intersection controller shall meet all the requirements for TS2 Type 2.
   B. Each Local intersection controller shall be capable of functioning in every respect as an integrated part of a closed loop traffic control system.
   C. Terminations of all interconnect cable, lightning/surge arrestors, terminal strips, etc., shall be included with each controller.
   D. The local intersection controller shall be capable of controlling a fully-actuated two to eight phase intersection and shall meet or exceed NEMA TS 2 Type 2 standards for fully actuated traffic control units.

ITEM 815.1 (Continued)

E. The controller shall conform to Section 3, Controller Units of NEMA No. TS 2. Traffic Control Assemblies. The controller unit shall utilize an input/output interface conforming to Section 3.3.1 of the NEMA TS 2 Standard for all input/output functions with the back panel terminals and facilities, including the malfunction management unit, detector rack assemblies, and auxiliary devices.

F. The local controller shall have internal communication capability with direct access to the data memory.

G. The local controller shall be capable of processing controller and intersection and system detection data and provide all necessary intersection control functions.

Local intersection traffic signal cable shall be #14 AWG.

The Contractor shall make all necessary arrangements with Eversource for the service connections or for any main power cut off when necessary, and pay all charges incurred.

SIGNAL SUPPORT

The required work to install and construct the foundations shall be included under the lump sum cost of Items 815.1. **All mast arms, pedestal poles and bases shall be finished as required by MassDOT and as specified herewith in these special provisions**.

Traffic signal posts shall be 8 and 10 foot one-piece, continuously tapered, seamless tube made of steel welded to the Base as a single unit. A one piece pole and base shall be used unless otherwise approved by the Engineer.

The bottom of the overhead signal heads shall have a minimum clearance of not less than 15 feet or greater than 19 feet above the pavement grade at the center of the roadway.

The Contractor shall be responsible for making all necessary arrangements to have the proper utility company(s) relocate overhead wires in order for the proper mast arm clearances to be obtained, should any conflicts arise. The Contractor shall take extra care and precaution in placing signal heads to ensure the existing overhead utility wires do not interfere with the visibility of the signal heads located above the roadway.

All measurements to determine the exact dimensions and clearances to existing overhead utility lines shall be made in the field by the Contractor for incorporation into the erection plans and shop drawings which are submitted for approval.

Mast Arm
Mast arm shall be fabricated and constructed in conformance with the 2015 MassDOT Overhead Signal Structure & Foundation Standard Drawings and as stated below.

All mast arm poles shall be galvanized steel monolevers with shoe bases.

ITEM 815.1 (Continued)

Acceptance of mast arm will be contingent upon review and approval of shop drawings submitted by the Contractor. Long-hand design calculations stamped by a structural engineer licensed in the Commonwealth of Massachusetts shall be submitted by the Contractor with the shop drawings for all mast arm poles.

1. Equipment Finish and Color

All traffic signal equipment, including, but not limited to, signal posts, bases, signal heads, visors (outside), mast arms, doors, pushbutton saddles, controller cabinet, service meter socket boxes, hardware, strapping, and rigid mounting brackets for signals and signs, shall be painted in **gloss black**. This includes the metal strapping used to secure signal heads to the mast arm shaft, the inside of visors. The Contractor shall submit to the Engineer four (4) paint chips and sample finishes on aluminum and steel of the intended color for review and concurrence prior to any work being done under this project.

Signal heads, doors, visors, mounting brackets, and hardware supplied direct from the manufacturer in the color stipulated above may be acceptable provided it meets or exceeds the finish process for the material indicated below:

2. Steel Equipment

Galvanizing

All bolts, screws, nuts, rods, and washers shall be galvanized in accordance with AASHTO M232 and the Standard Specifications. The hardened machine screws may be electroplate galvanized. Stainless steel studs, bolts, screws, nuts, straps, and washers shall not be galvanized. Galvanized hardware need not be painted; however, the ends of bolts, nuts, and washers shall be painted in the field according to section "Touch-up and Repairs." Immediately prior to galvanizing, the steel shall be immersed in a bath of zinc ammonium chloride. The dry kettle galvanizing process shall be used.

All steel components, other than above, shall be galvanized after fabrication in accordance with AASHTO M111. The galvanizing bath shall contain nickel (0.05% to 0.09% by weight) in accordance with Subsection 960.61 of the Standard Specifications.

Galvanized members requiring shop assembly shall be welded and drilled prior to galvanizing.

ITEM 815.1 (Continued)

Aluminum Equipment

All aluminum equipment called for shall have a powder coat in a color determined by MassDOT. The coating shall be a polyester-TGIC (triglycidyl isocyanurat) resin system conforming to the following:

Quality	Test	Limits
Abrasion	Taber abraser CS-10, 1000 gram load, 1000 cycles, ASTM D4060	100 mg. maximum weight loss
Adhesion	ASTM D 3359 Initial 1000 hours	 5A 5A
Gloss	ASTM D 523 15°C - 600 hours 15°C - 1000 hours	 82% retention 90% retention (washed)
Hardness	ASTM D 3363	2H - No Gouge
Impact	ASTM D 2794 Direct	Pass 6.59 Nm
Salt Spray Resistance	ASTM B 177 ASTM D 1654 1000 hours unscribed 400 hours scribed	 Table 2-10 Table 1-10
Weather Resistance	ASTM G 23, 1000 hours, 18 min. waterspray, 102 min. light	No film failure
Color	**Gross black**	
Identify	Infrared fingerprint	Match
Flexibility	180° bend; 13mm dia., mandrel within 10 seconds	No breaks, flaking or cracks. Tested with a Q-panel with 2 mils or less of coating
Humidity	ASTM D 2247, 1000 hours	No blister or film failure
Thickness		4 mils± 1 mils
Mar Resistance		Good

A Certificate of Compliance of the powder coating system is required for the Engineer's approval. The Contractor shall also secure a warranty on workmanship against any paint chipping, failure, and any other defects accruing during a period of two (2) years from the date of installation and acceptance by MassDOT of the installed equipment.

ITEM 815.1 (Continued)

3. Foundations

Signal support and controller cabinet foundations shall be designed and constructed in conformance with MassDOT Standard Drawings and in accordance with the applicable requirements of Section 901 and the Standard Drawings for Overhead Signal Structure and Foundation dated December 2015.

The top forming of cast-in-place concrete units shall extend downward for a minimum of 24 inches on the side of any foundation. The lower portions of all foundations shall be placed directly against undisturbed earth. No forms or reinforcing for foundations shall be set and concrete placed until the excavation has been inspected by the Engineer and approval to proceed has been given. The Contractor shall request written approval from the Engineer in advance of the placement of any concrete for foundations of traffic signal poles, mast arms and controller cabinets.

Concrete foundations shall be constructed of 4,000 psi, 1½ inch, 565 Cement Concrete. The Contractor shall submit shop drawings of any bolt circle details for approval by the Engineer. Anchor bolts shall be set accurately, and tops shall be formed neatly.

The standard foundation design provided herein and in the contract drawing is based on the soil condition identified in the soil boring log. If ledge or unsuitable soil is encountered during construction (i.e. on which does not apply to the design tables shown in MassDOT's standard drawings), the Design engineer shall submit a modified foundation design to be completed by a structural engineer licensed in the Commonwealth of Massachusetts, to the Contractor. If utilities or other underground obstructions are encountered, the Contractor shall backfill the area to its original condition until an alternate design has been approved by MassDOT. Subsurface conditions that require a special foundation as stated in Engineering Directive E-16-001 will be prepared and designed by the design engineer. Such subsurface conditions include sand material with blow counts less than 6bpf and clay material with blow counts less than 2 bpf. These foundations include spread footing and rock socketed foundation designs. No separate payment will be made for work considered incidental to the excavation, including but not limited to, mast arm foundations, dewatering, support of excavation, alternative foundation design, rock coring, etc. but all costs in connection therewith shall be included in the lump sum bid price for this item.

Mast arm foundations shall conform to minimum MAAB dimensions and shall not obstruct a sidewalk or crosswalk so that passage by physically challenged persons is impaired.

Reinforcing bars in the foundations shall comply with MassDOT Engineering Directive E-22-002, which requires all reinforcing bars to be epoxy coated per Section M8.01.07.

ITEM 815.1 (Continued)

Route 138 (Washington Street) at York Street

Location	Station	Offset	Soil Type	Mast Arm Length	Diameter	Depth	Vert. Bars	Tie Bars
#6	26+78.51	36.76' Left	Wet Sand (Dense)	30'	3'-6"	9'-0"	18-#8	#5 @ 12"
#4	27+43.16	40.00' Right	Wet Sand (Loose)	35'	3'-6"	14'-6"	18-#8	#5 @ 9"

4. As-Built Drawings

The Contractor shall supply the Engineer with as-built plans for the locations of all installed traffic signal equipment and conduit.

5. Testing of Traffic Signal System

The signal shall operate continuously for 30 days before requesting a final inspection.

The Contractor shall perform testing of the equipment grounding, terminals & facilities, detectors, preemption, and other systems components in the presence of the MassDOT, the Engineer, and the Stoughton Fire Department in accordance with the Standard Specifications. The Contractor shall order and pay for a Police Officer detail to facilitate the equipment testing.

SERVICE CONNECTION

It shall be the Contractor's responsibility to contact the utility company. The electric company (refer to utility contacts) will furnish the connection and power at the locations shown on the Contract Drawings. The service connection shown on the Contract Drawings is only approximate. The electric company will connect and disconnect power as required. No work shall be done in manholes or on power poles without a representative of the electric company being present. The Contractor will be responsible for coordinating work with the electric company.

The Contractor shall furnish and install, or cause to be installed, all service equipment to the satisfaction of the electric utility company. It shall also be the Contractor's responsibility to pay all charges to the utility company for performing the work previously described.

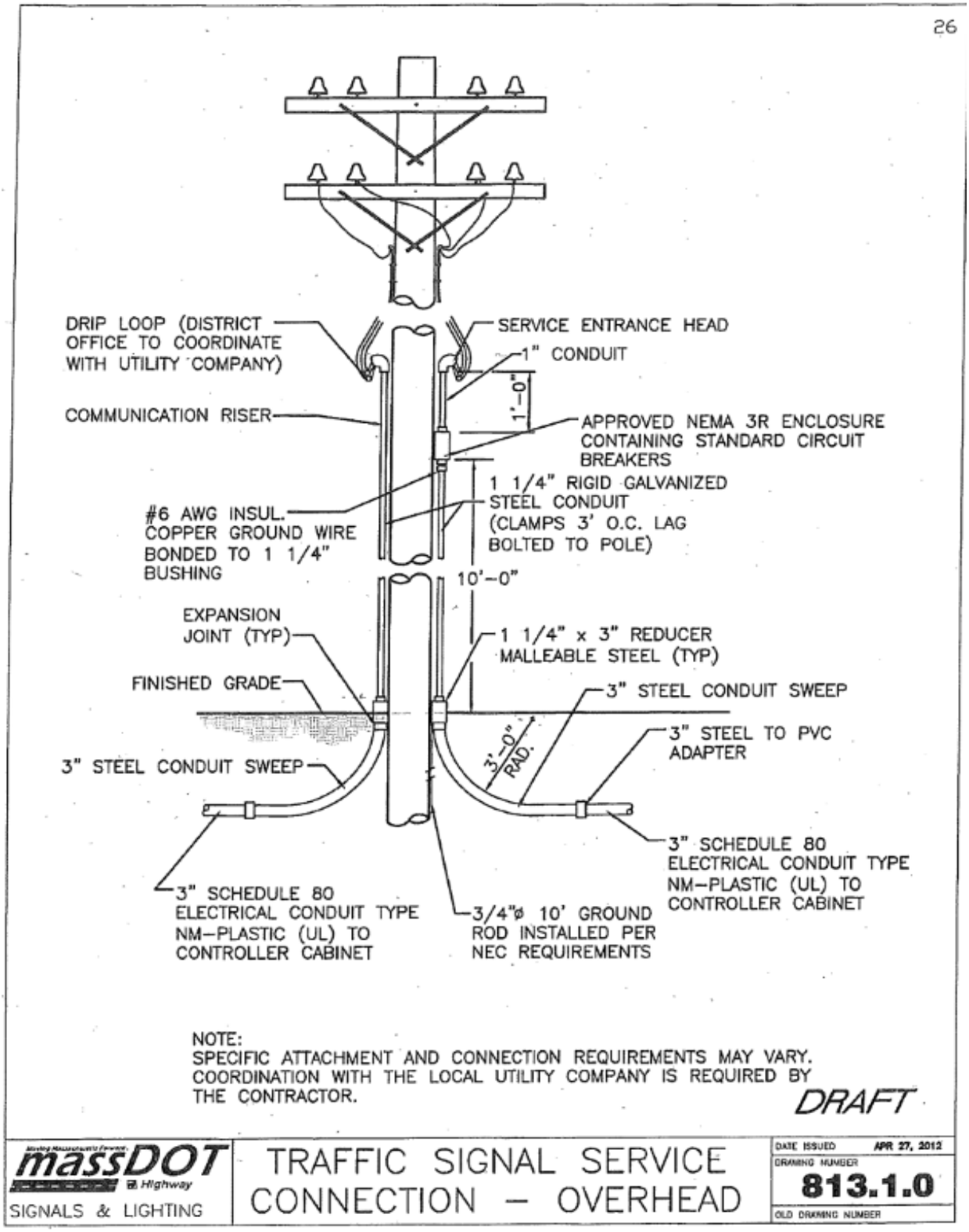
Openings where cables enter the bottom of the controller cabinet and each pull box shall be sealed with approved elastic sealing compound.

No direct reimbursement will be made under this contract to the Contractor for payments made to electric company, it being understood that full compensation for any payment made by the Contractor to the utility company will be included in the contract prices bid.

ITEM 815.1 (Continued)

Grounding Cable - Grounding cable shall be bare copper No. 8 AWG wires.

Service connection shall be installed per MassDOT Standard Detail Drawing 813.1.0.



ITEM 815.1 (Continued)

Actuated Controller

The traffic signal controller unit, malfunction management unit, video detection units, bus interface units, and all other ancillary traffic signal control equipment components included in ATC traffic controller shall comply with the National Electrical Manufacturer Association (NEMA) Standard No. TS 2, Traffic Controller Assemblies.

The traffic controller supplied shall conform to Section 3" Controller Units" of the NEMA TS 2 Standard. The traffic controller shall be supplied in a TS Type 2 Configuration as required in the list of major traffic signal items included on the plans for each intersection location. Specifically, the controller unit (CU) shall be supplied as an actuated controller with NTCIP capabilities; defined as Type A1 in subsection 3.2 of the NEMA TS 2 Standard.

Controller unit shall retain intersection data and controller unit programming in non-volatile EEPROM memory. The real time clock shall be maintained by a battery backup during power outages and shall include automatic accommodations for daylight savings time.

Controller unit shall be capable of two through 16-phase operation and 16 keyboard-programmable overlaps and shall meet or exceed NEMA TS-2, Type 2 standards for fully actuated traffic controller units.

Controller unit shall be capable of operating with one to four concurrent timing rings on a user programmable ring structure.

Controller unit shall be capable of operating as a volume density controller and shall be capable of functioning in every respect as an integrated part of a closed loop traffic control system with internal communication capability and direct access to the data memory.

Controller unit shall have internal Time Base Coordination (TBC) logic. The coordination control shall have the capabilities to operate as described under the Section 815.411 of the Standard Specifications.

Controller unit shall use a standard RS232 port provided in or with the local controller to allow for local printing of reports and for interconnecting to a remote master controller through the modem.

Controller unit shall have a security code function.

Controller unit shall have internal preemption with the capability of size unique preemption sequences. Each preempt sequence shall be fully user programmable for timing and signal display in response to an individual preempt command input.

Controller unit shall be provided with all necessary hardware, including cables and internal system modem to operate a closed loop system.

ITEM 815.1 (Continued)

Controller Cabinet
ATC traffic control cabinet shall comply with the National Electrical Manufacturer Association (NEMA) Standard No. TS 2, Type 2 Standards, Section 7 and the ITS Cabinet Standard. Cabinet size shall be a NEMA Size 6 or "P" size cabinet.

The controller cabinet shall be gross black color. The cabinet shall have a circuit breaker rated at 20 amperes to protect the vent fans and duplex outlet. In addition, an appropriately rated circuit breaker shall be furnished to protect all other equipment. The circuit breakers shall be approved and listed by the Underwriters Laboratories (UL). The operating mechanism shall be enclosed, trip free from operating handle on overload, and trip indicating. Contacts shall be silver alloy enclosed in an arc-quenching chamber. Circuit breakers shall be unaffected by ambient temperature range, relative humidity, applied power shock and vibration range specified in the NEMA TS2 standard. Breakers shall have a minimum interrupt capacity of 5,000 amperes. Additional fuses or breakers shall be installed as required by the individual equipment Specifications.

The cabinet shall be provided with a door activated, hermetically sealed microswitch. The switch shall be wired to spare terminals on the terminal facility and shall provide a dry contact closure across these terminals when the cabinet door is opened. This switch will signal the RCU that the cabinet door is open. The Contractor shall coordinate with MassDOT District 5 on these requirements.

The control cabinet shall be made of aluminum and be powder coated Polished Black. The controller cabinet shall also be supplied with a Manual Police Button to manually control the operations of the traffic signal via the Police Door Access Panel.

The following requirements are designed for effective use of a laptop computer in conjunction with the traffic signal controller. These requirements are also designed to permit all engineers, electricians, and technicians (including those who are disabled but ambulatory) to work in the cabinet in a safe, effective and comfortable manner. In addition. a lamp with an on/off switch shall be installed in the controller cabinet.

SDLS Serial Bus
Per section NEMA TS-2 standard, Section 3.3.1 a SDLC (Synchronous Data Link Control) to allow communications between the controller unit, MMU and BIUs shall be provided.

Malfunction Management Unit (MMU)
The MMU shall be capable of providing enhanced memory and remote retrieval of data, by means of a direct connection to the controller and shall be set-up such that remote monitoring of the conflict monitor shall be possible.

The MMU shall comply with Section 4 of the NEMA TS 2 standard for use with an ATC type controller and cabinet. . It shall be capable of being operated as either a Type 16 with 16 channels (8 vehicle, 4 pedestrian and 4 overlap) or a Type 12 with 12 channels (8 vehicle, 4 overlap). Each MMU shall be initially configured as a Type 16 unit.

ITEM 815.1 (Continued)

Bus Interface Unit (BIU)
The controller cabinet will be equipped with a Bus Interface Unit (BIU). The BIU shall comply with Section 8 of the NEMA TS 2 Standard.

BIU shall be fully interchangeable with any other manufacturer's unit and interchangeable in a NEMA TS 2 Type 2 cabinet assembly.

The BIU shall perform the interface function port 1 at the controller unit, the malfunction management unit, the loop detector rack assembly and the back panel terminal and facilities.

At a minimum, two LED indicators shall be provided on the BIU front panel. One indicator shall serve a dual use as a power on indication and as a diagnostic indicator for proper operation of the device. The second indicator shall serve as a transmit indicator illuminating each time data is transmitted.

Cabinet Power Supply
A separate power supply shall be supplied and installed in the ATC cabinet. The unit shall be AC line powered and provide regulated DC power, unregulated AC power, and a line frequency reference for the rack mounted loop amplifiers, bus interface units, load switches, and other auxiliary cabinet equipment, as required. As a minimum, the power supply shall meet all requirements of Section 5.3.5 of the NEMA TS 2 Standard.

The power supply shall be either shelf mounted or installed as part of the rack assembly.

The unit shall contain four LED indicators on the front panel to indicate the four outputs: + 12 V DC +/- 1 V DC @ 2.0 amps, + 24 V DC +/- 2 V DC @ 2.0 amps, 12 V AC @ 250 milliamps, and 60 Hz line frequency reference. A test point terminal shall also be located on the front panel for + 24V DC and logic ground testing.

Loop Detector Amplifier Rack Assembly
The loop amplifiers supplied shall be rack mount, Type C, two channel units with delay and extension timing internal to each unit's channel conforming to Section 6.5 of the NEMA TS 2 standards and as defined in Table 6-1 of the NEMA Standard. The detector shall fit in a standard card rack conforming to Section 6.5 of the NEMA TS 2 Standard and as defined in Table 5-9 on the NEMA Standard. The detector rack assembly shall be a Type 2 configuration conforming to Section 5.3.4 of the NEMA TS 2 Standard. The two-channel card rack loop amplifier unit shall occupy one of the rack slots. Each amplifier channel shall be labeled with the detector number.

The detector unit shall be capable of operating in a voltage range from 10.8 to 26.5 VDC. The unit shall operate from the cabinet's external power supply at 12 VDC. Detector units shall be microprocessor controlled, fully digital, self-tuning, and capable of detecting bicycles. Each channel of a dual-channel amplifier shall be connected to a series of wire loop detectors.

The cabinet shall be supplied with a minimum of twelve (12), two channel card rack loop amplifiers.

ITEM 815.1 (Continued)

Contractor shall supply and install on the upper left hand corner of the back of the cabinet door a laminated, pictorial diagram depicting the traffic detector amplifier channel assignments. The assignment information contained shall include approach name, phase, and lead-in terminal numbers.

Software
All local controller, malfunction management unit, and amplifier software shall be supplied with the latest available revision. Any software upgrades released by the manufacturer shall be supplied at no charge to the Owner for a period of five years after acceptance of the traffic signal installations.

Data Base Programming
Each programmable local hardware component (controller, malfunction management unit, preemption unit, and detector amplifier) shall be initially programmed by the Contractor based on information contained on the plans. Three sets of hard copy programming per device shall be supplied in three ring binders supplied by the Contractor.

Standard Module Functions
Controller shall be capable of functioning with both incoming and outgoing coordination.

The controller shall be equipped with a separate emergency flashing mechanism capable of providing flashing operation at the rate of 50 to 60 flashes per minute. This mechanism shall be so wired and so mounted within the cabinet that it will continue to cause the signals to flash even when the basic controller is removed from the cabinet.

The controller shall be capable of changing from stop-and-go operation to flashing operation in accordance with the Manual on Uniform Traffic Control Devices.

Load Switches
Load switches shall be provided with LED indicators wired to the input and output of each circuit. Spare load switches shall be provided in the cabinet as required by MassDOT.

Controller Back Panel And Terminal Facilities
The Controller shall be supplied complete with all load switches and flash transfer relays and appurtenances required for operation as a complete eight-phase unit regardless of the number of phases placed in operation at the time of installation. Spares should be provided as required by MassDOT.

ITEM 815.1 (Continued)

SPARE EQUIPMENT

The Contractor shall provide the following spare signal equipment inside the traffic signal controller cabinet:

1. A full complement of load switches to accommodate each available position of the back panel;
2. A full complement of flash transfer relays;
3. Two spare BIUs;
4. Two spare dual channel loop detector amplifiers (card rack)
5. A 25 foot RS-232 cable for communication function with a laptop computer.

Surge Suppression
Each cabinet shall have each input and output surge protected except signal outputs from cabinet load switches. (The load switches act as surge suppressors.)

The surge protector must be electrically connected to the nearest grounded metal structure or nearest ground rod.

Surge protection for power service shall conform to the NEMA TS-2 standard. The product complies when a lab report summary from an independent test laboratory stating the product passes the current NEMA TS-2(5.4.2.4) specification is submitted with the shop drawings.

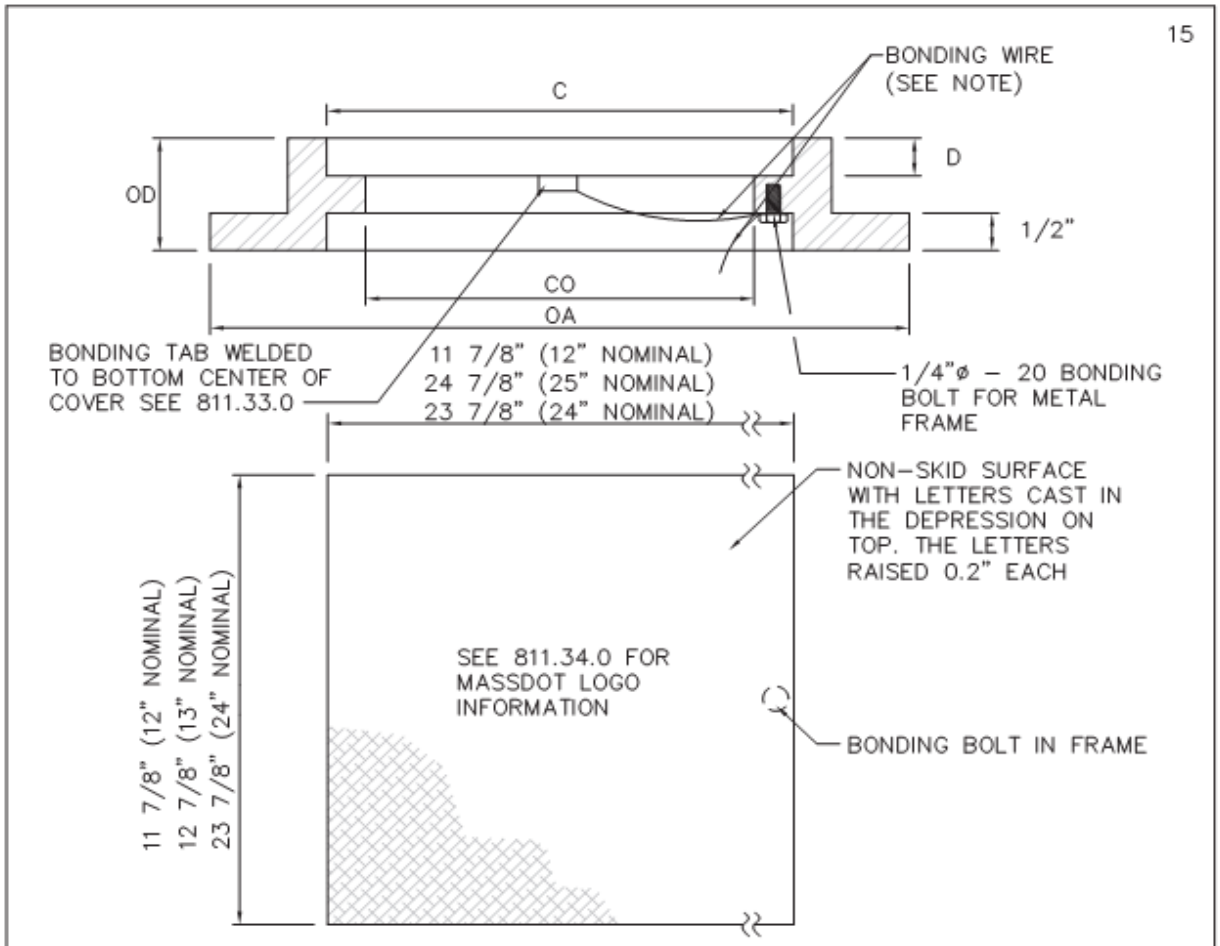
Surge protection for all loop, pedestrian button, and pre-emption connections shall have peak surge current protection of at least 10kA with a response time of less than 5 nanoseconds. The product complies when a lab report summary from an independent test laboratory stating the product passes this specification is submitted with the shop drawings.

Units shall be plug mounted in the controller cabinet.

Units shall be unconditionally warranted for at least 5 years.

Grounding and Testing of Grounding System
All pull boxes shall be grounded according to the MassDOT Standard Details, 811.31.1/811.32.1, 811.31.2/811.32.2, and 811.33.0 included in this special provision. The Contractor shall perform testing of the equipment grounding system in the presence of the Engineer in accordance with MassDOT Standard Specifications.

ITEM 815.1 (Continued)



SIZE OF COVER	COVER DEPTH	OVERALL DEPTH	CLEAR OPENING	OVERALL	APPROX. WEIGHT	STANDARD DRAWING
C	D	OD	CO	OA	W	
12" x 12"	1"	3 1/2"	10 1/2" x 10 1/2"	17 1/4" x 17 1/4"	82lb	811.31.0
13" x 25"	1 1/2"	3"	12" x 24"	20" x 29 3/4"	120lb	811.22.0 811.32.0
24" x 24"	1"	3"	22" x 22"	28 1/2" x 28 1/2"	190lb	811.23.0

NOTE:
ATTACH 3 FEET OF NO. 8 BONDING WIRE FROM COVER TAB TO BONDING BOLT ON FRAME. ATTACH SUFFICIENT LENGTH OF NO. 8 BONDING WIRE FROM BONDING BOLT ON FRAME TO THE BONDING WIRE ROUTED THROUGH THE PULL BOX

DRAFT

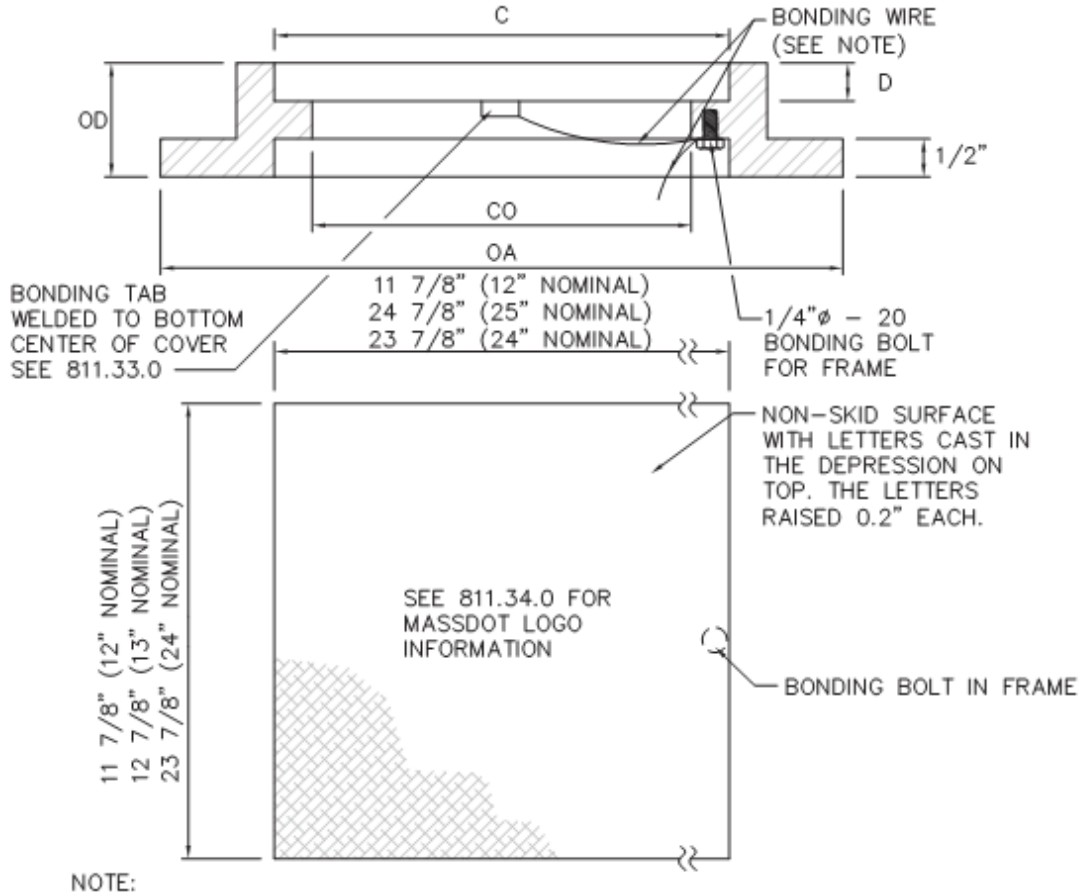
massDOT Highway
SIGNALS & LIGHTING

PULL BOX FRAME & COVER
NON ROADWAY

DATE ISSUED JUL 13, 2012
DRAWING NUMBER 811.31.1
811.32.1
OLD DRAWING NUMBER

ITEM 815.1 (Continued)

16



NOTE:
1. ATTACH 3 FEET OF NO. 8 BONDING WIRE FROM COVER TAB TO BONDING BOLT ON FRAME. ATTACH SUFFICIENT LENGTH OF NO. 8 BONDING WIRE FROM BONDING BOLT ON FRAME TO THE BONDING WIRE ROUTED THROUGH THE PULL BOX.
2. WHEN INSTALLED IN ROADWAY, COVER SHALL BE BOLTED DOWN PER MANUFACURERS REQUIREMENTS.

SIZE OF COVER	COVER DEPTH	OVERALL DEPTH	CLEAR OPENING	OVERALL	APPROX. WEIGHT	STANDARD DRAWING
C	D	OD	CO	OA	W	
12" x 12"	1"	3 1/2"	10 1/2" x 10 1/2"	17 1/4" x 17 1/4"	89lb	811.31.0
13" x 25"	1 1/2"	3"	12" x 24"	20" x 29 3/4"	159lb	811.22.0 811.32.0
24" x 24"	1"	3"	22" x 22"	28 1/2" x 28 1/2"	463lb	811.23.0

DRAFT

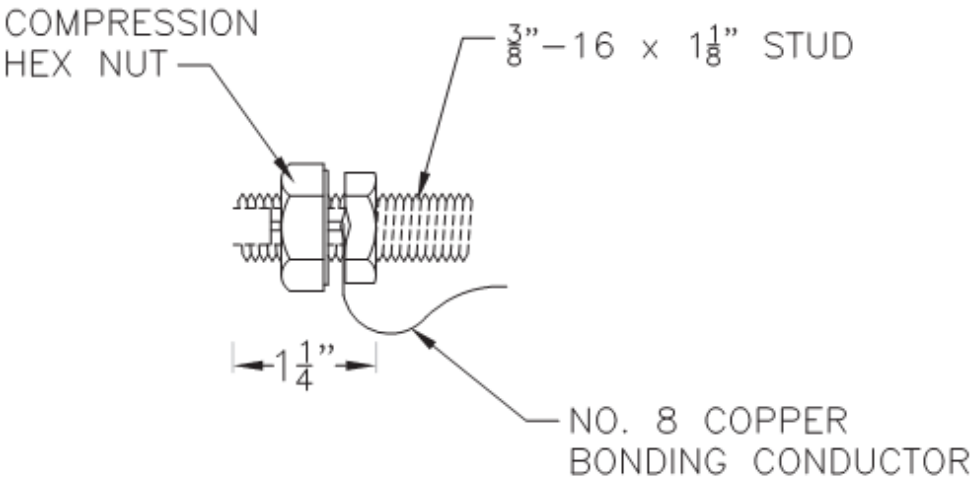
massDOT Highway
SIGNALS & LIGHTING

PULL BOX FRAME & COVER
H-20 & HS-20 LOAD

DATE ISSUED JUL 13, 2012
DRAWING NUMBER 811.31.2
811.32.2
OLD DRAWING NUMBER

ITEM 815.1 (Continued)

19



NOTES:
1. BONDING POST CONNECTOR SHALL BE LONG STUD TYPE WHICH WILL ACCOMMODATE A DOUBLE CONDUCTOR INSTALLATION.
2. ATTACH 3 FOOT LENGTH OF NO. 8 COPPER BONDING CONDUCTOR FROM BONDING POST CONNECTOR INSTALLED ON COVER TO BONDING POST CONNECTOR INSTALLED ON FRAME.
3. ATTACH FREE END OF BONDING CONDUCTOR ROUTED THROUGH CONDUIT SYSTEM TO BONDING POST CONNECTOR INSTALLED ON THE FRAME.
4. LUG SHALL BE EITHER COPPER OR BRASS.

DRAFT

massDOT Highway SIGNALS & LIGHTING	BONDING LUG	DATE ISSUED JUL 13, 2012 DRAWING NUMBER 811.33.0 OLD DRAWING NUMBER

ITEM 815.1 (Continued)

Manual Override
Provisions shall be made for manual override of the traffic controller. Manual override equipment shall include an automatic-manual switch and interval advance hand-push button switch, both located within the auxiliary police door.

Hand-push button switch shall have flexible cord of sufficient length to allow movement by the operator to observe the operation of the intersection from the controller cabinet.

Wiring and Service Connections
All conduit runs shall be sealed with an approved sealing compound at all manholes, handholes, pull boxes, junction boxes, cabinets and foundations to form a complete duct system. Sealing foam materials shall not be accepted on this contract.

Fine Tuning, Adjustment, and Testing Period
After the Contractor has finished installing the controllers and all other associated signal equipment and after the Contractor has set the signal equipment to operate as specified in the Contract Documents, the fine tuning, adjusting and testing period shall begin. During this period, the Contractor under the direction of the Engineer will make necessary adjustments and tests to ensure safe and efficient operation of the equipment. This period shall not last for more than 30 days. No request for final acceptance will be considered until successful completion of the testing period.

The cost of electrical energy consumed by the operation of the traffic signal during the construction, fine-tuning and testing until final acceptance of the signal shall be borne by the Contractor.

Guarantee After Final Acceptance
The Contractor shall diagnose (trouble-shoot) the system and, at his own expense, replace any part of the traffic signal control equipment found to be defective in workmanship, material or manner of functioning within six months from the date of final acceptance of the installations under this Contract. This requirement does not affect the one-year warranty period on equipment specified in Subsection 815.20 of the Standard Specifications.

Upon the date of acceptance of the project by the Department, the Contractor shall turn over all guarantees and warranties to the Department Engineer.

ITEM 815.1 (Continued)

Accessible Pedestrian Push Button
The pedestrian accessible pushbutton shall provide valuable information and cues via both a vibrating arrow button and audible sounds making the intersection accessible for all pedestrians.

The accessible pedestrian pushbutton shall be installed at a maximum of 42 inches above the finished sidewalk, the pushbutton shall be raised from or flush with their housings and shall be a minimum of 2 inches in the smallest direction. The force required to activate the controls shall be no greater than 5 pounds.

All sounds shall emanate from the unit via a weather-proof speaker that is protected by a vandal resistant screen. The accessible pedestrian pushbutton shall provide the following operating functions:

- Audible Locator tone tells the pedestrians that the intersection is equipped with accessible pedestrians pushbutton and where it is.
- Acknowledge tone, tells the pedestrians that they have places the call.
- Informational message tells the pedestrians about the crossing.
- Walk Cycle message, tells the pedestrians when the Walk Sign is one. Each board has three walk cycle messages; Chirp, Cuckoo, or Custom message.
- Visual: A red LED is lit when the pedestrians have placed a call.
- Tactile: The directional vibro-tactile arrow becomes active with the Walk Sign.

Pedestrian pushbuttons shall be located as close as practicable to the sidewalk curb ramp serving the controlled crossing and shall permit operation from a clear ground space. If two crosswalks, oriented in different directions, end at or near the same location, the positioning of pedestrian pushbuttons and/or legends on the pedestrian pushbutton signs shall clearly indicate which crosswalk signal is actuated by each pedestrian pushbutton. Pushbuttons shall be separated by a minimum 10 foot distance per MUTCD Fig 4E-4. The 9”x15” standard sign (R10-3e) shall be integral to the pushbutton assembly or mounted immediately above the button.

A maximum mounting height of 42 inch above the finish sidewalk grade shall be used for accessible pedestrian pushbuttons. The pushbuttons shall be located within 10 inches of the back of sidewalk.

Wiring Diagrams (Permanent Signal Control Installation)
Five sets of wiring diagrams for each control cabinet and all accessories shall be furnished including one Mylar reproducible copy and an electronic CAD file for each control cabinet when installed. All actual and potential terminal strip connections shall be shown. Accessory equipment includes flashers, switches, relays, detectors, etc.

All identification on the diagrams shall be as installed, and all field labeling shall be consistent with the diagrams. Furthermore, the format symbols, identifications, operating sequence, etc., common to all the intersection wiring diagrams shall be standardized and consistent with industry standards. Before acceptance of the job, the five copies of all operating and maintenance manuals and complete and accurate parts lists shall be supplied.

ITEM 815.1 (Continued)

Traffic Signal LED Module

All signal and pedestrian displays shall be equipped with LED signal modules. All red, amber, green, and pedestrian signal housings with the exception of optically programmed and fiber optic housings and shall conform to the following where applicable:

- ITE's Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Arrow Traffic Signal Supplement, Dated July 1, 2007
- ITE's Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Circular Signal Supplement, Dated June 27, 2005.
- ITE's Pedestrian and Countdown Signal Modules Compliant to PTCSI - Part 2 Light Emitting Diode (LED), Dated, February 2011
- On the MassDOT Traffic Signal Approved Equipment List

For an LED module to installed on this project, the LED module shall have approval from the MassDOT Traffic Control Products Approved Equipment Committee and be included on the Traffic Control Products List prior to the date of this proposal.

To prevent the LED module warranty from being voided, the connecting leads on the module shall not be cut. The original LED module leads shall be connected to the signal head terminal block as continuous wire without splices.

The LED signal module will be replaced or repaired by the manufacturer if it exhibits one of the following:

- A failure due to workmanship or material defects within the first 60 months of field operation.
- A greater than 40 percent light output degradation or a fall below the minimum intensity levels (as defined by the latest ITE performance specifications) within the first 36 months of field operation

Wire Loop Installed in Pavement

The wire loop detectors shall consist of 6 x 20' width or other sizes as shown on the plan, installations as specified on plans and shall conform to the relevant specifications as detailed on the general plan detail sheet and to the standard segmented loop detail sheets in the plans. Wire loop detectors shall be tested in accord with 815.66 of the Standard Specifications.

The meter used for these tests shall be checked for calibration each day of use by using a resistor block of ±5% resistors simulating loads of 1 megohm, 20 megohm and 100 megohms. The observed meter reading shall be ±10% of the nominal resistor load.

Vehicle Loop Detectors

Wire loop detectors shall be installed in the roadway pavement for vehicle detection at locations shown on the plans.

The detector lead-in cables shall be labeled, with the street name, phase, detector number and terminal numbers, both in the controller unit and in the pull box containing the detector lead-in splice. This labeling and attachment shall be of durable materials such as brass or plastic, attached by wire or plastic ties. Adhesive attachment of the label shall not be acceptable.

ITEM 815.1 (Continued)

Loop wire shall be encased in a protected plastic tubing of PVC or polyethylene plastic, IMSA 51-5, 6 mm outside diameter, and the wire may have cross-linked polyethylene insulation or it may have THHN/THWN insulation.

The heat source for soldering shall be electrical, not exceeding 30W capacity.

Splicing insulator shall be an approved re-enterable body splice kit with a non-hardening silicone gel sealing compound compatible with the wire insulation.

Splice and Connection
Splicing and connection shall be made in the pull box nearest the roadway loop sensor but not exceeding four loops per pull box. All loops included in a detector group as shown on the plans shall be spliced in a single pull box. Each lead and lead-in connector shall be stripped back and spliced using a pressure type wire connector applied with a crimping tool. Multiple loop sensors shall be identified as detailed on the plans.

Lead-in splicing shall be staggered to prevent contact with each other. Each crimped splice shall be soldered and insulated. The insulation material shall be heat-shrunken polyolefin. The shielded lead-in cable outer jacket and shield shall be stripped back sufficiently to ensure that the shield cannot come into contact with the spliced conductors. Splice hangers shall be provided in each pull box.

Follow the instructions of the kit manufacturer for this procedure when installing the re-enterable splice kit. The above splice shall be done on the day of the loop wire installation to prevent the entrance of any moisture into the plastic tubing.

The lead-in conductors shall be connected to the appropriate terminals in the controller cabinet, by using crimped and soldered terminal ends. The heat source for soldering shall be electrical not exceeding 30W capacity.

The loop detector installations shall include all wire, conduits, saw cuts and the correct number of turns. Corners shall be drilled not mitered. All wires shall be placed in a single saw cut as shown on the plans.

Testing of Loops
The following test procedure shall be performed in the presence of the Engineer before and after the loop sensor is sealed in the pavement as detailed below. The cost of equipment, labor, and materials to perform such testing and similar re-testing following repairs, replacement, or adjustment of any detector within the project area shall be included in the contract unit price for this Item.

After installation of wire loop sensors in the roadway and installation of shielded lead-in connecting the loop sensors to the controller cabinet each loop sensor and lead-in combination shall be tested (at the controller cabinet) for proper installation. The resistance from lead to lead of the same loop shall not exceed three (3) ohms per one thousand (1,000) feet as measured by a high quality meter suitable for measurements of low resistance in the range of 1 to 6 ohms.

ITEM 815.1 (Continued)

A megohm meter test at 500 volts DC shall be made between the two leads of a loop/lead-in combination temporarily spliced together, but otherwise disconnected from all terminals, and the shield drain wire and the earth ground connection. These resistances shall be at least one hundred (100) megohms.

A megohm meter test at 500 volts DC shall be made between lead-in shield and the earth ground rod. This resistance shall be at least one hundred (100) megohms.

The meter used for these tests shall be checked for calibration each day of use by using a resistor block of ±5% resistors simulating loads of 1 megohm, 20 megohm and 100 megohms. The observed meter reading shall be ±10% of the nominal resistor load.

If any loop sensor and lead-in combination fail to pass any one of the four (4) tests, it shall be repaired and then re-tested on two occasions at least two (2) weeks apart, and then shall pass on each re-test occasion. If the loop sensor lead-in combination does not pass all these re-tests, a new loop sensor and/or lead-in shall be installed, and shall pass these tests, at no additional cost.

After the above tests have been satisfactorily completed, all loop sensor/shielded lead-in inductances shall be measured and a written report of the results shall be filed with the Engineer and a copy stored with the “box prints” at the intersection.

EMERGENCY VEHICLE PRE-EMPTION

All new controller units furnished under this contract shall be capable of providing emergency vehicle preemption. The controller units will have the capability of interfacing with and accepting input from the optical emergency preemption systems at each location.

When optical energy impulses are received at the intersection, control of the signals shall transfer to the controller's internal pre-emption logic which shall cause the signal controller to show a selected display identical to one of the color interval displays normally available as specified, which will assist the emergency vehicle through the intersection without cross street conflict. After the vehicle has passed through the intersection, control of the signals shall then return to normal operation which shall restore the appropriate timings that were in effect prior to pre-emption.

The following description of work specifies the responsibilities involved in the installation of optical emergency vehicle pre-emption.

The Contractor is required to supply material and labor required or shown for the complete installation of optical pre-emption equipment at this project. Intersection pre-emption equipment required includes optical detectors, cable, interfacing equipment to the controller, making electrical connections and all required incidentals. The Contractor shall contact the Stoughton Fire and Police Departments to ensure compatibility of the equipment and supply new emitter devices on emergency vehicles as needed.

ITEM 815.1 (Continued)

The following are the operational requirements of the optical emergency vehicle pre-emption system:

Emergency Vehicle Design Speed for pre-emption controlled approaches shall be 50 miles per hour (mph) for the intersection of Washington Street at York Street.

Operating sequence as specified shall be initiated when the optical detector receives optical energy of the required repetition rate from an emitter.

Detector shall transform the optical energy signals into electrical signals and transmit the electrical signals to the controller for processing.

Controller shall not respond to optical energy signals from another authorized vehicle.

The optical detector cable shall meet the specifications of the system manufacturer.

The Contractor and owner personnel in the procedures of installation.

The Contractor shall be available to assist, supervise and check all wiring to insure proper operation.

The Contractor shall perform a final check out to include initial adjustment of range and timing to acceptable standards.

The Contractor shall demonstrate the system and instruct the drivers of emergency vehicles and other authorities in the operation of the system.

The Contractor shall instruct maintenance personnel in routine maintenance and minor troubleshooting of the system.

Any operation problems occurring within the next 30 days shall be corrected by the Contractor.

The cost of these field supervision and turn-on services shall be included in the Lump Sum Bid Price, and no additional payment shall be made, therefore.

ITEM 815.1 (Continued)

Pre-emption System Design and Documentation shall include the following:

1. Provide the installing agency with location for detector installation.
2. Provide the controller manufacturer, engineer and owner with electrical diagrams.
3. The installer shall install the equipment consistent with the pre-emption equipment, the manufacturer's recommended installation procedures and electrical diagrams in a neat and workmanlike manner.
4. The pre-emption equipment manufacturer shall be responsible for operational checkouts of the specified pre-emption functions prior to final acceptance and approval by the Engineer.

Operating checkouts include the following:

1. Verifying that priority system timing and range are properly set.
2. Pre-emption equipment warranties are put into effect.

SIGNAL HOUSINGS

The housings shall be 12-inch LED Type and shall be listed on the MassDOT "Approved Equipment" list. 5-inch louvered backplates with a 3 inch retroreflective yellow border shall be provided on all signal heads or as noted on the plans. All indicators shall be equipped with a standard cut-away tunnel visor.

Signals shall be rigidly mounted by means of approved hardware. All signal heads mounted overhead on mast arms shall be installed, with the bottom of the signals at the same height.

The Contractor shall modify any signal head location that is visibly obstructed to a motorist or pedestrian by overhead streetlight posts or other obstructions as determined by the Engineer. The mounting hardware shall be submitted for approval in the form of shop drawings prior to purchase and installation. The contractor will assume the cost of equipment purchased without the proper
approval by MassDOT. Warranty on all mounting hardware shall not be less than 60 months from the date of installation and acceptance by MassDOT and the Town of Stoughton.

The final adjustment of the facing of signals shall be made as directed by the Engineer after all the signals are operating, but prior to installing the through bolt above.

ITEM 815.1 (Continued)

COUNTDOWN PEDESTRIAN SIGNAL HEADS AND INDICATIONS

This Special Provision refers to definitions and practices described in "Pedestrian Traffic Control Signal Indications" published in the Equipment and Materials Standards of the Institute of Transportation Engineers, referred to in this document as "PTCSI."

Countdown Pedestrian Signal Indications shall be 16-inch with a cap visor and international symbolic full "WALKING MAN" and "HAND" signal display. The symbolic "HAND" shall consist of a Portland Orange LED upright full hand symbol conveying the don't walk message.

The symbolic "WALKING MAN" shall consist of white LED full walk symbol and shall overlay the HAND. Next to the pedestrian control symbols on the right, shall be double digit red LED's for pedestrian phase countdown. The countdown module shall display the number of seconds.

All pedestrian signals shall be a one-piece unit containing both the LED "HAND" and "WALKING MAN" and the LED Countdown fixture in the same unit.

Countdown Pedestrian Signals shall be in conformance with the MUTCD, latest edition, and shall be listed on the MassDOT "Approved Equipment" list.

Compensation
Item 815.1 will be paid for at the contract unit price, Lump Sum. This price shall include all labor, materials, equipment, removing, stacking, transporting the existing equipment, maintenance of the proposed traffic signal equipment until final acceptance and providing temporary signal system as required, repairs and replacements required to produce a fault-free traffic control system, and incidentals required to complete the work.

Conduit will be paid under Item 804.3.

Handholes and pull boxes associated with traffic signal system will be paid for under Items 811.22 and 811.31, respectively.

ITEM 852.11	**TEMPORARY PEDESTRIAN BARRICADE**	**FOOT**
ITEM 852.12	**TEMPORARY PEDESTRIAN CURB RAMP**	**EACH**

Work under these items consist of furnishing, deploying, maintaining in proper operating conditions, and removing temporary pedestrian barricades and temporary pedestrian ramps as part of a Temporary Pedestrian Access Route (TPAR) in order to guide pedestrians around a fully- or partially-closed sidewalk. These devices are intended to prevent pedestrians from entering the work area and to prevent pedestrians from inadvertently entering the vehicle travel lane by providing visual and physical separation between each space.

ITEM 852.11 and **ITEM 852.12** (Continued)

MATERIALS

The Temporary Pedestrian Barricade shall have a continuous bottom rail or edge no more than two (2) inches above the ground and eight (8) inches in height (minimum) to accommodate cane users, have a smooth and continuous hand railing along the top edge no less than 32 inches above the ground and not obstruct or project into the pedestrian path of travel. Barricade walls shall be nearly vertical and generally within the same plane.

If exposed to traffic, Temporary Pedestrian Barricades shall be crashworthy.

The Temporary Pedestrian Curb Ramp shall provide a 48 inch minimum width, with a firm, stable, and non-slip surface. Protective edging with a two (2) inch minimum height shall be installed when the curb ramp or landing platform has a vertical drop of six (6) inches or greater. The Temporary Pedestrian Curb Ramp walkway and landing area surface shall be of a solid, continuous, contrasting color abutting up to the existing sidewalk.

If a Temporary Pedestrian Curb Ramp leads to a crosswalk, a detectable warning pad must be used at the base of the ramp; if it leads to a protected path that does not conflict with vehicular traffic then a detectable pad shall not be used.

CONSTRUCTION METHODS

The Temporary Pedestrian Barricade shall be placed in an area that will provide pedestrians with a TPAR on a smooth, continuous hard surface for its entirety. The geometry and alignment of the facility shall meet the applicable requirements of the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities" and the Massachusetts Architectural Access Board.

The recommended width of the TPAR is 60 inches, but if constraints exist a minimum clear width of 48 inches shall be provided along its entirety. If a 60 inch width cannot be accommodated in full, a 60 inch by 60 inch passing space shall be provided every 200 feet or less along the TPAR.

Turning areas shall be 60 inches by 60 inches minimum.

Lateral joints between any surfaces shall not exceed 0.5 inches. Lateral edges may be vertical up to 0.25 inches high and shall be beveled at 1V:2H between 0.25 inches and 0.5 inches.

The TPAR shall be kept clear of debris, snow, and ice and the Temporary Pedestrian Barricades and Temporary Pedestrian Curb Ramps shall not obstruct drainage.

Removal and/or resetting of Temporary Pedestrian Barricades and Temporary Pedestrian Curb Ramps shall be considered incidental.

ITEM 852.11 and **ITEM 852.12** (Continued)

Compensation
Payment for Temporary Pedestrian Barricades will be made at the contract price per Foot installed in place, including all incidental items. This price shall include the cost of furnishing, installing, resetting, removal, and maintaining in good working condition.

Payment for Temporary Pedestrian Curb Ramps will be made at the contract price per Each unit installed in place, including all incidental items. This price shall include the cost of furnishing, installing, resetting, removal, and maintaining in good working condition.

ITEM 853.23 TEMPORARY BARRIER (TL-3) FOOT

Work under this item shall conform to the relevant provisions of Section 850 and shall consist of furnishing, installing, maintaining and final removal of TL-3 temporary barrier systems for channelization of traffic and/or work zone protection.

MATERIALS

The Contractor shall use a temporary barrier system that is listed on the Qualified Traffic Control Equipment List.
The Contractor may submit alternate materials to the Engineer for approval if the temporary barrier system meets the following criteria:

1. The system has been tested by an independent laboratory that is accredited by FHWA to crash test roadside hardware;
2. The system meets the minimum requirements of the AASHTO *Manual on Assessing Safety Hardware* (MASH) at Test Level (TL) 3 or higher; and
3. The system has a federal-aid eligibility letter from FHWA.

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 temporary barrier systems in conformance with the relevant provisions of Section 850.69 and shall be incidental to the temporary barrier systems.

Temporary impact attenuators that are listed on the Qualified Traffic Control Equipment List shall be used whenever a blunt end of the temporary barrier system is facing traffic within the clear zone unless it is protected by a second barrier system or secured to a separate barrier system or bridge railing by a method approved by the manufacturer.

ITEM 853.23(Continued)

CONSTRUCTION METHODS

Temporary barrier systems shall be placed in line with the drawings. Installation shall be per the manufacturer's specifications, details, and the approved shop drawings.

The Contractor shall not place any breaks in the temporary barrier system that will result in sections that are shorter than the stated minimum length-of-need (LON) under MASH Test 3-11. Exceptions shall be allowed for gate systems or changeable length segments placed over expansion joints if those barrier segment types have been tested and meet the minimum requirements of MASH Test 3-11 with the adjoining barrier system.

Within the LON section, temporary barrier systems shall only be placed on paved surfaces unless otherwise tested and certified under MASH TL-3 for those conditions.

Damage to the pavement surface caused by the temporary barrier during installation, while in service, and/or during removal shall be repaired as directed by the Engineer at the Contractor's expense.

Temporary barrier systems that require anchorage systems shall conform with the relevant provisions of Subsection 850.70.

Method of Measurement
Items 853.23 will be measured by the foot, in place.

Basis of Payment
Payment for work under these items will be made at the contract price per foot for temporary barrier installed in place, including all incidental items. This price shall include the cost of furnishing, installing, maintaining and final removal of all temporary barrier systems.

For temporary barrier systems that require anchorage systems, the cost of furnishing and installing 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 the item.

ITEM 853.8 TEMPORARY ILLUMINATION FOR WORK ZONE DAY

The work under this item shall conform to the relevant provisions of Subsection 850 of the Standard Specifications and the following:

The use of temporary portable light towers shall be limited to balloon diffuser systems.

These portable light towers shall be used throughout the project area for temporary work zone lighting. The use of unshielded wattage flood lights shall not be permitted.

The portable balloon light tower shall be used, relocated, and adjusted to meet the criteria in Subsection 850 of the Standard Specifications.

ITEM 853.8 (Continued)

Method of Measurement and Basis of Payment
Item 853.8 will be measured and paid for at the Contract unit price per Day. This cost shall include all labor, materials, equipment, tools, and all incidentals required for the installation of work zone lighting equipment. This shall include, but not limited to, wiring connections, equipment relocations and include all material and labor incidental to meet a complete and functional and operational system. The price of this system shall include any possible fabrication and installation of luminaires.

The per day price shall be full compensation for all "Temporary Illumination for Work Zone" regardless of the number of concurrent work areas, amount of equipment concurrently in use, or the durations of or changes of the work shifts per day.

Installation and modifying the existing setup shall be incidental to Item 853.8.

ITEM 859.1 REFLECTORIZED DRUMS WITH SEQUENTIAL FLASHING WARNING LIGHTS DAY

The work under this Item shall conform the relevant provisions of Subsection 850 of the Standard Specifications and the following:

Work under this item consists of furnishing, installing, maintaining in proper operating conditions, and removing reflectorized drums, and any necessary ballast, equipped with sequential flashing warning lights.

MATERIALS

Reflectorized drums shall be listed on the MassDOT Qualified Traffic Control Equipment List. Reflective sheeting on drums shall meet or exceed ASTM D4956 Type VIII. All drums shall be maintained in a satisfactory manner including the removal of oils, dirt, and debris that may cause reduced retroreflectivity.

The Contractor shall use one of the following sequential flashing warning light systems unless otherwise approved by the Engineer:

1. Empco-Lite LWCSD.
2. pi-Lit® Sequential Barricade-Style Lamp; or
3. Unipart Dorman SynchroGUIDE.

Sequential flashing warning lights shall be secured to reflectorized drums per the light manufacturer's specifications.

CONSTRUCTION METHODS

The first ten (10) drums in any merging or shifting taper as designated in the Temporary Traffic Control Plan shall be equipped with sequential flashing warning lights. These lights shall be operating, at a minimum, between dusk and dawn when the taper is deployed.

ITEM 859.1(Continued)

The successive flashing of the sequential warning lights shall occur from the upstream end of the merging or shifting taper to the downstream end of the taper in order to identify the desired vehicle path. Each warning light in the sequence shall be flashed at a rate of not less than 55, nor more than 75 times per minute.

Warning lights shall be powered off when drums are not deployed in a taper.

Method of Measurement
A group of ten (10) reflectorized drums with sequential flashing warning lights is considered one (1) unit and will be measured by the day. Each period of up to 24 hours during which this unit is in use will be measured as one day regardless of the number of times that the drums are positioned, repositioned, removed, or returned to service.

Basis of Payment
Reflectorized Drums with Sequential Flashing Warning Lights will be paid for at the contract unit price per day, which shall include full compensation for furnishing, positioning, repositioning, and removing the group of ten (10) drums as directed by the Engineer.

ITEM 864.1 GREEN FRICTION SURFACE FOR BIKE LANES SQUARE FOOT

The work under this item shall conform to the relevant provisions of Subsection 860 of the Standard Specifications and the following:

This work shall consist of furnishing and placing a Green Friction Surface (GFS) for bicycle safety, for bike lanes and other areas as identified in the Contract Drawings.

The GFS shall be comprised of furnishing and installing a green color surface per Manual of Uniform Traffic Control Devices (MUTCD), and as shown on the plans.

The acceptable manufacturers and products and/or an equal manufactured product are as follows:

DBI Services
Epoxy binder with recycled & colorized aggregates (Green)
Description: Installer of bicycle lanes using epoxy binder system with green for bicycle lanes or red for transit lane systems.
Contact: Richard Baker (rbaker@dbiservices.com)
(804) 213-0335
100 North Conahan Drive
Hazleton, Pennsylvania 18201
http://www.dbiservices.com/demarcation-colorized-pavement

ITEM 864.1 (Continued)

Traffic Calming USA
TrafficGrip (Coated Stone – Color Coated Aggregates)
Resin-based binder with color aggregate binding system
Description: TrafficGrip bike lane green stone is applied using epoxy. Our product is warranted for 4 years against UV fading (*Link: TrafficGrip Colored aggregate data sheet pdf).*
Contact: Glyn Owen (glyn@trafficcalmingusa.com)
(770) 550-4044
317 A, NorthPoint Parkway
Acworth, Georgia, 30102
http://trafficcalmingusa.com/coloredstone.html

Ennis-Flint
CycleGrip®MMAX
Methyl-Methacrylate (MMA)
Description: Green color lane surface ideal for long lane areas with low to high vehicle traffic including cross-over points such as parking lot entries/exits along the corridor.
Contact: Scott Seeley (sseeley@ennistraffic.com)
(800) 331-8118 ext. 3619
115 Todd Court
Thomasville, NC 27360
http://www.ennisflint.com/Products/Colored-Bike-Lanes/Cyclegrip

Ennis-Flint
PreMark
Pre-formed Thermoplastic
Description: Green color lane surface ideal for intersections, bike boxes, and conflict points with high volumes of vehicle traffic and lane crossings.
Contact: Scott Seeley (sseeley@ennistraffic.com)
(800) 331-8118 ext. 3619
115 Todd Court
Thomasville, NC 27360
http://www.ennisflint.com/Products/Colored-Bike-Lanes/PreMark-Bike-Lane-Green

Transpo Industries, Inc.
Color-Safe®
Methyl-Methacrylate (MMA)
Description: Color-Safe® is your solution for long lasting bike paths, bus lanes, crosswalks, and pedestrian areas. It is an MMA based material that outperforms paint and epoxies in color retention and durability. Color-Safe® is available in standard and custom PMS colors and capable of full cure in a wide range of temperatures.
Contact: Michael S. Stenko (Mstenko@transpo.com)
(914) 636-1000
20 Jones Street
New Rochelle, NY 10801
http://www.transpo.com/color-safe/index.html

ITEM 864.1 (Continued)

QUALITY CONTROL

A. General

The installer shall submit a minimum of three projects with the owner's contact information on which Green Friction Surface for Bike safety has been placed within the past three years. An installer who does not meet this minimum shall be allowed if they are certified by the manufacturer to install and a manufacturer's representative is onsite during installations.

B. Quality Control (QC) Plan

The QC plan for furnishing and installing the Green Friction Surface shall detail installer's key personnel, equipment, materials, proposed methods of installation, materials blending procedures, monitoring of ambient temperature, proposed methods of curing and corrective action plan. The Contractor shall submit a QC plan with any pertinent shop drawings and product literature and materials safety data to the Engineer for approval at least 30 days prior to placement of the Control Section.

C. Control Section

The Contractor shall construct a control section with a minimum area of one square yard to represent The Green Friction Surface for Bike Lane. The green color, the surface texture, materials and installation, shall be presented for acceptance and approval by the Engineer prior to installation. The control section may be constructed as a Green Friction Surface on the project and if accepted may remain as part of completed work.

EQUIPMENT AND APPLICATION REQUIREMENTS

A. Construction Requirements

A manufacturer's representative shall be present at the jobsite during construction of the control section. All construction operations shall meet the manufacturer's recommendations. Final approval will be given by the Engineer.

B. Weather Limitations

Green Friction Surface for Bike Lane shall not be placed on any wet surface or when the ambient temperature and humidity or the pavement temperature is below the manufacturer's recommendations or when the anticipated weather conditions would prevent the proper application and curing of the surface treatment as directed by the manufacturer's representative.

ITEM 864.1 (Continued)

C. Surface Preparations

The surface shall be clean, dry and free of all dust, oil, debris and any other material that might interfere with the bond to the existing surface as recommended by the manufacturer's representative. The manufacturer's specification shall control the installation on any new HMA pavement paved in the previous 30 days with motor vehicle traffic or 60 days without motor vehicle traffic.

The contractor shall pre-treat any joints and cracks per the manufacturer's recommendation.

All existing edge line pavement markings that are adjacent to the GFS location shall be covered and protected as approved by the Engineer prior to performing surface preparation. GFS shall not be placed over existing pavement markings or rumble strips. Lane line pavement markings that conflict with the GFS installation shall be removed by methods approved by the manufacturer's representative. Any existing edge line pavement markings that are damaged during the GFS application process shall be replaced at the contractor's expense per direction of the Engineer.

GFS shall be allowed to cure for the minimum duration as recommended by the binder component supplier's specifications and during that time the application area shall be closed to all vehicles and contractor's equipment traffic. After placement and cure of the GFS, the Contractor shall test the finished surface to detect unbonded areas.

Excess and loose aggregate shall be removed from the traveled way and shoulders in such a way that the GFS is not damaged or disturbed. Excess aggregate that can be reused shall be clean, uncontaminated and dry, if it is to be re-used in the GFS application.

Utilities, drainage structures, curbs and any other structures within or adjacent to the treatment location shall be protected against the application of the GFS materials.

D. Surface Friction

The Contractor shall meet as a minimum the friction value for the surrounding pavement surface.

E. Application Methods

GFS shall be applied in accordance with the manufacturer's recommendations. The GFS can be applied by either mechanical or manual techniques.

ITEM 864.1 (Continued)

Method of Measurement
Item 864.1 will be measured for payment by the total Square Foot area of Green Friction Surface for Bike Lane and shall be the actual number of square feet furnished and installed as required by the Engineer.

Item 864.1 will be paid for at the contract unit price per Square Foot. This price shall be full compensation for all labor, materials, tools, equipment, testing and incidental items required to complete the work.

ITEM 864.31 SLOTTED PAVEMENT MARKER ONE WAY WHITE EACH
ITEM 864.35 SLOTTED PAVEMENT MARKER TWO-WAY YELLOW/YELLOW EACH

The work under these items shall be done in accordance in accordance with the relevant provisions of Section 860, the relevant provisions of 1996 Traffic Standard Drawing TR.6.3 "Typical Pavement Markings for Freeways", the construction plans and the following.

The work to be done under these items consists of furnishing and installing one-way white and two-way white/red reflectorized pavement markers (slotted in pavement)

Markers shall be installed along the broken white lane lines (skip lines) at the midway point between successive skip lines at **80 foot intervals** on the mainline.

CONSTRUCTION METHODS

The work shall include cutting the tapered pavement slot to the dimensions shown on the typical details for the one-way or two-way markers, application of the manufacturer's recommended epoxy adhesive, and placing the reflectorized pavement marker in the proper position within the slot so that the reflective face is visible and perpendicular to oncoming traffic and so that the top of the marker is set 1/8± inch below the top of the adjacent pavement.

Surface preparation and installation shall be strictly in accordance with the manufacturer's instructions.

MATERIALS

Reflectorized pavement markers shall be 3M Series 290, Ennis-Flint Stimsonite C80, Ray-O-Lite Model 2004 or an approved equal.

ITEM 864.31 and **ITEM 864.35** (Continued)

Method of Measurement
The number of one-way white and two-way yellow/yellow reflectorized pavement markers (slotted in pavement), completely furnished and installed, will be measured by the Unit Each as a complete installation.

Basis of Payment
One-way white and two-way yellow/yellow reflectorized pavement markers (slotted in pavement) will be paid at the contract unit price each under Item 864.31 and Item 864.35 respectively, and shall include cutting the tapered pavement slot, furnishing and installation of the reflectorized markers, including all necessary materials, labor, incidentals, and equipment to complete the work.

ITEM 874.2 TRAFFIC SIGN REMOVED AND RESET EACH

The work under this Item shall conform to the relevant provisions of Subsection 840 of the Standard Specifications and the following:

The Contractor shall carefully remove all existing signs, attachment hardware and sign support posts as shown on the drawings and reset as directed by the Engineer. Existing foundations shall be removed to a depth of at least 6 inches below the existing ground and the holes backfilled with gravel. The surface shall be patched with a material to match the existing ground or as directed by the Engineer.

Signs and attachment hardware shall be satisfactorily stored and protected until reset in the proposed work. Sign support posts shall be disposed of in a satisfactory manner. New sign support posts shall be provided as called for under Item 847.1 as applicable.

Signs and attachment hardware 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 sign shall be mounted in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and the 1990 Standard Drawings for Signs and Supports. Sign panels shall be cleaned before being reset.

Method of Measurement
Item 874.2 will be measured for payment by the Each, complete in place.

Basis of Payment
Item 874.2 will be paid for at the Contract unit price per Each. This price shall include all labor, materials, equipment, dismantling, storing and resetting of the signs as designated above, the excavation and disposal of the existing foundation, the supplying and placing of compacted gravel backfill where foundations and posts are removed and the patching of the existing surface, and incidentals required to complete the work.

ITEM 874.7 MISCELLANEOUS SIGN REMOVED AND STACKED EACH

The work under this item shall conform to the relevant provisions of Subsection 828 of the Standard Specifications and the following:

The work includes dismantling, removing, transporting, and stacking miscellaneous private signs within the State Highway Layout Line and their supports as indicated on the Contract Drawings.

Signs shall be stacked at a location designated by the property owner and approved by the Engineer. The signs shall be stacked at a location on the property abutting the project, where the existing sign is present. The location shall be approved by the Engineer.

The existing foundation shall be removed in its entirety, backfilled with compacted gravel, and the holes restored. The sign panels and supports shall be stacked on boards.

Method of Measurement
Item 874.7 will be measured for payment by the Each sign removed and properly stacked.

Basis of Payment
Item 874.7 will be paid for per Each. This price shall include all labor, materials, equipment, dismantling, loading, transporting, stacking of the signs and their supports, the excavation of the existing foundations, placing compacted gravel backfill, the restoration or replacement in kind where foundations are removed, and incidentals required to complete the work.

ITEM 874.8 MISCELLANEOUS SIGN REMOVED AND RESET EACH

The work under this Item shall conform to the relevant provisions of Subsection 840 of the Standard Specifications and the following:

The work includes dismantling, removing, transporting, and resetting existing miscellaneous private signs, and their supports as indicated on the Contract Drawings.

The existing foundation shall be removed in its entirety, backfilled with compacted gravel, and the holes restored. The sign panels and supports shall be stacked on boards. The existing signs shall not be removed until the new signs and supports replacing them are ready for traffic or until the Engineer shall permit.

The Contractor shall carefully remove and reset at new locations all existing signs, attachment hardware and sign support posts not included under other sign items as shown on the drawings and as required by the Engineer.

Signs, attachment hardware and sign support posts shall be satisfactorily stored and protected until reset in the proposed work.

ITEM 874.8 (Continued)

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 materials at no additional cost. New attachment hardware shall be furnished and installed as necessary to replace any missing or unusable existing hardware.

Method of Measurement
Item 874.8 will be measured for payment by the Each sign removed and properly reset.

Basis of Payment
Item 874.8 will be paid for per Each. This price shall include all labor, materials, equipment, dismantling, loading, transporting and resetting signs and their supports, excavation of the existing foundations, new foundations, new supports and hardware, placing of compacted gravel backfill, restoration or replacement in kind where foundations were removed, and incidentals required to complete the work.

ITEM 950.5 TEMPORARY SUPPORT OF EXCAVATION LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsection 950 of the Standard Specifications and the following:

The Contractor shall furnish, install, maintain, and remove a temporary earth support system to be used in the excavation and construction of the four (4) proposed concrete gravity retaining walls from **STA. 31+64LT to STA. 34+58LT**.

The temporary earth support system shall be designed and constructed to allow the safe removal of existing structures, and construction of proposed structures and shall prevent damage to, or undermining of, the sides of excavations, roadways, driveways, and portions of existing structures to remain. The temporary earth support system is not intended to provide for control of water.

The temporary earth support system shall either consist of sheet pile walls, soldier piling and lagging, or any other system, which is approved by the Engineer. The approximate layout of the temporary earth support system is shown schematically on the Plans. It is the Contractor's responsibility to coordinate with DigSafe for any underground utilities before installing temporary earth support system to avoid any conflict and damage. The Contractor may relocate any underground utilities temporarily if it is feasible to do so to construct temporary earth support system.

Existing overhead service wires to abutting properties may interfere with the installation of the temporary earth support system. The Contractor may relocate overhead service wires if it is feasible to do so to construct the temporary earth support system. The Contractor shall coordinate the need to temporarily relocated overhead service wires to abutting properties with National Grid directly and will be responsible for any associated costs for the temporary service relocation.

ITEM 950.5 (Continued)

Due to the proximity of the proposed temporary earth support to existing structures located at 198 Washington Street, a ground monitoring survey program shall be performed to monitor for settlement or lateral movement of the existing structures at that location. The ground monitoring survey shall be performed at a frequency and for the duration specified in Item 194 – Ground Monitoring Survey. The ground monitoring survey program shall be paid for under Item 194.

Temporary earth support that is installed below the elevation of the bottom of the wall footings or adjacent building footings shall not be removed. The temporary earth support shall be cut off at or above the elevation of the bottom of adjacent footings with the remainder of the temporary earth support abandoned in place.

The temporary earth support system at locations shown on the plans shall be fully designed by the Contractor to carry all the applicable AASHTO loads. It shall be designed in accordance with the AASHTO Guide Design Specifications for Bridge Temporary Works, 1995, and all interims published as of the bid opening date.

The Contractor is responsible for determining all geotechnical criteria associated with the temporary earth support system including lateral earth pressures, live load surcharge, surcharge due to construction equipment operation, surcharge due to temporary traffic barriers and/or surcharge due to material storage near the top of excavation. Maximum design stresses in steel members shall not exceed 125% of the allowable basic stresses specified in the current specifications of the American Institute of Steel Construction. The design shall provide for all anticipated load conditions that may occur during the entire construction period. The minimum factor of safety for each of the design conditions shall be 1.50.

The temporary earth support system must be designed and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. Complete detailed drawings and calculations shall be submitted to the Engineer for approval. Detailed drawings shall include all materials, sizes of members, connections, methods and sequence of installation. Any earth support system located along the roadway approaches and adjacent to concrete barriers shall be designed for a vehicular impact load equivalent to the Test Level, MASH TL-3 assuming the concrete barrier to impact the support system. Written approval must be obtained prior to installation of temporary earth support system. Furnishing such plans and calculations shall not relieve the Contractor of sole responsibility for safety of the public, personnel, equipment, and structures, as well as successful project completion.

ITEM 950.5 (Continued)

Basis of Payment
Item 950.5 will be paid for at the Contract unit price, Lump Sum. This price shall include all labor, materials, equipment, Contractor's design and plans, submittals, and all incidental costs required to complete the work.

Payment of 60% of the lump sum price of this item will be made upon complete installation and removal of demolition and construction of Stage 1.

The remaining 40% of the Lump Sum price of this Item will be paid complete removal of the earth support system after Stage 2 construction, not to be left in place, and accepted by the Engineer.

ITEM 983.31 COMPOST AND SEED OVER MODIFIED ROCKFILL SLOPE SQUARE YARD

The work under this item shall conform to the relevant provisions of Subsection 983 of the Standard Specifications and the following:

Work under this Section consists of furnishing, and installation of modified rockfill on steep slopes at locations noted on the Plans.

Modified Rockfill shall conform to the requirements in Section M2.02.4 of the Standard Specifications.

Compost shall conform to the requirements in Item 751.7 – Compost Blanket.

Seed shall conform to the requirements in Section 765 of the overall project specifications.

Modified Rockfill shall be constructed in accordance with Section 983.66 of the Standard Specifications. Modified Rockfill shall be placed at a depth of 24-inches over 8-inches of crushed stone, as detailed on the Plans.

Compost mulch shall be spread over the modified rockfill to fill voids and is at the surface of the stones (not all stones will be covered). Once the compost is placed, seed shall be placed over the slope.

Placement of compost mulch shall be as shown on the plans and as directed by the Engineer. Compost mulch material may be placed hydraulically. Material shall be placed at approximately 6 inch (150 mm) depth (0.15 cy/SY).

Seed shall be broadcast over mulch in a two-step process with the mulch placed first, followed by seeding. Alternatively, compost and seed may be applied in one operation using equipment designed for this application. Equipment must be approved by Engineer.

ITEM 983.31 (Continued)

Method of Measurement
Item 983.1 will be measured for payment by the Square Yard of slope constructed and approved.

Basis of Payment
Item 983.1 will be paid for at the Contract unit price per Square Yard. This price shall include all labor, materials, equipment, seed, modified rockfill, grading, excavation, and incidentals required to complete the work.

Crushed stone will be measured and paid for under Item 156.

Geotextile Fabric will be measured and paid for under Item 698.3.

Compost Blanket will be measured and paid for under Item 751.7.

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DETAIL SHEETS

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CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)
Project File No. 613358
In the Town of Stoughton
Norfolk County
Federal Aid Project No. NHP(NHS)-003S(829)

ESTIMATE OF QUANTITIES DETAIL SHEETS

January 30, 2025

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
TEN PARK PLAZA – BOSTON, MA

- ESTIMATE OF QUANTITIES – DETAIL SHEETS -

CITY/TOWN: Stoughton YEAR: 2025
STATIONING: 11+45 TO 38+10 ROAD: G.A.R. Washington St (Route 138)
CLASS: Principal Arterial
Type of Project: Transportation Improvement Project
DATE: January 30, 2025

Earth Excavation	6,900	Cu. Yards	Gravel Borrow	4,400	Cu. Yards
Class A Trench Excavation	580	Cu. Yards	Gravel for Sidewalks	430	Cu. Yards
Class “B” Trench Excavation	620	Cu. Yards	Gravel for Driveways	225	Cu. Yards
Class B Rock Excavation	90	Cu. Yards	Embankment +15%	2,431	Cu. Yards

PAVEMENT NOTES:

FULL DEPTH CONSTRUCTION: **TOTAL AREA = 4,987 SY**

SURFACE: 1.5” ASPHALT RUBBER GAP GRADED – 12.5 (ARGG-12.5) OVER
(ASPHALT EMULSION FOR TACK COAT 0.06-0.08 GAL/SY)

INTERMEDIATE: 1.5” ASPHALT RUBBER GAP GRADED – 12.5 (ARGG-12.5) OVER
(ASPHALT EMULSION FOR TACK COAT 0.06-0.08 GAL/SY)

BASE: 4.50” SUPERPAVE BASE COURSE – 37.5 (SBC-37.5) OVER

SUBBASE: 4.00” DENSE GRADED CRUSHED STONE OVER
8” GRAVEL BOTTOW, TYPE b

MILLING AND OVERLAY: **TOTAL AREA = 8,320 SY**

SURFACE: 1.5" ASPHALT RUBBER GAP GRADED – 12.5 (ARGG-12.5) OVER
(ASPHALT EMULSION FOR TACK COAT 0.06-0.08 GAL/SY)

INTERMEDIATE: 1.5" ASPHALT RUBBER GAP GRADED – 12.5 (ARGG-12.5) OVER

VARIABLE STANDARD MILLING DEPTH (4.00" MAX) OF EXIST PAVEMENT

EXISTING PAVEMENT TREATED WITH ASPHALT EMULSION FOR TACK COAT 0.07-0.09 GAL/SY

FULL DEPTH PAVEMENT WIDENING
LESS THAN 4 FEET: **TOTAL AREA = 305 SY**

SURFACE: 1.5" ASPHALT RUBBER GAP GRADED – 12.5 (ARGG-12.5) OVER
(ASPHALT EMULSION FOR TACK COAT 0.06-0.08 GAL/SY)

INTERMEDIATE: 1.5" ASPHALT RUBBER GAP GRADED – 12.5 (ARGG-12.5) OVER
(ASPHALT EMULSION FOR TACK COAT 0.06-0.08 GAL/SY)

BASE: 6.00" HIGH EARLY STRENGTH CEMENT CONCRETE OVER

SUBBASE: 8.00" GRAVEL BORROW, TYPE b

HOT MIX ASPHALT WALK SURFACE: **AREA = 1,931 SY**

SURFACE: 3.0" HMA WALK SURFACE PLACED IN TWO LAYERS (ITEM 702.)
1.25" SUPERPAVE SURFACE COURSE – 9.5 (SSC-9.5) OVER
1.75" SUPERPAVE SURFACE COURSE – 12.5 (SIC-12.5) OVER

SUBBASE: 8.00" GRAVEL BORROW, TYPE b

CEMENT CONCRETE SIDEWALK/PEDESTRIAN CURB RAMP: **AREA = 103 SY**

SURFACE: 4.0” CEMENT CONCRETE SIDEWALK/PEDESTRIAN CURB RAMP OVER
(4000 PSI, 3/4”, 610)

SUBBASE: 8.00” GRAVEL BORROW, TYPE b

HMA DRIVEWAY: **AREA = 1,011 SY**

SURFACE: 4.0” HMA DRIVEWAY PLACED IN TWO LAYERS (ITEM 703.)
1.50” SUPERPAVE SURFACE COURSE – 9.5 (SSC-9.5) OVER
2.50” SUPERPAVE SURFACE COURSE – 12.5 (SSC-12.5) OVER

SUBBASE: 8.00” GRAVEL BORROW, TYPE b

ITEM 102.2 TREE TRIMMING

As required for the required utility pole and overhead wire relocations.

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING

As a contingency item, as required by the Engineer, and at the following location:

Station	LT/RT
12+46	LT

ITEM 102.521 TREE AND PLANT PROTECTION FENCE

Station	to	Station	LT/RT
12+42		12+55	LT
27+83		29+45	LT
30+07		30+19	LT
30+36		30+48	LT
30+63		30+75	LT
33+14		33+65	LT

ITEM 103. TREE REMOVED – DIAMETER UNDER 24 INCHES

Baseline
Washington Street

Station	Offset (FT)	LT/RT
33+12.42	29.54	LT
33+16.17	41.22	LT
33+21.43	24.75	LT
33+34.86	25.49	LT
33+37.07	39.72	LT
33+48.90	25.66	LT
33+58.63	25.27	LT
34+33.55	44.01	LT
34+42.71	35.11	LT

York Street

501+23.51	29.82	RT

ITEM 104. TREE REMOVED – DIAMETER 24 INCHES AND OVER

Alignment
Washington Street

Station	Offset (FT)	LT/RT
33+63.93	47.16	LT
33+89.58	46.49	LT
34+16.30	44.09	LT

ITEM 107.48 PREFORMED JOINT FILLER

Wall	Number of Joints	Footing Width (FT)
Wall 1 STA 31+64 TO STA 32+56 LT	4	6.00
Wall 2 STA 32+83 TO STA 33+66 LT	3	6.00
Wall 3 STA 33+88 TO STA 34+42 LT	2	6.00

ITEM 142. CLASS B TRENCH EXCAVATION

Excavation and disposal of material encountered greater than 5 feet in depth needed to install storm drain piping and structures.

ITEM 144. CLASS B ROCK EXCAVATION

Removal and disposal of rock encountered when excavating to install drainage structures, pipe, fence, guard rail, and conduit.

ITEM 146. DRAINAGE STRUCTURE REMOVED

As a contingency item, as required by the Engineer, and at the following locations:

Baseline
Washington St

Station	Offset(FT)	Type
24+50 LT	18.00	CB
24+73 RT	16.00	CB
36+40 LT	24.00	CB
36+64 LT	23.00	CB

ITEM 153. CONTROLLED DENSITY FILL - EXCAVATABLE

To be used for backfilling for trenching within the concrete slab, backfilling around TL-3 guardrail leave outs, and backfilling around Eversource transmission duct.

ITEM 156. CRUSHED STONE

To be used to stabilize the foundations of proposed drainage structures.

ITEM 181.11 DISPOSAL OF UNREGULATED SOIL
ITEM 181.12 DISPOSAL OF REGULATED SOIL IN-STATE FACILITY
ITEM 181.13 DISPOSAL OF REGULATED SOIL OUT-OF-STATE FACILITY
ITEM 181.14 DISPOSAL OF HAZARDOUS WASTE

Based on the preliminary review of the project area potentially impacting release sites are located at the following properties:

168 Washington Street (RTN 4-0015643)
71 York Street (RTN 4-0026335)

ITEM 201. CATCH BASIN

This item is used for all proposed catch basins.

Station	Offset(FT)		Structure #	Type
15+93.29	17.00	LT	3	CBCI
15+36.44	19.00	RT	4	CBCI
20+83.45	17.00	LT	6	CBCI
22+57.11	21.00	LT	9	CBCI
22+57.26	18.97	RT	10	CBCI-E
22+82.19	19.00	RT	13	CBCI-E
22+82.10	21.00	LT	14	CBCI
24+48.09	25.00	LT	16	CBCI
24+73.48	24.31	RT	17	CBCI
26+51.31	28.00	LT	20	CBCI
26+51.79	27.00	RT	21	CBCI
28+28.72	28.00	LT	24	CBCI
28+15.00	25.53	RT	25	CBCI
30+70.80	28.00	LT	27	CBCI
30+75.52	17.00	RT	28	CBCI
36+36.53	28.00	LT	31	CBCI
36+63.54	28.00	LT	33	CBCI

ITEM 202. MANHOLE

This item is used for all proposed manholes.

Baseline
Washington Street

Station	Offset (FT)		Structure #	Type
12+48.86	1.07	RT	1	DMH
15+36.96	1.24	LT	2	DMH
21+01.29	23.58	RT	7	DMH
22+63.44	23.26	RT	11	DMH
22+71.62	20.15	LT	12	DMH
24+62.08	24.78	LT	18	DMH
26+51.35	2.04	RT	22	DMH
27+68.16	15.49	RT	122	DMH
27+63.06	0.07	RT	123	DMH
28+15.02	14.90	RT	26	DMH
30+65.43	16.53	RT	29	DMH

ITEM 204.11 GUTTER INLET – SPECIAL

Contingency item for any gutter inlets required for drainage construction.

ITEM 220. DRAINAGE STRUCTURE ADJUSTED

This item is used for adjusting existing drainage structures that are retained and all proposed drainage structures once to intermediate milled grade and again to finished grade.

ITEM 220.5 DRAINAGE STRUCTURE REMODELED

Contingency item for any structures that need to be remodeled.

ITEM 221.1 FRAME AND COVER - SECURED

This item is used for drainage manholes within the State Highway Layout with speed limit greater or equal to 45 mph.

ITEM 222.1 FRAME AND GRATE – MASSDOT CASCADE TYPE

This item is used to replace all the frame and grates and all proposed catch basins within the State Highway Layout.

ITEM 223.2 FRAME AND GRATE (OR COVER) REMOVED AND DISCARDED

This item is used to remove and discard all castings of structures that are being adjusted, removed, or abandoned.

ITEM 224.12 12 INCH HOOD

This item is used on catch basins CBCI6, CBCI10, AND CBCI13 discharging to the vernal pool.

ITEM 227.31 REMOVAL OF DRAINAGE PIPE SEDIMENT

Assume 50% of all exiting drainage pipes that are being retained within the limit of work need to be cleaned.

ITEM 227.4 MASONRY PLUG

Station	Offset	Pipe Size (IN)
36+36.94	14.52 LT	6
36+68.43	14.88 LT	6

ITEM 281.6 CEMENT CONCRETE PAVERS (WATERWAY)

Station	Offset (FT)	LT/RT
20+90.13	43.21	RT

ITEM 309. DUCTILE IRON FITTINGS FOR WATER PIPE

All bends, tees, reducers, increasers, and all other fittings that may be required to complete the work of the Contract, as required by the Engineer, and not included for payment under other bid items.

ITEM 357.06 6 INCH GATE BOX

Contingency item for the replacement of damaged or frozen existing 6 Inch Gate Box on existing water main.

ITEM 357.12 12 INCH GATE BOX

Contingency item for the replacement of damaged or frozen existing 10 Inch Gate Box on existing water main.

ITEM 440. CALIUM CHLORIDE FOR ROADWAY DUST CONTROL

To be used for roadway dust control for all full depth construction areas. Say two applications for each area.

ITEM 443. WATER FOR ROADWAY DUST CONTROL

As needed to control dust generated from bare soil conditions for all full depth construction areas. Assume 2 applications for each area.

ITEM 451. HMA FOR PATCHING

For permanent utility trench patching outside full depth pavement construction and for permanent repair of delaminated areas exposed by the milling operation.

ITEM 452. ASPHALT EMULSION FOR TACK COAT

Tack coat coverage is required on the intermediate course, base course, milled areas, and cement concrete base course.

ITEM 453. HMA JOINT ADHESIVE

All transverse joints and all longitudinal joints of the surface course shall be treated prior to laying the next adjoining lane.

ITEM 472. TEMPORARY ASPHALT PATCHING

As requried by the Engineer for miscellaneous work such temporary pedestrian ramps, temporary patching of utility trenches.

ITEM 506. GRANITE CURB TYPE VB – STRAIGHT

Baseline	From Station		To Station	
Washington Street	12+30.00	LT	12+60.10	LT
Washington Street	12+45.94	RT	18+87.82	RT
Washington Street	13+10.07	LT	13+10.13	LT
Washington Street	13+20.07	LT	14+84.20	LT
Washington Street	15+27.56	LT	15+44.00	LT
Washington Street	15+27.56	LT	15+44.00	LT
Washington Street	15+80.14	LT	15+87.80	LT
Washington Street	15+87.78	LT	15+98.68	LT
Washington Street	16+00.64	LT	16+06.77	LT
Washington Street	16+49.76	LT	17+89.69	LT
Washington Street	17+81.61	LT	17+95.08	LT
Washington Street	18+53.73	LT	21+56.48	LT
Washington Street	19+02.82	RT	19+73.50	RT
Washington Street	21+51.22	RT	27+40.08	RT
Washington Street	21+80.46	LT	26+82.47	LT
Washington Street	27+53.49	RT	27+62.50	RT
Washington Street	27+75.59	RT	31+38.79	RT
Washington Street	28+11.32	LT	30+84.61	LT
Washington Street	31+09.60	LT	31+36.10	LT
Washington Street	31+53.79	RT	33+53.35	RT
Washington Street	31+63.11	LT	32+58.55	LT
Washington Street	32+78.55	LT	33+68.32	LT
Washington Street	33+73.35	RT	34+01.67	RT
Washington Street	33+88.40	LT	35+43.72	LT
Washington Street	34+31.67	RT	35+18.83	RT
Washington Street	35+48.92	RT	35+82.53	RT
Washington Street	35+58.72	LT	35+58.76	LT
Washington Street	35+83.61	LT	35+84.21	LT
Washington Street	35+99.14	LT	37+63.54	LT
Washington Street	36+09.50	RT	36+54.30	RT
Washington Street	36+73.69	RT	37+46.40	RT
Washington Street	37+57.26	RT	37+62.73	RT
Washington Street	37+62.73	RT	37+91.17	RT
Washington Street	37+73.42	LT	37+73.52	LT
Washington Street	37+97.47	LT	37+97.57	LT
York Street	500+63.41	RT	502+65.00	RT
York Street	500+76.44	LT	502+65.00	LT

ITEM 506.1 GRANITE CURB TYPE VB – CURVED

Baseline	From Station		To Station		Radius (FT)
Washington Street	11+51.69	RT	11+72.10	RT	30
Washington Street	12+24.56	RT	12+45.94	RT	30
Washington Street	12+60.10	LT	12+65.22	LT	5
Washington Street	13+10.07	LT	13+20.07	LT	10
Washington Street	14+84.20	LT	14+94.20	LT	10
Washington Street	15+27.56	LT	15+27.56	LT	3
Washington Street	15+44.00	LT	15+44.00	LT	3
Washington Street	15+78.10	LT	15+87.78	LT	10
Washington Street	15+78.10	LT	15+80.14	LT	2
Washington Street	15+87.80	LT	15+89.89	LT	2
Washington Street	15+98.68	LT	16+08.75	LT	10
Washington Street	15+98.63	LT	16+00.64	LT	2
Washington Street	16+06.77	LT	16+08.75	LT	2
Washington Street	16+39.55	LT	16+49.76	LT	10
Washington Street	17+89.69	LT	17+99.18	LT	10
Washington Street	17+95.08	LT	17+99.18	LT	5
Washington Street	18+43.78	LT	18+53.73	LT	10
Washington Street	27+40.08	RT	27+46.73	RT	10
Washington Street	27+46.73	RT	27+53.49	RT	10
Washington Street	27+62.50	RT	27+69.14	RT	10
Washington Street	27+69.14	RT	27+75.59	RT	10
Washington Street	35+43.72	LT	35+58.72	RT	15
Washington Street	35+84.21	LT	35+99.14	LT	15
Washington Street	37+63.54	LT	37+73.52	LT	10
York Street	500+36.68	LT	500+76.44	LT	40
York Street	500+22.53	LT	500+63.41	LT	45

ITEM 620.12 GUARDRAIL, TL-2 (SINGLE-FACED)

Baseline
York Steet

Station	To	Station	
500+85.85		502+40.00	LT

ITEM 620.13 GUARDRAIL, TL-3 (SINGLE-FACED)

Station	To	Station	
13+70.07		14+77.08	LT
21+89.80		26+32.47	LT
21+63.72		24+81.67	RT

ITEM 627.1 TRAILING ANCHORAGE

Baseline
Washington Street

Station	To	Station	
21+80.42		21+89.90	LT
24+81.67		24+91.00	RT

York Street

500+76.35		500+85.85	LT

ITEM 627.82 GUARDRAIL TANGENT END TREATMENT, TL-2

Baseline
York Street

Station	To	Station	
502+65.00		502+40.00	LT

ITEM 627.83 GUARDRAIL – TANGENT END TREATMENT, TL-3

Station	To	Station	
13+20.07		13+70.07	LT
14+34.20		14+84.20	LT
26+32.47		26+82.47	LT

ITEM 628.22 TRANSITION TO RIGID BARRIER (SINGLE FACED)

Baseline
Washington Street

Station	To	Station	
21+51.22		21+63.72	RT

ITEM 628.304 TEMPORARY IMPACT ATTENUATOR, NON-REDIRECTIVE, TL-2

Baseline
York Street

Station	To	Station
502+13.79		502+63.79

ITEM 628.305 TEMPORARY IMPACT ATTENUATOR, NON-REDIRECTIVE, TL-3

Station	To	Station	
13+20.07		13+70.07	LT
20+01.22		20+31.22	RT

ITEM 628.313 PERMANENT IMPACT ATTENUATOR, REDIRECTIVE, TL-3

Baseline
Washington Street

Station	To	Station	
20+01.22		20+31.22	RT

ITEM 629.1 PRECAST CONCRETE BARRIER – SINGLE FACED

Baseline
Washington Street

Station	To	Station	
20+31.22		21+51.22	RT

ITEM 630.2 GUARDRAIL REMOVED AND DISCARDED

Station	To	Station	
13+26.30		14+80.01	LT
20+98.74		24+29.30	RT
22+17.52		25+88.28	LT

ITEM 645.148 48 INCH CHAIN LINK FENCE (PIPE TOP RAIL) VINYL COATED (LINE POST OPTION)

Station	To	Station	Offset
21+40		24+49	RT
32+81		33+66	LT
33+90		34+42	LT

ITEM 652.048 48 INCH CHAIN LINK FENCE END POST

Station	Offset
21+40	RT
24+49	RT
32+81	LT
33+66	LT
33+90	LT
34+42	LT

ITEM 660. METAL PIPE RAIL

	Station	To	Station
Wall 1	31+63 LT		32+52 LT

ITEM 693. STONE WALL REMOVED AND STACKED

Baseline
Washington Street

Station	to	Station	LT/RT
16+60.21		17+52.05	LT
31+62.51		31+88.23	LT
31+88.23		32+52.68	LT
32+85.06		33+07.20	LT
37+00.98		37+46.24	RT

ITEM 705.2. PAVERS REMOVED AND STACKED

Alignment
Washington Street

Station	Offset	LT/RT
32+10	40.00	LT

ITEM 711. BOUND REMOVED AND RESET

Contingency item for the removal and reset of Bound affected by the construction.

ITEM 751.7 COMPOST BLANKET

Baseline
Washington Street

Station	To	Station
15+29		16+00 RT
22+00		26+00 LT
25+00		27+00 RT

York Street

500+76		502+50LT

ITEM 767.9 JUTE MESH

Baseline
Washington Street

Station	To	Station
13+09		14+93 LT
20+96		24+46 RT
21+81		25+92 LT

ITEM 901. 4000 PSI, 1.5 IN., 565 CEMENT CONCRETE

Cement concrete required for construction of retaining walls from:

Sta 31+63 to 31+98

Sta 31+98 to 32+33

Sta 32+88 to 33+67

Sta 33+89 to 34+43

Cast in place concrete curb from:

Sta 21+60 to Sta 23+25

ITEM 903. 3000 PSI, 1.5 IN., 470 CEMENT CONCRETE

Cement concrete required for construction of thrust blocks at hydrants relocation, proposed tapping sleeves, capping of existing water pipe.

ITEM 983.31 COMPOST AND SEED OVER MODIFIED ROCKFILL SLOPE

Baseline

Washington Street 1

Station	**To**	**Station**
5+27		16+00 RT
22+00		26+00 LT
25+00		27+00 RT

York Street

500+82		502+50 LT

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DRAWINGS AND SKETCHES

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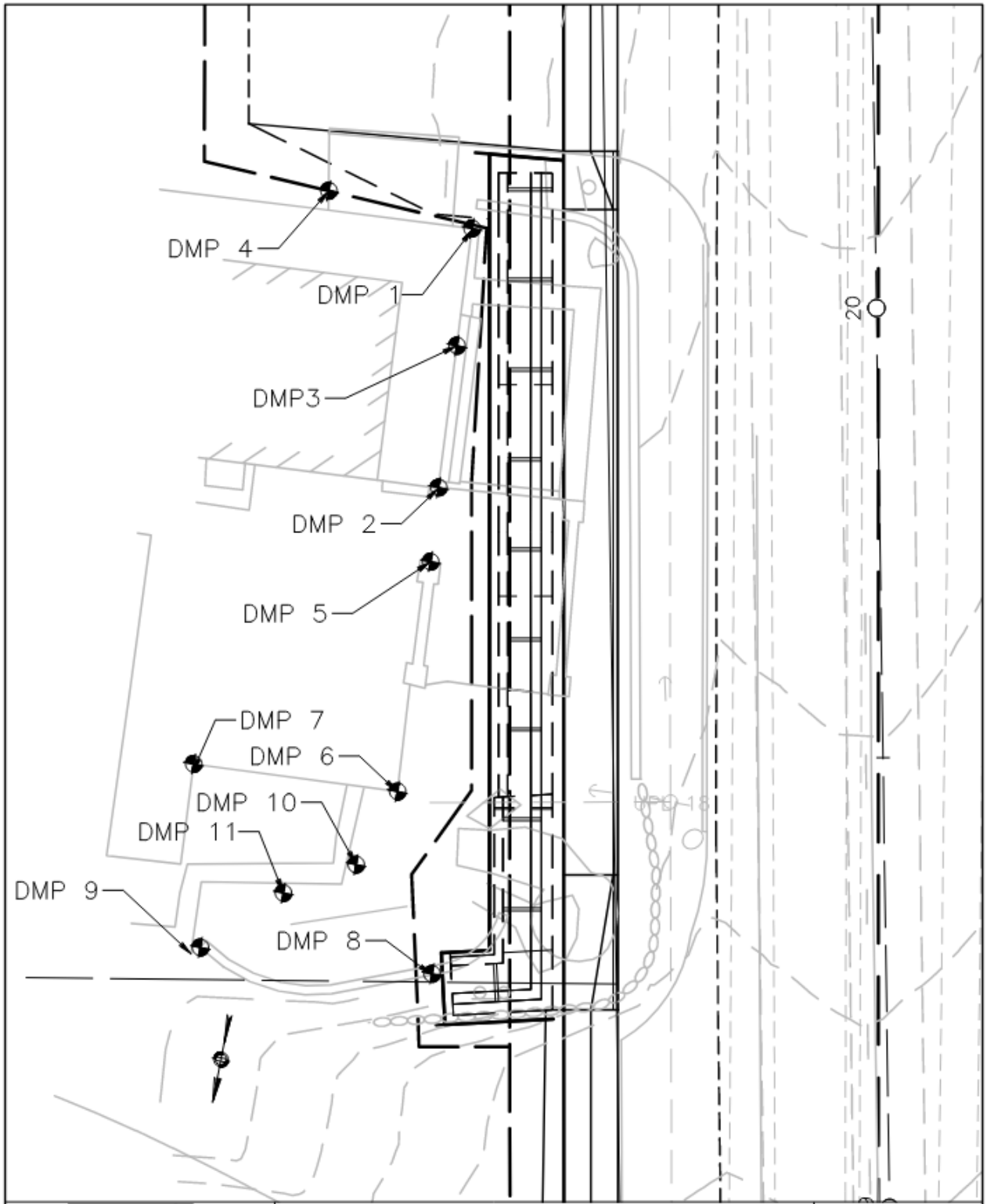

Nitsch Engineering

NITSCH PROJ. NO.:	14537.6
DATE:	OCTOBER, 2022
DESIGNED BY:	N/A
DRAWN BY:	MRS
CHECKED BY:	MMS

PROJECT TITLE:
STOUGHTON
WASHINGTON STREET
CORRIDOR IMPROVEMENTS

DRAWING TITLE:
GROUND MONITORING LOCATIONS

APPENDIX NO.
–

BRIDGE NO.
–

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1

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GEOTECHNICAL REPORT

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LGCI
Lahlaf Geotechnical Consulting, Inc.

April 14, 2022

Mr. Matthew J. Soltys, P.E.
Nitsch Engineering, Inc.
2 Center Plaza, Suite 430
Boston, MA 02108
Phone: (617) 338-0063
Fax: (508) 365-3355
E-mail: msoltys@nitscheng.com

Re: **Preliminary Geotechnical Letter Report**
Proposed Mast Arms Reinforced Slope, and Retaining Wall
Stoughton, Massachusetts
LGCI Project No. 2139

Dear Mr. Soltys,

Lahlaf Geotechnical Consulting, Inc. (LGCI) has completed a geotechnical study for the proposed mast arms, reinforced slope, and retaining wall in Stoughton, Massachusetts. This letter report presents the results of our study.

We performed our services in general accordance with our proposal No. 21099-Rev. 2, revised date November 16, 2021, and in general accordance with the terms and conditions of the Subconsultant Authorization by Nitsch Engineering, Inc. (Nitsch), dated December 2, 2021, and signed by Mr. Joshua J. Alston of Nitsch.

1. PROJECT INFORMATION

1.1 Purpose and Scope of Services

The purpose of our geotechnical services was to perform subsurface explorations at the site and to provide foundation design and construction recommendations for mast arms and a retaining wall, and to perform slope stability analyses.

LGCI performed the following services:

- Coordinated the boring and test pit locations with Nitsch and provided an LGCI geotechnical engineer to mark the boring locations in the field.

- Engaged a drilling subcontractor to advance twelve (12) soil borings: eight (8) soil boings for proposed mast arms, and four (4) soil borings for slope stability analyses. Our drilling subcontractor contacted the utility clearance agency (Dig Safe Systems, Inc.) and the Town of Stoughton for utility clearance, and applied for and obtained a MassDOT permit for the

borings and test pits. Our scope also included two (2) borings on the AA Will Corp. property for a proposed retaining wall. These borings will be performed after a right of entry is secured by MassDOT from the property owner.

- Engaged an excavation subcontractor to perform two (2) test pits near the existing retaining wall along the southbound lane on Washington Street. The purpose of the test pits is to expose the wall foundation and confirm the bearing stratum.

- Provided a field engineer to perform five (5) hand probes at the bottom of the existing slope to explore for the presence of organic soil for slope stability analyses.

- Provided a geotechnical field engineer, full-time, at the site to observe the soil borings, test pits, and hand probes; describe the soil samples; and prepare the field logs.

- Prepared this preliminary geotechnical letter report containing the results of our subsurface explorations, our geotechnical recommendations for mast arm foundation design in accordance with standard drawings: "Overhead Signal Structure & Foundation, Sheets 1 through 7," by the Massachusetts Department of Transportation (MassDOT), Highway Division and dated December 2015, and the results of our slope stability analyses. Our letter report will be finalized after borings for the proposed retaining wall near the AA Will Corp. property are completed.

LGCI did not perform environmental services for this project. LGCI's scope of services did not include an environmental assessment for the presence or absence of wetlands or analytical testing for hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site, or mold in the soil or in any structure at the site. Any statements regarding odors, colors, or unusual or suspicious items or conditions are for information only and to support our geotechnical services.

Our scope did not include attending meetings, preparing specifications, performing contract document review, or providing construction services. LGCI would be pleased to perform these services when needed under a separate agreement. Recommendations for stormwater management, erosion control, pavement design, slope stability analyses, and detailed cost or quantity estimates are not included in our scope of work.

1.2 Site Description

Our understanding of the existing conditions is based on our field observations, readily available aerial photographs of the site, and on the following drawings.

- Drawing titled "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

The site consists of several sections of Route 138 (Washington Street) as shown in Figure 1, including:

- The intersection of Washington Street and York Street, and a stretch of roadway along Washington Street extending about 500 feet north of the same intersection. The roadway grade ranges between about El. 202 feet on the northern end of the stretch and about El. 220 on the southern side of the stretch near the intersection. The grades drop on either side of the roadway along this stretch. Along the embankment on the eastern side of Washington Street which is the focus of the stability analyses in this report, the grades drop steeply about 6 feet on the northern side of the stretch and about 23 feet on the southern side of the stretch towards wetland areas.
- The intersection of Washington Street with the driveway to Stop & Shop (across from O'Reilly's Auto Parts). The grade at the intersection is about El. 235 feet.
- The intersection of Washington Street and Central Washington Street in Stoughton. The grades at the intersection range between El. 240 feet and El. 242 feet.
- The portion of Washington Street in front of the AA Will Corp. property located at 198 Washington Street in Stoughton, Massachusetts as shown in Figure 1. The grades in Washington Street in front of the AA Will Corp. property range between about El. 240 feet and El. 244 feet, and between El. 232 feet and El. 237 feet near the existing retaining wall on the southbound side of Washington Street north of (across from) the AA Will Corp. property.

1.3 Project Description

Our understanding of the proposed mast arms is based on our discussions with Nitsch and the following drawing:

- Drawing titled "Stoughton, Washington Street (Route138), Traffic Signal Plan, Sheet No. 104 to 108 out of 226," prepared by Nitsch Engineering, Inc., plotted on April 1, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on April 4, 2022.

We understand that Nitsch was engaged by MassDOT to design improvements along Washington Street in Stoughton, Massachusetts. The improvements will include installing mast arms at the intersections of Washington Street and York Street, Washington Street and the Stop and Shop Driveway, and Washington Street and Central Street in Stoughton. The proposed mast arm sizes are as follows:

- Intersection of Washington Street and York Street: one (1) 30-foot mast arm at the northeast corner of the intersection and one (1) 25-foot mast arm at the western side of the intersection.
- Intersection of Washington Street and the Stop and Shop Driveway: one (1) 35-foot mast arm at the northeast corner of the intersection and one (1) 30-foot mast arm at the western side of the intersection.
- Intersection of Washington Street and Central Street: 45-foot mast arm at the northeast corner of the intersection, one (1) 25-foot mast arm at the northwest corner of the

intersection, one (1) 35-foot mast arm at the southeast corner of the intersection, and one (1) 45-foot mast arm at the southwest corner of the intersection.

The improvements will include widening the roadway which will require extending the embankment on the eastern side of Washington Street along the 500-foot stretch north of the intersection with York Street. Based on information provided to us by Nitsch the proposed embankment will be reinformed with a rock-armored slope inclined at about 2H:1V. The thickness of the armored slope will be about 24- inches. The improvements will also include providing a retaining wall in front of the AA Will Corp. property. We understand that the existing retaining wall across from the AA Will Corp. property will remain.

2. SITE AND SUBSURFACE CONDITIONS

2.1 Surficial Geology

LGCI reviewed the following surficial geologic map: "Surficial Materials Map of the Blue Hills Quadrangle, Massachusetts," prepared by Stone, B.D., and DiGiacomo-Cohen, M.L. Scientific Investigation Map 3402, Quadrangle 127 – Blue Hills, 2018.

The Surficial Geologic Map indicates that the natural soils in the general vicinity of the site consist of coarse deposits, including gravel deposits, sand and gravel deposits, and sand deposits. The gravel deposits are composed mainly of gravel, cobbles, and boulders. The sand and gravel layers generally range from 25 to 50 percent gravel particles and from 50 to 75 percent sand particles. The sand deposits are composed mainly of very coarse to fine sand. Coarser layers may contain up to 25 percent gravel, and finer layers may contain fine sand, silt, and clay.

The Surficial Geological Map of the site is shown in Figure 2.

2.2 LGCI's Explorations

2.2.1 General

LGCI coordinated our exploration locations with Nitsch and marked the exploration locations in the field by taping distances from the existing landmarks. Our borings were marked in the field in accordance with the Boring and Test Pit Location Plan listed in Section 1.2. A few borings had to be slightly relocated to avoid existing utilities.

Our drilling subcontractor contacted the utility clearance agency (Dig Safe Systems, Inc.) for utility clearance. Our drilling subcontractor coordinated the clearance of water, sewer, and drains with the City of Stoughton. Our drilling subcontractor also obtained a MassDOT permit, implemented a traffic management plan, and coordinated with and engaged police details.

Unless notified otherwise, we will dispose of the soil samples obtained during our explorations after three months.

2.2.2 Soil Borings

LGCI engaged Northern Drill Service, Inc. (NDS) of Northborough, Massachusetts to advance twelve (12) soil borings (MA-1 to MA-8 and SB-1 to SB-4) between the dates of March 3 and 28, 2022. The borings were advanced with a track-mounted Diedrich D-25 drill rig or truck mounted Mobile Drill B-53 using drive and wash technique with a 4-inch casing. The borings extended to depths ranging between 12.5 feet and 31 feet beneath the ground surface. Upon completion, the boreholes were backfilled with the soil cuttings and gravel. In paved areas, the ground surface was restored with asphalt cold patch. In concrete areas, the ground surface was restored with concrete.

NDS performed Standard Penetration Tests (SPT) during drilling and obtained split spoon samples in the borings with an automatic hammer at typical depth intervals of 2 feet or 5 feet as noted on the boring logs in general accordance with ASTM D-1586.

An LGCI geotechnical engineer observed and logged the borings in the field.

2.2.3 Test Pits

NDS performed two (2) test pits in front of the existing retaining wall across from the AA Will Corp. property. The purpose of the test pits was to expose the existing wall foundation and to explore the bearing material. The test pits extended to depths ranging between 5.5 and 6 feet beneath the ground surface and were performed using a Kubota KX 080-4 excavator. Upon completion, the test pits were backfilled with the excavated material which was placed in 18- to 24-inch lifts and tamped with the excavator bucket.

Test pit TP-1 and TP-2 indicated that the existing concrete block wall is founded on natural sand and gravel at depths of 3 feet to 2.5 feet, i.e., 2 to 1.5 courses of blocks beneath the ground, respectively. The bottom course of blocks rest on a 2- to 4-inch-thick leveling pad of concrete.

2.2.4 Hand Probes

An LGCI representative advanced five (5) hand auger probes near the bottom of the embankment on the eastern side of Washington Street just north of York Street. The purpose of the probes was to explore for the possible presence of organic soil at the bottom of the embankment. Due to obstructions, the probes terminated at depths ranging between 2.5 and 3.5 beneath the ground surface.

2.2.5 Boring and Test Pits logs and Locations

The boring and test pit locations are shown in Figures 3A to 3D. Attachment A contains LGCI's boring logs, Attachment B contain LGCI's probe logs, and Attachment C contains the test pit logs and retaining wall foundation sketches. Table 1 includes a summary of LGCI's borings.

The ground surface elevations included in this report were interpolated to the nearest foot from the drawings referenced in section 1.2 of the report.

2.3 Subsurface Conditions

2.3.1 General

The subsurface description in this report is based on a limited number of borings and is intended to highlight the major soil strata encountered during our borings. The subsurface conditions are known only at the actual boring locations. Variations may occur and should be expected between boring locations. The boring logs represent conditions that we observed at the time of our borings and were edited, as appropriate, based on the results of the laboratory test data and inspection of the soil samples in the laboratory. The strata boundaries shown in our boring logs are based on our interpretations and the actual transitions may be gradual. Graphic soil symbols are for illustration only.

Below are individual descriptions of the subsurface conditions encountered for each proposed improvement. The soil strata encountered in the borings were as follows, starting at the ground surface.

2.3.2 Slope Borings near York Street (Borings SB-1 to SB-4)

Asphalt/Concrete/Topsoil – Asphalt was encountered at the ground surface in borings SB-1 to SB-3. The thickness of the asphalt ranged between 7 and 8 inches. A layer of concrete was encountered beneath the asphalt in borings SB-1 to SB-3. The thickness of the concrete was about 7 inches. Topsoil was encountered at the ground surface in boring SB-4. The thickness of the topsoil was about 3 inches.

Fill – A layer of fill was encountered beneath the asphalt/concrete or topsoil in SB-1, SB-2 and SB-4. The fill extended to depths of 19 feet, 14 feet, and 4 feet beneath the ground surface, respectively. The samples in this layer were mostly described as well graded gravel or silty sand. The fines content in the fill ranged between 0 to 25 percent and the gravel content ranged up to 30 percent. When described as gravel the sand content ranged between 0 and 40 percent. The fill also contained traces of organic soil and asphalt.

The SPT N-values in the fill layer ranged between 7 blows per foot (bpf) and 28 bpf, with most values below 17 bpf, indicating medium dense soil.

Peat/Buried Topsoil – A layer of peat or buried topsoil was encountered in boring SB-1 and SB-2 and extended to depths of 23.6 feet and 14.1 feet, respectively. Three (3) samples were described as peat and two (2) samples were described as silty sand. When described as silty sand, the fines content ranged between 15 and 20 percent, and the gravel content ranged between 20 and 30 percent.

The SPT N-values in the peat layer ranged between 6 bpf and 10 bpf, indicating loose soil.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill or peat/ buried topsoil in all borings and extended to depths ranging between 9.2 feet and 31 feet beneath the ground surface. Six (6) soil samples were described as sand and five (5) soil samples were described as gravel. The fines content ranged between 0 and 20 percent, and the gravel content ranged between 10 and 35 percent. When described as gravel, the sand content ranged between 10 and 30 percent.

The SPT N-values in the sand layer ranged between 4 bpf and refusal, with most values ranging between 16 and 28 bpf, indicating loose to medium dense sand.

Weathered Rock or Rock – Weathered rock was encountered in boring SB-2 at a depth of 19 feet below the ground surface. Split spoon refusal was encountered in borings SB-3 and SB-4. Possible rock or boulders were encountered in SB-3 and SB-4 at depths of 26 feet and 9.2 feet below ground surface respectively. The button bit was advanced in borings SB-3 and SB-4 to the termination depths of 28.6 feet and 12.5 feet, respectively.

2.3.3 Retaining Wall near Southbound Side of Washington Street (Across from the AA Will Corp. Property) (Test Pits TP-1 to TP-2)

Topsoil –Topsoil was encountered at the ground surface in test pit TP-2. The thickness of the topsoil was about 12 inches.

Fill – A layer of fill was encountered at the ground surface or beneath the topsoil in both the test pits. The fill extended to depths of 4.3 feet and 2.5 feet beneath the ground surface in TP-1 and TP-2, respectively. The samples in this layer were described as well graded sand. The fines content in the fill ranged between 5 to 10 percent and the gravel content ranged up to 20 percent. The fill contained traces of organic soil and roots.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill in both test pits. The sand layer extended to depths of 5.5 feet and 2.5 feet below ground surface in test pits TP-1 and TP-2, respectively. The samples in this layer were described as poorly graded sand or well graded sand. The fines content was about 5 percent, and the gravel content ranged between 25 and 35 percent. This layer contained 5 to 15 percent cobbles up to 8 inches in diameter. The excavation effort was described as easy to moderate.

2.3.4 Intersection of Washington Street and York Street (Borings MA-1 and MA-2)

Topsoil –Topsoil was encountered at the ground surface in borings MA-1 and MA-2. The thickness of the topsoil was 7 inches and 4 inches, respectively.

Fill – A layer of fill was encountered beneath the topsoil in borings MA-1 and MA-2. The fill extended to depths of 2.0 feet and 4.0 feet beneath the ground surface, respectively. The samples in this layer were described as silty sand or buried topsoil. The fines content in the fill ranged between 15 to 20 percent and the gravel content ranged up to 40 percent. The fill contained traces of organic soil and roots.

The SPT N-values in the fill layer ranged between 7 bpf and 28 bpf, indicating loose to medium dense soil.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill in borings MA-1 and MA-2 and extended to the termination depth of 21 feet at boring MA-1 and to 16 feet below ground surface in boring MA-2. The samples in this layer were mostly described as well graded sand. One (1) sample was described as well graded gravel and one (1) sample was described as poorly graded sand. The fines content ranged between 5 and 10 percent and the gravel content ranged up to 40 percent. When described as gravel, the sand content ranged up to 10 percent. This layer contained boulders between the depths of 9.6 feet and 17.5 feet beneath the ground surface in borings MA-1.

The SPT N-values in the sand layer ranged between 6 bpf and refusal, with most values ranging between 11 bpf and 29 bpf, indicating loose to medium dense sand.

Boulder/Rock– Apparent rock was encountered in boring MA-2 at a depth of 16 feet beneath the ground surface. The drilling subcontractor advanced a button bit 2.2 feet between the depths of 16.0 feet to 18.2 feet below ground surface.

2.3.5 Intersection of Washington Street at Stop and Shop Driveway (Borings MA-3 and MA-4)

Topsoil/Bark Mulch –Topsoil was encountered at the ground surface in boring MA-3. Boring MA-4 had a layer of bark mulch over the topsoil. The thickness of the topsoil and bark mulch, where encountered, was about 2 feet in both borings.

Fill – A layer of fill was encountered beneath the topsoil in the borings MA-3 and MA-4, and extended to depths of 9.0 feet and 4.0 feet beneath the ground surface, respectively. The samples in this layer were described as sand with silt, one (1) sample was described as silty sand. The fines content in the fill ranged between 10 to 20 percent and the gravel content ranged up to 35 percent. The fill contained traces of organic soil, coal, ash, and asphalt.

The SPT N-values in the fill layer ranged between 3 bpf and 31 bpf, indicating loose to dense fill. The high SPT N-value recorded in the fill in boring MA-4 may be caused by obstructions in the fill and may not represent the true density of the fill.

Buried Organic Soil – A layer of buried organic soil was encountered in boring MA-3 and extended to a depth of 11.5 feet below the ground surface. The samples in this layer were described as silty sand. The fines content ranged between 20 to 30 percent. The gravel content ranged between 10 and 30 percent.

The SPT N-value in the fill layer was 10 bpf.

Sand and Gravel – A layer of sand and gravel was encountered beneath the organic soil in MA-3 and beneath the fill in MA-4 and extended to the termination depths of 21 feet in both borings. The samples in this layer were mostly described as well graded sand. One (1) sample was described as well graded gravel and one (1) sample was described as poorly graded sand. The fines content ranged between 0 and 15 percent and the gravel content ranged up to 35 percent. When described as gravel, the sand content ranged between 20 to 25 percent.

The SPT N-values in the sand layer ranged between 6 bpf and 76 bpf, with most values ranging between 18 bpf and 24 bpf, indicating mostly medium dense sand.

2.3.6 Intersection of Washington Street and Central Street (Borings MA-5 and MA-8)

Asphalt/Concrete/Topsoil – Asphalt was encountered at the ground surface in boring MA-7. The thickness of the asphalt was about 5 inches. A layer of concrete was encountered at the ground surface in boring MA-5. The thickness of the concrete was about 2.5 inches. Topsoil was encountered at the ground surface in borings MA-6 and MA-8. The thickness of the topsoil was about 3 inches and 24 inches, respectively. Boring MA-6 had a layer of bark mulch over the topsoil.

Fill – A layer of fill was encountered beneath the asphalt, concrete, or topsoil in borings MA-5 to MA-8 and extended to depths of 4.0 feet beneath the ground surface in borings MA-5 to MA-7 and to a depth of 8.0 feet the beneath the ground surface in boring MA-8. The samples in this layer were mostly described as silty sand. Three (3) samples were described as sand with silt, and one (1) sample was described as gravel. The fines content in the fill ranged between 0 to 20 percent and the gravel content ranged up to 25 percent. When described as gravel, the fill contained about 25 percent gravel. The fill also contained traces of organic soil, roots, coal, and asphalt.

The SPT N-values in the sand layer ranged between 16 bpf and refusal, with most values falling lower than 47 bpf, indicating medium dense to dense soil.

Sand and Gravel – A layer of sand was encountered beneath the fill in all borings. The sand layer extended to the termination depths in MA-5 to MA-8. The samples in this layer were mostly described as well graded or poorly graded sand with silt. The fines content in the sand layer ranged between 0 and 15 percent, and the gravel content ranged up to 35 percent.

The SPT N-values in the sand layer ranged between 16 bpf and refusal, with most values ranging between 24 bpf and 73 bpf, indicating dense to very dense sand.

Boulder/Rock – Split spoon refusal was encountered in MA-6 at a depth of 20.2 feet on possible boulder or bedrock.

2.4 Groundwater

Groundwater was measured at the end or shortly after the end of drilling in all borings at depths ranging between 6.0 feet and 19.0 feet beneath the ground surface as shown in Table 1 and in the boring logs. Groundwater was not encountered in the test pits as shown in Table 2 and test pit logs.

The groundwater information reported herein is based on observations made during or shortly after the completion of drilling and may not represent the actual groundwater conditions. Furthermore, the drilling procedure introduced water into the boreholes; therefore, additional time may be required for the groundwater levels to stabilize. The groundwater information presented in this report only represents the conditions encountered at the time and location of the explorations. Seasonal fluctuation should be anticipated.

3. EVALUATION AND RECOMMENDATIONS

3.1 Mast Arm Foundation Recommendations

Based on the results of the borings, the subsurface conditions at the site are suitable to support the proposed mast arm foundations. Each mast arm should be supported on a cored pier (drilled shaft) designed in accordance with the standard drawings: "Overhead Signal Structure & Foundation, Sheets 1 through 7," by the MassDOT, Highway Division and dated December 2015 (Standard Drawing).

Using the average SPT N-value (with hammer energy correction), we assessed the soil designation in accordance with the Standard Drawing. The table on the next page shows the average SPT N-values (corrected and uncorrected for hammer energy), the mast arm length, the depth to groundwater, and the recommended soil designation for design of the drilled shafts.

Intersection	Boring	Groundwater Level (ft.)	Mast Arm Length (ft.)	Average SPT N-Value	Corrected Average SPT N-Value*	Designation
Washington St. & York St.	MA-1 **	6	30	20.3	27.0	WET SAND (DENSE)
	MA-2 **	9.2	25	12.4	16.5	WET SAND (LOOSE)
Washington St. & Stop and Shop Driveway	MA-3	9	35	7.5	9.9	WET SAND (LOOSE)
	MA-4	6	30	22.6	30.2	WET SAND (DENSE)
Washington St. & Central St.	MA-5	11.7	45	32.8	43.7	DRY SAND (DENSE)
	MA-6	10.1	25	27.3	36.4	DRY SAND (DENSE)
	MA-7	10.5	35	36.5	48.6	DRY SAND (DENSE)
	MA-8	9	45	26.3	35.1	WET SAND (DENSE)

*Correction for 80% automatic hammer efficiency.

** Based on the boring logs, drilling near the bottom of the shaft will likely extend through boulders or into rock.

3.2 Bearing Resistance and Settlement

LGCI will provide bearing resistance recommendations and will estimate the anticipated settlement for the proposed retaining all in front of the AA Will Corp. property after the borings at that locations ae completed.

3.3 Slope Stability Analyses

3.3.1 General

LGCI performed limit equilibrium analyses to evaluate the global stability of the proposed riprap slope embankment on the eastern side of Washington Street just north of York Street. LGCI performed stability analyses using the slope stability program PCSTABL5M to calculate the factor of safety, FS, for a sliding failure using the Simplified Bishop Method of slices for circular failure surfaces. For this project, we defined critical failure surfaces as those surfaces that start on the upper side of the proposed riprap slope on Washington Street and extend to the lower side of the proposed slope in the wet areas, i.e., surfaces that entirely encompass the existing slope (global failure surfaces).

We performed slope stability analyses on cross sections between approximate station Sta. 10+00 and Sta. 12+00 (corresponding to proposed Sta. 23+00 and Sta. 25+00, respectively).

3.3.2 Slope Geometry

Our understanding of the proposed armored/riprap slope is based on our discussions with Nitsch and on the following documents:

- Drawing titled "Stoughton, Washington Street (Route138), Cross Sections Plan, Sheet No. 149 to 157 out of 226," prepared by Nitsch Engineering, Inc., plotted on April 1, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on April 4, 2022.

- Detailed cross section of the Riprap Slope provided to LGCI by Nitsch via e-mail on April 4, 2022.

We performed slope stability analyses for three (3) representative sections, i.e., sections at proposed Sta. 23+00, Sta. 24+00, and Sta. 25+00.

3.3.3 Soil Parameters

LGCI estimated the friction angles of the onsite soils, including the existing fill, natural sand and gravel layer, and organic soil (peat or buried organic soil) based on SPT data from borings SB-1, SB-2, and SB-3.

The table below shows the soil parameters we used in our slope stability analyses.

Soil Layer	Total Unit Weight (pcf)	Saturated Unit Weight (pcf)	Friction Angle (degrees)
Topsoil	115	120	28
Crushed Stone	135	140	42
Gravel Borrow	135	140	36
Existing Fill	120	125	33
Peat/Buried Organic Soil	110	115	29
Natural Sand & Gravel	125	130	36
Weathered Rock	135	140	42

For the rock, we assigned high strength values to force the failure surfaces into the overlying sand.

3.3.4 Results of Slope Stability Analyses

Our analyses indicated FS values of 1.55, 1.52, and 1.44 at Sta. 23+00, Sta. 24+00, and Sta. 25+00, respectively. The results of our slope stability analysis are included in Attachment D.

4. CONSTRUCTION CONSIDERATIONS

4.1 Site Preparation and Earthwork

4.1.1 General

Loose, soft, or organic materials as well as abandoned structures, if any, and utilities and deleterious matter encountered during initial stripping operations should be removed within the proposed foundation area. Material placed around the mast arm near the surface should be compacted.

4.1.2 Drilled Shaft for Mast Arms

- During construction of the cored pier foundation (drilled shaft), a temporary casing that will be removed when concrete is placed will be required to prevent collapse of the fill and sand.

- We did not encounter boulders in our borings. However, the fill could contain cobbles and boulders. The contractor should be prepared to remove such boulders, if encountered, during the installation of the drilled shaft.

- When the drilling operations are complete, concrete should be placed inside the casing as soon as possible.

- The concrete should be placed using a tremie pipe. We recommend pouring the pier foundation concrete on the same day that the pier is drilled.

- A representative of LGCI should assess that the pier foundation is founded on competent bearing materials and that the pier foundation installation procedures comply with our recommendations.

4.1.3 Footing Subgrade

LGCI will provide footing subgrade preparation for the proposed retaining wall in front of the AA Will Corp. property after ten borings at the locations are completed.

4.1.4 Slope Subgrade Preparation

- We recommend removing the topsoil and organic matter from the surface of the existing slope before placing fill for the slope extension.

- At the bottom of the proposed slope, the surficial organic soil and swamp deposits material should be removed before placing fill for the new slope

5. REPORT LIMITATIONS

Our analysis and recommendations are based on project information provided to us at the time of this report. If changes to the type, size, and location of the proposed structures or to the site grading are made, the recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions and recommendations modified in writing by LGCI. LGCI cannot accept responsibility for designs based on our recommendations unless we are engaged to review the final plans and specifications to determine whether any changes in the project affect the validity of our recommendations and whether our recommendations have been properly implemented in the design.

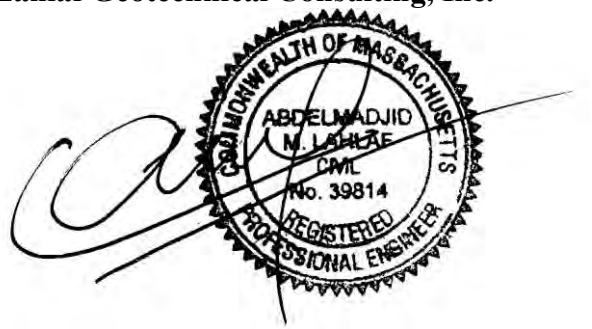
It is not part of our scope to perform a more detailed site history; therefore, we have not explored for or researched the locations of buried utilities or other structures in the area of the proposed construction. Our scope did not include environmental services or services related to moisture, mold, or other biological contaminates in or around the site.

We cannot accept responsibility for designs based on recommendations in this report unless we are engaged to 1) make site visits during construction to check that the subsurface conditions exposed during construction are in general conformance with our design assumptions and 2) ascertain that, in general, the work is being performed in compliance with the contract documents.

Our report has been prepared in accordance with generally accepted engineering practices and in accordance with the terms and conditions set forth in our agreement. No other warranty, expressed or implied, is made. This report has been prepared for the exclusive use of Nitsch Engineering, Inc. for the specific application to the Proposed Mast Arms, Reinforced Slope, and Retaining Wall in Stoughton, Massachusetts as conceived at this time.

Very truly yours,

Lahlaf Geotechnical Consulting, Inc.



Abdelmadjid M. Lahlaf, Ph.D., P.E.
Principal Engineer

Attachments: Table 1 – Summary of LGCI's Boring

Table 1 - Summary of LGCI's Borings
Proposed Mast Arms and Reinforced Slope
Stoughton, Massachusetts
LGCI Project No. 2139

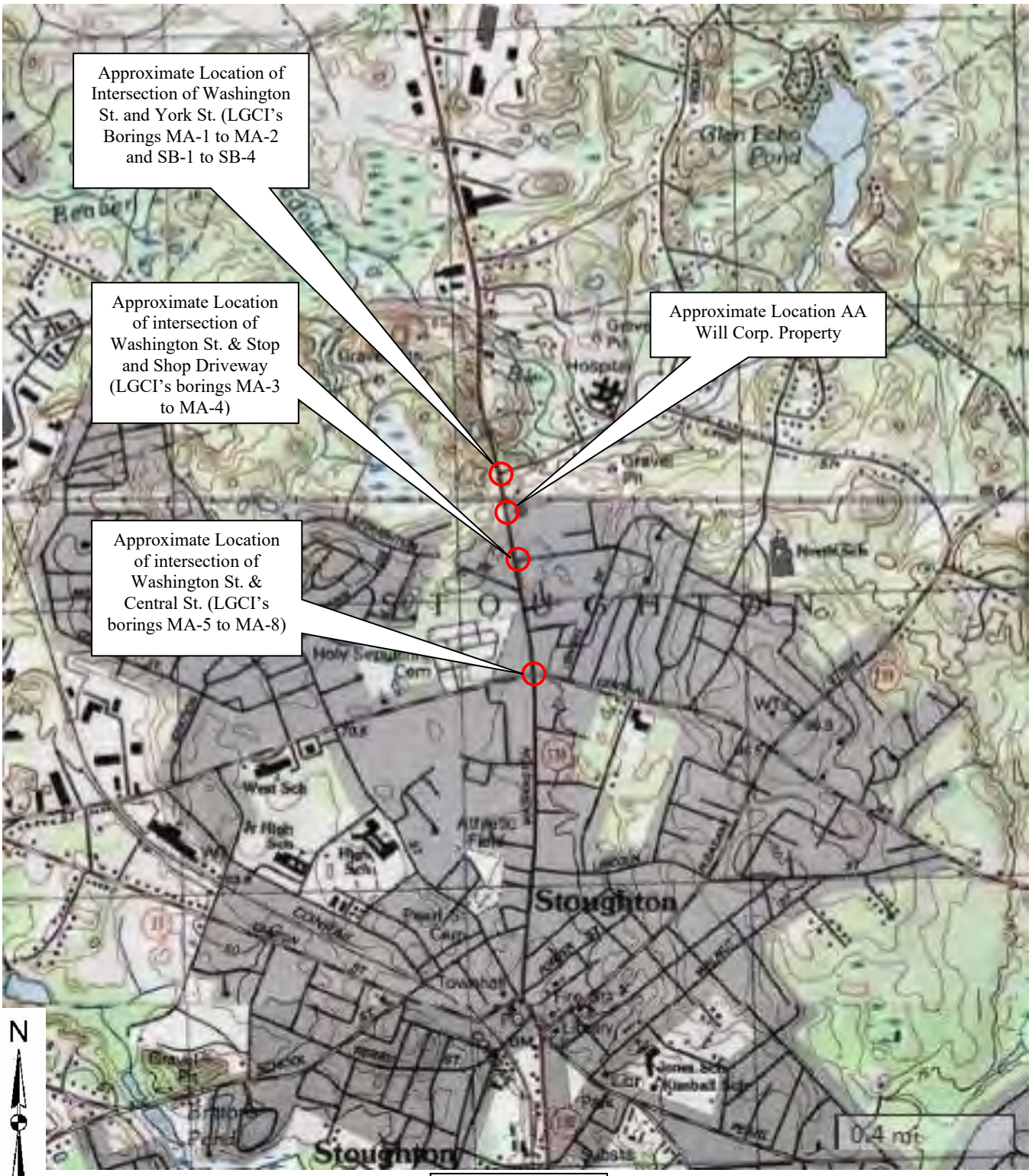
Boring No.	Ground Surface Elevation (ft.)[1]	Groundwater[2] Depth / El. (ft.)	Bottom of Topsoil/**Asphalt** Depth / El. (ft.)	Bottom of Concrete Depth / El. (ft.)	Bottom of Fill Depth / El. (ft.)	Bottom of Oragnic Soil/**Peat** Depth / El. (ft.)	Bottom of Sand and Gravel Depth / El. (ft.)	Top of Rock Depth / El. (ft.)	Bottom of Boring Depth / El. (ft.)
MA-1	216.0	6.0 / **210.0**	0.6 / **215.4**	- / **-**	2.0 / **214.0**	- / **-**	21.0 [3]/ **195.0**	- / **-**	21.0 / **195.0**
MA-2	219.0	9.2 / **209.8**	0.4 / **218.6**	- / **-**	4.0 / **215.0**	- / **-**	16.0 / **203.0**	16.0 [4]/ **203.0**	18.2 / **200.8**
MA-3	235.0	9.0 / **226.0**	2.0 / **233.0**	- / **-**	9.0 / **226.0**	11.5 / **223.5**	21.0 [3]/ **214.0**	- / **-**	21.0 / **214.0**
MA-4	235.0	6.0 / **229.0**	2.0 / **233.0**	- / **-**	4.0 / **231.0**	- / **-**	21.0 [3]/ **214.0**	- / **-**	21.0 / **214.0**
MA-5	242.0	11.7 / **230.3**	- / **-**	0.2 / **241.8**	4.0 / **238.0**	- / **-**	21.0 [3]/ **221.0**	- / **-**	21.0 / **221.0**
MA-6	240.0	10.1 / **229.9**	0.3 / **239.7**	- / **-**	4.0 / **236.0**	- / **-**	20.2 [3]/ **219.8**	- / **-**	20.2 / **219.8**
MA-7	241.0	10.5 / **230.5**	**0.5** / **240.5**	**-** / **-**	4.0 / **237.0**	- / **-**	21.0 [3]/ **220.0**	- / **-**	21.0 / **220.0**
MA-8	241.0	9.0 / **232.0**	2.0 / **239.0**	- / **-**	8.0 / **233.0**	- / **-**	21.0 [3]/ **220.0**	- / **-**	21.0 / **220.0**
SB-1	202.0	6.0 / **196.0**	**0.6** / **201.4**	1.2 / **200.8**	19.0 / **183.0**	**23.6** / **178.4**	31.0 [3]/ **171.0**	- / **-**	31.0 / **171.0**
SB-2	204.0	8.0 / **196.0**	**0.7** / **203.3**	**-** / **-**	14.0 / **190.0**	14.1 / **189.9**	19.0 / **185.0**	19.0 [4]/ **185.0**	26.0 / **178.0**
SB-3	211.0	19.0 / **192.0**	**0.7** / **210.3**	**-** / **-**	- / **-**	- / **-**	26.0 / **185.0**	26.0 [4]/ **185.0**	28.6 / **182.4**
SB-4	215.0	8.5 / **206.5**	0.3 / **214.7**	**-** / **-**	4.0 / **211.0**	- / **-**	9.2 / **205.8**	9.2 [4]/ **205.8**	12.5 / **202.5**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: ""Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.
2. Groundwater depths based on level at the end of drilling, level after drilling, or based on sample moisture, whichever is shallower.
3. Boring terminated in the sand and gravel layer.
4. Boring terminated in rock or in a boulder .
5. "-" means layer was not encountered.

Table 2 - Summary of LGCI's Test Pits
Proposed Mast Arms and Reinforced Slope
Stoughton, Massachusetts
LGCI Project No. 2139

Test Pit No.	Ground Surface Elevation (ft.)[1]	Groundwater[2] Depth / El. (ft.)	Bottom of Topsoil Depth / El. (ft.)	Bottom of Fill Depth / El. (ft.)	Bottom of Sand and Gravel Depth / El. (ft.)	Bottom of Test Pit Depth / El. (ft.)
TP-1	232.0	- / **-**	- / **-**	4.3 / **227.7**	6.0 [3]/ **226.0**	6.0 / **226.0**
TP-2	237.0	- / **-**	1.0 / **236.0**	2.5 / **234.5**	5.5 [3]/ **231.5**	5.5 / **231.5**

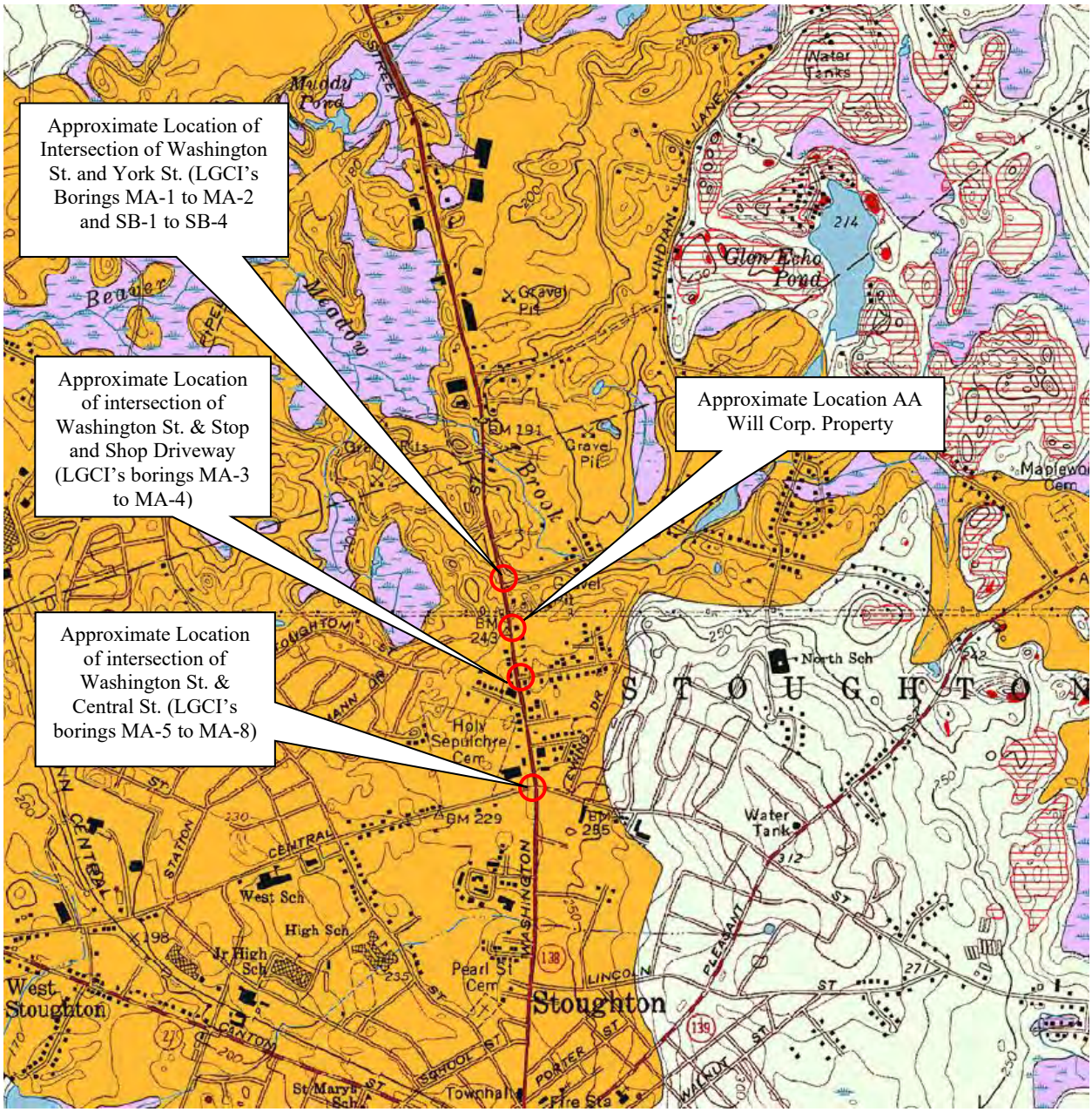
1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.
2. Groundwater not encountered.
3. Test pit terminated in the sand and gravel layer.
4. "-" means layer or groundwater was not encountered.



Contour Interval: 3 meters

Note: Figure based on USA Topo Maps of Stoughton, MA obtained from https://viewer.nationalmap.gov/

Client:	Project:	
Nitsch Engineering, Inc.	Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 1 – Site Location Map
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139 / Date: April 2022



N

Coarse deposits consist of *gravel deposits*, *sand and gravel deposits*, and *sand deposits*, not differentiated in this report. *Gravel deposits* are composed of at least 50 percent gravel-size clasts; cobbles and boulders predominate; minor amounts of sand occur within gravel beds, and sand comprises a few separate layers. Gravel layers generally are poorly sorted, and bedding commonly is distorted and faulted due to postdepositional collapse related to melting of ice. *Sand and gravel deposits* occur as mixtures of gravel and sand within individual layers and as layers of sand alternating with layers of gravel. Sand and gravel layers generally range between 25 and 50 percent gravel particles and between 50 and 75 percent sand particles. Layers are well sorted to poorly sorted; bedding may be distorted and faulted due to postdepositional collapse. *Sand deposits* are composed mainly of very coarse to fine sand, commonly in well-sorted layers. Coarser layers may contain up to 25 percent gravel particles, generally granules and pebbles; finer layers may contain some very fine sand, silt, and clay

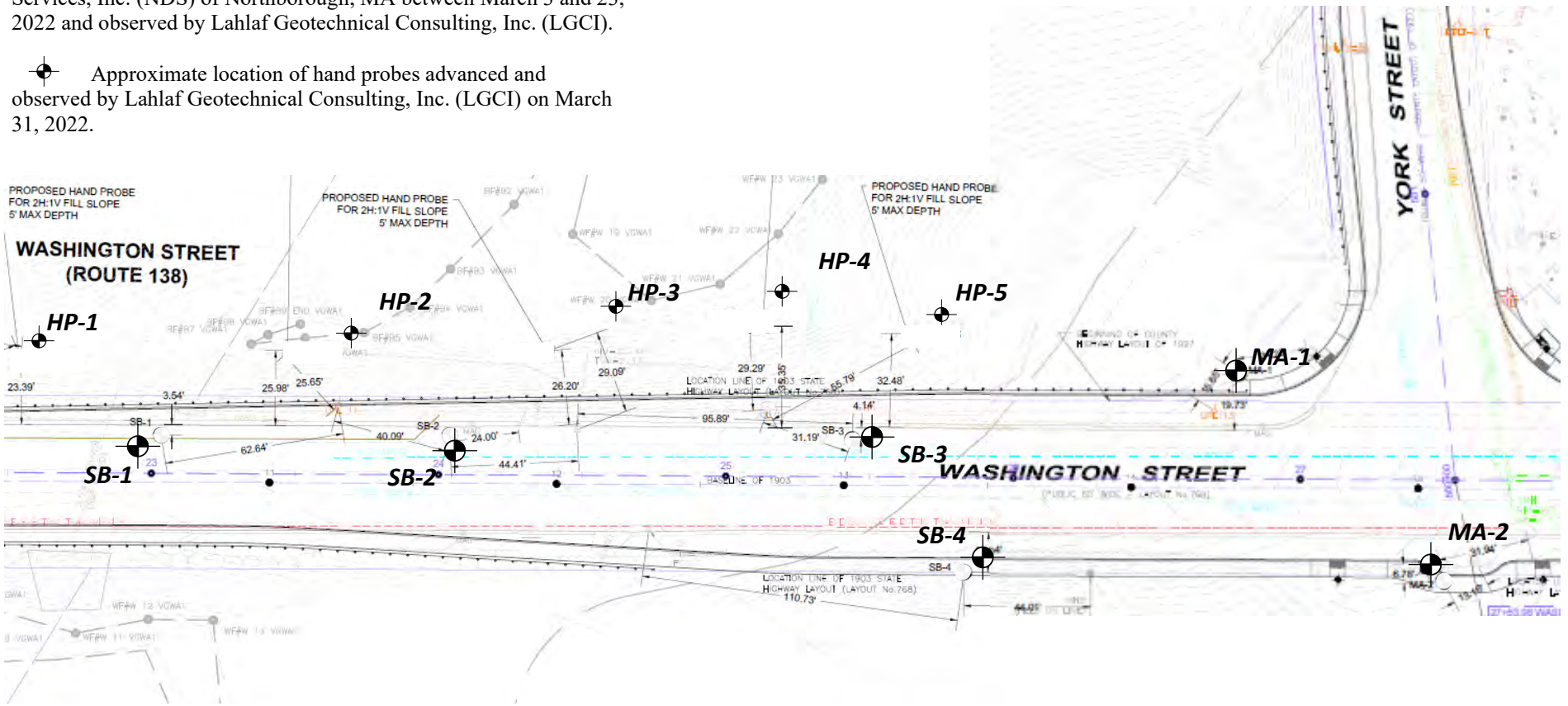
Note: Figure based on map titled: "Surficial Materials Map of the Blue Hills Quadrangle, Massachusetts," prepared by Stone, B.D., and DiGiacomo-Cohen, M.L. Scientific Investigation Map 3402, Quadrangle 127 – Blue Hills, 2018.

Client:	Project:	Figure 2 – Surficial Geologic Map	
Nitsch Engineering, Inc.	Proposed Mast Arms, Reinforced Slope, and Retaining Wall		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: April 2022

Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA between March 3 and 23, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).

Approximate location of hand probes advanced and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI) on March 31, 2022.

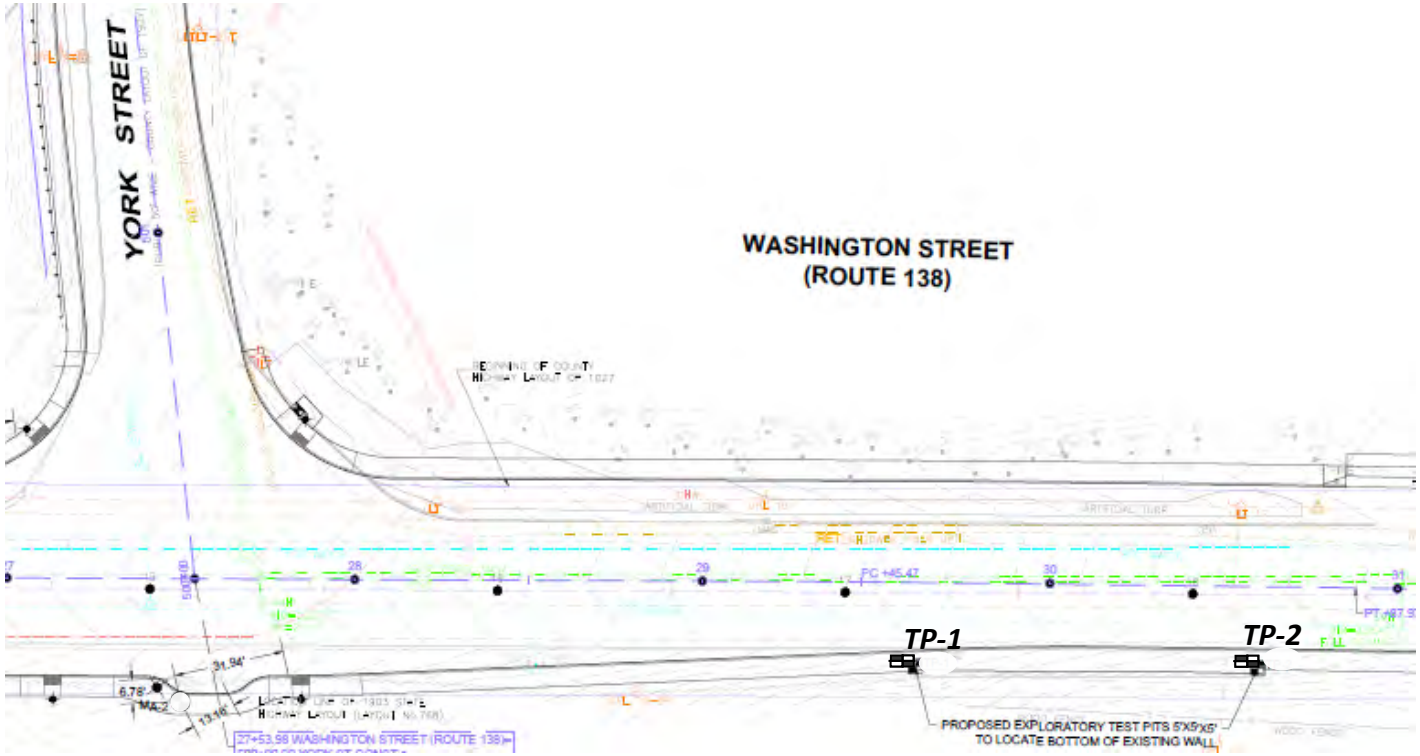


Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 and 2 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3A – Boring Location Plan - MA-1 & MA-2 and SB-1 to SB-4	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: April 2022

Legend

Approximate location of test pit advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA on March 25, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



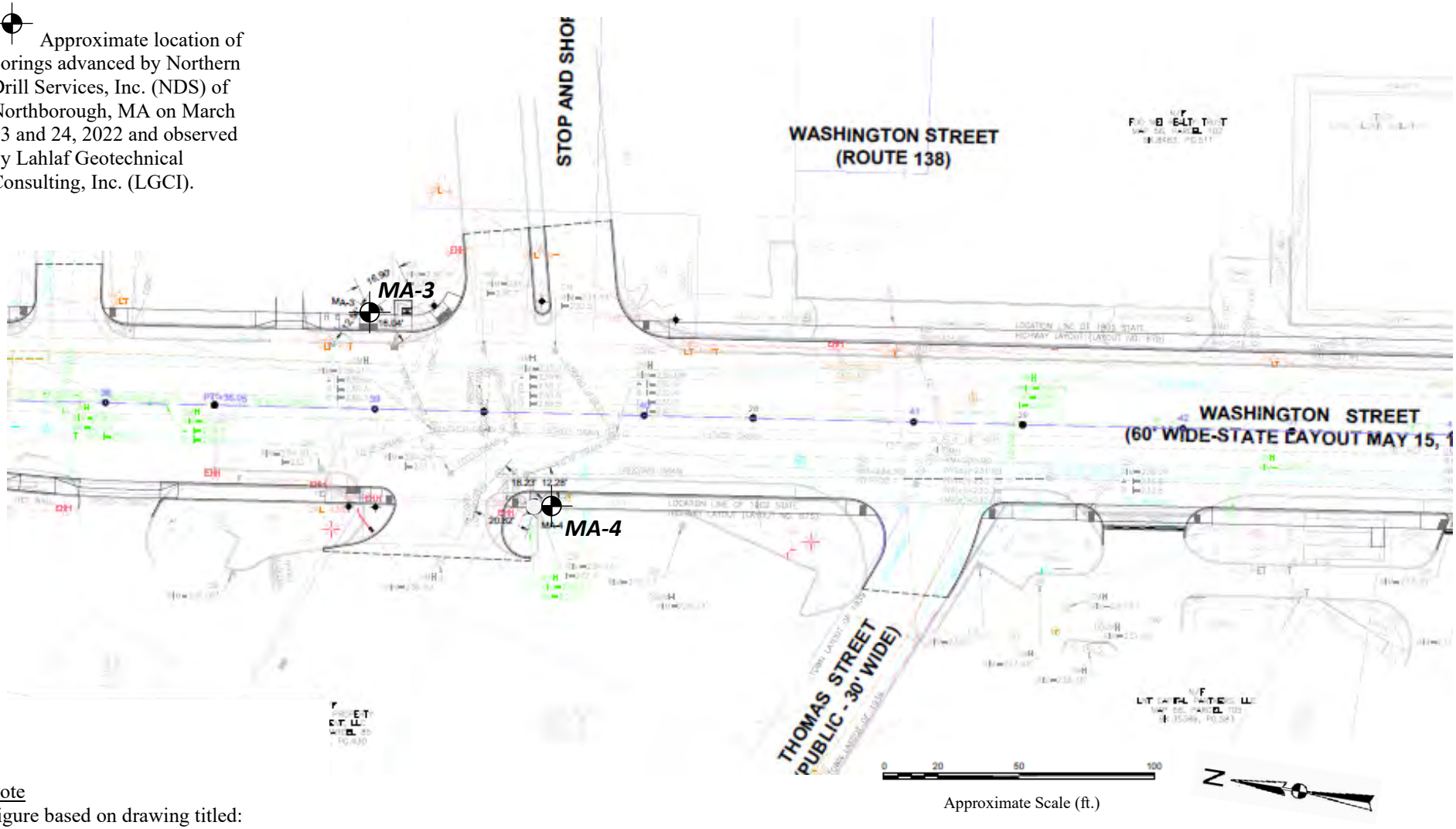
Approximate Scale (ft.)

Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 2 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022 and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3B – Test Pit Location Plan - TP-1 and TP-2	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: April 2022

Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA on March 23 and 24, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



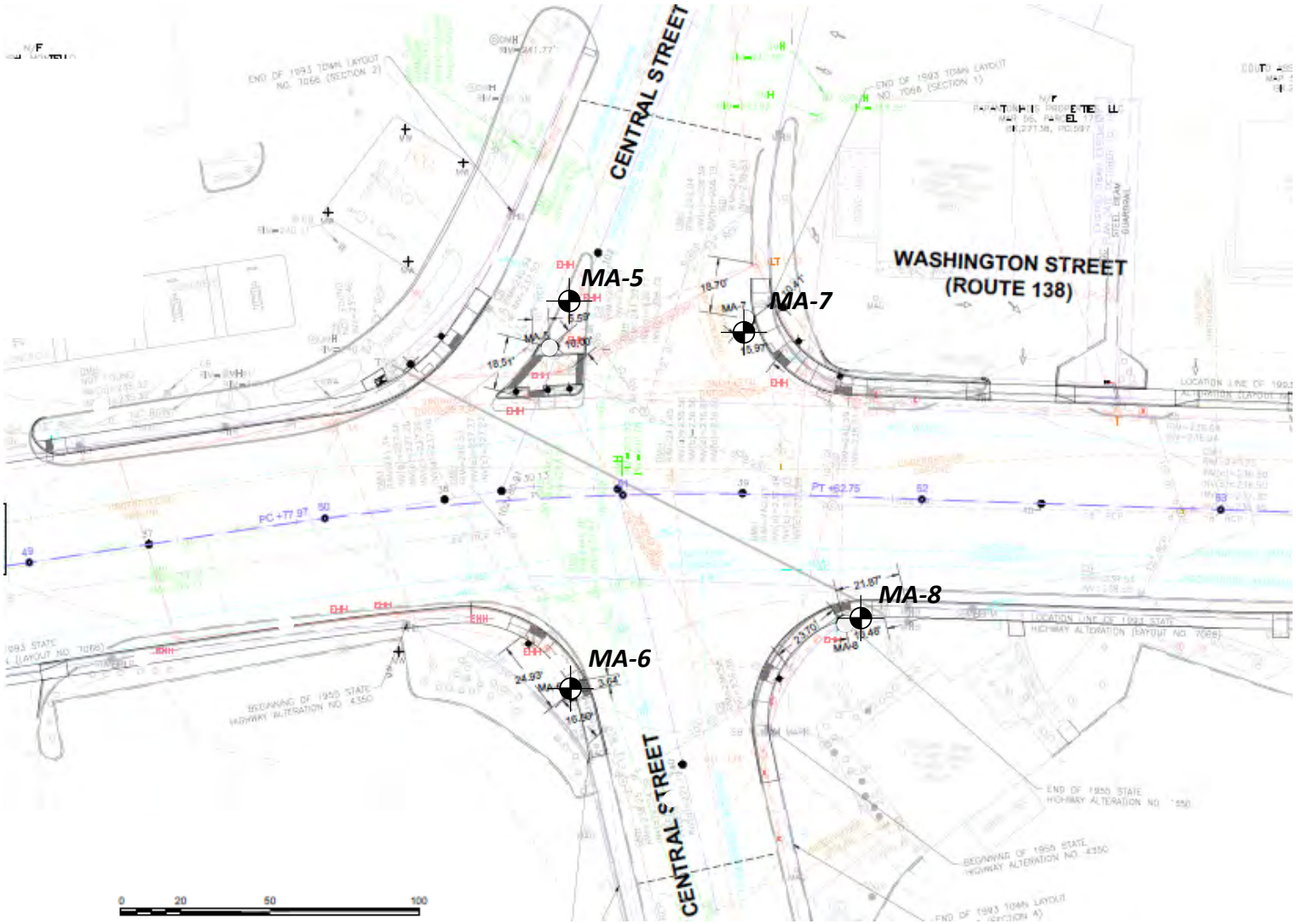
Approximate Scale (ft.)

Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 4 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022 and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3C – Boring Location Plan - MA-3 to MA-4	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: April 2022

Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA between March 24 and 28, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



Approximate Scale (ft.)

Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 5 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022 and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3D – Boring Location Plan - MA-5 to MA-8	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: April 2022

Attachment A – Boring Logs

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BORING LOG

MA-1
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/4/22 **DATE COMPLETED:** 3/4/22
BORING LOCATION: Near Northern side of York St
COORDINATES: NA
SURFACE El.: 216 ft. (see note 1) **TOTAL DEPTH:** 21 ft.
WEATHER: 20's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 6.0 ft. / El. 210.0 ft. Based on sample moisture
AT END OF DRILLING: 17.0 ft. / El. 199.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	215.0	0	S1	6-15-13-11 (28)	24/14		Topsoil	0.6	S1 - Top 7": Topsoil
							Fill	215.4	Bot. 7": Silty SAND with Gravel (SM), fine to coarse, ~15% fines, 25-30% fine to coarse angular gravel, trace of organic soil, brown moist
		2	S2	8-10-19-11 (29)	24/9			2.0 214.0	S2 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 5-10% fines, light brown, moist
		4	S3	7-6-7-6 (13)	24/3				S3 - Well Graded GRAVEL (GW), fine to coarse, subrounded, 0-5% fines, ~10% fine to coarse sand, brown, moist
5	210.0	6	S4	5-5-6-4 (11)	24/10		Sand and Gravel		S4 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, ~5% fines, ~30% fine to coarse subrounded gravel, light brown, wet
		8							
		9	S5	40-60/1"	7/0			9.6	S5 - No recovery
10	205.0	9.6				1	Boulder	206.4 13.5	REMARK 1: Spun 3" casing at depth of 9.6'. Drilled through boulder from 9.6' to 13.5'.
		14	S6	100/1"	1/0	2	Sand and Gravel	14.0	REMARK 2: Drove casing to depth of 14.0' through what appears to be a thin sand seam about 6.0" thick.
		14.1						202.0	S6 - No recovery
15	200.0						Boulder		
						3		17.5 198.5	REMARK 3: Drilled through boulder. Used 5 tanks of water drilling 9.6' to 20.0'. Broke through boulder at depth of 17.5'.
		19	S7	23-29-33-29 (62)	24/9		Sand and Gravel		S7 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 30-35% fine to coarse angular gravel, trace of weathered rock, brown wet
20	195.0	21						21.0	Bottom of borehole at 21.0 feet. Backfilled borehole with drill cutting and 7 bags of gravel.
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

MA-2
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/23/22 **DATE COMPLETED:** 3/23/22
BORING LOCATION: Near west side of York St and Washington St
COORDINATES: NA
SURFACE El.: 219 ft. (see note 1) **TOTAL DEPTH:** 18.2 ft.
WEATHER: 40's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 205.0 ft. Based on sample moisture
AT END OF DRILLING: 9.2 ft. / El. 209.8 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** HO

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0					Topsoil	0.4 / 218.6	S1 - S1 Top 4": Topsoil S1 Bot 7": Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 35-40% fine to coarse subangular gravel, trace of organic soil, brown, moist
		2	S1	3-6-9-5 (15)	24/11		Fill		S2 - Buried Topsoil, trace of roots, dark brown, moist
	215.0	4	S2	7-4-3-2 (7)	24/2			4.0 / 215.0	
5		6	S3	5-3-3-3 (6)	24/1				S3 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, ~5% fines, 25-30% fine subrounded gravel, brown, moist
		8	S4	4-8-11-7 (19)	24/3	1			S4 - Similar to S3, 5-10% fines, 20-25% fine to coarse subrounded gravel REMARK 1: Drove 3" spoon from 4.0' to 8.0'.
	210.0		S5	9-6-9-7 (15)	24/6				S5 - Similar to S3, 35-40% fine to coarse subrounded gravel
10		10					Sand and Gravel		
	205.0	14							S6 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 25-30% fine to coarse subrounded to angular gravel, gray to brown, wet (rock in tip of spoon)
15		16	S6	5-5-9-30 (14)	24/6			16.0 / 203.0	
						2	Rock	18.2	REMARK 2: Advanced button bit from 16.0' to 18.2' in possible rock. Used 1.5 tanks of water drilling from 16.0' to 18.2'.
	200.0								Bottom of borehole at 18.2 feet. Backfilled borehole with drill cutting and 4 bags of gravel.
20									
	195.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

MA-3
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/23/22 **DATE COMPLETED:** 3/24/22
BORING LOCATION: Near Stop and Shop Driveway
COORDINATES: NA
SURFACE El.: 235 ft. (see note 1) **TOTAL DEPTH:** 21 ft.
WEATHER: 50's / Sunny / Rain
GROUNDWATER LEVELS:
DURING DRILLING: 9.0 ft. / El. 226.0 ft. Based on sample moisture
AT END OF DRILLING: 11.3 ft. / El. 223.7 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** LB

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	2-4-8-6 (12)	24/10		Topsoil	2.0	S1 - Topsoil
		2	S2	4-3-3-3 (6)	24/17		Fill	233.0	S2 - Silty SAND (SM), fine to coarse, 15-20% fines, 10-15% fine to coarse subangular to subrounded gravel, trace of coal, trace of ash, trace of organic soil, trace of asphalt, black to brown, moist
		4							
5	230.0		S3	4-2-3-6 (5)	24/6				S3 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 10-15% fines, 30-35% fine to coarse subangular gravel, brown, moist
		6	S4	4-2-1-1 (3)	24/9				S4 - Well Graded SAND with Silt (SW-SM), fine to coarse, 10-15% fines, 10-15% fine to coarse subangular to angular gravel, brown, moist
		8				1			REMARK 1: Casing pushed from 8 to 9 feet, sampled from 9 to 11 feet.
		9						9.0 ▽	
10	225.0		S5	5-2-8-11 (10)	24/11		Buried Organic Soil	226.0	S5 - Top 7": Silty SAND (SM), fine to coarse, ~30% fines, ~10% fine to coarse subangular gravel, trace of organic soil, black, wet Bot 4": Silty SAND (SM), fine to coarse, 25-30% fines, ~10% fine subrounded gravel, trace of organic soil, brown, wet
		11	S6	16-30-47-43 (77)	24/12			11.5 ▽	S6 - Top 6": Silty SAND with Gravel (SM), fine to coarse, ~20% fines, 25-30% fine to coarse subangular gravel, trace of organic soil, gray to brown, wet
		13					Sand and Gravel	223.5	Bot 6": Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 10-15% fines, ~15% fine to coarse subrounded gravel, brown, wet
		14							
15	220.0		S7	45-38-38-29 (76)	24/14				S7 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 30-35% fine to coarse subangular to subrounded gravel, brown, wet
		16							
		19	S8	19-11-11-10 (22)	24/12				S8 - Well Graded GRAVEL with Sand (GW), fine to coarse, subrounded, 0-5% fines, 20-25% fine to coarse sand, brown, wet
20	215.0								
		21						21.0	Bottom of borehole at 21.0 feet. Backfilled borehole with drill cutting and 2 bags of gravel.
25	210.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

MA-4
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/24/22 **DATE COMPLETED:** 3/24/22
BORING LOCATION: Near O'Reilly Auto Parts Entrance
COORDINATES: NA
SURFACE El.: 235 ft. (see note 1) **TOTAL DEPTH:** 21 ft.
WEATHER: 40's / Rain
GROUNDWATER LEVELS:
DURING DRILLING: 8.0 ft. / El. 227.0 ft. Based on sample moisture
AT END OF DRILLING: 6.0 ft. / El. 229.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** LB

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	1-2-4-5 (6)	24/4	1	Topsoil	2.0	S1 - Topsoil and bark mulch REMARK 1: Plastic washing up in mud tub from 0 to 4 feet. Encountered irrigation utility at depth of 1.5 feet
		2	S2	8-11-20-19 (31)	24/7		Fill	233.0 4.0	S2 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines, 10-15% fine to coarse subangular gravel, light brown, moist
5	230.0	4 5.5	S3	14-17-29-70/0" (46)	18/4			231.0	S3 - Well Graded SAND with Gravel (SW), fine to coarse, 0-5% fines, 30-35% fine to coarse subangular gravel, gray, moist
		6	S4	11-10-14-19 (24)	24/9				S4 - Similar to S3, wet
		8	S5	9-10-12-10 (22)	24/7				S5 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 15-20% fine to coarse subrounded gravel, gray, wet
10	225.0	10	S6	11-8-10-7 (18)	24/8				S6 - Similar to S5
		12					Sand and Gravel		
15	220.0	14	S7	5-5-5-5 (10)	24/3				S7 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 15-20% fine to coarse angular gravel, gray, wet
		16							
20	215.0	19	S8	3-3-3-2 (6)	24/5				S8 - Similar to S7, 10-15 % fine to coarse subrounded gravel
		21						21.0	Bottom of borehole at 21.0 feet. Backfilled borehole with drill cutting and 1 bag of gravel.
25	210.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/25/22 **DATE COMPLETED:** 3/25/22
BORING LOCATION: Near NE corner of Washington St and Central St
COORDINATES: NA
SURFACE El.: 242 ft. (see note 1) **TOTAL DEPTH:** 21 ft.
WEATHER: 40's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 228.0 ft. Based on sample moisture
AT END OF DRILLING: 11.7 ft. / El. 230.3 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** LB

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
							Concrete	0.2 / 241.8	2.5" of Concrete
		0.5	S1	3-3-3	18/2		Fill		S1 - Well Graded GRAVEL with Sand (GW), fine to coarse, subangular, 0-5% fines, 20-25% fine to coarse sand, light brown, moist
	240.0	2	S2	5-7-28-21 (35)	24/10				S2 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 5-10% fines, 15-20% fine to coarse angular gravel, light brown, moist
		4						4.0 / 238.0	
5			S3	8-12-35-28 (47)	24/13				S3 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, trace of coarse, 5-10% fines, ~15% fine to coarse subrounded gravel, light brown, moist
		6	S4	7-16-15-20 (31)	24/14				S4 - Similar to S3
	235.0	8	S5	12-17-30-30 (47)	24/11				S5 - Well Graded SAND with Gravel (SW), fine to coarse, 0-5% fines, 25-30% fine to coarse subangular gravel, light brown, moist
10		10	S6	17-9-15-31 (24)	24/14				S6 - Silty SAND (SM), fine to medium, ~15% fines, ~5% fine subrounded gravel, brown, moist
	230.0	12					Sand and Gravel		▼
		14	S7	28-34-27-32 (61)	24/6				▽ S7 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 20-25% fine to coarse subangular to angular gravel, brown, wet
15		16							
	225.0					1			REMARK 1: Drill rig chattering at depth 17. feet. Drilled through cobble.
		19	S8	14-31-34-32 (65)	24/12				S8 - Similar to S7, 30-35% fine to coarse angular gravel
20		21						21.0	
	220.0								Bottom of borehole at 21.0 feet. Backfilled borehole with drill cutting and 1 bag of gravel. Ground surface was restored with concrete.
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/24/22 **DATE COMPLETED:** 3/24/22
BORING LOCATION: Near NW corner of Washington St and Central St
COORDINATES: NA
SURFACE El.: 240 ft. (see note 1) **TOTAL DEPTH:** 20.2 ft.
WEATHER: 40's / Rain
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 226.0 ft. Based on sample moisture
AT END OF DRILLING: 10.1 ft. / El. 229.9 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** LB

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	3-5-8-12 (13)	24/12		Topsoil	0.3 239.7	S1 - Top 3": Bark mulch Bot 9": Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 15-20% fine to coarse subangular gravel, trace of organic soil, trace of asphalt, brown, moist
		2	S2	32-14-13-12 (27)	24/6		Fill	4.0 236.0	S2 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, ~15% fine to coarse subangular gravel, trace of roots, trace of bark mulch, light brown, moist
5	235.0	4	S3	13-13-12-16 (25)	24/10				S3 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 15-20% fine to coarse subangular gravel, light brown, moist
		6	S4	14-10-14-13 (24)	24/5				S4 - Similar to S3, 30-35% fine to coarse subrounded to subangular gravel
		8	S5	12-16-20-17 (36)	24/12				S5 - Similar to S3, 25-30% fine to coarse subangular gravel
10	230.0	10	S6	18-20-19-17 (39)	24/15				S6 - Similar to S3
		12					Sand and Gravel		
15	225.0	14	S7	9-9-12-17 (21)	24/11				S7 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 15-20% fine to coarse subrounded gravel, light brown, wet
		16							
20	220.0	20							
		20.2	S8	100/2"	2/0			20.2	S8 - No recovery. Refusal on possible rock or boulder Bottom of borehole at 20.2 feet. Backfilled borehole with drill cutting. Ground surface was restored with concrete.
25	215.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/25/22 **DATE COMPLETED:** 3/25/22
BORING LOCATION: Near SE corner of Washington St and Central St
COORDINATES: NA
SURFACE El.: 241 ft. (see note 1) **TOTAL DEPTH:** 21 ft.
WEATHER: 40's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 227.0 ft. Based on sample moisture
AT END OF DRILLING: 10.5 ft. / El. 230.5 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** LB

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
							Asphalt	0.5	5" Asphalt
	240.0	0.5	S1	10-5-4	18/9		Fill	240.5	S1 - Silty SAND with Gravel (SM), fine to coarse, ~20% fines, 20-25% fine to coarse subrounded gravel, trace of asphalt, brown to black, moist
		2	S2	2-2-6-24 (8)	24/13				S2 - Silty SAND (SM), fine to medium, ~15% fines, 5-10% fine to coarse subrounded gravel, trace of organic soil, orange to brown, moist
		4						4.0	
5			S3	23-22-34-43 (56)	24/12		Sand and Gravel	237.0	S3 - Well Graded SAND with Gravel (SW), fine to coarse, 0-5% fines, 30-35% fine to coarse subrounded to angular gravel, light brown, moist
	235.0	6	S4	20-59-41/3"	15/9				S4 - Similar to S3, 20-25% fine to coarse subangular gravel
		7.3							
		9	S5	13-32-41-20 (73)	24/13				S5 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 25-30% fine to coarse subangular gravel, brown, moist
10									▼
	230.0	11							
		14	S6	14-9-15-21 (24)	24/8				▽ S6 - Similar to S5, 15-20% fine to coarse subrounded gravel, wet
15									
	225.0	16							
		19	S7	14-16-20-23 (36)	24/9				S7 - Similar to S5, wet
20									
	220.0	21						21.0	
									Bottom of borehole at 21.0 feet. Backfilled borehole with drill cutting. Ground surface was restored with cold patch asphalt.
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/28/22 **DATE COMPLETED:** 3/28/22
BORING LOCATION: Near SW corner of Washington St and Central St
COORDINATES: NA
SURFACE El.: 241 ft. (see note 1) **TOTAL DEPTH:** 21 ft.
WEATHER: 30's / Snow showers
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 227.0 ft. Based on sample moisture
AT END OF DRILLING: 9.0 ft. / El. 232.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** HO

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	240.0	0	S1	2-4-3-2 (7)	24/11		Topsoil	2.0	S1 - Topsoil
		2	S2	10-21-10-4 (31)	24/8	1	Fill	239.0	S2 - Silty SAND (SM), fine to medium, ~15% fines, 10-15% fine to coarse subrounded gravel, trace of organic soil, trace of coal, trace of roots, brown, moist REMARK 1: Encountered hard drilling at depth 3 feet. Possible concrete, offset borehole 3 feet east.
		4	S3	2-2-4-6 (6)	24/2				S3 - Silty SAND (SM), fine to medium, ~15% fines, 0-5% fine to coarse subrounded gravel, trace of organic soil, trace of roots, brown, moist
5	235.0	6	S4	9-9-14-26 (23)	24/9				S4 - Silty SAND with Gravel (SM), fine to coarse, ~20% fines, 20-25% fine to coarse subrounded to subangular gravel, trace of organic soil, brown, moist
		8	S5	13-20-24-19 (44)	24/14		Sand and Gravel	8.0 233.0	S5 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 5-10% fines, 5-10% fine to coarse subrounded gravel, light brown, moist
10	230.0	10	S6	19-16-31-53 (47)	24/24				S6 - Similar to S5
		12							
		14	S7	9-8-8-9 (16)	24/10				S7 - Similar to S5, gray, wet
15	225.0	16							
		19	S8	20-17-11-11 (28)	24/9				S8 - Similar to S5, 20-25% fine to coarse subangular gravel, wet
20	220.0	21						21.0	Bottom of borehole at 21.0 feet. Backfilled borehole with drill cutting and 1 bag of gravel.
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 1 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/22/22 **DATE COMPLETED:** 3/23/22
BORING LOCATION: ~60 ft. North of UP #11
COORDINATES: NA
SURFACE El.: 202 ft. (see note 1) **TOTAL DEPTH:** 31 ft.
WEATHER: 50's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 6.0 ft. / El. 196.0 ft. Based on sample moisture
AT END OF DRILLING: 13.0 ft. / El. 189.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Carl Bierholm
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Mobile B-57 Truck Rig
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: OL / TG **CHECKED BY:** HO

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
							Asphalt	0.6	7" of Asphalt
						1	Concrete	1.2	7" of Concrete
	200.0	2						200.8	REMARK 1: Advanced button bit through concrete below asphalt, first sample taken at 2.0'.
			S1	17-18-10-4 (28)	24/9				S1 - S1 Top 4": Well Graded GRAVEL with Sand (GW), fine to coarse, angular, 0-5% fines, ~30% fine to coarse sand, mostly pink, wet (possible broken cobble)
		4							S1 Bot 5": Silty SAND with Gravel (SM), fine, trace medium, sightly plastic, 20-25% fines, ~20% fine subrounded gravel, brown, moist
5			S2	7-5-3-4 (8)	24/4				S2 - Well Graded GRAVEL with Sand (GW), fine to coarse, angular, 0-5% fines, ~15% coarse sand, gray, wet (possible broken cobble)
		6							S3 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subrounded to angular, 5-10% fines, ~15% fine to coarse sand, brown, wet
	195.0		S3	7-8-3-5 (11)	24/3				
		8				2			REMARK 2: 2" spoon did not collect sample so redrove 3" spoon at depth of 8.0'.
			S4	3-4-3-6 (7)	24/6				S4 - S4 Top 3": Well Graded GRAVEL (GW), fine to coarse, subround to subangular, 0-5% fines, 0-5% coarse sand, brown, wet
10		10				3	Fill		S4 Bot 3": Silty SAND (SM), fine to medium, ~20% fines, 5-10% fine gravel, brown, wet
			S5	10-7-3-5 (10)	24/7				REMARK 3: 2" spoon did not collect sample so redrove 3" spoon at depth of 10.0'.
	190.0	12							S5 - S5 Top 3":Silty SAND with Gravel (SM), fine to medium, ~15% fines, 25-30% subround gravel, brown, wet
			S6	7-6-11-6 (17)	24/7				S5 Bot 4": Poorly Graded GRAVEL with Sand (GP), fine, subangular, 0-5% fines, 30-35% medium to coarse sand, brown, wet
		14							S6 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subrounded to angular, 5-10% fines, 15-20% coarse sand, brown, wet
15			S7	13-12-12-6 (24)	24/5				S7 - Well Graded GRAVEL with Sand (GW), fine to coarse, 0-5% fines, 15-20% coarse sand, gray, moist
		16							S8 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 20-25% coarse subangular gravel, brown, wet
	185.0		S8	9-8-8-7 (16)	24/8				
		18							
		19						19.0	
								183.0	S9 - PEAT (PT), fibrous, trace leaves, trace roots, trace wood, black, wet
20			S9	2-2-4-3 (6)	24/24				
		21					Peat		S10 - S10 Top 12": Similar to S9
	180.0		S10	4-3-3-6 (6)	24/15				S10 Bot 3": PEAT (PT), nonfibrous, trace roots, 20-25% fine sand, black, wet
		23						23.6	
			S11	4-5-5-11 (10)	24/7			178.4	S11 - Silty SAND with Gravel (SM), fine to medium, 15-20% fines, 20-25% fine subrounded gravel, trace organic soil, brown, light gray at bottom of sample, wet
25							Sand and Gravel		

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

SB-1
PAGE 2 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		25	S12	15-16-17-19 (33)	24/7		Sand and Gravel	178.4	S12 - Well Graded GRAVEL with Sand (GW), fine to coarse, subrounded to angular, 0-5% fines, 25-30% fine to medium sand, gray, wet
	175.0	27							
		29	S13	12-8-10-11 (18)	24/2				S13 - Poorly Graded GRAVEL (GP), coarse, subangular, 0-5% fines, brown wet Drove 3" spoon, similar to S13, ~10% fine to coarse sand
30		31						31.0	
	170.0								Bottom of borehole at 31.0 feet. Backfilled borehole with drill cutting and 6 bags of gravel. Ground surface was restored with cold patch asphalt.
35									
	165.0								
40									
	160.0								
45									
	155.0								
50									
	150.0								
55									
	145.0								
60									

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BORING LOG

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PAGE 1 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/21/22 **DATE COMPLETED:** 3/22/22
BORING LOCATION: ~40 ft. South of UP #11
COORDINATES: NA
SURFACE El.: 204 ft. (see note 1) **TOTAL DEPTH:** 26 ft.
WEATHER: 50's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 8.0 ft. / El. 196.0 ft. Based on sample moisture
AT END OF DRILLING: 19.5 ft. / El. 184.5 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Carl Bierholm
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Mobile B-57 Truck Rig
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: AML **CHECKED BY:** HO

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
							Asphalt	0.7	8" of Asphalt
						1			REMARK 1: Advanced button bit through concrete below asphalt, first sample taken at 2.0'.
		2	S1	12-8-5-6 (13)	24/10				S1 - Silty SAND with Gravel (SM), fine to coarse, ~20% fines, 25-30% fine to coarse subangular gravel, brown, moist
	200.0	4	S2	6-5-4-4 (9)	24/2				S2 - Well Graded GRAVEL (GW), fine to coarse, subangular, 0-5% fines, 0-5% coarse sand, brown, moist
5		6	S3	4-4-5-4 (9)	24/7		Fill		S3 - Poorly Graded SAND with Silt (SP-SM), fine to medium, ~5% fines, light brown, moist
		8							▽
	195.0	9	S4	9-7-9-7 (16)	24/7				S4 - Silty GRAVEL with Sand (GM), fine, subangular to subrounded, ~15% fines, 35-40% fine to coarse sand, brown, wet
10		11						14.0	
	190.0	14	S5	5-4-4-6 (8)	24/1	1	Buried Topsoil		S5 - Silty SAND with Gravel (SM), fine to medium, trace coarse, 15-20% fines, ~30% fine to coarse subangular gravel, trace organic soil, brown, moist (possible buried subsoil)
15		16						16.0	REMARK 1: Description of sample S5 based on soil at tip of spoon
							Sand and Gravel		
	185.0	19	S6	11-9-9-10 (18)	24/10	2		19.2	S6 - S6 Top 2": Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, ~45% coarse subrounded gravel, pink, wet (possible weathered rock)
20		21					Weathered Rock		S6 Bot 8": Well Graded SAND with Silt and Gravel (SW-SM), fine to medium, trace coarse, 10-15% fines, ~15% fine gravel, trace of , dark brown, wet
									REMARK 2: Drill rig chattering at 20.0'.
	180.0	24							S7 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, angular to subangular, ~10% fines, 35-40% fine to coarse sand, pink to brown,
25				32-28-43-35					

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

SB-2
PAGE 2 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		24	S7	(71)	24/10		Weathered Rock		moist (possible weathered granite)
		26						26.0	Bottom of borehole at 26.0 feet. Backfilled borehole with drill cutting and 6 bags of gravel. Ground surface was restored with cold patch asphalt.
	175.0								
30									
	170.0								
35									
	165.0								
40									
	160.0								
45									
	155.0								
50									
	150.0								
55									
	145.0								
60									

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BORING LOG

SB-3
PAGE 1 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/21/22 **DATE COMPLETED:** 3/21/22
BORING LOCATION: North of York Street (NB Lane, Slope Boring)
COORDINATES: NA
SURFACE El.: 211 ft. (see note 1) **TOTAL DEPTH:** 28.6 ft.
WEATHER: 50's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 19.0 ft. / El. 192.0 ft. Based on sample moisture
AT END OF DRILLING: 23.0 ft. / El. 188.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Mobile B-57 Truck Rig
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** HO

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	210.0	0.5 / 0.7	S1	100/2"	2/0	1	Asphalt / Boulder	0.7	8" of Asphalt S1 - No Recovery REMARK 1: Broke split spoon sampling S1. Drill chattering, advanced roller bit 12" in boulder.
		2	S2	13-10-7-7 (17)	24/10			2.0	S2 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 25-30% fine to coarse subangular gravel, brown, moist
		4	S3	7-2-2-5 (4)	24/0				S3 - No Recovery, Rock in tip of split spoon
5	205.0	6	S4	4-3-3-6 (6)	24/8				S4 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, ~10% fines, 25-30% fine to coarse subrounded gravel, brown, moist
		8							
		9	S5	12-16-12-13 (28)	24/6				S5 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subrounded to subangular, 5-10% fines, 15-20% fine to coarse sand, brown, moist
10	200.0	11							
							Sand and Gravel		
		14	S6	11-16-12-6 (28)	24/2				S6 - Well Graded GRAVEL with Sand (GW), fine to coarse, subrounded to angular, 0-5% fines, 15-20% coarse sand, brown, moist
15	195.0	16							
		19	S7	10-7-16-84/3" (23)	21/8				S7 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 30-35% fine to coarse subrounded to angular gravel, brown, wet
20	190.0	20.8				2			REMARK 2: Casing refusal at depth of 21.0'. Advanced roller bit through 8.0" cobble, no water returning
		24							
25				13-9-7-29					S8 - Poorly Graded SAND with Gravel (SP), fine to medium, trace of coarse, 0-5% fines, 15-20% fine to coarse subangular gravel, brown, wet

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

SB-3
PAGE 2 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	185.0	24 26	S8	(16)	24/7		Sand and Gravel	26.0 185.0	
						3	Boulder		REMARK 3: Cobbles and boulders from 26.0' to 28.6'.
		28.5 28.6	S9	100/1"	1/0			28.6	S9 - No Recovery Bottom of borehole at 28.6 feet. Backfilled borehole with drill cutting and 6 bags of gravel. Ground surface was restored with cold patch asphalt.
30	180.0								
35	175.0								
40	170.0								
45	165.0								
50	160.0								
55	155.0								
60									

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BORING LOG

SB-4
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/3/22 **DATE COMPLETED:** 3/3/22
BORING LOCATION: North of York street at bottom of slope
COORDINATES: NA
SURFACE El.: 215 ft. (see note 1) **TOTAL DEPTH:** 12.5 ft.
WEATHER: 40's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 8.5 ft. / El. 206.5 ft. Based on sample moisture
AT END OF DRILLING: 9.5 ft. / El. 205.5 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG / LB **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	5-7-7-5 (14)	24/10		Topsoil	0.3	S1 - Top 3": Topsoil Bot 7": Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 20-25% fine to coarse subangular gravel, trace of asphalt, gray to black, moist
		2	S2	5-5-7-10 (12)	24/4	1	Fill		S2 - Silty SAND with Gravel (SM), fine to coarse, ~15% fines, 15-20% fine to coarse subrounded gravel, trace of asphalt, brown, moist
		4	S3	10-14-8-7 (22)	24/7			4.0	REMARK 1: Spun 4" casing at depth of 4.0'.
5	210.0	6	S4	3-3-5-16 (8)	24/3		Sand and Gravel		S3 - Similar to S2, no asphalt S4 - Poorly Graded GRAVEL with Silt (GP-GM), coarse, subangular, 5-10% fines, 10-15% fine to coarse sand, brown, moist
		8				2			REMARK 2: Advanced button bit through 8.0" cobble at depth of 7.8'.
		8.5	S5	25-75/2"	8/6				S5 - Poorly Graded SAND (SP), fine to medium, 0-5% fines, 10-15% coarse subrounded gravel, gray, wet
10	205.0	9.2				3		9.2	REMARK 3: Advance button bit from 9.2' to 12.5' into possible rock. Used 3 tanks of water drilling from 4.0' to 12.5'.
							Rock	12.5	Bottom of borehole at 12.5 feet. Backfilled borehole with drill cutting and 4 bags of gravel.
15	200.0								
20	195.0								
25	190.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Attachment B – Probe Logs

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PROBE LOG

HP-1
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 195 ft. (see note 1) **TOTAL DEPTH:** 2.7 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1			Forest Mat	0.5	G1 - Forest Mat
		0.5	G2			Swamp Deposits	194.5	G2 - Silty SAND (SM), fine, ~35% fines, trace of roots, trace of organic soil, brown, moist (Swamp Deposit)
		1.5	G3					G3 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines, 0-5% fine subrounded gravel, trace of roots, trace of organic soil, brown, moist
					1		2.7	REMARK 1: Refusal at depth 2.7' on possible cobbles or boulder.
								Bottom of borehole at 2.7 feet.
5	190.0							
10	185.0							
15	180.0							
20	175.0							
25	170.0							

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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PROBE LOG

HP-2
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 188 ft. (see note 1) **TOTAL DEPTH:** 3.5 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 0.0 ft. / El. 188.0 ft.
AT END OF DRILLING: -
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1			Forest Mat	1.5	G1 - Forest Mat
		1.5	G2			Swamp Deposits	186.5	G2 - Poorly Graded GRAVEL (GP), coarse, subrounded, 0-5% fines, 0-5% fine sand, gray, wet
		2	G3					G3 - Well Graded GRAVEL with Silt and Sand GW-GM), 10-15% fines, 20-25% fine to coarse sand, brown to gray, wet
	185.0	3	G4		1			G4 - Poorly Graded SAND with Gravel (SP), medium to coarse, 5-10% fines, 30-35% coarse subrounded gravel, gray, wet
5					2		3.5	REMARK 1: Refusal at depth 3.5' on possible cobbles or boulder.
								REMARK 2: Performed two additional hand probes: HP-2A and HP-2B. Both encountered refusal at depths 2.0' and 2.5', respectively.
	180.0							Bottom of borehole at 3.5 feet.
10								
	175.0							
15								
	170.0							
20								
	165.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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PROBE LOG

HP-3
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 187 ft. (see note 1) **TOTAL DEPTH:** 3 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 1.5 ft. / El. 185.5 ft.
AT END OF DRILLING: -
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1			Forest Mat	1.0	G1 - Forest Mat
		1	G2			Swamp Deposits	2.0	G2 - Silty SAND (SM), fine to medium, ~30% fines, 0-5% fine rounded gravel, trace of organic soil, trace of roots, black, wet
	185.0	2	G3		1 2	Buried Organic Soil	3.0	G3 - Silty SAND with Gravel (SM), mostly fine, 30-35% fines, ~15% coarse subrounded gravel, trace of organic soil, organic odor, brown to black, wet REMARK 1: Refusal at depth 3.0' on possible cobbles or boulder. REMARK 2: Performed two additional hand probes: HP-3A and HP-3B. Both encountered refusal at depths 1.0' and 2.5', respectively. Bottom of borehole at 3.0 feet.
5	180.0							
10	175.0							
15	170.0							
20	165.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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PROBE LOG

HP-4
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 189 ft. (see note 1) **TOTAL DEPTH:** 2.5 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 0.5 ft. / El. 188.5 ft.
AT END OF DRILLING: -
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
0		0	G1		1	Forest Mat	0.5 ▽ 188.5	G1 - Forest Mat
		0.5	G2		2	Swamp Deposits		G2 - Silty SAND with GRAVEL (SM), fine to medium, 25-30% fines, 25-30% fine to coarse rounded to subrounded gravel, brown to black, wet
		1.5	G3		3		2.5	G3 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, rounded to subrounded, 5-10% fines, 30-35% medium to coarse sand, light brown, wet
								REMARK 1: Refusal at depth 2.5' on possible cobbles or boulder.
								REMARK 2: Cobbles and boulders are observable at ground surface elevation.
								REMARK 3: Performed an additional hand probe: HP-4A. Encountered refusal at depth 1.0' on possible cobbles or boulder.
	185.0							Bottom of borehole at 2.5 feet.
5								
	180.0							
10								
	175.0							
15								
	170.0							
20								
	165.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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PROBE LOG

HP-5
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 206 ft. (see note 1) **TOTAL DEPTH:** 3 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	205.0	0	G1			Forest Mat	1.0	G1 - Forest Mat
		1	G2			Swamp Deposits	205.0	G2 - Silty SAND (SM), fine to medium, ~15% fines, 10-15% fine to coarse subrounded gravel, trace of roots, brown, moist
		2	G3		1			G3 - Silty SAND Gravel (SM), fine to coarse, 15-20% fines, ~30% fine to coarse subrounded gravel, ~10% cobbles about 4" in diameter, trace of roots, brown, moist
					2		3.0	REMARK 1: Refusal at depth 3.0' on possible cobbles or boulder.
								REMARK 2: Performed an additional hand probe: HP-5A. Encountered refusal at depth 1.0' on possible cobbles or boulder.
5	200.0							Bottom of borehole at 3.0 feet.
10	195.0							
15	190.0							
20	185.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Attachment C – Test Pit Logs and Foundation Sketches

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TEST PIT LOG

TP-1
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/25/22 **DATE COMPLETED:** 3/25/22
TEST PIT LOCATION: Near retaining wall on SB side of Washington St
COORDINATES: NA
SURFACE EL.: 232 ft. (see note 1) **TOTAL DEPTH:** 6 ft.
GROUNDWATER LEVELS:
▽ **DURING EXCAVATION:** Not encountered
▼ **AT END OF EXCAVATION:** Not encountered

EXCAVATION SUBCONTRACTOR: Northern Drill Service, Inc.
EXCAVATION FOREMAN: Justin Steven
EXCAVATOR TYPE/MODEL: Kubota KX 080-4
WEATHER: 40's / Cloudy
TEST PIT DIMENSIONS: 9.0' x 5.0'
LOGGED BY: OL **CHECKED BY:** HO

Depth (ft)	El. (ft)	Excavation Effort	Remark	Strata	Depth El.(ft.)	Material Description
0	230.0	E		Fill	4.3 227.7	0 ft. - 4.3 ft.: Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 15-20% coarse subangular gravel, trace of roots, trace of organic soil, brown, moist
2.5	227.5	M	1 2	Sand and Gravel	6.0	4.3 ft. - 6 ft.: Well Graded SAND with Gravel (SW), fine to coarse, ~5% fines, 30-35% fine to coarse subrounded gravel, up to 15% cobbles up to 8", trace of roots, light brown, moist REMARK 1: Excavator scraping on potential boulder. LGCI representative confirmed the presence of a boulder in the test pit. REMARK 2: Test pit terminated due to side wall collapse.
5.0						Bottom of test pit at 6.0 feet. Test pit backfilled with excavated material and tamped in 18-inch lifts with excavator bucket.

GENERAL COMMENTS: **E = Easy, M - Moderate, D = Difficult, V = Very Difficult**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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TEST PIT LOG

TP-2
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/25/22 **DATE COMPLETED:** 3/25/22
TEST PIT LOCATION: Near retaining wall on SB side of Washington St
COORDINATES: NA
SURFACE EL.: 237 ft. (see note 1) **TOTAL DEPTH:** 5.5 ft.
GROUNDWATER LEVELS:
DURING EXCAVATION: Not encountered
AT END OF EXCAVATION: Not encountered

EXCAVATION SUBCONTRACTOR: Northern Drill Service, Inc.
EXCAVATION FOREMAN: Justin Steven
EXCAVATOR TYPE/MODEL: Kubota KX 080-4
WEATHER: 40's / Cloudy
TEST PIT DIMENSIONS: 10.0' x 4.0'
LOGGED BY: OL **CHECKED BY:** HO

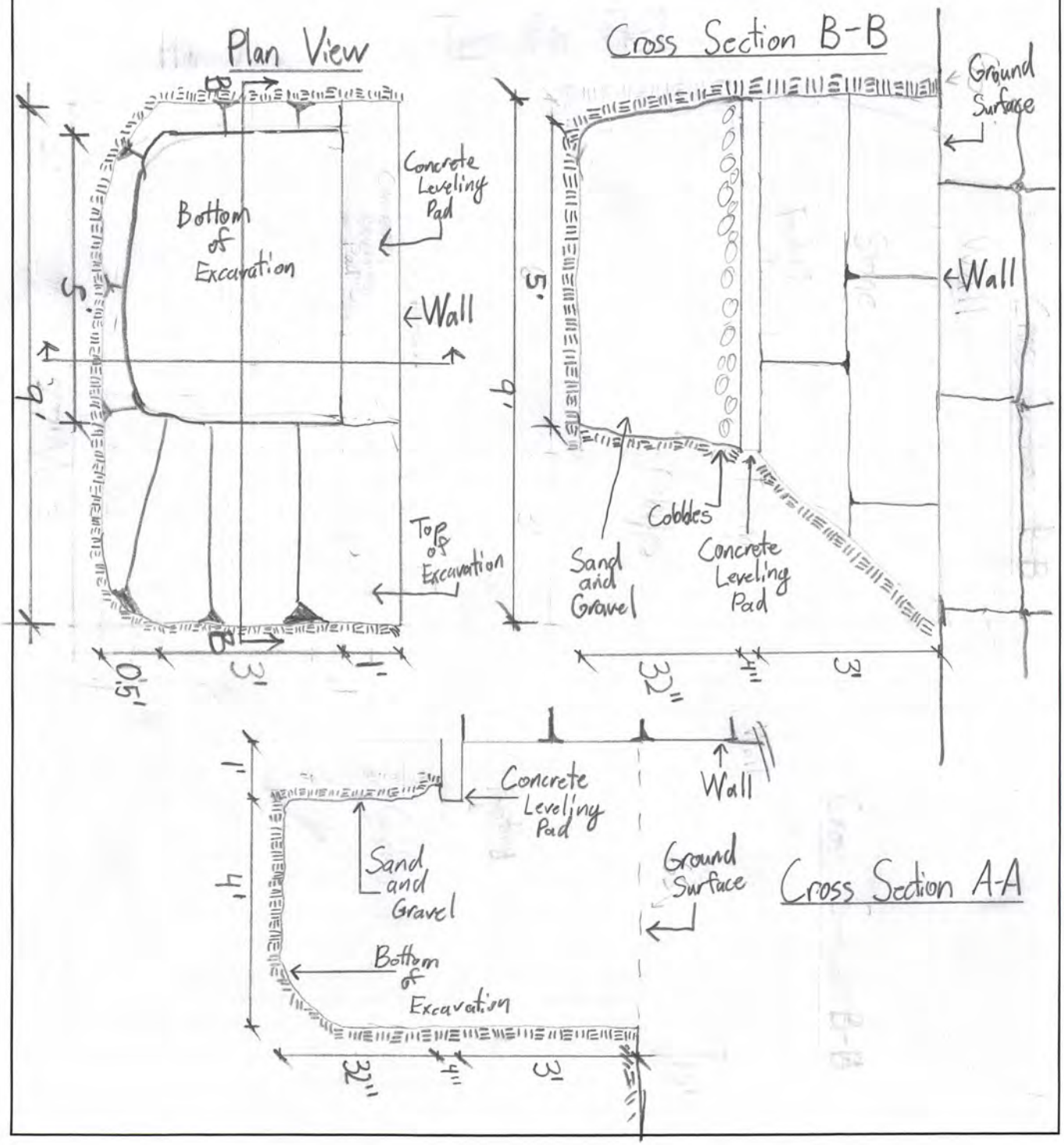
Depth (ft)	El. (ft)	Excavation Effort	Remark	Strata	Depth El.(ft.)	Material Description
		E		Topsoil	1.0	0 ft. - 1 ft.: Topsoil
	235.0	E		Fill	236.0 2.5	1 ft. - 2.5 ft.: Well Graded SAND (SW), fine to coarse, ~5% fines, 5-10% coarse subrounded gravel, brown, moist
2.5					234.5	
	232.5	E		Sand and Gravel		2.5 ft. - 5.5 ft.: Poorly Graded SAND with Gravel (SP), medium to coarse, ~5% fines, 25-30% fine to coarse subrounded gravel, trace of cobbles up to 8", brown, moist
5.0					5.5	
						Bottom of test pit at 5.5 feet. Test pit backfilled with excavated material and tamped in 18-inch lifts with excavator bucket.

GENERAL COMMENTS: **E = Easy, M - Moderate, D = Difficult, V = Very Difficult**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Road, Suite 2
Billerica, MA 01862
Phone: (978) 330-5912
Fax: (978) 330-5056
E-mail: LGCI@lgcinc.net

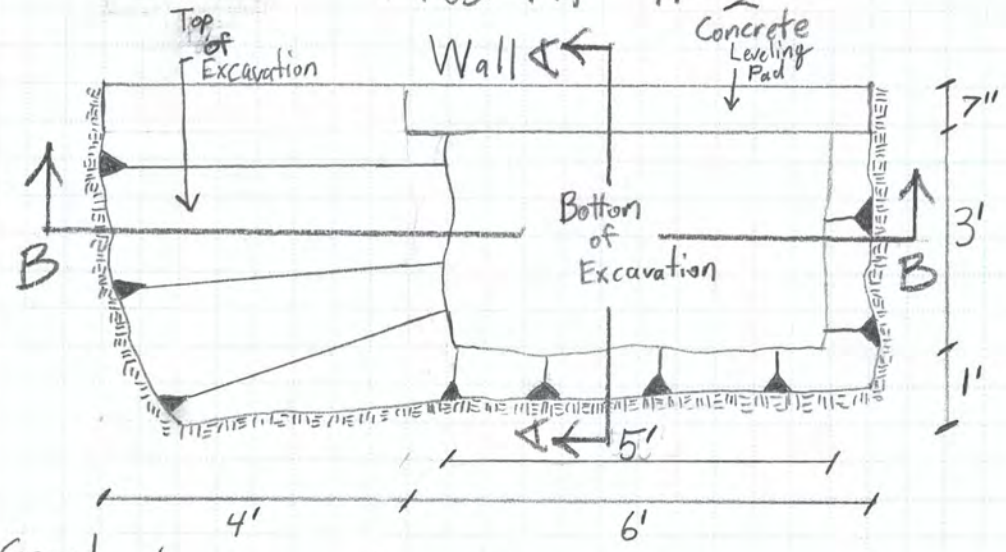
Project Name: Prop. Mast Arms, Reinforced Slope, Retaining Wall Stoughton, MA
LGCI Project No.: 2139
Prepared by: OIL
Date: 3/31/22
Checked by: OML
Date: 4/13/22
Purpose: Test Pit TP-1



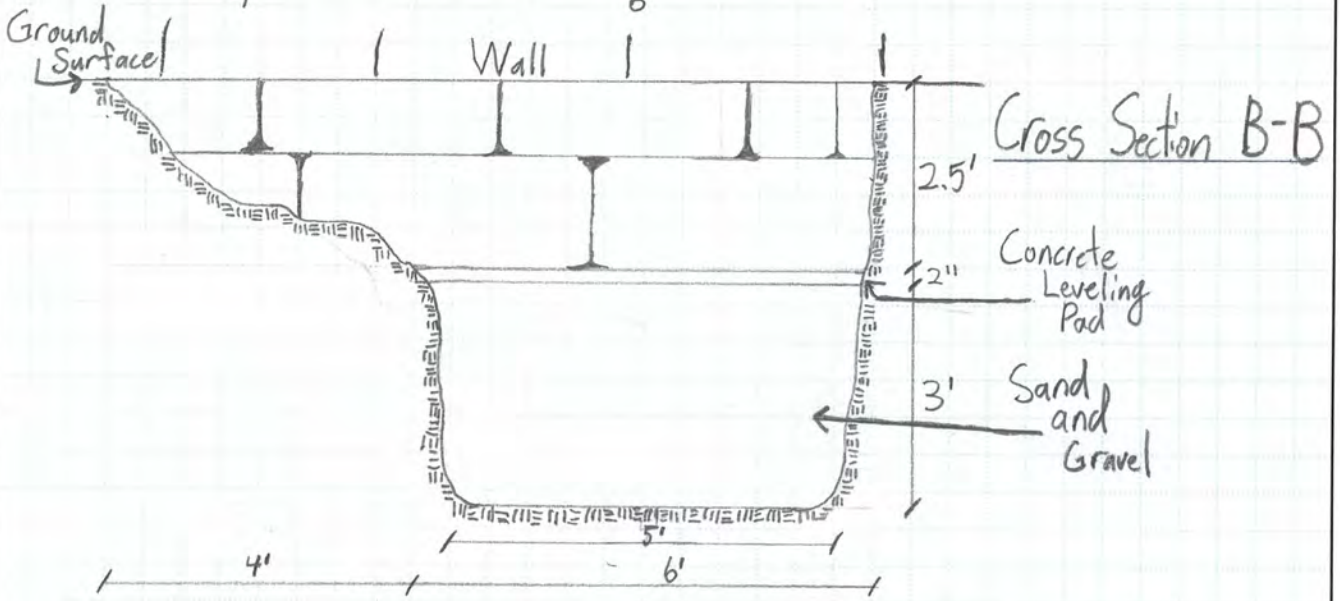
LGCI Proposal No.: 2139
Prepared by: OIL
Date: 4/1/22

Project Name: Prop. Mast Arms, Reinforced Slope, Retaining Wall
Project Location: Stoughton, MA

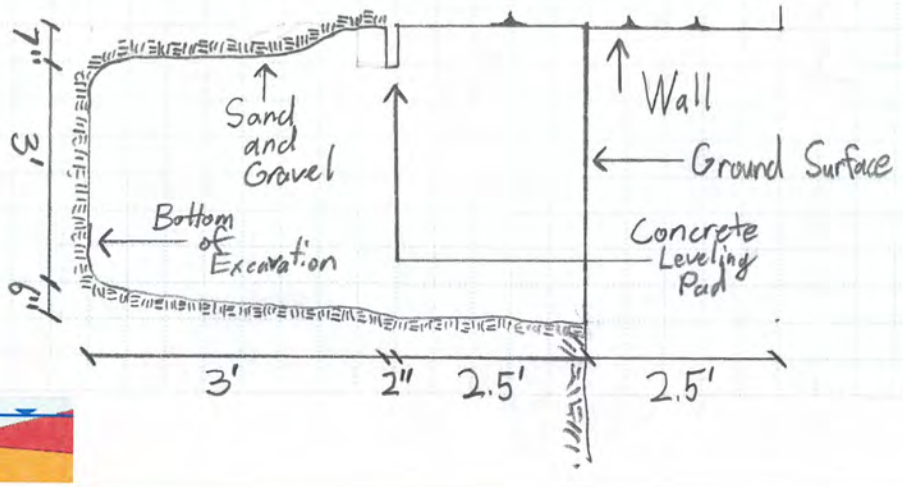
Test Pit TP-2



Plan View



Cross Section B-B



Cross Section A-A

Attachment D – Results of Slope Stability Analyses

2139 Sta 24+00

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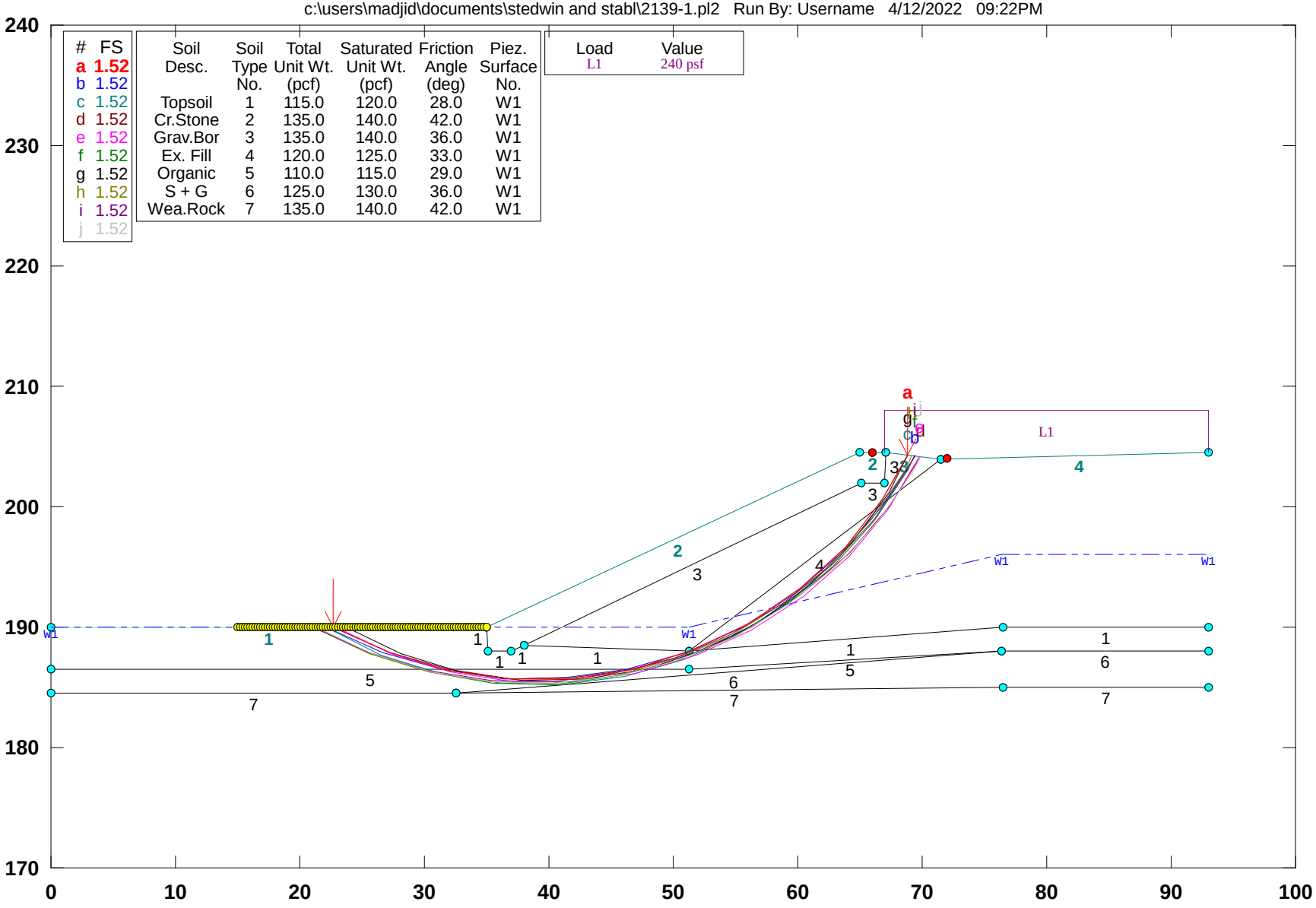
f	1.52
g	1.52
h	1.52
i	1.52
j	1.52

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
Topsoil	1	115.0	120.0	28.0	W1
Cr.Stone	2	135.0	140.0	42.0	W1
Grav.Bor	3	135.0	140.0	36.0	W1
Ex. Fill	4	120.0	125.0	33.0	W1
Organic	5	110.0	115.0	29.0	W1
S + G	6	125.0	130.0	36.0	W1
Wea.Rock	7	135.0	140.0	42.0	W1

Load	Value
L1	240 psf



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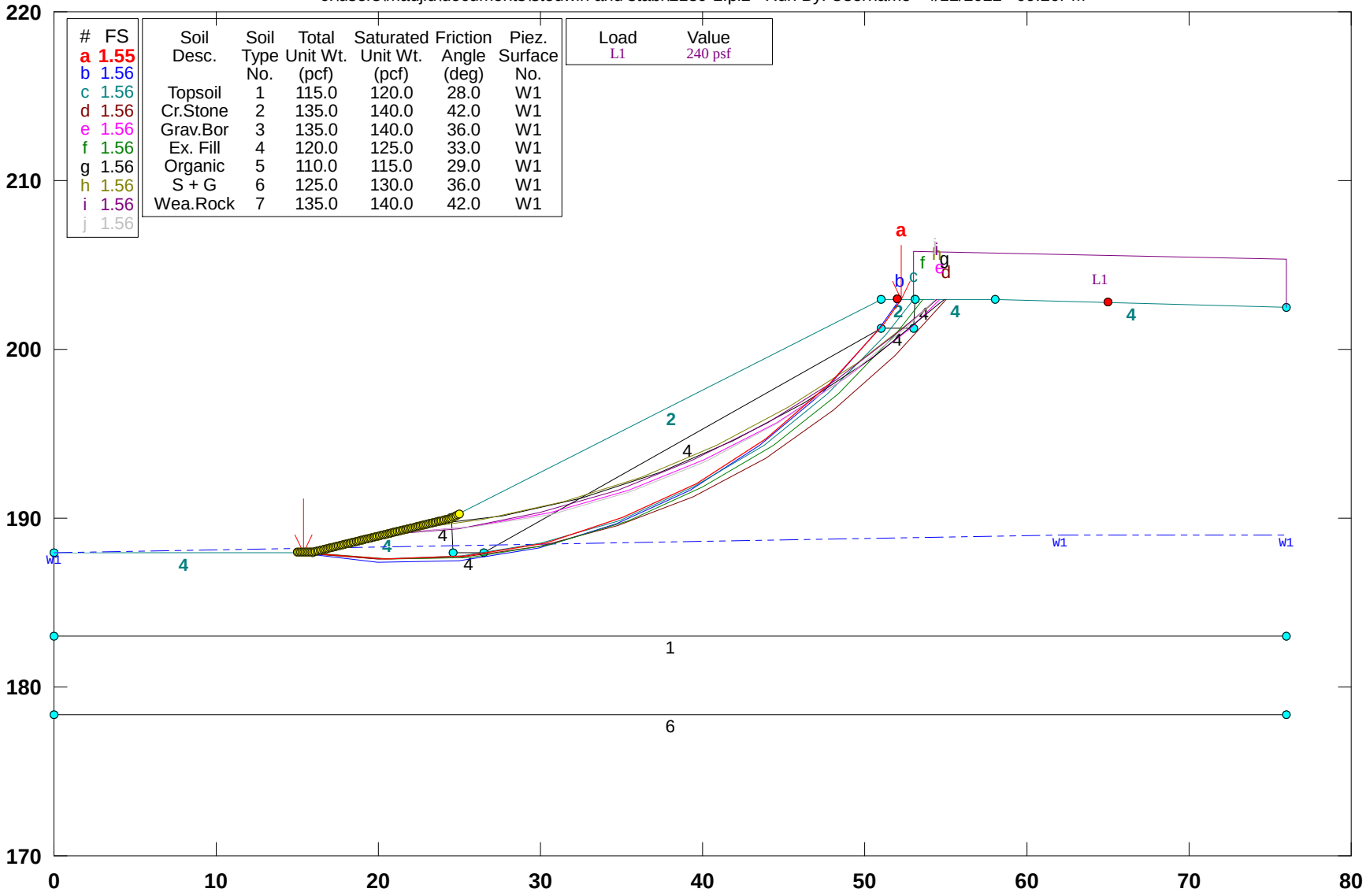

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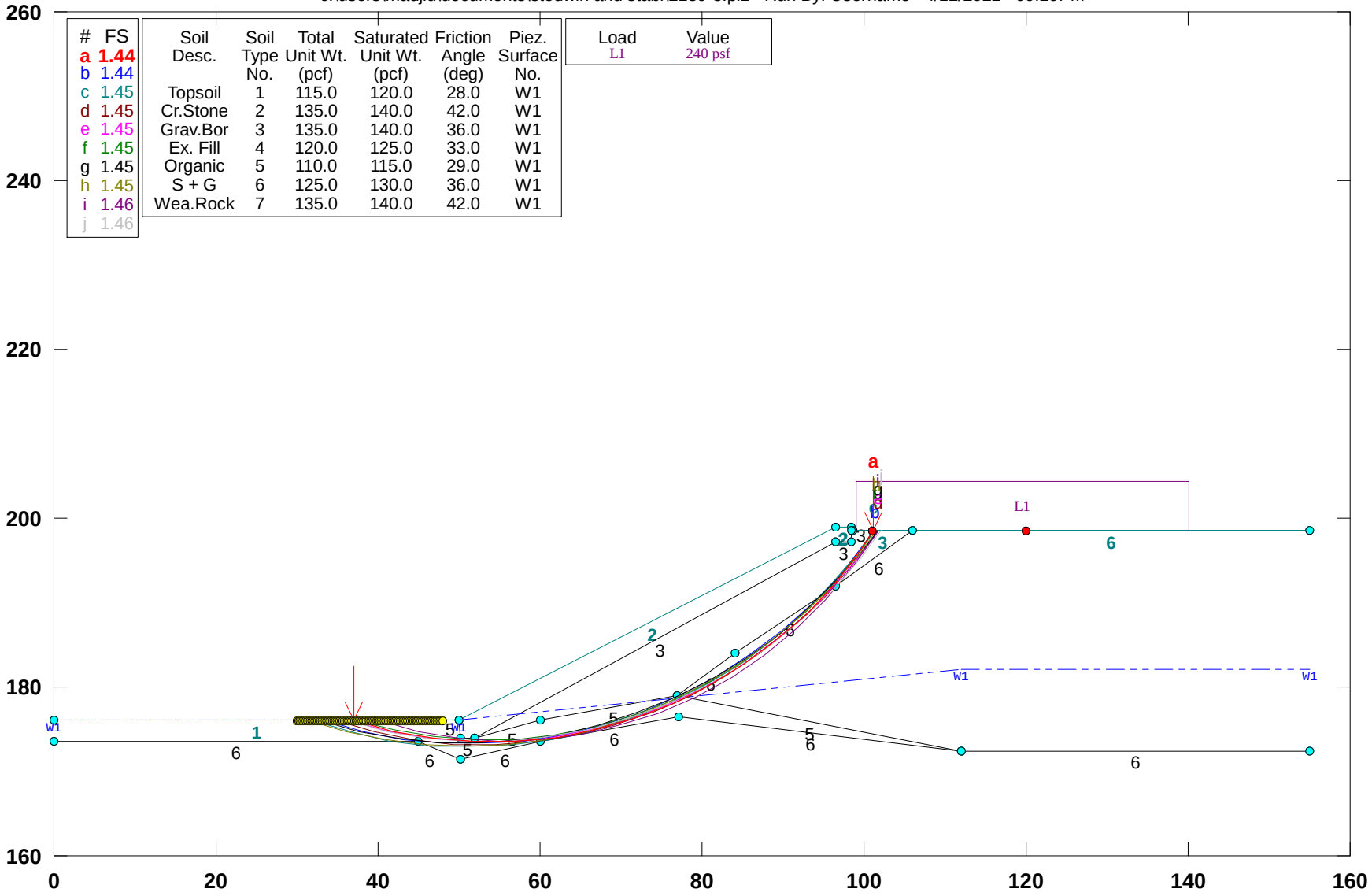
f	1.45
g	1.45
h	1.45
i	1.46
j	1.46

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
Topsoil	1	115.0	120.0	28.0	W1
Cr.Stone	2	135.0	140.0	42.0	W1
Grav.Bor	3	135.0	140.0	36.0	W1
Ex. Fill	4	120.0	125.0	33.0	W1
Organic	5	110.0	115.0	29.0	W1
S + G	6	125.0	130.0	36.0	W1
Wea.Rock	7	135.0	140.0	42.0	W1

Load	Value
L1	240 psf



PCSTABL5M/si FSmin=1.44

Safety Factors Are Calculated By The Modified Bishop Method

LGCI
Lahlaf Geotechnical Consulting, Inc.

February 9, 2023

Mr. Matthew J. Soltys, P.E.
Nitsch Engineering, Inc.
2 Center Plaza, Suite 430
Boston, Massachusetts 02108
Phone: (617) 338-0063
Fax: (508) 365-3355
E-mail: msoltys@nitscheng.com

Re: **Geotechnical Report**
Proposed Mast Arms, Reinforced Slope, and Retaining Wall
Stoughton, Massachusetts
LGCI Project No. 2139-Rev. 1

Dear Mr. Soltys:

Lahlaf Geotechnical Consulting, Inc. (LGCI) has completed a geotechnical study for the proposed mast arms, reinforced slope, and retaining wall in Stoughton, Massachusetts. We are submitting this report containing the results of our study and our foundation design and construction recommendations and the results of the geophysical survey performed at the site.

The soil samples from our explorations were delivered to the MassDOT storage facility in Lawrence.

Thank you for choosing LGCI as your geotechnical engineer.

Very truly yours,

Lahlaf Geotechnical Consulting, Inc.

Abdelmadjid M. Lahlaf, Ph.D., P.E.
Principal Engineer

LGCI
Lahlaf Geotechnical Consulting, Inc.

GEOTECHNICAL REPORT
PROPOSED MAST ARMS, REINFORCED SLOPE, AND RETAINING WALL
STOUGHTON, MASSACHUSETTS

LGCI Project No. 2139-Rev. 1
February 9, 2023

Prepared for:

NITSCH ENGINEERING, INC.
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Boston, Massachusetts 02108
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Fax: (508) 365-3355

100 Chelmsford Road, Suite 2, Billerica, MA 01862 Tel: (978) 330-5912 Fax: (978) 330-5056 www.lgcinc.net

GEOTECHNICAL REPORT
PROPOSED MAST ARMS, REINFORCED SLOPE, AND RETAINING WALL
STOUGHTON, MASSACHUSETTS
LGCI Project No. 2139-Rev. 1
February 9, 2023

Prepared for:

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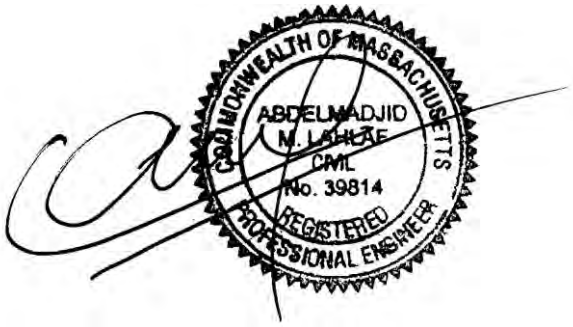

Abdelmadjid M. Lahlaf, Ph.D., P.E.
Principal Engineer

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Geotechnical Report
Proposed Mast Arms, Reinforced Slope, and Retaining Wall
Stoughton, Massachusetts
LGCI Project No. 2139-Rev. 1

1. PROJECT INFORMATION

1.1 Project Authorization

This geotechnical report presents the results of the subsurface explorations and a geotechnical evaluation performed by Lahlaf Geotechnical Consulting, Inc. (LGCI) for the proposed mast arms, reinforced slope, and retaining wall in Stoughton, Massachusetts. To date, we have performed services in two (2) phases as follows:

- We performed our initial services in general accordance with our proposal No. 21099-Rev. 2 dated October 20, 2021, revised on November 16, 2021, and in general accordance with the terms and conditions of the Subconsultant Authorization by Nitsch Engineering, Inc. (Nitsch), dated December 2, 2021, and signed by Mr. Joshua J. Alston of Nitsch.

- We performed additional explorations in general accordance with the scope of services described in our proposal No. 22065-Rev. 1, dated May 9, 2022.

1.2 Purpose and Scope of Services

The purpose of our geotechnical services was to perform subsurface explorations at the site and to provide foundation design and construction recommendations for mast arms and a retaining wall, and to perform slope stability analyses. LGCI performed the following services:

- Coordinated the boring, test pit, and hand probe locations with Nitsch and provided an LGCI geotechnical engineer to mark the exploration locations in the field.

- Engaged a drilling subcontractor to advance fourteen (14) soil borings: eight (8) soil borings for the proposed mast arms, four (4) soil borings for slope stability analyses, and two (2) soil borings for the proposed retaining wall. Our drilling subcontractor contacted the utility clearance agency (Dig Safe Systems, Inc.) and the Town of Stoughton for utility clearance, and applied for and obtained a MassDOT permit for the borings and test pits.

- Engaged an excavation subcontractor to perform two (2) test pits near the existing retaining wall along the southbound lane on Washington Street. The purpose of the test pits was to expose the wall foundation and confirm the bearing stratum.

- Provided a field engineer to perform five (5) hand probes at the bottom of the existing slope to explore for the presence of organic soil for slope stability analyses.

- Provided an LGCI geotechnical engineer, full time, at the site to observe the soil borings, test pits, and hand probes; describe the soil samples, and prepare the field logs.

- Prepared this geotechnical report containing the results of our subsurface explorations and our recommendations for foundation design and construction recommendations for the proposed retaining wall, our geotechnical recommendations for mast arm foundation design in

accordance with standard drawings: "Overhead Signal Structure & Foundation, Sheets 1 through 7," by the Massachusetts Department of Transportation (MassDOT), Highway Division and dated December 2015, and the results of our slope stability analyses.

Following our initial explorations, LGCI submitted a preliminary geotechnical letter report dated April 14, 2022. The present report includes the results of our explorations and supersedes the April 14, 2022 report.

LGCI did not perform environmental services for this project. LGCI's scope of services did not include an environmental assessment for the presence or absence of wetlands or analytical testing for hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site, or mold in the soil or in any structure at the site. Any statements regarding odors, colors, or unusual or suspicious items or conditions are for information only and to support our geotechnical services.

Our scope does not include attending meetings, preparing specifications, performing contract document review, or providing construction services. LGCI would be pleased to perform these services when needed under a separate agreement. Recommendations for stormwater management, erosion control, pavement design, site specific liquefaction analysis, pile analysis and design, and detailed cost or quantity estimates are not included in our scope of work.

1.3 Site Description

Our understanding of the existing conditions is based on our field observations at the site, readily available aerial photographs of the site, our conversations with Nitsch, and on the following drawings:

- Drawing titled: "Stoughton, Washington Street (Route 138), Soil Boring & Test Pit Location Plan, Sheets No. 1 to 5," (Boring and Test Pit Location Plan) prepared by Nitsch, plotted on February 22, 2022, and provided to LGCI by Nitsch via e-mail on February 23, 2022.

- Drawing titled: "Stoughton, Washington Street (Route 138), Soil Boring & Test Pit Location Plan, Sheet No. 3 of 5," (Updated WB-1 and WB-2 Boring Location Plan), prepared by Nitsch, plotted on September 12, 2022, and provided to LGCI by Nitsch via e-mail on September 14, 2022.

The site consists of several sections of Route 138 (Washington Street) in Stoughton, Massachusetts as shown in Figure 1, including:

- The intersection of Washington Street and York Street, and a stretch of roadway along Washington Street extending about 525 feet north of the same intersection. The roadway grade ranges between about El. 202 feet on the northern end of the stretch and about El. 220 feet on the southern side of the stretch near the intersection. The grades drop on either side of the roadway along this stretch. Along the embankment on the eastern side of Washington Street which is the focus of the stability analyses in this report, the grades drop steeply about 6 feet

on the northern side of the stretch and about 23 feet on the southern side of the stretch towards wetland areas.

- The intersection of Washington Street with the driveway to Stop & Shop (across from O'Reilly's Auto Parts). The grade at the intersection is about El. 235 feet.

- The intersection of Washington Street and Central Washington Street in Stoughton. The grades at the intersection range between El. 240 feet and El. 242 feet.

- The portion of Washington Street in front of the AA Will Corp. property located at 198 Washington Street in Stoughton, Massachusetts as shown in Figure 1. The grades in Washington Street in front of the AA Will Corp. property range between about El. 240 feet and El. 244 feet, and between El. 232 feet and El. 237 feet near the existing retaining wall on the southbound side of Washington Street north of (across from) the AA Will Corp. property.

1.4 Project Description

Our understanding of the proposed improvements is based on our discussions with Nitsch and the following drawings:

- Drawing titled: "Stoughton, Washington Street (Route 138), Traffic Signal Plan, Sheets No. 104 to 108 out of 226," (Traffic Signal Plan) prepared by Nitsch, plotted on April 1, 2022, and provided to LGCI by Nitsch via e-mail on April 4, 2022.

- Drawing titled: "Stoughton, Washington Street (Route 138), Typical Sections & Pavement Notes," (Reinforced Slope Drawing) prepared by Nitsch, plotted on September 21, 2022, and provided to LGCI by Nitsch via e-mail on September 22, 2022.

- Drawing titled: "Stoughton, Washington Street (Route 138), Wall Plan & Profile," (Retaining Wall Drawing) prepared by Nitsch, plotted on October 4, 2022, and provided to LGCI by Nitsch via e-mail on October 4, 2022.

- Untitled retaining wall detail prepared by Nitsch, plotted on October 4, 2022, and provided to LGCI by Nitsch via e-mail on October 4, 2022.

We understand that Nitsch was engaged by MassDOT to design improvements along Washington Street in Stoughton, Massachusetts. The improvements will include installing mast arms at the intersections of Washington Street and York Street, Washington Street and the Stop and Shop Driveway, and Washington Street and Central Street in Stoughton. Based on the Traffic Signal Plan, the proposed mast arm sizes are as follows:

- Intersection of Washington Street and York Street: one (1) 30-foot mast arm at the northeast corner of the intersection and one (1) 25-foot mast arm at the western side of the intersection.

- Intersection of Washington Street and the Stop and Shop Driveway: one (1) 35-foot mast arm at the northeast corner of the intersection and one (1) 30-foot mast arm at the western side of the intersection.

- Intersection of Washington Street and Central Street: one (1) 45-foot mast arm at the northeast corner of the intersection, one (1) 25-foot mast arm at the northwest corner of the intersection, one (1) 35-foot mast arm at the southeast corner of the intersection, and one (1) 45-foot mast arm at the southwest corner of the intersection.

The improvements will include widening the roadway which will require extending the embankment on the eastern side of Washington Street along the 525-foot stretch north of the intersection with York Street between STA 21+75 and STA 27+00. Based on information provided to us by Nitsch and on the Reinforced Slope Drawing, the bottom 10 feet of the proposed fill embankment located between STA 21+75 and STA 25+00 will be reinforced with a rock-armored slope inclined at about 2H:1V. The thickness of the rock-armored slope will be about 24 inches. The remainder of the proposed embankment located between STA 21+75 and STA 27+00 will not be reinforced with a rock-armored slope and will be inclined at about 2H:1V. The proposed cut embankment located between STA 25+00 and STA 27+00 will be reinforced with a rock-armored slope inclined at about 1.5H:1V. The thickness of the armored slope will be about 24 inches.

The improvements will also include the construction of a retaining wall in front of the AA Will Corp. property. We understand that the proposed retaining wall will consist of a concrete gravity retaining wall. Based on the Retaining Wall Drawing, we understand that the proposed retaining wall will consist of three (3) sections separated by driveways as described below. We understand that the existing retaining wall across from the AA Will Corp. property will remain.

- Section 1, i.e., the northernmost portion of the proposed retaining wall, will be located between about Sta. 31+63.26 and Sta. 32+52.69. Section 1 of the proposed retaining wall will be about 89 feet in length and will have total wall heights ranging between about 7.8 feet and 12 feet, with exposed heights ranging between about 5 feet and 7.5 feet. The bottom of footing elevation of Section 1 of the proposed retaining wall will range between about El. 235.85 feet and El. 238.85 feet, requiring cuts up to about 7.0 to 10.0 feet to achieve the proposed grade of the bottom of footing.

- Section 2, i.e., the middle portion of the proposed retaining wall, will be located between about Sta. 32+78.50 and Sta. 33+77.21. Section 2 of the proposed retaining wall will be about 99 feet in length and will have a total height of about 7. 1feet, with exposed heights ranging between about 3 feet and 4 feet. The bottom of footing elevation of Section 2 of the proposed retaining wall will be about El. 239.35 feet, requiring cuts up to 8.0 feet to achieve the proposed grade of the bottom of footing.

- Section 3, i.e., the southernmost portion of the proposed retaining wall, will be located between about Sta 34+01.27 and Sta. 34+58.25. Section 3 of the proposed retaining wall will be about 57 feet in length and will have a total height of about 7.8 feet, with exposed heights ranging between about 3.5 feet and 5.0 feet. The bottom of footing elevation of

Section 3 of the proposed retaining wall will be about El. 237.99 feet, requiring cuts up to 7 feet to achieve the proposed grade of the bottom of footing.

Based on the retaining wall detail, we understand that the proposed retaining wall footings will be 6 feet wide and will have a thickness of 2 feet.

1.5 Elevation Data

We understand that the elevations provided in the Boring and Test Pit Location Plan and the Retaining Wall Drawing are referenced with respect to the North American Vertical Datum of 1988 (NAVD 88). Elevations are in feet.

2. SITE AND SUBSURFACE CONDITIONS

2.1 Surficial Geology

LGCI reviewed the following surficial geologic map titled: "Surficial Materials Map of the Blue Hills Quadrangle, Massachusetts," prepared by Stone, B.D., and DiGiacomo-Cohen, M.L. Scientific Investigation Map 3402, Quadrangle 127 – Blue Hills, 2018.

The Surficial Geologic Map indicates that the natural soils in the general vicinity of the site consist of coarse deposits, including gravel deposits, sand and gravel deposits, and sand deposits. The gravel deposits are composed mainly of gravel, cobbles, and boulders. The sand and gravel layers generally range from 25 to 50 percent gravel particles and from 50 to 75 percent sand particles. The sand deposits are composed mainly of very coarse to fine sand. Coarser layers may contain up to 25 percent gravel, and finer layers may contain fine sand, silt, and clay.

The Surficial Geological Map of the site is shown in Figure 2.

2.2 LGCI's Explorations

2.2.1 General

LGCI coordinated our exploration locations with Nitsch and marked the exploration locations in the field by taping distances from the existing landmarks. Our borings were marked in the field in accordance with the Boring and Test Pit Location Plan and the Updated WB-1 and WB-2 Boring Location Plan listed in Section 1.3. A few borings had to be slightly relocated to avoid existing utilities.

Our drilling subcontractor contacted the utility clearance agency (Dig Safe Systems, Inc.) for utility clearance. Our drilling subcontractor coordinated the clearance of water, sewer, and drains with the Town of Stoughton. Our drilling subcontractor also obtained a MassDOT permit, implemented a traffic management plan, and coordinated with and engaged police details.

Unless notified otherwise, we will dispose of the soil samples obtained during our explorations after three (3) months.

2.2.2 Soil Borings

LGCI engaged Northern Drill Service, Inc. (NDS) of Northborough, Massachusetts to advance twelve (12) soil borings (MA-1 to MA-8 and SB-1 to SB-4) for the slope near York Street and for the proposed mast arms between the dates of March 3 and 28, 2022. The borings were advanced with a track-mounted Diedrich D-25 drill rig or truck mounted Mobile Drill B-53 using drive and wash technique with a 4-inch casing. The borings extended to depths ranging between 12.5 feet and 31 feet beneath the ground surface. Upon completion, the boreholes were backfilled with the soil cuttings and gravel. In paved areas, the ground surface was

restored with asphalt cold patch. In concrete areas, the ground surface was restored with concrete.

LGCI engaged NDS to advance an additional two (2) soil borings (WB-1 and WB-2) along the proposed retaining wall near the AA Will Corp. property on September 22 and 23, 2022. The borings were advanced with a track mounted Diedrich D-25 drill rig using drive and wash technique with a 4-inch casing. NDS performed vacuum explorations down to a depth of 6 feet beneath the ground surface in the borings to clear the boreholes for utilities. The borings extended to a depth of 36 feet beneath the ground surface. Upon completion, the boreholes were backfilled with the soil cuttings and gravel.

NDS performed Standard Penetration Tests (SPT) during drilling and obtained split spoon samples in the borings with an automatic hammer at typical depth intervals of 2 feet or 5 feet as noted on the boring logs in general accordance with ASTM D-1586.

An LGCI geotechnical engineer observed and logged the borings in the field.

2.2.3 Test Pits

NDS performed two (2) test pits in front of the existing retaining wall across from the AA Will Corp. property on March 25, 2022. The purpose of the test pits was to expose the existing wall foundation and to explore the bearing material. The test pits extended to depths ranging between 5.5 and 6 feet beneath the ground surface and were performed using a Kubota KX 080-4 excavator. Upon completion, the test pits were backfilled with the excavated material which was placed in 18- to 24-inch lifts and tamped with the excavator bucket.

The results of the test pits are summarized in Section 2.4.

2.2.4 Hand Probes

An LGCI representative advanced five (5) hand auger probes near the bottom of the embankment on the eastern side of Washington Street just north of York Street on March 31, 2022. The purpose of the probes was to explore for the possible presence of organic soil at the bottom of the embankment. Due to obstructions, the probes terminated at depths ranging between 2.5 and 3.5 beneath the ground surface.

2.2.5 Geophysical Survey

LGCI engaged Hager Geoscience, Inc. (HGI) to perform a geophysical survey at the site for the purpose of exploring for the depth of rock along or near the alignment of the proposed retaining wall in Front of AA Will Corp. Property on January 11, 2023. HGI engaged a police detail for traffic control during the survey. Typically, boring logs including depth to rock are used to calibrate the geophysical data. In the absence of rock information from our boring as described below, HGI used several methods to explore for the depth of rock, including low-

frequency Ground Penetrating Radar (LFGPR), seismic refraction, and horizontal-to-vertical spectral ratio (HVSR).

2.2.6 Boring, Probe, and Test Pits Logs and Locations

The boring, probe, and test pit locations are shown in Figures 3A to 3E. Appendix A contains LGCI's boring logs, Appendix B contains LGCI's probe logs, and Appendix C contains the test pit logs and retaining wall foundation sketches. Tables 1 to 3 include summaries of LGCI's borings, test pits, and probes, respectively.

The ground surface elevations included in this report were interpolated to the nearest foot from the drawings referenced in section 1.3 of the report.

The results of the geophysical survey are included in Appendix D.

2.3 Subsurface Conditions

2.3.1 General

The subsurface description in this report is based on a limited number of explorations and is intended to highlight the major soil strata encountered during our explorations. The subsurface conditions are known only at the actual exploration locations. Variations may occur and should be expected between exploration locations. The boring, probe, and test pit logs represent conditions that we observed at the time of our explorations and were edited, as appropriate, based on the results of the laboratory test data and inspection of the soil samples in the laboratory. The strata boundaries shown in our boring, probe, and test pit logs are based on our interpretations and the actual transitions may be gradual. Graphic soil symbols are for illustration only.

Below are individual descriptions of the subsurface conditions encountered for each proposed improvement. The soil strata encountered in the borings, probes, and test pits were as follows, starting at the ground surface.

2.3.2 Slope Borings near York Street (Borings SB-1 to SB-4)

Asphalt/Concrete/Topsoil – Asphalt was encountered at the ground surface in borings SB-1 to SB-3. The thickness of the asphalt ranged between 7 and 8 inches. A layer of concrete was encountered beneath the asphalt in borings SB-1 to SB-3. The thickness of the concrete was about 7 inches. Topsoil was encountered at the ground surface in boring SB-4. The thickness of the topsoil was about 3 inches. We understand that Nitsch will reduce impacts to the existing slab as part of the design of the project.

Fill – A layer of fill was encountered beneath the asphalt/concrete or topsoil in SB-1, SB-2 and SB-4. The fill extended to depths of 19 feet, 14 feet, and 4 feet beneath the ground surface, respectively. The samples in this layer were mostly described as well graded gravel or silty

sand. The fines content in the fill ranged between 0 to 25 percent and the gravel content ranged up to 30 percent. When described as gravel the sand content ranged between 0 and 40 percent. The fill also contained traces of organic soil and asphalt.

The SPT N-values in the fill layer ranged between 7 blows per foot (bpf) and 28 bpf, with most values below 17 bpf, indicating medium dense soil.

Peat/Buried Topsoil – A layer of peat or buried topsoil was encountered in boring SB-1 and SB-2 and extended to depths of 23.6 feet and 14.1 feet, respectively. Three (3) samples were described as peat and two (2) samples were described as silty sand. When described as silty sand, the fines content ranged between 15 and 20 percent, and the gravel content ranged between 20 and 30 percent.

The SPT N-values in the peat layer ranged between 6 bpf and 10 bpf, indicating loose soil.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill or peat/ buried topsoil in all borings and extended to depths ranging between 9.2 feet and 31 feet beneath the ground surface. Six (6) soil samples were described as sand and five (5) soil samples were described as gravel. The fines content ranged between 0 and 20 percent, and the gravel content ranged between 10 and 35 percent. When described as gravel, the sand content ranged between 10 and 30 percent.

The SPT N-values in the sand layer ranged between 4 bpf and refusal, with most values ranging between 16 and 28 bpf, indicating loose to medium dense sand.

Weathered Rock or Rock – Weathered rock was encountered in boring SB-2 at a depth of 19 feet below the ground surface. Split spoon refusal was encountered in borings SB-3 and SB-4. Possible rock or boulders were encountered in SB-3 and SB-4 at depths of 26 feet and 9.2 feet below ground surface respectively. The button bit was advanced in borings SB-3 and SB-4 to the termination depths of 28.6 feet and 12.5 feet, respectively.

2.3.3 Retaining Wall near Southbound Side of Washington Street (Across from the AA Will Corp. Property) (Test Pits TP-1 to TP-2)

Topsoil –Topsoil was encountered at the ground surface in test pit TP-2. The thickness of the topsoil was about 12 inches.

Fill – A layer of fill was encountered at the ground surface or beneath the topsoil in both the test pits. The fill extended to depths of 4.3 feet and 2.5 feet beneath the ground surface in TP-1 and TP-2, respectively. The samples in this layer were described as well graded sand. The fines content in the fill ranged between 5 to 10 percent and the gravel content ranged up to 20 percent. The fill contained traces of organic soil and roots.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill in both test pits. The sand layer extended to depths of 5.5 feet and 2.5 feet below ground surface in test pits TP-

1 and TP-2, respectively. The samples in this layer were described as poorly graded sand or well graded sand. The fines content was about 5 percent, and the gravel content ranged between 25 and 35 percent. This layer contained 5 to 15 percent cobbles up to 8 inches in diameter. The excavation effort was described as easy to moderate.

2.3.4 Intersection of Washington Street and York Street (Borings MA-1 and MA-2)

Topsoil –Topsoil was encountered at the ground surface in borings MA-1 and MA-2. The thickness of the topsoil was 7 inches and 4 inches, respectively.

Fill – A layer of fill was encountered beneath the topsoil in borings MA-1 and MA-2. The fill extended to depths of 2.0 feet and 4.0 feet beneath the ground surface, respectively. The samples in this layer were described as silty sand or buried topsoil. The fines content in the fill ranged between 15 to 20 percent and the gravel content ranged up to 40 percent. The fill contained traces of organic soil and roots.
The SPT N-values in the fill layer ranged between 7 bpf and 28 bpf, indicating loose to medium dense soil.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill in borings MA-1 and MA-2 and extended to the termination depth of 21 feet at boring MA-1 and to 16 feet below ground surface in boring MA-2. The samples in this layer were mostly described as well graded sand. One (1) sample was described as well graded gravel and one (1) sample was described as poorly graded sand. The fines content ranged between 5 and 10 percent and the gravel content ranged up to 40 percent. When described as gravel, the sand content ranged up to 10 percent. This layer contained boulders between the depths of 9.6 feet and 17.5 feet beneath the ground surface in boring MA-1.

The SPT N-values in the sand layer ranged between 6 bpf and refusal, with most values ranging between 11 bpf and 29 bpf, indicating loose to medium dense sand.

Boulder/Rock– Apparent rock was encountered in boring MA-2 at a depth of 16 feet beneath the ground surface. The drilling subcontractor advanced a button bit 2.2 feet between the depths of 16.0 feet to 18.2 feet below ground surface.

2.3.5 Intersection of Washington Street at Stop and Shop Driveway (Borings MA-3 and MA-4)

Topsoil/Bark Mulch –Topsoil was encountered at the ground surface in boring MA-3. Boring MA-4 had a layer of bark mulch over the topsoil. The thickness of the topsoil and bark mulch, where encountered, was about 2 feet in both borings.

Fill – A layer of fill was encountered beneath the topsoil in the borings MA-3 and MA-4 and extended to depths of 9.0 feet and 4.0 feet beneath the ground surface, respectively. The samples in this layer were described as sand with silt, one (1) sample was described as silty

sand. The fines content in the fill ranged between 10 to 20 percent and the gravel content ranged up to 35 percent. The fill contained traces of organic soil, coal, ash, and asphalt.

The SPT N-values in the fill layer ranged between 3 bpf and 31 bpf, indicating loose to dense fill. The high SPT N-value recorded in the fill in boring MA-4 may be caused by obstructions in the fill and may not represent the true density of the fill.

Buried Organic Soil – A layer of buried organic soil was encountered in boring MA-3 and extended to a depth of 11.5 feet below the ground surface. The samples in this layer were described as silty sand. The fines content ranged between 20 to 30 percent. The gravel content ranged between 10 and 30 percent.

The SPT N-value in this layer was 10 bpf, indicating loose material.

Sand and Gravel – A layer of sand and gravel was encountered beneath the organic soil in MA-3 and beneath the fill in MA-4 and extended to the termination depths of 21 feet in both borings. The samples in this layer were mostly described as well graded sand. One (1) sample was described as well graded gravel and one (1) sample was described as poorly graded sand. The fines content ranged between 0 and 15 percent and the gravel content ranged up to 35 percent. When described as gravel, the sand content ranged between 20 to 25 percent.

The SPT N-values in the sand layer ranged between 6 bpf and 76 bpf, with most values ranging between 18 bpf and 24 bpf, indicating mostly medium dense sand.

2.3.6 Intersection of Washington Street and Central Street (Borings MA-5 to MA-8)

Asphalt/Concrete/Topsoil – Asphalt was encountered at the ground surface in boring MA-7. The thickness of the asphalt was about 5 inches. A layer of concrete was encountered at the ground surface in boring MA-5. The thickness of the concrete was about 2.5 inches. Topsoil was encountered at the ground surface in borings MA-6 and MA-8. The thickness of the topsoil was about 3 inches and 24 inches, respectively. Boring MA-6 had a layer of bark mulch over the topsoil.

Fill – A layer of fill was encountered beneath the asphalt, concrete, or topsoil in borings MA-5 to MA-8 and extended to depths of 4.0 feet beneath the ground surface in borings MA-5 to MA-7 and to a depth of 8.0 feet the beneath the ground surface in boring MA-8. The samples in this layer were mostly described as silty sand. Three (3) samples were described as sand with silt, and one (1) sample was described as gravel. The fines content in the fill ranged between 0 to 20 percent and the gravel content ranged up to 25 percent. When described as gravel, the fill contained about 25 percent gravel. The fill also contained traces of organic soil, roots, coal, and asphalt.

The SPT N-values in the sand layer ranged between 16 bpf and refusal, with most values falling lower than 47 bpf, indicating medium dense to dense soil.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill in all borings. The sand layer extended to the termination depths in MA-5 to MA-8. The samples in this layer were mostly described as well graded or poorly graded sand with silt. The fines content in the sand layer ranged between 0 and 15 percent, and the gravel content ranged up to 35 percent.

The SPT N-values in the sand layer ranged between 16 bpf and refusal, with most values ranging between 24 bpf and 73 bpf, indicating dense to very dense sand.

Boulder/Rock – Split spoon refusal was encountered in MA-6 at a depth of 20.2 feet on possible boulder or bedrock.

2.3.7 Retaining Wall in Front of AA Will Corp. Property (Borings WB-1 and WB-2)

Topsoil – A layer of surficial organic topsoil was encountered at the ground surface in boring WB-2. The thickness of the topsoil was about 1.2 feet.

Fill – A layer of fill was encountered at the ground surface in boring WB-1 and beneath the layer of topsoil in boring WB-2. The fill extended to depths of 1.2 and 6 feet beneath the ground surface in borings WB-1 and WB-2, respectively. The samples in this layer were mostly described as well graded gravel. One (1) sample was described as well graded sand. The fines content in the fill ranged between 0 to 15 percent and the sand content ranged between 5 to 30 percent. When described as sand, the gravel content in the fill ranged between 20 to 25 percent. The fill contained between 10 to 15 percent cobbles up to about 6 inches in size. The fill also contained traces of roots.

SPT N-values were not recorded within the fill layer.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill in borings WB-1 and WB-2. The sand and gravel layer extended to the termination depths of 36 feet beneath the ground surface in borings WB-1 and WB-2. The samples in this layer were mostly described as well graded sand or poorly graded sand. Three (3) samples were described as well graded gravel. The fines content in the sand and gravel layer ranged between 0 and 15 percent, and the gravel content ranged between 5 to 45 percent. When described as gravel, the sand content in this layer ranged between 15 to 25 percent.

The SPT N-values in the sand and gravel layer ranged between 5 bpf and refusal, with most values ranging between 13 bpf and 33 bpf, indicating medium dense to dense sand and gravel. Please note that the high SPT N-values recorded in the sand and gravel layer may be due to obstructions such as cobbles and boulders present within the sand and gravel layer and may not represent the true density of the sand and gravel.

The results of the geophysical survey, included in Appendix D, indicated good agreement between the different methods used in the survey described in Section 2.2.5. The results of the geophysical survey also indicated that the depth to the top of rock was 40 feet or greater along the proposed retaining wall.

2.4 Test Pit Results

Test pit TP-1 and TP-2 indicated that the existing concrete block wall is founded on natural sand and gravel at depths of 3 feet to 2.5 feet, i.e., 2 to 1.5 courses of blocks beneath the ground, respectively. The bottom course of blocks rests on a 2- to 4-inch-thick leveling pad of concrete.

2.5 Groundwater

Groundwater was measured at the end or shortly after the end of drilling in all borings at depths ranging between 6.0 feet and 19.0 feet beneath the ground surface as shown in Table 1 and in the boring logs. Groundwater was not encountered in the test pits or probes as shown in Tables 2 and 3, and in the test pit and probe logs.

The groundwater information reported herein is based on observations made during or shortly after the completion of drilling or excavation, and may not represent the actual groundwater conditions, as additional time may be required for the groundwater levels to stabilize. The groundwater information presented in this report only represents the conditions encountered at the time and location of the explorations. Seasonal fluctuation should be anticipated.

3. EVALUATION AND RECOMMENDATIONS

3.1 Mast Arm Foundation Recommendations

Based on the results of the borings, the subsurface conditions at the site are suitable to support the proposed mast arm foundations. Each mast arm should be supported on a cored pier (drilled shaft) designed in accordance with the standard drawings: "Overhead Signal Structure & Foundation, Sheets 1 through 7," by the MassDOT, Highway Division and dated December 2015 (Standard Drawing).

Using the average SPT N-value (with hammer energy correction), we assessed the soil designation in accordance with the Standard Drawing. The table below shows the average SPT N-values (corrected and uncorrected for hammer energy), the mast arm length, the depth to groundwater, and the recommended soil designation for design of the drilled shafts.

Intersection	Boring	Groundwater Level (ft.)	Mast Arm Length (ft.)	Average SPT N-Value	Corrected Average SPT N-Value*	Designation
Washington St. & York St.	MA-1 **	6	30	20.3	27.0	WET SAND (DENSE)
	MA-2 **	9.2	25	12.4	16.5	WET SAND (LOOSE)
Washington St. & Stop and Shop Driveway	MA-3	9	35	7.5	9.9	WET SAND (LOOSE)
	MA-4	6	30	22.6	30.2	WET SAND (DENSE)
Washington St. & Central St.	MA-5	11.7	45	32.8	43.7	DRY SAND (DENSE)
	MA-6	10.1	25	27.3	36.4	DRY SAND (DENSE)
	MA-7	10.5	35	36.5	48.6	DRY SAND (DENSE)
	MA-8	9	45	26.3	35.1	WET SAND (DENSE)

*Correction for 80% automatic hammer efficiency.

** Based on the boring logs, drilling near the bottom of the shaft will likely extend through boulders or into rock.

3.2 Bearing Resistance and Settlement of Proposed Retaining Wall

3.2.1 General

The subsurface conditions encountered in the borings advanced along the proposed retaining wall alignment are suitable for shallow foundations after the surficial organic soil and existing

fill are removed and replaced with Gravel Borrow. We anticipate that the removal will extend to depths of up to 6 feet beneath the existing grade. The removal may extend deeper at locations not explored by LGCI.

Our recommendations for footings design are presented in Section 3.2.2 and our settlement estimate is presented in Section 3.2.3.

3.2.2 Footing Design

- We recommended placing a minimum of 12 inches of compacted Gravel Borrow or crushed stone below all footings to provide a uniform working surface.

- Footings should be placed at a minimum depth of 4 feet below the final grade to provide adequate frost protection.

- Wall footings should be designed and constructed with continuous, longitudinal steel reinforcement for greater bending strength to span across small areas of loose or soft soils that may go undetected during construction.

- A representative of LGCI should be engaged to observe that the foundation subgrades have been prepared in accordance with our recommendations.

- We estimated the nominal bearing resistance, q_n, for the proposed shallow foundations for footing widths ranging between 5 and 8 feet, a bearing depth of 4 feet below the ground surface, and a footing length ranging between 57 and 99 feet. We have assumed that the footings will bear on 12 inches of Gravel Borrow placed directly on top of the natural sand and gravel layer. Using a conservatively low friction angle of 31 degrees for the natural sand and gravel, we estimated a nominal resistance as follows:

  $q_n = 0.8*B + 10$ where B is the footing width in feet and q_n is in kips per square foot (ksf)

- The factored bearing resistance, q_R, should be calculated by multiplying the nominal resistance, q_n, by the appropriate resistance factor φ_b. The resistance factors should be as follows:

Service Limit State	1.0 (AASHTO-9, Section 10.5.5.1)
Extreme Limit State	1.0 (AASHTO-9, Section 10.5.5.3)
Strength Limit State	0.55 for wall footings, if any (AASHTO-9, Section 11.5.7)

3.2.3 Settlement Estimates

- LGCI estimated the service limit state bearing resistance of the retaining wall using the boring data for widths of abutment footings ranging between 5 and 8 feet. We used Hough's Method described in AASHTO-9 for well graded silty sand and gravel. We

assumed that the settlement occurs in the top 25 feet, i.e., in the 21-foot layer beneath the proposed footing embedded at a depth of 4 feet beneath the ground surface. Our calculations are included in Appendix E. To keep the total settlement of the wall footings within one (1) inch, the service limit state bearing resistance should be as follows:

$q = (41.9/B) + 2$ where B is in feet and q is in ksf.

- For the resistance above, we anticipate that the total settlement of the proposed footings will be less than 1 inch and that the differential settlement will be less than ½ to ¾ of an inch over a distance of 25 feet.

- The bearing resistance should be limited to the lower of q_n in Section 3.2.2 and q in this section.

3.3 Seismic Recommendations

Seismic design criteria for the retaining wall are provided in the sections below for a 1,000-year return period in accordance with the AASHTO Guide Specifications for LRFD Seismic Bridge Design (2011 with latest revisions).

- Site Class: D
- Peak Ground Acceleration (PGA): 0.067g
- Spectral Response Acceleration at short period (S_s): 0.140g
- Spectral Response Acceleration at 1 sec. (S_1): 0.037g
- Site Factor F_{pga} (Table 3.10.3.2-1): 1.6
- Site Coefficient F_a (Table 3.10.3.2-2): 1.6
- Site Coefficient F_v (Table 3.10.3.2-3): 2.4
- Adjusted Peak Ground Acceleration, A_s: 0.108g
- Adjusted Spectral Response S_{DS}: 0.224g
- Adjusted Spectral Responses S_{D1}: 0.089g

Based on the boring information, we believe the site soils at this location are in general not susceptible to liquefaction.

3.4 Lateral Pressures for Wall Design

Lateral earth pressures recommended for design of the retaining wall are provided below.

Coefficient of Active Earth Pressure, K_A:	0.31
Coefficient of At-Rest Earth Pressure, K_o:	0.50
Friction Angle between Backfill and Back of Wall, δ:	10 degrees
Total Unit Weight, γ:	120 pcf
Buoyant Unit Weight γ':	57.4 pcf

Note: The coefficient of active pressure value is based on Coulomb's equation using an internal friction angle for the backfill, ϕ, of 30 degrees and a friction angle between the backfill and the structure, δ, of 10 degrees. The coefficients of active and at-rest earth pressure are provided for wall backfill with a horizontal surface (non-sloping backfill) on the active side for the retaining wall.

- In accordance with MassDOT's LRFD Bridge Manual (2013) Section 3.1.6, for cantilever walls not founded on rock with a total height less than or equal to 5 feet, the coefficient of lateral earth pressure should be calculated using the following equation: $0.5*(K_A + K_o)$. For cantilever walls not founded on rock with a total height greater than 5 feet or any spread-footing supported gravity wall, the coefficient of lateral earth pressure should be calculated using K_A.

- In accordance with Section 3.3.1 of the 2013 MassDOT LRFD Bridge Design Manual, the passive earth pressures should be neglected in front of the walls in determining local wall stability (overturning, sliding, and bearing pressures).

- In accordance with AASHTO-9, Section 3.4.1, for the Strength Limit State, a load factor of 1.5 should be applied to the lateral earth pressure.

- We recommend placing free-draining material (Gravel Borrow, MassDOT M1.03.0, Type b) within the 3 feet immediately behind the wall. We recommend providing weep holes in the wall to promote drainage.

- Assuming that the footings are cast in place, we recommend an angle of friction ϕ_f of 34 degrees between the Gravel Borrow beneath the bottom of the footing and the compacted natural soil. In accordance with AASHTO-9, a resistance factor should be used for the shear resistance between the bottom of the proposed foundations and the Gravel Borrow as follows:

  0.8 for cast-in-place concrete foundation (Table 10.5.5.2.2-1)
  0.9 for precast concrete foundation (Table 10.5.5.2.2-1)
  1.0 for wing wall foundations (Table 11.5.7-1)

3.5 Seismic Pressure

In accordance with AASHTO Guide Specifications for LRFD Seismic Bridge Design (2011 with latest revisions), the site described in this report is classified as Seismic Design Category (SDC) A. According to the MassDOT Bridge Manual, Sections 3.4.4 and 3.4.6, a seismic analysis is not required SDC A walls.

3.6 Slope Stability Analyses

3.6.1 General

LGCI performed limit equilibrium analyses to evaluate the global stability of the proposed riprap slope embankment on the eastern side of Washington Street just north of York Street.

LGCI performed stability analyses using the slope stability program PCSTABL5M to calculate the factor of safety, FS, for a sliding failure using the Simplified Bishop Method of slices for circular failure surfaces. For this project, we defined critical failure surfaces as those surfaces that start on the upper side of the proposed riprap slope on Washington Street and extend to the lower side of the proposed slope in the wet areas, i.e., surfaces that entirely encompass the existing slope (global failure surfaces).

We performed slope stability analyses on cross sections between approximate station Sta. 10+00 and Sta. 12+00 (corresponding to proposed Sta. 23+00 and Sta. 25+00, respectively).

3.6.2 Slope Geometry

Our understanding of the proposed armored/riprap slope is based on our discussions with Nitsch and on the following documents:

- Drawing titled "Stoughton, Washington Street (Route138), Cross Sections Plan, Sheet No. 149 to 157 out of 226," prepared by Nitsch Engineering, Inc., plotted on April 1, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on April 4, 2022.

- Detailed cross section of the Riprap Slope provided to LGCI by Nitsch via e-mail on April 4, 2022.

We performed slope stability analyses for three (3) representative sections, i.e., sections at proposed Sta. 23+00, Sta. 24+00, and Sta. 25+00.

3.6.3 Soil Parameters

LGCI estimated the friction angles of the onsite soils, including the existing fill, natural sand and gravel layer, and organic soil (peat or buried organic soil) based on SPT data from borings SB-1, SB-2, and SB-3.

The table below shows the soil parameters we used in our slope stability analyses.

Soil Layer	Total Unit Weight (pcf)	Saturated Unit Weight (pcf)	Friction Angle (degrees)
Topsoil	115	120	28
Crushed Stone	135	140	42
Gravel Borrow	135	140	36
Existing Fill	120	125	33
Peat/Buried Organic Soil	110	115	29
Natural Sand & Gravel	125	130	36
Weathered Rock	135	140	42

For the rock, we assigned high strength values to force the failure surfaces into the overlying sand.

3.6.4 Results of Slope Stability Analyses

Our analyses indicated FS values of 1.55, 1.52, and 1.44 at Sta. 23+00, Sta. 24+00, and Sta. 25+00, respectively. The results of our slope stability analysis are included in Appendix E.

4. CONSTRUCTION CONSIDERATIONS

4.1 Site Preparation and Earthwork

4.1.1 General

Loose, soft, or organic materials as well as abandoned structures, if any, and utilities and deleterious matter encountered during initial stripping operations should be removed within the proposed foundation areas. Material placed around the mast arms near the surface should be compacted.

4.1.2 Drilled Shaft for Mast Arms

- During construction of the cored pier foundation (drilled shaft), a temporary casing that will be removed when concrete is placed will be required to prevent collapse of the fill and sand.

- We did not encounter boulders in our borings. However, the fill could contain cobbles and boulders. The contractor should be prepared to remove such boulders, if encountered, during the installation of the drilled shaft.

- When the drilling operations are complete, concrete should be placed inside the casing as soon as possible.

- The concrete should be placed using a tremie pipe. We recommend pouring the pier foundation concrete on the same day that the pier is drilled.

- A representative of LGCI should assess that the pier foundation is founded on competent bearing materials and that the pier foundation installation procedures comply with our recommendations.

4.1.3 Footing Subgrade Preparation

- Existing fill, organic soil, abandoned utilities, and other below-ground structures should be entirely removed from within and 1 foot outside the proposed foundation footprints.

- Due to the variability of the site soils and potential for differing bearing materials, we recommend placing a minimum of 12 inches of Gravel Borrow under footings to provide a firm working surface during placement of formwork and rebar.

- The subgrade of the footings in the natural sand and gravel should be compacted with a dynamic vibratory compactor imparting a minimum of 10 kips of force to the subgrade.

- Should boulders be encountered at the footing subgrade, the boulders should be removed, and the resulting excavation should be backfilled with compacted Gravel Borrow.

- Loose or soft soils identified during the compaction of the footing subgrades that cannot be compacted in place should be excavated to a suitable bearing stratum as determined by the representative of LGCI. Grades should be restored by backfilling with Gravel Borrow (MHD M1.03.0, Type a) or crushed stone.

- When crushed stone is required in the drawings or it is used for the convenience of the contractor, it should be wrapped in a geotextile fabric for separation except where introduction of the geotextile fabric promotes sliding.

- An LGCI representative should observe the exposed foundation subgrades prior to fill and concrete placement to verify that the exposed bearing materials are suitable for the design soil bearing pressure. If soft or loose pockets are encountered in the footing excavations, the soft or loose materials that cannot be compacted in place should be removed, and the bottom of the footing should be placed at a lower elevation on firm soil, or the resulting excavation should be backfilled with Gravel Borrow, or crushed stone wrapped in a geotextile fabric.

4.2 Fill Materials

Fill placed beneath the foundations and to backfill the walls should meet the gradation and compaction requirements of Gravel Borrow (MassDOT M1.03.0, Type a).

Materials to be used as fill should first be tested for compliance with the applicable gradation specifications.

4.3 Reuse of Onsite Materials

Based on our field observations, we do not anticipate that the site soils will meet the gradation requirements of Gravel Borrow. Should the contractor encounter materials potentially suitable for reuse during earthwork operations, the contractor should avoid mixing the reusable soils with unsuitable soils. The soils to be reused should be excavated and stockpiled separately for compliance testing.

Soils with 20 percent or greater fines content are generally very sensitive to moisture content variations and are susceptible to frost. Such soils are very difficult to compact at moisture contents that are much higher or much lower than the optimum moisture content determined from the laboratory compaction test. Therefore, strict moisture control should be implemented during compaction of onsite soils with fines contents of 20 percent or greater. The contractor should be prepared to remove and replace such soils if pumping occurs.

4.4 Temporary Excavations

Where temporary support of excavation (SOE) systems are needed, such as for the proposed retaining wall, the design of the SOE system should be performed by a professional engineer registered in the Commonwealth of Massachusetts and engaged by the contractor. The existing sand and gravel may contain cobbles and boulders that may preclude the use of sheet piles. The

contractor should review the subsurface information and select the appropriates SOE system. The design should be submitted to Nitsch for review at least two weeks before the start of construction. The design should include details about the size of the components of the system, and the construction and removal sequence.

All excavations to receive human traffic should be constructed in accordance with OSHA guidelines.

The site soils should generally be considered Type "C" and should have a maximum allowable slope of 1.5 Horizontal to 1 Vertical (1.5H:1V) for excavations less than 20 feet deep. Deeper excavations, if needed, should have shoring designed by a professional engineer.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of the excavation sides and bottom.

4.5 Groundwater Control Procedures

We do not anticipate that major groundwater control procedures will be needed during the excavation for the proposed retaining wall foundation. However, due to the sloping ground in the general vicinity of the site, surface runoff should be managed to maintain dry excavations. We recommend that the contractor design and submit a plan to collect and remove groundwater prior to the start of the excavations. Such a plan should include at a minimum, multiple sump pump pits extending at least 3 feet beneath the bottom of the excavation.

Groundwater levels should be maintained at a minimum of 1-foot below the bottom of excavations during construction. In addition to local sump pumps, the contractor should be prepared to use well points to maintain a dry excavation. The contractor should be permitted to employ whatever commonly accepted means and practices are available to dewater.

To reduce the potential for sinkholes developing over sump pump pits after the sump pumps are removed, the crushed stone placed in the sump pump pits should be wrapped in a geotextile fabric. Alternatively, the crushed stone should be entirely removed after the sump pump is no longer in use and the sump pump pit should be restored with suitable backfill.
Groundwater collected from excavations should be filtered for fines in sedimentation basins before being discharged. At a minimum, the sedimentation basins should be constructed of hay bales wrapped in a geotextile fabric.

The contractor should discharge groundwater from the dewatering system in accordance with permits and local and state regulations.

4.6 Slope Subgrade Preparation

- We recommend removing the topsoil and organic matter from the surface of the existing slope before placing fill for the slope extension.

- At the bottom of the proposed slope, the surficial organic soil and swamp deposits material should be removed before placing fill for the new slope.

4.7 Contractor Submittals

The contractor should submit details about the construction procedures, including:

- The proposed construction sequence;
- Groundwater control system.

Contractor submittals should be prepared and sealed by a professional engineer registered in the Commonwealth of Massachusetts and should be submitted for review at least two weeks before the start of the work.

5. REPORT LIMITATIONS

Our analysis and recommendations are based on project information provided to us at the time of this report. If changes to the type, size, and location of the proposed structures or to the site grading are made, the recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions and recommendations modified in writing by LGCI. LGCI cannot accept responsibility for designs based on our recommendations unless we are engaged to review the final plans and specifications to determine whether any changes in the project affect the validity of our recommendations and whether our recommendations have been properly implemented in the design.

It is not part of our scope to perform a more detailed site history; therefore, we have not explored for or researched the locations of buried utilities or other structures in the area of the proposed construction. Our scope did not include environmental services or services related to moisture, mold, or other biological contaminates in or around the site.

We cannot accept responsibility for designs based on recommendations in this report unless we are engaged to 1) make site visits during construction to check that the subsurface conditions exposed during construction are in general conformance with our design assumptions and 2) ascertain that, in general, the work is being performed in compliance with the contract documents.

Our report has been prepared in accordance with generally accepted engineering practices and in accordance with the terms and conditions set forth in our agreement. No other warranty, expressed or implied, is made. This report has been prepared for the exclusive use of Nitsch Engineering, Inc. for the specific application to the Proposed Mast Arms, Reinforced Slope, and Retaining Wall in Stoughton, Massachusetts as conceived at this time.

6. REFERENCES

In addition to the references included in the text of the report, we used the following references:

American Association of State Highway and Transportation Officials (2020), "AASHTO LRFD Bridge Design Specifications," 9th Edition, Washington, D.C.

American Association of State Highway and Transportation Officials (2011), "AASHTO Guide Specifications for LRFD Seismic Bridge Design," 2nd Edition, with 2012 and 2014 Interim Revisions.

Massachusetts Highway Department (2023), "Standard Specifications for Highways and Bridges."

MassDOT (2013), "LRFD Bridge Manual," revised 2020.

United States Department of Labor, Occupational Safety and Health Administration [OSHA] (October 1989) "Federal Register, Volume 54, No. 209: Construction Standards for Excavations, 29 CFR, part 1926, Subpart P.".

US Geological Survey, Stoughton, MA Topo Map from http://mapserver.mytopo.com.

Table 1 - Summary of LGCI's Borings
Proposed Mast Arms, Reinforced Slope and Retaining Wall
Stoughton, Massachusetts
LGCI Project No. 2139

Boring No.	Ground Surface Elevation (ft.)[1]	Groundwater[2] Depth / El. (ft.)	Bottom of Topsoil/**Asphalt** Depth / El. (ft.)	Bottom of Concrete Depth / El. (ft.)	Bottom of Fill Depth / El. (ft.)	Bottom of Organic Soil/**Peat** Depth / El. (ft.)	Bottom of Sand and Gravel Depth / El. (ft.)	Top of Rock Depth / El. (ft.)	Bottom of Boring Depth / El. (ft.)
MA-1	216.0	6.0 / **210.0**	0.6 / **215.4**	- / -	2.0 / **214.0**	- / -	21.0 [3]/ **195.0**	- / -	21.0 / **195.0**
MA-2	219.0	9.2 / **209.8**	0.4 / **218.6**	- / -	4.0 / **215.0**	- / -	16.0 / **203.0**	16.0 [4]/ **203.0**	18.2 / **200.8**
MA-3	235.0	9.0 / **226.0**	2.0 / **233.0**	- / -	9.0 / **226.0**	11.5 / **223.5**	21.0 [3]/ **214.0**	- / -	21.0 / **214.0**
MA-4	235.0	6.0 / **229.0**	2.0 / **233.0**	- / -	4.0 / **231.0**	- / -	21.0 [3]/ **214.0**	- / -	21.0 / **214.0**
MA-5	242.0	11.7 / **230.3**	- / -	0.2 / **241.8**	4.0 / **238.0**	- / -	21.0 [3]/ **221.0**	- / -	21.0 / **221.0**
MA-6	240.0	10.1 / **229.9**	0.3 / **239.7**	- / -	4.0 / **236.0**	- / -	20.2 [3]/ **219.8**	- / -	20.2 / **219.8**
MA-7	241.0	10.5 / **230.5**	**0.5** / **240.5**	- / -	4.0 / **237.0**	- / -	21.0 [3]/ **220.0**	- / -	21.0 / **220.0**
MA-8	241.0	9.0 / **232.0**	2.0 / **239.0**	- / -	8.0 / **233.0**	- / -	21.0 [3]/ **220.0**	- / -	21.0 / **220.0**
SB-1	202.0	6.0 / **196.0**	**0.6** / **201.4**	1.2 / **200.8**	19.0 / **183.0**	**23.6** / **178.4**	31.0 [3]/ **171.0**	- / -	31.0 / **171.0**
SB-2	204.0	8.0 / **196.0**	**0.7** / **203.3**	- / -	14.0 / **190.0**	14.1 / **189.9**	19.0 / **185.0**	19.0 [4]/ **185.0**	26.0 / **178.0**
SB-3	211.0	19.0 / **192.0**	**0.7** / **210.3**	- / -	- / -	- / -	26.0 / **185.0**	26.0 [4]/ **185.0**	28.6 / **182.4**
SB-4	215.0	8.5 / **206.5**	0.3 / **214.7**	- / -	4.0 / **211.0**	- / -	9.2 / **205.8**	9.2 [4]/ **205.8**	12.5 / **202.5**
WB-1	241.0	6.0 / **235.0**	- / -	- / -	1.2 / **239.8**	- / -	36.0 [3]/ **205.0**	- / -	36.0 / **205.0**
WB-2	245.0	14.0 / **231.0**	1.2 / **243.8**	- / -	6.0 / **239.0**	- / -	36.0 [3]/ **209.0**	- / -	36.0 / **209.0**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.
2. Groundwater depths based on level at the end of drilling, level after drilling, or based on sample moisture, whichever is shallower.
3. Boring terminated in the sand and gravel layer.
4. Boring terminated in rock or on a boulder .
5. "-" means layer was not encountered.

Table 2 - Summary of LGCI's Test Pits
Proposed Mast Arms and Reinforced Slope
Stoughton, Massachusetts
LGCI Project No. 2139

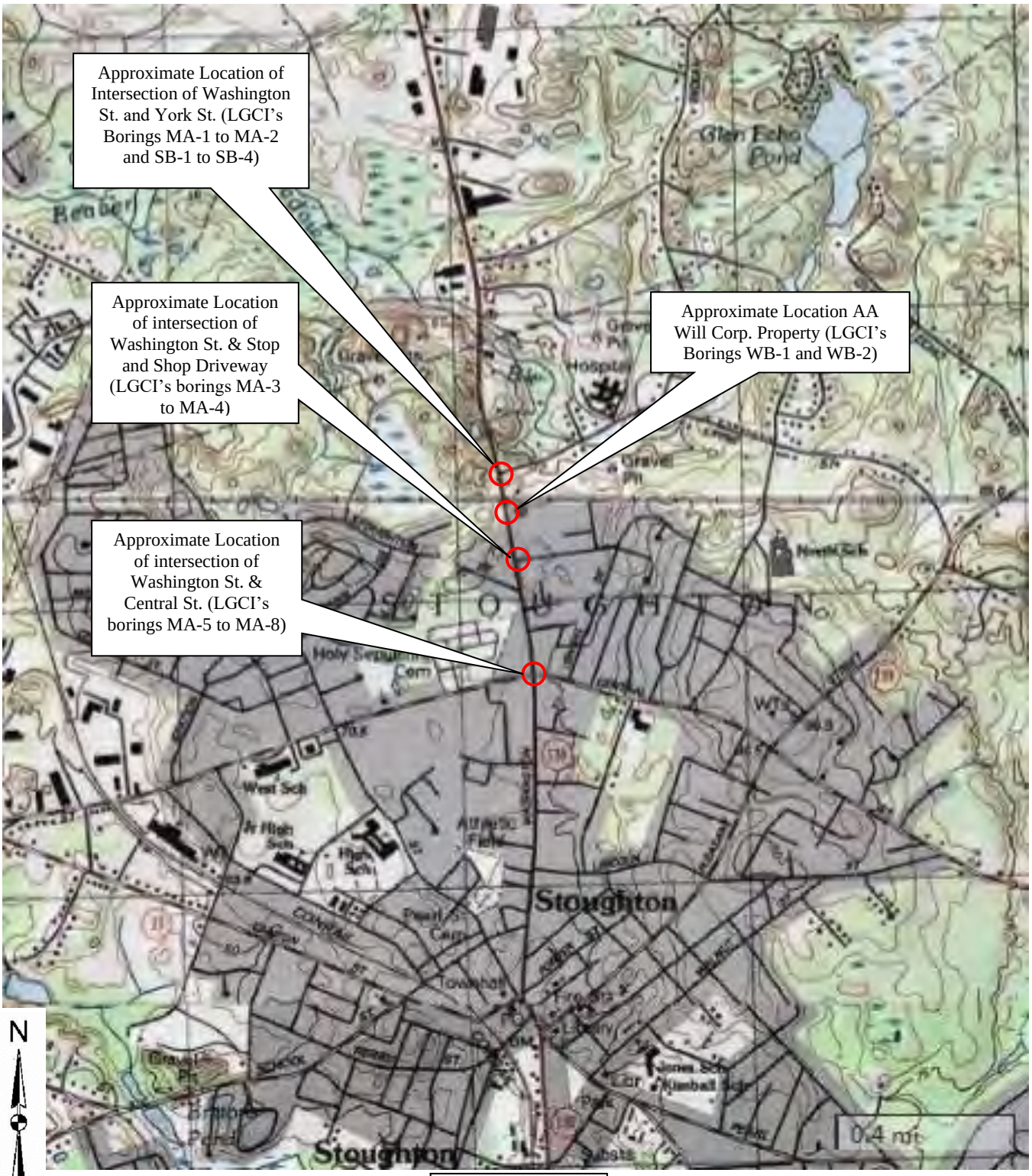
Test Pit No.	Ground Surface Elevation (ft.)[1]	Groundwater[2] Depth / El. (ft.)	Bottom of Topsoil Depth / El. (ft.)	Bottom of Fill Depth / El. (ft.)	Bottom of Sand and Gravel Depth / El. (ft.)	Bottom of Test Pit Depth / El. (ft.)
TP-1	232.0	- / **-**	- / **-**	4.3 / **227.7**	6.0 [3]/ **226.0**	6.0 / **226.0**
TP-2	237.0	- / **-**	1.0 / **236.0**	2.5 / **234.5**	5.5 [3]/ **231.5**	5.5 / **231.5**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.
2. Groundwater not encountered.
3. Test pit terminated in the sand and gravel layer.
4. "-" means layer or groundwater was not encountered.

Table 3 - Summary of LGCI's Probes
Proposed Mast Arms and Reinforced Slope
Stoughton, Massachusetts
LGCI Project No. 2139

Probe No.	Ground Surface Elevation (ft.)[1]	Groundwater[2] Depth / El. (ft.)	Bottom of Forest Mat Depth / El. (ft.)	Bottom of Fill Depth / El. (ft.)	Bottom of Buried Organic Soil Depth / El. (ft.)	Bottom of Probe Depth / El. (ft.)
HP-1	195.0	- / **-**	0.5 / **194.5**	2.7 [3]/ **192.3**	- / **-**	2.7 / **192.3**
HP-2	188.0	0.0 / **188.0**	1.5 / **186.5**	3.5 [3]/ **184.5**	- / **-**	3.5 / **184.5**
HP-3	187.0	1.5 / **185.5**	1.0 / **186.0**	2.0 / **185.0**	3.0 [4]/ **184.0**	3.0 / **184.0**
HP-4	189.0	0.5 / **188.5**	0.5 / **188.5**	2.5 [3]/ **186.5**	- / **-**	2.5 / **186.5**
HP-5	205.0	- / **-**	***1.0*** / **204.0**	3.0 [3]/ **202.0**	- / **-**	3.0 / **202.0**

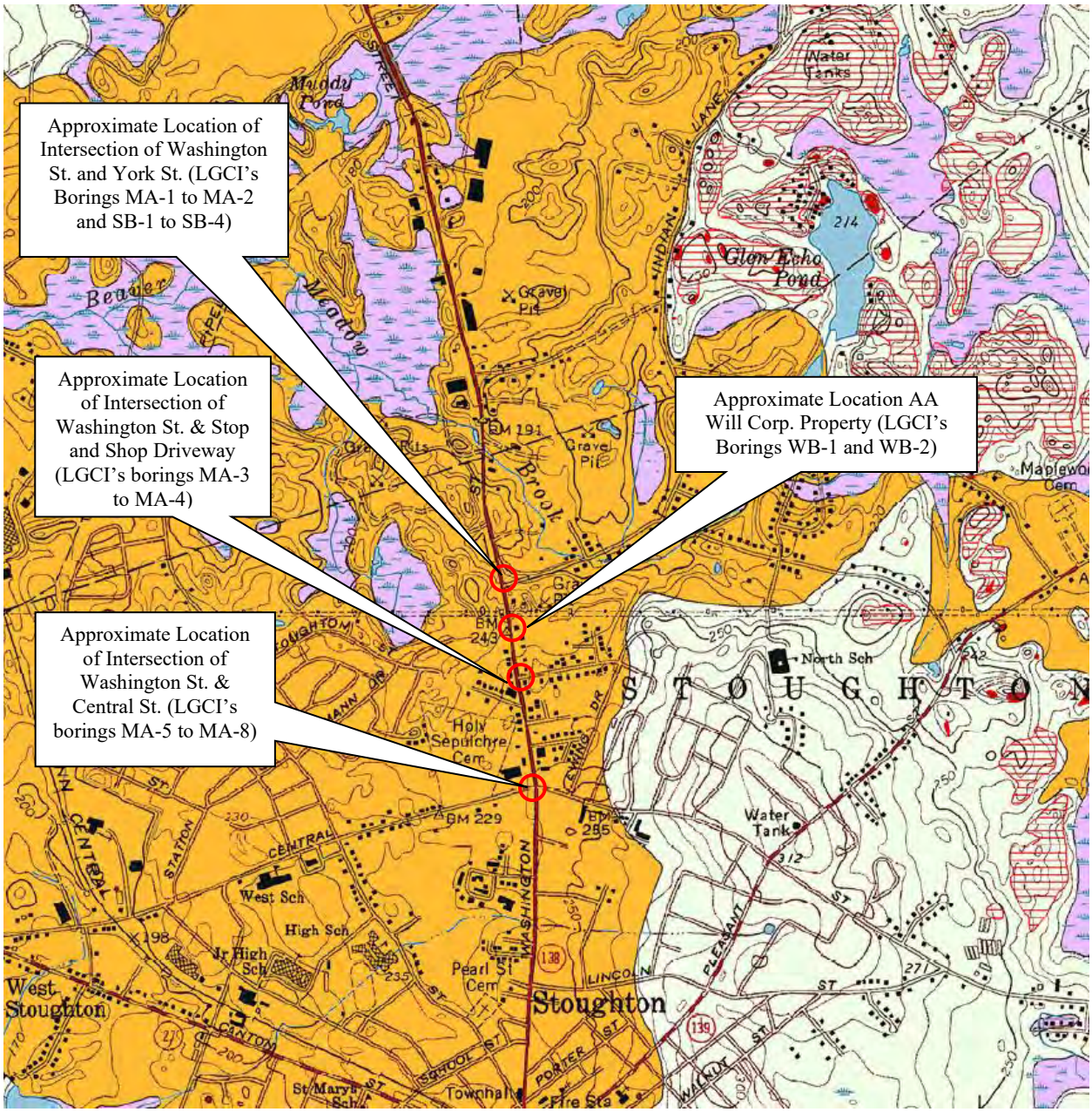
1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2023.
2. Groundwater depths based on level at the end of drilling, level after drilling, or based on sample moisture, whichever is shallower.
3. Probe terminated in the Fill layer.
4. Probe terminated in the buried organic soil layer.
5. "-" means layer was not encountered.



Contour Interval: 3 meters

Note: Figure based on USA Topo Maps of Stoughton, MA obtained from https://viewer.nationalmap.gov/

Client:	Project:	
Nitsch Engineering, Inc.	Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 1 – Site Location Map
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139 / Date: Feb. 2023



N

Coarse deposits consist of *gravel deposits*, *sand and gravel deposits*, and *sand deposits*, not differentiated in this report. *Gravel deposits* are composed of at least 50 percent gravel-size clasts; cobbles and boulders predominate; minor amounts of sand occur within gravel beds, and sand comprises a few separate layers. Gravel layers generally are poorly sorted, and bedding commonly is distorted and faulted due to postdepositional collapse related to melting of ice. *Sand and gravel deposits* occur as mixtures of gravel and sand within individual layers and as layers of sand alternating with layers of gravel. Sand and gravel layers generally range between 25 and 50 percent gravel particles and between 50 and 75 percent sand particles. Layers are well sorted to poorly sorted; bedding may be distorted and faulted due to postdepositional collapse. *Sand deposits* are composed mainly of very coarse to fine sand, commonly in well-sorted layers. Coarser layers may contain up to 25 percent gravel particles, generally granules and pebbles; finer layers may contain some very fine sand, silt, and clay

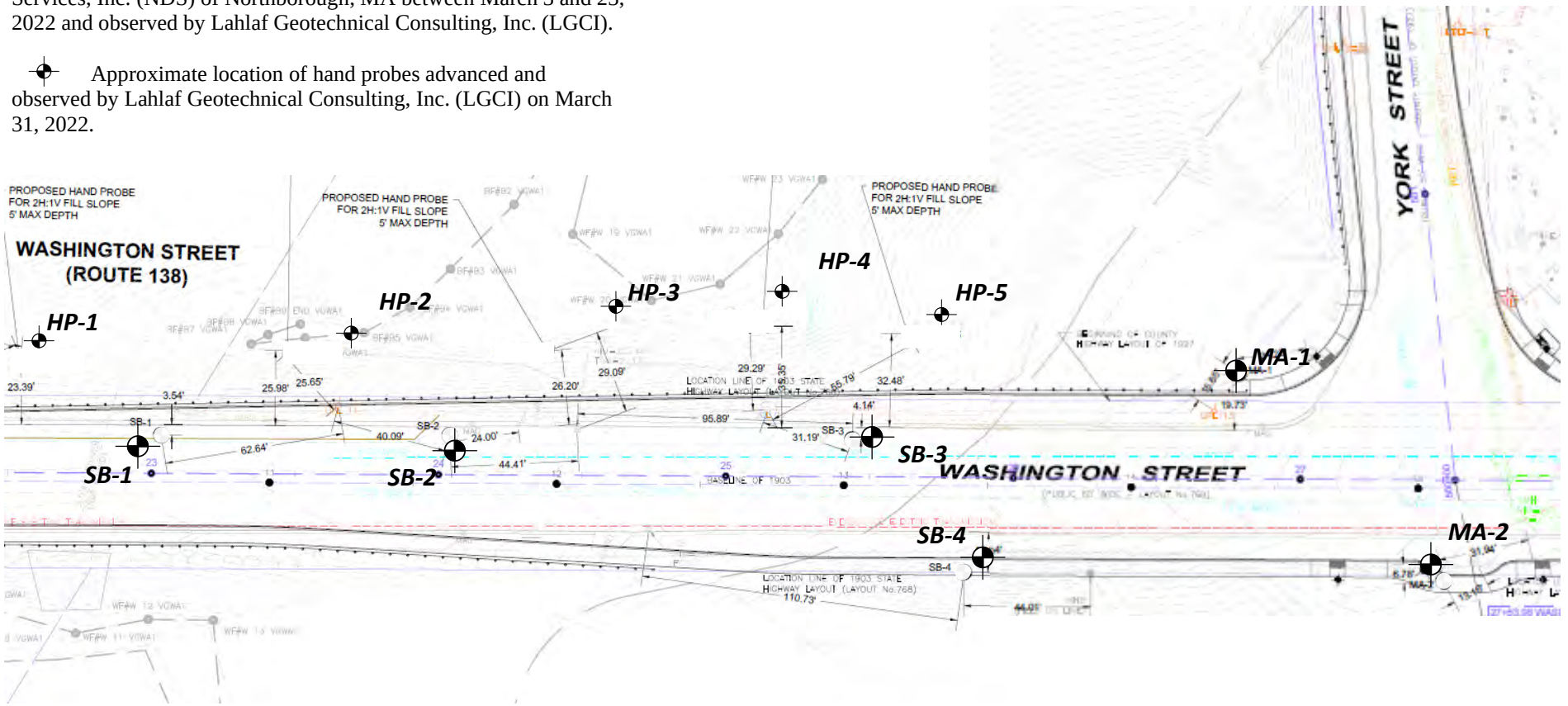
Note: Figure based on map titled: "Surficial Materials Map of the Blue Hills Quadrangle, Massachusetts," prepared by Stone, B.D., and DiGiacomo-Cohen, M.L. Scientific Investigation Map 3402, Quadrangle 127 – Blue Hills, 2018.

Client:	Project:	Figure 2 – Surficial Geologic Map	
Nitsch Engineering, Inc.	Proposed Mast Arms, Reinforced Slope, and Retaining Wall		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: Feb. 2023

Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA between March 3 and 23, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).

Approximate location of hand probes advanced and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI) on March 31, 2022.



Approximate Scale (ft.)

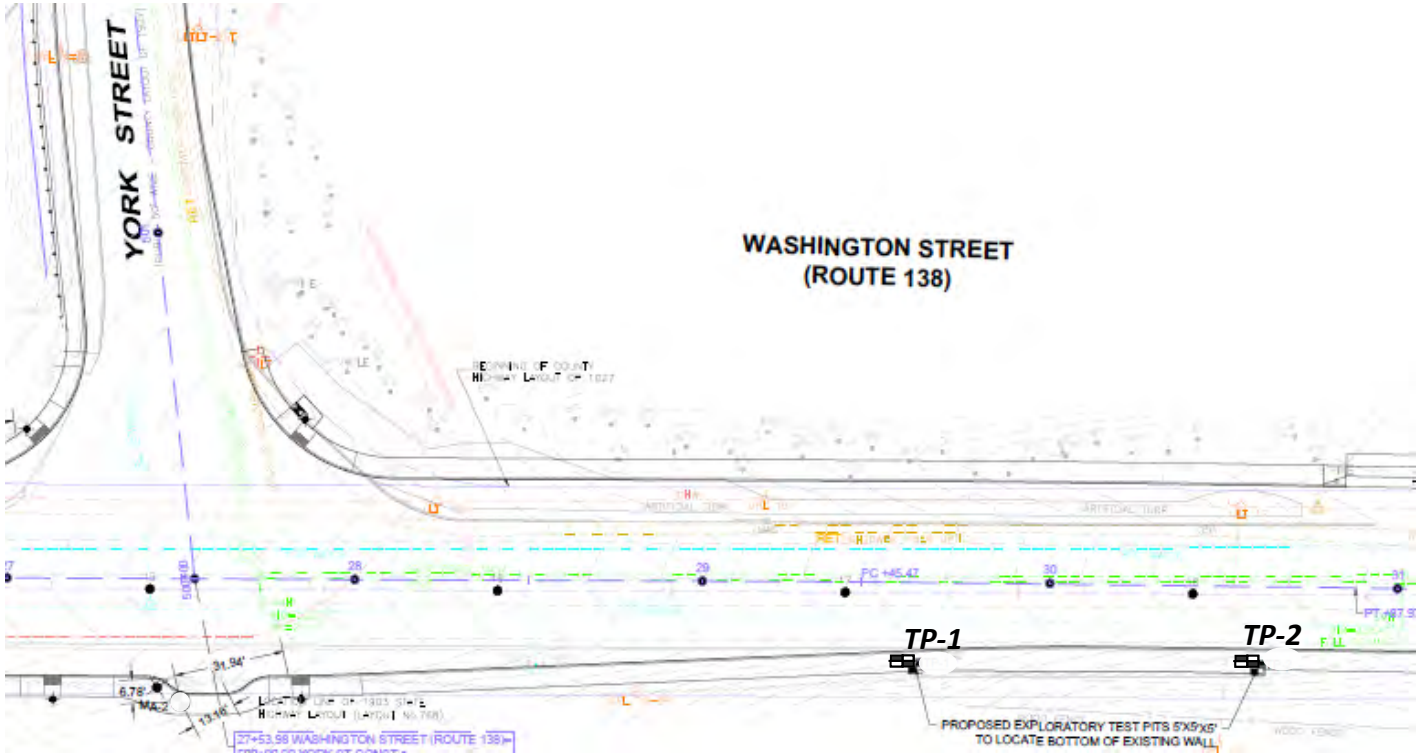
Note

Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 and 2 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3A – Boring Location Plan - MA-1 & MA-2 and SB-1 to SB-4	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: Feb. 2023

Legend

Approximate location of test pit advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA on March 25, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



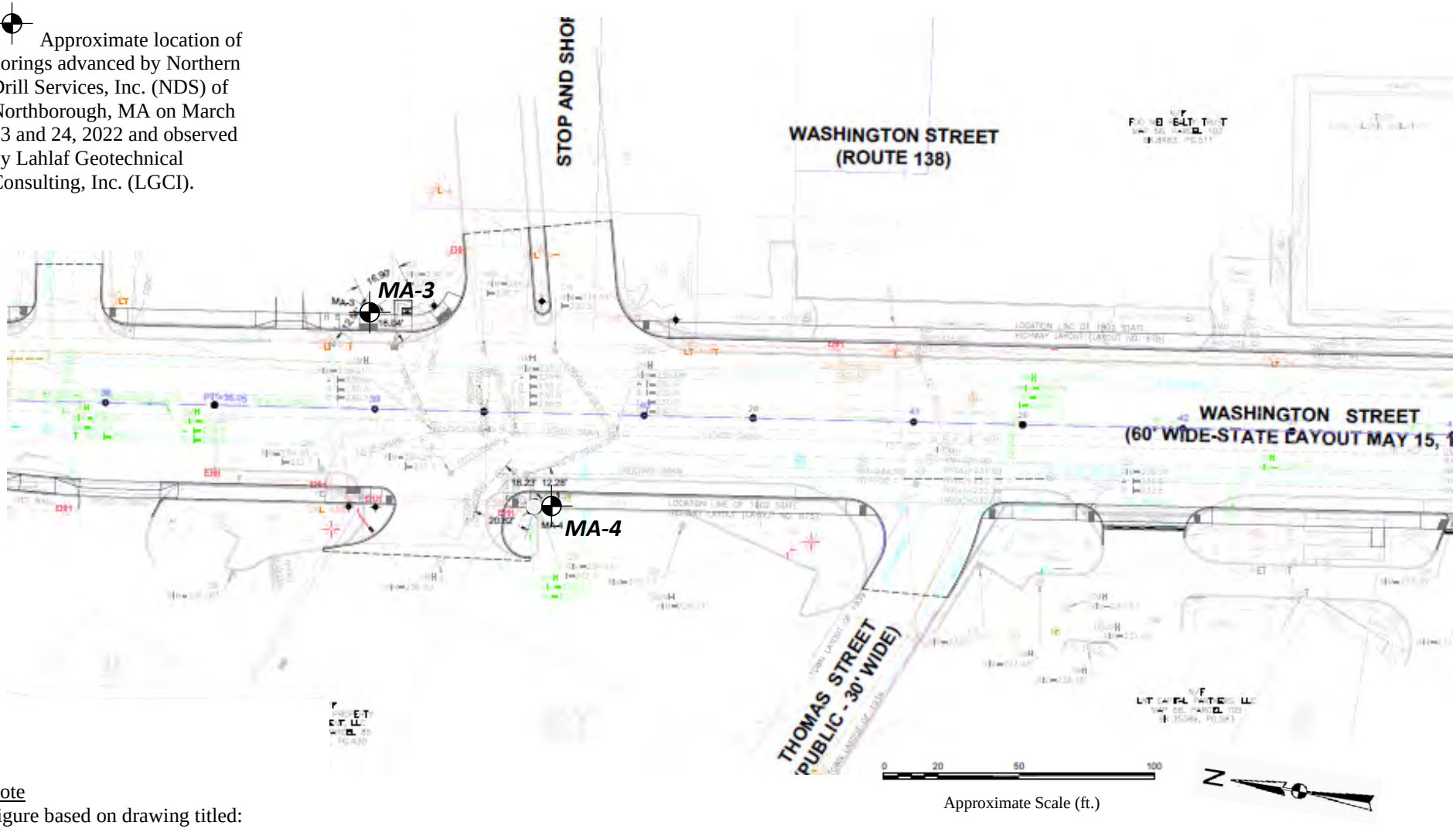
Approximate Scale (ft.)

Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 2 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022 and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3B – Test Pit Location Plan - TP-1 and TP-2	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: Feb. 2023

Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA on March 23 and 24, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



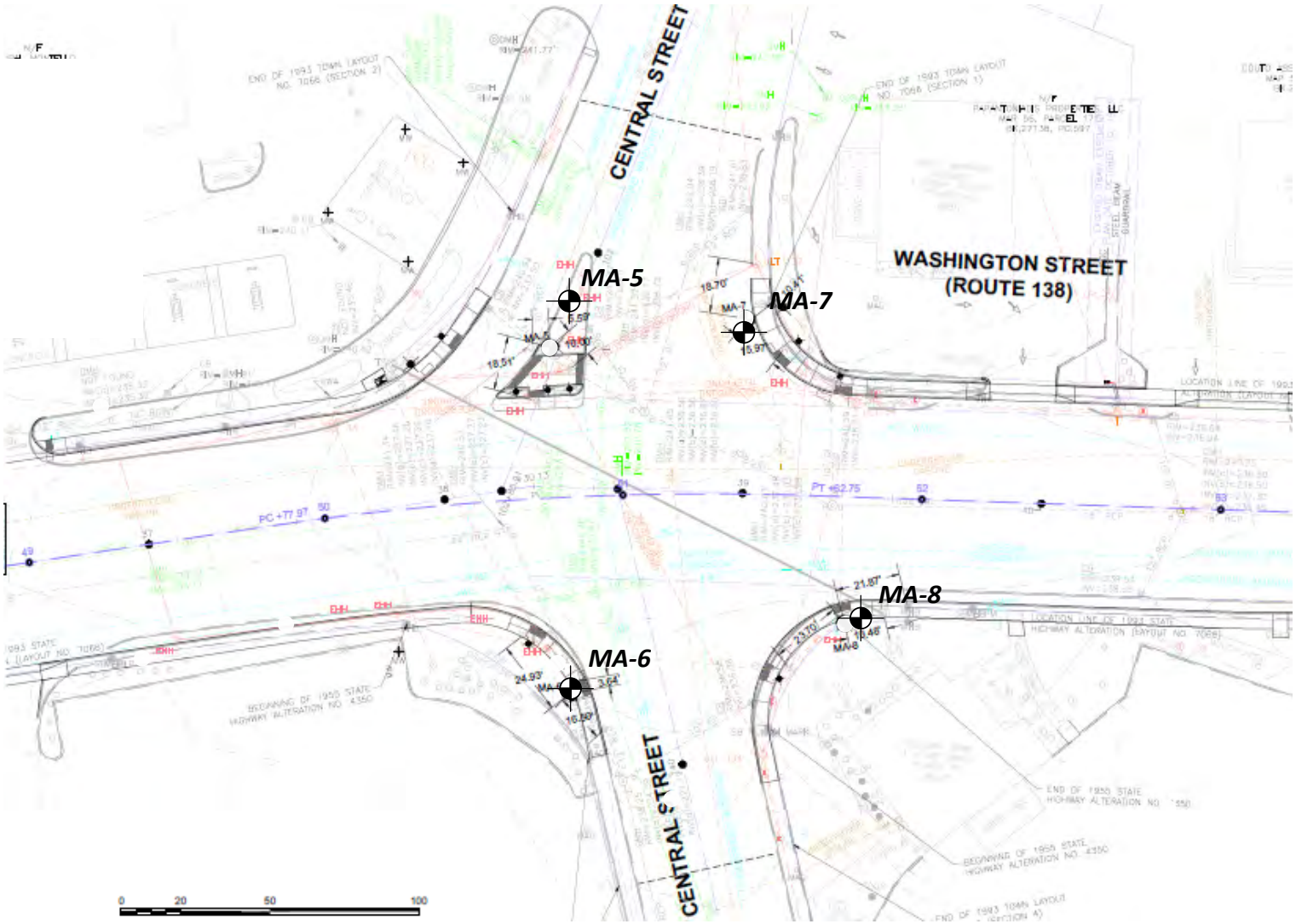
Approximate Scale (ft.)

Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 4 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022 and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3C – Boring Location Plan - MA-3 to MA-4	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: Feb. 2023

Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA between March 24 and 28, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



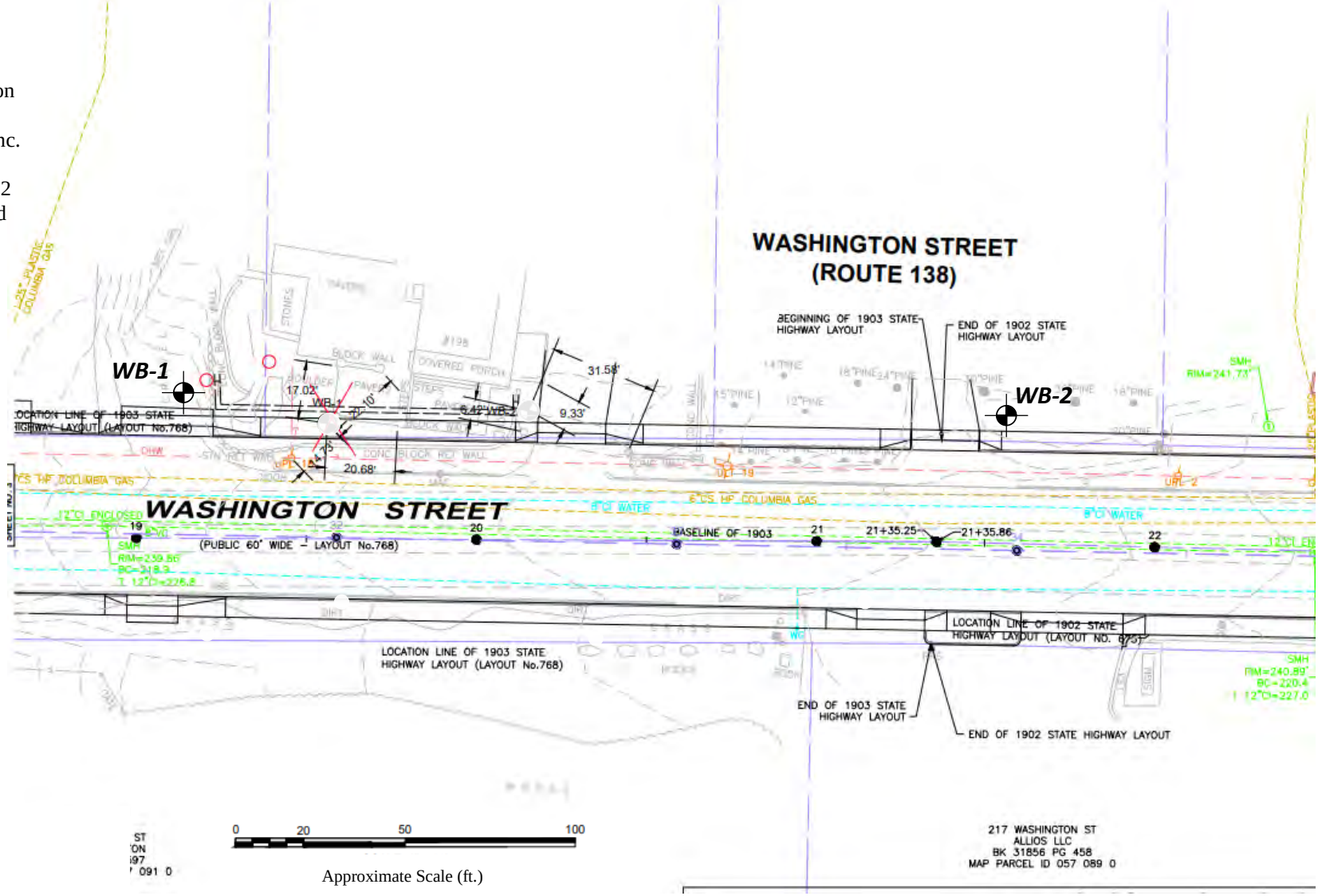
Approximate Scale (ft.)

Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 5 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022 and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3D – Boring Location Plan - MA-5 to MA-8	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: Feb. 2023

Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA between September 22 and 23, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 3 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022 and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3E – Boring Location Plan – WB-1 to WB-2	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: Feb. 2023

APPENDIX A – Boring Logs

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Road, Suite 2
Billerica, MA 01862
Telephone: (978) 330-5912
Fax: (978) 330-5056

BORING LOG

MA-1
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/4/22 **DATE COMPLETED:** 3/4/22
BORING LOCATION: Near Northern side of York St
COORDINATES: NA
SURFACE El.: 216 ft. (see note 1) **TOTAL DEPTH:** 21 ft.
WEATHER: 20's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 6.0 ft. / El. 210.0 ft. Based on sample moisture
AT END OF DRILLING: 17.0 ft. / El. 199.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	215.0	0	S1	6-15-13-11 (28)	24/14		Topsoil	0.6	S1 - Top 7": Topsoil
							Fill	215.4	Bot. 7": Silty SAND with Gravel (SM), fine to coarse, ~15% fines, 25-30% fine to coarse angular gravel, trace of organic soil, brown moist
		2	S2	8-10-19-11 (29)	24/9			2.0 214.0	S2 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 5-10% fines, light brown, moist
		4	S3	7-6-7-6 (13)	24/3				S3 - Well Graded GRAVEL (GW), fine to coarse, subrounded, 0-5% fines, ~10% fine to coarse sand, brown, moist
5	210.0	6	S4	5-5-6-4 (11)	24/10		Sand and Gravel		S4 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, ~5% fines, ~30% fine to coarse subrounded gravel, light brown, wet
		8							
		9	S5	40-60/1"	7/0			9.6	S5 - No recovery
10	205.0	9.6				1	Boulder	206.4 13.5	REMARK 1: Spun 3" casing at depth of 9.6'. Drilled through boulder from 9.6' to 13.5'.
		14	S6	100/1"	1/0	2	Sand and Gravel	14.0	REMARK 2: Drove casing to depth of 14.0' through what appears to be a thin sand seam about 6.0" thick.
		14.1						202.0	S6 - No recovery
15	200.0						Boulder		
						3		17.5 198.5	REMARK 3: Drilled through boulder. Used 5 tanks of water drilling 9.6' to 20.0'. Broke through boulder at depth of 17.5'.
		19	S7	23-29-33-29 (62)	24/9		Sand and Gravel		S7 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 30-35% fine to coarse angular gravel, trace of weathered rock, brown wet
20	195.0	21						21.0	Bottom of borehole at 21.0 feet. Backfilled borehole with drill cutting and 7 bags of gravel.
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

LGCI Lahlaf Geotechnical Consulting, Inc.
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Fax: (978) 330-5056

BORING LOG

MA-2
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/23/22 **DATE COMPLETED:** 3/23/22
BORING LOCATION: Near west side of York St and Washington St
COORDINATES: NA
SURFACE El.: 219 ft. (see note 1) **TOTAL DEPTH:** 18.2 ft.
WEATHER: 40's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 205.0 ft. Based on sample moisture
AT END OF DRILLING: 9.2 ft. / El. 209.8 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** HO

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0					Topsoil	0.4 / 218.6	S1 - S1 Top 4": Topsoil S1 Bot 7": Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 35-40% fine to coarse subangular gravel, trace of organic soil, brown, moist
		2	S1	3-6-9-5 (15)	24/11		Fill		S2 - Buried Topsoil, trace of roots, dark brown, moist
	215.0	4	S2	7-4-3-2 (7)	24/2			4.0 / 215.0	
5		6	S3	5-3-3-3 (6)	24/1				S3 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, ~5% fines, 25-30% fine subrounded gravel, brown, moist
		8	S4	4-8-11-7 (19)	24/3	1			S4 - Similar to S3, 5-10% fines, 20-25% fine to coarse subrounded gravel REMARK 1: Drove 3" spoon from 4.0' to 8.0'.
	210.0		S5	9-6-9-7 (15)	24/6				S5 - Similar to S3, 35-40% fine to coarse subrounded gravel
10		10					Sand and Gravel		
	205.0	14							S6 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 25-30% fine to coarse subrounded to angular gravel, gray to brown, wet (rock in tip of spoon)
15		16	S6	5-5-9-30 (14)	24/6			16.0 / 203.0	
						2	Rock	18.2	REMARK 2: Advanced button bit from 16.0' to 18.2' in possible rock. Used 1.5 tanks of water drilling from 16.0' to 18.2'.
	200.0								Bottom of borehole at 18.2 feet. Backfilled borehole with drill cutting and 4 bags of gravel.
20									
	195.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Road, Suite 2
Billerica, MA 01862
Telephone: (978) 330-5912
Fax: (978) 330-5056

BORING LOG

MA-3
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/23/22 **DATE COMPLETED:** 3/24/22
BORING LOCATION: Near Stop and Shop Driveway
COORDINATES: NA
SURFACE El.: 235 ft. (see note 1) **TOTAL DEPTH:** 21 ft.
WEATHER: 50's / Sunny / Rain
GROUNDWATER LEVELS:
DURING DRILLING: 9.0 ft. / El. 226.0 ft. Based on sample moisture
AT END OF DRILLING: 11.3 ft. / El. 223.7 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** LB

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	2-4-8-6 (12)	24/10		Topsoil	2.0	S1 - Topsoil
		2	S2	4-3-3-3 (6)	24/17		Fill	233.0	S2 - Silty SAND (SM), fine to coarse, 15-20% fines, 10-15% fine to coarse subangular to subrounded gravel, trace of coal, trace of ash, trace of organic soil, trace of asphalt, black to brown, moist
		4							
5	230.0		S3	4-2-3-6 (5)	24/6				S3 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 10-15% fines, 30-35% fine to coarse subangular gravel, brown, moist
		6	S4	4-2-1-1 (3)	24/9				S4 - Well Graded SAND with Silt (SW-SM), fine to coarse, 10-15% fines, 10-15% fine to coarse subangular to angular gravel, brown, moist
		8				1			REMARK 1: Casing pushed from 8 to 9 feet, sampled from 9 to 11 feet.
		9						9.0 ▽	
10	225.0		S5	5-2-8-11 (10)	24/11		Buried Organic Soil	226.0	S5 - Top 7": Silty SAND (SM), fine to coarse, ~30% fines, ~10% fine to coarse subangular gravel, trace of organic soil, black, wet Bot 4": Silty SAND (SM), fine to coarse, 25-30% fines, ~10% fine subrounded gravel, trace of organic soil, brown, wet
		11	S6	16-30-47-43 (77)	24/12			11.5 ▽	S6 - Top 6": Silty SAND with Gravel (SM), fine to coarse, ~20% fines, 25-30% fine to coarse subangular gravel, trace of organic soil, gray to brown, wet
		13					Sand and Gravel	223.5	Bot 6": Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 10-15% fines, ~15% fine to coarse subrounded gravel, brown, wet
		14							
15	220.0		S7	45-38-38-29 (76)	24/14				S7 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 30-35% fine to coarse subangular to subrounded gravel, brown, wet
		16							
		19	S8	19-11-11-10 (22)	24/12				S8 - Well Graded GRAVEL with Sand (GW), fine to coarse, subrounded, 0-5% fines, 20-25% fine to coarse sand, brown, wet
20	215.0								
		21						21.0	
									Bottom of borehole at 21.0 feet. Backfilled borehole with drill cutting and 2 bags of gravel.
25	210.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/24/22 **DATE COMPLETED:** 3/24/22
BORING LOCATION: Near O'Reilly Auto Parts Entrance
COORDINATES: NA
SURFACE El.: 235 ft. (see note 1) **TOTAL DEPTH:** 21 ft.
WEATHER: 40's / Rain
GROUNDWATER LEVELS:
DURING DRILLING: 8.0 ft. / El. 227.0 ft. Based on sample moisture
AT END OF DRILLING: 6.0 ft. / El. 229.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** LB

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	1-2-4-5 (6)	24/4	1	Topsoil	2.0	S1 - Topsoil and bark mulch REMARK 1: Plastic washing up in mud tub from 0 to 4 feet. Encountered irrigation utility at depth of 1.5 feet
		2	S2	8-11-20-19 (31)	24/7		Fill	233.0 4.0	S2 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines, 10-15% fine to coarse subangular gravel, light brown, moist
5	230.0	4 5.5	S3	14-17-29-70/0" (46)	18/4			231.0	S3 - Well Graded SAND with Gravel (SW), fine to coarse, 0-5% fines, 30-35% fine to coarse subangular gravel, gray, moist
		6	S4	11-10-14-19 (24)	24/9				S4 - Similar to S3, wet
		8	S5	9-10-12-10 (22)	24/7				S5 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 15-20% fine to coarse subrounded gravel, gray, wet
10	225.0	10	S6	11-8-10-7 (18)	24/8				S6 - Similar to S5
		12					Sand and Gravel		
15	220.0	14	S7	5-5-5-5 (10)	24/3				S7 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 15-20% fine to coarse angular gravel, gray, wet
		16							
20	215.0	19	S8	3-3-3-2 (6)	24/5				S8 - Similar to S7, 10-15 % fine to coarse subrounded gravel
		21						21.0	Bottom of borehole at 21.0 feet. Backfilled borehole with drill cutting and 1 bag of gravel.
25	210.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/25/22 **DATE COMPLETED:** 3/25/22
BORING LOCATION: Near NE corner of Washington St and Central St
COORDINATES: NA
SURFACE El.: 242 ft. (see note 1) **TOTAL DEPTH:** 21 ft.
WEATHER: 40's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 228.0 ft. Based on sample moisture
AT END OF DRILLING: 11.7 ft. / El. 230.3 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** LB

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
							Concrete	0.2 / 241.8	2.5" of Concrete
		0.5	S1	3-3-3	18/2		Fill		S1 - Well Graded GRAVEL with Sand (GW), fine to coarse, subangular, 0-5% fines, 20-25% fine to coarse sand, light brown, moist
	240.0	2	S2	5-7-28-21 (35)	24/10				S2 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 5-10% fines, 15-20% fine to coarse angular gravel, light brown, moist
		4						4.0 / 238.0	
5			S3	8-12-35-28 (47)	24/13				S3 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, trace of coarse, 5-10% fines, ~15% fine to coarse subrounded gravel, light brown, moist
		6	S4	7-16-15-20 (31)	24/14				S4 - Similar to S3
	235.0	8	S5	12-17-30-30 (47)	24/11				S5 - Well Graded SAND with Gravel (SW), fine to coarse, 0-5% fines, 25-30% fine to coarse subangular gravel, light brown, moist
10		10	S6	17-9-15-31 (24)	24/14				S6 - Silty SAND (SM), fine to medium, ~15% fines, ~5% fine subrounded gravel, brown, moist
	230.0	12					Sand and Gravel		▼
		14	S7	28-34-27-32 (61)	24/6				▽ S7 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 20-25% fine to coarse subangular to angular gravel, brown, wet
15		16							
	225.0					1			REMARK 1: Drill rig chattering at depth 17. feet. Drilled through cobble.
		19	S8	14-31-34-32 (65)	24/12				S8 - Similar to S7, 30-35% fine to coarse angular gravel
20		21						21.0	
	220.0								Bottom of borehole at 21.0 feet. Backfilled borehole with drill cutting and 1 bag of gravel. Ground surface was restored with concrete.
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/24/22 **DATE COMPLETED:** 3/24/22
BORING LOCATION: Near NW corner of Washington St and Central St
COORDINATES: NA
SURFACE El.: 240 ft. (see note 1) **TOTAL DEPTH:** 20.2 ft.
WEATHER: 40's / Rain
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 226.0 ft. Based on sample moisture
AT END OF DRILLING: 10.1 ft. / El. 229.9 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** LB

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	3-5-8-12 (13)	24/12		Topsoil / Fill	0.3 / 239.7	S1 - Top 3": Bark mulch Bot 9": Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 15-20% fine to coarse subangular gravel, trace of organic soil, trace of asphalt, brown, moist
		2	S2	32-14-13-12 (27)	24/6		Fill	4.0 / 236.0	S2 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, ~15% fine to coarse subangular gravel, trace of roots, trace of bark mulch, light brown, moist
5	235.0	4	S3	13-13-12-16 (25)	24/10		Sand and Gravel		S3 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 15-20% fine to coarse subangular gravel, light brown, moist
		6	S4	14-10-14-13 (24)	24/5				S4 - Similar to S3, 30-35% fine to coarse subrounded to subangular gravel
		8	S5	12-16-20-17 (36)	24/12				S5 - Similar to S3, 25-30% fine to coarse subangular gravel
10	230.0	10	S6	18-20-19-17 (39)	24/15				S6 - Similar to S3
		12							
		14	S7	9-9-12-17 (21)	24/11				S7 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 15-20% fine to coarse subrounded gravel, light brown, wet
15	225.0	16							
20	220.0	20							
		20.2	S8	100/2"	2/0			20.2	S8 - No recovery. Refusal on possible rock or boulder Bottom of borehole at 20.2 feet. Backfilled borehole with drill cutting. Ground surface was restored with concrete.
25	215.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/25/22 **DATE COMPLETED:** 3/25/22
BORING LOCATION: Near SE corner of Washington St and Central St
COORDINATES: NA
SURFACE El.: 241 ft. (see note 1) **TOTAL DEPTH:** 21 ft.
WEATHER: 40's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 227.0 ft. Based on sample moisture
AT END OF DRILLING: 10.5 ft. / El. 230.5 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** LB

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
							Asphalt	0.5	5" Asphalt
	240.0	0.5	S1	10-5-4	18/9		Fill	240.5	S1 - Silty SAND with Gravel (SM), fine to coarse, ~20% fines, 20-25% fine to coarse subrounded gravel, trace of asphalt, brown to black, moist
		2	S2	2-2-6-24 (8)	24/13				S2 - Silty SAND (SM), fine to medium, ~15% fines, 5-10% fine to coarse subrounded gravel, trace of organic soil, orange to brown, moist
		4						4.0	
5			S3	23-22-34-43 (56)	24/12		Sand and Gravel	237.0	S3 - Well Graded SAND with Gravel (SW), fine to coarse, 0-5% fines, 30-35% fine to coarse subrounded to angular gravel, light brown, moist
	235.0	6	S4	20-59-41/3"	15/9				S4 - Similar to S3, 20-25% fine to coarse subangular gravel
		7.3							
		9	S5	13-32-41-20 (73)	24/13				S5 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 25-30% fine to coarse subangular gravel, brown, moist
10									▼
	230.0	11							
		14	S6	14-9-15-21 (24)	24/8				▽ S6 - Similar to S5, 15-20% fine to coarse subrounded gravel, wet
15									
	225.0	16							
		19	S7	14-16-20-23 (36)	24/9				S7 - Similar to S5, wet
20									
	220.0	21						21.0	
									Bottom of borehole at 21.0 feet. Backfilled borehole with drill cutting. Ground surface was restored with cold patch asphalt.
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/28/22 **DATE COMPLETED:** 3/28/22
BORING LOCATION: Near SW corner of Washington St and Central St
COORDINATES: NA
SURFACE El.: 241 ft. (see note 1) **TOTAL DEPTH:** 21 ft.
WEATHER: 30's / Snow showers
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 227.0 ft. Based on sample moisture
AT END OF DRILLING: 9.0 ft. / El. 232.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** HO

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	240.0	0	S1	2-4-3-2 (7)	24/11		Topsoil	2.0	S1 - Topsoil
		2	S2	10-21-10-4 (31)	24/8	1	Fill	239.0	S2 - Silty SAND (SM), fine to medium, ~15% fines, 10-15% fine to coarse subrounded gravel, trace of organic soil, trace of coal, trace of roots, brown, moist REMARK 1: Encountered hard drilling at depth 3 feet. Possible concrete, offset borehole 3 feet east.
		4	S3	2-2-4-6 (6)	24/2				S3 - Silty SAND (SM), fine to medium, ~15% fines, 0-5% fine to coarse subrounded gravel, trace of organic soil, trace of roots, brown, moist
5	235.0	6	S4	9-9-14-26 (23)	24/9				S4 - Silty SAND with Gravel (SM), fine to coarse, ~20% fines, 20-25% fine to coarse subrounded to subangular gravel, trace of organic soil, brown, moist
		8	S5	13-20-24-19 (44)	24/14		Sand and Gravel	8.0 233.0	S5 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 5-10% fines, 5-10% fine to coarse subrounded gravel, light brown, moist
10	230.0	10	S6	19-16-31-53 (47)	24/24				S6 - Similar to S5
		12							
		14	S7	9-8-8-9 (16)	24/10				S7 - Similar to S5, gray, wet
15	225.0	16							
		19	S8	20-17-11-11 (28)	24/9				S8 - Similar to S5, 20-25% fine to coarse subangular gravel, wet
20	220.0	21						21.0	Bottom of borehole at 21.0 feet. Backfilled borehole with drill cutting and 1 bag of gravel.
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 1 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/22/22 **DATE COMPLETED:** 3/23/22
BORING LOCATION: ~60 ft. North of UP #11
COORDINATES: NA
SURFACE El.: 202 ft. (see note 1) **TOTAL DEPTH:** 31 ft.
WEATHER: 50's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 6.0 ft. / El. 196.0 ft. Based on sample moisture
AT END OF DRILLING: 13.0 ft. / El. 189.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Carl Bierholm
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Mobile B-57 Truck Rig
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: OL / TG **CHECKED BY:** HO

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
							Asphalt	0.6	7" of Asphalt
						1	Concrete	1.2	7" of Concrete
	200.0	2						200.8	REMARK 1: Advanced button bit through concrete below asphalt, first sample taken at 2.0'.
			S1	17-18-10-4 (28)	24/9				S1 - S1 Top 4": Well Graded GRAVEL with Sand (GW), fine to coarse, angular, 0-5% fines, ~30% fine to coarse sand, mostly pink, wet (possible broken cobble)
		4							S1 Bot 5": Silty SAND with Gravel (SM), fine, trace medium, sightly plastic, 20-25% fines, ~20% fine subrounded gravel, brown, moist
5			S2	7-5-3-4 (8)	24/4				S2 - Well Graded GRAVEL with Sand (GW), fine to coarse, angular, 0-5% fines, ~15% coarse sand, gray, wet (possible broken cobble)
		6							
	195.0		S3	7-8-3-5 (11)	24/3				S3 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subrounded to angular, 5-10% fines, ~15% fine to coarse sand, brown, wet
		8				2			REMARK 2: 2" spoon did not collect sample so redrove 3" spoon at depth of 8.0'.
			S4	3-4-3-6 (7)	24/6				S4 - S4 Top 3": Well Graded GRAVEL (GW), fine to coarse, subround to subangular, 0-5% fines, 0-5% coarse sand, brown, wet
10		10				3	Fill		S4 Bot 3": Silty SAND (SM), fine to medium, ~20% fines, 5-10% fine gravel, brown, wet
			S5	10-7-3-5 (10)	24/7				REMARK 3: 2" spoon did not collect sample so redrove 3" spoon at depth of 10.0'.
	190.0	12							S5 - S5 Top 3":Silty SAND with Gravel (SM), fine to medium, ~15% fines, 25-30% subround gravel, brown, wet
			S6	7-6-11-6 (17)	24/7				S5 Bot 4": Poorly Graded GRAVEL with Sand (GP), fine, subangular, 0-5% fines, 30-35% medium to coarse sand, brown, wet
		14							S6 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subrounded to angular, 5-10% fines, 15-20% coarse sand, brown, wet
15			S7	13-12-12-6 (24)	24/5				S7 - Well Graded GRAVEL with Sand (GW), fine to coarse, 0-5% fines, 15-20% coarse sand, gray, moist
		16							
	185.0		S8	9-8-8-7 (16)	24/8				S8 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 20-25% coarse subangular gravel, brown, wet
		18							
		19						19.0	
								183.0	
20			S9	2-2-4-3 (6)	24/24				S9 - PEAT (PT), fibrous, trace leaves, trace roots, trace wood, black, wet
		21					Peat		S10 - S10 Top 12": Similar to S9
	180.0		S10	4-3-3-6 (6)	24/15				S10 Bot 3": PEAT (PT), nonfibrous, trace roots, 20-25% fine sand, black, wet
		23						23.6	
			S11	4-5-5-11 (10)	24/7			178.4	S11 - Silty SAND with Gravel (SM), fine to medium, 15-20% fines, 20-25% fine subrounded gravel, trace organic soil, brown, light gray at bottom of sample, wet
25							Sand and Gravel		

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 2 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		25	S12	15-16-17-19 (33)	24/7		Sand and Gravel	178.4	S12 - Well Graded GRAVEL with Sand (GW), fine to coarse, subrounded to angular, 0-5% fines, 25-30% fine to medium sand, gray, wet
	175.0	27							
		29	S13	12-8-10-11 (18)	24/2				S13 - Poorly Graded GRAVEL (GP), coarse, subangular, 0-5% fines, brown wet Drove 3" spoon, similar to S13, ~10% fine to coarse sand
30		31						31.0	
	170.0								Bottom of borehole at 31.0 feet. Backfilled borehole with drill cutting and 6 bags of gravel. Ground surface was restored with cold patch asphalt.
35									
	165.0								
40									
	160.0								
45									
	155.0								
50									
	150.0								
55									
	145.0								
60									

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BORING LOG

SB-2
PAGE 1 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/21/22 **DATE COMPLETED:** 3/22/22
BORING LOCATION: ~40 ft. South of UP #11
COORDINATES: NA
SURFACE El.: 204 ft. (see note 1) **TOTAL DEPTH:** 26 ft.
WEATHER: 50's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 8.0 ft. / El. 196.0 ft. Based on sample moisture
AT END OF DRILLING: 19.5 ft. / El. 184.5 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Carl Bierholm
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Mobile B-57 Truck Rig
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: AML **CHECKED BY:** HO

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
							Asphalt	0.7	8" of Asphalt
						1			REMARK 1: Advanced button bit through concrete below asphalt, first sample taken at 2.0'.
		2	S1	12-8-5-6 (13)	24/10				S1 - Silty SAND with Gravel (SM), fine to coarse, ~20% fines, 25-30% fine to coarse subangular gravel, brown, moist
	200.0	4	S2	6-5-4-4 (9)	24/2				S2 - Well Graded GRAVEL (GW), fine to coarse, subangular, 0-5% fines, 0-5% coarse sand, brown, moist
5		6	S3	4-4-5-4 (9)	24/7		Fill		S3 - Poorly Graded SAND with Silt (SP-SM), fine to medium, ~5% fines, light brown, moist
		8							▽
	195.0	9	S4	9-7-9-7 (16)	24/7				S4 - Silty GRAVEL with Sand (GM), fine, subangular to subrounded, ~15% fines, 35-40% fine to coarse sand, brown, wet
10		11							
	190.0	14	S5	5-4-4-6 (8)	24/1	1	Buried Topsoil	14.0	S5 - Silty SAND with Gravel (SM), fine to medium, trace coarse, 15-20% fines, ~30% fine to coarse subangular gravel, trace organic soil, brown, moist (possible buried subsoil)
15		16						16.0	REMARK 1: Description of sample S5 based on soil at tip of spoon
							Sand and Gravel		
	185.0	19	S6	11-9-9-10 (18)	24/10			19.2	S6 - S6 Top 2": Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, ~45% coarse subrounded gravel, pink, wet (possible weathered rock)
20		21				2	Weathered Rock		S6 Bot 8": Well Graded SAND with Silt and Gravel (SW-SM), fine to medium, trace coarse, 10-15% fines, ~15% fine gravel, trace of , dark brown, wet
									REMARK 2: Drill rig chattering at 20.0'.
	180.0	24							S7 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, angular to subangular, ~10% fines, 35-40% fine to coarse sand, pink to brown,
25				32-28-43-35					

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

SB-2
PAGE 2 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		24	S7	(71)	24/10		Weathered Rock		moist (possible weathered granite)
		26						26.0	Bottom of borehole at 26.0 feet. Backfilled borehole with drill cutting and 6 bags of gravel. Ground surface was restored with cold patch asphalt.
	175.0								
30									
	170.0								
35									
	165.0								
40									
	160.0								
45									
	155.0								
50									
	150.0								
55									
	145.0								
60									

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BORING LOG

SB-3
PAGE 1 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/21/22 **DATE COMPLETED:** 3/21/22
BORING LOCATION: North of York Street (NB Lane, Slope Boring)
COORDINATES: NA
SURFACE El.: 211 ft. (see note 1) **TOTAL DEPTH:** 28.6 ft.
WEATHER: 50's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 19.0 ft. / El. 192.0 ft. Based on sample moisture
AT END OF DRILLING: 23.0 ft. / El. 188.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Mobile B-57 Truck Rig
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG **CHECKED BY:** HO

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Material Description
	210.0	0.5 / 0.7	S1	100/2"	2/0	1	Asphalt / Boulder	8" of Asphalt S1 - No Recovery REMARK 1: Broke split spoon sampling S1. Drill chattering, advanced roller bit 12" in boulder.
		2	S2	13-10-7-7 (17)	24/10		Sand and Gravel	S2 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 25-30% fine to coarse subangular gravel, brown, moist
5		4	S3	7-2-2-5 (4)	24/0			S3 - No Recovery, Rock in tip of split spoon
	205.0	6	S4	4-3-3-6 (6)	24/8			S4 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, ~10% fines, 25-30% fine to coarse subrounded gravel, brown, moist
		8						
		9	S5	12-16-12-13 (28)	24/6			S5 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subrounded to subangular, 5-10% fines, 15-20% fine to coarse sand, brown, moist
10	200.0	11						
		14	S6	11-16-12-6 (28)	24/2			S6 - Well Graded GRAVEL with Sand (GW), fine to coarse, subrounded to angular, 0-5% fines, 15-20% coarse sand, brown, moist
15	195.0	16						
		19	S7	10-7-16-84/3" (23)	21/8			S7 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 30-35% fine to coarse subrounded to angular gravel, brown, wet
20	190.0	20.8				2		REMARK 2: Casing refusal at depth of 21.0'. Advanced roller bit through 8.0" cobble, no water returning
		24						
25				13-9-7-29				S8 - Poorly Graded SAND with Gravel (SP), fine to medium, trace of coarse, 0-5% fines, 15-20% fine to coarse subangular gravel, brown, wet

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

SB-3
PAGE 2 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	185.0	24 26	S8	(16)	24/7		Sand and Gravel	26.0 185.0	
						3	Boulder		REMARK 3: Cobbles and boulders from 26.0' to 28.6'.
		28.5 28.6	S9	100/1"	1/0			28.6	S9 - No Recovery Bottom of borehole at 28.6 feet. Backfilled borehole with drill cutting and 6 bags of gravel. Ground surface was restored with cold patch asphalt.
30	180.0								
35	175.0								
40	170.0								
45	165.0								
50	160.0								
55	155.0								
60									

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BORING LOG

SB-4
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/3/22 **DATE COMPLETED:** 3/3/22
BORING LOCATION: North of York street at bottom of slope
COORDINATES: NA
SURFACE El.: 215 ft. (see note 1) **TOTAL DEPTH:** 12.5 ft.
WEATHER: 40's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 8.5 ft. / El. 206.5 ft. Based on sample moisture
AT END OF DRILLING: 9.5 ft. / El. 205.5 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: TG / LB **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	5-7-7-5 (14)	24/10		Topsoil	0.3	S1 - Top 3": Topsoil Bot 7": Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 20-25% fine to coarse subangular gravel, trace of asphalt, gray to black, moist
		2	S2	5-5-7-10 (12)	24/4	1	Fill		S2 - Silty SAND with Gravel (SM), fine to coarse, ~15% fines, 15-20% fine to coarse subrounded gravel, trace of asphalt, brown, moist
		4	S3	10-14-8-7 (22)	24/7			4.0	REMARK 1: Spun 4" casing at depth of 4.0'.
5	210.0	6	S4	3-3-5-16 (8)	24/3		Sand and Gravel		S3 - Similar to S2, no asphalt S4 - Poorly Graded GRAVEL with Silt (GP-GM), coarse, subangular, 5-10% fines, 10-15% fine to coarse sand, brown, moist
		8				2			REMARK 2: Advanced button bit through 8.0" cobble at depth of 7.8'.
		8.5	S5	25-75/2"	8/6				S5 - Poorly Graded SAND (SP), fine to medium, 0-5% fines, 10-15% coarse subrounded gravel, gray, wet
10	205.0	9.2				3		9.2	REMARK 3: Advance button bit from 9.2' to 12.5' into possible rock. Used 3 tanks of water drilling from 4.0' to 12.5'.
							Rock		
15	200.0							12.5	Bottom of borehole at 12.5 feet. Backfilled borehole with drill cutting and 4 bags of gravel.
20	195.0								
25	190.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

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PAGE 1 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 9/22/22 **DATE COMPLETED:** 9/23/22
BORING LOCATION: Near northern side of prop. retaining wall
COORDINATES: NA
SURFACE El.: 241 ft. (see note 1) **TOTAL DEPTH:** 36 ft.
WEATHER: 50's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 6.0 ft. / El. 235.0 ft. Based on sample moisture
AT END OF DRILLING: 12.4 ft. / El. 228.6 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Vacuum then drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HO **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
0	240.0	0.5	G1			1	Fill		REMARK 1: Performed vacuum explorations for the top 6 feet to clear borehole for utilities.
		1.2	G2					1.2 239.8	G1 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 20-25% fine to coarse subrounded gravel, gray, moist
			G3						G2 - Well Graded GRAVEL (GW), fine to coarse, subrounded, 0-5% fines, 5-10% fine to medium sand, brown, moist
5									G3 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, ~25% fine to coarse subrounded gravel, 10-15% cobbles up to 8" in size, brown, moist
	235.0	6	S1	6-7-8-6 (15)	24/4				S1 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, ~25% fine to coarse subrounded gravel, brown, wet
		8	S2	6-7-6-8 (13)	24/5	1			S2 - Similar to S1
10		10	S3	36-55-55/2"	14/6				REMARK 1: Drill rig chattering between depths of 9 feet and 10 feet on possible cobbles or boulder.
	230.0	11.2				2	Sand and Gravel		S3 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 40-45% fine to coarse subrounded to subangular gravel, brown, wet
		14	S4	12-11-14-14 (25)	24/8				REMARK 2: Drill rig chattering between depths of 11.5 feet and 13 feet on possible cobbles or boulder.
15									S4 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, trace coarse, ~10% fines, 30-35% fine to coarse subrounded to subangular gravel, brown, wet
	225.0	16							
		19	S5	11-15-17-18 (32)	24/10				S5 - Poorly Graded SAND with Silt (SP-SM), fine, 5-10% fines, trace of fine subangular gravel, brown, wet
20									
	220.0	21							
		24							S6 - No reovery, drove 3" spoon and obtained sample: Well Graded SAND with Silt (SW-SM), fine to coarse, 5-10% fines, 10-15% fine
25				29-17-16-17					

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

WB-1
PAGE 2 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	215.0	24	S6	(33)	24/0			239.8	subangular gravel, brown, wet
		26							
		29							
30			S7	19-18-20-22 (38)	24/7		Sand and Gravel		S7 - Similar to S6
	210.0	31							
		34							
35			S8	18-12-12-12 (24)	24/9				S8 - Poorly Graded SAND with Gravel (SP), coarse, 0-5% fines, 20-25% fine subangular gravel, brown, wet
	205.0	36						36.0	
									Bottom of borehole at 36.0 feet. Backfilled borehole with drill cutting and 2 bags of gravel.
40									
	200.0								
45									
	195.0								
50									
	190.0								
55									
	185.0								
60									

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BORING LOG

WB-2
PAGE 1 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 9/22/22 **DATE COMPLETED:** 9/22/22
BORING LOCATION: Near southern side of prop. retaining wall
COORDINATES: NA
SURFACE El.: 245 ft. (see note 1) **TOTAL DEPTH:** 36 ft.
WEATHER: 60's / Rain
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 231.0 ft. Based on sample moisture
AT END OF DRILLING: 19.0 ft. / El. 226.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Vacuum then drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HO **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1			1	Topsoil		REMARK 1: Performed vacuum explorations for the top 6 feet to clear borehole for utilities.
		1.2	G2					1.2	G1 - Topsoil
									G2 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subrounded, 10-15% fines, 20-25% fine to medium sand, 10-15% cobbles up to 6" in size, trace of roots, dark brown, moist
		3	G3				Fill		G3 - Similar to G2, 25-30% fine to coarse sand
5	240.0								
		6	S1	3-2-3-3 (5)	24/5			6.0	S1 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 25-30% fine subrounded gravel, brown, moist
		8	S2	6-4-5-4 (9)	24/0				S2 - No recovery, drove 3" spoon and obtained sample: Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subrounded, 10-15% fines, 20-25% fine to coarse sand, brown, moist
10	235.0	10	S3	3-3-3-7 (6)	24/0				S3 - No recovery, drove 3" spoon and obtained sample: Similar to S2
		12	S4	11-12-13-13 (25)	24/7				S4 - Well Graded GRAVEL with Sand (GW), fine to coarse, subrounded, 0-5% fines, ~15% medium to coarse sand, brown, moist
		14	S5	4-8-10-13 (18)	24/9		Sand and Gravel		S5 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 25-30% fine subrounded gravel, brown, wet
15	230.0	16	S6	25-50-50/3"	15/8				S6 - Similar to S5
		17.3							
		19	S7	22-29-25-19 (54)	24/0				S7 - No recovery, drove 3" spoon and obtained sample: Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, trace coarse, 5-10% fines, 25-30% fine to coarse subrounded gravel, brown, wet
20	225.0	21							
		24							
25	220.0		S8	14-12-13-18					S8 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 5-10% fines, light brown, wet

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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BORING LOG

WB-2
PAGE 2 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		24	S8	(25)	24/7				
		26							
		29							
30	215.0		S9	8-10-12-12 (22)	24/12		Sand and Gravel		S9 - Poorly Graded SAND with Silt (SP-SM), fine to medium, trace coarse, 5-10% fines, 5-10% fine subrounded gravel, light brown, wet
		31							
		34							
35	210.0		S10	17-31-51-67 (82)	24/24				S10 - Similar to S9, no gravel
		36						36.0	
40	205.0								Bottom of borehole at 36.0 feet. Backfilled borehole with drill cutting and 2 bags of gravel.
45	200.0								
50	195.0								
55	190.0								
60	185.0								

APPENDIX B – Probe Logs

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PROBE LOG

HP-1
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 195 ft. (see note 1) **TOTAL DEPTH:** 2.7 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1			Forest Mat	0.5	G1 - Forest Mat
		0.5	G2			Swamp Deposits	194.5	G2 - Silty SAND (SM), fine, ~35% fines, trace of roots, trace of organic soil, brown, moist (Swamp Deposit)
		1.5	G3					G3 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines, 0-5% fine subrounded gravel, trace of roots, trace of organic soil, brown, moist
					1		2.7	REMARK 1: Refusal at depth 2.7' on possible cobbles or boulder.
								Bottom of borehole at 2.7 feet.
5	190.0							
10	185.0							
15	180.0							
20	175.0							
25	170.0							

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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100 Chelmsford Road, Suite 2
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PROBE LOG

HP-2
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 188 ft. (see note 1) **TOTAL DEPTH:** 3.5 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 0.0 ft. / El. 188.0 ft.
AT END OF DRILLING: -
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1			Forest Mat	1.5	G1 - Forest Mat
		1.5	G2			Swamp Deposits	186.5	G2 - Poorly Graded GRAVEL (GP), coarse, subrounded, 0-5% fines, 0-5% fine sand, gray, wet
		2	G3					G3 - Well Graded GRAVEL with Silt and Sand GW-GM), 10-15% fines, 20-25% fine to coarse sand, brown to gray, wet
	185.0	3	G4		1			G4 - Poorly Graded SAND with Gravel (SP), medium to coarse, 5-10% fines, 30-35% coarse subrounded gravel, gray, wet
5					2		3.5	REMARK 1: Refusal at depth 3.5' on possible cobbles or boulder.
								REMARK 2: Performed two additional hand probes: HP-2A and HP-2B. Both encountered refusal at depths 2.0' and 2.5', respectively.
	180.0							Bottom of borehole at 3.5 feet.
10								
	175.0							
15								
	170.0							
20								
	165.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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PROBE LOG

HP-3
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 187 ft. (see note 1) **TOTAL DEPTH:** 3 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 1.5 ft. / El. 185.5 ft.
AT END OF DRILLING: -
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1			Forest Mat	1.0	G1 - Forest Mat
		1	G2			Swamp Deposits	2.0	G2 - Silty SAND (SM), fine to medium, ~30% fines, 0-5% fine rounded gravel, trace of organic soil, trace of roots, black, wet
	185.0	2	G3		1 2	Buried Organic Soil	3.0	G3 - Silty SAND with Gravel (SM), mostly fine, 30-35% fines, ~15% coarse subrounded gravel, trace of organic soil, organic odor, brown to black, wet REMARK 1: Refusal at depth 3.0' on possible cobbles or boulder. REMARK 2: Performed two additional hand probes: HP-3A and HP-3B. Both encountered refusal at depths 1.0' and 2.5', respectively. Bottom of borehole at 3.0 feet.
5	180.0							
10	175.0							
15	170.0							
20	165.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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PROBE LOG

HP-4
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 189 ft. (see note 1) **TOTAL DEPTH:** 2.5 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 0.5 ft. / El. 188.5 ft.
AT END OF DRILLING: -
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
0		0	G1		1	Forest Mat	0.5 ▽ 188.5	G1 - Forest Mat
		0.5	G2		2	Swamp Deposits		G2 - Silty SAND with GRAVEL (SM), fine to medium, 25-30% fines, 25-30% fine to coarse rounded to subrounded gravel, brown to black, wet
		1.5	G3		3		2.5	G3 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, rounded to subrounded, 5-10% fines, 30-35% medium to coarse sand, light brown, wet
								REMARK 1: Refusal at depth 2.5' on possible cobbles or boulder.
								REMARK 2: Cobbles and boulders are observable at ground surface elevation.
								REMARK 3: Performed an additional hand probe: HP-4A. Encountered refusal at depth 1.0' on possible cobbles or boulder.
	185.0							Bottom of borehole at 2.5 feet.
5								
	180.0							
10								
	175.0							
15								
	170.0							
20								
	165.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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PROBE LOG

HP-5
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 206 ft. (see note 1) **TOTAL DEPTH:** 3 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	205.0	0	G1			Forest Mat	1.0	G1 - Forest Mat
		1	G2				205.0	G2 - Silty SAND (SM), fine to medium, ~15% fines, 10-15% fine to coarse subrounded gravel, trace of roots, brown, moist
		2	G3		1	Swamp Deposits		G3 - Silty SAND Gravel (SM), fine to coarse, 15-20% fines, ~30% fine to coarse subrounded gravel, ~10% cobbles about 4" in diameter, trace of roots, brown, moist
5	200.0				2		3.0	REMARK 1: Refusal at depth 3.0' on possible cobbles or boulder. REMARK 2: Performed an additional hand probe: HP-5A. Encountered refusal at depth 1.0' on possible cobbles or boulder. Bottom of borehole at 3.0 feet.
10	195.0							
15	190.0							
20	185.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

APPENDIX C – Test Pit Logs and Foundation Sketches

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TEST PIT LOG

TP-1
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/25/22 **DATE COMPLETED:** 3/25/22
TEST PIT LOCATION: Near retaining wall on SB side of Washington St
COORDINATES: NA
SURFACE EL.: 232 ft. (see note 1) **TOTAL DEPTH:** 6 ft.
GROUNDWATER LEVELS:
▽ **DURING EXCAVATION:** Not encountered
▼ **AT END OF EXCAVATION:** Not encountered

EXCAVATION SUBCONTRACTOR: Northern Drill Service, Inc.
EXCAVATION FOREMAN: Justin Steven
EXCAVATOR TYPE/MODEL: Kubota KX 080-4
WEATHER: 40's / Cloudy
TEST PIT DIMENSIONS: 9.0' x 5.0'
LOGGED BY: OL **CHECKED BY:** HO

Depth (ft)	El. (ft)	Excavation Effort	Remark	Strata	Depth El.(ft.)	Material Description
0	230.0	E		Fill	4.3 / 227.7	0 ft. - 4.3 ft.: Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 15-20% coarse subangular gravel, trace of roots, trace of organic soil, brown, moist
2.5						
	227.5	M	1 2	Sand and Gravel	6.0	4.3 ft. - 6 ft.: Well Graded SAND with Gravel (SW), fine to coarse, ~5% fines, 30-35% fine to coarse subrounded gravel, up to 15% cobbles up to 8", trace of roots, light brown, moist REMARK 1: Excavator scraping on potential boulder. LGCI representative confirmed the presence of a boulder in the test pit. REMARK 2: Test pit terminated due to side wall collapse.
5.0						Bottom of test pit at 6.0 feet. Test pit backfilled with excavated material and tamped in 18-inch lifts with excavator bucket.

GENERAL COMMENTS: **E = Easy, M - Moderate, D = Difficult, V = Very Difficult**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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TEST PIT LOG

TP-2
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/25/22 **DATE COMPLETED:** 3/25/22
TEST PIT LOCATION: Near retaining wall on SB side of Washington St
COORDINATES: NA
SURFACE EL.: 237 ft. (see note 1) **TOTAL DEPTH:** 5.5 ft.
GROUNDWATER LEVELS:
DURING EXCAVATION: Not encountered
AT END OF EXCAVATION: Not encountered

EXCAVATION SUBCONTRACTOR: Northern Drill Service, Inc.
EXCAVATION FOREMAN: Justin Steven
EXCAVATOR TYPE/MODEL: Kubota KX 080-4
WEATHER: 40's / Cloudy
TEST PIT DIMENSIONS: 10.0' x 4.0'
LOGGED BY: OL **CHECKED BY:** HO

Depth (ft)	El. (ft)	Excavation Effort	Remark	Strata	Depth El.(ft.)	Material Description
		E		Topsoil	1.0	0 ft. - 1 ft.: Topsoil
	235.0	E		Fill	236.0 2.5	1 ft. - 2.5 ft.: Well Graded SAND (SW), fine to coarse, ~5% fines, 5-10% coarse subrounded gravel, brown, moist
2.5					234.5	
	232.5	E		Sand and Gravel		2.5 ft. - 5.5 ft.: Poorly Graded SAND with Gravel (SP), medium to coarse, ~5% fines, 25-30% fine to coarse subrounded gravel, trace of cobbles up to 8", brown, moist
5.0					5.5	
						Bottom of test pit at 5.5 feet. Test pit backfilled with excavated material and tamped in 18-inch lifts with excavator bucket.

GENERAL COMMENTS: **E = Easy, M - Moderate, D = Difficult, V = Very Difficult**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

LGCI
Lahlaf Geotechnical Consulting, Inc.
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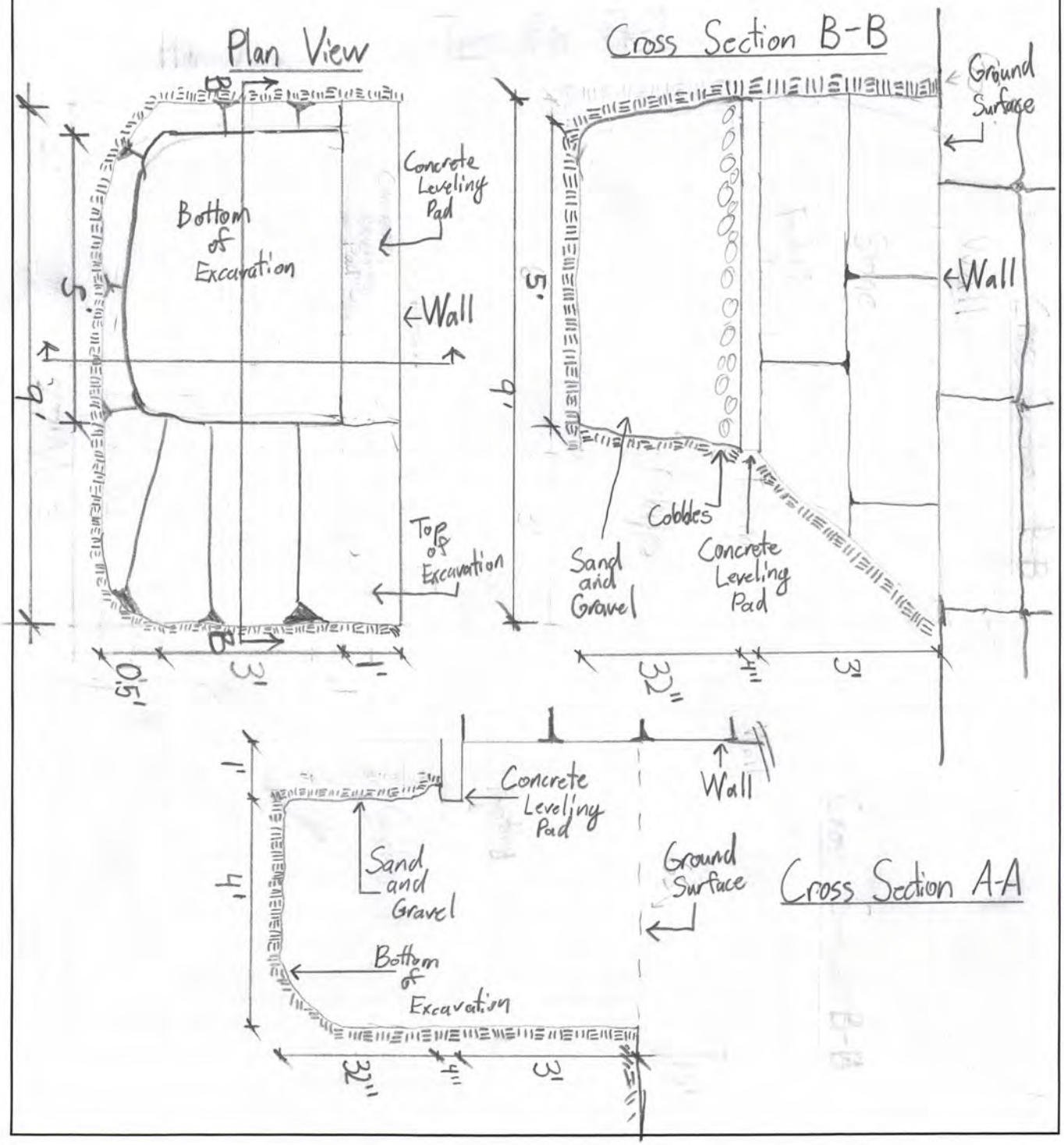
Phone: (978) 330-5912
Fax: (978) 330-5056
E-mail: LGCI@lgcinc.net

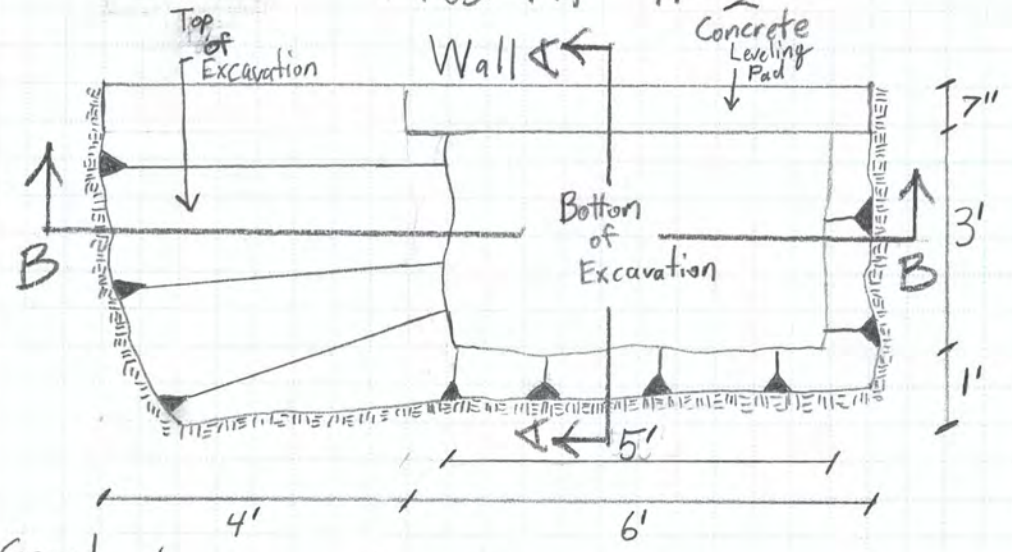
Project Name: Prop. Mast Arms, Reinforced Slope, Retaining Wall Stoughton, MA
LGCI Project No.: 2139
Prepared by: OIL
Date: 3/31/22
Checked by: OML
Date: 4/13/22
Purpose: Test Pit TP-1



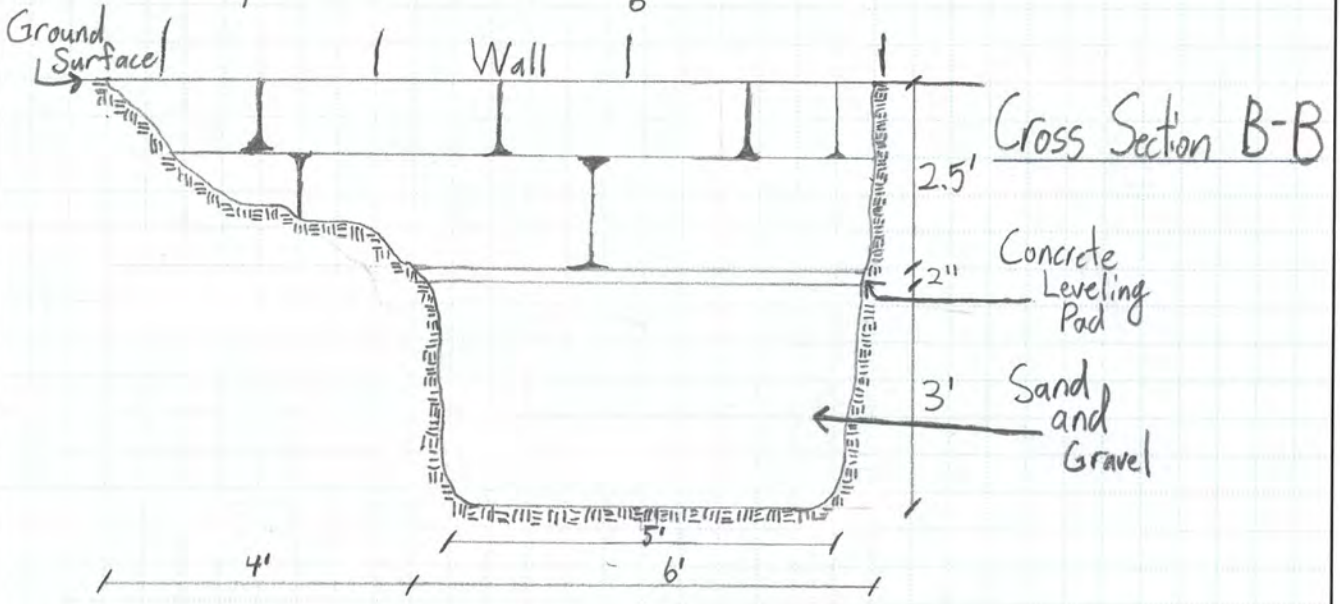
LGCI Proposal No.: 2139
Prepared by: OIL
Date: 4/1/22

Project Name: Prop. Mast Arms, Reinforced Slope, Retaining Wall
Project Location: Stoughton, MA

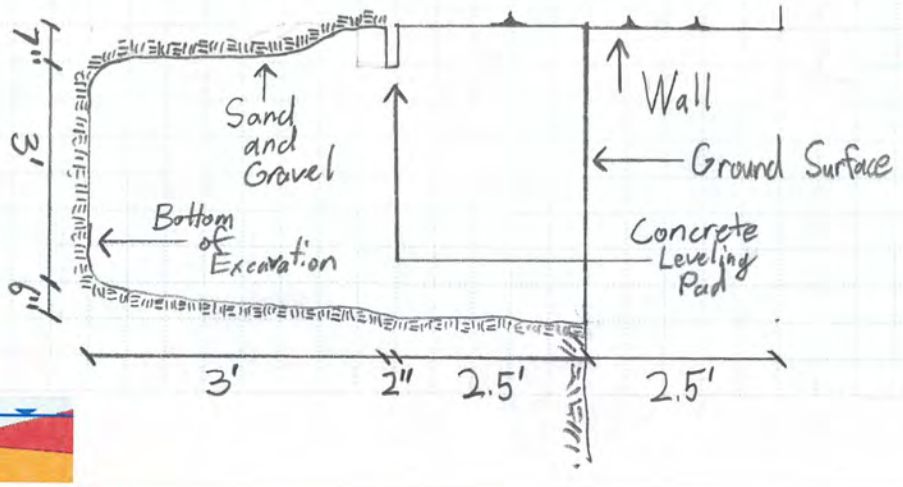
Test Pit TP-2



Plan View



Cross Section B-B

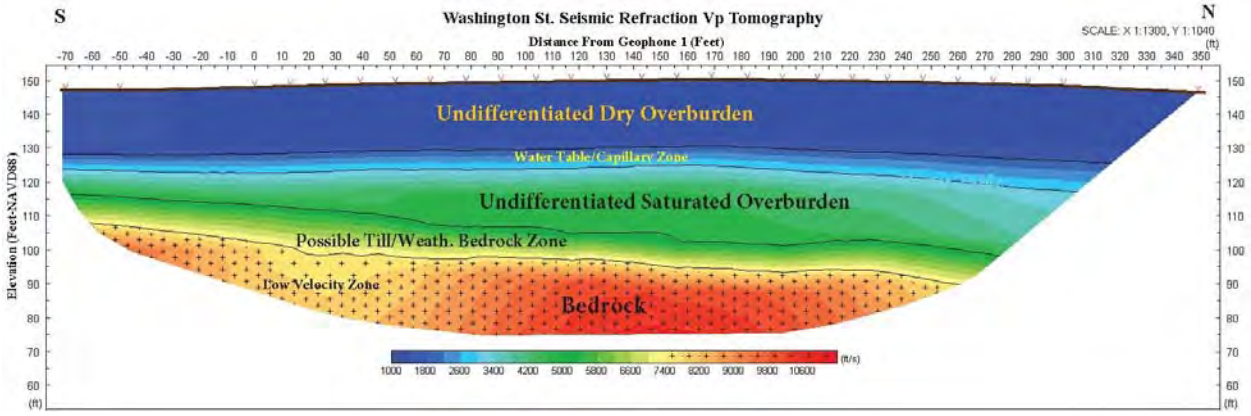


Cross Section A-A

APPENDIX D – Results of Geophysical Survey

HAGER GEOSCIENCE
A COLLIER GEOPHYSICS COMPANY

GEOPHYSICAL INVESTIGATION
BEDROCK ELEVATION SURVEY
198 WASHINGTON STREET
STOUGHTON, MA



January 23, 2023
File 2022049

Prepared for:
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100 Chelmsford Road, Suite 2
Billerica, MA 01862

HAGER GEOSCIENCE
A Collier Geophysics Company
596 MAIN STREET | WOBURN, MA 01801 | TEL: 781.935.8111 | FAX: 781.935.2717 | WWW.HAGERGEOSCIENCE.COM

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Hager GeoScience

1.0 INTRODUCTION

This report details the results of a geophysical survey conducted by Hager GeoScience (HGI) for Lahlaf Geotechnical Consulting, Inc. (LGCI) at 198 Washington Street in Stoughton, Massachusetts. The objective of the survey was to investigate the depth of bedrock surface along the proposed retaining wall alignment for a distance of 300 feet (Plate 1). The field data acquisition was performed on January 11, 2023, under traffic control provided by the Stoughton Police Department.

Two boreholes, drilled along the proposed alignment by LGCI were terminated in sand and gravel at a depth of 36 feet. In the absence of existing bedrock data, a multi-method geophysical approach was used to obtain independent sources of bedrock information for constraining bedrock depth. These methods included Low-frequency Ground Penetrating Radar (LFGPR), seismic refraction, and horizontal-to-vertical spectral ratio (HVSR).

2.0 DATA ACQUISITION

The survey location for each geophysical method is shown on Plate 1, an AutoCAD Map3D 2021 plot created from the HGI field notes, GPS data, and an aerial photograph provided by Microsoft©. The LFGPR and seismic refraction surveys were conducted on the east side of Washington St. along the edge of road shoulder. HVSR locations were situated on soil adjacent to the road.

2.1 LFGPR Survey

HGI used a Geophysical Survey Systems Inc. (GSSI) SIR-2000 digital acquisition system with a 100-MHz very high-powered antenna system. The 100-MHz bi-static configuration includes a transmitting and receiving antenna connected by a fiber-optic link cable and separation of a one meter. Albeit of larger size and weight, the increased antenna power and bi-static antenna offset allows for robust penetration in attenuating material, as well as greater depth of penetration.

LFGPR data were collected as two-way travel time and reflection amplitude. Measurements were made of the time input radar waves travel to and reflect back from a subsurface change in electrical properties, as well as the relative energy of the reflected signal. The acquired data were displayed in real time on the system's color monitor for initial quality control, while being simultaneously recorded on its flash memory. A survey wheel provided horizontal distance control.

Table 1 below shows the pertinent parameters used for the LFGPR data collection.

Table 1
LFGPR Data Acquisition Parameters

Antenna Frequency (MHz)	Range (ns)	Survey Mode[1]	Scan Rate (scans/s)	Scans Per 1-foot Interval (ft)	Samples/ Trace	Approx. Signal Penetration Depth (ft)
100 (bistatic)	700	SW	8	5	1024	80

(1) SW – Survey Wheel

The LFGPR data were subsequently downloaded to a PC at the HGI office for processing and analysis using GSSI's RADAN® 7 software.

2.2 Seismic Refraction Survey

HGI personnel collected refraction data using a linear array of 24 14-Hz vertical geophones spaced 13 feet apart. Off-end and end shots were made on either end of the seismic line. In-line shots were made every 26 feet (2 geophone intervals). A 90-pound propelled energy generator provided the seismic energy source. Up to 25 vertical stacks were made at each shot point to mitigate traffic induced vibrations and improve the signal-to-noise ratio. The quality of the seismic signals were verified in the field at each shot location.

The geophone array was attached to HGI's Geometrics Geode® 24-channel exploration seismograph system via seismic cables that relay the motion-induced electrical signals from individual sensors to the seismograph. The electrical signals are recorded as SEG-2 Rev 1, 32-bit integer data. Our acquisition software provides a number of Windows-based modules that permits on-site display and evaluation of data quality.

Table 2 below shows the pertinent parameters used for the refraction data collection.

Table 2
Seismic Refraction Survey Acquisition Parameters

Line	Number of Geophones	Geophone Spacing (ft)	Maximum Shot Offset (ft)	In-Line Shot Locations (ft)	Sample Rate (ms)	Recording Time (sec)
1	24	13	100	Every 26 feet (2 geophone intervals)	0.125	0.5

2.3 HVSR Survey

HGI collected HVSR data at four locations (shown on Plate 1) using 4.5-Hz tri-axial geophones attached to HGI's Geometrics Geode® 24-channel exploration seismograph. Field collection for the HVSR method consists of recording passive seismic energy from two horizontal and one vertical direction. HVSR analysis is based on recording all forms of omni-directional passive energy generated by natural and anthropogenic sources, including micro-seismic events, ocean tides, and distant sources of human and natural activity. The 4.5-Hz tri-axial geophones were leveled on soil/grass and the system set to record a series of four-minute records for a period of at least 20 minutes.

2.4 GPS

HGI used its Sokkia RTK GRX3 Rover GPS system to locate the geophysical survey locations, as well as select surface features for reference. The Sokkia system provided a relative accuracy of less than 0.164 feet horizontally and 0.328 feet vertically for points in the Massachusetts State plane coordinate system (MA83F).

3.0 DATA REDUCTION AND ANALYSIS

Following the field data collection, the geophysical data were downloaded to a PC at the HGI office, where they were archived, processed, and analyzed using the following proprietary software:

- LFGPR analysis: GSSI's RADAN® 7
- Seismic Refraction analysis: Geogiga Seismic Pro Refractor® 9.3, DW Tomo ® 9.3
- HVSR analysis: Geopsy® 3.3
- Database Analysis: Microsoft Excel®, Golden Software Surfer® 23
- Graphic presentations: PowerPoint® 2013, AutoCAD® Map3D 2022, Adobe Acrobat®

3.1 GPR Survey

LFGPR data were processed and analyzed on HGI computers using GSSI's RADAN® 7 software. Prior to analysis, the raw LFGPR data required processing to reduce the detrimental effects of site-specific noise associated with interfering background frequency signals, destructive reflections from surface and buried objects, and general signal attenuation. Band-pass filters, horizontal smoothing, background removal, deconvolution, differentiation, distance normalization, velocity migration, and gain adjustments were performed as essential processing steps for analyzing LFGPR data. Several iterations of LFGPR data processing and analysis were necessary to mitigate the detrimental effects from aforementioned sources of interference.

The processed profiles were analyzed for the location, depth, and orientation of reflective features relating to changes in soil and bedrock stratigraphy. Reflective boundaries interpreted as reflections from the bedrock surface were "picked" to produce a database of depth points. In the absence of borehole derived bedrock depths, time to depth conversions of GPR data at the Site were calculated using experience with similar soil stratigraphy, migration velocity analysis, and constraints provided by results of other geophysical surveys.

LFGPR bedrock depth points were compiled to produce the bedrock elevation profile shown on Figure G-1.

3.2 Seismic Refraction Survey

The seismic refraction data were analyzed using Geogiga Technology Corporation's (GTC) Geogiga Refractor® 9.3 and DW Tomo® 9.3 seismic refraction software.

Refraction data reduction and analysis initiated with the determination of arrival times of the direct (where applicable) and refracted waves for each shot-receiver pair. These arrivals were identified and "picked" on a trace-by-trace basis by examining individual seismograms for the break in phase leading the first coherent seismic wavelet arrival. Coherent arrivals were enhanced through the use of frequency filters that remove both coherent (e.g., electrical) and non-coherent (e.g., traffic) noise from individual records.

Direct and refracted wave travel times expressed as a function of source and receiver locations were used to generate the earth model most consistent with all observations. Picked arrival times were subdivided into individual refractor layers on the basis of refractor geometry. This is accomplished by examining the slope of the line connecting refractor P-wave arrival times plotted

as a function of distance. Since the slope of the line depends on a layer's seismic velocity, slope changes may be used to discriminate between layers of differing velocity.

Using layer information, Geogiga Refractor® 9.3 was used to calculate layer velocities and depths using general reciprocal velocity modelling methods (GRM). This method provides a robust model for determining the depth to acoustic boundaries, such as competent rock.

Geogiga DWTomo® 9.3 was used to create a tomographic velocity model using the first arrival times of refraction signals. The tomography velocity model was developed using a regularized inversion modeling approach incorporating bending ray path analysis to develop a best-fit tomography model. Unlike GRM modelling approaches, refraction tomography method does not require layer assignments or reciprocal ray tracing, thereby providing an independent analysis of first arrivals and more detailed imaging of transitional p-wave velocity fields.

GRM and tomography velocity models are presented as Figures S-1A and S-1B, respectively.

3.3 HVSR Survey

HVSR data were analyzed using Geopsy® 3.3. The software calculates the ratio of the Fourier amplitude spectra for the horizontal and vertical components of ambient seismic noise for each individual geophone, which resolves a spectral peak at the site-specific fundamental resonance frequency. The spectral peak frequency can then be used to calculate an approximate depth to an impedance boundary using either a published regression formula (i.e., Ibs-von Seht & Wohlenberg, 1999; Parolai *et al.*, 2004) or a site-specific average soil Vs measurement (Nakamura, 1989; Konno & Ohmachi, 1998)[1,2,3,4].

Data were obtained at the 4 different locations (Station 1 to 4) shown on Plate 1. The recorded data were processed using Geogiga® Front End 9.3 in order to create appended data for each geophone component at each of the four stations. HVSR analysis of the appended data was performed using Geopsy® 3.3 and presented on Table S-1. Resultant frequency spectra for each HVSR location are shown on Figures S-2 to S-5

4.0 RESULTS

The bedrock models produced from LFGPR (Figure G-1), seismic refraction (Figures S1A and S1B), and HVSR (Tables S-1) surveys are in good agreement. The models illustrate a bedrock surface dipping from south to north, ranging in elevation from approximately 110 feet to 90 feet above mean se level.

[1] Ibs-von Seht, M. and J. Wohlenberg, 1999. Microtremor measurements used to map thickness of soft sediments, Bulletin of the Seismological Society of America, 89:1, 250-259.
[2] Parolai, S., S.M. Richwalski, C. Milkereit, and P. Bormann, 2004. Assessment of the stability of H/V spectral ratios from ambient noise and comparison with earthquake data in the Cologne area (Germany), Tectonophysics, 390:1-4, 57-73.
[3] Nakamura, Y., 1989. A method for dynamic characteristics estimation of subsurface using microtremor on the ground surface, Quarterly Report of the RTRI, 30:1, 25-33.
[4] Konno, K. and T. Ohmachi, 1998. Ground-motion characteristics estimated from spectral ratio between horizontal and vertical components of microtremor, Bulletin of the Seismological Society of America, 88:1, 228-241.

Seismic refraction models (Figures S1A and S1B) also illustrate characteristics of the unconsolidated ground water aquifer. Tomographic modeling of seismic refraction data (Figure S1B) illustrates the transitional Vp field in overburden resulting from denser soils (till?) overlying bedrock, as well as a low-velocity bedrock fracture zone.

5.0 DISCUSSION

Each of the geophysical methods measure contrasts in different physical and electromagnetic properties of soil and rock. Therefore, observed variations in elevation of these boundaries are to be expected. For example, the LFGPR data would likely show reflections from weathered bedrock, dense till, and less weathered bedrock, whereas, the seismic refraction method would most likely resolve competent bedrock acoustic boundaries. The LFGPR bedrock elevation model articulates irregularities along the bedrock surface, whereas the seismic refraction images are smoothed elevation models.

The bedrock elevation models from all the geophysical surveys provide reasonable constraints for determining the bedrock surface elevation.

6.0 THE GEOPHYSICAL METHODS

6.1 Ground Penetrating radar (GPR)

6.1.1 Description of the Method. The principle of ground penetrating radar (GPR) is the same as that used by police radar, except that GPR transmits electromagnetic energy into the ground. The energy is reflected back to the surface from interfaces between materials with contrasting electrical (dielectric and conductivity) and physical properties. The greater the contrast between two materials in the subsurface, the stronger the reflection observed on the GPR record. The depth of GPR signal penetration depends on the properties of the subsurface materials and the frequency of the antenna used to collect radar data. Lower frequency antennas provide greater signal penetration, but result in lower object resolution.

6.1.2 Data Collection. HGI collects GPR data using a Geophysical Survey Systems (GSSI) SIR 2, 20, 2000, 3000, or 4000 ground penetrating radar system. Data are digitally recorded on the internal hard drive or flash memory of the GPR system. System controls allow the GPR operator to filter out noise, attributed to coupling noise caused by conductive soil conditions, spurious noise caused by local EMF fields, and internal system noise. For shallow surveys, we use antennas with center frequencies ranging from 2000- to 400-megahertz (MHz). For deeper penetration, we use lower frequency antennas ranging from 350 MHz to 15 MHz, depending on the anticipated target depth and the degree of signal penetration. All of these antenna configurations can collect data in continuous mode, distance mode, or as discrete point measurements using signal-stacking techniques. Since there is a trade-off between signal penetration and resolution, test data are sometimes collected using antennas with several different frequencies, with the highest frequency antenna that produces the highest quality data used. In some cases, data are collected with several antenna frequencies.

The horizontal scale of the GPR record shows distance along the survey traverse. In the continuous data collection mode, the horizontal scale on each GPR record is determined by the antenna speed along the surface. When a survey wheel is used, the GPR system records data with a fixed number of traces per unit distance. The GPR record is automatically marked at specified distance intervals

along the survey line. The vertical scale of the radar record is determined by the velocity of the transmitted signal in the media under study and the range setting, or recording time window of the GPR system. The recording time interval, or range, represents the maximum two-way travel time in which data are recorded. The conversion of the two-way travel time of the transmitted signals to depth is determined by the propagation velocity of the GPR signal, which is site (media) specific. When little or no information is available about the makeup of subsurface materials, we estimate propagation velocities from handbook values and experience at similar sites or by CDP velocity surveys with a bi-static antenna.

6.1.3 Data Processing. After completion of data collection, the GPR data are transferred to a PC for review and processing using RADAN® 7 software. When appropriate, we prepare 3D models of GPR data, which can be sliced in the X, Y, and Z directions.

The size, shape, and amplitude of GPR reflections are used to interpret GPR data. Objects such as metallic UST's and utilities produce reflections with high amplitude and distinctive hyperbolic shapes. Clay, concrete pipes, boulders and other in-situ features may produce radar signatures of similar shape but lower amplitude. The boundaries between saturated and unsaturated materials such as sand and clay, bedrock and overburden, generally also produce strong reflections.

6.1.4 Limitations of the Method. GPR signal penetration is site-specific and is determined by the dielectric properties of local soil and fill materials. GPR signals propagate well in resistive materials such as sand and gravel; however, soils containing clay, ash- or cinder-laden fill or fill saturated with brackish or otherwise electrically conductive groundwater cause GPR signal attenuation and loss of target resolution. Concrete containing rebar or wire mesh also inhibits signal penetration.

The interpreted depths of objects detected using GPR are based on on-site calibration, handbook values, and/or estimated GPR signal propagation velocities from similar sites. GPR velocities and depth estimates may vary if the medium under investigation or soil water content is not uniform throughout the site.

Utilities are interpreted on the basis of reflections of similar size and depth that exhibit a linear trend; however, GPR cannot unambiguously determine that all such reflectors are related. Fiberglass USTs or utilities composed of plastic or clay may be difficult to detect if situated in soils with similar electromagnetic properties, or if situated in fill with other reflecting targets that generate "clutter" or signal scattering and thus obscure other deeper reflectors. Objects buried beneath reinforced concrete pads or slabs may also be difficult, but possible, to detect.

As a rule of thumb, GPR can resolve utilities with a diameter of 1" per foot of depth (i.e., a 1"-diameter utility can be detected to a burial depth of 1 foot).

Changes in the speed at which the GPR antenna is moved along the surface causes slight variations in the horizontal scale of the recorded traverse. Distance interpolation may be performed to minimize the error in interpreted object positions. The variation in the horizontal scale of the GPR record may be controlled, to a certain extent, with a distance encoder or survey wheel. The GPR antenna produces a cone-shaped signal pattern that emanates approximately 45 degrees from horizontal front and back of the antenna. Therefore, buried objects may be detected before the antenna is located directly over them. GPR anomalies may appear larger than actual target dimensions.

GPR interpretation is more subjective than other geophysical methods. The interpretive method is based on the identification of reflection patterns that do not uniquely identify a subsurface target. Borings, test pits, site utility plans and other ground-truth are recommended to verify the interpreted GPR results.

6.2 Seismic Refraction

6.2.1 Description of the Method. We collect seismic refraction data using our Geometrics Geode® exploration seismograph system with 24- or 48-channel geophone arrays. Geophone spacing depends on the depth of investigation, but is between 5 to 20 feet. Shot points are located at a minimum off the ends of each spread, at the end geophones, and in the middle of the spread.

6.2.2 Data Analysis and Interpretation. HGI analyzes seismic refraction data using Geogiga Technology Corporation's (GTC) Geogiga Seismic Pro® 8.3. Picked arrival times are subdivided into individual refractor layers on the basis of refractor geometry by examining the slope of the line connecting refractor arrival times plotted as a function of distance. Since the slope of the line depends on a layer's seismic velocity, slope changes may be used to discriminate between layers of differing velocity.[5]

Using this layer information, Geogiga Refractor 8.3 offers calculations of layer velocities and depths using approximate and average general reciprocal methods (GRM), delay time, and slope intercept modeling methods. The GRM is used as the primary modeling method because it provides lateral changes in layer velocities and the capability of identifying and modeling stratigraphy where velocity inversion and/or hidden layers are present.

6.2.3 Limitations of the Method. Analysis of seismic refraction data requires an assumption of a model composed of a number of layers, such as bedrock overlain by overburden, or bedrock overlain by till and overburden. Other limiting assumptions are that i) seismic refraction layers are continuous and extend from one end of the refraction line to the other; and ii) layer velocities increase with depth.

Seismic refraction requires a sufficiently strong source so that seismic energy is transmitted to refracting interfaces and returned to the surface to be recorded by each geophone in a seismic spread. When bedrock is deep and/or overburden velocities are low, explosives or seisgun sources may be required to produce sufficient seismic energy to reach most or all of the geophones in a spread. It is becoming increasingly difficult to use intrusive seismic sources, particularly explosives, at many sites.

Seismic refraction can only distinguish between materials if their seismic velocities are sufficiently different. Thus it may not be possible to distinguish between weathered bedrock and till, particularly if the bedrock is shale.

Electric lines with 60-cycle current (and/or greater harmonics) may create interference with seismic data collection along lines adjacent to or beneath them.

[5] Although this procedure is generally tractable, there are a number of cases where layers cannot be resolved, including situations where a low-velocity layer (LVL) exists beneath a layer of greater velocity, and where layers are too thin to be resolved.

6.3 H/V Spectral Analysis

6.3.1 Description of the Method. The spectral ratio method, also called the H/V method, is used to determine depth to bedrock and estimate the resonant frequency for a site by analyzing signals generated by both natural and cultural ambient sources of seismic noise. Natural sources of noise include ocean wave- and surf-generated vibrations that are observed even at stations located in the central regions of continents. Anthropogenic sources of seismic noise, including signals generated by vehicle and foot traffic, also provide useful signal for analysis, making the spectral ratio method ideal for work in urban environments.

HGI collects seismic data for H/V interpretation using three-component geophones arranged in either small arrays or in single station configurations with the north channel of each geophone aligned with magnetic north. A Geometrics Geode® 48-channel seismograph records the signal from each channel of each geophone for a period of time long enough to capture several wavelengths of the lowest frequency noises to allow for quality control.

6.3.2 Data Analysis and Interpretation. HGI analyzes ambient seismic data using the Geopsy v. 2.9.0 suite. Data analysis proceeds with applying a Fourier transform to both the horizontal channels and the vertical channel of the time series recorded during the survey. The ratio is taken between the Fourier amplitude spectra of the horizontal and vertical channels of each geophone. The peak frequency of this ratio serves as a good estimate of the site response (or resonant frequency) for most sites. The relationship between the resonant frequency and sediment thickness may then be calculated using a site-specific estimate of the surface shear velocity and change in shear velocity with depth parameter. The regression equations developed by Ibs-von Seht & Wohlenberg (1999) and Parolai et al. (2004) are used to provide estimates of depth to bedrock.

6.3.3 Limitations. Unlike seismic refraction, reflection, and MASW studies, where a continuous profile along the length of a survey line is produced, the H/V method provides a 1D depth to bedrock measurement or determination of site response. In sites where 2- or 3-D geological features are present, the peak frequency of the H/V ratio should be considered as only a lower bound estimate on the amplification factor and estimates of depth to bedrock may be subject to errors of up to 10%. Additionally, in environments where overburden is very thick or cultural noise is minimal, the peak frequency of the H/V ratio may be particularly low in amplitude and difficult to observe. The method is best-suited as an exploratory tool to use as a precursor to profiling with seismic reflection, refraction, or MASW techniques as it can provide an estimate of depth to bedrock that may be useful for determining seismic profiling survey geometry, or as a constraint on modeling the results from other methods.

6.4 RTK GNSS Global Positioning System (GPS)

6.4.1 Description of the Method. The RTK GPS system consists of a base (reference) receiver and a roving receiver. The base receiver remains stationary during a survey and is mounted on a tribrach and tripod. A rover receiver is used to record points remotely and can be mounted on a staff, vehicle, or other object. The base provides real-time corrections to the rover over a radio connection. The system can produce accuracy on a centimeter scale, but the level of accuracy depends on factors that include the geometry of the transmitting satellites and the receivers' view

of the horizons (e.g., the density of buildings and trees). The data can be collected as quickly as 5 Hz or 5 readings per second.

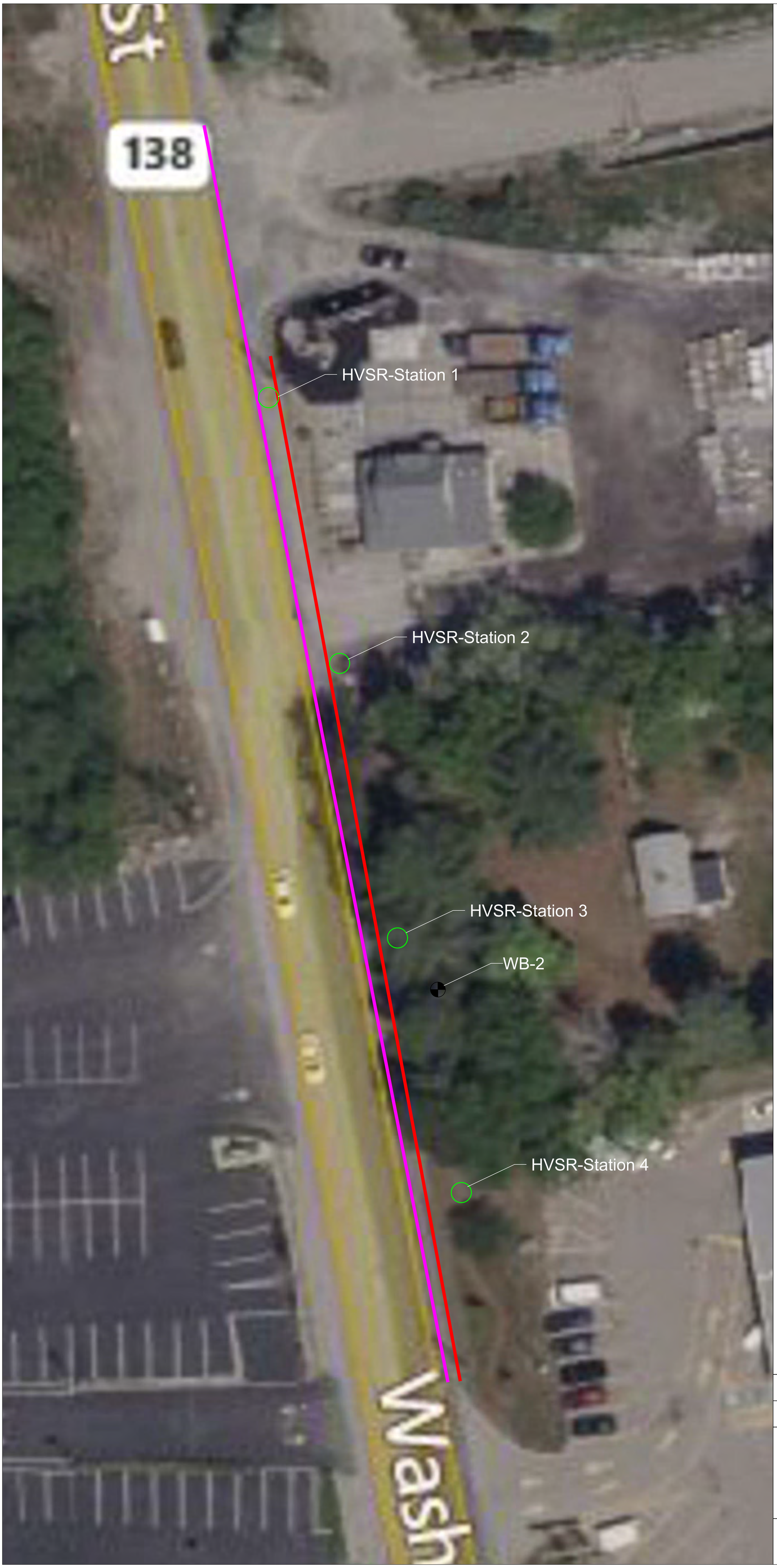
6.4.2 Data Collection and Processing. We perform our GPS surveys using a Sokkia RTK GRX3 GPS system. The base station can be set up over a known or unknown point, with the position taken from satellite information. Once the system has achieved a fixed solution for the rover receiver, data points can be collected with survey-grade (centimeter-scale) precision. When GPS points are being collected at a site where the fixed solution is constantly lost and gained, points are checked multiple times for precision. All data points are saved to a Carlson Surveyor 2 field computer.

The GPS data are corrected automatically by the base receiver in the field prior to being recorded. If the base station is located on an unknown point that is later defined, the GPS data can be corrected in the office to fit the real world coordinates.

6.4.3 Limitations of the Method. The quality of the GPS signal is site-specific. The base and rover receiver need to have clear views of the horizon and good satellite geometry to achieve the highest level of accuracy and precision. Although a fixed solution can be achieved in wooded environments or sites with taller buildings, it may take more time to achieve the solutions, the fixed solution may be lost frequently when moving the rover, and in some cases the fixed solution may be wrong. Each of these situations requires longer to locate data points accurately and precisely. When the point is too close to a building, beneath a building overhang, under a tree, or obscured by some other object, a fixed solution may not be possible.

When the base station is set up over an unknown point, the survey data location can be at least several tens of meters from the real world location. The data points will have survey grade precision relative to the location of the base station and other data points, but will have a real world accuracy discrepancy.

HGI does not guarantee to produce a surveyor-quality map from its GPS data, as this is not its profession. If survey-level accuracy is critical for a project, we recommend hiring professional surveyors for that purpose.



LEGEND

- *100MHz GPR Transect*
- *Seismic Refraction Line*
- *HVSR Station*
- *HGI - Identified Borehole*

0 32 64 Feet

Plate 1

January 2023	File 2022049

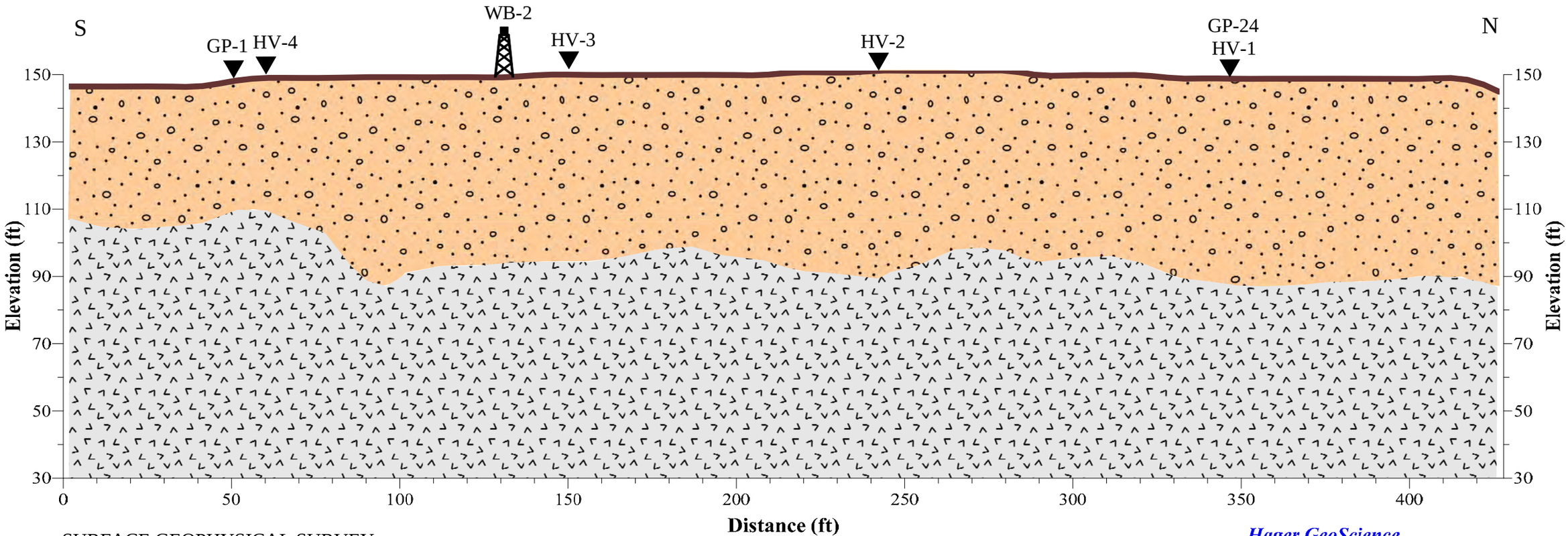
Geophysical Survey Overview
198 Washington Street
Stoughton, MA

Hager GeoScience,
A Collier Geophysics Company
596 Main Street, Woburn, MA 01801
(781) 935-8111 hgi@hagergeoscience.com

Overburden **Bedrock**

HAGER GEOSCIENCE
A COLLIER GEOPHYSICS COMPANY

Figure G-1
LFGPR Profile (100-MHz)



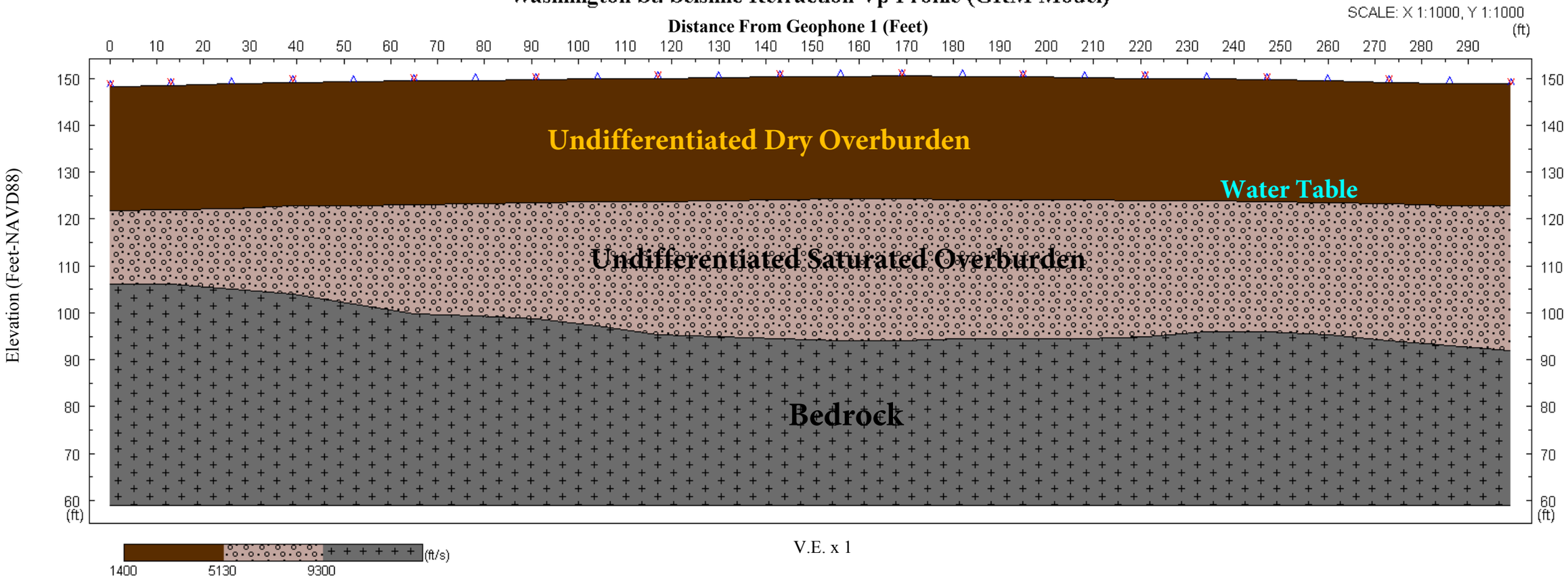
SURFACE GEOPHYSICAL SURVEY
198 WASHINGTON STREET
STOUGHTON, MA
January 2023 File. 2022049

Hager GeoScience
A Collier Geophysics Company
596 Main Street
Woburn, MA 01801
(781) 935-8111 hgi@hagergeoscience.com

Figure S1A

S **N**

Washinigton St. Seismic Refraction Vp Profile (GRM Model)



V.E. x 1

1.00 in

1 inch ~ 25 feet

SURFACE GEOPHYSICAL SURVEY
198 WASHINGTON STREET
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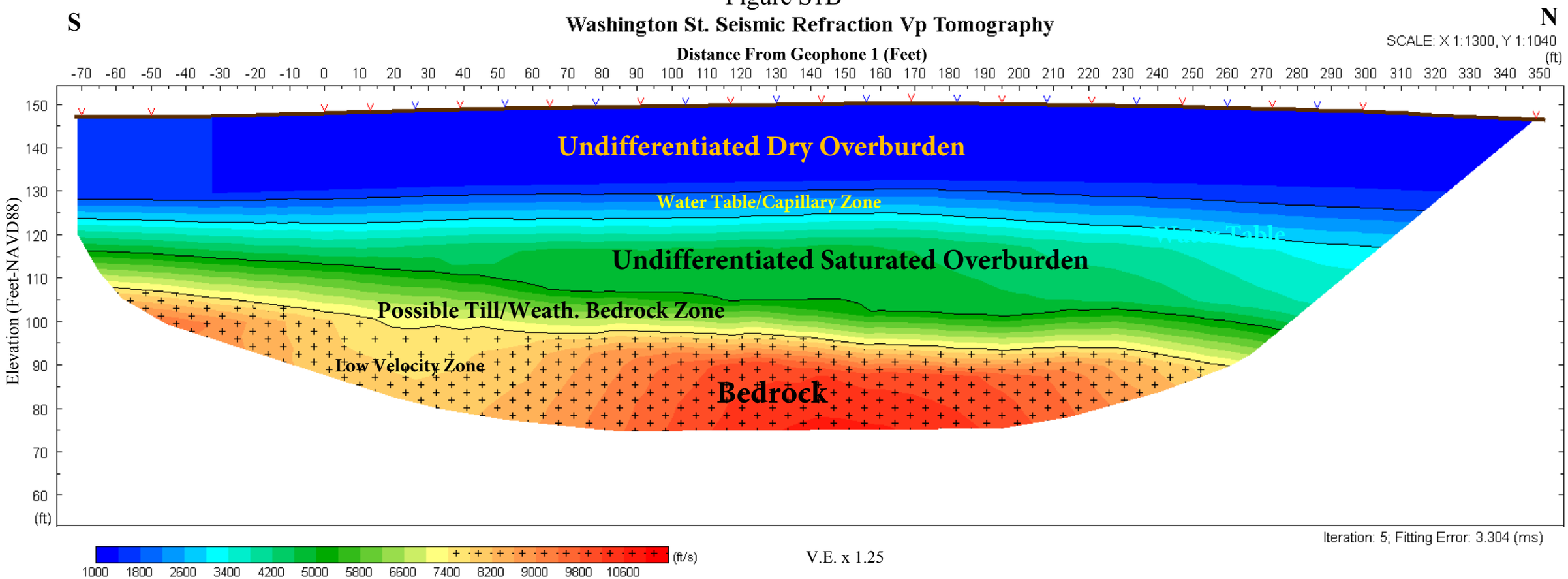
Figure S1B

Washington St. Seismic Refraction Vp Tomography



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Station Number	H/V Res. Peak (Hz)	Calculated Depth (meters)		Calculated Depth (feet)	
		Ibs-von Seht & Wohlenberg (1999)	Parolai et al (2004)	Ibs-von Seht & Wohlenberg (1999)	Parolai et al (2004)
HVSR Station 1	3.50	17	15	55	51
HVSR Station 2	3.80	15	14	49	45
HVSR Station 3	4.00	14	13	46	41
HVSR Station 4	4.50	12	10	39	34

Surface Geophysical Survey
198 Washington Street
Stoughton, MA

File 2022049

Figure S-2
HVSR Station 1

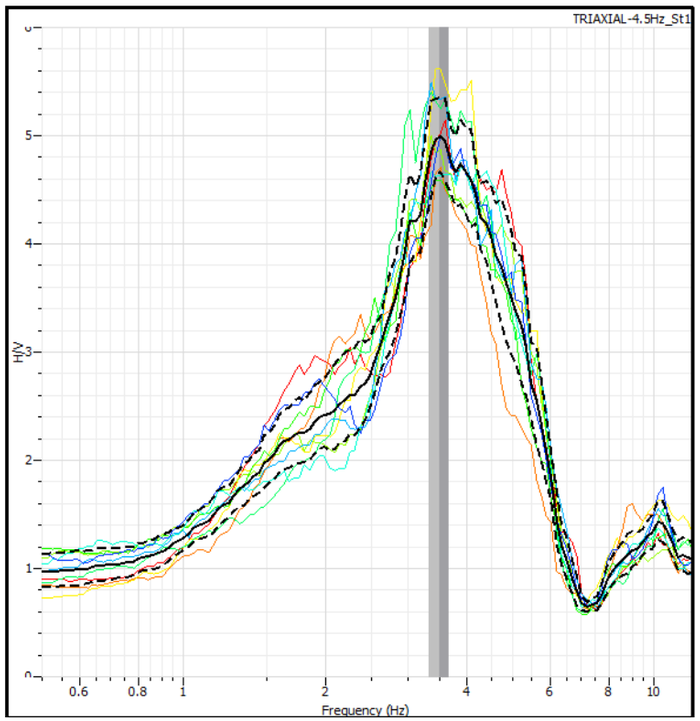

Figure S-2. Response for HVSR Station 1. The solid line (used for interpretation) represents the average spectrum of the time windows used (colored lines) for the H/V ratio, while dashed lines indicate +/- standard deviation from the average curve. The grey shaded area represents the numerical average frequency for all values calculated from the time windows used. The main impedance peak at 3.5Hz (solid line) suggests the presence of bedrock at an approximate depth of 55 feet below ground level (Table S-1).

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Figure S-3
HVSR Station 2

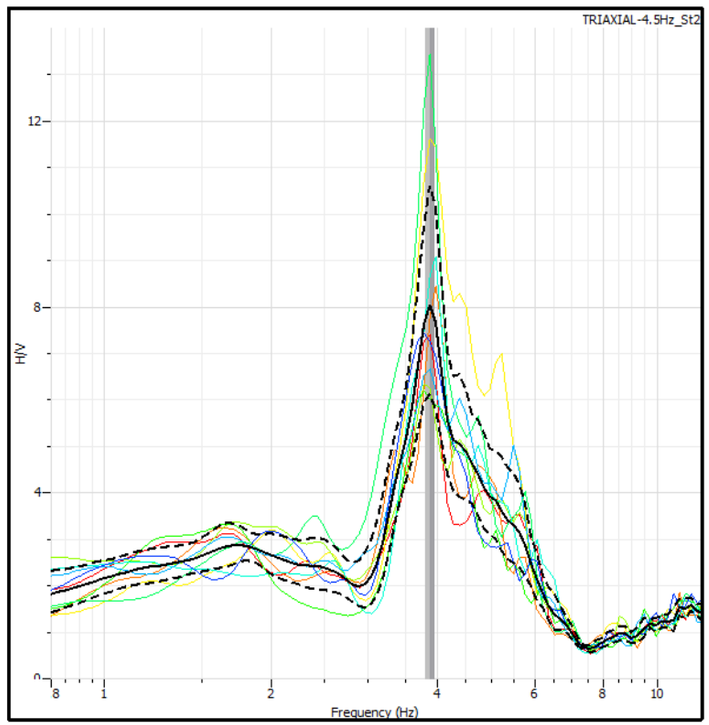

Figure S-3. Response for HVSR Station 2. The solid line (used for interpretation) represents the average spectrum of the time windows used (colored lines) for the H/V ratio, while dashed lines indicate +/- standard deviation from the average curve. The grey shaded area represents the numerical average frequency for all values calculated from the time windows used. The main impedance peak at 3.8Hz (solid line) suggests the presence of bedrock at an approximate depth of 49 feet below ground level (Table S-1).

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Figure S-4
HVSR Station 3

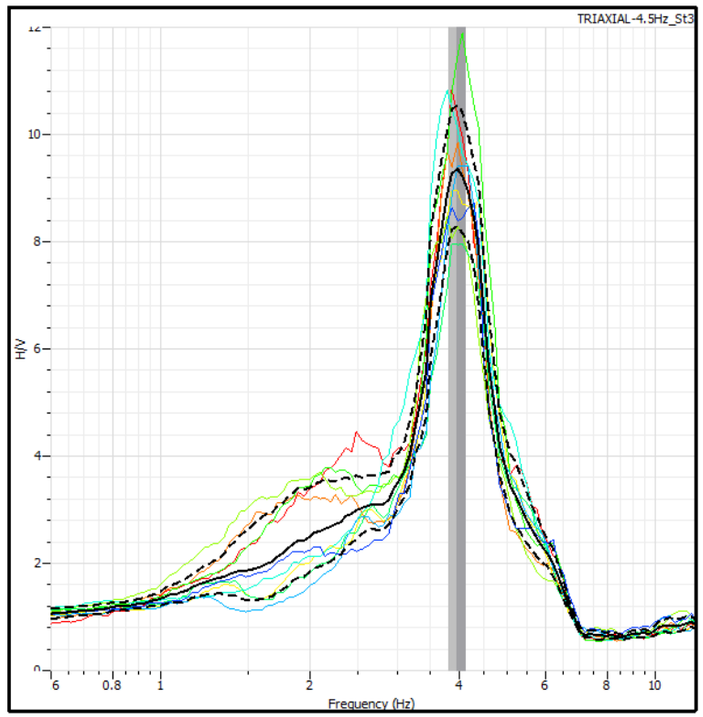

Figure S-4. Response for HVSR Station 3. The solid line (used for interpretation) represents the average spectrum of the time windows used (colored lines) for the H/V ratio, while dashed lines indicate +/- standard deviation from the average curve. The grey shaded area represents the numerical average frequency for all values calculated from the time windows used. The main impedance peak at 4Hz (solid line) suggests the presence of bedrock at an approximate depth of 46 feet below ground level (Table S-1).

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File 2022049

Figure S-5
HVSR Station 4

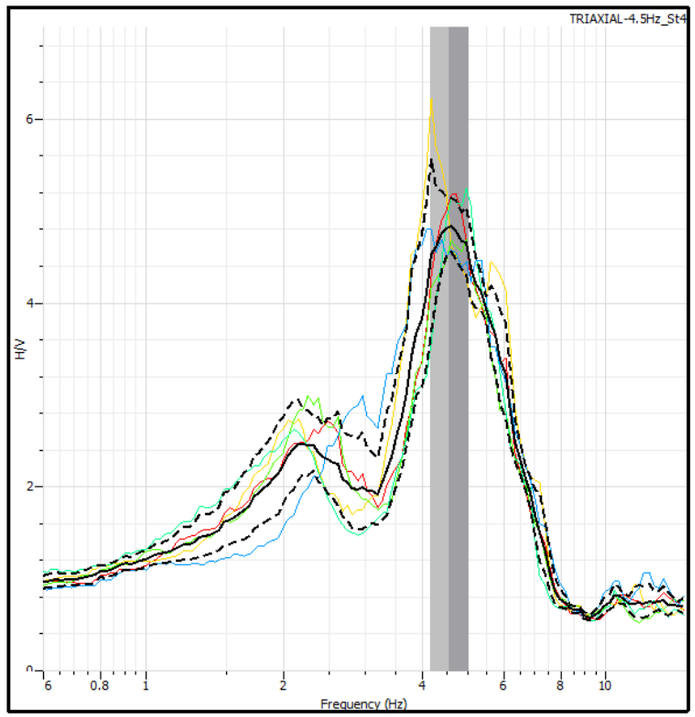

Figure S-5. Response for HVSR Station 4. The solid line (used for interpretation) represents the average spectrum of the time windows used (colored lines) for the H/V ratio, while dashed lines indicate +/- standard deviation from the average curve. The grey shaded area represents the numerical average frequency for all values calculated from the time windows used. The main impedance peak at 4.5Hz (solid line) suggests the presence of bedrock at an approximate depth of 39 feet below ground level (Table S-1).

Hager GeoScience

APPENDIX E – Calculations and Results of Slope Stability Analyses

2139 Sta 24+00

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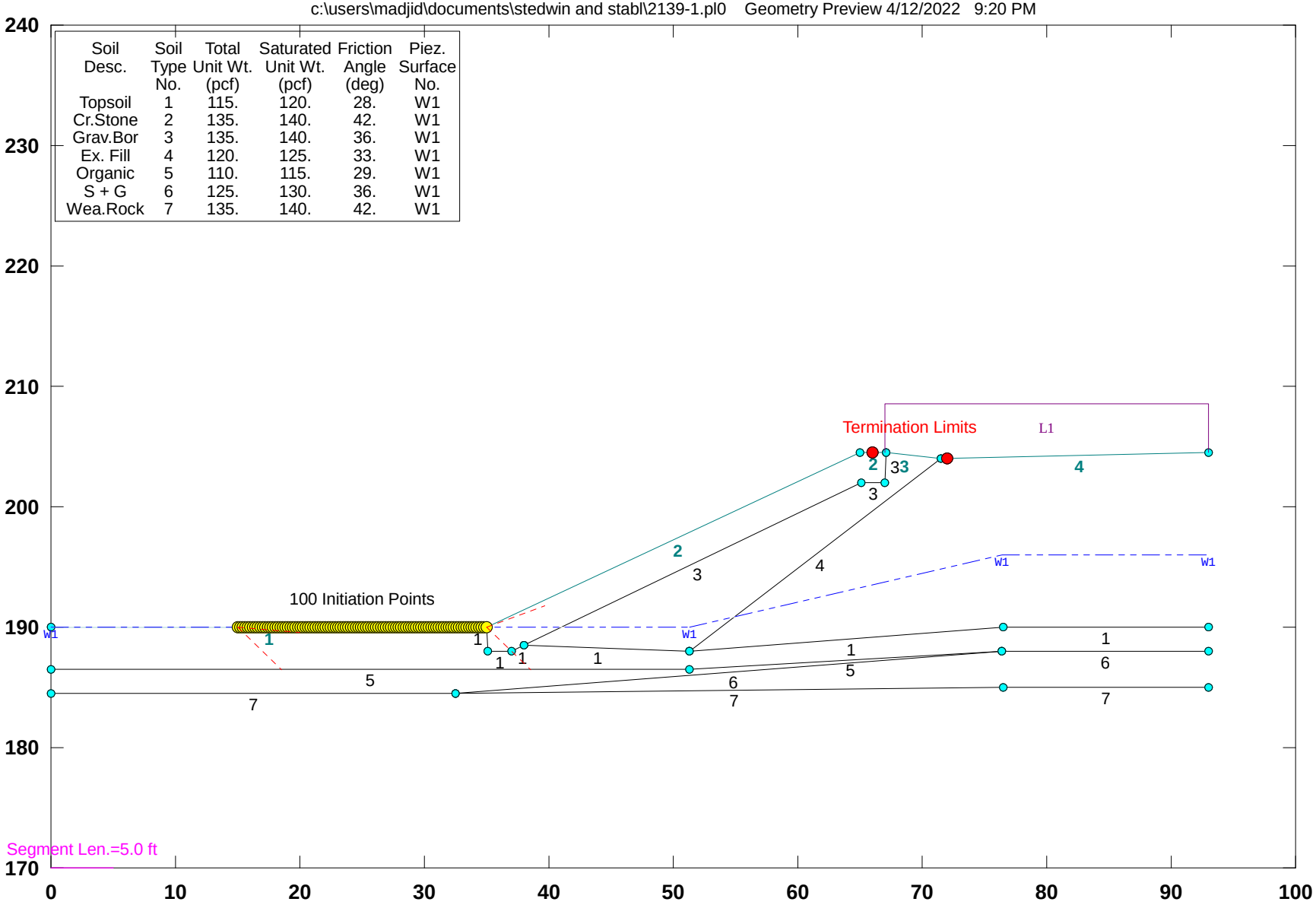

2139 Sta 23+00

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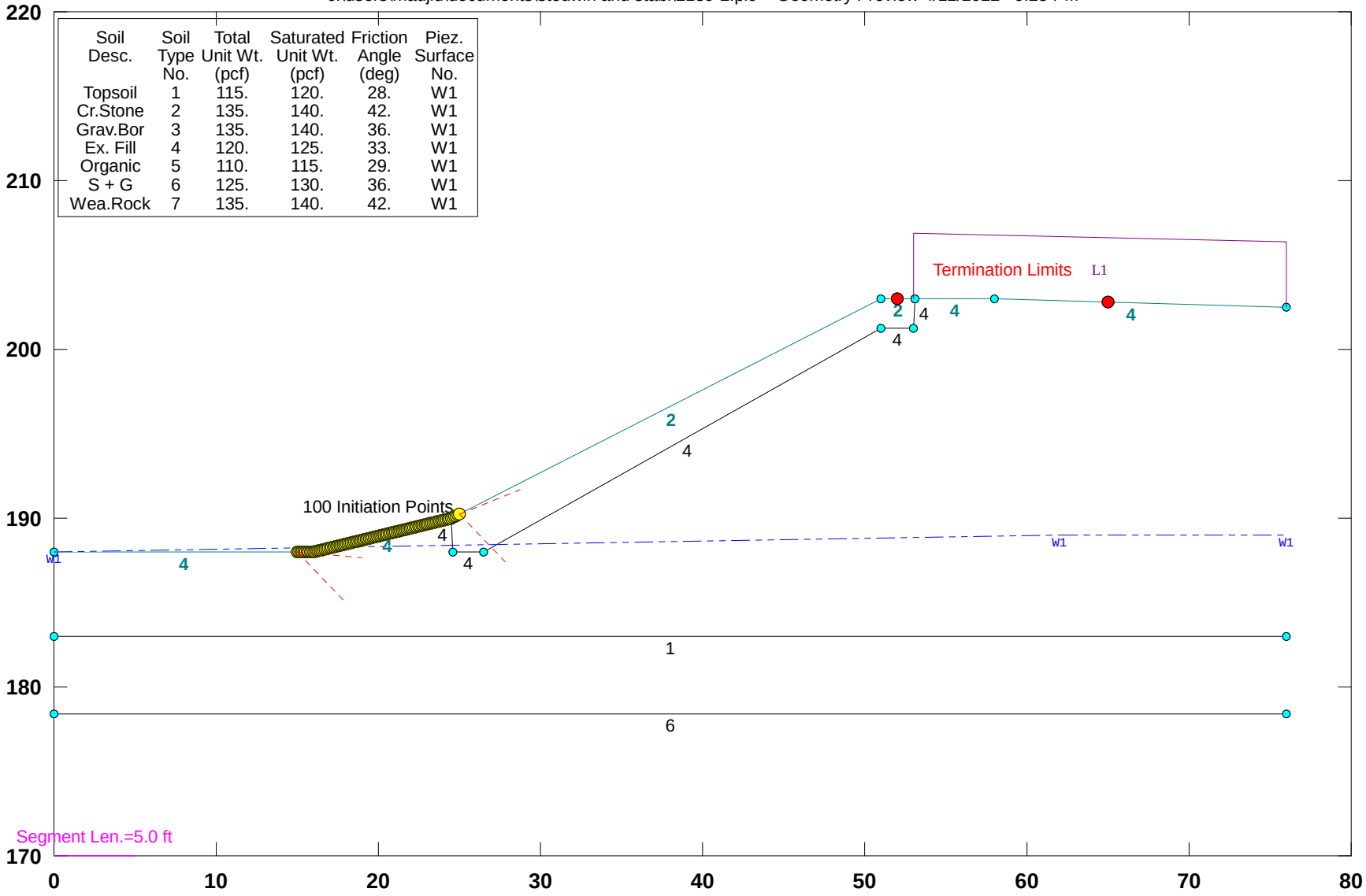

2139 Sta 25+00

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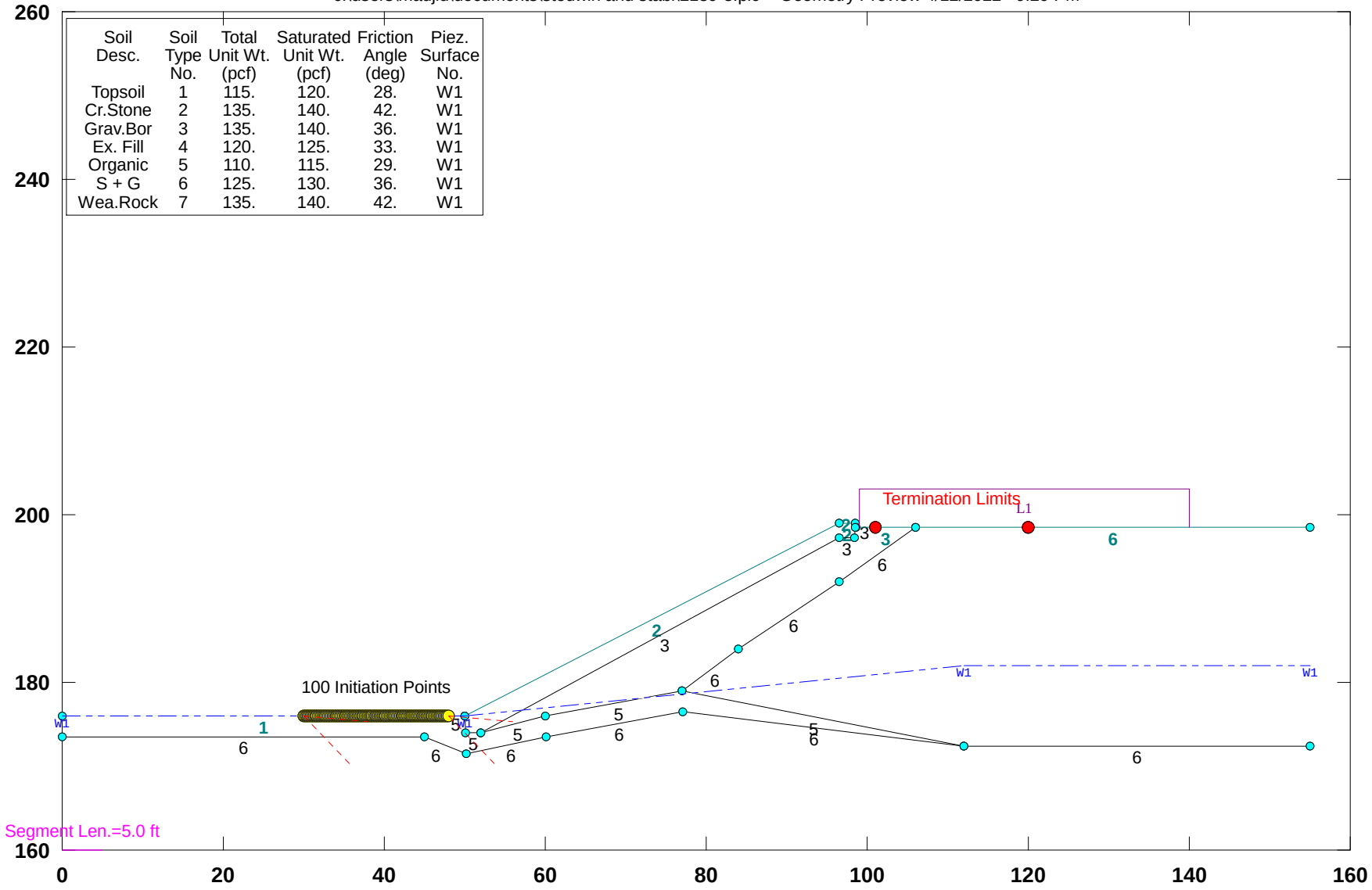
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
Topsoil	1	115.	120.	28.	W1
Cr.Stone	2	135.	140.	42.	W1
Grav.Bor	3	135.	140.	36.	W1
Ex. Fill	4	120.	125.	33.	W1
Organic	5	110.	115.	29.	W1
S + G	6	125.	130.	36.	W1
Wea.Rock	7	135.	140.	42.	W1



LGCI
Lahlaf Geotechnical Consulting, Inc.

BEARING RESISTANCE CALCULATION

LGCI Project No.:	2139	Calculated by:	TG
LGCI Project Name:	Prop. Mast Arms, Reinforced Slope, and Retaining Wal	Date:	10/11/2022
Location:	Stoughton, MA	Checked by:	AML
Client:	Nitsch Engineering, Inc.	Date:	10/25/2022

$q_n = c\ N_{cm} + 0.5\ \gamma\ B\ N_{\gamma m}\ C_{w\gamma} + q\ N_{qm}\ C_{wq}$ (AASHTO 2014, 10.6.3.2a-1)

$q_n = c\ N_c\ s_c\ i_c + 0.5\ \gamma\ B\ N_\gamma\ s_\gamma\ i_\gamma\ C_{w\gamma} + q\ N_q\ s_q\ d_q\ i_q\ C_{wq}$

where:

q_n = Nominal bearing resistance

c = shear strength

B = Width of footing

q = (total or buoyant unit weight, γ or γ') x (depth of embedment, D_f)

$C_{w\gamma}$ and C_{wq} = Correction Factors for the g.w. Table (AASHTO 2014 Table 10.6.3.1.2a-2)

$N_{c,\gamma,q}$ = Bearing Capacity Factors (AASHTO 2014, Table 10.6.3.1.2a-1)

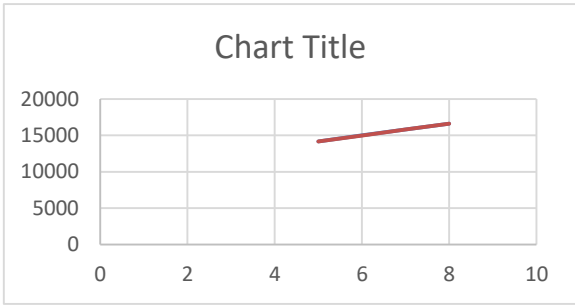
$s_{c,\gamma,q}$ = Shape Factors (AASHTO 2014, Table 10.6.3.1.2a-3)

d_q = Depth Correction Factor (AASHTO 2014, Table 10.6.3.1.2a-4)

$i_{c,\gamma,q}$ = Incline loading factors (AASHTO 2014, Equations 10.6.3.1.2a-5 to -9)

Calculated

5	14172	14172	
6	14996	14985	
7	15809	15798	
8	16611	16611	
Slope =	813		
Intercept=	10107		
qn = 0.81 B +	10.107		



Given:

Bearing material (fine grained or granular):			Granular
Thinkness of granular soil beaneath footing, h =	0	feet	
Footing inclination, α, =	0	Degrees	
Width of footing, B =	8	feet	
Effective width, B' =	8	feet	assume ring foundation (mat foundation would lead higher qall)
Wall height, H =	5	feet	
Length of footing, L =	57	feet	
Depth of Embedment, D_f =	4		(see Note 2 below)
Groundwater depth, d_w =	6	feet	
Load inclination, θ =	90	Degrees	(AASHTO 2014, Figure C10.6.3.2a-1)
Angle of friction, ϕ =	31	Degrees	See shear strength page

Shear strength (c or s_u) =	0	psf	
Unit weight of soil, γ =	120	pcf	
Unit Weight of Water, γ_w =	62.4	pcf	

N_c =	32.7	N_{cm} =	35.59123
N_q =	20.6	N_{qm} =	22.33615
N_γ=	26	$N_{\gamma m}$=	24.54035

Notes:

1. For granular bearing materials B=B'. For fine grained soils, B'=B+h (where h = thickness of layer of granular fill placed beneath the footing) assuming a 2V:1H footing load distribution (see Perloff & Baron, 1976, attached)

2. Depth of embedment D_f is 4 feet

S_c =	1.09	i_c =	1	b_c =	1.00	d_q =	1	C_{wq} =	1

S_q = 1.1 i_q = 1 b_q = 1.00 $C_{w\gamma}$ = 0.5

S_γ = 0.9 i_γ = 1

q_n = 16,611 psf

For Allowable Stress Design (ASD), use FS = 3 i. e., qall = 5,537 psf

Load Resistance Factor Design (LRFD): AASHTO 2014, Table 10.5.5.2.2-1: 0.45 For Munfakh et Al. (sand w/SPT)

Factored Bearing Resistance q_r = 7,475 psf

3.74 tsf

Shape Factors (AASHTO 2012, Table 10.6.3.1.2a-3)

$\phi = 0$, $s_c = 1 + (B/5L)$

$\phi > 0$, $s_c = 1 + (B/L)(N_q/N_c)$ = 1.088

$\phi = 0$, $s_q = 1$

$s_q = 1 + (B/L)\tan\phi$ = 1.084

$\phi = 0$, $s_\gamma = 1$

$s_\gamma = 1 - 0.4(B/L)$ = 0.944

Load Inclination Factors (if horizontal load other than lateral pressure, enter manually)

NEGLECT LOAD INCLINATION FACTORS PER COMMENTARY on AASHTO-9 (2020) page 10-71. Use

$i_c = i_q - [(1-i_q)/(N_q-1)]$ for $\phi > 0$

$i_c = 1 - (nh/BLcN_c)$ for $\phi = 0$

i_c = 1.000

$i_q = [1 - h/(v + BLc\cot\phi)]^n$ = 1.000

$i_\gamma = [1 - h/(v + BLc\cot\phi)]^{(n+1)}$ = 1.000

$n = [2 + L/B)/(1 + L/B)]\cos^2\theta + [(2 + B/L)/(1 + B/L)]\sin^2\theta$ = 1.877

Estimate P, and Q. Use:

Coefficient of lateral earth pressure, K_A =	0
Wall height, H =	5 feet
Groundwater depth, d_w =	6 feet
Wall Toe, t_w =	2 feet
Unit weight of fill, γ_{fill} =	125 pcf
Unit weight of water, γ_w =	62.4 pcf
$v = (\gamma_{fill} * H)(B - t_w)$ =	3,750 plf
$h = K_A(\gamma_{fill} * H) * H/2$ =	0 plf

Base inclination Factors (Based on AASHTO 2002. Not included in AASHTO 2007)

$b_q = b_\gamma = (1 - \alpha\tan\phi)^2$ = 1.00

$b_c = b_\gamma - (1 - b_\gamma)/(N_c \tan\phi)$ for $\phi > 0$

$b_c = 1 - (2\alpha/(\pi + 2))$ for $\phi = 0$

b_c = 1.00

Depth Correction Factor

Table 10.6.3.1.2-a4

d_q = 1.0

Groundwater Correction Factor

C_{wq} 1

$C_{w\gamma}$ 0.5

Table 4-3 Manual On Estimating Soil Properties for Foundation Design– EPRI 1990

N VERSUS $\bar{\phi}_{tc}$ RELATIONSHIPS

N Value (blows/ft or 305 mm)	Relative Density	Approximate $\bar{\phi}_{tc}$ (degrees) (a)	(b)
0 to 4	very loose	< 28	< 30
4 to 10	loose	28 to 30	30 to 35
10 to 30	medium	30 to 36	35 to 40
30 to 50	dense	36 to 41	40 to 45
> 50	very dense	> 41	> 45

a - Source: Peck, Hanson, and Thornburn (12), p. 310.
b - Source: Meyerhof (13), p. 17.

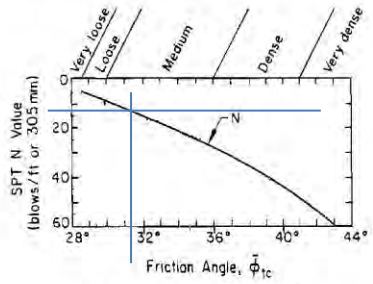


Figure 4-12. N versus $\bar{\phi}_{tc}$

Source: Peck, Hanson, and Thornburn (12), p. 310.

can be approximated as follows:

$$\bar{\phi}_{tc} \approx \tan^{-1} [0.1 + 0.38 \log (q_c/\bar{\sigma}_{vo})] \quad (4\text{-}12)$$

Adjustments to this figure and equation for soils of different compressibility and stress history should be made as described in Section 2.

4-15

Use top 2 SPTs

WB-1	WB-2
15	5
13	9
110	6
25	25

average. = 10.5

ignored

Correct for hammer energy: N60=80/60* 10.5 = 14

Average of top 6 N values in sand = 0.456522

Navg =14 Phi = 31.5 Degrees by Peck et al., say 31 degrees

Navg = Phi = Degrees by Meyerhof say: Degrees

Use Phi = 31

AASHTO 2012, Table 10.6.3.1.2a-1

Angle of friction, ϕ	N_c	N_q	N_γ
0	5.14	1	0
1	5.4	1.1	0.1
2	5.6	1.2	0.2
3	5.9	1.3	0.2
4	6.2	1.4	0.3
5	6.5	1.6	0.5
6	6.8	1.7	0.6
7	7.2	1.9	0.7
8	7.5	2.1	0.9
9	7.9	2.3	1
10	8.4	2.5	1.2
11	8.8	2.7	1.4
12	9.3	3	1.7
13	9.8	3.3	2
14	10.4	3.6	2.3
15	11	3.9	2.7
16	11.6	4.3	3.1
17	12.3	4.8	3.5
18	13.1	5.3	4.1
19	13.9	5.8	4.7
20	14.8	6.4	5.4
21	15.8	7.1	6.2
22	16.9	7.8	7.1
23	18.1	8.7	8.2
24	19.3	9.6	9.4
25	20.7	10.7	10.9
26	22.3	11.9	12.5
27	23.9	13.2	14.5
28	25.8	14.7	16.7
29	27.9	16.4	19.3
30	30.1	18.4	22.4
31	32.7	20.6	26
32	35.5	23.2	30.2
33	38.6	26.1	35.2
34	42.2	29.4	41.1
35	46.1	33.3	48
36	50.6	37.8	56.3
37	55.6	42.9	66.2
38	61.4	48.9	78
39	67.9	56	92.3
40	75.3	64.2	109.4
41	83.9	73.9	130.2
42	93.7	85.4	155.6
43	105.1	99	186.5
44	118.4	115.3	224.6
45	133.9	134.9	271.8

Consideration should be given to the relative change in the computed nominal resistance based on effective versus gross footing dimensions for the size of footings typically used for bridges. Judgment should be used in deciding whether the use of gross footing dimensions for computing nominal bearing resistance at the strength limit state would result in a conservative design.

10.6.3.1.2—Theoretical Estimation

10.6.3.1.2a—Basic Formulation

C10.6.3.1.2a

The nominal bearing resistance shall be estimated using accepted soil mechanics theories and should be based on measured soil parameters. The soil parameters used in the analyses shall be representative of the soil shear strength under the considered loading and subsurface conditions.

The nominal bearing resistance of spread footings on cohesionless soils shall be evaluated using effective stress analyses and drained soil strength parameters.

The nominal bearing resistance of spread footings on cohesive soils shall be evaluated for total stress analyses and undrained soil strength parameters. In cases where the cohesive soils may soften and lose strength with time, the bearing resistance of these soils shall also be evaluated for permanent loading conditions using effective stress analyses and drained soil strength parameters.

For spread footings bearing on compacted soils, the nominal bearing resistance shall be evaluated using the more critical of either total or effective stress analyses.

Except as noted below, the nominal bearing resistance of a soil layer, in ksf, should be taken as:

$$q_n = cN_{cm} + \gamma D_f N_{qm} C_{wq} + 0.5\gamma \quad BN_{\gamma m} C_{w\gamma} \tag{10.6.3.1.2a-1}$$

The bearing resistance formulation provided in Eqs. 10.6.3.1.2a-1 though 10.6.3.1.2a-4 is the complete formulation as described in the Munfakh, et al. (2001). However, in practice, not all of the factors included in these equations have been routinely used.

in which:

$$N_{cm} = N_c s_c i_c \tag{10.6.3.1.2a-2}$$

$$N_{qm} = N_q s_q d_q i_q \tag{10.6.3.1.2a-3}$$

$$N_\gamma m = N_\gamma s_\gamma i_\gamma \tag{10.6.3.1.2a-4}$$

where:

c = cohesion, taken as undrained shear strength (ksf)

N_c = cohesion term (undrained loading) bearing capacity factor as specified in Table 10.6.3.1.2a-1 (dim)

N_q = surcharge (embedment) term (drained or undrained loading) bearing capacity factor as specified in Table 10.6.3.1.2a-1 (dim)

N_γ = unit weight (footing width) term (drained loading) bearing capacity factor as specified in Table 10.6.3.1.2a-1 (dim)

γ = total (moist) unit weight of soil above or below the bearing depth of the footing (kcf)

D_f = footing embedment depth (ft)

B = footing width (ft)

$C_{wq}, C_{w\gamma}$ = correction factors to account for the location of the groundwater table as specified in Table 10.6.3.1.2a-2 (dim)

s_c, s_γ, s_q = footing shape correction factors as specified in Table 10.6.3.1.2a-3 (dim)

d_q = correction factor to account for the shearing resistance along the failure surface passing through cohesionless material above the bearing elevation as specified in Table 10.6.3.1.2a-4 (dim)

i_c, i_γ, i_q = load inclination factors determined from Eqs. 10.6.3.1.2a-5 or 10.6.3.1.2a-6, and 10.6.3.1.2a-7 and 10.6.3.1.2a-8 (dim)

For $\phi_f = 0$:

$$i_c = 1 - (nH/cBLN_c) \qquad (10.6.3.1.2a\text{-}5)$$

For $\phi_f > 0$:

$$i_c = i_q - [(1 - i_q)/(N_q - 1)] \qquad (10.6.3.1.2a\text{-}6)$$

in which:

$$i_q = \left[1 - \frac{H}{(V + cBL\cot\phi_f)}\right]^n \qquad (10.6.3.1.2a\text{-}7)$$

$$i_\gamma = \left[1 - \frac{H}{V + cBL\cot\phi_f)}\right]^{(n+1)} \qquad (10.6.3.1.2a\text{-}8)$$

$$n = [(2 + L/B)/(1 + L/B)]\cos^2\theta + [(2 + B/L)/(1 + B/L)]\sin^2\theta \qquad (10.6.3.1.2a\text{-}9)$$

Most geotechnical engineers nationwide have not used the load inclination factors. This is due, in part, to the lack of knowledge of the vertical and horizontal loads at the time of geotechnical explorations and preparation of bearing resistance recommendations.

Furthermore, the basis of the load inclination factors computed by Eqs. 10.6.3.1.2a-5 to 10.6.3.1.2a-8 is a combination of bearing resistance theory and small scale load tests on 1 in. wide plates on London Clay and Ham River Sand (Meyerhof, 1953). Therefore, the factors do not take into consideration the effects of depth of embedment. Meyerhof further showed that for footings with a depth of embedment ratio of $D_f/B = 1$, the effects of load inclination on bearing resistance are relatively small. The theoretical formulation of load inclination factors were further examined by Brinch-Hansen (*1970*), with additional modification by Vesic (*1973*) into the form provided in Eqs. 10.6.3.1.2a-5 to 10.6.3.1.2a-8.

It should further be noted that the resistance factors provided in Article 10.5.5.2.2 were derived for vertical loads. The applicability of these resistance factors to design of footings resisting inclined load combinations is not currently known. The combination of the resistance factors and the load inclination factors may be overly conservative for footings with an embedment of approximately $D_f/B = 1$ or deeper because the load inclination factors were derived for footings without embedment.

where:

B = footing width (ft)

L = footing length (ft)

H = unfactored horizontal load (kips)

V = unfactored vertical load (kips)

θ = projected direction of load in the plane of the footing, measured from the side of length L (degrees)

In practice, therefore, for footings with modest embedment, consideration may be given to omission of the load inclination factors.

Figure C10.6.3.1.2a-1 shows the convention for determining the θ angle in Eq. 10.6.3.1.2a-9.

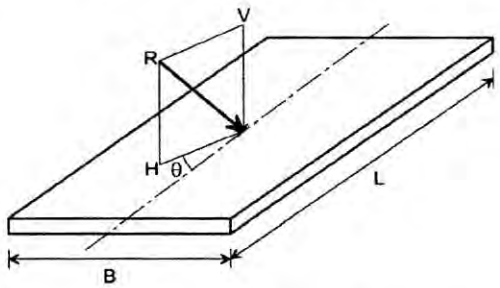


Figure C10.6.3.1.2a-1—Inclined Loading Conventions

Table 10.6.3.1.2a-1—Bearing Capacity Factors N_c (Prandtl, 1921), N_q (Reissner, 1924), and N_γ (Vesic, 1975)

ϕ_f	N_c	N_q	N_γ	ϕ_f	N_c	N_q	N_γ
0	5.14	1.0	0.0	23	18.1	8.7	8.2
1	5.4	1.1	0.1	24	19.3	9.6	9.4
2	5.6	1.2	0.2	25	20.7	10.7	10.9
3	5.9	1.3	0.2	26	22.3	11.9	12.5
4	6.2	1.4	0.3	27	23.9	13.2	14.5
5	6.5	1.6	0.5	28	25.8	14.7	16.7
6	6.8	1.7	0.6	29	27.9	16.4	19.3
7	7.2	1.9	0.7	30	30.1	18.4	22.4
8	7.5	2.1	0.9	31	32.7	20.6	26.0
9	7.9	2.3	1.0	32	35.5	23.2	30.2
10	8.4	2.5	1.2	33	38.6	26.1	35.2
11	8.8	2.7	1.4	34	42.2	29.4	41.1
12	9.3	3.0	1.7	35	46.1	33.3	48.0
13	9.8	3.3	2.0	36	50.6	37.8	56.3
14	10.4	3.6	2.3	37	55.6	42.9	66.2
15	11.0	3.9	2.7	38	61.4	48.9	78.0
16	11.6	4.3	3.1	39	67.9	56.0	92.3
17	12.3	4.8	3.5	40	75.3	64.2	109.4
18	13.1	5.3	4.1	41	83.9	73.9	130.2
19	13.9	5.8	4.7	42	93.7	85.4	155.6
20	14.8	6.4	5.4	43	105.1	99.0	186.5
21	15.8	7.1	6.2	44	118.4	115.3	224.6
22	16.9	7.8	7.1	45	133.9	134.9	271.8

Table 10.6.3.1.2a-2—Coefficients C_{wq} and $C_{w\gamma}$ for Various Groundwater Depths

D_w	C_{wq}	$C_{w\gamma}$
0.0	0.5	0.5
D_f	1.0	0.5
$>1.5B + D_f$	1.0	1.0

Where the position of groundwater is at a depth less than 1.5 times the footing width below the footing base, the bearing resistance is affected. The highest anticipated groundwater level should be used in design.

Table 10.6.3.1.2a-3—Shape Correction Factors s_c, s_γ, s_q

Factor	Friction Angle	Cohesion Term (s_c)	Unit Weight Term (s_γ)	Surcharge Term (s_q)
Shape Factors s_c, s_γ, s_q	$\phi_f = 0$	$1+\left(\frac{B}{5L}\right)$	1.0	1.0
	$\phi_f > 0$	$1+\left(\frac{B}{L}\right)\left(\frac{N_q}{N_c}\right)$	$1-0.4\left(\frac{B}{L}\right)$	$1+\left(\frac{B}{L}\tan\phi_f\right)$

Table 10.6.3.1.2a-4—Depth Correction Factor d_q

Friction Angle, ϕ_f (degrees)	D_f/B	d_q
32	1	1.20
	2	1.30
	4	1.35
	8	1.40
37	1	1.20
	2	1.25
	4	1.30
	8	1.35
42	1	1.15
	2	1.20
	4	1.25
	8	1.30

The depth correction factor should be used only when the soils above the footing bearing elevation are as competent as the soils beneath the footing level; otherwise, the depth correction factor should be taken as 1.0.

Linear interpolations may be made for friction angles in between those values shown in Table 10.6.3.1.2a-4.

The parent information from which Table 10.6.3.1.2a-4 was developed covered the indicated range of friction angle, ϕ_f. Information beyond the range indicated is not available at this time.

10.6.3.1.2b—Considerations for Punching Shear

C10.6.3.1.2b

If local or punching shear failure is possible, the nominal bearing resistance shall be estimated using reduced shear strength parameters c^* and ϕ^* in Eqs. 10.6.3.1.2b-1 and 10.6.3.1.2b-2. The reduced shear parameters may be taken as:

$$c^* = 0.67c \qquad (10.6.3.1.2b\text{-}1)$$

Local shear failure is characterized by a failure surface that is similar to that of a general shear failure but that does not extend to the ground surface, ending somewhere in the soil below the footing. Local shear failure is accompanied by vertical compression of soil below the footing and visible bulging of soil adjacent to the footing but not by sudden rotation or tilting of the

$$\phi^* = \tan^{-1}(0.67 \tan \phi_f) \quad (10.6.3.1.2b\text{-}2)$$

where:

c^* = reduced effective stress soil cohesion for punching shear (ksf)

ϕ^* = reduced effective stress soil friction angle for punching shear (degrees)

footing. Local shear failure is a transitional condition between general and punching shear failure. Punching shear failure is characterized by vertical shear around the perimeter of the footing and is accompanied by a vertical movement of the footing and compression of the soil immediately below the footing but does not affect the soil outside the loaded area. Punching shear failure occurs in loose or compressible soils, in weak soils under slow (drained) loading, and in dense sands for deep footings subjected to high loads.

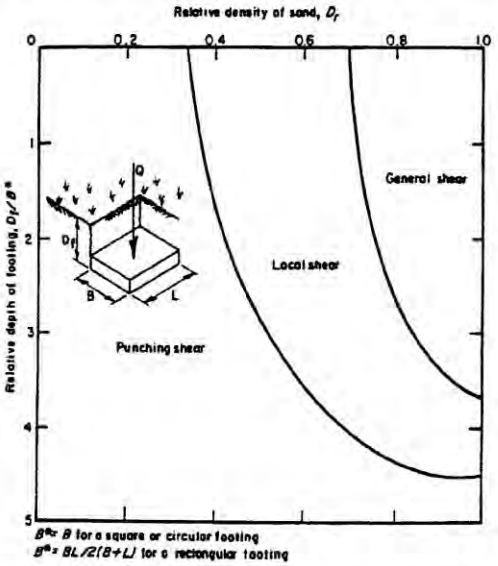


Figure C10.6.3.1.2b-1—Modes of Bearing Capacity Failure for Footings in Sand

10.6.3.1.2c—Considerations for Footings on Slopes

C10.6.3.1.2c

For footings bearing on or near slopes:

$$N_q = 0.0 \quad (10.6.3.1.2c\text{-}1)$$

In Eq. 10.6.3.1.2a-1, N_c and N_γ shall be replaced with N_{cq} and $N_{\gamma q}$, respectively, from Figures 10.6.3.1.2c-1 and 10.6.3.1.2c-2 for footings bearing on or near slopes. In Figure 10.6.3.1.2c-1, the slope stability factor, N_s, shall be taken as:

A rational numerical approach for determining a modified bearing capacity factor, N_{cq}, for footings on or near a slope is given in Bowles (1988).

- For $B < H_s$:

$$N_s = 0 \quad (10.6.3.1.2c\text{-}2)$$

- For $B \geq H_s$:

$$N_s = \frac{\gamma H_s}{c} \qquad (10.6.3.1.2c\text{-}3)$$

where:

B = footing width (ft)

H_s = height of sloping ground mass (ft)

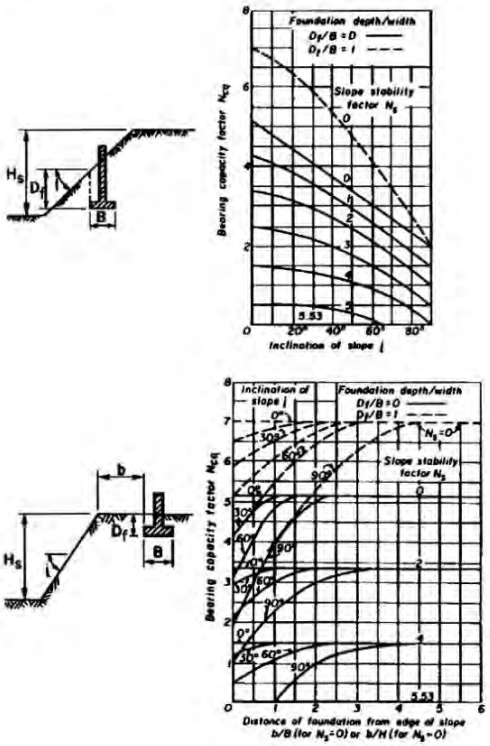


Figure 10.6.3.1.2c-1—Modified Bearing Capacity Factors for Footing in Cohesive Soils and on or adjacent to Sloping Ground after Meyerhof (1957)

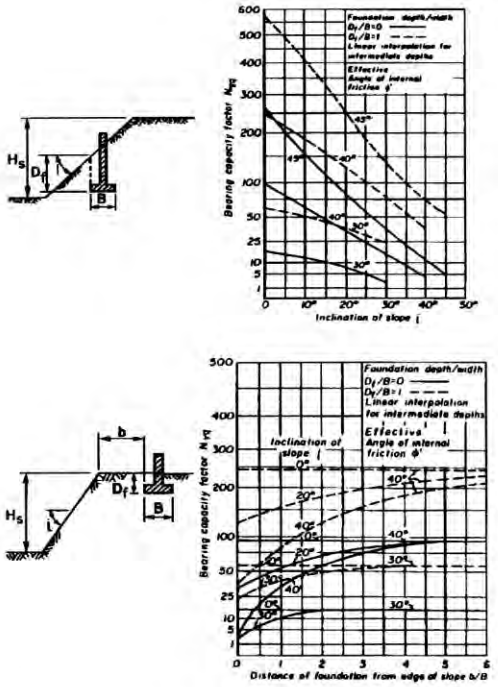


Figure 10.6.3.1.2c-2—Modified Bearing Capacity Factors for Footing in Cohesionless Soils and on or adjacent to Sloping Ground after Meyerhof (1957)

10.6.3.1.2d—Considerations for Two-Layer Soil Systems—Critical Depth

Where the soil profile contains a second layer of soil with different properties affecting shear strength within a distance below the footing less than H_{crit}, the bearing resistance of the layered soil profile shall be determined using the provisions for two-layered soil systems herein. The distance H_{crit}, in feet, may be taken as:

$$H_{crit} = \frac{(3B)\ \ln\left(\frac{q_1}{q_2}\right)}{2\left(1+\frac{B}{L}\right)} \qquad (10.6.3.1.2d\text{-}1)$$

where:

q_1 = nominal bearing resistance of footing supported in the upper layer of a two-layer system, assuming the upper layer is infinitely thick (ksf)

q_2 = nominal bearing resistance of a fictitious footing of the same size and shape as the actual footing but supported on surface of the second (lower) layer of a two-layer system (ksf)

B = footing width (ft)

L = footing length (ft)

10.6.3.1.2e—Two-Layered Soil System in Undrained Loading

Where a footing is supported on a two-layered soil system subjected to undrained loading, the nominal bearing resistance may be determined using Eq. 10.6.3.1.2a-1 with the following modifications:

c_1 = undrained shear strength of the top layer of soil as depicted in Figure 10.6.3.1.2e-1 (ksf)

N_{cm} = N_m, a bearing capacity factor as specified below (dim)

N_{qm} = 1.0 (dim)

Where the bearing stratum overlies a stiffer cohesive soil, N_m, may be taken as specified in Figure 10.6.3.1.2e-2.

Where the bearing stratum overlies a softer cohesive soil, N_m may be taken as:

$$N_m = \left(\frac{1}{\beta_m} + \kappa s_c N_c\right) \le s_c N_c \qquad (10.6.3.1.2e\text{-}1)$$

in which:

$$\beta_m = \frac{BL}{2(B+L)H_{s2}} \qquad (10.6.3.1.2e\text{-}2)$$

$$\kappa = \frac{c_2}{c_1} \qquad (10.6.3.1.2e\text{-}3)$$

where:

β_m = the punching index (dim)

c_1 = undrained shear strength of upper soil layer (ksf)

c_2 = undrained shear strength of lower soil layer (ksf)

H_{s2} = distance from bottom of footing to top of the second soil layer (ft)

C10.6.3.1.2e

Vesic' (1970) developed a rigorous solution for the modified bearing capacity factor, N_m, for the weak undrained layer over strong undrained layer situation. This solution is given by the following equation:

$$N_m = \frac{\kappa N_c^*(N_c^* + \beta_m - 1)A}{B\ C - (\kappa N_c^* + \beta_m - 1))(N_c^* + 1)} \qquad (C10.6.3.1.2e\text{-}1)$$

in which:

$$A = \left[(\kappa+1)N_c^{*2} + (1+\kappa\beta_m)N_c^* + \beta_m - 1\right] \qquad (C10.6.3.1.2e\text{-}2)$$

$$B = \left[\kappa(\kappa+1)N_c^* + \kappa + \beta_m - 1\right] \qquad (C10.6.3.1.2e\text{-}3)$$

$$C = \left[(N_c^* + \beta_m)N_c^* + \beta_m - 1\right] \qquad (C10.6.3.1.2e\text{-}4)$$

- For circular or square footings:

$$\beta_m = \frac{B}{4H} \qquad (C10.6.3.1.2e\text{-}5)$$

$$N_c^* = 6.17$$

- For strip footings:

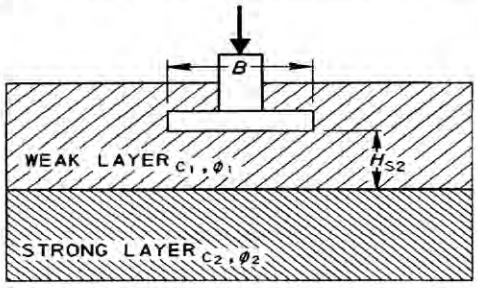
$$\beta_m = \frac{B}{2H} \qquad (C10.6.3.1.2e\text{-}6)$$

$$N_c^* = 5.14$$

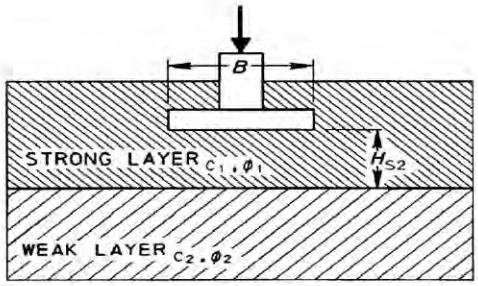
s_c = shape correction factor determined from Table 10.6.3.1.2a-3

N_c = bearing capacity factor determined herein (dim)

N_{qm} = bearing capacity factor determined herein (dim)



(a)



(b)

Figure 10.6.3.1.2e-1—Two-Layer Soil Profiles

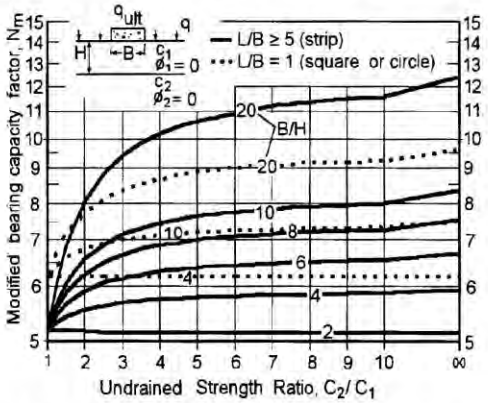


Figure 10.6.3.1.2e-2—Modified Bearing Factor for Two-Layer Cohesive Soil with Weaker Soil Overlying Stronger Soil (EPRI, 1983)

10.6.3.1.2f—Two-Layered Soil System in Drained Loading

Where a footing supported on a two-layered soil system is subjected to a drained loading, the nominal bearing resistance, in ksf, may be taken as:

$$q_n = \left[q_2 + \left(\frac{1}{K}\right) c_1' \cot \phi_1' \right] e^{2\left[1+\left(\frac{B}{L}\right)\right] K \tan \phi_1' \left(\frac{H}{B}\right)} - \left(\frac{1}{K}\right) c_1' \cot \phi_1' \quad (10.6.3.1.2f\text{-}1)$$

in which:

$$K = \frac{1-\sin^2 \phi_1'}{1+\sin^2 \phi_1'} \quad (10.6.3.1.2f\text{-}2)$$

where:

c'_1 = drained shear strength of the top layer of soil as depicted in Figure 10.6.3.1.2e-1 (ksf)

q_2 = nominal bearing resistance of a fictitious footing of the same size and shape as the actual footing but supported on surface of the second (lower) layer of a two-layer system (ksf)

ϕ'_1 = effective stress angle of internal friction of the top layer of soil (degrees)

C10.6.3.1.2f

If the upper layer is a cohesionless soil and ϕ' equals 25–50 degrees, Eq. 10.6.3.1.2f-1 reduces to:

$$q_n = q_2 e^{0.67\left[1+\left(\frac{B}{L}\right)\right]\frac{H}{B}} \quad (C10.6.3.1.2f\text{-}1)$$

10.6.3.1.3—Semiempirical Procedures

The nominal bearing resistance of foundation soils may be estimated from the results of in-situ tests or by observed resistance of similar soils. The use of a particular in-situ test and the interpretation of test results should take local experience into consideration. The following in-situ tests may be used:

- Standard Penetration Test
- Cone Penetration Test

The nominal bearing resistance in sand, in ksf, based on SPT results may be taken as:

$$q_n = \frac{\bar{N}1_{60} B}{5}\left(C_{wq} \frac{D_f}{B} + C_{w\gamma} \right) \quad (10.6.3.1.3\text{-}1)$$

where:

$\bar{N}1_{60}$ = average *SPT* blow count corrected for both overburden and hammer efficiency effects (blows/ft) as specified in Article 10.4.6.2.4. Average the blow count over a depth range from the bottom of the footing to $1.5B$ below the bottom of the footing.

B = footing width (ft)

C10.6.3.1.3

In application of these empirical methods, the use of average *SPT* blow counts and *CPT* tip resistances is specified. The resistance factors recommended for bearing resistance included in Table 10.5.5.2.2-1 assume the use of average values for these parameters. The use of lower bound values may result in an overly conservative design. However, depending on the availability of soil property data and the variability of the geologic strata under consideration, it may not be possible to reliably estimate the average value of the properties needed for design. In such cases, the Engineer may have no choice but to use a more conservative selection of design input parameters to mitigate the additional risks created by potential variability or the paucity of relevant data.

The original derivation of Eqs. 10.6.3.1.3-1 and 10.6.3.1.3-2 did not include inclination factors (Meyerhof, 1956).

$C_{wq}, C_{w\gamma}$ = correction factors to account for the location of the groundwater table as specified in Table 10.6.3.1.2a-2 (dim)

D_f = footing embedment depth taken to the bottom of the footing (ft)

The nominal bearing resistance, in ksf, for footings on cohesionless soils based on *CPT* results may be taken as:

$$q_n = \frac{\overline{q_c}B}{40}\left(C_{wq}\frac{D_f}{B} + C_{w\gamma}\right) \qquad (10.6.3.1.3\text{-}2)$$

where:

$\overline{q_c}$ = average cone tip resistance within a depth range B below the bottom of the footing (ksf)

B = footing width (ft)

$C_{wq}, C_{w\gamma}$ = correction factors to account for the location of the groundwater table as specified in Table 10.6.3.1.2a-2 (dim)

D_f = footing embedment depth taken to the bottom of the footing (ft)

10.6.3.1.4—Plate Load Tests

The nominal bearing resistance may be determined by plate load tests, provided that adequate subsurface explorations have been made to determine the soil profile below the foundation. Where plate load tests are conducted, they should be conducted in accordance with AASHTO T 235 and ASTM D1194.

The nominal bearing resistance determined from a plate load test may be extrapolated to adjacent footings where the subsurface profile is confirmed by subsurface exploration to be similar.

C10.6.3.1.4

Plate load tests have a limited depth of influence and furthermore may not disclose the potential for long-term consolidation of foundation soils.

Scale effects should be addressed when extrapolating the results to performance of full scale footings. Extrapolation of the plate load test data to a full scale footing should be based on the design procedures provided herein for settlement (service limit state) and bearing resistance (strength and extreme event limit state), with consideration to the effect of the stratification, i.e., layer thicknesses, depths, and properties. Plate load test results should be applied only within a sub-area of the project site for which the subsurface conditions, i.e., stratification, geologic history, and properties, are relatively uniform.

10.6.3.2—Bearing Resistance of Rock

10.6.3.2.1—General

The methods used for design of footings on rock shall consider the presence, orientation, and condition of discontinuities, weathering profiles, and other similar profiles as they apply at a particular site.

For footings on competent rock, reliance on simple and direct analyses based on uniaxial compressive rock strengths and *RQD* may be applicable. For footings on less competent rock, more detailed investigations and

C10.6.3.2.1

The design of spread footings bearing on rock is frequently controlled by either overall stability, i.e., the orientation and conditions of discontinuities, or load eccentricity considerations. The designer should verify adequate overall stability at the service limit state and size the footing based on eccentricity requirements at the strength limit state before checking nominal bearing resistance at both the service and strength limit states.

LGCI
Lahlaf Geotechnical Consulting, Inc.

BEARING RESISTANCE CALCULATION

LGCI Project No.:	2139	Calculated by:	TG
LGCI Project Name:	Prop. Mast Arms, Reinforced Slope, and Retaining Wal	Date:	10/11/2022
Location:	Stoughton, MA	Checked by:	AML
Client:	Nitsch Engineering, Inc.	Date:	10/11/2022

$q_n = c\ N_{cm} + 0.5\ \gamma\ B\ N_{\gamma m}\ C_{w\gamma} + q\ N_{qm}\ C_{wq}$ (AASHTO 2014, 10.6.3.2a-1)

$q_n = c\ N_c\ s_c\ i_c + 0.5\ \gamma\ B\ N_\gamma\ s_\gamma\ i_\gamma\ C_{w\gamma} + q\ N_q\ s_q\ d_q\ i_q\ C_{wq}$

where:

q_n = Nominal bearing resistance

c = shear strength

B = Width of footing

q = (total or buoyant unit weight, γ or γ') x (depth of embedment, D_f)

$C_{w\gamma}$ and C_{wq} = Correction Factors for the g.w. Table (AASHTO 2014 Table 10.6.3.1.2a-2)

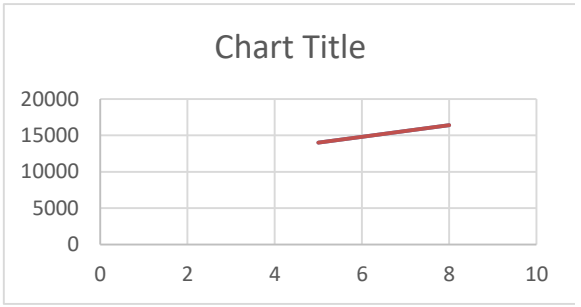
$N_{c,\gamma,q}$ = Bearing Capacity Factors (AASHTO 2014, Table 10.6.3.1.2a-1)

$s_{c,\gamma,q}$ = Shape Factors (AASHTO 2014, Table 10.6.3.1.2a-3)

d_q = Depth Correction Factor (AASHTO 2014, Table 10.6.3.1.2a-4)

$i_{c,\gamma,q}$ = Incline loading factors (AASHTO 2014, Equations 10.6.3.1.2a-5 to -9)

	Calculated		
5	14009	14009	
6	14814	14808	
7	15613	15607	
8	16406	16406	
Slope =	799		
Intercept=	10014		
qn = 0.8 B +	10.014		



Given:

Bearing material (fine grained or granular):			Granular
Thinkness of granular soil beaneath footing, h =	0	feet	
Footing inclination, α, =	0	Degrees	
Width of footing, B =	8	feet	
Effective width, B' =	8	feet	assume ring foundation (mat foundation would lead higher qall)
Wall height, H =	7.5	feet	
Length of footing, L =	99	feet	
Depth of Embedment, D_f =	4		(see Note 2 below)
Groundwater depth, d_w =	6	feet	
Load inclination, θ =	90	Degrees	(AASHTO 2014, Figure C10.6.3.2a-1)
Angle of friction, ϕ =	31	Degrees	See shear strength page

Shear strength (c or s_u) =	0	psf	
Unit weight of soil, γ =	120	pcf	
Unit Weight of Water, γ_w =	62.4	pcf	

N_c =	32.7	N_{cm} =	34.36465
N_q =	20.6	N_{qm} =	21.5996
N_γ=	26	$N_{\gamma m}$=	25.1596

Notes:

1. For granular bearing materials B=B'. For fine grained soils, B'=B+h (where h = thickness of layer of granular fill placed beneath the footing) assuming a 2V:1H footing load distribution (see Perloff & Baron, 1976, attached)

2. Depth of embedment D_f is 4 feet

S_c =	1.05	i_c =	1	b_c =	1.00	d_q =	1	C_{wq} =	1

S_q = 1 i_q = 1 b_q = 1.00 $C_{w\gamma}$ = 0.5

S_γ = 1 i_γ = 1

q_n = 16,406 psf

For Allowable Stress Design (ASD), use FS = 3 i. e., qall = 5,469 psf

Load Resistance Factor Design (LRFD): AASHTO 2014, Table 10.5.5.2.2-1: 0.45 For Munfakh et Al. (sand w/SPT)

Factored Bearing Resistance q_r = 7,383 psf

3.69 tsf

Shape Factors (AASHTO 2012, Table 10.6.3.1.2a-3)

$\phi = 0$, $s_c = 1 + (B/5L)$

$\phi > 0$, $s_c = 1 + (B/L)(N_q/N_c)$ = 1.051

$\phi = 0$, $s_q = 1$

$s_q = 1 + (B/L)\tan\phi$ = 1.049

$\phi = 0$, $s_\gamma = 1$

$s_\gamma = 1 - 0.4(B/L)$ = 0.968

Load Inclination Factors (if horizontal load other than lateral pressure, enter manually)

NEGLECT LOAD INCLINATION FACTORS PER COMMENTARY on AASHTO-9 (2020) page 10-71. Use

$i_c = i_q - [(1-i_q)/(N_q-1)]$ for $\phi > 0$

$i_c = 1 - (nh/BLcN_c)$ for $\phi = 0$

i_c = 1.000

$i_q = [1 - h/(v + BLc\cot\phi)]^n$ = 1.000

$i_\gamma = [1 - h/(v + BLc\cot\phi)]^{(n+1)}$ = 1.000

$n = [2 + L/B)/(1 + L/B)]\cos^2\theta + [(2 + B/L)/(1 + B/L)]\sin^2\theta$ = 1.925

Estimate P, and Q. Use:

Coefficient of lateral earth pressure, K_A =	0	
Wall height, H =	7.5	feet
Groundwater depth, d_w =	6	feet
Wall Toe, t_w =	2	feet
Unit weight of fill, γ_{fill} =	120	pcf
Unit weight of water, γ_w =	62.4	pcf
$v = (\gamma_{fill} * H)(B - t_w)$ =	5,400	plf
$h = K_A(\gamma_{fill} * H) * H/2$ =	0	plf

Base inclination Factors (Based on AASHTO 2002. Not included in AASHTO 2007)

$b_q = b_\gamma = (1 - \alpha\tan\phi)^2$ = 1.00

$b_c = b_\gamma - (1 - b_\gamma)/(N_c \tan\phi)$ for $\phi > 0$

$b_c = 1 - (2\alpha/(\pi + 2))$ for $\phi = 0$

b_c = 1.00

Depth Correction Factor

Table 10.6.3.1.2-a4

d_q = 1.0

Groundwater Correction Factor

C_{wq} 1

$C_{w\gamma}$ 0.5

Table 4-3 Manual On Estimating Soil Properties for Foundation Design– EPRI 1990

N VERSUS $\bar{\phi}_{tc}$ RELATIONSHIPS

N Value (blows/ft or 305 mm)	Relative Density	Approximate $\bar{\phi}_{tc}$ (degrees) (a)	(b)
0 to 4	very loose	< 28	< 30
4 to 10	loose	28 to 30	30 to 35
10 to 30	medium	30 to 36	35 to 40
30 to 50	dense	36 to 41	40 to 45
> 50	very dense	> 41	> 45

a - Source: Peck, Hanson, and Thornburn (12), p. 310.
b - Source: Meyerhof (13), p. 17.

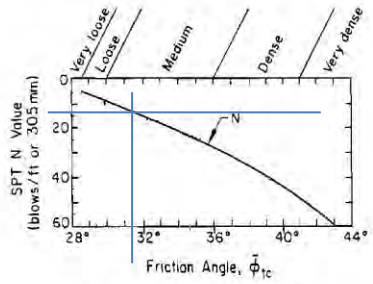


Figure 4-12. N versus $\bar{\phi}_{tc}$

Source: Peck, Hanson, and Thornburn (12), p. 310.

can be approximated as follows:

$$\bar{\phi}_{tc} \approx \tan^{-1} [0.1 + 0.38 \log (q_c/\bar{\sigma}_{vo})] \quad (4\text{-}12)$$

Adjustments to this figure and equation for soils of different compressibility and stress history should be made as described in Section 2.

4-15

Use top 2 SPTs

WB-1	WB-2
15	5
13	9
110	6
25	25

average. = 10.5

ignored

Correct for hammer energy: N60=80/60* 10.5 = 14

Average of top 6 N values in sand = 0.456522

Navg =14 Phi = 31.5 Degrees by Peck et al., say 31 degrees
Navg = Phi = Degrees by Meyerhof say: Degrees
Use Phi = 31

AASHTO 2012, Table 10.6.3.1.2a-1

Angle of friction, ϕ =	N_c	N_q	N_γ
0	5.14	1	0
1	5.4	1.1	0.1
2	5.6	1.2	0.2
3	5.9	1.3	0.2
4	6.2	1.4	0.3
5	6.5	1.6	0.5
6	6.8	1.7	0.6
7	7.2	1.9	0.7
8	7.5	2.1	0.9
9	7.9	2.3	1
10	8.4	2.5	1.2
11	8.8	2.7	1.4
12	9.3	3	1.7
13	9.8	3.3	2
14	10.4	3.6	2.3
15	11	3.9	2.7
16	11.6	4.3	3.1
17	12.3	4.8	3.5
18	13.1	5.3	4.1
19	13.9	5.8	4.7
20	14.8	6.4	5.4
21	15.8	7.1	6.2
22	16.9	7.8	7.1
23	18.1	8.7	8.2
24	19.3	9.6	9.4
25	20.7	10.7	10.9
26	22.3	11.9	12.5
27	23.9	13.2	14.5
28	25.8	14.7	16.7
29	27.9	16.4	19.3
30	30.1	18.4	22.4
31	32.7	20.6	26
32	35.5	23.2	30.2
33	38.6	26.1	35.2
34	42.2	29.4	41.1
35	46.1	33.3	48
36	50.6	37.8	56.3
37	55.6	42.9	66.2
38	61.4	48.9	78
39	67.9	56	92.3
40	75.3	64.2	109.4
41	83.9	73.9	130.2
42	93.7	85.4	155.6
43	105.1	99	186.5
44	118.4	115.3	224.6
45	133.9	134.9	271.8

Consideration should be given to the relative change in the computed nominal resistance based on effective versus gross footing dimensions for the size of footings typically used for bridges. Judgment should be used in deciding whether the use of gross footing dimensions for computing nominal bearing resistance at the strength limit state would result in a conservative design.

10.6.3.1.2—Theoretical Estimation

10.6.3.1.2a—Basic Formulation

C10.6.3.1.2a

The nominal bearing resistance shall be estimated using accepted soil mechanics theories and should be based on measured soil parameters. The soil parameters used in the analyses shall be representative of the soil shear strength under the considered loading and subsurface conditions.

The nominal bearing resistance of spread footings on cohesionless soils shall be evaluated using effective stress analyses and drained soil strength parameters.

The nominal bearing resistance of spread footings on cohesive soils shall be evaluated for total stress analyses and undrained soil strength parameters. In cases where the cohesive soils may soften and lose strength with time, the bearing resistance of these soils shall also be evaluated for permanent loading conditions using effective stress analyses and drained soil strength parameters.

For spread footings bearing on compacted soils, the nominal bearing resistance shall be evaluated using the more critical of either total or effective stress analyses.

Except as noted below, the nominal bearing resistance of a soil layer, in ksf, should be taken as:

$$q_n = cN_{cm} + \gamma D_f N_{qm} C_{wq} + 0.5\gamma \quad BN_{\gamma m} C_{w\gamma} \tag{10.6.3.1.2a-1}$$

The bearing resistance formulation provided in Eqs. 10.6.3.1.2a-1 though 10.6.3.1.2a-4 is the complete formulation as described in the Munfakh, et al. (2001). However, in practice, not all of the factors included in these equations have been routinely used.

in which:

$$N_{cm} = N_c s_c i_c \tag{10.6.3.1.2a-2}$$

$$N_{qm} = N_q s_q d_q i_q \tag{10.6.3.1.2a-3}$$

$$N_\gamma m = N_\gamma s_\gamma i_\gamma \tag{10.6.3.1.2a-4}$$

where:

c = cohesion, taken as undrained shear strength (ksf)

N_c = cohesion term (undrained loading) bearing capacity factor as specified in Table 10.6.3.1.2a-1 (dim)

N_q = surcharge (embedment) term (drained or undrained loading) bearing capacity factor as specified in Table 10.6.3.1.2a-1 (dim)

N_γ = unit weight (footing width) term (drained loading) bearing capacity factor as specified in Table 10.6.3.1.2a-1 (dim)

γ = total (moist) unit weight of soil above or below the bearing depth of the footing (kcf)

D_f = footing embedment depth (ft)

B = footing width (ft)

$C_{wq}, C_{w\gamma}$ = correction factors to account for the location of the groundwater table as specified in Table 10.6.3.1.2a-2 (dim)

s_c, s_γ, s_q = footing shape correction factors as specified in Table 10.6.3.1.2a-3 (dim)

d_q = correction factor to account for the shearing resistance along the failure surface passing through cohesionless material above the bearing elevation as specified in Table 10.6.3.1.2a-4 (dim)

i_c, i_γ, i_q = load inclination factors determined from Eqs. 10.6.3.1.2a-5 or 10.6.3.1.2a-6, and 10.6.3.1.2a-7 and 10.6.3.1.2a-8 (dim)

For $\phi_f = 0$:

$$i_c = 1 - (mH/cBLN_c) \qquad (10.6.3.1.2a\text{-}5)$$

For $\phi_f > 0$:

$$i_c = i_q - [(1 - i_q)/(N_q - 1)] \qquad (10.6.3.1.2a\text{-}6)$$

in which:

$$i_q = \left[1 - \frac{H}{(V + cBL\cot\phi_f)}\right]^n \qquad (10.6.3.1.2a\text{-}7)$$

$$i_\gamma = \left[1 - \frac{H}{V + cBL\cot\phi_f)}\right]^{(n+1)} \qquad (10.6.3.1.2a\text{-}8)$$

$$n = [(2 + L/B)/(1 + L/B)]\cos^2\theta + [(2 + B/L)/(1 + B/L)]\sin^2\theta \qquad (10.6.3.1.2a\text{-}9)$$

Most geotechnical engineers nationwide have not used the load inclination factors. This is due, in part, to the lack of knowledge of the vertical and horizontal loads at the time of geotechnical explorations and preparation of bearing resistance recommendations.

Furthermore, the basis of the load inclination factors computed by Eqs. 10.6.3.1.2a-5 to 10.6.3.1.2a-8 is a combination of bearing resistance theory and small scale load tests on 1 in. wide plates on London Clay and Ham River Sand (Meyerhof, 1953). Therefore, the factors do not take into consideration the effects of depth of embedment. Meyerhof further showed that for footings with a depth of embedment ratio of $D_f/B = 1$, the effects of load inclination on bearing resistance are relatively small. The theoretical formulation of load inclination factors were further examined by Brinch-Hansen (*1970*), with additional modification by Vesic (*1973*) into the form provided in Eqs. 10.6.3.1.2a-5 to 10.6.3.1.2a-8.

It should further be noted that the resistance factors provided in Article 10.5.5.2.2 were derived for vertical loads. The applicability of these resistance factors to design of footings resisting inclined load combinations is not currently known. The combination of the resistance factors and the load inclination factors may be overly conservative for footings with an embedment of approximately $D_f/B = 1$ or deeper because the load inclination factors were derived for footings without embedment.

where:

B = footing width (ft)

L = footing length (ft)

H = unfactored horizontal load (kips)

V = unfactored vertical load (kips)

θ = projected direction of load in the plane of the footing, measured from the side of length L (degrees)

In practice, therefore, for footings with modest embedment, consideration may be given to omission of the load inclination factors.

Figure C10.6.3.1.2a-1 shows the convention for determining the θ angle in Eq. 10.6.3.1.2a-9.

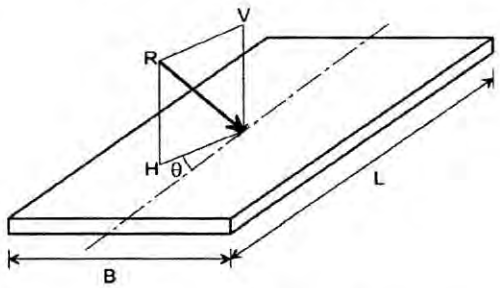


Figure C10.6.3.1.2a-1—Inclined Loading Conventions

Table 10.6.3.1.2a-1—Bearing Capacity Factors N_c (Prandtl, 1921), N_q (Reissner, 1924), and N_γ (Vesic, 1975)

ϕ_f	N_c	N_q	N_γ	ϕ_f	N_c	N_q	N_γ
0	5.14	1.0	0.0	23	18.1	8.7	8.2
1	5.4	1.1	0.1	24	19.3	9.6	9.4
2	5.6	1.2	0.2	25	20.7	10.7	10.9
3	5.9	1.3	0.2	26	22.3	11.9	12.5
4	6.2	1.4	0.3	27	23.9	13.2	14.5
5	6.5	1.6	0.5	28	25.8	14.7	16.7
6	6.8	1.7	0.6	29	27.9	16.4	19.3
7	7.2	1.9	0.7	30	30.1	18.4	22.4
8	7.5	2.1	0.9	31	32.7	20.6	26.0
9	7.9	2.3	1.0	32	35.5	23.2	30.2
10	8.4	2.5	1.2	33	38.6	26.1	35.2
11	8.8	2.7	1.4	34	42.2	29.4	41.1
12	9.3	3.0	1.7	35	46.1	33.3	48.0
13	9.8	3.3	2.0	36	50.6	37.8	56.3
14	10.4	3.6	2.3	37	55.6	42.9	66.2
15	11.0	3.9	2.7	38	61.4	48.9	78.0
16	11.6	4.3	3.1	39	67.9	56.0	92.3
17	12.3	4.8	3.5	40	75.3	64.2	109.4
18	13.1	5.3	4.1	41	83.9	73.9	130.2
19	13.9	5.8	4.7	42	93.7	85.4	155.6
20	14.8	6.4	5.4	43	105.1	99.0	186.5
21	15.8	7.1	6.2	44	118.4	115.3	224.6
22	16.9	7.8	7.1	45	133.9	134.9	271.8

Table 10.6.3.1.2a-2—Coefficients C_{wq} and $C_{w\gamma}$ for Various Groundwater Depths

D_w	C_{wq}	$C_{w\gamma}$
0.0	0.5	0.5
D_f	1.0	0.5
$>1.5B + D_f$	1.0	1.0

Where the position of groundwater is at a depth less than 1.5 times the footing width below the footing base, the bearing resistance is affected. The highest anticipated groundwater level should be used in design.

Table 10.6.3.1.2a-3—Shape Correction Factors s_c, s_γ, s_q

Factor	Friction Angle	Cohesion Term (s_c)	Unit Weight Term (s_γ)	Surcharge Term (s_q)
Shape Factors s_c, s_γ, s_q	$\phi_f = 0$	$1+\left(\frac{B}{5L}\right)$	1.0	1.0
	$\phi_f > 0$	$1+\left(\frac{B}{L}\right)\left(\frac{N_q}{N_c}\right)$	$1-0.4\left(\frac{B}{L}\right)$	$1+\left(\frac{B}{L}\tan\phi_f\right)$

Table 10.6.3.1.2a-4—Depth Correction Factor d_q

Friction Angle, ϕ_f (degrees)	D_f/B	d_q
32	1	1.20
	2	1.30
	4	1.35
	8	1.40
37	1	1.20
	2	1.25
	4	1.30
	8	1.35
42	1	1.15
	2	1.20
	4	1.25
	8	1.30

The depth correction factor should be used only when the soils above the footing bearing elevation are as competent as the soils beneath the footing level; otherwise, the depth correction factor should be taken as 1.0.

Linear interpolations may be made for friction angles in between those values shown in Table 10.6.3.1.2a-4.

The parent information from which Table 10.6.3.1.2a-4 was developed covered the indicated range of friction angle, ϕ_f. Information beyond the range indicated is not available at this time.

10.6.3.1.2b—Considerations for Punching Shear

C10.6.3.1.2b

If local or punching shear failure is possible, the nominal bearing resistance shall be estimated using reduced shear strength parameters c^* and ϕ^* in Eqs. 10.6.3.1.2b-1 and 10.6.3.1.2b-2. The reduced shear parameters may be taken as:

$$c^* = 0.67c \qquad (10.6.3.1.2b\text{-}1)$$

Local shear failure is characterized by a failure surface that is similar to that of a general shear failure but that does not extend to the ground surface, ending somewhere in the soil below the footing. Local shear failure is accompanied by vertical compression of soil below the footing and visible bulging of soil adjacent to the footing but not by sudden rotation or tilting of the

$$\phi^* = \tan^{-1}(0.67 \tan \phi_f) \quad (10.6.3.1.2b\text{-}2)$$

where:

c^* = reduced effective stress soil cohesion for punching shear (ksf)

ϕ^* = reduced effective stress soil friction angle for punching shear (degrees)

footing. Local shear failure is a transitional condition between general and punching shear failure. Punching shear failure is characterized by vertical shear around the perimeter of the footing and is accompanied by a vertical movement of the footing and compression of the soil immediately below the footing but does not affect the soil outside the loaded area. Punching shear failure occurs in loose or compressible soils, in weak soils under slow (drained) loading, and in dense sands for deep footings subjected to high loads.

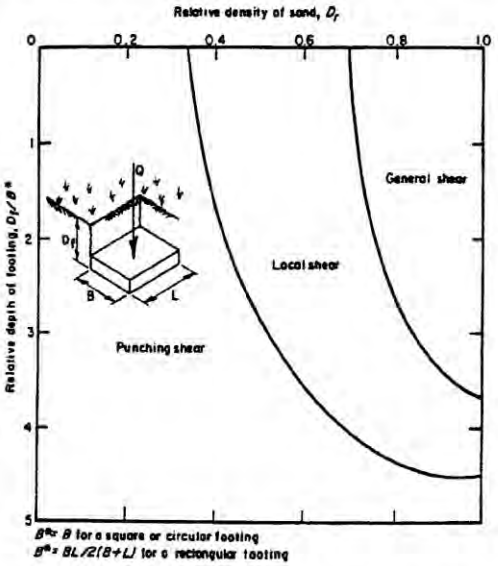


Figure C10.6.3.1.2b-1—Modes of Bearing Capacity Failure for Footings in Sand

10.6.3.1.2c—Considerations for Footings on Slopes

C10.6.3.1.2c

For footings bearing on or near slopes:

$$N_q = 0.0 \quad (10.6.3.1.2c\text{-}1)$$

In Eq. 10.6.3.1.2a-1, N_c and N_γ shall be replaced with N_{cq} and $N_{\gamma q}$, respectively, from Figures 10.6.3.1.2c-1 and 10.6.3.1.2c-2 for footings bearing on or near slopes. In Figure 10.6.3.1.2c-1, the slope stability factor, N_s, shall be taken as:

A rational numerical approach for determining a modified bearing capacity factor, N_{cq}, for footings on or near a slope is given in Bowles (1988).

- For $B < H_s$:

$$N_s = 0 \quad (10.6.3.1.2c\text{-}2)$$

- For $B \geq H_s$:

$$N_s = \frac{\gamma H_s}{c} \qquad (10.6.3.1.2c\text{-}3)$$

where:

B = footing width (ft)

H_s = height of sloping ground mass (ft)

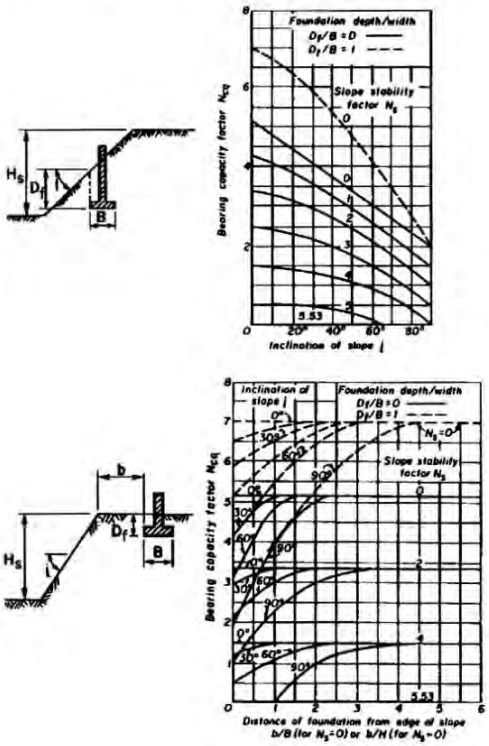


Figure 10.6.3.1.2c-1—Modified Bearing Capacity Factors for Footing in Cohesive Soils and on or adjacent to Sloping Ground after Meyerhof (1957)

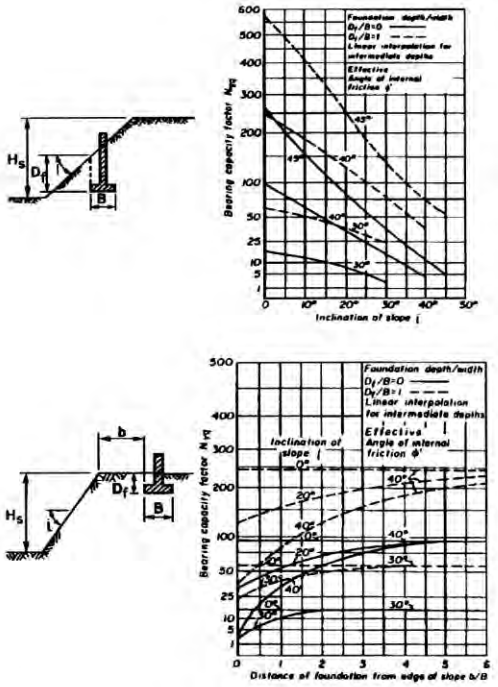


Figure 10.6.3.1.2c-2—Modified Bearing Capacity Factors for Footing in Cohesionless Soils and on or adjacent to Sloping Ground after Meyerhof (1957)

10.6.3.1.2d—Considerations for Two-Layer Soil Systems—Critical Depth

Where the soil profile contains a second layer of soil with different properties affecting shear strength within a distance below the footing less than H_{crit}, the bearing resistance of the layered soil profile shall be determined using the provisions for two-layered soil systems herein. The distance H_{crit}, in feet, may be taken as:

$$H_{crit} = \frac{(3B)\ \ln\left(\frac{q_1}{q_2}\right)}{2\left(1+\frac{B}{L}\right)} \qquad (10.6.3.1.2d\text{-}1)$$

where:

q_1 = nominal bearing resistance of footing supported in the upper layer of a two-layer system, assuming the upper layer is infinitely thick (ksf)

q_2 = nominal bearing resistance of a fictitious footing of the same size and shape as the actual footing but supported on surface of the second (lower) layer of a two-layer system (ksf)

B = footing width (ft)

L = footing length (ft)

10.6.3.1.2e—Two-Layered Soil System in Undrained Loading

Where a footing is supported on a two-layered soil system subjected to undrained loading, the nominal bearing resistance may be determined using Eq. 10.6.3.1.2a-1 with the following modifications:

c_1 = undrained shear strength of the top layer of soil as depicted in Figure 10.6.3.1.2e-1 (ksf)

N_{cm} = N_m, a bearing capacity factor as specified below (dim)

N_{qm} = 1.0 (dim)

Where the bearing stratum overlies a stiffer cohesive soil, N_m, may be taken as specified in Figure 10.6.3.1.2e-2.

Where the bearing stratum overlies a softer cohesive soil, N_m may be taken as:

$$N_m = \left(\frac{1}{\beta_m} + \kappa s_c N_c\right) \le s_c N_c \qquad (10.6.3.1.2e\text{-}1)$$

in which:

$$\beta_m = \frac{BL}{2(B+L)H_{s2}} \qquad (10.6.3.1.2e\text{-}2)$$

$$\kappa = \frac{c_2}{c_1} \qquad (10.6.3.1.2e\text{-}3)$$

where:

β_m = the punching index (dim)

c_1 = undrained shear strength of upper soil layer (ksf)

c_2 = undrained shear strength of lower soil layer (ksf)

H_{s2} = distance from bottom of footing to top of the second soil layer (ft)

C10.6.3.1.2e

Vesic' (1970) developed a rigorous solution for the modified bearing capacity factor, N_m, for the weak undrained layer over strong undrained layer situation. This solution is given by the following equation:

$$N_m = \frac{\kappa N_c^*(N_c^* + \beta_m - 1)A}{B\ C - (\kappa N_c^* + \beta_m - 1))(N_c^* + 1)} \qquad (C10.6.3.1.2e\text{-}1)$$

in which:

$$A = \left[(\kappa+1)N_c^{*2} + (1+\kappa\beta_m)N_c^* + \beta_m - 1\right] \qquad (C10.6.3.1.2e\text{-}2)$$

$$B = \left[\kappa(\kappa+1)N_c^* + \kappa + \beta_m - 1\right] \qquad (C10.6.3.1.2e\text{-}3)$$

$$C = \left[(N_c^* + \beta_m)N_c^* + \beta_m - 1\right] \qquad (C10.6.3.1.2e\text{-}4)$$

- For circular or square footings:

$$\beta_m = \frac{B}{4H} \qquad (C10.6.3.1.2e\text{-}5)$$

$$N_c^* = 6.17$$

- For strip footings:

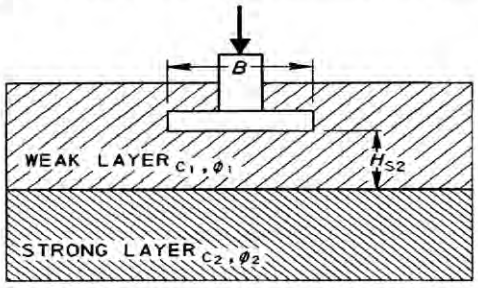
$$\beta_m = \frac{B}{2H} \qquad (C10.6.3.1.2e\text{-}6)$$

$$N_c^* = 5.14$$

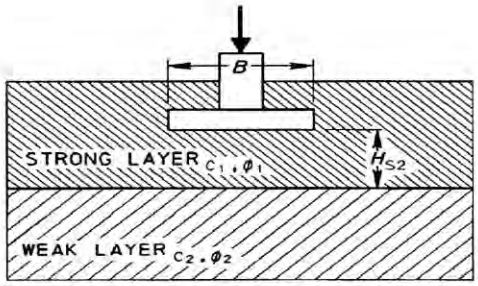
s_c = shape correction factor determined from Table 10.6.3.1.2a-3

N_c = bearing capacity factor determined herein (dim)

N_{qm} = bearing capacity factor determined herein (dim)



(a)



(b)

Figure 10.6.3.1.2e-1—Two-Layer Soil Profiles

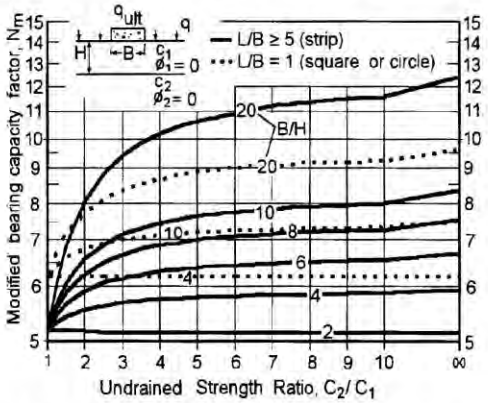


Figure 10.6.3.1.2e-2—Modified Bearing Factor for Two-Layer Cohesive Soil with Weaker Soil Overlying Stronger Soil (EPRI, 1983)

10.6.3.1.2f—Two-Layered Soil System in Drained Loading

Where a footing supported on a two-layered soil system is subjected to a drained loading, the nominal bearing resistance, in ksf, may be taken as:

$$q_n = \left[q_2 + \left(\frac{1}{K}\right)c_1' \cot \phi_1'\right] e^{2\left[1+\left(\frac{B}{L}\right)\right]K \tan \phi_1' \left(\frac{H}{B}\right)} - \left(\frac{1}{K}\right)c_1' \cot \phi_1' \quad (10.6.3.1.2f\text{-}1)$$

in which:

$$K = \frac{1-\sin^2 \phi_1'}{1+\sin^2 \phi_1'} \quad (10.6.3.1.2f\text{-}2)$$

where:

c'_1 = drained shear strength of the top layer of soil as depicted in Figure 10.6.3.1.2e-1 (ksf)

q_2 = nominal bearing resistance of a fictitious footing of the same size and shape as the actual footing but supported on surface of the second (lower) layer of a two-layer system (ksf)

ϕ'_1 = effective stress angle of internal friction of the top layer of soil (degrees)

C10.6.3.1.2f

If the upper layer is a cohesionless soil and ϕ' equals 25–50 degrees, Eq. 10.6.3.1.2f-1 reduces to:

$$q_n = q_2 e^{0.67\left[1+\left(\frac{B}{L}\right)\right]\frac{H}{B}} \quad (C10.6.3.1.2f\text{-}1)$$

10.6.3.1.3—Semiempirical Procedures

The nominal bearing resistance of foundation soils may be estimated from the results of in-situ tests or by observed resistance of similar soils. The use of a particular in-situ test and the interpretation of test results should take local experience into consideration. The following in-situ tests may be used:

- Standard Penetration Test
- Cone Penetration Test

The nominal bearing resistance in sand, in ksf, based on SPT results may be taken as:

$$q_n = \frac{\bar{N}1_{60}B}{5}\left(C_{wq}\frac{D_f}{B} + C_{w\gamma}\right) \quad (10.6.3.1.3\text{-}1)$$

where:

$\bar{N}1_{60}$ = average *SPT* blow count corrected for both overburden and hammer efficiency effects (blows/ft) as specified in Article 10.4.6.2.4. Average the blow count over a depth range from the bottom of the footing to $1.5B$ below the bottom of the footing.

B = footing width (ft)

C10.6.3.1.3

In application of these empirical methods, the use of average *SPT* blow counts and *CPT* tip resistances is specified. The resistance factors recommended for bearing resistance included in Table 10.5.5.2.2-1 assume the use of average values for these parameters. The use of lower bound values may result in an overly conservative design. However, depending on the availability of soil property data and the variability of the geologic strata under consideration, it may not be possible to reliably estimate the average value of the properties needed for design. In such cases, the Engineer may have no choice but to use a more conservative selection of design input parameters to mitigate the additional risks created by potential variability or the paucity of relevant data.

The original derivation of Eqs. 10.6.3.1.3-1 and 10.6.3.1.3-2 did not include inclination factors (Meyerhof, 1956).

$C_{wq}, C_{w\gamma}$ = correction factors to account for the location of the groundwater table as specified in Table 10.6.3.1.2a-2 (dim)

D_f = footing embedment depth taken to the bottom of the footing (ft)

The nominal bearing resistance, in ksf, for footings on cohesionless soils based on *CPT* results may be taken as:

$$q_n = \frac{\overline{q_c}B}{40}\left(C_{wq}\frac{D_f}{B} + C_{w\gamma}\right) \qquad (10.6.3.1.3\text{-}2)$$

where:

$\overline{q_c}$ = average cone tip resistance within a depth range B below the bottom of the footing (ksf)

B = footing width (ft)

$C_{wq}, C_{w\gamma}$ = correction factors to account for the location of the groundwater table as specified in Table 10.6.3.1.2a-2 (dim)

D_f = footing embedment depth taken to the bottom of the footing (ft)

10.6.3.1.4—Plate Load Tests

The nominal bearing resistance may be determined by plate load tests, provided that adequate subsurface explorations have been made to determine the soil profile below the foundation. Where plate load tests are conducted, they should be conducted in accordance with AASHTO T 235 and ASTM D1194.

The nominal bearing resistance determined from a plate load test may be extrapolated to adjacent footings where the subsurface profile is confirmed by subsurface exploration to be similar.

C10.6.3.1.4

Plate load tests have a limited depth of influence and furthermore may not disclose the potential for long-term consolidation of foundation soils.

Scale effects should be addressed when extrapolating the results to performance of full scale footings. Extrapolation of the plate load test data to a full scale footing should be based on the design procedures provided herein for settlement (service limit state) and bearing resistance (strength and extreme event limit state), with consideration to the effect of the stratification, i.e., layer thicknesses, depths, and properties. Plate load test results should be applied only within a sub-area of the project site for which the subsurface conditions, i.e., stratification, geologic history, and properties, are relatively uniform.

10.6.3.2—Bearing Resistance of Rock

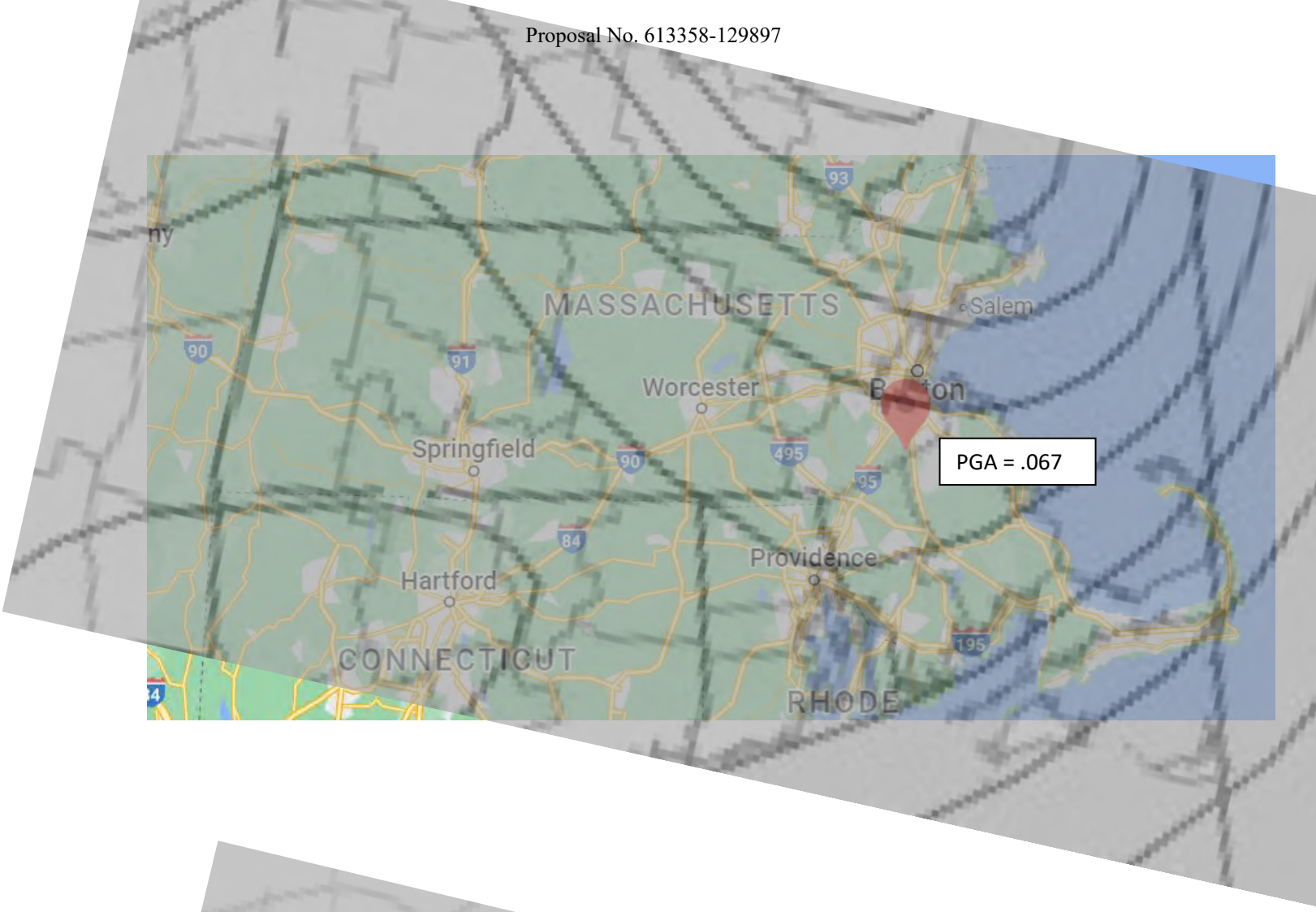
10.6.3.2.1—General

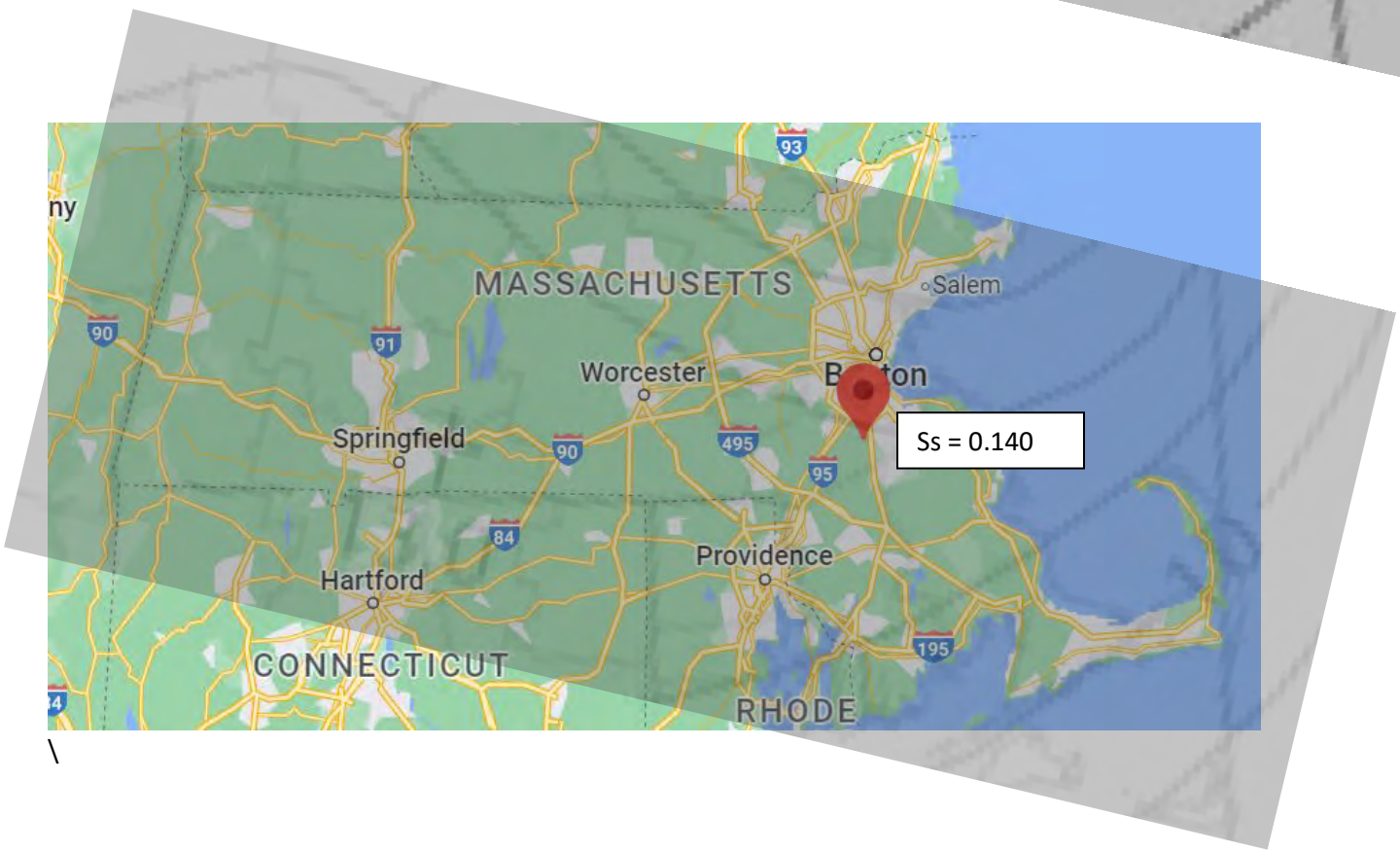
The methods used for design of footings on rock shall consider the presence, orientation, and condition of discontinuities, weathering profiles, and other similar profiles as they apply at a particular site.

For footings on competent rock, reliance on simple and direct analyses based on uniaxial compressive rock strengths and *RQD* may be applicable. For footings on less competent rock, more detailed investigations and

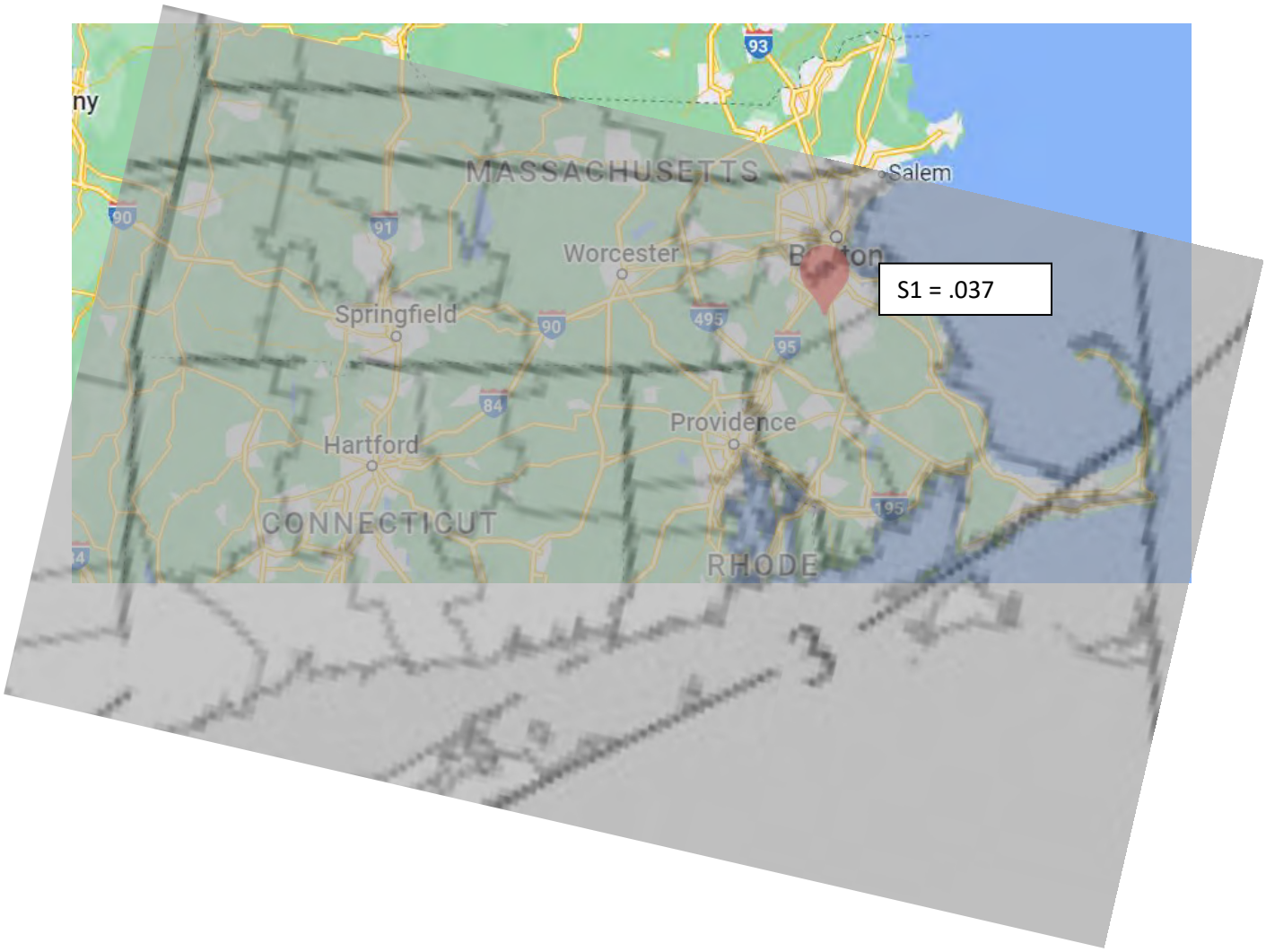
C10.6.3.2.1

The design of spread footings bearing on rock is frequently controlled by either overall stability, i.e., the orientation and conditions of discontinuities, or load eccentricity considerations. The designer should verify adequate overall stability at the service limit state and size the footing based on eccentricity requirements at the strength limit state before checking nominal bearing resistance at both the service and strength limit states.


MASSACHUSETTS
Salem
Worcester
Springfield
Hartford
Providence
CONNECTICUT
RHODE
PGA = .067


MASSACHUSETTS
Salem
Worcester
Springfield
Hartford
Providence
CONNECTICUT
RHODE
Ss = 0.140

\


MASSACHUSETTS
Worcester
Springfield
Hartford
CONNECTICUT
Providence
RHODE
Salem
S1 = .037

Project:	Prop. Mast Arms, Reinforced Slope, and Ret. Wall	Calculated by:	AML
Location:	Stoughton, MA	Date:	10/25/2022
Project No.	2139	Checked By:	JPE
Purpose:	Estimate Service Limit State Bearing Resistance	Date:	10/26/2022

Procedure: Use Hough's Method (see attached AASHTO-9 Section 10.6.2.4.2b

ΔH = $H * (1/C') * \log((\sigma'_o + \Delta\sigma)/\sigma'_o)$

σ_o = effective stress at mid-depth of layer

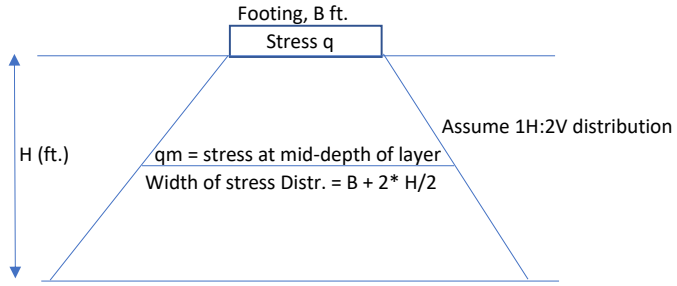
$\Delta\sigma$ = Load

C' = Bearing Capacity Index from Chart AASHTO-9 10.6.2.4.2b-1

Unit Weight =	120	pcf
Buoyant Unit Weight =	57.6	pcf
Limiting Settlement (ΔH) =	1	inch
Assume Settlement Occurs in Top	25	feet
Depth of Footing Embedment =	4	feet
H = 25' - 4' =	21	feet

Depth (ft.)	Depth to Groundwater (ft.)	Total Stress (psf)	Pore Water Pressure (psf)	Effective Stress (psf)	SPT WB-1	SPT WB-2	Average SPT, N	Energy Correction for 80% Efficiency	SPT, N60	Overburden Correction, CN = 0.77*log(40/σ_o(ksf))	SPT (N1)60
4											
7	6	840	62.4	777.6	15	5	10	1.33	13.33	1.32	17.57
9	6	1080	187.2	892.8	13	9	11	1.33	14.67	1.27	18.65
11	6	1320	312	1008	100	6	6	1.33	8.00	1.23	9.85
13	6	1560	436.8	1123.2		25	25	1.33	33.33	1.19	39.82
15	6	1800	561.6	1238.4		18	18	1.33	24.00	1.16	27.89
17	6	2040	686.4	1353.6	25	100	25	1.33	33.33	1.13	37.74
20	6	2400	873.6	1526.4	32	54	43	1.33	57.33	1.09	62.62
25	6	3000	1185.6	1814.4	33	25	29	1.33	38.67	1.03	40.00
										Average (N1)60=	31.77

ignore



Average (N1)60	Factor C'	C'*ΔH/H	Stress, qm, at H/2 from b.o.f.. (ksf)
31.77	105	0.42	1.99

q*B = qm * (B + 2*H/2)

q = qm *(1 + H/B)

q = 1.99 + 41.87 * (1/B) (ksf)

H (ft.)	qm (ksf)	B (ft.)	q (ksf)
21	1.99	5	10.37
21	1.99	6	8.97
21	1.99	7	7.98
21	1.99	8	7.23

Use of methods based on local geologic conditions and calibration require approval from the Owner.

10.6.2.4.2b—Hough Method

Estimation of spread footing settlement on cohesionless soils by the empirical Hough method shall be determined using Eqs. 10.6.2.4.2b-1 and 10.6.2.4.2b-2. *SPT* blow counts shall be corrected as specified in Article 10.4.6.2.4 for depth, i.e. overburden stress, and *SPT* hammer efficiency, before correlating the SPT blow counts to the bearing capacity index, C'.

$$S_e = \sum_{i=1}^{n} \Delta H_i \qquad (10.6.2.4.2b\text{-}1)$$

in which:

$$\Delta H_i = H_c \frac{1}{C'} \log\left(\frac{\sigma'_o + \Delta\sigma_v}{\sigma'_o}\right) \qquad (10.6.2.4.2b\text{-}2)$$

where:

n = number of soil layers within zone of stress influence of the footing
ΔH_i = elastic settlement of layer i (ft)
H_c = initial height of layer i (ft)
C' = bearing capacity index from Figure 10.6.2.4.2b-1 (dim)
σ'_o = initial vertical effective stress at the midpoint of layer i (ksf)
$\Delta\sigma_v$ = increase in vertical stress at the midpoint of layer i (ksf)

settlement due the fill or reinforced soil structure s be included in the footing settlement estimate, unle approach fill or reinforced soil structure settlem allowed to occur before the bridge foundati constructed. Both the Hough and Schmertmann m have been successfully used to estimate fill/rein soil structure settlement when cohesionless soi present (Samtani and Allen, 2018).

Details of other settlement estimation procedur be found in textbooks and engineering ma including:

- Terzaghi and Peck (1967)
- Sowers (1979)
- U.S. Department of the Navy (1982)
- D'Appolonia (Gifford et al., 1987)—This m includes consideration for over-consolidated
- Tomlinson (1986)
- Gifford et al. (1987)
- Elastic Half Space Method (Munkfakh et al.,

These methods, however, have not been calibrated.

Calibration of local methods should be bas processes as described in Samtani and Kulicki (201 Samtani and Allen (2018).

C10.6.2.4.2b

The Hough method was developed for nor consolidated cohesionless soils.

The Hough method has several advantages other methods used to estimate settlement in cohesi soil deposits, including express consideration o layering and the zone of stress influence beneath a f of finite size.

The subsurface soil profile should be subdivide layers based on stratigraphy to a depth of about times the footing width. The maximum layer thic should be about 10.0 ft.

While Hough (1959) did not specifically stat the *SPT N* values should be corrected for hammer e in addition to overburden pressure, due to the vinta the original work, hammers that typically hav efficiency of approximately 60 percent were in g used to develop the empirical correlations contain the method. If using *SPT* hammers with efficiencie differ significantly from this 60 percent value, values should also be corrected for hammer ener effect requiring that $N1_{60}$ be used (Samtani and Now 2006).

Studies conducted by Gifford et al. (1987 Samtani and Nowatzki (2006) indicate that Ho procedure may be more conservative, but with prediction variability, than the Schmertmann Me However, this difference is mostly taken into ac through the load factor, γ_{SE}, since it has been calib

layer i (ksf)

using reliability theory (Kulicki et al. 2015) (Samtar
Kulicki, 2018) (Samtani and Allen (2018).

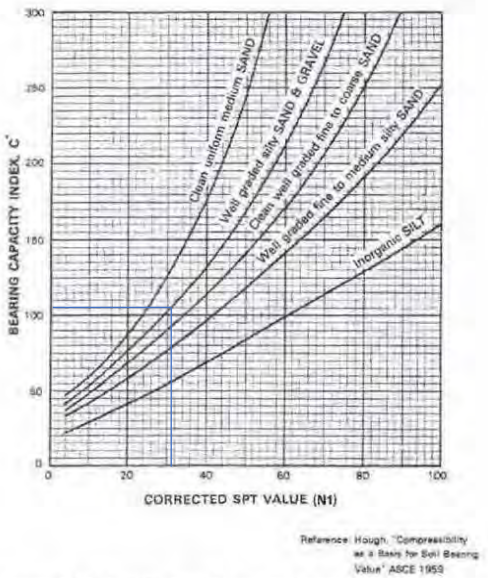


Figure 10.6.2.4.2b-1—Bearing Capacity Index versus Corrected *SPT* (Hough, 1959, as modified in Samtani and Nowatzki, 2006)

The Hough method is applicable to c
deposits. The "Inorganic Silt" curve shou
be applied to soils that exhibit plasticity be
in such soils are unreliable (Samtani
2006). The settlement characteristics of
that exhibit plasticity should be inve
undisturbed samples and laboratory conso
prescribed in Article 10.6.2.4.3.

10.6.2.4.2c—Schmertmann Method

Estimation of spread footing immediate, or elastic, settlement, S_i, on cohesionless soils by the empirical Schmertmann, method shall be calculated using Eq. 10.6.2.4.2c-1.

$$S_i = C_1 C_2 \Delta p \sum_{i=1}^{n} \Delta J_i \qquad (10.6.2.4.2c\text{-}1)$$

in which:

$$\Delta J_i = H_c\left(\frac{I_z}{144XE}\right) \qquad (10.6.2.4.2c\text{-}2)$$

$$C_1 = 1 - 0.5\left(\frac{p_o}{\Delta p}\right) \geq 0.5 \qquad (10.6.2.4.2c\text{-}3)$$

$$C_2 = 1 + 0.2\log_{10}\left(\frac{t}{0.1}\right) \qquad (10.6.2.4.2c\text{-}4)$$

where:

ΔJ_i = elastic spring stiffness of layer, i (ft/ksf)

C10.6.2.4.2c

Background information for this met
published in Schmertmann (1970) and S
al. (1978), in the format as presented here
Samtani and Nowatzki (2006). This
originally developed for use with the stati
resistance q_c, in which q_c was correlat
modulus, E, and E is used directly in thi
original formulation for this correlation by
(1970) assumed E was in units of tsf (i.e.,
(in tsf or kg/cm^2). The correlation in Tabl
predicts E in ksi. Correlations between E
values are also available and provi
10.6.2.4.2c-1.

The variables in the equati
(Eq. 10.6.2.4.2c-2) require specific units f
(provided in Table 10.6.2.4.2c-1) is in ksi.
the units for ΔJ_i being ft/ksf. Further
10.6.2.4.2c-1 and 10.6.2.4.2c-3, units of p
be ksf.

H_c = height of compressible soil layer, i (ft)

I_z = strain influence factor from Figure 10.6.2.4.2c-1a. The dimensions L_f and B_f represent the least lateral dimension of the footing after correction for eccentricities, i.e., use effective footing dimension. The strain influence factor is a function of depth and is obtained from the strain influence diagram. The

strain influence diagram is constructed for the axisymmetric case (L_f/B_f = 1) and the plane strain case ($L_f/B_f \geq 10$) as shown in Figure 10.6.2.4.2c-1a. The strain influence diagram for intermediate conditions should be determined by simple linear interpolation.

n = number of soil layers within the zone of strain influence (strain influence diagram).

Δp = net uniform applied stress (load intensity) at the foundation depth as shown in Figure 10.6.2.4.2c-1b in which p is equal to the uniform applied footing stress, σ_v, as specified in Article 11.6.3.2 (see Figure 10.6.2.4.2c-1b) (ksf).

E = elastic modulus of layer i, estimated using Table 10.6.2.4.2c-1 (ksi).

X = a factor used to determine the value of elastic modulus. The value of elastic modulus is based on correlations with $N1_{60}$-values or q_c from Table 10.6.2.4.2c-1, then values of X shall be taken as follows:

X = 1.25 for axisymmetric case (L_f/B_f = 1)
X = 1.75 for plane strain case ($L_f/B_f \geq 10$)

Use interpolation for footings with values of L_f/B_f between 1 and 10. If the value of elastic modulus is based on in-situ testing (e.g., pressuremeter), use X = 1.0.

C_1 = correction factor to incorporate the effect of strain relief due to embedment

p_o = effective in-situ overburden stress at the foundation depth as shown in Figure 10.6.2.4.2c-1b (ksf)

p_{op} = effective in-situ overburden stress at the depth to peak strain influence factor, I_{zp}, as shown in Figure 10.6.2.4.2c-1b (ksf)

Δp = net uniform applied stress (load intensity) at the foundation depth as shown in Figure 10.6.2.4.2c-1b in which p is equal to the uniform applied footing stress, σ_v, as specified in Article 11.6.3.2 (ksf).

C_2 = correction factor to incorporate time-dependent (creep) increase in settlement for time, t, after construction

For C_2, correction factor, the time duration, t, 10.6.2.4.2c-4 is set to 0.1 years to evaluate the settl immediately after construction, i.e., C_2 = 1. If long

construction

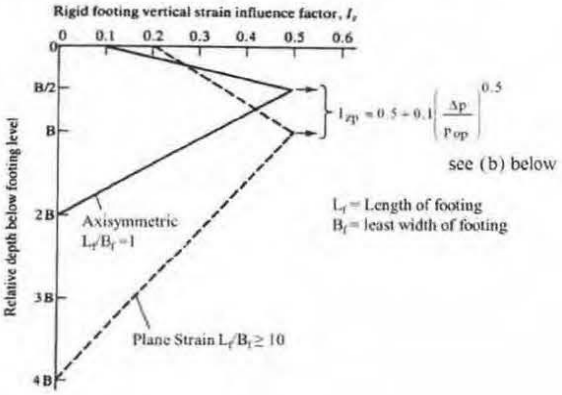
t = time from completion of construction to date under consideration for evaluation of C_2 (yrs)

The C_2 parameter shall not be used to estimate time-dependent consolidation settlements. Where consolidation settlement can occur within the depth of the strain distribution diagram, the magnitude of the consolidation settlement shall be estimated as per Article 10.6.2.4.3 and added to the immediate settlement of other layers within the strain distribution diagram where consolidation settlement may not occur.

immediately after construction, i.e., C_2 = 1.0. If long creep movement of the soil is suspected the appropriate time duration, t, should be used i computation of C_2. Creep movement is not the sa consolidation settlement. This factor can hav important influence on the reported settlement sinc included in Eq. 10.6.2.4.2c-1 as a multiplier example, the C_2 factor for time durations of 0.1 yrs 10 yrs, and 50 yrs are 1.0, 1.2, 1.4, and 1.54, respect In cohesionless soils and unsaturated fine-g cohesive soils with low plasticity, time durations yr and 1 yr, respectively, are generally appropriat sufficient for cases of static loads.

Table 10.6.2.4.2c-1—Correlations between Elastic Soil Modulus and *SPT* $N1_{60}$ or static Cone q_c values for the Schmertmann Method (modified after Schmertmann 1970, and Samtani and Nowatzki 2006)

Correlation between E and *SPT* $N1_{60}$ Value	
Soil Type	**E (ksi)**
Silts, sandy silts, slightly cohesive mixtures	$0.056\ N1_{60}$
Clean fine to medium sands and slightly silty sands	$0.097\ N1_{60}$
Coarse sands and sands with little gravel	$0.139\ N1_{60}$
Sandy gravel and gravels	$0.167\ N1_{60}$
Correlation between E and q_c (static cone resistance, in ksi)	
Soil Type	**E (ksi)**
Sandy soils	$0.028 q_c$



(a)

B_f

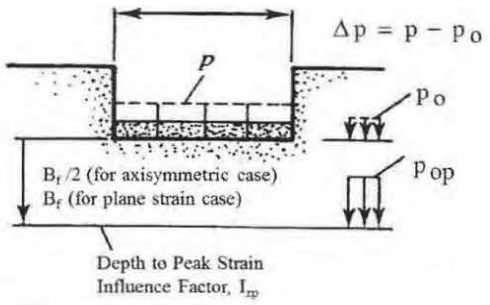


Figure 10.6.2.4.2c-1—(a) Simplified vertical strain influence factor distributions, (b) Explanation of pressure terms in equation for I_{zp} (after Schmertmann et al., 1978, as reported in Samtani and Nowatzki, 2006).

limits, grain size, and unit weight measureme
confirm soil layering.

- CU tests on normally to slightly over consol
samples that exhibit disturbance should contain a
one specimen consolidated to at least $4\sigma_p'$ to
extrapolation of the undrained shear strength at
- Undrained strengths from CU tests correspond
effective consolidation pressure used in the test
effective stress needs to be converted to the equi
depth in the ground.
- A profile of σ_p' (or OCR) should be developed an
in evaluating undrained shear strength.
- Correlations for S_u based on in-situ test measure
should not be used for final design unless they
been calibrated to the specific soil profile
consideration. Correlations for S_u based on *SP*
should be avoided.

10.4.6.2.3—Drained Strength of Cohesive Soils

Long-term effective stress strength parameters, c' and ϕ'_f, of clays should be evaluated by slow consolidated drained direct shear box tests, consolidated drained (CD) triaxial tests, or consolidated undrained (CU) triaxial tests with pore pressure measurements. In laboratory tests, the rate of shearing should be sufficiently slow to ensure substantially complete dissipation of excess pore pressure in the drained tests or, in undrained tests, complete equalization of pore pressure throughout the specimen.

C10.4.6.2.3

The selection of peak, fully softened, or re
strength for design analyses should be based on a r
of the expected or tolerable displacements of th
mass.

The use of a nonzero cohesion intercept, c
long-term analyses in natural materials mu
carefully assessed. With continuing displacement
likely that the cohesion intercept value will decre
zero for long-term conditions, especially for
plastic clays.

10.4.6.2.4—Drained Strength of Granular Soils

C10.4.6.2.4

The drained friction angle of granular deposits should be evaluated by correlation to the results of *SPT* testing, *CPT* testing, or other relevant in-situ tests. Laboratory shear strength tests on undisturbed samples, if feasible to obtain, or reconstituted disturbed samples, may also be used to determine the shear strength of granular soils.

If *SPT N* values are used, unless otherwise specified for the design method or correlation being used, they shall be corrected for the effects of overburden pressure determined as:

$$N1 = C_N N \qquad (10.4.6.2.4\text{-}1)$$

$N1$ = *SPT* blow count corrected for overburden pressure, σ'_v (blows/ft)
C_N = $[0.77 \log_{10}(40/\sigma'_v)]$, and $C_N < 2.0$
σ'_v = vertical effective stress (ksf)
N = uncorrected *SPT* blow count (blows/ft)

SPT N values should also be corrected for hammer efficiency, if applicable to the design method or correlation being used, determined as:

Because obtaining undisturbed samples of gra deposits for laboratory testing is extremely difficu results of in-situ tests are commonly used to de estimates of the drained friction angle, ϕ_f. If reconst disturbed soil samples and laboratory tests are us estimate the drained friction angle, the reconst samples should be compacted to the relative density estimated from the available in-situ The test specimen should be large enough to allo full grain size range of the soil to be included i specimen. This may not always be possible, and possible, it should be recognized that the shear str measured would likely be conservative.

A method using the results of *SPT* testi presented. Other in-situ tests, such as *CPT* and *DMT* be used. For details on determinatfion of ϕ_f from tests, refer to Sabatini et al. (2002).

The use of automatic trip hammers is increasi order to use correlations based on standard rope cathead hammers, the *SPT N* values must be correc

$$N_{60} = \left(\frac{ER}{60\%}\right)N \qquad (10.4.6.2.4\text{-}2)$$

where:

N_{60} = *SPT* blow count corrected for hammer efficiency (blows/ft)
ER = hammer efficiency expressed as percent of theoretical free fall energy delivered by the hammer system actually used (dim)
N = uncorrected *SPT* blow count (blows/ft)

When *SPT* blow counts have been corrected for both overburden effects and hammer efficiency effects, the resulting corrected blow count shall be denoted as $N1_{60}$, determined as:

$$N1_{60} = C_N N_{60} \qquad (10.4.6.2.4\text{-}3)$$

The drained friction angle of granular deposits should be determined based on the following correlation.

reflect the greater energy delivered to t these systems.

Hammer efficiency (ER) for spe systems used in local practice may be use values provided. If used, specific ha efficiencies shall be developed in gene with ASTM D4945 for dynamic analysis or other accepted procedure.

The following values for ER may hammer specific data are not available, e boring logs:

ER = 60 percent for conventional drop rope and cathead
ER = 80 percent for automatic trip hamm

Corrections for rod length, hole size liner may also be made if appropriate. In are only significant in unusual cases or significant variation from standard pro corrections may be significant for liquefaction. Information on these additio may be found in Youd and Idriss (1997).

The $N1_{60}$-ϕ_f correlation used is Bowles (1977). The correlation of Peck

Table 10.4.6.2.4-1—Correlation of *SPT* $N1_{60}$ Values to Drained Friction Angle of Granular Soils (modified after Bowles, 1977)

$N1_{60}$	ϕ_f
<4	25–30
4	27–32
10	30–35
30	35–40
50	38–43

For gravels and rock fill materials where *SPT* testing is not reliable, Figure 10.4.6.2.4-1 should be used to estimate the drained friction angle.

Rock Fill Grade	Particle Unconfined Compressive Strength (ksf)
A	>4,610
B	3,460–4,610
C	2,590– 3,460
D	1,730– 2,590
E	≤1,730

Thornburn (1974) falls within the rar
Experience should be used to select specifi
the ranges. In general, finer materials or
significant silt-sized material will fall in th
of the range. Coarser materials with less th
fines will fall in the upper portion of t
geologic history and angularity of the par
need to be considered when selecting a va

Care should be exercised when
correlations of *SPT* results to soil par
published correlations are based on cc
($N1_{60}$) and some are based on uncorrected

The designer should ascertain the
correlation and use either $N1_{60}$ or N as ap

Care should also be exercised when u
counts to estimate soil shear strength i
coarse gravel, cobbles, or boulders.
cobbles, or boulders could cause the *SPT*
be unrealistically high.

The secant friction angle derived fron
to estimate the drained friction angle of g
fill materials depicted in Figure 10.4.6.2.
a straight line from the origin of a Mohr
intersection with the strength envelope
normal stress. Thus, the angle derived is
to analysis of field conditions subject to
stresses. See Terzaghi, Peck, and Me
additional details regarding this procedure

DOCUMENT A00808

PROJECT UTILITY COORDINATION FORM

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Project Utilities Coordination (PUC) Form

CONTACTS AND GENERAL UTILITY INFORMATION

11/5/2024
Revision Date:

City/Town:	Project File #:	PUC Completed by:	Utility Pole Set:		
Stoughton	613358	MD / CJL	NGRID-Electric		
Route/Street:	**Resident Engineer:**	**Mass DOT PM:**	**Scheduled Ad Date:**	**Total Poles Relocated:**	11/5/2024 PRINTED
Route 138 / Washington Street		Shahpar Negah	2/22/2025	14	

Consultant:	Contact:	Office #	Cell #	Email
Nitsch Engineering	Matthew Soltys	(508) 365-1030	(508) 964-3355	msoltys@nitscheng.com

Utility Company	Contact	Office #	Cell #	Email	Scope, Budget, Duration Submitted		Reimbursement			Potential for District Initiated Early Relocation *		Utilities On Bridge/Structure		Utilities Underground (UG) /Aerial (OH)	
					Yes	No	Agreement	Non-Reimb'le	Notes	YES	NO	YES	NO	UG	OH
National Grid Electric	Noah Skole	(413) 335-9234		Noah.Skole@nationalgrid.com	X		X				X		X		X
Verizon	Karen Mealey	(774) 409-3160		karen.m.mealey@verizon.com	X		X				X		X		X
Comcast	Wendy Brown	(978) 848-5163		Wendy_Brown@comcast.com	X		X				X		X		X
Crown Castle	Mark Bonanno	(508) 616-7818		mark.bonanno@crowncastle.com	X		X				X		X		X
Eversource Gas	Brendan Pitts	(508) 895-4818		brendan.pitts@Eversource.com	X		X				X		X	X	
Town of Stoughton DPW	Marc Tisdelle	(781) 341-1300 ext: 9263		mtisdelle@stoughton-ma.gov	X		X				X		X		X
Eversource Electric Transmission	Ed Zdonek	(617) 541-5794		edward.zdonek@eversource.com		X	X		Eversource will not be seeking reimbursement per email received 11/01/2024.		X		X	X	

Utility Relocation Notes for MassDOT Contractor

Unless otherwise noted by Contract, the MassDOT Contractor is to provide the District Construction Office with 7 Calendar Days advance notification in order to validate the current progress and provide the required 30 Days advance notice-to-proceed for the first Utility - and each subsequent Utility. These advance notifications are to be identified in the Contractor's Schedules (Pre-Con preparation, Baseline, Subnets, and Updated/Monthly Schedules) as specified in Subsection 8.02 (for DBB Contracts) and/or Section 9 (of DB Contracts). Note: The durations included below do not include these lead-times. See Additional 'Important Basis notes for Contractor' - on last PUC Form page.

Additional notes:

Suggested Sequence of Relocation (Based on Consultant proposed construction staging)

The sequence as detailed on the following pages is based on the consultants proposed staging plan. This information was compiled through meetings that included all of the utilities listed below along with the designer and the Town of Stoughton . The information provided is the best available information prior to project advertisement.

A008088 - 3

Proposal No. 613358-129897

Is 'enabling' (prep) work, by the Contractor, necessary prior to the start of the first series of utility relocations:	Yes	No
	X	

Has any of the Utility work been identified to work concurrently	Yes	No
		X

11/5/2024
PRINTED

massDOT Massachusetts Department of Transportation Highway Division

	RESPONSIBLE PARTY		DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by Utilities (Lead time not included)	Concurrent / Exclusive Utility Work				Access Restraint & Limitations of Operations Notes	
					Contractor note: In planning and executing the work, the Access Restraints listed in the Special Provisions, takes precedence over the checklist in these 4 columns.				Should an AR be considered for the Contractor ?	
	C = Contractor	U = Utility Co.			Exclusive Utility on site: Utility working with no other Utilities in vicinity	Concurrent Utilities: Utility working with other Utilities on site	Contractor Off-Site: No Contractor physical construction operations on-site (while Utility is	Contractor Concurrent: Contractor and Utility are working on-site - but NOT in the same vicinity	Potential Access Restraint (Yes/No)	Reason/Note (optional)
	C		>Contractor to notify the Utilities 30 days prior to the start of any work. >Contractor to perform clearing & grubbing, tree trimming, required slope work, and construct proposed retaining walls as necessary.							
			UTILITY OPERATIONS - Aerial							
Task: 1			***National Grid Electric***							
		U	NGrid Electric - Site Readiness: Dig-safe, pre-checks, etc.	10	X			X		
		U	NGrid Electric - Poles & Anchors: 15 poles relocated, 1 removed. 2 pushbraces installed, 2 removed. 4 anchors installed, 1 replaced, 1 removed.	25	X			X		
		U	NGrid Electric - Electric Overhead: Reconductor with 1110ft spacer cable and frame poles. Reconductor additional 100ft 3ph 477 B/AL	35	X			X		
		U	NGrid Electric - Secondary: Replace 1210ft of seconday cable.	5	X			X		
		U	NGrid Electric - Equipment: Replace 2- 1ph transformers, 1-3ph cutouts and 1- 3ph feeder monitor.	5	X			X		
		U	NGrid Electric - Underground: Relocation of 1 3ph riser, cable pull and splicing.	10	X			X		
		U	NGrid Electric - Outage Coordination	5	X			X		
		U	NGrid Electric - Tree Trimming: Additional tree trimming needed.	10	X			X		
			Sub-Total	**105**						
Task: 2			***Crown Castle***							
		U	Crown Castle - Shuffle slack from Pole 18 to Pole 15 on Washington St. Shuffle slack from Pole 9 on York St to Pole 15 on Washington St.	1	X			X		
		U	Crown Castle - Complete +/- 8 Pole transfers on Washington St.	2	X			X		
			Sub-Total	**3**						
Task: 3			***Town of Stoughton - DPW***							
		U	Stoughton DPW - Remove streetlight arms and fixtures and relocate to new pole (approx 4)	1	X			X		
			Sub-Total	**1**						
Task: 4			***Comcast***							
		U	Comcast - Strand construction.	4	X			X		
		U	Comcast - Cable construction.	4	X			X		
		U	Comcast - Audit drops & hardline & cold-splice new equip.	4	X			X		
		U	Comcast - Night cut-over.	2	X			X		
		U	Comcast - swing Fiber & wreck-out.	11	X			X		
			Sub-Total	**25**						
Task: 5			***Verizon***							
		U	Verizon - Verizon subcontractor to relocate riser conduit to relocated utility poles.	3	X			X		
		U	Verizon - Verizon place strand and guying on newly placed National Grid placed poles.	12	X			X		
		U	Verizon - Verizon Line transfer aerial cable and service wires where possible.	5	X			X		
		U	Verizon - Verizon Line rod and rope new conduit pathways.	5	X			X		
		U	Verizon - Verizon Line place new fiber cables, terminals, and service wires. Reconnect existing service.	22	X			X		
		U	Verizon - Verizon Line place aerial copper cable.	0	X			X		
		U	Verizon - Verizon Splice join and test new fiber and copper cable.	16	X			X		
		U	Verizon - Verizon Splice trimout aerial fiber and copper cable.	15	X			X		
		U	Verizon - Verizon Line remove aerial copper plant.	24	X			X		
		U	Verizon - Verizon Line remove aerial fiber plant.	39	X			X		
		U	Verizon - Verizon remove 21 old utility poles with associated guying and anchors.	14	X			X		
			Sub-Total	**155**						
	C		>Contractor to notify the Utilities 30 days prior to the start of any work.							
			UTILITY OPERATIONS - Underground							
Task: 6			***Eversource Gas***							
		U	Eversource Gas - Relocate ~200' of 6" steel gas main due to proposed drainage structures conflicts.	12	X			X		
			Sub-Total	**12**						
Task: 7			***Eversource Electric Transmission***							
		U	Eversource Electric - Adjust / Remodel (2) EMH	1	X			X		
			Sub-Total	**1**						

IMPORTANT BASIS NOTES - FOR CONTRACTOR

1 Unless otherwise specified in the MassDOT Construction Contract, or unless specifically noted within this PUC Form, these durations (herein) are based upon the Contractor providing *unimpeded access* to the Utility company to perform Utility relocations (see Note 5 - Access).

	RESPONSIBLE PARTY		DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by Utilities (Lead time not included)	Concurrent / Exclusive Utility Work Contractor note: In planning and executing the work, the Access Restraints listed in the Special Provisions, takes precedence over the checklist in these 4 columns.				Access Restraint & Limitations of Operations Notes Should an AR be considered for the Contractor ?	
	C = Contractor	U = Utility Co.			Exclusive Utility on site: Utility working with no other Utilities in vicinity	Concurrent Utilities: Utility working with other Utilities on site	Contractor Off-Site: No Contractor physical construction operations on-site (while Utility is	Contractor Concurrent: Contractor and Utility are working on-site - but NOT in the same vicinity	Potential Access Restraint (Yes/No)	Reason/Note (optional)
2			"Concurrent Utilities" operations noted herein, are to signify those Utility Company operations that can be worked concurrently (e.g. Utility A and Utility B work on-site together) - MassDOT and the Contractor are to prepare NTPs to Utilities accordingly.							
3			"Potential Access Restraints" noted within this PUC Form are for planning purposes. See MassDOT Contract for Contractual Access Restraints (refer to Subsections 8.02, 8.03, and/or 8.06 for Design Bid Build Contracts and Volume II Section 9 for Design Build Contracts).							
4			Utility non-work periods - For planning purposes, the durations above contain some non work days (contingency) for New England conditions (precipitation, high temperatures, low temperatures, snow, ice). Gas line work however, typically has a seasonal restriction and can NOT be installed from 15-November to 15-March. Municipally Owned Electric and Gas Utilities are also restricted from proceeding from 15-November to 15-March. The Contractor shall (and the CTD plan) reflect this calendar restriction within the schedule (unless otherwise note).							
5			Access - Unless otherwise noted in the Contract, and in addition to the 'enabling' notes above, the Contractor must provide safe and unimpeded access (for trucks, lifts, cranes, etc.) to the Utilities, to allow for the proposed relocation(s) - including but not limited to snow removal, clearing and grubbing, guard rail removal, barrier removal, tree removal, and grading.							
6			For all MassDOT construction contracts issued after January 2014, the new Utility Coordination/documentation specification is required. This is Section 8.14 in Design-Bid-Build Contracts (see Design-Build index reference for applicable section #).							
7			Prior to starting any and all enabling work for Utilities, the Contractor is to plan in advance with submittals and approved durations.							
8			* Potential District Initiated Early Utility Relocation - if noted herein, the District reserves the right to initiate early utility relocation in advance of the Contract NTP. In submitting a bid price and in the development/basis of the Baseline Schedule, the Contractor shall not plan the Work with the potential benefit of any form of 'early utility relocation.' As a requirement of the Baseline submission, unless otherwise noted in this Specification, the earliest that the first Utility company is to receive the 30 days advance notification to mobilize to the site, will be 7 calendar days after the pre-construction meeting and never sooner than 7 days after the Contract NTP.							
9			** Assumed Duration, Not Provided By Utility Company.							

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DOCUMENT A00810

MassDOT Herbicide Use Report

Proposal No. 613358-129897

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:

MDAR ALERT*:

Treatment Description:

Area Treated (as applicable)

Acres: **Sq Yds:** **Miles:**

Weeds Targeted:

Gallons Formula Used:

Application Method:

Date/Time Began:

Date/Time End:

Product Used:

Name: _____	Name: _____	Name: _____
EPA Reg. No: _____	EPA Reg. No: _____	EPA Reg. No: _____
% Active Ingredient	% Active Ingredient	% Active Ingredient
Dry: _____	Dry: _____	Dry: _____
Liquid: _____	Liquid: _____	Liquid: _____
Formulation (dilution rate): _____	Formulation (dilution rate): _____	Formulation (dilution rate): _____

Additional products used (surfactants, etc.) or other information:

Applicators: **License Numbers:**

* Please note:
EDRR Species (MAM, Hogweed, Pepperweed, Kudzu, etc.)
Tree of Heaven 1) stands of >20 trees; 2) >5 trees near nursery, landscape company, or highway rest area where trucks stop

Upon completion, please submit form to MassDOT District Engineer and Landscape Design Section in Boston office.

07/18/2018

DOCUMENT A00811

WATERING LOG
for
MassDOT Plantings

Watering Log for MassDOT Plantings

Project Description:

Contract No:

Project No:

Plant Locations/s: (Attach planting plan/s as necessary)

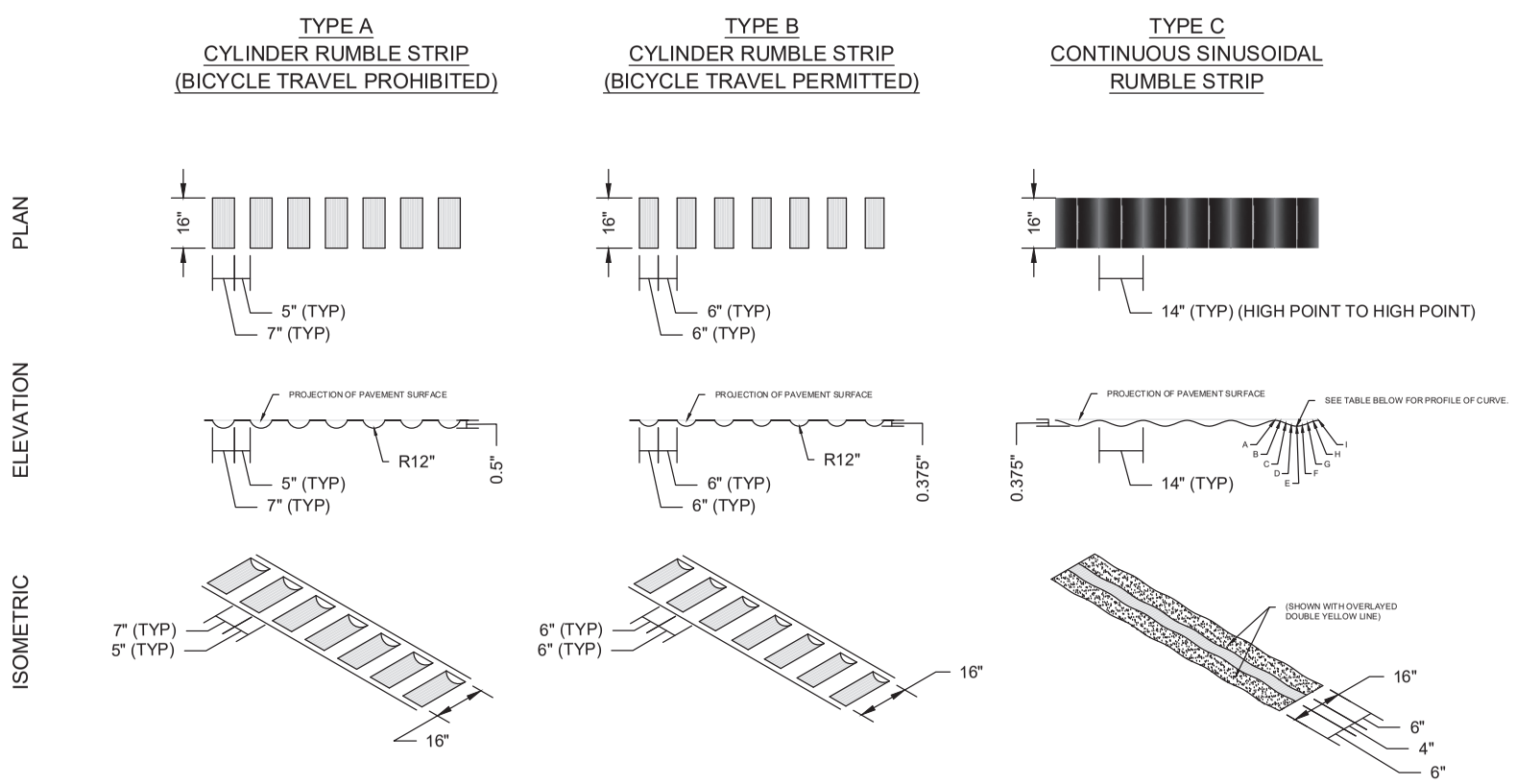
Notes:

	Separate logs shall be kept to track areas or plants with different watering schedules. Trees shall receive a minimum of 10 gallons with each watering and shrubs a minimum of 5 gallons. Provide note that if watering is not performed as scheduled due to rain. Record date of rainfall and amount.												
Date Watered													
Landscape Contractor Initial													
Prime Contractor Initial													
Date Watered													
Landscape Contractor Initial													
Prime Contractor Initial													

Each week, following watering, Log shall be submitted to the MassDOT Engineer.
6/15/2018

DOCUMENT A00816

RUMBLE STRIP DETAILS



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

DATE OF ISSUE: 2020

DRAWING 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: STOUGHTON Project File Number: 613358

Contract Number: 129897

Project Description: Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)

All AutoCAD files are provided solely as a courtesy to facilitate public access to information. MassDOT attempts to provide current and accurate information but cannot guarantee so. MassDOT provides such documents, files or other data "as is" without any warranty of any kind, either expressed or implied, including but not limited to, accuracy, reliability, omissions, completeness and currentness. The Commonwealth of Massachusetts and its Consultants shall not be liable for any claim for damages, including lost profits or other consequential, exemplary, incidental, indirect or special damages, relating in any way to the documents, files or other data accessible from this file, including, but not limited to, claims arising out of or related to electronic access or transmission of data or viruses. Because data stored on electronic media can deteriorate undetected or be modified without our knowledge, MassDOT cannot be held liable for its completeness or correctness. MassDOT makes no representation as to the compatibility of these files beyond the version of the stated CAD software.

By signing this form, I agree that it shall be my responsibility to reconcile this electronic data with the conformed contract documents, and that only the conformed contract documents shall be regarded as legal documents for this Project. I understand that this authorization does not give me the right to distribute the files. I agree to the terms above and wish to receive the AutoCAD files.

This signed form shall be emailed to the Highway Design Engineer at the MassDOT -Highway Division at the following email address:

DOTHighwayDesign@dot.state.ma.us
Attn: AutoCAD Files

Name of person requesting AutoCAD files: _____

Affiliation/Company: _____

Address: _____

_____

Telephone number: _____

Email address: _____

Signature/Date: _____

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DOCUMENT A00830

ARMY CORPS OF ENGINEERS
NAE-2023-00652
PERMIT APPLICATION

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DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DISTRICT
REGULATORY DIVISION
696 VIRGINIA ROAD
CONCORD MA 01742

August 28, 2024

Regulatory Division
Transportation & Utility Section

Erica Larner
MassDOT - Highway Division
10 Park Plaza
Boston, MA 02116
Via Email: erica.n.larner@dot.state.ma.us

Andrea Kendall
LEC Environmental Consultants, Inc.
100 Grove Street, Suite 310
Worcester, MA 01602

Dear Ms. Larner and Ms. Kendall:

This letter is in response to the application you submitted to the New England District, Regulatory Division on August 16, 2024 for a Department of the Army permit verification. This project has been assigned the file number NAE-2023-00652. This file number should be referenced in all correspondence with this office.

The proposed work includes improvements to Route 138 including installing new signal equipment, constructing ADA compliant pedestrian ramps, sidewalks, curbing, and driveways; full depth box widening; pavement milling and resurfacing; installing retaining walls; and drainage improvements in Stoughton, Norfolk County, Massachusetts.

We have completed our initial review of the application and have determined that it is incomplete. The following information listed below is necessary to have a complete application. Please provide this information in **one consolidated response within 30 days (September 27, 2024) of the date of this correspondence.** If you do not respond within the 30-day timeframe, the request will be administratively withdrawn. Closure of your file will not preclude you from re-opening the file at a later date, upon our receipt of the requested information.

1. Please provide a description of the proposed 300 SF of temporary impacts between ST 23 and ST 24 on plan sheet 8. The plan appears to represent the placement of riprap within a wetland, which is considered a permanent discharge of fill by the Corps.

Please note, we cannot process your application further until the additional information requested is received. You are cautioned that commencement of the

proposed work in waters of the United States subject to U.S. Army Corps of Engineers' jurisdiction prior to DA authorization would constitute a violation of Federal laws and subject you to possible enforcement action.

If you have any questions concerning this correspondence, please contact Kevin Newton at (978)-318-8044, or by email at kevin.m.newton@usace.army.mil.

Sincerely,

Kevin Newton

Digitally signed by Kevin Newton
Date: 2024.08.28 09:37:16 -04'00'

Kevin Newton
Project Manager/Biologist

Enclosures

cc:
Kylie Abouzeid, MassDOT – Highway Division (via Kylie.A.Abouzeid@dot.state.ma.us)
Heidi Davis, MassDEP (via heidi.davis@mass.gov)
Tyler Lewis, MassDEP (via tyler.lewis@mass.gov)
Ryan Hale, MassDEP (via ryan.hale@mass.gov)

DOCUMENT A00831

ARMY CORPS OF ENGINEERS

GENERAL PERMIT

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General Permit No.: NAE-2022-02649 Final Effective Date: June 2, 2023
Applicant: General Public, Commonwealth of Massachusetts Expiration Date: June 1, 2028

Department of the Army
General Permits for the Commonwealth of Massachusetts

The New England District of the U.S. Army Corps of Engineers (USACE) hereby issues twenty-five (25) regional general permits (GPs) for activities subject to USACE jurisdiction in waters of the U.S., including wetlands, navigable waters within the Commonwealth of Massachusetts and adjacent ocean waters to the seaward limit of the outer continental shelf. The Massachusetts GPs (hereafter referred to as the MA GP or GP) are issued in accordance with USACE regulations at 33 CFR 320 – 332 [see 33 CFR 325.5(c)(1)]. These GPs establish criteria and contain permit conditions to ensure that the authorized activities have no more than minimal individual and cumulative adverse impacts to the environment.

In issuing these GPs, the Federal Government does not assume any liability for the following: (a) damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes; (b) damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the U.S. in the public interest; (c) damages to persons, property or to other permitted or unpermitted activities or structures caused by the activity authorized by any of the GPs; (d) design or construction deficiencies associated with the permitted work; or (e) damage claims associated with any future modification, suspension or revocation of these permits.

Tammy R. Turley 02 June 2023

Tammy R. Turley Date
Chief, Regulatory Division

SECTION I. STATUTORY AUTHORITES & REGULATED ACTIVITIES

1. Work Requiring USACE Authorization

a. Section 10: Work and structures that are located in, over, under or that affect navigable waters of the United States (U.S.) (see 33 CFR 329). The USACE regulates these activities under section 10 of the Rivers and Harbors Act of 1899 (see 33 CFR 322).

b. Section 404: The discharge of dredged or fill material into waters of the U.S (see 33 CFR 328). The USACE regulates these activities under Section 404 of the Clean Water Act (CWA). The term "discharge of dredged or fill material" also includes certain discharges resulting from excavation. Applicants should contact USACE to determine if a particular excavation discharge occurring within waters of the U.S., is a regulated activity. See 33 CFR 323.4 of the CWA for exempted activities.

For additional information on the limits of USACE jurisdiction, please see: https://www.nae.usace.army.mil/Portals/74/docs/regulatory/JurisdictionalLimits/Jurisdictional_Limits_Brochure.pdf

2. Authority to Issue General Permits

a. In accordance with 33 CFR 322.2(f), 325.2(e)(2), and 325.5(c), USACE may issue regional general permits authorizing activities under Section 10 of the RHA.

b. In accordance with Section 404(e) of the CWA, 33 USC 1344(e), and 33 CFR 323.2(h), 325.2(e)(2), and 325.5(c), after notice and opportunity for public hearing, USACE may issue regional general permits for any category of activities involving discharges of dredged or fill material if the activities in such category are similar in nature, will cause only minimal adverse environmental effects when performed separately, and will only have minimal cumulative adverse effect on the environment.

3. Related Laws

33 CFR 320.3 includes a list of related laws including, but not limited to, Section 408 of the Rivers and Harbors Act of 1899, Section 401 of the Clean Water Act, Section 402 of the Clean Water Act, Section 307(c) of the Coastal Zone Management Act of 1972, Section 106 of the National Historic Preservation Act of 1966, Section 7 of the Endangered Species Act, the Fish and Wildlife Coordination Act of 1956, the Magnuson-Stevens Fishery Conservation and Management Act, the Fish and Wildlife Coordination Act, Section 302 of the Marine Protection, Research and Sanctuaries Act of 1972, Section 7(a) of the Wild and Scenic Rivers Act, the Golden Eagle Protection Act, and the Migratory Bird Treaty Act.

SECTION II. REVIEW CATEGORIES & APPLICATION PROCEDURES

To qualify under these GPs, the design, construction, and maintenance associated with each proposed activity must meet the terms and eligibility criteria listed in Section III, all applicable general conditions (GCs) in Section IV, and any specific mitigation requirements in Section V. Applicants should first review the GPs to see if a project is eligible for authorization under one or more of the GPs within this document. Any activity not specifically listed may still be eligible for authorization under these GPs; applicants are advised to contact USACE for specific eligibility determination.

Please note that these GPs allow for Self-Verification (SV) contingent upon meeting all criteria and with full adherence to all GCs. Projects that do not qualify for SV, may meet criteria for Pre-Constriction Notification (PCN). Tables are provided under each activity, which outline criteria for SV and PCN. Activities that do not meet criteria for SV or PCN may require review as an Individual Permit (IP). Activities may require a PCN or IP as noted in Sections III and/or IV of this GP. Notwithstanding compliance with the terms of these GPs, USACE retains discretionary authority to require either PCN review or IP review on a case-by-case basis for any project based on concerns for the environment or for any of the other public interest factors found in 33 CFR 320.4(a). These GPs also do not replace or change those activities identified as exempt from USACE regulation (33 CFR 323.4).

1. Pre-Application Assistance

Prospective applicants may request a pre-application meeting to address any questions they may have. USACE may also request a pre-application meeting or additional information to facilitate review of the request. Pre-application meetings and/or site visits help streamline the authorization process by alerting the prospective applicant to potentially time-consuming factors that may arise during the evaluation of their project (e.g., avoidance, minimization and compensatory mitigation requirements, historic properties, endangered species, essential fish habitat, impacts to federal projects, and/or dredging of contaminated sediments).

To schedule a pre-application meeting, present questions, or if you need further assistance, please contact USACE at:

Email: cenae-r-ma@usace.army.mil (strongly preferred) Phone: (978) 318-8338

Mail: U.S. Army Corps of Engineers
New England District
Regulatory Division, Massachusetts Section
696 Virginia Road
Concord, MA 01742

2. Submitting a Request

Please follow the procedures outlined in Sections II.2-5 when requesting an SV or applying for PCN authorization for activities covered by these GPs. The GPs are provided in Section III below. For SV-eligible projects, the Self-Verification Notification (SVN) must be submitted within 30 days of commencing work. Otherwise, a Pre-Construction Notification (PCN) must be submitted for work that is not SV-eligible. Please include appropriate drawings and attachments and submit your request using the mailbox identified in Section II.4 or II.5 below. USACE will promptly confirm receipt of your request and notify you in the event additional information is required. Guidance on

how to submit electronic correspondence is located on the NAE Regulatory website here: https://www.nae.usace.army.mil/Missions/Regulatory/Submitting-Electronic-Correspondence.

3. Local, State & Federal Approvals

Applicants are responsible for applying for and obtaining any required local, state, and federal permits or approvals. These must be obtained prior to the commencement of work in waters. Such authorizations may include a Water Quality Certification, a Coastal Zone Management Act consistency determination, and other approvals as noted below. Authorization under these GPs does not obviate the need for the permittee to obtain other Federal, State, or local permits, approvals, or authorizations required by law.

I. Water Quality Certification under Section 401 of the Federal Clean Water Act (33 USC 1341).
Applicants are responsible for determining the appropriate 401 Water quality Certification (WQC) requirements and submitting this information to the USACE at the time of their PCN application or when completing their SVN. Applicants that are unsure of whether their activity has been certified should contact MassDEP, or EPA Region 1 when the activity is located on tribal lands, for a determination. The 401 WQC requirement must be satisfied by acquiring one of the following WQCs from MassDEP (see GC 8):

General 401 WQC: The MassDEP issued a WQC on April 21, 2023 conditionally certifies all activities in GPs 1 – 24 eligible for SV and PCN so long as the activity is described in 314 CMR 9.03, and is not an activity described in 314 CMR 9.04, and so long as the activity meets all other requirements, terms and conditions of this WQC. The MassDEP WQC also conditionally certifies activities described in GP 25 so long as the activity meets all other conditions of the WQC. Emergency projects described in GP 25 must obtain an emergency certification or otherwise be authorized pursuant to 310 CMR 10.06, qualify under a Severe Weather Emergency Declaration pursuant to 310 CMR 10.06(8) issued by the MassDEP, or meet the requirements of 9.12(2) or (3) in order to be certified under the WQC

Applicants should refer to the following link to determine if their activity is eligible: *https://www.nae.usace.army.mil/Missions/Regulatory/ State-General-Permits/ Massachusetts-General-Permit/*. If eligible, you must comply with all applicable WQC conditions. Activities listed in 314 CMR 9.03 that are not exempt from the Wetland Protection Act must have a valid Final Order of Conditions (OOC) or Final Restoration Order of Conditions pursuant to 310 CMR 10.00 to be eligible under the General 401 WQC.

Individual 401 WQC: In the event the proposed activity is not covered by the general WQC, applicants shall contact MassDEP and apply for an individual 401 WQC if their activity does not qualify for a General 401 WQC as outlined above. MassDEP may issue, waive, or deny the individual 401 WQC on a case-by-case basis. All activities listed in 314 CMR 9.04 must obtain an individual 401 WQC from MassDEP to be eligible under these GPs. When an Individual 401 WQC is required for *PCN activities*, the applicant shall submit their Individual 401 WQC application concurrently to MassDEP and the USACE to comply with 40 CFR 121.

Activities Proposed on Tribal Lands: When an activity is proposed on Tribal lands, the applicant shall refer to the general 401 WQCs granted by the Environmental Protection Agency (EPA), Region 1 on May 15, 2023. These 401 WQCs are located on the USACE Regulatory website: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

II. Coastal Zone Management Act Federal Consistency Concurrence pursuant to Section 307 of the CZMA of 1972, as amended. Federal consistency concurrence is required for all activities located within the coastal zone, unless determined otherwise by the Massachusetts Office of Coastal Zone Management (MA CZM) (see GC 9). As applicable, this requirement must be satisfied by acquiring one of the following from the MA CZM:

General CZM Federal Consistency Concurrence (General Concurrence): MA CZM has granted General Concurrence for all SV and PCN activities for GPs 1-25 and this can be found at: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/. The applicant must obtain all applicable permits and approvals prior to the commencement of work in USACE jurisdiction (i.e., construction begins on site). For SVs, General Concurrence is automatically granted and no further action is required from the applicant. For PCNs, the USACE will coordinate with MA CZM to acquire General Concurrence as part of the PCN application review. During review of the PCN application, USACE may request additional information from the applicant to support CZM's evaluation of the activity.

Individual CZM Federal Consistency Concurrence (Individual Concurrence): In certain cases, MA CZM may elevate any GP activity 1-25 to require Individual Concurrence. The applicant must contact MA CZM and follow the procedures to obtain Individual Concurrence as determined appropriate by MA CZM.

The MA CZM program includes five regional offices that serve 78 coastal municipalities. The following map provides more information about these offices: https://www.mass.gov/service-details/czm-regions-coastal-communities-and-coastal-zone-boundary

III. Other Approvals: Approvals typically required in Massachusetts include, but are not limited to, a Chapter 91 Permit/License, Massachusetts Environmental Protection Act (MEPA) review, Wetlands Protection Act Order of Conditions, and/or Aquaculture Certification. *Applicants should also be aware that USACE may not be able to render a permit decision in the event the proposed activity is denied by another local, state and/or federal agency.*

4. Procedures for Self-Verification (SV) Eligible Projects

If the activity is eligible for an SV, the Self-Verification Notification (SVN) must be completed prior to the start of project construction and submitted to USACE within 30 days of commencing work. The purpose of the SVN is to provide applicants with a tool to assist them when determining if the activity as proposed is SV-eligible. The following GPs do not require submission of the SVN: GP 1 (SV #1), GP 3 (SV #2-3), GP 4 (SV #2), GP 11, GP 12 (note #2), GP 14 (see note), GP 15 (see note), and GP 24 (SV #3). **For the activities not listed above, the SVN must be completed prior to the start of work and be kept on site at all times during project construction.** The applicant shall not begin work for SV-eligible activities until they have completely verified the bulleted items below.

Digital submittals by email are **strongly encouraged** to facilitate the most efficient processing of the SVN submittal. Please communicate with USACE staff if you are unable to provide a digital copy. Addresses are cenae-r-ma-sv@usace.army.mil (email) or Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751 (mail).

Eligible SV Activities:

- Are subject to USACE jurisdiction (see GC 2); and
- Qualify for one or more of the GPs within this document (Section III); and
- Meet the GCs within this document (Section IV); and

- When required, are supported by a complete SVN (Appendix C); and
- Receive all other required local, State, and/or Federal approvals.

5. Procedures for Pre-Construction Notification (PCN) Eligible Projects

For activities that require a PCN, an application to and written authorization from USACE is required. *No work requiring a PCN may proceed until the applicant receives written authorization from USACE verifying that the activity is authorized.* The verification letter may include special conditions that the applicant must comply with. When possible, it is *highly* recommended that PCN application materials are submitted at least 90 days before the target start date to allow for USACE evaluation and any necessary agency consultations. PCN applications shall demonstrate in writing how the proposed activity complies with all GCs, as applicable to their activity.

Digital submittals by email are **strongly encouraged** to facilitate the most efficient processing of the PCN application. Please communicate with USACE staff if you are unable to provide a digital copy. Addresses are cenae-r-ma@usace.army.mil or Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751 (mail).

Eligible PCN Activities:

- Are subject to USACE jurisdiction (see GC 2); and
- Qualify for one or more of the GPs within this document (Section III); and
- Meet the GCs within this document (Section IV); and
- Comply with the Mitigation Standards within this document (Section V); and
- Are supported by a complete PCN document (Appendix B); and
- When required, are supported by the submittal of project information to the appropriate parties identified in Appendix A; and
- Receive all other required local, State, and/or Federal approvals.

6. Interagency Review Procedures

The USACE reserves the opportunity to coordinate PCN activities with Federal and State agencies to ensure that the proposed activity results in no more than a minimal impact to the aquatic environment. In some cases, USACE may require project modifications involving avoidance, minimization, and/or compensatory mitigation for unavoidable impacts to ensure the net effects of a project are minimal. The USACE determines, after review and coordination with the agencies and/or the applicant, if PCN applications:

a. Meet the terms and conditions of the GP as proposed;
b. Require additional information;
c. Require avoidance, minimization, compensatory mitigation, construction sequencing, project modification, or other special conditions to avoid or minimize adverse impacts to the aquatic environment;
d. Require individual permit review regardless of whether the terms and GCs of these GPs are met, based on concerns for the aquatic environment or any other factor of the public interest (see Section 9 below).

For activities requiring a PCN, the applicant must wait for written authorization from USACE before commencing activities in waters of the U.S. Beginning work for PCN required activities without a USACE written authorization is a violation of these GPs, and the terms and conditions of this document. The applicant may be subjected to an enforcement action by USACE and/or the Environmental Protection Agency (EPA).

7. Construction of Solid Fill Structures and Fills Along the Coastline or Baseline from Which the Territorial Sea is Measured.

Projects involving the construction of solid fill structures or discharge of fill that may extend beyond the coastline or the baseline from which the territorial sea is measured (i.e., mean low water) will require a PCN. The USACE will submit a description of the proposed work and a copy of the plans to the Solicitor, Department of the Interior, Washington, DC 20240, and request comments concerning the effects of the proposed work on the outer continental rights of the United States. These comments will be included in the administrative record of the application. After completion of permit review, the record will be forwarded to the Chief of Engineers. The decision on the application will be made by the Secretary of the Army after coordination with the Attorney General.

8. Emergency Activities

Per 33 CFR 325.2(e)(4), an emergency is limited to a situation that would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship if corrective action requiring a permit is not undertaken within a time period less than the normal time needed to process an application under standard procedures. Emergency work shall be limited to that which is necessary to stabilize and secure the situation. Additional work needed for final repairs shall not be completed until approval is obtained through the appropriate, non-emergency process. Emergency work is subject to the same terms and conditions of these GPs as non-emergency work, and similarly, must qualify for authorization under these GPs; otherwise, an IP is required. *See GP 25 Emergency Situations for additional information.*

9. Individual Permit

Projects that do not meet the terms and conditions of this GP may require review as an IP (33 CFR 325.5 (b)). Proposed work in this category will require a separate Federal application for an individual permit from USACE (33 CFR 325.1). In addition, USACE retains discretionary authority on a case-by-case basis to elevate GP-eligible activities to an IP based on concerns for the environment or any other factor of the public interest (33 CFR 320.4 (a)). Applicants are required to submit the appropriate application materials directly to USACE as early as possible to expedite the permit review process. General information and application forms can be obtained at our website or by contacting our office at cenae-r-ma@usace.army.mil or (978) 318-8338. Individual 401 WQC and/or CZMA Federal consistency concurrence from the appropriate MA agencies are required before USACE can issue an individual permit. Applying for an IP does not relieve the applicant from their obligation to obtain all required Federal, State and/or local approvals.

10. Compliance

Applicants shall ensure compliance with all applicable GPs in Section III, GCs in Section IV, and any special conditions included in USACE verification letters. Noncompliance with these GPs, GCs, and special conditions may subject the applicant to criminal, civil, or administrative penalties, and/or an ordered restoration, and/or the permit may be modified, suspended or revoked by USACE. The USACE will consider any activity requiring USACE authorization to be noncompliant if that activity does not comply with all GP terms and conditions at all times, including while the project is under construction and when work is completed.

SECTION III. MASSACHUSETTS GENERAL PERMITS

Applicants are encouraged to review Sections I & II prior to submitting an application to confirm that the activity as proposed complies with all terms and conditions of the 2023 MA GPs. Applicants are also encouraged to review the definitions in Section VII, Definitions & Acronyms, of this document. Several terms are frequently used throughout the GPs, and it is important for the reader to understand these terms. If seeking verification for an activity previously verified under the 2018 MA GPs, please contact the USACE to discuss permitting needs in advance of submitting an application.

General Permits

1. Aids to Navigation and Temporary Recreational Structures
2. Maintenance
3. Moorings
4. Structures in Navigable Waters of the U.S.
5. Boat Ramps and Marine Railways
6. Utility Lines, Oil or Natural Gas Pipelines, Outfall Or Intake Structures, and Appurtenant Features
7. Dredging, Disposal of Dredged Material, Beach Nourishment, Rock Removal and Rock Relocation
8. U.S. Coast Guard Approved Bridges
9. Bank and Shoreline Stabilization
10. Aquatic Habitat Restoration, Enhancement, and Establishment Activities
11. Fish and Wildlife Harvesting and Attraction Devices and Activities
12. Response Operations, Oil and Hazardous Substances
13. Cleanup of Hazardous and Toxic Waste
14. Scientific Measurement Devices
15. Survey Activities
16. Land and Water-Based Renewable Energy Generation Facilities and Hydropower Projects
17. Residential, Commercial and Institutional Developments, and Recreational Facilities
18. Aquaculture
19. Mining Activities
20. Living Shorelines
21. Agricultural Activities
22. Reshaping Existing Drainage Ditches, Construction of New Ditches, and Mosquito Management
23. Linear Transportation Projects and Wetland/Stream Crossings
24. Temporary Construction, Access, and Dewatering
25. Emergency Situations

GP 1. AIDS TO NAVIGATION AND TEMPORARY RECREATIONAL STRUCTURES (Authority: §10)

(a) The placement of aids to navigation and regulatory markers that are approved by and installed in accordance with the requirements of the U.S. Coast Guard (USCG). See 33 CFR, Part 66; and (b) Temporary buoys, markers, and similar structures placed for recreational use during specific events such as water skiing competitions and boat races or seasonal use. See GC 16.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Aids to navigation and regulatory markers approved by and installed in accordance with the requirements of the USCG. 2. Temporary buoys, markers and similar structures that are: (a) placed for recreational use during specific events and removed within 30 days after event; or (b) placed during winter events on ice and removed before spring thaw. These structures must be authorized by the local harbormaster, not located within an FNP or its buffer zone, and not located in saltmarsh or tidal vegetated shallows.	1. Impacts in saltmarsh or tidal vegetated shallows. 2. Activities that are not SV eligible.
Note: An SVN submittal to USACE is not required for work authorized under SV #1 above.	

GP 2. MAINTENANCE (Authorities: §10 and §404)

Repair, rehabilitation, or replacement of any previously authorized[1], currently serviceable structure, or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3 (activities occurring before certain dates), provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction technique requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement are authorized. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the activities above. Maintenance dredging and beach nourishment are not eligible under GP 2 (see GP 7). Stream crossing modifications (including sliplining), replacements or extensions are not eligible under GP 2 (see GPs 6, 17, 23). *See GP 25 Emergency Situations for expedited review of emergency activities.*

Not authorized under GP 2 (IP required): (a) Permanent impacts in >1 acre in non-tidal waters and/or wetlands; or (b) Permanent impacts >1/2 acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; or (c) Temporary impacts >1 acre in tidal waters; >5000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >1000 SF in vegetated shallows; (d) New stream channelization or stream relocation projects (e.g., those in response to storm or flood events).

Self-Verification Eligible

Maintenance activities that meet all of the following terms:

1. In non-tidal waters, the combined permanent and temporary impacts extending beyond the original footprint are ≤5,000 SF[2] and not located in vegetated shallows or riffle and pool complexes.

2. In tidal waters, the combined permanent and temporary impacts extending beyond the original footprint are ≤5,000 SF, ≤1,000 SF in mudflats and/or natural rocky habitat, and not located in saltmarsh and tidal vegetated shallows.

3. Minor deviations in the repair, rehabilitation, or replacement of previously authorized, currently serviceable structures or fills.

4. Bulkhead replacement in tidal and non-tidal waters via installation of new bulkhead within 18 inches of the existing bulkhead and associated backfill.

5. Drawdown of an impoundment for dam/levee repair provided it does not exceed 18 months and one growing season (April through September).

Pre-Construction Notification Required

1. Discharges associated with removal of accumulated sediments and debris in the vicinity of existing structures, including intake and outfall structures and associated canals.

2. The removal of sediment outside the immediate vicinity of existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.) that is ≥200 linear feet. This activity is limited to the minimum necessary to restore the waterway in the vicinity of the structure to the approximate dimensions existing when the structure was built.

3. Dam and flood control or levee repair, rehabilitation, or replacement involves:
   a. A change in the flood elevation or permanent water surface elevation of the impoundment; or
   b. Drawdown of impoundment for construction exceeding one growing season (see SV eligible #5);
   c. Any modification that changes the character, scope, or size of the original fill design; or
   d. Does not meet SV eligible 1-7.

4. Installation of steel piles, including steel sheet piles, that cannot be done in the dry and where NOAA-ESA listed species are mapped as present.

[1] Some maintenance activities may not be subject to regulation under Section 404 of the CWA in accordance with 33 CFR 323.4(a)(2). Per 33 CFR 330.3, Vested dates are: a) Work performed and structures installed before December 18, 1968 (Section 10); and b) Fill placed before July 25, 1975 (Section 404).
[2] This excludes dam projects that may require a temporary drawdown with impacts >5,000 SF in non-tidal waters. Instead, the drawdown shall comply with SV #5 to be eligible under Self-Verification.

6. Any stream channel modification is limited to the minimum necessary for the repair, rehabilitation, or replacement of the structure or fill; such modifications, including the removal of material from the stream channel, must be immediately adjacent to the project or within the boundaries of the structure or fill. 7. Work to previously approved tide gates not affecting upstream tidal resource areas.	5. Activities located in the Connecticut River or Merrimack River, unless they are completed in the dry or when the tide is waterward of the work area. 6. Activities on USACE properties & USACE-controlled easements. 7. Activities that do not require an IP. Activities that do not require a PCN or an IP may be SV eligible.
Notes: 1. This authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the CWA §404(f) exemption for maintenance. See 33 CFR 323.4(a)(2). Prior USACE permits may have included authorization to maintain the activity, in which case authorization under this GP is not necessary. 2. See GC 22 for information on temporary construction mats.	

GP 3. MOORINGS (Authority: §10)

New moorings and mooring fields; the relocation of previously authorized moorings; expansions, boundary reconfigurations or modifications of previously authorized mooring fields; and maintenance and replacement of moorings.

Not authorized under GP 3 (IP required): (a) Moorings or mooring fields converted to or associated with a new boating facility[1]; or (b) Moorings in a USACE Federal Navigation Anchorage or USACE Federal Navigation Channel, except municipal-operated mooring fields.

Self-Verification Eligible	Pre-Construction Notification Required
1. New or relocated moorings that meet all the following terms: a. Authorized by a local harbormaster/ municipality under MGL Chapter 91 §10A; and b. No interference with navigation; and c. Single boat, single-point and non-commercial; and d. Not associated with a boating facility, and e. Neither placed within nor impact tidal vegetated shallows (e.g., eelgrass); and f. Not located within a USACE Federal navigation project (FNP) or the FNP buffer zone. 2. Existing, authorized moorings are converted from traditional moorings to low impact mooring technology (see note below) and/or helical anchors. 3. Maintenance and replacement of moorings authorized by the USACE.	1. New mooring fields; or expansions, boundary reconfigurations or modifications of existing, authorized mooring fields. 2. Moorings located such that they, and/or vessels docked or moored at them, are within the buffer zone of the horizontal limits of a Federal Anchorage. The buffer zone is equal to 3 times the authorized depth of that channel (see GC 15). 3. New individual moorings located in saltmarsh, mudflats, natural rocky habitat, and tidal vegetated shallows. Locating moorings these areas should be avoided to the maximum extent practicable. If these areas cannot be avoided, plans should show conservation mooring or low-impact mooring systems that prevent mooring chains from resting or dragging on the bottom substrate at all tides, where practicable. USACE may require a survey in areas previously mapped as containing eelgrass or within 100 ft. of existing eelgrass beds to document presence or absence of eelgrass and to determine the appropriate type and amount of compensatory mitigation for impacts to eelgrass. 4. Replacement moorings located in tidal vegetated shallows. 5. Moorings that are not SV eligible and do not require an IP.

Notes:

1. Low impact mooring systems, including conservation moorings, are encouraged to minimize impacts of chain scouring from conventional moorings during the tidal cycle.
2. An SVN submittal to USACE is not required for work authorized under SV #2-3 above.

[1] Boating facilities are marinas, yacht clubs, boat clubs, boat yards, dockominiums, town facilities, land/homeowner's associations, etc. that provide for a fee, rent or sell mooring or docking space. Not classified as boating facilities are municipal moorings or municipal mooring fields that charge an equitable user fee based only on the actual costs incurred.

GP 4. STRUCTURES IN NAVIGABLE WATERS OF THE U.S. (Authority: §10 & §404)

New, expansions, reconfigurations or modifications of structures for navigational access in waters of the U.S. including but not limited to temporary/seasonal or permanent pile and pole-supported piers, floats, stairs, shore outhauls, and boat and float lifts.

Not authorized under GP 4 (IP required): (a) Structures associated with a new boating facility; (b) Structures in a USACE Federal anchorage or channel; or (c) Artificial reefs.

Self-Verification Eligible

1. Private, non-commercial piers, floats and lifts that meet all the following terms:

a. Piers and floats in: (i) Tidal waters total ≤600 SF combined; and (ii) Non-tidal navigable waters of the U.S. total ≤600 SF combined; and

b. Piers are ≤4 feet wide and ≥6 feet above the marsh substrate (the height is measured from the marsh substrate to the bottom of the lowest longitudinal support); and

c. Floats and lifts in tidal waters and non-tidal navigable waters of the U.S. are ≥24 inches above the substrate during all tidal cycles. Float stops are preferred when site conditions warrant them (i.e., low tide exposes substrate), and skids can only be used in areas where piles are not feasible and on sandy or hard bottom substrates; and

d. Piers, floats and lifts: (i) Are ≥25 feet from previously mapped or existing vegetated shallows, or riparian property line extensions; (ii) Extend ≤25% of the waterway width in non-tidal navigable waters of the U.S. or MHW in tidal navigable waters of the U.S.

e. Installation of ≤12-inch diameter timber piles. Installation of ≥12-inch diameter piles of any material type when installed in the dry.

2. Fenders and similar structures.

Pre-Construction Notification Required

1. Shore outhauls.
2. Expansions, modifications, or new reconfiguration zones at any authorized boating facility.
3. New, expansions, reconfigurations, reconfiguration zones, or modifications of structures that provide public, community or government recreational uses such as boating, fishing, swimming, access, etc.
4. Installation of steel piles, including steel sheet piles, that cannot be done in the dry and where NOAA-ESA listed species are mapped as present.
5. Located within the buffer zone of the horizontal limits of an FNP (GC 15).
6. Miscellaneous structures.
7. Impacts in tidal vegetated shallows.
8. Structures that are not SV eligible and do not require an IP.

Notes:

1. See GC 19 regarding pile driving and pile removal in navigable waters and
2. See GC 20 regarding time of year restrictions in tidal waters.
3. Boating facilities are facilities that provide for a fee, rent, or sell mooring space, such as marinas, yacht clubs, boat clubs, boat yards, town facilities, dockominiums, etc. Pile supported structures with no discharges of dredged or fill material are not regulated by USACE in non-navigable waters.
4. A SVN submittal to USACE is not required for SV #2 above.

GP 5. BOAT RAMPS AND MARINE RAILWAYS (Authorities: §10 and §404)

Activities required for the construction of boat ramps and marine railways, including excavation and fill.

Not authorized under GP 5 (IP required): (a) Permanent impacts that are >1 acre in non-tidal waters of the U.S., >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows[1]; or (c) dredging in navigable waters of the U.S. (see GP 7).

Self-Verification Eligible	Pre-Construction Notification Required
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. Boat ramps are located within 25 feet of property line extensions unless the properties are owned by the same owner. The USACE may require a letter of no objection from the abutter(s).
2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, and (c), not located in saltmarsh and tidal vegetated shallows.	2. Activities that are not eligible for SV and do not require an IP.

GP 6. UTILITY LINES, OIL OR NATURAL GAS PIPELINES, OUTFALL OR INTAKE STRUCTURES, AND APPURTENANT FEATURES (Authorities: §10 & §404)

Activities required for: (a) The construction, maintenance, repair or removal of utility lines, oil or natural gas pipelines[1], outfall or intake structures[2], and appurtenant features including the associated excavation, backfill, or bedding for these structures. (b) The construction, maintenance, or expansion of substations and other appurtenant facilities associated with a utility line, oil or natural gas pipeline, and outfall or intake structure in non-tidal waters of the U.S.; and (c) The construction and maintenance of foundations for overhead utility line towers, poles, and anchors in tidal and non-tidal waters of the U.S., provided the foundations are the minimum size necessary and separate footings for each tower leg (rather than a larger single pad) are used where feasible. This GP authorizes the construction of access roads to facilitate construction of the above activities provided the activity, in combination with all other activities included in one single and complete project, does not exceed the thresholds identified below (IP required). Access roads used solely for construction of the utility line must be removed upon completion of the work. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the activities above.[3]

Not authorized under GP 6 (IP required): (a) Permanent impacts for any single and complete project that are >1 acre in non-tidal waters of the U.S.; >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows; (c) Stormwater treatment or detention systems, or subsurface sewage disposal systems in waters of the U.S.; or (d) New tide gates that do not meet SV criteria below.

Self-Verification Eligible	Pre-Construction Notification Required
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, and (c), not located in saltmarsh and tidal vegetated shallows. 3. Intake structures that are dry hydrants used exclusively for firefighting activities with no stream impoundments. 4. New tide gates on outfall structures for pipes conveying stormwater and/or industrial NPDES-permitted discharges from waters that are not waters of the U.S.	1. New outfall and/or intake structures. 2. Unconfined work or silt producing activities in streams with diadromous fish. 3. Submarine cables, conduits, or pipelines that occur in, over or under navigable waters of the U.S. 4. Stream channelization, relocation, impoundment, or loss of streambed occurs. 5. The activity is placed within and runs parallel to or along a streambed within waters of the U.S. 6. There is a permanent change in preconstruction contours in waters of the U.S. 7. Installation of utility lines or gas/oil pipelines using trench excavation where material is temporarily sidecast into waters of the U.S. for >3 months. Applicants must demonstrate how the material would not be dispersed by currents or other forces. 8. Activities that are not SV eligible and do not require an IP.

[1] See the definitions of a “utility line” and “oil or natural gas pipeline” in Section VII.
[2] Outfall structures must be in compliance with regulations issued under the National Pollutant Discharge Elimination System Program (Section 402 of the Clean Water Act).
[3] Temporary impacts shall comply with all GCs, including GC 32 Utility Line Installation and Removal.

GP 7. DREDGING (Authority: §10), DISPOSAL OF DREDGED MATERIAL (Authorities: §10, §404), BEACH NOURISHMENT (Authorities: §10 & §404), ROCK REMOVAL (Authority: §10) AND ROCK RELOCATION (Authorities: §10 & §404)

New, improvement and maintenance dredging (see notes below) including: (a) Disposal of dredged material at a confined aquatic disposal cell, beach nourishment location, near shore site, or ocean disposal site selected under Section 404 of the Clean Water Act pursuant to the 404(b)(1) Guidelines, provided the dredged material meets the requirements for such disposal; (b) Beach nourishment not associated with dredging; and (c) Rock removal and relocation for navigation.

Not authorized under GP 7 (IP required): (a) Dredging where ocean disposal is required for the disposal of dredged material (Section 103); New dredging >½ acre; ≥10,000 CY; >1000 SF permanent impacts to intertidal areas, saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF permanent impacts to tidal vegetated shallows; (b) Maintenance or improvement dredging and/or disposal with >1 acre of impacts to intertidal areas, saltmarsh, mudflats, riffle and pool complexes, or non-tidal vegetated shallows; (c) New dredging where the primary purpose is sand mining for beach nourishment; (d) Beach scraping; (e) Boulder removal and relocation for navigation >½ acre; or (f) Blasting.

Self-Verification Eligible

1. Maintenance dredging of previously dredged areas, with upland disposal, that meet all of the following terms:
   a. Dredged area ≤1/2 acre; and
   b. Activities comply with GC 20, TOY Restrictions. The time-of-year restriction(s) stated in Appendix B of the MA Division of Marine Fisheries (DMF) Technical Report TR-47[1] can apply instead if the general TOY restriction if a TOY is provided for a specific waterbody and is less restrictive. This is to protect endangered species, EFH, and other species; and
   c. The dredge footprint is located >25' from salt marsh or >100' from vegetated shallows; and
   d. Combined permanent and temporary impacts that are (i) ≤1,000 SF in mudflats or natural rocky habitat, or (ii) ≤5,000 SF within intertidal habitat and areas containing shellfish (an area contains shellfish unless: it is verified that minimal shellfish are present per the local shellfish constable or a shellfish survey; or it is not mapped as a MassGIS shellfish suitability area).
   e. No return water from upland disposal areas.

2. Boulder relocation with ≤1,000 SF of impacts, relocated to a similar depth and substrate.

Pre-Construction Notification Required

1. Maintenance dredging where the primary purpose is sand mining for beach nourishment.

2. New dredging and associated disposal ≤1/2 acre or <10,000 cubic yards.

3. Improvement dredging.

4. Beach nourishment in waters of the U.S. not associated with dredging.

5. Activities that are located in saltmarsh and tidal vegetated shallows.

6. Dredging in a Federal Navigation Project or within the buffer zone (see GC 15).

7. Activities that are not eligible for SV and do not require an IP.

Notes:

1. See Section VII for definitions of improvement and maintenance dredging.
2. For PCN activities, the USACE may waive or adjust the time of year requirement on a case-by-case basis after consultation with resource agencies.
3. Disposal site of any dredged material must be identified prior to obtaining USACE authorization.
4. Contact the USACE if a ten-year authorization to maintain an area is desired.

[1] The MA DMF Technical Report TR-47: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/

GP 8. U.S. COAST GUARD APPROVED BRIDGES (Authorities: §404)

Discharges of dredged or fill material incidental to the construction and modification of bridges across navigable waters of the U.S., including cofferdams, abutments, foundation seals, piers, and temporary construction and access fills provided that the USCG authorizes the construction of the bridge structure under Section 9 of the Rivers and Harbors Act of 1899 or other applicable laws. A USCG Authorization Act Exemption or a Surface Transportation and Uniform Relocation Assistance Act (STURRA) (144h) exemption do not constitute USCG authorization.

Not authorized under GP 8 (IP Required): Causeways and approach fills (see GP 23).

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Discharges of dredged or fill material that are incidental to the construction of bridges across navigable waters and meet all of the following: a. Combined permanent and temporary impacts that are ≤5,000 SF. b. Combined permanent and temporary impacts that are ≤1,000 SF in mudflats and natural rocky habitat. c. Not located in saltmarsh and tidal vegetated shallows.	1. Activities on USACE properties & USACE controlled easements.2. Installation of steel piles, including steel sheet piles, that cannot be done in the dry and where NOAA-ESA listed species are mapped as present. 3. Activities that are not eligible for SV and do not require an IP.

Notes:

1. GP 8 is not applicable to bridges over inland waters or wetlands that are not tidally influenced or regulated as navigable under Section 10.
2. See eligibility criteria for GPs 2 & 23 for projects that are not subject to USCG regulations.

GP 9. BANK AND SHORELINE STABILIZATION (Authorities: §10 & §404)

Bank stabilization activities necessary for erosion protection along the banks of lakes, ponds, streams, estuarine and ocean waters, and any other open waters. Includes bulkheads, seawalls, riprap, revetments, living seawalls, or slope protection & similar structures, specifically for the purpose of shoreline protection. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the activities above.

Activities must meet the following criteria: (a) No material is placed in excess of the minimum needed for erosion protection; (b) No material is of a type, or is placed in any location, or in any manner, that will impair surface water flow into or out of any waters of the U.S.; (c) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored native trees and treetops may be used in low energy areas); (d) Native plants appropriate for current site conditions, including salinity, must be used for bioengineering or vegetative bank stabilization; (e) The activity is not a stream channelization activity; and (f) The activity must be properly maintained, which may require repairing it after severe storms or erosion events. This GP authorizes those maintenance and repair activities if they require authorization. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to construct the bank stabilization activity. See GP 20 for living shoreline stabilization structures or fills.

Not authorized under GP 9 (IP required): (a) New bank stabilization >500 feet in total length (>1,000 linear feet in total length when necessary to protect transportation infrastructure) or permanent loss of saltmarsh >1,000 SF, unless the District Engineer waives this criterion by making a written determination concluding that the discharge of dredged or fill material will result in no more than minimal adverse environmental effects (an exception is for bulkheads – the district engineer cannot issue a waiver for a new bulkhead that is >1,000 feet in length along the bank); (b) Stream channelization or relocation activities; or (c) Breakwaters, groins or jetties.

Self-Verification Eligible

1. Activities in tidal and non-tidal waters that are:
   a. <200 feet in length.
   b. <400 feet in length when necessary to protect transportation infrastructure.
   c. ≤1 cubic yard of fill per linear foot average along the bank waterward of the plane of OHW or HTL.
   d. Not located in non-tidal wetlands, saltmarsh, vegetated shallows.

Pre-Construction Notification Required

1. Activities in tidal and non-tidal waters that are:
   a. ≥200 feet to ≤500 feet in total length. Activities >500 feet in total length must have a written waiver from USACE.
   b. ≥400 feet to ≤1,000 feet in total length when necessary to protect transportation infrastructure. Activities >1,000 feet in total length must have a written waiver from USACE.
   c. >1 cubic yard of fill per linear foot average along the bank waterward of the plane of OHW or HTL.
   d. Located in non-tidal wetlands, saltmarsh, vegetated shallows.
2. Activities with permanent loss of tidal or non-tidal waters that is (a) ≥5,000 SF or (b) ≥1,000 SF in mudflats and natural rocky habitat.
3. Activities that are (a) located in the Connecticut River or Merrimack River and/or (b) require installation of steel piles/steel sheet piles that cannot be done in the dry where NOAA ESA-listed species are mapped as present.
4. Activities on USACE properties & USACE-controlled easements.
5. Activities that require grouted riprap and/or poured/unformed concrete.
6. Activities that are not eligible for SV and do not require an IP.

Note: The applicant shall comply with GC 24. This includes utilization of bioengineering techniques in lieu of hard armoring to the maximum extent practicable as site conditions allow.

GP 10. AQUATIC HABITAT RESTORATION, ENHANCEMENT, AND ESTABLISHMENT ACTIVITIES (Authorities: §10 and §404)

Activities for the restoration, enhancement and establishment of non-tidal and tidal wetlands and riparian areas, including invasive, non-native or nuisance species control; the restoration and enhancement of non-tidal streams and other non-tidal open waters; the relocation of non-tidal waters, including non-tidal streams & associated wetlands for reestablishment of a natural stream morphology and reconnection of the floodplain; the restoration and enhancement of shellfish, finfish and wildlife; and the rehabilitation or enhancement of tidal streams, tidal wetlands and tidal open waters; provided those activities result in net increases in aquatic resource functions and services. See GP 9 for bank and shoreline stabilization. See GP 20 for living shorelines.

Not authorized under GP 10 (IP required): Stream channelization activities and artificial reefs.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In tidal and non-tidal waters excluding tidal vegetated shallows, the combined permanent and temporary impacts are ≤5,000 SF. 2. Eelgrass (vegetated shallows) planting and transplanting ≤100 SF in tidal waters.	1. In tidal and non-tidal waters excluding tidal vegetated shallows, the combined permanent and temporary impacts are >5,000 SF. 2. Eelgrass (vegetated shallows) planting and transplanting >100 SF in tidal waters. 3. Permanent water impoundments, dam removal, fish ladders, or tide gates. 4. Stream relocation, impoundment, or loss of streambed occurs. 5. Runneling projects with the purpose of restoring saltmarsh by removing excess water that ponds on the saltmarsh surface. 6. The conversion of: (a) a stream or natural wetlands to another aquatic habitat type (e.g., stream to wetland or vice versa, wetland to pond, etc.) or uplands, (b) one wetland type to another (e.g., forested wetland to an emergent wetland). 7. Activities in the Connecticut River from the Turners Falls Dam to the MA/CT border, or Merrimack River from the Essex Dam to the mouth, involving permanent or temporary impacts unless they are performed <5 feet waterward from OHW or HTL and in the dry. This is to protect endangered species. 8. Activities on USACE properties & USACE-controlled easements. 9. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Changes in wetland plant communities that occur when wetland hydrology is more fully restored during wetland rehabilitation activities are not considered a conversion to another aquatic habitat type.
2. See RGL 18-01 for guidance on removal of obsolete dams and other structures from rivers and streams. https://www.usace.army.mil/missions/civil-works/regulatory-program-and-permits/guidance-letters/
3. An ecological reference site may be used for a design basis of the restoration activity. The reference site should possess characteristics of an intact aquatic habitat or riparian area that exists in the region. The reference site shall represent the target habitat type of the proposed activity. A reference site may be required at the discretion of USACE.

GP 11. FISH AND WILDLIFE HARVESTING AND ATTRACTION DEVICES AND ACTIVITIES (Authorities: §10 and §404)

Fish and wildlife harvesting and attraction devices and activities in waters of the U.S. such as pound nets, crab traps, crab and shellfish dredging, eel pots, lobster traps, duck blinds, clam and oyster digging, fish aggregating devices, and small fish attraction devices such as open-water fish concentrators (sea kites, etc.).

Not authorized under GP 11 (IP required): Artificial reefs; or new, or expansions of, impoundments and semi-impoundments of waters of the U.S. for the culture or holding of motile species such as lobster with an impounded area >½ acre.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤1/2 acre, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. Fish and wildlife harvesting and attraction devices and activities that do not require a PCN or IP.	1. Pound nets, impoundments or semi-impoundments of waters of the U.S. for the culture or holding of motile species such as lobster with an impounded area ≤½ acre, fish aggregating devices, or small fish attraction devices. 2. Devices and activities that are located in tidal vegetated shallows, mud flats, or saltmarsh. 3. Devices and activities that do not require an IP.

Note: An SVN submittal to USACE is not required for work authorized under GP 11.

GP 12. RESPONSE OPERATIONS, OIL AND HAZARDOUS SUBSTANCES (Authorities: §10 & §404)

(a) Activities conducted in response to a discharge or release of oil and hazardous substances that are subject to the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300) including containment, cleanup, and mitigation efforts, provided that the activities are done under either: (i) The Spill Prevention, Control and Countermeasure Plan required by 40 CFR 112.3; (ii) The direction or oversight of the Federal on-scene coordinator designated by 40 CFR 300; or (iii) Any approved existing State, regional or local contingency plan provided that the Regional Response Team concurs with the proposed response efforts or does not object to the response effort; (b) Activities required for the cleanup of oil releases in waters of the U.S. from electrical equipment that are governed by EPA's polychlorinated biphenyl (PCB) spill response regulations at 40 CFR 761; (c) Booms placed in navigable waters of the U.S. for oil and hazardous substance containment, absorption and prevention; and (d) The use of structures and fills for spill response training exercises. Wetlands, vegetated shallows, mudflats, and riffle and pool complexes should be restored in place at the same elevation.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Activities are conducted in accordance with (a) or (b) above that are not planned or scheduled, but an emergency response (see Note 1). 2. Booms placed in navigable waters of the U.S. for oil and hazardous substance containment, absorption and prevention. 3. Temporary impacts for spill response training exercises ≤5000 SF in non-tidal waters and ≤1000 SF in tidal waters with no impacts to wetlands, saltmarsh, mudflats, or vegetated shallows. 4. Temporary structures in tidal waters with no impacts to wetlands, saltmarsh, mudflats, vegetated shallows, or riffle and pool complexes and in place ≤30 days.	1. Activities (a) or (b) above are planned or scheduled, not an emergency response; or 2. Activities that are not eligible for SV and do not require an IP.

Notes:

1. For emergency response activities in the Connecticut River from the Turners Falls Dam to the MA/CT border, Merrimack River from the Essex Dam to the mouth, and remaining tidal waters that are not rivers, the permittee must contact the USACE at (978) 318-8338 before or as soon as possible after the work authorized under GP 12(a) - (c) commences for the USACE to address effects under the Endangered Species Act.
2. An SVN submittal to USACE is not required for booms used for spill prevention, or properly contained and cleaned de minimus oil or hazardous substance discharges into navigable waters of the U.S.

GP 13. CLEANUP OF HAZARDOUS AND TOXIC WASTE (Authorities: §10 and §404)

Specific activities required to affect the containment, stabilization, or removal of hazardous or toxic waste materials, including court ordered remedial action plans or related settlements, which are performed, ordered or sponsored by a government agency with established legal or regulatory authority.

Not authorized under GP 13: (a) Establishment of new disposal sites; or (b) Expansion of existing sites used for the disposal of hazardous or toxic waste.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in vegetated shallows and riffle and pool complexes.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) >5,000 SF, and (b) located in vegetated shallows and riffle and pool complexes. 2. Permanent and temporary impacts in tidal waters or navigable waters of the U.S. 3. Stream channelization, relocation, impoundment, or loss of streambed occurs. 4. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Wetlands, vegetated shallows, mudflats, and riffle and pool complexes should be restored in place at the same elevation to the maximum extent practicable.
2. Activities undertaken entirely on a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site by authority of CERCLA, are not required to obtain permits under Section 404 of the CWA or Section 10 of the Rivers and Harbors Act.

GP 14. SCIENTIFIC MEASUREMENT DEVICES (Authorities: §10 and §404)

Scientific measurement devices for measuring and recording scientific data, such as staff gauges, tide and current gauges, meteorological stations, water recording and biological observation devices, water quality testing and improvement devices, and similar structures. Also eligible are small weirs and flumes constructed primarily to record water elevation, flow and/or velocity. Upon completion of the use of the device to measure and record scientific data, the measuring device and any other structures or fills associated with that device (e.g., foundations, anchors, buoys, lines, etc.) must be removed to the maximum extent practicable and the site restored to preconstruction elevations.

Not authorized under GP 14 (IP required): (a) Permanent impacts that are >5,000 SF in tidal and non-tidal waters of the U.S.; >1000 SF in tidal saltmarsh, mud flats, riffle and pool complexes; or >100 SF in tidal vegetated shallows; or (b) Temporary impacts in tidal waters that are >1 acre, unless the District Engineer waives this criterion by making a written determination concluding that the discharge of dredged or fill material will result in no more than minimal adverse environmental effects; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, (c) not located in saltmarsh and tidal vegetated shallows. 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.	1. Biological sampling devices, weirs or flumes, or the activity restricts or concentrates movement of aquatic organisms. 2. Permanent towers located in navigable waters that record and measure scientific data. 3. Devices that are not eligible for SV and do not require an IP.

Note: An SVN submittal to USACE is not required for temporary measuring devices with a footprint of <10 SF, with a profile of <3 feet high measured from the substrate and located in water deeper than -10 feet MLW.

GP 15. SURVEY ACTIVITIES (Authorities: §10 and §404)

Survey activities such as soil borings, core sampling, seismic exploratory operations, plugging of seismic shot holes and other exploratory-type bore holes, exploratory trenching, soil surveys, sampling, sample plots or transects for wetland delineations, and historic resources surveys.

Not authorized under GP 15 (IP required): (a) Permanent impacts that are >1 acre in tidal and non-tidal waters; >1000 SF in tidal saltmarsh, mud flats, or riffle and pool complexes; or >100 SF in tidal vegetated shallows; or (b) Temporary impacts in tidal waters that are >1 acre, unless the District Engineer waives this criterion by making a written determination concluding that the discharge of dredged or fill material will result in no more than minimal adverse environmental effects; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, (c) not located in saltmarsh and tidal vegetated shallows.	1. Exploratory trenching (see Note 2) occurs in waterways (e.g., streams, tidal waters). 2. Activities associated with the recovery of historic resources, and the drilling and discharge of excavated material from test wells for oil and gas exploration. 3. Seismic exploratory operations occur in tidal waters, the Connecticut River from the Turners Falls Dam to the MA/CT border, or the Merrimack River from the Essex Dam to the mouth. This is to protect endangered species. 4. Activities that are not eligible for SV and do not require an IP.

Notes:

1. An SVN submittal is not required for wetland delineations, and core sampling conducted for preliminary evaluation of dredge project analysis.
2. For the purposes of GP 15, the term “exploratory trenching” means mechanical land or underwater clearing of the upper soil profile to expose bedrock or substrate for the purpose of mapping or sampling the exposed material.
3. The discharge of drilling mud and cuttings may require a permit under §402 of the CWA.

GP 16. LAND AND WATER-BASED RENEWABLE ENERGY GENERATION FACILITIES (Authorities: §10 and §404), AND HYDROPOWER PROJECTS (Authority: §10 and §404)

Structures and work in tidal waters and discharges of dredged or fill material into tidal and non-tidal waters for the construction, expansion, modification or removal of: (a) Land-based renewable energy production facilities (e.g., solar, wind, biomass, geothermal) and their attendant features; (b) Water-based wind or hydrokinetic renewable energy generation projects and their attendant features; and (c) Discharges of dredged or fill material associated with hydropower projects. Attendant features may include, but are not limited to, land-based collection and distribution facilities, control facilities, and parking lots. For each single and complete project in (b) above, no more than 10 generation units (e.g., wind turbines or hydrokinetic devices) are authorized in navigable waters of the U.S. Upon completion of the pilot project (see note 2), the generation units, transmission lines, and other structures or fills associated with the pilot project must be removed to the maximum extent practicable.

Not authorized under GP 16 (IP required): (a) Permanent impacts that are >1 acre in non-tidal waters, >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in vegetated shallows; or (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
In non-tidal waters, the combined permanent and temporary impacts for land-based activities are (a) ≤5,000 SF, (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. In non-tidal waters, the combined permanent and temporary impacts for land-based activities are (a) >5000 SF, or (b) located in vegetated shallows or riffle and pool complexes. 2. Permanent and temporary impacts in tidal waters. 3. Water-based wind or hydrokinetic renewable energy generation projects, and hydropower projects. 4. For all activities eligible for authorization under GP 16: a. The activity occurs in tidal waters or in, over or under navigable waters. b. Stream channelization, relocation, impoundment, or loss of streambed occurs. 5. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Utility lines constructed to transfer the energy from the land-based renewable generation or collection facility to a distribution system, regional grid, or other facility may be authorized by GP 6.
2. For the purposes of this GP, the term “pilot project” means an experimental project where the renewable energy generation units will be monitored to collect information on their performance and environmental effects at the project site.

GP 17. RESIDENTIAL, COMMERCIAL AND INSTITUTIONAL DEVELOPMENTS AND RECREATIONAL FACILITIES (AUTHORITIES: §404)

Discharges of dredged or fill material into non-tidal waters for the construction or expansion of: (a) Residences and residential subdivisions; (b) Residential, commercial and institutional building foundations and building pads; and (c) Recreational facilities such as playgrounds, playing fields, bikeways, trails, etc. This GP also authorizes attendant features that include, but are not limited to, roads, parking lots, garages, yards, and utility lines, and stormwater management facilities. This GP authorizes attendant features if they are necessary for the use of the project purpose.

Not authorized under GP 17 (IP required): (a) Permanent impacts that result in loss of non-tidal waters >1/2 acre; >1000 SF in riffle and pool complexes or vegetated shallows; or (b) Subsurface sewerage disposal systems in non-tidal waters.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) <5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. Stream channelization or relocation resulting in loss of streambed that is <200 LF.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≥5,000 SF, or (b) located in riffle and pool complexes or non-tidal vegetated shallows. 2. Stream and wetland crossings that require a PCN per GCs 20 TOY Restrictions and GC 31 Stream Work and Crossings & Wetland Crossings. 3. Stream channelization or relocation resulting in loss of streambed that is ≥200 LF. Stream impoundment activities of any kind. 4. Activities on USACE properties & USACE-controlled easements. 5. Activities that are not SV eligible and do not require an IP.

Notes:

1. Stream and wetland crossings (permanent and temporary), including those built with construction mats; and modifications (including sliplining), replacements or extensions to existing crossings.
2. See GC 22 for information on temporary construction mats.
3. Subdivisions: For residential subdivisions, the aggregate total loss of waters of United States authorized by this GP cannot exceed 1/2-acre. This includes any loss of waters of the United States associated with development of individual subdivision lots.

GP 18. AQUACULTURE (Authorities: §10 and §404)

(a) The installation of buoys, floats, racks, trays, nets, lines, tubes, containers, and other structures into navigable waters of the U.S.; (b) Discharges of dredged or fill material into tidal and non-tidal waters necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities; and (c) Shellfish seeding or brushing the flats projects. Any fill material imported to the project from offsite (this is limited to mineral growth medium used in culture trays) shall be clean and of comparable grain size to the native substrate. Activities authorized under this GP must have (a) their MA DMF Aquaculture Certificate letter for licensed shellfish aquaculture sites, (b) documentation that the applicant has coordinated with the U.S. Coast Guard regarding USCG Private Aids to Navigation standards, (c) their MEPA Certificate (if required), and (d) documentation that the applicant has contacted their local authorities (ex. harbormaster, select board, shellfish constable) for authorization of their facility.

Not authorized under GP 18 (IP required): (a) New, or expansions of, impoundments and semi-impoundments of tidal and non-tidal waters for the culture or holding of motile species such as lobster with an impounded area >½ acre; (b) Cultivation of a nonindigenous species (see Note 1) unless that species has been previously cultivated in the waterbody; (c) Cultivation of an aquatic nuisance species (see Note 1); (d) Attendant features such as docks, piers, boat ramps (see GP 4); (e) stockpiles, staging areas, or the deposition of shell material back into tidal and non-tidal waters as waste.

Self-Verification Eligible

1. In tidal waters, a new lease site area is (a) ≤2-acre, (b) not located in salt marsh, natural rocky habitat, or tidal vegetated shallows.

2. In tidal waters, *expansions* of existing lease sites not to exceed 2 acres for the entire site (e.g. 1 acre lease site increasing to a 2 acre lease site may qualify as SV). A PCN is required for expansions in salt marsh, natural rocky habitat, and tidal vegetated shallows.

3. Cages, racks that are elevated ≥2 feet above the ocean floor with legs within a lease site with ≤4 buoys marking the corners.

4. Floating cage strings with a single connecting line, ≤2 anchors and ≤2 end marker buoys per string within a lease site with ≤4 buoys marking the corners.

5. No activities located within 25 feet of tidal vegetated shallows.

6. Culture only indigenous species.

7. Not located in FNP or within a distance of three times the authorized depth of an FNP (see GC 15).

8. Not located in or impinge upon the value of any National Lands or Federal Properties.

9. Floating upweller docks that total ≤600 SF in area.

Pre-Construction Notification Required

1. Discharges of fill material associated with aquaculture >5,000 SF.

2. Research, educational, commercial-viability or experimental aquaculture gear activities >1,000 SF.

3. Kelp or finfish aquaculture.

4. Land-based hatchery intakes >3 inches in diameter.

5. Activities in water depths >10 feet mean low lower water (MLLW).

6. Activities with in-water lines, ropes or chains that are not SV eligible (see #3-4).

7. Activities occur in the Connecticut River from the Turners Falls Dam to the MA/CT border or the Merrimack River from the Essex Dam to the mouth. This is to protect endangered species.

8. New, or expansions of, impoundments and semi-impoundments for the culture or holding of motile species such as lobster with an impounded area ≤1/2 acre.

9. Activities that do not require an IP. Activities that do not require a PCN or an IP may be SV eligible.

Note: The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 defines: (a) nonindigenous species as “any species or other viable biological material that enters an ecosystem beyond its historic range, including any such organism transferred from one country into another”; and (b) aquatic nuisance species as “a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters.”

GP 19. MINING ACTIVITIES (Authorities: §10 and §404)

Discharges of dredged or fill material into non-tidal waters for mining activities, except for coal mining and metallic mineral mining activities.

Not authorized under GP 19 (IP required): (a) Permanent impacts >1 acre in non-tidal waters; or (b) Activities in tidal waters.

Self-Verification Eligible	Pre-Construction Notification Required
In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes, non-tidal vegetated shallows, and streams.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) >5,000 SF, or (b) located in riffle and pool complexes, non-tidal vegetated shallows, and streams. 2. The activity occurs in non-tidal navigable waters of the U.S. 3. Stream channelization, relocation, impoundment, loss of streambed, or discharge of tailings into streams occurs. 4. Work on USACE properties & USACE-controlled easements. 5. Activities that are not eligible for SV and do not require an IP.

GP 20. LIVING SHORELINES[1] (Authorities: §10 and §404)

Construction and maintenance of living shorelines to stabilize banks and shores in tidal waters. In non-tidal waters that are not subject to the ebb and flow of the tide, nature-based bank stabilization techniques such as bioengineering and vegetative stabilization may be authorized by GP 9. This GP authorizes those maintenance and repair activities in-kind that are necessary to address changing environmental conditions.

The following terms must be met for both SVs and PCNs as applicable: (a) Coir logs, coir mats, stone, native oyster shell, native wood debris, and other structural materials must be adequately anchored, of sufficient weight, or installed in a manner that prevents relocation in most wave action or water flow conditions, except for extremely severe storms; (b) For living shorelines consisting of tidal fringe wetlands, native plants appropriate for current site conditions, including salinity and elevation, must be used if the site is planted by the permittee; (c) Discharges of dredged or fill material into waters of the U.S., and oyster or mussel reef structures in navigable waters, must be the minimum necessary for the establishment and maintenance of the living shoreline; (d) If sills or other structural materials per PCN #4 must be constructed to protect fringe wetlands for the living shoreline, those structures must be the minimum size necessary to protect those fringe wetlands; (e) The activity must be designed, constructed, and maintained so that it has no more than minimal adverse effects on water and sediment movement between the waterbody and the shore and the movement of aquatic organisms between the waterbody and the shore; and (f) The living shoreline must be properly maintained and monitored, which may require periodic repair of sills, bioengineered components, or replacing sand fills after severe storms or erosion events. Vegetation may be replanted to maintain the living shoreline.

Not authorized under GP 20 (IP required): (a) The activity is ≥1000 feet in length along the bank (≥2000 LF both banks) unless waived by the District Engineer; or (b) The activity is >30 feet channel ward of mean low water in tidal waters; or (c) Upland reclamation activities; or (d) Stream channelization or relocation activities; or (e) Breakwaters, groins, jetties, or artificial reefs; or (f) Permanent impacts >1,000 SF in existing saltmarsh; >100 SF in existing tidal vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Tidal and non-tidal living shorelines ≤100 LF for each bank (≤200 LF for both banks). 2. Combined permanent and temporary impacts ≤5,000 SF in tidal waters, excluding existing salt marsh, tidal vegetated shallows, natural rocky habitat, and mudflats.	1. Tidal and non-tidal living shorelines >100 LF to <1000 LF (>200 LF to <2000 LF for both banks). 2. Permanent and temporary impacts in existing salt marsh, tidal vegetated shallows, or mudflats. 3. Work on USACE properties & USACE-controlled easements. 4. Use of stone sills, native oyster shell, native wood debris, or other structural materials.

Notes:

1. PCNs require monitoring for a minimum of 5 years in accordance with an approved restoration plan, unless otherwise determined by the USACE. The first year of monitoring will be the first year that the site has been through a full growing period after completion of construction and planting.
2. Applicants are encouraged to obtain a MEPA certificate prior to submitting a USACE permit application.

[1] A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural "soft" elements alone or in combination with some type of harder shoreline structure (e.g., oyster or mussel reefs or rock sills) for added protection and stability. Living shorelines should maintain the natural continuity of the land-water interface and retain or enhance shoreline ecological processes. Living shorelines must have a substantial biological component, either tidal or lacustrine fringe wetlands or oyster or mussel reef structures.

GP 21. AGRICULTURAL ACTIVITIES (Authority: §404)

Discharges of dredged or fill material in non-tidal waters for agricultural activities, including the construction of building pads for farm buildings. Authorized activities include: (a) installation, placement, or construction of drainage tiles, ditches, or levees; mechanized land clearing; land leveling; the relocation of existing serviceable drainage ditches; and similar activities; (b) construction of farm ponds, excluding perennial streams, provided the farm pond is used solely for agricultural purposes; and (c) discharges of dredged or fill material to relocate existing serviceable drainage ditches constructed in non-tidal streams.

Not authorized under GP 21 (IP required): (a) Permanent impacts that are >1 acre in non-tidal waters; or >1000 SF in riffle and pool complexes, or non-tidal vegetated shallows; (b) Work in tidal waters; or (c) Construction of farm ponds in perennial streams.

Self-Verification Eligible	**Pre-Construction Notification Required**
In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) >5,000 SF, or (b) located in riffle and pool complexes and non-tidal vegetated shallows. 2. Activities occur in non-tidal navigable waters of the U.S. 3. Stream channelization, relocation, impoundment, loss of streambed, or farm ponds in non-perennial streams occurs. 4. Activities that are not eligible for SV and do not require an IP.

Note: Some discharges for agricultural activities may qualify for an exemption under Section 404(f) of the CWA (see 33 CFR 323.4). This GP authorizes the construction of farm ponds that do not qualify for the CWA §404(f)(1)(C) exemption because of the recapture provision at §404(f)(2).

GP 22. RESHAPING EXISTING DRAINAGE DITCHES, CONSTRUCTION OF NEW DITCHES, AND MOSQUITO MANAGEMENT (Authorities: §10 and §404)

Discharges to modify the cross-sectional configuration of currently serviceable drainage ditches constructed in tidal and non-tidal waters, for the purpose of improving water quality by regrading the drainage ditch with gentler slopes, which can reduce erosion, increase growth of vegetation, and increase uptake of nutrients and other substances by vegetation. Also authorized are mosquito reduction activities.

Not authorized under GP 22 (IP required): Stream channelization, relocation, impoundments, or loss of streambed.

Self-Verification Eligible	**Pre-Construction Notification Required**
≤500 linear feet of drainage ditch will be reshaped provided excavated material is deposited in an upland area.	1. >500 linear feet of drainage ditch will be reshaped, excavated material is deposited in a water of the U.S., or the reshaping of the ditch increases the drainage capacity beyond the original as-built capacity or expands the area drained by the ditch as originally constructed (i.e., the capacity of the ditch is not the same as originally constructed or drains additional wetlands or other waters of the U.S.). 2. Permanent and temporary impacts in tidal vegetated shallows. 3. New ditches or relocation of drainage ditches constructed in waters of the U.S. (i.e., the location of the centerline of the reshaped drainage ditch is not approximately the same as the location of the centerline of the original drainage ditch). 4. Activities that are not eligible for SV and do not require an IP.

Note: Some ditch activities are exempt under Section 404(f) of the CWA (see 33 CFR 323.4).

GP 23. LINEAR TRANSPORTATION PROJECTS AND WETLAND/STREAM CROSSINGS (Authorities: §10 & §404)

Activities[1] required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., driveways, roads, highways, railways, trails, airport runways, and taxiways) and attendant features. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats (see Note 1), necessary to construct the linear transportation project.

Not authorized under GP 23 (IP required): (a) Permanent impacts for any single and complete project that are >1 acre in non-tidal waters; >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows; (c) Non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars (see GP 17); or (d) New tide gates.

Self-Verification Eligible

1. In non-tidal waters, the combined permanent and temporary impacts are a) ≤5,000 SF; b) not located in riffle and pool complexes and non-tidal vegetated shallows; and c) meet the Massachusetts River and Stream Crossing Standards

2. Existing crossings (e.g., culverts, elliptical or arch pipes, etc.) are not modified by (a) decreasing the diameter of the crossing or (b) changing the friction coefficient, such as through slip lining (retrofitting an existing culvert by inserting a smaller diameter pipe), culvert relining or invert lining.

3. Stream channelization or relocation resulting in loss of streambed that is <200 LF.

Pre-Construction Notification Required

1. In non-tidal waters, the combined permanent and temporary impacts are a) >5,000 SF; b) located in vegetated shallows or riffle and pool complexes; or c) do not meet the Massachusetts River and Stream Crossing Standards (see note 4).

2. The activity occurs in tidal waters, salt marsh, or in, over or under navigable waters of the U.S.

3. Stream and wetland crossings that require a PCN per GC 20 TOY Restrictions and GC 31 Stream Work and Crossings & Wetland Crossings.

4. Stream channelization or relocation resulting in loss of streambed that is ≥200 LF. Stream impoundment activities of any kind.

5. Work on USACE properties & USACE-controlled easements.

6. Activities that are not eligible for SV and do not require an IP.

Notes:

1. See GC 22 for information on temporary construction mats.
2. Discharges of dredged or fill material incidental to the construction of bridges across navigable waters of the U.S. may be authorized under GP 8.
3. Loss of streambed does not require a PCN when bridge piers or similar supports are used.
4. In their PCN application submission to the USACE, applicants must explain why they are unable to meet the Massachusetts River and Stream Crossing Standards.
5. For tidal crossings, modeling is encouraged as a method to verify the proposed crossing would not be undersized and resilient to the effects of sea level rise.

[1] Stream crossings must conform with the MA Stream Crossing Guidelines when practicable and comply with all applicable GCs of this document (Section IV).

GP 24. TEMPORARY CONSTRUCTION, ACCESS, AND DEWATERING (Authorities: §10 and §404)

Temporary structures, work, and discharges, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites that are not authorized under another GP activity.

Not authorized under GP 24 (IP required): (a) Permanent structures or impacts; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows; (c) Use of cofferdams to dewater wetlands or other aquatic areas to change their use; (d) Temporary stream crossings (see GPs 6, 17, 23); (e) Structures or fill left in place after construction is completed.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, temporary impacts are a) ≤5,000 SF; b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, temporary impacts are a) ≤5,000 SF, b) ≤1,000 SF in mudflats and/or natural rocky habitat, and c) not located in saltmarsh and tidal vegetated shallows. 3. Structures in navigable waters of the U.S. provided impacts do not require a PCN and they are left in place ≤30 days.	1. In non-tidal waters, temporary impacts are a) >5,000 SF; b) located in riffle and pool complexes or non-tidal vegetated shallows. 2. In tidal waters, temporary impacts are a) >5,000 SF; b) >1,000 SF in mudflats and/or natural rocky habitat, or (c) located in saltmarsh and tidal vegetated shallows. 3. Activities in the Connecticut River from the Turners Falls Dam to the MA/CT border, or Merrimack River from the Essex Dam to the mouth, involving temporary impacts unless they are performed <5 feet waterward from OHW or HTL and in the dry. This is to protect endangered species; or 4. Activities not eligible for SV and do not require an IP.

Notes:

1. Turbidity or sediment resuspension is generally not considered to occur when properly using management techniques to work in dry conditions. See GC 25.
2. Total impact areas under SV Eligible 1-2 exclude use of temporary construction mats. See GC 22 for information on temporary construction mats.
3. An SVN submittal to USACE is not required for SV #3 above.

GP 25. EMERGENCY SITUATIONS (Authorities: §10 and §404)

Structures or work in or affecting navigable waters of the U.S. and the discharge of dredged or fill material into waters of the U.S., including wetlands, necessary for repair or protection measures associated with an emergency situation[1], MassDEP Emergency Declaration/Certification, or FEMA Declared Disaster. The activity shall be the minimum necessary to alleviate the immediate emergency unless that additional work would result in no more than minimal effects to aquatic environment and is necessary to reduce the potential for future failure or loss of the structure or site. Typical activities authorized under this GP include, but are not limited to, restoration of damaged areas; bank stabilization; temporary fills for staging, access, and dewatering; and, repair, replacement, or rehabilitation of existing structures and/or fills (i.e., roads, bridges, utility pipelines and flood control structures, including attendant features, and other existing structures located in waters of the U.S.).

For the restoration of areas damaged by storms floods, or other discrete events: (a) The restored area must not extend waterward of the ordinary high-water mark or high tide line that existed prior to the damage. (b) The slope of the restored area below the ordinary high-water mark or high tide line must not exceed the slope that existed prior to the damage. (c) The bottom elevation of the restored area must not exceed the bottom elevation that existed prior to the damage (i.e., the restored area must not result in a reduction in the depth of the waterbody that existed prior to the damage). (d) Except in cases of FEMA reimbursement, the activity must be initiated, under contract to commence, or funds shall be allocated for the activity within 30 days of authorization under GP 25.

Not authorized under GP 25 (IP required): (a) Permanent impacts for a single and complete project >1/2 acre in tidal waters, unless the district engineer waives this criterion by making a written determination concluding that the activity will result in no more than minimal adverse environmental effects; >1,000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >5,000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1,000 SF in vegetated shallows; (c) New structures or fills that did not previously exist before the storm event or other discrete event (see other GPs).

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Activities that qualify under a Severe Weather Emergency Declaration pursuant to 310 CMR 10.06(8) and/or receive an Emergency Certification pursuant to 310 CMR 10.06 and/or meet the requirements of 314 CMR 9.12(2) or (3); and 2. Activities eligible under a FEMA Declared Disaster that also comply with #1 above.	1. Activities that are eligible under a FEMA Declared Disaster and do not qualify under SV #1. 2. Minor deviations in the structure or fill area, including those to existing structures or fills are authorized due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to alleviate the emergency. 3. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Review the GCs (Section IV) to confirm if a PCN is not required elsewhere in this document.
2. If the activity is not a MassDEP Emergency Declaration/Certification, does not meet the requirements of 314 CMR 9.12(2) or (3), or is not a FEMA Declared Disaster, applicants must explain in writing why their activity qualifies as an emergency (see footnote) to be eligible under GP 25.
3. SV eligible activities qualify under the general 401 WQC MassDEP issued for the 2023 MA GPs (GC 9).

[1] An emergency, as determined by this office and 33 CFR 325.2(e)(4), is one which would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship if corrective action requiring a Department of the Army permit is not undertaken within a time period less than the normal time to process the request under standard processing procedures.

SECTION IV. GENERAL CONDITIONS:

To qualify for GP authorization, the applicant must comply with the following general conditions, as applicable, in addition to authorization-specific conditions imposed by the division or district engineer.

1. Other Permits
2. Federal Jurisdictional Boundaries
3. Single and Complete Projects
4. Use of Multiple General Permits
5. Suitable Material
6. Tribal Rights & Burial Sites
7. Avoidance, Minimization, and Compensatory Mitigation
8. Water Quality & Stormwater Management
9. Coastal Zone Management
10. Federal Threatened and Endangered Species
11. Essential Fish Habitat
12. National Lands
13. Wild and Scenic Rivers
14. Historic Properties
15. USACE Property and Federal Projects (§408)
16. Navigation
17. Permit/Authorization Letter On-Site
18. Storage of Seasonal Structures
19. Pile Driving and Pile Removal in Navigable Waters
20. Time of Year Restrictions
21. Heavy Equipment in Wetlands
22. Temporary Fill & Construction Mats
23. Restoration of Wetland Areas
24. Bank Stabilization
25. Soil Erosion and Sediment Controls
26. Aquatic Life Movements and Management of Water Flows
27. Spawning, Breeding, and Migratory Areas
28. Vernal Pools
29. Invasive Species
30. Fills Within 100-Year Floodplains
31. Stream Work and Crossings & Wetland Crossings
32. Utility Line Installation and Removal
33. Water Supply Intakes
34. Coral Reefs
35. Blasting
36. Inspections
37. Maintenance
38. Property Rights
39. Transfer of GP Verifications
40. Modification, Suspension, and Revocation
41. Special Conditions
42. False or Incomplete Information
43. Abandonment
44. Enforcement Cases
45. Previously Authorized Activities
46. Duration of Authorization

1. Other Permits. Authorization under these GPs does not obviate the need for the permittee to obtain other Federal, State, or local permits, approvals, or authorizations required by law. Permittees are responsible for obtaining all required permits, approvals, or authorizations. Activities that are not regulated by the State, but subject to USACE jurisdiction, may still be eligible for these GPs.

2. Federal Jurisdictional Boundaries.
a. Applicability of these GPs shall be evaluated with reference to Federal jurisdictional boundaries. Activities shall be evaluated with reference to "waters of the U.S." under the CWA (33 CFR 328) and "navigable waters of the U.S." under §10 of the Rivers and Harbors Act of 1899 (33 CFR 329). Permittees are responsible for ensuring that the boundaries used satisfy the Federal criteria defined at 33 CFR 328-329. These sections prescribe the policy, practice, and procedures to be used in determining the extent of the USACE jurisdiction. Note: Waters of the U.S. includes all waters pursuant to 33 CFR 328.3(a), and adjacent wetlands as the term is defined in 33 CFR 328.3(c).
b. Wetlands shall be delineated in accordance with the USACE Wetlands Delineation Manual and the most recent Northcentral/Northeast Regional Supplement. Wetland delineation and jurisdiction information is located at: www.nae.usace.army.mil/missions/regulatory/jurisdiction-and-wetlands and maps are located at www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit.
c. Vegetated shallows shall be delineated when present on the project site. Vegetated shallow survey guidance and maps are located at: www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit.
d. Natural rocky habitats shall be delineated when present on the project site. The definition of natural rocky habitats is in Section VII of the MA GP. Natural rocky habitat survey guidance and maps are located at: www.nae.usace.army.mil/ missions/regulatory/state-general-permits/massachusetts-general-permit.

3. Single and Complete Projects. The MA GP shall not be used for piecemeal work and shall be applied to single and complete projects. The term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers.
a. For non-linear projects, a single and complete project must have independent utility. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed, even if the other phases were not built, can be considered as separate single and complete projects with independent utility.
b. Unless USACE determines the activity has independent utility, all components of a single project and/or all planned phases of a multi-phased project (e.g., subdivisions should include all work such as roads, utilities, and lot development) shall be evaluated as one single and complete project.
c. For linear projects such as power lines or pipelines with multiple crossings, a "single and complete project" is all crossings of a single water of the U.S. (i.e., single waterbody) at a specific location. For linear projects crossing a single waterbody several times at separate and distant locations, each crossing is considered a single and complete project. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately. If any crossing requires a PCN review or an individual permit review, then the entire linear project shall be reviewed as one project under PCN or the individual permit procedures.

4. Use of Multiple General Permits. The use of more than one GP for a single and complete project is prohibited, except when the acreage loss of waters of the U.S. authorized by the GPs does not exceed the acreage limit of the GPs with the highest specified acreage limit. For example, if a road crossing over waters is constructed under GP 23, with an associated utility line

crossing authorized by GP 6, if the maximum acreage loss of waters of the U.S. for the total project is ≥1 acre it shall be evaluated as an IP.

5. Suitable Material & Discharge of Pollutants. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). All activities involving any discharge into waters of the U.S. authorized under these GPs shall be consistent with applicable water quality standards, effluent limitations, standards of performance, prohibitions, and pretreatment standards and management practices established pursuant to the CWA (33 U.S.C. 1251), and applicable state and local laws. If applicable water quality standards, limitations, etc., are revised or modified during the term of this GP, the authorized work shall be modified to conform with these standards within six months from the effective date of such revision or modification, or within a longer period of time deemed reasonable by the District Engineer in consultation with the Regional Administrator of the EPA. Unless monitoring data indicates otherwise, applicants may presume that their activity complies with state water quality standards provided they are in compliance with the Section 401 WQC (Applicable only to the Section 404 activity).

6. Tribal Rights & Burial Sites

a. For all SV and PCN applications, prospective permittees shall follow the guidance set forth in Appendix A, Guidance for NHPA Section 106 Compliance in Massachusetts.

b. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

c. Many tribal resources are not listed on the National Register of Historic Places (NRHP) and may require identification and evaluation in collaboration with the identifying tribe and by qualified professionals. The Tribal Historic Preservation Officer (THPO) and State Historic Preservation Officer (SHPO) may be able to assist with locating information on:

i. Previously identified tribal resources; and
ii. Areas with potential for the presence of tribal resources.

d. Discovery of Previously Unknown Remains and Artifacts: If any previously unidentified human remains, cultural deposits, or artifacts are discovered while accomplishing the activity authorized by this permit, you must immediately notify the USACE of what you have found, and to the maximum extent practicable, cease work and avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The USACE will initiate the appropriate the Federal, Tribal, and state coordination required to determine if the items or remains are eligible for listing in the NRHP and warrant a recovery effort or can be avoided.

e. Burial Sites: Burial sites, marked or unmarked, are subject to state law (Massachusetts Unmarked Burial Law). Native American burial sites on federal or tribal land are subject to the provisions of Native American Graves Protection and Repatriation Act (NAGPRA). Regulated activities may not result in disturbance or removal of human remains until disposition of the remains has been determined by the appropriate authority under these laws, and the work is authorized by the USACE. Regulated activities which result in an inadvertent discovery of human remains must stop immediately, and the USACE, as well as the appropriate state and tribal authority, must be notified. Regulated work at inadvertent discovery sites requires compliance with state law or NAGPRA, as appropriate, prior to re-starting work.

7. Avoidance, Minimization, and Compensatory Mitigation. To qualify under the MA GP, activities must comply with Section V Mitigation Standards and the following as applicable:

a. Avoid and Minimize: Activities must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the U.S. to the maximum extent practicable at the project site. Avoidance and minimization are required to the extent necessary to ensure that the adverse effects to the aquatic environment (both area and function) are no more than minimal.

b. Compensatory mitigation for unavoidable impacts to waters of the U.S., including direct, indirect, secondary, and temporal loss, will generally be required for permanent impacts that exceed the thresholds identified in Section V, and may be required for temporary impacts, to offset unavoidable impacts which remain after all appropriate and practicable avoidance and minimization has been achieved and to ensure that the adverse effects to the aquatic environment are no more than minimal. Proactive restoration projects or temporary impact work with no secondary effects may generally be excluded from this requirement.
c. Mitigation proposals shall follow the guidelines found in the Compensatory Mitigation for Losses of Aquatic Resources; Final Rule April 10, 2008; 33 CFR 332. Prospective permittees may purchase mitigation credits in-lieu of permittee-responsible mitigation as compensation for unavoidable impacts to waters of the U.S. in the Commonwealth of Massachusetts.

8. Water Quality & Stormwater Management. The 401 WQC requirement applies to all activities listed under GPs 1-25, unless determined otherwise by MassDEP. Permittees shall also satisfy stormwater management requirements in Massachusetts.

a. General 401 WQC: MassDEP issued a WQC on April 21, 2023 which conditionally certifies all activities in GPs 1 – 24 eligible for SV and PCN so long as the activity is described in 314 CMR 9.03, and is not an activity described in 314 CMR 9.04, and so long as the activity meets all other requirements, terms and conditions of the WQC. The MassDEP WQC also conditionally certifies activities described in GP 25 so long as the activity meets all other conditions of the WQC. Emergency projects described in GP 25 must obtain an emergency certification or otherwise be authorized pursuant to 310 CMR 10.06, qualify under a Severe Weather Emergency Declaration pursuant to 310 CMR 10.06(8) issued by the MassDEP, or meet the requirements of 9.12(2) or (3) in order to be certified under the WQC. Prospective permittees may refer to the following link to determine if their activity is eligible: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/ Massachusetts-General-Permit/. The General 401 WQC is located here, and it provides detailed information regarding what activities are certified and the conditions for certification. Activities listed in 314 CMR 9.03 that are not exempt from the Wetland Protection Act must have a valid Final Order of Conditions (OOC) or Final Restoration Order of Conditions pursuant to 310 CMR 10.00 to be eligible under the General 401 WQC.
b. Individual 401 WQC: Prospective permittees shall contact MassDEP and apply for an individual 401 WQC if their activity does not qualify for a General 401 WQC as outlined above. MassDEP may issue, waive, or deny the individual 401 WQC on a case-by-case basis. All activities listed in 314 CMR 9.04 must obtain an individual 401 WQC from MassDEP to be eligible under these GPs. When an Individual 401 WQC is required for *PCN activities*, the prospective permittee shall submit their Individual 401 WQC application concurrently to MassDEP and USACE to comply with 40 CFR 121.
c. The prospective permittee is responsible for determining the appropriate 401 WQC requirement and submitting this information to the USACE at the time of their PCN application or when completing their SVN. Prospective permittees that are unsure of whether their activity has been certified should contact MassDEP for a determination.
d. As applicable, all activities shall be compliant with the Massachusetts Stormwater Handbook. The Stormwater Handbook can be accessed on the NAE Regulatory website here: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.
e. No work requiring authorization under Section 404 of the CWA may be performed unless (1) the prospective permittee qualifies for coverage under the April 21, 2023 General 401 WQC, (2) the prospective permittee receives an individual Section 401 WQC from the MassDEP, or (3) the MassDEP waives individual Section 401 WQC.

9. Coastal Zone Management. The permittee must obtain CZM consistency concurrence when an activity is located in the coastal zone in order to be eligible under the MA GP. This requirement

shall be satisfied by acquiring one of the following from the Massachusetts Office of Coastal Zone Management (MA CZM):

a. General CZM Federal Consistency Concurrence (General Concurrence): MA CZM has granted General Concurrence for all SV and PCN activities for GPs 1-25. The prospective permittee must obtain all applicable permits and approvals before construction of the authorized activity begins (e.g., before work begins on site). For SVs, General Concurrence is automatically granted and no further action is required from the prospective permittee. For PCNs, the USACE will coordinate with MA CZM to acquire General Concurrence as part of the PCN application review.
b. Individual CZM Federal Consistency Concurrence (Individual Concurrence): In certain cases, MA CZM may elevate any GP activity 1-25 and require Individual Concurrence. The prospective permittee must contact MA CZM and follow the procedures to obtain Individual Concurrence as determined appropriate by MA CZM.
c. Permittees must obtain CZM consistency concurrence as outlined above before commencing work authorized under these GPs.

10. Federal Threatened and Endangered Species

a. No activity is authorized under any GP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify designated critical habitat or critical habitat proposed for such designation. No activity is authorized under any GP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the consequences of the proposed activity on listed species or critical habitat has been completed. See 50 CFR 402.02 for the definition of "effects of the action" for the purposes of ESA section 7 consultation, as well as 50 CFR 402.17, which provides further explanation under ESA section 7 regarding "activities that are reasonably certain to occur" and "consequences caused by the proposed action."
b. Other Federal agencies should follow their own procedures for complying with the requirements of the ESA (see 33 CFR 330.4(f)(1)). If a PCN is required for the proposed activity, the Federal permittee must provide USACE with the appropriate documentation to demonstrate compliance with those requirements. The USACE will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.
c. USFWS ESA-Listed Species: Non-federal applicants shall use the USFWS website, Information for Planning and Consultation (IPAC), to determine if their activity is located within the ESA-listed species range. The IPAC website can be accessed on the NAE Regulatory website: https://www. nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/. Applicants shall ensure they have an updated, valid species list before construction begins. This may require applicants to update their species list in IPAC before the start of construction. Note: Applicants should refer to the NAE Regulatory Website at the link above to determine if they have been designated as a non-federal representative. Applicants shall complete Section 7 consultation according to the guidance document located on the NAE Regulatory Website. After completing the Rangewide Determination Key and reaching the outcome "may affect, not likely to adversely affect", you may be required to wait up to 15 days before that outcome is final and compliance under Section 7 of the ESA is fulfilled.

i. *Self-Verification Criteria*: The activity is SV-eligible if:
   1) The activity is not located within the ESA-listed species range;
   2) Another (lead) Federal agency has completed Section 7 consultation; or
   3) The activity is located within the ESA-listed species range ***and*** USACE has designated the applicant as a non-federal representative under 50 CFR 402.08 of the ESA for all

species within the project's action area. As the non-federal representative, the applicant shall complete consultation through IPAC and reach the outcome of "no effect" or "not likely to adversely affect".

ii. *Pre-Construction Notification Criteria*: The activity requires a PCN if:

1) The activity is located within the ESA-listed species range ***and*** USACE has NOT designated the applicant as a non-federal representative under 50 CFR 402.08 of the ESA for all species within the project's action area;

2) The activity is located in designated or proposed critical habitat; or

3) The activity is located within the ESA-listed species range and completion of the IPAC determination key has resulted in the outcome of "may affect" or "may affect, likely to adversely affect"; or

4) A PCN is required elsewhere in this document.

d. NOAA-Listed Species: Non-federal applicants shall refer to the Section 7 Mapper for federally listed species to determine if any species are mapped as present. When NOAA-listed species are present, the applicant shall generate a species report through the mapper and submit this document as part of their PCN or SVN submission. The NOAA Fisheries' Section 7 Mapper can be accessed here on the NAE Regulatory website here: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

e. Authorization of an activity by an GP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

11. Essential Fish Habitat (EFH).

a. SV eligible activities have been determined to result in no more than minimal adverse effects, provided the permittee complies with all terms and conditions of the MA GP as appliable to the activity. NMFS has granted General Concurrence [50 CFR 600.920(g)] for all SV eligible activities. These activities do not require project specific EFH consultation.

b. For PCN required activities, the applicant is required to describe and identify potential adverse effects to EFH and should refer to NOAA Fisheries' EFH Mapper (http://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper) and Omnibus Essential Fish Habitat Amendment 2 Volume 2: EFH and HAPC Designation Alternatives and Environmental Impacts (https://www.habitat.noaa.gov/application/efhmapper/oa2_efh_hapc.pdf). If an activity is located within EFH, the PCN application must contain:

1. A description of the action located in EFH.
2. An analysis of the potential adverse effects of the action on EFH and the managed Species.
3. Conclusions regarding the effects of the action on EFH.
4. Proposed mitigation, if applicable (refer to the mitigation thresholds located in Section V).

c. Federal agencies shall follow their own procedures for complying with the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act. For activities requiring a PCN, the applicant is responsible for furnishing documentation that demonstrates consultation for EFH has been completed.

d. For PCN activities, no work may commence until EFH consultation as required by the Magnuson-Stevens Act has been completed.

12. National Lands. Activities that impinge upon the value of any National Wildlife Refuge, National Forest, National Marine Sanctuary, National Historic Landmarks or any other area administered by the National Park Service, U. S. Fish and Wildlife Service (USFWS) or U.S. Forest Service (USFS) require a PCN or Individual Permit. Federal land managers seeking authorization for activities located in the above listed National Lands may proceed under SV, unless a PCN is required elsewhere in this document.

13. Wild and Scenic Rivers. The following activities in designated river or study river segments in the National Wild and Scenic River (WSR) System require a PCN unless the Federal agency with direct management responsibility for such river, in Massachusetts this is generally the National Park Service, has determined in writing to the proponent that the proposed work will not adversely affect the WSR designation or study status:

a. Activities that occur in WSR segments, in and 0.25 miles up or downstream of WSR segments, or in tributaries within 0.25 miles of WSR segments;
b. Activities that occur in wetlands within 0.25 miles of WSR segments;
c. Activities that have the potential to alter free-flowing characteristics in WSR segments.

No GP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

As of May 10, 2023, affected rivers in Massachusetts include: the Taunton River (40 miles), Sudbury River (16.6 miles), Assabet River (4.4 miles), Concord River (8 miles), Nashua River (27 miles), Squannacook River (16.3 miles), Nissitissit River (4.7 miles), and the Westfield River, including West Branch, Middle Branch, Gendale Brook, East Branch, Drowned Land Brook, Center Brook, Windsor Jambs Brook, Shaker Mill Brook, Depot Brook, Savery Brook, Watson Brook, Center Pond Brook (78.1 miles). The most up to date list of designated and study rivers and their descriptions may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

14. Historic Properties

a. For all SV and PCN applications, permittees shall follow the guidance set forth in Appendix A, Guidance for NHPA Section 106 Compliance in Massachusetts.

b. No undertaking authorized by these GPs shall cause effects[1] (defined in 36 CFR Part 800 and 33 CFR Part 325, Appendix C, and its Interim Guidance) on properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places (NRHP)[2], including previously unknown historic properties within the permit area, unless the USACE or another Federal action agency has satisfied the consultation requirements of Section 106 of the National Historic Preservation Act (Section 106). If another Federal agency is determined the lead federal agency for compliance with Section 106, applicant must obtain the appropriate documentation and provide this information to the USACE to demonstrate compliance with Section 106. The applicant shall not begin the activity until the USACE notifies them in writing that the documentation provided satisfies Section 106 requirements.

[1] Effect means the alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register of Historic Properties.
[2] See the NAE Regulatory website, National Register of Historic Places link here: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

c. Many historic properties are not listed on the NRHP and may require identification and evaluation by qualified historic preservation and/or archaeological consultants. The State Historic Preservation Officer (SHPO), Massachusetts Board of Underwater Archaeological Resources (BUAR), local historical societies, certified local governments, general public, and NRHP may also be able to assist with locating information on:

i. Previously identified historic properties; and
ii. Areas with potential for the presence of historic properties.

d. Discovery of Previously Unknown Remains and Artifacts: If any previously unidentified human remains, cultural deposits, or artifacts are discovered while accomplishing the activity authorized by this permit, you must immediately notify the USACE of what you have found, and to the maximum extent practicable, cease work and avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The USACE will initiate the Federal, State and tribal coordination required to determine if the items or remains warrant a recovery effort and/or if the site is eligible for listing in the National Register of Historic Places.

e. Section 110k: Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. § 306113) prevents the USACE from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106, has intentionally significantly adversely effected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the USACE, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the USACE is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties effected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or effects historic properties on tribal lands or effects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

f. Underwater Archaeological Resources: Under Massachusetts General Law Ch. 6, s.'s 179-180, and Ch. 91, s. 63, the BUAR has statutory jurisdiction within state waters and is the sole trustee of the Commonwealth's underwater heritage, charged with the responsibility of encouraging the discovery and reporting, as well as the preservation and protection, of underwater archaeological resources. Underwater archaeological resources located within the waters of the Commonwealth of Massachusetts are property of the Commonwealth, which holds title to these resources and retains regulatory authority over their use. Under Massachusetts General Law, no person, organization or corporation may "remove, displace, damage, or destroy" any underwater archaeological resources located within the Commonwealth's submerged lands except through consultation with the BUAR and in conformity with the permits it issues. https://www.mass.gov/orgs/board-of-underwater-archaeological-resources.

15. USACE Property and Federal Projects. (33 USC §408)

a. USACE projects and property can be found at: https://www.nae.usace.army.mil/Missions/Civil-Works/.

b. In addition to any authorization under these GPs, prospective permittee shall contact the USACE Real Estate Division (https://www.nae.usace.army.mil/Missions/Real-Estate-Division/) at (978) 318-8585 for work occurring on or potentially affecting USACE properties and/or USACE-controlled easements. Work may not commence on USACE properties and/or USACE-controlled easements until they have received any required USACE real estate documents evidencing site-specific permission to work.

c. Any proposed temporary or permanent occupation or alteration of a Federal project (including, but not limited to, a levee, dike, floodwall, channel, anchorage, breakwater, seawall, bulkhead, jetty, wharf, pier, or other work built or maintained but not necessarily owned by the United States),

is not eligible for SV and requires a PCN. This includes all proposed structures and work in, over, or under a USACE federal navigation project (FNP) or in the FNP's buffer zone. The buffer zone is an area that extends from the horizontal limits of the FNP to a distance of three times the FNP's authorized depth. The activity also requires review and approval by the USACE pursuant to 33 USC 408 (Section 408 Permission). The prospective permittee may reach out to the POCs located here: https://www.nae.usace.army.mil/ Missions/Section-408/.
d. Any structure or work constructed in a FNP or its buffer zone shall be subject to removal at the owner's expense prior to any future USACE dredging or the performance of periodic hydrographic surveys.
e. Where a Section 408 permission is required, written verification for the PCN will not be issued prior to the decision on the Section 408 permission request.

16. Navigation
a. No activity may cause more than a minimal adverse effect on navigation.
b. Any safety lights and signals prescribed by the U.S. Coast Guard, must be installed, and maintained at the permittee's expense on authorized facilities in navigable waters of the U.S.
c. There shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein, and no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized herein.
d. The permittee understands and agrees that if future U.S. operations require the removal, relocation, or other alteration of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from USACE, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the U.S. No claim shall be made against the U.S. on account of any such removal or alteration.

17. Permit/Authorization Letter On-Site. For PCNs, the permittee shall ensure that a copy of these GPs and the accompanying authorization letter are at the work site (and the project office) whenever work is being performed, and that all personnel with operational control of the site ensure that all appropriate personnel performing work are fully aware of its terms and conditions. The entire permit authorization shall be made a part of any and all contracts and sub-contracts for work that affects areas of USACE jurisdiction at the site of the work authorized by these GPs. This shall be achieved by including the entire permit authorization in the specifications for work. The term "entire permit authorization" means these GPs, including GCs and the authorization letter (including its drawings, plans, appendices, special conditions, and other attachments), and any permit modifications. If the authorization letter is issued after the construction specifications, but before receipt of bids or quotes, the entire permit authorization shall be included as an addendum to the specifications. If the authorization letter is issued after receipt of bids or quotes, the entire permit authorization shall be included in the contract or sub-contract as a change order. Although the permittee may assign various aspects of the work to different contractors or sub-contractors, all contractors and sub-contractors shall be obligated by contract to comply with all environmental protection provisions contained within the entire authorization letter, and no contract or sub-contract shall require or allow unauthorized work in areas of USACE jurisdiction. For SVs, the permittee shall ensure that a complete and signed copy of the SVN is present on site during construction and is made available for review at any time by USACE and other Federal, State, & Local regulatory agencies. A complete and signed copy of the SVN must be submitted to USACE Regulatory within 30 days of initiating construction of the authorized activity, unless stated otherwise in the applicable GP.

18. Storage of Seasonal Structures. Coastal structures such as pier sections, floats, etc., that

are removed from the waterway for a portion of the year (often referred to as seasonal structures) shall be stored in an upland location, located above MHW and not in tidal wetlands. These seasonal structures may be stored on the fixed, pile-supported portion of the structure that is seaward of MHW. This is intended to prevent structures from being stored on the marsh substrate and the substrate seaward of MHW.

19. Pile Driving and Pile Removal in Navigable Waters.
a. Derelict, degraded or abandoned piles and sheet piles in navigable waters of the U.S., except for those inside existing work footprints for piers, must be completely removed, cut and/or driven to 3 feet below the substrate to prevent interference with navigation, and existing creosote piles that are affected by project activities shall be completely removed if practicable. In areas of fine-grained substrates, piles must be removed by the direct, vibratory or clamshell pull method[1] to minimize sedimentation and turbidity impacts and prevent interference with navigation from cut piles. Removed piles shall be disposed of in an upland location landward of MHW or OHW and not in wetlands, tidal wetlands or mudflats.
b. A PCN is required for the installation or removal of structures with jetting techniques.
c. A PCN is required for the installation of >12 inch-diameter piles of any material type or steel piles of any size in tidal waters, unless they are installed in the dry. If piles are not installed in the dry:
i. Impact pile driving shall commence with an initial set of three strikes by the hammer at 40% energy, followed by a one-minute wait period, then two subsequent 3-strike sets at 40% energy, with one minute waiting periods, before initiating continuous impact driving.
ii. Vibratory pile driving shall be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period shall be repeated two more times, followed immediately by pile-driving at full rate and energy.
iii. In addition to using a soft start at the beginning of the workday for pile driving as described in 19c(i-ii), a soft start must also be used at any time following a cessation of pile driving for a period of 30 minutes or longer.
d. Bubble curtains may be used to reduce sound pressure levels during vibratory or impact hammer pile driving.

20. Time-of-Year (TOY) Restrictions. Activities that include in-water work must comply with the TOY Restrictions below to be SV eligible, otherwise a PCN is required. PCN submittals shall contain written justification for deviation from the TOY Restrictions. The term “in-water work” does not include conditions where the work site is “in-the-dry” (e.g., intertidal areas exposed at low tide). The term “in-the-dry” includes work contained within a cofferdam so long as the cofferdam is installed and subsequently removed outside the TOY Restriction. The TOY restrictions stated in Appendix B of the MA DMF Technical Report TR-47[2] can apply instead for activities in tidal waters if (1) TOYs are provided for a specific waterbody where the activity is proposed and (2) the TOYs are less restrictive than below. The activity must also not require a PCN elsewhere in this document to be SV eligible.

[1] Direct Pull: Each piling is wrapped with a choker cable or chain that is attached at the top to a crane. The crane then pulls the piling directly upward, removing the piling from the sediment. Vibratory Pull: The vibratory hammer is a large mechanical device (5-16 tons) that is suspended from a crane by a cable. The vibrating hammer loosens the piling while the crane pulls up. Clamshell Pull: This can remove intact, broken or damaged pilings. The clamshell bucket is a hinged steel apparatus that operates like a set of steel jaws. The bucket is lowered from a crane and the jaws grasp the piling stub as the crane pulls up. The size of the clamshell bucket is minimized to reduce turbidity during piling removal.
[2] The MA DMF Technical Report TR-47: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/

	TOY Restriction (No work)
Non-tidal Waters	Defer to TR-47
Tidal Waters	January 15 – November 15

Alternate work windows proposed under a PCN will generally be coordinated with the USFWS and NMFS. Resulting written verifications may include species-specific work allowed windows.

21. Heavy Equipment in Wetlands. Operating heavy equipment (drill rigs, fixed cranes, etc.) within wetlands shall be minimized, and such equipment shall not be stored, maintained, or repaired in wetlands, to the maximum extent practicable. Where construction requires heavy equipment operation in wetlands, the equipment shall:

i. Have low ground pressure (typically ≤3 psi);

ii. Be placed on swamp/construction/timber mats (herein referred to as "construction mats" or "mats") that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation. See GC 22 for information on the placement of construction mats; or

iii. Be operated on adequately dry or frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath the equipment and upheaval of adjacent wetlands. Construction mats are to be placed in the wetland from the upland or from equipment positioned on mats if working within a wetland. Dragging construction mats into position is prohibited. Other support structures that are capable of safely supporting equipment may be used with written USACE authorization.

22. Temporary Fill, Work & Construction Mats.

a. *Construction mats in non-tidal waters*: Temporary construction mats shall be in place ≤1 year *and* for one growing season or less to be SV eligible. A PCN is required if construction mats are in place >1 year *or* for more than one growing season. Construction mats can be placed in an area of any size in non-tidal waters. The activity may occur in segments to ensure the requirements for SV above are met, otherwise a PCN is required.

b. *Construction mats in tidal waters*: Temporary construction mats placed in an area <5,000 SF in tidal waters are SV eligible, provided those mats are in place ≤6 months. Temporary construction mats placed in an area ≥5,000 SF or in place >6 months in tidal waters require a PCN.

c. *Management of construction mats:* At a minimum, construction mats shall be managed in accordance with the following construction mat best management practices (BMPs):

1. Mats shall be in good condition to ensure proper installation, use, and removal.
2. As feasible, mats shall be placed in a location that will minimize the amount of mats needed for the wetland crossing(s).
3. Inspect mats prior to their re-use and remove any plant debris. Mats are to be thoroughly cleaned before re-use to prevent the spread of invasive plant species.
4. Impacts to wetland areas shall be minimized during installation, use, and removal of the mats.
5. Adequate erosion & sediment controls shall be installed at approaches to mats to promote a smooth transition to, and minimize sediment tracking onto, the mats.
6. In most cases, mats should be placed along the travel area so that the individual boards are resting perpendicular to the direction of traffic. No gaps should exist between mats. Place mats far enough on either side of the resource area to rest on firm ground.

d. A PCN is required for temporary fills in place >2 years. All temporary fills and disturbed soils shall be stabilized to prevent the material from eroding into waters of the U.S. where it is not authorized. Work shall include phased or staged development to ensure only areas under active development are exposed and to allow for stabilization practices as soon as practicable. Temporary fill must be placed in a manner that will prevent it from being eroded by expected high flows.

e. Activities that require unconfined temporary fill and are authorized for discharge into waters of the U.S. shall consist of material that minimizes effects to water quality.
f. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable when temporary structures, work, and discharges of dredged or fill material, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Materials shall be placed in a location and manner that does not adversely impact surface or subsurface water flow into or out of the wetland. Temporary fill authorized for discharge into wetlands shall be placed on geotextile fabric or other appropriate material laid on the pre-construction wetland grade where practicable to minimize impacts and to facilitate restoration to the original grade. Construction mats are excluded from this requirement.
g. Construction debris and deteriorated materials shall not be located in waters of the U.S.
h. Temporary fills, construction mats, and corduroy roads shall be entirely removed as soon as they are no longer needed to construct the authorized activity and the disturbed areas be restored to pre-construction contours and conditions.
i. Construction equipment, such as temporary barges in tidal waters, shall provide clearance above the substrate to avoid grounding onto the substrate during all tides.

23. Restoration of Wetland Areas.
a. Upon completion of construction, all disturbed wetland areas shall be stabilized with a wetland seed mix or plant plugs containing only plant species native to New England, and be appropriate for site conditions, including salinity and frequency of inundation, and shall not contain any species listed in the “Invasive and Other Unacceptable Plant Species” Appendix K of the New England District “Compensatory Mitigation Standard Operating Procedures” found at https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation.aspx.
b. The introduction or spread of invasive plant species in disturbed areas shall be prevented and controlled. Equipment shall be thoroughly cleaned before and after project construction to prevent the spread of invasive species. This includes, but is not limited to, tire treads and construction mats.
c. In areas of authorized temporary disturbance, if trees are cut in USACE jurisdiction, they shall be cut at or above ground level and not uprooted in order to prevent disruption of any kind to the wetland soil structure and to allow stump sprouts to revegetate the work area, unless otherwise authorized.
d. Wetland areas where permanent disturbance is not authorized shall be restored to their original condition and elevation, which under no circumstances shall be higher than the pre-construction elevation. Original condition means careful protection and/or removal of existing soil and vegetation, and replacement back to the original location such that the original soil layering and vegetation schemes are approximately the same, unless otherwise authorized.

24. Bank Stabilization.
a. Projects involving construction or reconstruction/maintenance of bank stabilization within USACE jurisdiction shall be designed to minimize environmental effects, effects to neighboring properties, scour, conversion of natural shoreline to hard armoring, etc. to the maximum extent practicable.
b. Projects involving the construction of new bank stabilization within USACE jurisdiction shall use bioengineering techniques and natural materials in the project design to the maximum extent practicable. Use of hard structures shall be eliminated or minimized unless the prospective permittee can demonstrate that use of bioengineering techniques is not practicable due to site conditions.
c. Where possible, bank stabilization projects shall optimize the natural function of the shoreline, including self-sustaining stability to attenuate flood flows, fishery, wildlife habitat and water quality protection, while protecting upland infrastructure from storm events that can cause erosion as well as impacts to public and private property.
d. No material shall be placed in excess of the minimum needed for erosion protection.
e. No material shall be placed in a manner that will be eroded by normal or expected high flows (properly anchored native trees and treetops may be used in low energy areas).

f. Native plants appropriate for current site conditions, including salinity, must be used for bioengineering or vegetative bank stabilization.
g. The activity must be properly maintained, which may require repairing it after severe storms or erosion events.

25. Soil Erosion and Sediment Controls.
a. Appropriate soil erosion and sediment controls[1] (hereinafter referred to as "controls") must installed prior to earth disturbance and maintained in effective operating condition during construction. Biodegradable wildlife friendly erosion controls should be used whenever practicable to minimize effects to water quality.
b. Activities in streams (rivers, streams, brooks, etc.) and tidal waters that are capable of producing sedimentation or turbidity should be done during periods of low-flow or no-flow, when the stream or tide is waterward of the work area. Controls may also be used to obtain dry work conditions (e.g., coffer dam, turbidity curtain). The prospective permittee must demonstrate in the project plans where the controls are proposed and how these controls would avoid and/or minimize turbidity or sedimentation.
c. A PCN is required for controls that encroach: i) >25% of the stream width measured from OHW in non-tidal diadromous streams from March 15 to June 30; or ii) >25% of the waterway width measured from MHW in tidal waters from Feb. 1 to June 30, or >50% of the waterway width measured from MHW in tidal waters from July 1 to Jan. 14. This is to protect upstream fish passage. Proponents must also maintain downstream fish passage throughout the project.
d. No dewatering shall occur with direct discharge to waters or wetlands. Excess water in isolated work areas shall be pumped or directed to a sedimentation basin, tank or other dewatering structures in an upland area adequately separated from waters or wetlands. Suspended solids shall be removed prior to discharge back into waters or wetlands from these dewatering structures. All discharge points back into waters and wetlands shall use appropriate energy dissipaters and erosion and sedimentation control BMPs.
e. Temporary controls shall be removed upon completion of work, but not until all exposed soil and other fills, as well as any work waterward of OHW or the HTL, are permanently stabilized at the earliest practicable date. Sediment and debris collected by these devices shall be removed and placed at an upland location in a manner that will prevent its later erosion into a waterway or wetland. Controls may be left in place if they are biodegradable and flows and aquatic life movements are not disrupted.

26. Aquatic Life Movements and Management of Water Flows.
a. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies and wetlands shall be:

i. Suitably spanned, bridged, culverted, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species; and
ii. Properly aligned and constructed to prevent bank erosion or streambed scour both adjacent to and inside the crossing.

[1] Appropriate soil erosion, sediment and turbidity controls include cofferdams, bypass pumping around barriers immediately up and downstream of the work footprint (i.e., dam and pump), installation of sediment control barriers (i.e., silt fence, vegetated filter strips, geotextile silt fences, filter tubes, erosion control mixes, hay bales or other devices) downhill of all exposed areas, stream fords, retention of existing vegetated buffers, application of temporary mulching during construction, phased construction, and permanent seeding and stabilization, etc.

b. To avoid adverse impacts on aquatic organisms, the low flow channel/thalweg shall remain unobstructed during periods of low flow, except when necessary to perform the authorized work.
c. For work in tidal waters, in-stream controls (e.g., cofferdams) should be installed in such a way as to not obstruct fish passage.
d. Riprap and other stream bed materials shall be installed in a manner that avoids organism entrapment in rock voids or water displaced to subterranean flow with crushed stone and riprap.
e. To the maximum extent practicable, the preconstruction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity shall not restrict or impede the passage of normal or high flows unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

27. Spawning, Breeding, and Migratory Areas.
a. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized under these GPs.
b. Activities in waters of the U.S. that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.
c. The applicant is responsible for obtaining any "take" permits required under the USFWS's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The applicant should contact the appropriate local office of the USFWS to determine if such "take" permits are required for a particular activity.
d. Information on spawning habitat for species managed under the Magnuson-Stevens Fishery Conservation and Management Act (i.e., EFH for spawning adults) can be obtained from NAE Regulatory website, Essential Fish Habitat section, at: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.
e. Information regarding diadromous fish habitat can be obtained from the following DMF website at: https://www.mass.gov/info-details/massgis-data-diadromous-fish.

28. Vernal Pools.
a. A PCN is required if a discharge of dredged or fill material is proposed within a vernal pool depression that is also a water of the U.S.
b. Vernal pools must be identified on the plans that show aquatic resource delineations.
c. Adverse impacts to vernal pools shall be avoided & minimized to the maximum extent practicable.

29. Invasive Species.
a. The introduction, spread or the increased risk of invasion of invasive plant or animal species on the project site, into new or disturbed areas, or areas adjacent to the project site caused by the site work shall be avoided. Construction mats shall be thoroughly cleaned before reuse to avoid spread of invasive species.
b. Unless otherwise directed by USACE, all applications for PCN non-tidal projects proposing fill in USACE jurisdiction shall include an Invasive Species Control Plan. Additional information can be found at: https://www.nae.usace.army.mil/Missions/Regulatory/Invasive-Species/, https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/.

30. Fills Within 100-Year Floodplains. The activity shall comply with applicable Federal Emergency Management Agency (FEMA) approved, Massachusetts Emergency Management

Agency (MEMA) approved and/or local floodplain management requirements. Applicants should contact FEMA and/or MEMA regarding floodplain management requirements.

31. Stream Work and Crossings & Wetland Crossings.
a. When feasible, all temporary and permanent crossings of waterbodies and wetlands (hereinafter referred to as "crossings") shall conform to the "Massachusetts River and Stream Crossing Standards" located at: https://www.mass.gov/doc/massachusetts-river-and-stream-crossing-standards/download or https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/. Projects that do not conform to these guidelines shall be reviewed under PCN or IP procedures.
b. Crossings shall be suitably culverted, bridged, or otherwise designed to withstand and to prevent the restriction of high flows, to maintain existing low flows, maintain water quality, and not obstruct the movement of aquatic life indigenous to the waterbody beyond the duration of construction.
c. Crossings shall be installed in such a manner as to preserve hydraulic capacity and flow, sediment transport, and organism passage at its present level, between the wetlands on either side of the road. The applicant shall take necessary measures to correct any wetland damage resulting from deficiencies in hydraulic capacity, sediment transport and organism passage.
d. Stream crossings shall utilize a natural mixed grain-size streambed material composition that matches upstream and downstream substrates to create a stable streambed. Substrate should function appropriately during normal and high flows without washing out. If natural streambed material is not utilized, a PCN is required.
e. Activities involving open trench excavation in flowing waters require a PCN. Work should not occur in flowing waters (requires using management techniques such as temporary flume pipes, culverts, cofferdams, etc.). Normal flows should be maintained within the stream boundary's confines when practicable. Projects utilizing these management techniques must meet all applicable terms and conditions of the GP, including the GCs in Section IV.

32. Utility Line Installation and Removal
a. Subsurface utility lines must be installed at a sufficient depth to avoid damage from anchors, dredging, etc., and to prevent exposure from erosion and stream adjustment.
b. When utility lines are installed via horizontal directional drilling, a frac-out contingency plan shall be present on site for the duration of construction. As necessary, the applicant shall immediately contain, control, recover, and remove drilling fluids released into the environment.
c. Abandoned or inactive utility lines must be removed and faulty lines (e.g., leaking hazardous substances, petroleum products, etc.) must be removed or repaired. A written verification from the USACE is required if they are to remain in place, e.g., to protect sensitive areas or ensure safety.
d. Utility lines shall not adversely alter existing hydrology, and trenches cannot be constructed or backfilled in such a manner as to drain waters of the U.S. (e.g., backfilling with extensive gravel layers, creating a French drain effect). In wetland areas, structures such as ditch plugs, cut-off walls, clay blocks, bentonite, or other suitable material shall be used within utility trenches to ensure that the trench through which the utility line is installed does not drain waters of the U.S. including wetlands.
e. Stockpiling of tree debris, to the extent where it has the effect of fill material, shall not occur in waters of the U.S. Tree debris shall be removed from waters of the U.S. and placed in uplands without causing additional disturbance to aquatic resources. Failure to meet this condition could change the bottom elevation of the wetland and be considered a discharge of fill material, and depending on the area of alteration, may require a PCN or IP.

33. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

34. Coral Reefs. Impacts to coral reefs are not authorized under these GPs. Coral reefs consist of the skeletal deposit, usually of calcareous or silicaceous materials, produced by the vital activities of anthozoan polyps or other invertebrate organisms present in growing portions of the reef.

35. Blasting. Blasting in waters of the U.S. associated with work such as dredging, trenching, pile installation, etc. is not authorized under these GPs.

36. Inspections. The permittee shall allow USACE to make periodic inspections at any time deemed necessary to ensure that the work is being or has been performed in accordance with the terms and conditions of this permit. To facilitate these inspections, for activities requiring a PCN, the permittee shall complete and return the Certificate of Compliance when it is provided with a PCN verification letter. For SV-eligible activities, the permittee shall complete and submit the SVN to USACE within 30 days of initiating project construction, at which point, USACE may opt to inspect the activity to verify compliance with the terms and conditions of the GP. Post-construction engineering drawings may be required by USACE for completed work. This includes post-dredging survey drawings for any dredging work.

37. Maintenance. The permittee shall maintain the activity authorized by these GPs in good condition and in conformance with the terms and conditions of this permit. Some maintenance activities may not be subject to federal regulation under Section 404 in accordance with 33 CFR 323.4(a)(2). This condition is not applicable to maintenance of dredging projects. Prospective permittees should contact USACE to inquire about maintenance of dredging projects, and its eligibility under these GPs. Maintenance dredging is subject to the review thresholds in GP #7 as well as any conditions included in a written USACE authorization. Maintenance dredging includes only those areas and depths previously authorized and dredged.

38. Property Rights. Per 33 CFR 320.4(g)(6), these GPs do not convey any property rights, either in real estate or material, or any exclusive privileges, nor do they authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations.

39. Transfer of GP Verifications. When the work authorized by these GPs is still in existence at the time the property is transferred, the terms and conditions of these GPs, including any special conditions, will continue to be binding on the entity or individual who received the GP authorizations, as well as the new owner(s) of the property. If the permittee sells the property associated with a GP authorization, the applicant may transfer the GP authorization to the new owner by submitting a letter to USACE to validate the transfer. A copy of the GP authorization letter must be attached to the letter, and the letter must include the following statement: “The terms and conditions of these general permits, including any special conditions, will continue to be binding on the new owner(s) of the property.” This letter shall be signed by both the seller and new property owner(s).

40. Modification, Suspension, and Revocation. These GPs and any individual authorization issued thereof may be either modified, suspended, or revoked in whole or in part pursuant to the policies and procedures of 33 CFR 325.7; and any such action shall not be the basis for any claim for damages against the U.S.

41. Special Conditions. The USACE may impose other special conditions on a project authorized pursuant to these GPs that are determined necessary to minimize adverse navigational and/or environmental effects or based on any other factor of the public interest. Failure to comply with all conditions of the authorization, including special conditions, constitutes a permit violation and may subject the applicant to criminal, civil, or administrative penalties or restoration.

42. False or Incomplete Information. If USACE makes a determination regarding the eligibility of a project under these GPs, and subsequently discovers that it has relied on false, incomplete, or inaccurate information provided by the applicant, the authorization will not be valid, and the U.S. Government may institute appropriate legal proceedings.

43. Abandonment. If the permittee decides to abandon the activity authorized under these GPs, unless such abandonment is merely the transfer of property to a third party, he/she/they may be required to restore the area to the satisfaction of USACE.

44. Enforcement cases. These GPs do not apply to any existing or proposed activity in USACE jurisdiction associated with an on-going USACE or EPA enforcement action, until such time as the enforcement action is resolved or USACE or EPA determines that the activity may proceed independently without compromising the enforcement action.

45. Previously Authorized Activities.

a. Completed projects that received prior authorization from USACE (SV or PCN), shall remain authorized in accordance with the original terms and conditions of those authorizations, including their terms, GCs, and any special conditions provided in a written verification.

b. Activities authorized pursuant to 33 CFR 330.3 (activities occurring before certain dates) are not affected by these GPs.

46. Duration of Authorization.

These GPs expire on June 1, 2028. Activities authorized under these GPs will remain authorized until the GPs expire, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 CFR 325.2(e)(2). Activities authorized under GPs 1-25 that have either commenced (i.e., are under construction) or are under contract to commence in reliance upon this authorization will have until June 1, 2029 to complete the work. If requested by USACE, the permittee shall furnish documentation that demonstrates the project was under construction or under contract to commence by June 1, 2028. If work is not completed before June 1, 2029, the permittee must contact USACE. The USACE may issue a new authorization provided the project meets the terms and conditions of the MA GPs in effect at the time. Activities completed under the SV or PCN authorizations of these GPs will continue to be authorized after their expiration date.

SECTION V: MITIGATION STANDARDS

1. Mitigation Types

For all activities, applicants must (a) demonstrate how the project has been designed to avoid or minimize impacts to aquatic resources; and (b) describe measures taken to avoid or minimize impacts to aquatic resources through construction techniques and/or site access. Please see https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/ for assistance with preparing mitigation in accordance with the 2008 Compensatory Mitigation for Losses of Aquatic Resources; Final Rule (33 CFR 332.3), hereafter referred to as "2008 Mitigation Rule."

Avoidance - Avoidance of impacts (direct and indirect) to aquatic resources means that project activities would not result in the placement of fill material or installation of a structure that could impact the resource area. Avoidance can include, but is not limited to, designing the project to avoid impacts to all or a portion of the aquatic resource areas.

Minimization - Minimization of impacts (direct and indirect) to aquatic resources means that measures are taken to ensure the amount and duration of impacts are limited to the maximum extent practicable. There are many minimization measures that could be implemented, prior to, during, or after the proposed activity, to ensure impacts are minimized. Examples include, but are not limited to:

- Permanent preservation of avoided aquatic features and buffer zone, in perpetuity. In these cases, the preserved area would be under a conservation easement and managed by conservation oriented third-party manager.
- Utilization of best management practices (BMPs) to ensure impacts are limited, and do not result in adverse impacts to the integrity and long-term functions of preserved/avoided features.

Compensatory Mitigation - Compensatory mitigation is generally required for PCN activities in which the impacts to the aquatic resources have been avoided and minimized to the maximum extent practicable but would still result in unavoidable adverse effects to the environment that are considered more than minimal or are contrary to the public interest. *Whatever the case may be, compensatory mitigation is no substitute for avoidance and minimization.*

2. Thresholds for Compensatory Mitigation

The basic objective of compensatory mitigation in the USACE Regulatory Program is to offset environmental losses resulting from unavoidable impacts to waters of the U.S. authorized by Department of the Army permits. **The following compensatory mitigation thresholds apply to all PCN activities that result in loss[1] of the resource area types listed below. Activities[2] in waters of the U.S. associated with the restoration, enhancement, and establishment of tidal and non-tidal aquatic resources are not considered loss and are not subject to the thresholds below.** Thresholds for different resource areas may not be combined to exceed 5,000 SF of total loss of all waters. The USACE will continue to evaluate projects on a case-by-case basis, and may in some cases require compensatory mitigation below these thresholds (e.g. minor impacts that add to a cumulative loss).

[1] See definition of loss in Section VII.
[2] These activities must result in net increases in aquatic resource functions and services to be exempted from the thresholds above.

Compensatory Mitigation Thresholds in Massachusetts		
Resource Area	**Non-Tidal Threshold**	**Tidal Threshold**
Stream	200 LF	200 LF
Bank Stabilization	500 LF	500 LF
Open Water	Project Dependent	Project Dependent
Wetland	5,000 SF	500 SF
Vernal Pool	All	N/A
SAV	Project dependent	25 SF
Mudflat	N/A	1,000 SF
Intertidal	N/A	1,000 SF

These thresholds can be utilized to determine at what point compensatory mitigation is required but are not used to determine how much mitigation may be needed to offset impacts to resources. Per the 2008 Mitigation Rule (33 CFR 332.3(f)(1)) "the amount of required compensatory mitigation must be, to the extent practicable, sufficient to replace lost aquatic resource functions. In cases where appropriate functional or condition assessment methods or other suitable metrics are available, these methods should be used where practicable to determine how much compensatory mitigation is required. If a functional or condition assessment or other suitable metric is not used, a minimum one-to-one acreage or linear foot compensation ratios must be used."

3. Compensatory Mitigation Hierarchy

Compensatory mitigation should follow the hierarchy as outlined in 33 CFR 332.3(b)(2-6) or current regulation. This hierarchy in order of preference includes: (1) Mitigation Bank credits, (2) In-Lieu Fee program credits, (3) permittee-responsible mitigation under a watershed approach, (4) permittee-responsible mitigation through on-site and in-kind mitigation, and (5) permittee-responsible mitigation through off-site and/or out-of-kind mitigation. If the proposed mitigation deviates from this mitigation hierarchy, the applicant **must** justify in writing why the proposed mitigation is environmentally preferable to the preferred method of compensatory mitigation (See 2008 Mitigation Rule). **In order for your application to be considered complete, you must provide a statement that discusses how your project will compensate for the loss or impact to aquatic resources.** If you are proposing permittee responsible mitigation, the 12 components of a mitigation plan (33 CFR 332.4(c)(2-14) must be addressed for your application to be considered complete. Prospective applicants are encouraged to contact USACE with questions at any time. Addressing the 12 components of a mitigation plan is commensurate with the amount of compensatory mitigation required, and USACE can assist prospective applicants with the level of information needed to satisfy each component.

For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee.

4. In-Lieu Fee (ILF)

The purchase of credits from the Massachusetts In-Lieu Fee Program (MA ILFP) is the ***preferred*** method of compensatory mitigation in Massachusetts since, as of the issuance date of this GP, there are no mitigation banks available in Massachusetts. The applicant shall develop a mitigation plan that addresses the baseline conditions at the impact site and the number of credits to be provided (see 33 CFR 332.4(c)(1)(ii)).

The MA ILFP is administered by the Massachusetts Department of Fish & Game (DFG) in accordance with the 2008 Mitigation Rule at 33 CFR 332. The Mitigation Rule governs in-lieu fee compensatory mitigation associated with USACE permits under §404 of the Clean Water Act and/or §9 or §10 of the Rivers and Harbors Act of 1899.

MA ILFP Website: https://www.mass.gov/in-lieu-fee-program

Acceptance of an ILF payment into the ILFP established by the 2014 MA ILFP Instrument (link below) is an acknowledgement by DFG that it assumes all legal responsibility for satisfying the mitigation requirements of the USACE (i.e., the implementation, performance, and long-term management and monitoring of the compensatory mitigation project(s) approved under this Instrument and subsequent Compensatory Mitigation Plans). This transfer of legal responsibility is established by: 1) the approval of this In-Lieu Fee Instrument; 2) receipt by the district engineer of a Notice of Credit Sale and Transfer of Legal Responsibility to DFG that is signed by the DFG and the permittee and dated; and 3) the transfer of fees from the permittee to DFG.

MA ILFP Fact Sheet: https://www.mass.gov/files/documents/2017/01/sj/ilfp-fact-sheet-ma-ilfp-fees.pdf

MA ILFP Instrument: https://www.mass.gov/files/documents/2016/08/nd/ilfp-final-instrument-dfg.pdf

5. Permittee-Responsible

The USACE may determine that the proposed permittee-responsible compensatory mitigation is appropriate on a case-by-case basis. As described in the Compensatory Mitigation Hierarchy section above, applicants must justify in writing why the proposed mitigation is environmentally preferable to the purchase of ILF credits. Applicants are encouraged to contact the USACE prior to submission of a permit application to seek further guidance regarding USACE mitigation requirements.

Applicants will demonstrate their proposed compensatory mitigation in writing by addressing the 12 components of a mitigation plan (33 CFR 332.4(c)(2-14). *Please note that all elements must be addressed, or the permit application will be deemed incomplete.* In certain circumstances, the district engineer may determine that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). Guidance on how to address these components can be found on the New England District Mitigation webpage: https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/

Performance standards will be used to measure the successfulness of the mitigation project. A successful mitigation project is one that is self-sustaining. For a mitigation project that will restore, enhance, or create wetlands, proper performance standards must address hydrology, hydric soils, and hydrophytic vegetation. The mitigation proposal must include an explanation of quantitative methods used to measure the success of performance standards (i.e., percent cover may be measured using vegetation plots, hydrology may be measured using data loggers, soil cores may be taken and evaluated for hydric soil indicators).

Monitoring methods should include quantitative sampling methods following established, scientific protocols. Sampling documentation, as part of monitoring reports, should include maps and coordinates (also shapefiles, if available) showing locations of sampling points, transects, quadrats, etc. In addition, permanent photo stations should be established coincident with sampling locations.

SECTION VI: FEDERAL & STATE AGENCY CONTACT INFORMATION & ORGANIZATIONAL WEBSITES

Federal Agencies

U.S. Army Corps of Engineers
Regulatory Division
696 Virginia Road
Concord, Massachusetts 01742-2751
(978) 318-8338 (phone); (978) 318-8303 (fax)
www.nae.usace.army.mil/missions/regulatory

U.S. Army Corps of Engineers
Navigation Division – Section 408
696 Virginia Road
Concord, Massachusetts 01742-2751
See link below for contact information:
https://www.nae.usace.army.mil/Missions/Section-408/

National Marine Fisheries Service
55 Great Republic Drive
Gloucester, Massachusetts 01930
(978) 281-9300 (phone)
(*Federal endangered species & EFH)*

U.S. Fish & Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301
(603) 223-2541 (phone)
(Federal endangered species)

National Park Service
15 State Street
Boston, Massachusetts 02109
(617) 223-5191 (phone)
(*Wild and Scenic Rivers*)

Bureau of Ocean and Energy Management
1849 C Street, NW
Washington D.C. 20240
202-208-6474 (phone)
(*Offshore Wind Facilities)*

Chief, Risk Analysis Branch
FEMA Region 1
99 High Street, 6th Floor
U.S. Department of Homeland Security
Boston, Massachusetts 02110
(617) 956-7576 (phone)

Commander (dpb)
First Coast Guard District
Battery Building
One South Street
New York, New York 10004-1466
(212) 514-4331 (phone); (212) 514-4337 (fax)
(*Bridge permits*)

U.S. Environmental Protection Agency
5 Post Office Square
Suite 100 (OEP06–3)
Boston, Massachusetts 02109-3912
(617) 918-1692 (phone)

State Agencies in Massachusetts

Massachusetts Department of Environmental Protection (MassDEP)	
DEP Division of Wetlands & Waterways	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 292-5695
Northeast Region	150 Presidential Way, Suite 300 Woburn, Massachusetts 01801 (978) 694-3200
Southeast Region	20 Riverside Drive, Route 105 Lakeville, Massachusetts 02347 (508) 946-2800
Central Region	8 New Bond Street Worcester, Massachusetts 01606 (508) 792-7650
Western Region	436 Dwight Street Springfield, Massachusetts 01103 (413) 784-1100

Massachusetts Office of Coastal Zone Management (CZM) Emails may be sent to: czm@mass.gov	
MA Office of Coastal Zone Management	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 626-1200
North Shore Region	2 State Fish Pier Gloucester, Massachusetts 01930 (978) 281-3972
South Shore Region	175 Edward Foster Road Scituate, Massachusetts 02066
Cape Cod and Islands Region	3195 Main Street, P.O. Box 220 Barnstable, MA 02630
South Coastal Region	81-B County Road, Suite E Mattapoisett, MA 02739

Massachusetts Historical Commission (MHC)	
Office Location:	220 Morrisey Boulevard Boston, Massachusetts 02125 (617) 727-8470

Massachusetts Board of Underwater Archaeological Resources (BUAR) Emails may be sent to: david.s.robinson@mass.gov	
Office Location:	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 626-1014

SECTION VII: Definitions & Acronyms

Artificial or Living Reef: A structure which is constructed or placed in waters for the purpose of enhancing fishery resources and commercial and recreational fishing opportunities.
Attendant Features: Occurring with or as a result of; accompanying.
Biodegradable: A material that decomposes into elements found in nature within a reasonably short period of time and will not leave a residue of plastic or a petroleum derivative in the environment after degradation. In contrast, degradable plastics break down into plastic fragments that remain in the environment after degradation. Examples of biodegradable materials include jute, sisal, cotton, straw, burlap, coconut husk fiber (coir) or excelsior. In contrast, degradable plastics break down into plastic fragments that remain in the environment after degradation. Photodegradable, UV degradable or Oxo-(bio)degradable plastics are not considered biodegradable under this GP.
Boating facilities: These provide, rent or sell mooring space, such as marinas, yacht clubs, boat yards, dockominiums, municipal facilities, land/home owners, etc. Not classified as boating facilities are piers shared between two abutting properties or municipal mooring fields that charge an equitable user fee based on the actual costs incurred.
Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved. Must comply with the applicable provisions of 33 CFR 332. See also the New England District Compensatory Mitigation Guidance at http://www.nae.usace.army.mil/Missions/Regulatory/Mitigation.aspx.
Construction mats: Constructions, swamp and timber mats (herein referred to as “construction mats”) are generic terms used to describe structures that distribute equipment weight to prevent wetland damage while facilitating passage and providing work platforms for workers and equipment. They are comprised of sheets or mats made from a variety of materials in various sizes. A timber mat consists of large timbers bolted or cabled together. Corduroy roads, which are not considered to be construction mats, are cut trees and/or saplings with the crowns and branches removed, and the trunks lined up next to one another. Corduroy roads are typically installed as permanent structures. Like construction mats, they are considered as fill whether they are installed temporarily or permanently.
Cumulative Impacts: The impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.1). Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems. See 40 CFR 230.11(g).
Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.
Dredging:
Improvement Dredging: For the purposes of these GPs, this is dredging deeper than previously authorized by the USACE and dredged under that authorization.
Maintenance Dredging: For the purposes of these GPs, this is dredging from an area previously authorized by the USACE and dredged under that authorization. The USACE may require proof of authorization and dredging. Maintenance dredging typically refers to the routine removal of accumulated sediment to maintain the design depths of serviceable navigation channels, harbors, marinas, boat launches and port facilities. Maintenance dredging is conducted for navigational purposes and does not include any expansion of the previously dredged area. The USACE may

review a maintenance dredging activity as new dredging if sufficient time has elapsed to allow for the colonization of SAS, shellfish, etc.

New Dredging: For the purposes of these GPs, this is a) first time the USACE authorizes dredging of a particular location or b) dredging has not occurred for an extended period of time, and this has allowed for aquatic resources (i.e., eelgrass, shellfish, etc.) to redevelop in the area.

Dredged material & discharge of dredged material: These are defined at 33 CFR 323.2(c) and (d). The term dredged material means material that is excavated or dredged from waters of the U.S.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s) but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: A stream with flowing water only during, and for a short duration, after precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Erosion Controls: Appropriate soil erosion, sediment and turbidity controls include cofferdams, bypass pumping around barriers immediately up and downstream of the work footprint (i.e., dam and pump), installation of sediment control barriers (i.e., silt fence, vegetated filter strips, geotextile silt fences, filter tubes, erosion control mixes, hay bales or other devices) downhill of all exposed areas, stream fords, retention of existing vegetated buffers, application of temporary mulching during construction, phased construction, and permanent seeding and stabilization, etc.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area (33 CFR 332.2).

Expansions: Work that increases the footprint of fill, structures, depth of basin or drainage features, or floats, or slip capacity.

Essential Fish Habitat (EFH): The Federal Magnuson-Stevens Fishery Management and Conservation Act broadly defines EFH to include those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. See www.greateratlantic.fisheries.noaa.gov/habitat for more information.

Fill material & discharge of fill material: Material placed in waters of the U.S. where the material has the effect of either replacing any portion of a water of the U.S. with dry land or changing the bottom elevation of any portion of a water of the U.S. Fill material does not include any pollutant discharged into the water primarily to dispose of waste. These are defined at 33 CFR 323.2 (e) & (f).

Federal navigation projects (FNPs): These areas are maintained by the USACE; authorized, constructed and maintained on the premise that they will be accessible and available to all on equal terms; and comprised of USACE Federal anchorages, Federal channels and Federal turning basins. The buffer zone is equal to three times the authorized depth of a FNP. The following are FNPs in MA and more information, including the limits, is provided at www.nae.usace.army.mil/missions/navigation >> Navigation Projects:

- Andrews River, Harwich, MA
- Aunt Lydia's Cove
- Beverly Harbor
- Boston Harbor
- Buttermilk Bay Channel
- Canapitsit Channel
- Cape Cod Canal
- Chatham Harbor
- Cohasset Harbor
- Cross Rip Shoals, Nantucket Sound
- Cuttyhunk Harbor
- Dorchester Bay and Neponset River
- Duxbury Harbor
- Edgartown Harbor
- Essex River
- Fall River Harbor
- Falmouth Harbor
- Gloucester Harbor and Annisquam River
- Green Harbor
- Hingham Harbor
- Hyannis Harbor
- Ipswich River
- Island End River (Chelsea, MA)
- Kingston Harbor
- Lagoon Pond
- Little Harbor Woods Hole

Lynn Harbor
Malden River
Menemsha Creek
Merrimack River
Mystic River
Nantucket Harbor of Refuge
New Bedford and Fairhaven Harbor
Newburyport Harbor
Oak Bluffs Harbor
Pigeon Cove Harbor
Plymouth Harbor
Pollock Rip Shoals, Nantucket Sound
Provincetown Harbor
Red Brook Harbor
Rockport Harbor
Salem Harbor
Sandy Bay Harbor of Refuge
Saugus River
Scituate Harbor
Sesuit Harbor
Taunton River
Vineyard Haven Harbor
Wareham Harbor
Wellfleet Harbor
Westport River and Harbor
Weymouth Back River
Weymouth Fore and Town Rivers
Winthrop Harbor
Woods Hole Channel

Flume: An open artificial water channel, in the form of a gravity chute, which leads water from a diversion dam or weir alongside a natural flow. A flume can be used to measure the rate of flow.
FNP buffer zone: The buffer zone of a USACE Federal Navigation Project (FNP) is equal to three times the authorized depth of the FNP.
Frac out: During horizontal directional drilling (HDD) operations, drilling fluid travels up the borehole into a pit. When the borehole becomes obstructed or the pressure becomes too great inside the borehole, the ground fractures and fluid escapes to the surface and may affect surface waters.
Ground disturbance: Any activity that compacts, relocates, overturns, removes, mixes, or otherwise disturbs the ground, including under water. Ground disturbance can be caused by the use of hand tools (shovels, pick axe, posthole digger, etc.), heavy equipment (excavators, backhoes, bulldozers, dredgers, trenching and earthmoving equipment, etc.), and heavy trucks (large four wheel drive trucks, dump trucks and tractor trailers, etc.). Trenching, bulldozing, dredging, excavating, scraping, and plowing are typical examples of ground disturbance activities.
Height:width ratio: The height of structures shall at all points be equal to or exceed the width of the deck. For the purpose of this definition, height shall be measured from the marsh substrate to the bottom of the longitudinal support beam.
High Tide Line (HTL): The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides 58 that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds. (33 CFR 328). Refer to the highest predicted tide for the current year at the nearest NOAA tide gage. https://tidesandcurrents.noaa.gov/map/index.html
Historic Property: Any prehistoric or historic site (including archaeological sites), district, building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).
Impacts:
Direct Impacts: Effects that are caused by the activity and occur at the same time and place (40 CFR 1508.7).
Indirect impacts: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.
Secondary impacts: Effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material.

Information about secondary effects on aquatic ecosystems shall be considered prior to the time final section 404 action is taken by permitting authorities. Some examples of secondary effects on an aquatic ecosystem are: aquatic areas drained, flooded, fragmented; fluctuating water levels in an impoundment and downstream associated with the operation of a dam; septic tank leaching and surface runoff from residential or commercial developments on fill; and leachate and runoff from a sanitary landfill located in waters of the U.S. See 40 CFR 230.11(h).

Incidental Fallback: Incidental fallback is the redeposit of small volumes of dredged material that is incidental to excavation activity in waters of the U.S. when such material falls back to substantially the same place as the initial removal (33 CFR 323.2(d)(2)(iii)).

In the dry: Work that is done under dry conditions, e.g., work behind cofferdams or when the stream or tide is waterward of the work.

Independent utility: A test to determine what constitutes a single and complete non-linear project in the USACE Regulatory Program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Individual permit: A Department of the Army authorization that is issued following a case-by-case evaluation of a specific structure or work in accordance with the procedures of 33 CFR 322, or a specific project involving the proposed discharge(s) in accordance with the procedures of 33 CFR 323, and in accordance with the procedures of 33 CFR 325 and a determination that the proposed discharge is in the public interest pursuant to 33 CFR 320.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Intertidal: The area in between mean low water and the high tide line.

Living reef: See the definition of “artificial or living reef.”

Living shoreline: A term used to describe a low-impact approach with a substantial biological component to shoreline protection and restoration along coastal shores, riparian zones, lacustrine fringe wetlands, or oyster or mussel reef structures. This approach integrates natural features to restore, enhance, maintain, or create habitat, functions, and processes while also functioning to mitigate flooding or shoreline erosion. Living shorelines may stabilize banks and shores with small fetch and gentle slopes that are subject to low-to mid-energy waves. A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural “soft” elements alone or in combination with some type of harder shoreline structure (e.g., oyster or mussel reefs or rock sills) for added protection and stability. Living shorelines should maintain the natural continuity of the land-water interface and retain or enhance shoreline ecological processes.

Loss of waters of the United States: Waters of the U.S. that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. The loss of stream bed includes the acres of stream bed that are permanently adversely affected by filling or excavation because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the U.S. is a threshold measurement of the impact to jurisdictional waters or wetlands for determining whether a project may qualify for a GP; it is not a net threshold that is calculated after considering compensatory mitigation that maybe used to offset losses of aquatic functions and services. Waters of the U.S. temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the U.S. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the U.S.

Maintenance: The repair, rehabilitation, or in-kind replacement of any previously authorized, currently serviceable structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3 – "Activities occurring before certain dates," provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Maintenance includes minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards that are necessary to make repair, rehabilitation, or replacement are authorized. Currently serviceable means useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.
Maintenance Exemption: In accordance with 33 CFR 323.4(a)(2), any discharge of dredged or fill material that may result from any of the following activities is not prohibited by or otherwise subject to regulation under Section 404 of the CWA: "Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design."
Mean high water: Line on the shore reached by the plane of the average high water. Where precise determination of the actual location of the line becomes necessary, it must be established by survey with reference to the available tidal datum, preferably averaged over a period of 18.6 years. Less precise methods, such as observation of the "apparent shoreline" which is determined by reference to physical markings, lines of vegetation, or changes in type of vegetation, may be used only where an estimate is needed of the line reached by the mean high water.
Mechanized land clearing: Land clearing activities using mechanized equipment such as backhoes or bulldozers with sheer blades, rakes or discs constitute point source discharges and are subject to section 404 jurisdiction when they take place in wetlands or waters of the U.S (Regulatory Guidance Letter 90-05).
Metallic mineral: Any ore or material to be excavated from the natural deposits on or in the earth for its metallic mineral content to be used for commercial or industrial purposes. "Metallic mineral" does not include thorium or uranium.
Minor deviations: Deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards, which are necessary to make repair, rehabilitation, or replacement are permitted, provided the adverse environmental effects resulting from such repair, rehabilitation, or replacement are minimal.
Natural Rocky Habitats: Intertidal and subtidal substrates of pebble-gravel, cobble, boulder, or rock ledge and outcrops. Manufactured stone (e.g., cur or engineered riprap) is not considered a natural rocky habitat. Natural rocky habitats are either found as pavement (consolidated pebble-gravel, cobble, or boulder areas) or as a mixture with fines (i.e., clay and sand) and other substrates. Rocky habitats as EFH are defined as follows: (1) All pebble-gravel, cobble, or boulder pavements; (2) Pebble-gravel mixed with fines: mixed substrate of pebble-gravel and fines where pebble-gravel is an evident component of the substrate (either through visual observation or within sediment samples). Sediment samples with a content of 10% or more of pebble-gravel in the top layer (6-12 inches) should be delineated; (3) Scattered cobble, scattered boulder, scattered cobble/boulder: mixed substate of cobble and/or boulder and other substrates. The aerial extent of cobbles and/or boulders should be delineated; and (4) All rock ledge outcrops: area should be delineated along the edge of the ledge/outcrop (as defined by NMFS Habitat and Ecosystems Services Branch, Gloucester, MA).
Navigable waters or Navigable waters of the U.S.: These waters are subject to section 10 of the Rivers and Harbors Act of 1899 and are defined as those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce (33 CFR Part 329). Work or structures in navigable

waters require permits pursuant to §9 and §10 of the Rivers and Harbors Act of 1899. Also see the definition of “waters of the U.S.” below.
Note: Currently the following non-tidal waters have been determined to be navigable waters of the U.S. subject to permit jurisdiction in Massachusetts: Merrimack River, Connecticut River, and Charles River to the Watertown Dam.
Nearshore disposal: This is defined in the USACE Coastal Engineering Manual as “(1) In beach terminology an indefinite zone extending seaward from the shoreline well beyond the breaker zone. (2) The zone which extends from the swash zone to the position marking the start of the offshore zone, typically at water depths of the order of 20m.” A nearshore berm is an artificial berm built in shallow water using dredged material. Often, the berm is intended to renourish the adjacent and downdrift shore over time under the influence of waves and currents.
Non-regulated activity: Only structures or fills that were previously authorized and are in compliance with the terms and condition of the original authorization can be maintained as a non-regulated activity under 33 CFR 323.4(a)(2). Minor deviations from the previously authorized footprint do not qualify as a non-regulated activity and require new authorization from the USACE. The state’s maintenance provisions may differ from the USACE and a project may require reporting and written authorization from the state.
Non-tidal wetlands: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. Non-tidal wetlands contiguous to tidal waters are located landward of the HTL (*i.e.,* spring HTL). Also see the definition of “Waters of the U.S.” below.
Oil or natural gas pipeline: Any pipe or pipeline for the transportation of any form of oil or natural gas, including products derived from oil or natural gas, such as gasoline, jet fuel, diesel fuel. heating oil, petrochemical feedstocks, waxes, lubricating oils, and asphalt.
Ordinary High Water Mark (OHWM): A line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas. See 33 CFR 328.3(e).
Overall project: The overall project, for purposes of these GPs, includes all regulated activities that are reasonably related and necessary to accomplish the project purpose. Also see the definition of “single and complete linear project.”
Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.
Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.
Permanent impacts: Permanent impacts means waters of the U.S. that are permanently affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent impacts include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody.
Preconstruction notification (PCN): A request submitted by the applicant to the USACE for confirmation that a particular activity is authorized by these GPs. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Preconstruction notification may be required by the terms and conditions of these GPs. A PCN may be voluntarily submitted in cases where PCN is not required and the applicant wants confirmation that the activity is authorized under these GPs.
Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions (33 CFR 332.2).
Real estate subdivision: Includes circumstances where a landowner or developer divides a tract of land into smaller parcels for the purpose of selling, conveying, transferring, leasing, or

developing said parcels. This would include the entire area of a residential, commercial or other real estate subdivision, including all parcels and parts thereof

Reconfiguration zone: A USACE authorized area in which permittees may rearrange pile-supported structures and floats without additional authorizations. A reconfiguration zone does not grant exclusive privileges to an area or an increase in structure or float area.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/ historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in again in aquatic resource area and functions (33 CFR 332.2).

Reference Site: Reference sites - Compensatory restoration, rehabilitation, and creation mitigation projects should seek to duplicate the features of reference aquatic resources or enhance connectivity with adjacent natural upland and aquatic resource landscape elements. Performance standards related to reference sites are encouraged. Mitigation project sites must be selected based on their ability to be, and continue to be, resistant to disturbance from the surrounding landscape, by locating them adjacent to refuges, buffers, green spaces, and other preserved natural elements of the landscape. In general, aquatic resource mitigation projects must be designed to be self-sustaining, natural systems within the landscape and climate in which they are located, with little or no ongoing maintenance and/or hydrologic manipulation.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area (33 CFR 332.2).

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation (33 CFR 332.2).

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Sedimentation: Sedimentation is defined as the process of deposition of a solid material from a state of suspension. Deposited sediments may accumulate and have temporal impacts to aquatic resource areas. See secondary effects definition above. For the purposes of this document, “greater than minimal sedimentation” is generally not considered to occur when using proper erosion controls (GC 25) or when sedimentation is considered “de minimis” 33 CFR 323.2(d)(5).

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term “single and complete project” is defined as that portion of the total linear project proposed or accomplished by one owner/ developer or partnership or other association of owners/developers that includes all crossings of a single water of the U.S. (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for the purposes of these GPs. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term “single and complete project” is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete

non-linear project must have independent utility (see the definition of “independent utility”). Single and complete non-linear projects may not be “piecemealed” to avoid the limits in a GP authorization.
Special aquatic sites (SAS): These include inland and saltmarsh wetlands, mud flats, vegetated shallows, sanctuaries and refuges, coral reefs, and riffle and pool complexes. These are defined at 40 CFR 230.3 and listed in 40 CFR 230 Subpart E.
Streambed: The stream substrate between the OHW marks on each side. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the streambed, but outside of the OHW marks, are not considered part of the streambed.
Stream channelization: The manipulation of a stream’s course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the U.S.
Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.
Temporal loss: The time lag between the loss of aquatic resource functions caused by the permitted impacts and the replacement of aquatic resource functions at the compensatory mitigation site(s) (33 CFR 332.2).
Temporary impacts: Temporary impacts include, but are not limited to, jurisdictional waters that are temporarily filled, flooded, excavated, or drained because of the regulated activity. Impacts are considered temporary when they are removed immediately upon completion of the activity. Note: An impact is considered temporary when the aquatic resource is restored to pre-project conditions, but effects to archaeological and/or cultural resources may be permanent in duration.
Tidal wetlands: A wetland that is subject to the ebb and flow of the tide. See the definition of “Waters of the U.S.” below.
Tide gates: Structures such as duckbills, flap gates, manual and self-regulating tide gates, etc. that regulate or prevent upstream tidal flows.
Turbidity: A measure of the level of particles such as sediment, plankton, or organic by-products, in a body of water. As the turbidity of water increases, it becomes denser and less clear due to a higher concentration of these light-blocking particles. Suspended solids are more likely to carry toxic chemicals, and can also negatively affect aquatic organisms, water temperature, and dissolved oxygen levels.
Utility line: Any pipe or pipeline for the transportation of any gaseous, liquid, liquescent, or slurry substance, for any purpose that is not oil, natural gas, or petrochemicals. A utility line also includes any cable, line, or wire for the transmission for any purpose of electrical energy, telephone, and telegraph messages, and radio and television communication. The term ‘utility line’ does not include activities that drain a water of the U.S., such as drainage tile or French drains, but it does apply to pipes conveying drainage from another area.
Vegetated shallows: Permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as eelgrass *(Zostera marina)* and widgeon grass (*Rupia maritima*) in marine systems (does not include salt marsh) as well as a number of freshwater species in rivers and lakes. These are a type of SAS defined at 40 CFR 230.43. Vegetated shallows are commonly referred to as submerged aquatic vegetation or SAV. Vegetated shallow survey guidance is located at www.nae.usace.army.mil/missions/regulatory /jurisdiction-and-wetlands. Maps of vegetated shallows in Massachusetts are located at www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit.
Vernal pools: For the purposes of these GPs, vernal pools are depressional wetland basins that typically dry up in most years and may contain inlets or outlets, typically of intermittent flow. Vernal pools range in both size and depth depending upon landscape position and parent material(s). In

most years, vernal pools support one or more of the following obligate indicator species: wood frog, spotted salamander, blue-spotted salamander, marbled salamander, Jefferson's salamander and fairy shrimp. However, they should preclude sustainable populations of predatory fish.

Water diversions: Water diversions are activities such as bypass pumping (e.g., "dam and pump") or water withdrawals. Temporary flume pipes, culverts or cofferdams where normal flows are maintained within the stream boundary's confines aren't water diversions. "Normal flows" are defined as no change in flow from pre-project conditions.

Waters of the United States (U.S.) These waterbodies are the waters where permits are required for the discharge of dredged or fill material pursuant to §404 of the CWA. These waters include but are not limited to navigable waters of the U.S. and tidal wetlands and include many non-tidal wetlands and other waterbodies. See definitions for navigable waters of the U.S., tidal wetlands, waterbody, and non-tidal wetlands. (33 CFR 328)

Waterbody: Examples of "waterbodies" include oceans, coastal waters, rivers, streams, ditches, lakes, ponds, and wetlands. If a wetland is adjacent to a waterbody determined to be a water of the U.S., that waterbody and any adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)).

Weir: A barrier across a river designed to alter the flow characteristics. In most cases, weirs take the form of a barrier, smaller than most conventional dams, across a river that causes water to pool behind the structure and allows water to flow over the top. Weirs are commonly used to alter the flow regime of a river, prevent flooding, measure discharge and help render a river navigable.

Wetland: Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. The Corps of Engineers Wetlands Delineation Manual in conjunction with the associated regional supplement should be used to determine if a wetland is present and delineate wetland boundaries.

Acronyms

BMPs	Best Management Practices
BUAR	Massachusetts Board of Underwater Archaeological Resources
CWA	Clean Water Act
CZM	Coastal Zone Management
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EFH	Essential Fish Habitat
FNP	Federal Navigation Project
GC	General Condition
GP	General Permit
HTL	High Tide Line
IP	Individual Permit
LID	Low impact development
MassDEP	Massachusetts Department of Environmental Protection
MA DMF	Massachusetts Division of Marine Fisheries
MHC	Massachusetts Historical Commission
MHW	Mean High Water
MLLW	Mean Lower Low Water
MLW	Mean Low Water
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
OHW	Ordinary High Water Mark
PCN	Preconstruction Notification
SAS	Special Aquatic Sites
SF	Square Feet
SV	Self-Verification
SHPO	State Historic Preservation Officer
THPO	Tribal Historic Preservation Officer
USFWS	U.S. Fish and Wildlife Service
USCG	U.S. Coast Guard
USFS	U.S. Forest Service
USGS	U.S. Geological Service
WQC	Water Quality Certification

Appendix A: Guidance for NHPA Section 106 Compliance in Massachusetts

1. Purpose & Applicability

Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA) (54 U.S.C § 306108), requires Federal agencies to take into account the effects of their undertakings on Historic Properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. Therefore, in order for an activity to be eligible for authorization under the 2023 Massachusetts General Permit, the USACE must consider the effect the activity may have on historic properties. Historic properties may include, but are not limited to, historic districts, archaeological districts, sites, buildings, structures, objects, sacred sites, traditional cultural places, and traditional cultural landscapes that are included in, or eligible for inclusion in, the National Register of Historic Places (NRHP).

This guidance applies to projects that require authorization under Section 404 of the Clean Water Act (33 U.S.C. § 1344) and/or Section 10 of the Rivers and Harbors Act (33 U.S.C. §403) and will assist applicants when evaluating and documenting the presence of historic properties within or near their project site(s). The prospective applicant will evaluate their proposed project using the criteria below to determine if their project has the potential to affect historic properties and if so, whether or not historic properties are present or are likely to be present. All activities authorized under these GPs shall follow the terms outlined in General Condition 14: Historic Properties and General Condition 6: Tribal Rights & Burial Sites. Prospective applicants shall complete their due diligence according to the procedures below for their application to be deemed complete.

2. No Potential to Affect Historic Properties

Certain activities do not have the potential to cause effects on historic properties, assuming such historic properties were present, based on the nature of the activity and site-specific conditions. Therefore, these activities **do not** require historic property identification efforts or notification of the SHPO, THPOs, and/or BUAR under Section 106. The USACE has determined the following activities within the stated parameters have no potential to affect historic properties:

General Permit	Activity Parameters
1	Temporary buoys, markers and similar structures that are placed during winter events on ice and removed before spring thaw.
2	Repair or rehabilitation of structures that are less than 45 years in age. Any temporary structures or fills or work necessary to complete repairs or rehabilitation must not result in any ground disturbance.
3	Maintenance and replacement of moorings that are less than 45 years in age.
6	Maintenance, repair, replacement, or removal of utility lines, oil or natural gas pipelines, outfall or intake structures, and/or appurtenant features that are less than 45 years in age when all access, staging, and ground disturbance is strictly limited to previously disturbed areas (including any previous ground disturbance). Replacement must be in kind or smaller in size. Installation of tide gates on outfall structures that are less than 45 years in age.
7	Maintenance dredging of previously dredged areas where dredging does not extend beyond the original bottom elevations.

	Disposal of dredged material at an existing established and USACE-approved confined aquatic disposal cell. Beach nourishment in ongoing existing nourishment areas.
11	Fish and wildlife harvesting and attraction devices and activities.
13	Cleanup of hazardous and toxic waste materials, including contaminated sediments, that are less than 45 years in age.
16	Removal of land-based and water-based renewable energy generation facilities and hydropower projects that are less than 45 years in age.
18	Installation of buoys, floats, racks, trays, nets, lines, tubes, containers, and other structures for previously authorized by the USACE and ongoing aquaculture activities. Discharges of dredged or fill material into tidal or non-tidal waters necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities for previously authorized and ongoing aquaculture activities.
20	Maintenance activities for existing living shorelines excluding maintenance activities that require new ground disturbance such as excavation or re-sloping of the bank/shoreline.
22	Reshaping or maintenance of existing drainage ditches less than 45 years in age excluding ditch enlargement.
23	Placement of temporary and removable linear transportation and wetland/stream crossings that have no ground disturbance prior to placement, during placement, and during removal (i.e., placed on the surface and subsequently removed within one year of placement).
24	Placement of temporary and removable crossings and cofferdams that have no ground disturbance prior to placement, during placement, and during removal (i.e., placed on the surface and subsequently removed within one year of placement).
25	Emergency repair of existing structures and/or fills less than 45 years in age.

3. Historic Property Identification

If the activity does not fit under the criteria above, the following historic property identification efforts must be completed to demonstrate compliance with Section 106 of the NHPA. This includes documenting previously identified and unidentified historic properties in the project area.

a. Previously Identified Historic Properties: The prospective applicant shall document if previously identified historic properties are present on or adjacent to the project site by notifying the Massachusetts Historical Commission (MHC) and the Massachusetts Board of Underwater Archaeological Resources (BUAR), as appropriate, of the proposed project. The MHC and BUAR will check their records for the presence of any previously identified historic properties. The following outlines how prospective applicants should notify the MHC and BUAR.

i. The prospective applicant will notify the SHPO and BUAR to identify any previously recorded cultural resources. Applicants shall mail a completed Project Notification Form[18], project narrative, location (coordinates), plans, soil maps, and information on known cultural resources to the MHC. The MHC does not accept submissions via email. Applicants shall email or mail this information to the BUAR when the activity is located in lakes, ponds, rivers, and/or navigable waters in MA. Emailed file attachments should be <10MB. Any files >10MB shall be delivered via a file exchange system or the hard copy documents shall be mailed. Preferred contact information is listed below.

ii. **When sending this information, applicants must also document proof of receipt OR proof the information was delivered.** Proof of receipt constitutes a certified mail receipt, read email receipt, or other mail/email/online tracking services that document the information has reached the intended recipient(s). Proof the information was delivered constitutes a certificate of mailing, email delivery receipt, or other mail/email/online services that document the information was sent at a particular time. When using proof of delivery such (e.g., certificate of mailing), applicants should add 5 days to the 30-day notification period so the mail has time to reach its intended recipient. When using proof of receipt, the applicant may begin the 30-day notification period from the date received by the intended recipient.

iii. When mailing or emailing the application materials, applicants should include the following statement: "Please send responses to this notification directly to the USACE via email: cenae-r-ma@usace.army.mil or address regular mail responses to: Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751." Email responses to the USACE are strongly preferred. The SHPO and BUAR will contact the USACE and cc the applicant(s) within 30 days of receiving the notification if their records indicate that historic properties are located in the project vicinity, and if additional review and/or surveys are recommended to ensure NHPA compliance. If the SHPO and/or BUAR do not respond within 30 days of receiving the notification, is it presumed that no known historic properties are present.

b. Previously Unidentified Historic Properties: The prospective applicant shall evaluate the project site and determine the sensitivity for the presence of historic properties if the project site has not been previously surveyed for cultural resources within the last 10 years. If the sensitivity is determined to be moderate to high, an intensive archaeological and/or architectural survey is required to investigate the potential presence of historic properties. The individual conducting this survey must meet the Secretary of the Interior's Standards for Professional Qualifications (48 FR 44738-44739) in the discipline relevant to a particular resource type. For example, archeologists should not document and evaluate buildings or structures and architectural historians should not document and evaluate archaeological sites. The identification and qualifications for those participating in any survey and evaluation of resources should be included with the survey results. The criteria listed below are indicators of low sensitivity for the presence of historic properties for consideration when determining if an archaeological or architectural survey is needed.

Low sensitivity indicators:

- Previous archaeological and/or architectural survey within the last 10 years with negative results.
- In a location created in modern times (i.e., built on fill placed within the last 45 years or within an area excavated within the last 45 years).
- USACE has reviewed the project description and determined that a survey is not warranted based on the proposed activity and its location.

State survey guidance and standards are provided in the September 1995 Historic Properties Survey Manual Guidelines for the Identification of Historical and Archaeological Resources in Massachusetts available. State survey guidance and standards for underwater surveys are provided

[18] https://www.sec.state.ma.us/mhc/mhcform/formidx.htm

in the Board of Underwater Archaeological Resources' 2022 Policy Guidance on Archaeological Investigations and Related Survey Standards for the Discovery of Underwater Archaeological Resources. This guidance is available on the NAE Regulatory website: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

Please note, a negative result from MHC and/or BUAR does not necessarily mean no historic properties are present. Often proposed project sites have not been previously subject to a survey, so historic properties which may be present have not been previously recorded.

4. Tribal Coordination

Prospective applicants shall mail the Project Notification Form, project narrative, location (coordinates), plans with locus map, soil maps, and information on cultural resources to the Wampanoag Tribe of Gay Head (Aquinnah), Mashpee Wampanoag Tribe, Narragansett Indian Tribe, and/or Stockbridge-Munsee Community Band of Mohican Indians with interests in the project location. Preferred tribal contact information, including their respective areas of interest, can be found below. Applicants shall follow the same procedures as identified in Section 3(a)i-iii above when notifying Tribes of the proposed activity. Applicants shall provide the USACE with any responses received from the tribe(s) with their PCN application. If a tribe does not respond within 30 days of receiving the notification, the applicant shall provide USACE with all documentation of tribal outreach with their SV or PCN submission (e.g., emails, letters, phone call log, etc.). If the tribe indicates the presence of a previously unrecorded cultural resource, including a traditional cultural property (TCP) or traditional cultural landscape (TCL), a PCN is required.

5. Effect Determination

The project may have the potential to affect historic properties and/or tribal resources if 1) notification recipients respond within 30 calendar days of notification with concerns, 2) historic properties eligible for listing, or potentially eligible for listing in the NRHP, are present or 3) tribal resources are known to be present. The USACE may need to further review the project to confirm potential effects to historic properties and/or tribal resources. A PCN is required for any activity that may affect a historic property.

The USACE may determine the project will have 'no effect' on historic properties (i.e., no historic properties affected) when procedures outlined in Section 3 above are followed and no cultural resources are identified. Similarly, if historic properties are identified and will be completely avoided, the USACE may determine 'no effect.'

6. Contact Information:

Massachusetts Historical Commission

The Massachusetts Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

No email. Applicants or their representatives must send project information via certified mail and submit the certified mail receipt to the USACE or send via regular mail and submit proof of delivery.

Area of concern: All of Massachusetts.

Massachusetts Board of Underwater Archaeological Resources (BUAR)

100 Cambridge Street, Suite 900
Boston, Massachusetts 02114
Email: david.s.robinson@mass.gov

Applicants or their representatives must send project information via email (***strongly preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: All waterbodies in Massachusetts.

Wampanoag Tribe of Gay Head (Aquinnah)

Bettina Washington
Tribal Historic Preservation Officer (THPO)
20 Black Brook Road
Aquinnah, Massachusetts 02535
Email: thpo@wampanoagtribe-nsn.gov

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: All of Massachusetts.

Mashpee Wampanoag Tribe

ATTN: David Weeden
Tribal Historic Preservation Officer (THPO)
483 Great Neck Road South
Mashpee, Massachusetts 02649
Email: 106review@mwtribe-nsn.gov
Cc: David.weeden@mwtribe-nsn.gov

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: All of Massachusetts.

Narragansett Indian Tribe

ATTN: John Brown
Tribal Historic Preservation Officer (THPO)
Narragansett Indian Longhouse
4425 South County Trail
Charlestown, Rhode Island 02813
Email: tashtesook@aol.com

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: Massachusetts east of the Connecticut River.

Stockbridge-Munsee Community Band of Mohican Indians

ATTN: Jeff Bendremer
Tribal Historic Preservation Manager
Stockbridge-Munsee Community
Tribal Historic Preservation Extension office
86 Spring Street
Williamstown, Massachusetts 01267
Email: thpo@mohican-nsn.gov

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: West of the Connecticut River and Northfield, Montague, Miller's Falls, Turner's Falls, Sunderland, Amherst, Hadley, South Hadley, Chicopee, Springfield and Longmeadow.

APPENDIX B PRE-CONSTRUCTION NOTIFICATION

U.S. Army Corps of Engineers (USACE), New England District (NAE)

PRE-CONSTRUCTION NOTIFICATION (PCN)

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332.

Principal Purpose The information provided will be used in evaluating activities under Pre-Construction Notification procedures within New England.

Routine Uses This information may be shared with other federal, state, and local government agencies during the application review process. Submission

Disclosure of requested information is voluntary. However, if information is not provided the PCN application cannot be fully evaluated nor can USACE render a permit decision.

Instructions The applicant must complete ALL required sections of this document before their submission to USACE. The PCN submission to USACE shall include one set of drawings which show the location and character of the proposed activity, statements that address each required field below, and documentation that supports each field (e.g., emails, letters, description/narrative, phone calls, surveys, reports, etc.). Electronic submissions to the following address are strongly preferred: cenae-r-ma@usace.army.mil. The email subject line shall contain the following: General Permit #, PCN, City/Town, and date submitted. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY USACE)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (*agent is not required*)
First - Middle - Last -	First - Middle - Last -
Company -	Company -
E-mail Address -	E-mail Address -
6. APPLICANT'S ADDRESS:	9. AGENT'S ADDRESS:
Address-	Address-
City - State - Zip - Country -	City - State - Zip - Country -
7. APPLICANT'S PHONE NOs. with AREA CODE	10. AGENT'S PHONE NOs. with AREA CODE
a. Residence b. Business c. Fax d. Mobile	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*)	City: State: Zip:
Latitude: °N Longitude: °W	

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*)

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

The Pre-Construction Notification must be signed by the person who desires to undertake the proposed activity (applicant) and, if the statement in block 11 has been filled out and signed, the authorized agent.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Instructions for Preparing a

Department of the Army

General Permit (GP) Pre-Construction Notification (PCN)

Blocks 1 through 4. To be completed by the U.S. Army Corps of Engineers.

Block 5. Applicant' Name. Enter the name and the e-mail address of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the name of the organization and responsible officer and title. If more than one party is associated with the PCN, please attach a sheet of paper with the necessary information marked Block 5.

Block 6. Address of Applicant. Please provide the full address of the party or parties responsible for the PCN. If more space is needed, attach an extra sheet of paper marked Block 6.

Block 7. Applicant Telephone Number(s). Please provide the telephone number where you can usually be reached during normal business hours.

Blocks 8 through 11. To be completed, if you choose to have an agent.

Block 8. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, consultant, or any other person or organization. Note: An agent is not required.

Blocks 9 and 10. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where they can be reached during normal business hours.

Block 11. Statement of Authorization. To be completed by the applicant, if an agent is to be employed.

Block 12. Proposed General Permit Activity Name or Title. Please provide a name identifying the proposed GP activity, e.g., Windward Marina, Rolling Hills Subdivision, or Smith Commercial Center.

Block 13. Name of Waterbody. Please provide the name (if it has a name) of any stream, lake, marsh, or other waterway to be directly impacted by the GP activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 14. Proposed Activity Street Address. If the proposed GP activity is located at a site having a street address (not a box number), enter it in Block 14.

Block 15. Location of Proposed Activity. Enter the latitude and longitude of where the proposed GP activity is located. Indicate whether the project location provided is the center of the project or whether the project location is provided as the latitude and longitude for each of the "corners" of the project area requiring evaluation. If there are multiple sites, please list the latitude and longitude of each site (center or corners) on a separate sheet of paper and mark as Block 15.

Block 16. Other Location Descriptions. If available, provide the Tax Parcel Identification number of the site, Section, Township, and Range of the site (if known), and / or local Municipality where the site is located.

Block 17. Directions to the Site. Provide directions to the site from a known location or landmark. Include highway and street numbers as well as names. Also provide distances from known locations and any other information that would assist in locating the site. You may also provide a description of the location of the proposed GP activity, such as lot numbers, tract numbers, or you may choose to locate the proposed GP activity site from a known point (such as the right descending bank of Smith Creek, one mile downstream from the Highway 14 bridge). If a large river or stream, include the river mile of the proposed GP activity site if known. If there are multiple locations, please indicate directions to each location on a separate sheet of paper and mark as Block 17.

Block 18. Identify the Specific General Permit(s) You Propose to Use. List the number(s) of the General Permit(s) you want to use to authorize the proposed activity (e.g., GP 4).

Block 19. Description of the Proposed General Permit Activity. Describe the proposed GP activity, including the direct and indirect adverse environmental effects of the proposed activity. The description of the proposed activity should be sufficiently detailed for USACE to determine that the adverse environmental effects of the activity will be no more than minimal. Identify the materials to be used in construction, as well as the methods by which the work is to be done.

Provide drawings to show that the proposed GP activity complies with the terms of the applicable GP(s). Drawings should contain sufficient detail to provide an illustrative description of the proposed GP activity, but do not need to be detailed engineering plans. The written descriptions and illustrations are an important part of the application. Please describe, in detail, what you wish to do. If more space is needed, attach an extra sheet of paper marked Block 19.

Block 20: Description of Proposed Mitigation Measures. Describe any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed GP activity. The description of any proposed mitigation measures should be sufficiently detailed for USACE to determine how the measures would avoid and minimize adverse environmental effects. If adverse effects exceed the New England District compensatory mitigation thresholds, you must document how compensatory mitigation would be satisfied in Block 24.

Block 21. Purpose of General Permit Activity. Describe the purpose and need for the proposed GP activity. What will it be used for and why? Also include a brief description of any related activities associated with the proposed project. Provide the approximate dates you plan to begin and complete all work.

Block 22. Quantity of Wetlands, Streams, or Other Types of Waters Directly Affected by the Proposed General Permit Activity. For discharges of dredged or fill material into Waters of the U.S., provide the amount of wetlands, streams, or other types of waters filled, flooded, excavated, or drained by the proposed GP activity. For structures or work in Navigable Waters of the U.S. subject to Section 10 of the Rivers and Harbors Act of 1899, provide the amount of navigable waters filled, dredged, occupied by one or more structures (e.g., aids to navigation, mooring buoys) by the proposed GP activity. The area of impact includes the structures or fills with direct or indirect effects to waters of the U.S. The length of impact includes the length of a stream, including is banks, that are directly affected by the structures or fills. The duration of impact should be identified as temporary (xx days) or permanent. The impact purpose should briefly describe what structure or fill is responsible for the impact.

Block 23. Identify Any Other General Permit(s), Regional General Permit(s), or Individual Permit(s) Used to Authorize Any Part of Proposed Activity or Any Related Activity. List any other GP(s) or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. For linear projects, list other separate and distant crossings of waters and wetlands authorized by these GPs that do not require PCNs. If more space is needed, attach an extra sheet of paper marked Block 23.

Block 24. Compensatory Mitigation Statement for Losses Greater Than the New England District Compensatory Mitigation Thresholds. New England District requires compensatory mitigation at a minimum one for one replacement ratio or greater for all aquatic resource losses that require a PCN and exceed the New England District Compensatory Mitigation Thresholds, unless USACE determines in writing that either some other form of mitigation is more environmentally appropriate or the adverse environmental effects of the proposed GP activity are no more than minimal without compensatory mitigation, and provides an activity specific waiver of this requirement. Describe the proposed compensatory mitigation for wetland losses greater than the New England District Compensatory Mitigation Thresholds or provide an explanation of why USACE should not require wetland compensatory mitigation for the proposed GP activity. If more space is needed, attach an extra sheet of paper marked Block 24.

Block 25. Is Any Portion of the General Permit Activity Already Complete? Describe any work that has already been completed for the GP activity.

Block 26. List the Name(s) of Any Species Listed As Endangered or Threatened under the Endangered Species Act that Might be Affected by the General Permit Activity. If you are not a federal agency, and if any listed species or designated critical habitat might be affected or is in the vicinity of the proposed GP activity, or if the proposed GP activity is located in designated critical habitat, list the name(s) of those endangered or threatened species that might be affected by the proposed GP activity or utilize the designated critical habitat that might be affected by the proposed GP activity. If you are a Federal agency, and the proposed GP activity requires a PCN, you must provide documentation demonstrating compliance with Section 7 of the Endangered Species Act.

Block 27. List Any Historic Properties that Have the Potential to be Affected by the General Permit Activity. If you are not a federal agency, and if any historic properties have the potential to be affected by the proposed GP activity, list the name(s) of those historic properties that have the potential to be affected by the proposed GP activity. Provide all relevant documentation about these historic properties in the PCN submittal. If you are a Federal agency, and the proposed GP activity requires a PCN, you must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

Block 28. List the Wild and Scenic River or Congressionally Designated Study River if the General Permit Activity Would Occur in such a River. If the proposed GP activity will occur in a river in the National Wild and Scenic River System or in a river officially designated by Congress as a “study river” under the Wild and Scenic Rivers Act, provide the name of the river. For a list of Wild and Scenic Rivers and study rivers, please visit http://www.rivers.gov/

Block 29. General Permit Activities that also Require Permission from the USACE Under 33 U.S.C. 408. If the proposed GP activity also requires permission from the USACE under 33 U.S.C. 408 because it will temporarily or permanently alter, occupy, or use a USACE federal authorized civil works project, indicate whether you have submitted a written request for section 408 permission from the USACE district having jurisdiction over that project.

Block 30. 401 Water Quality Certification. As described above, specify if the activity requires a 401 WQC from the certifying authority.

Block 31. Other Information Required For General Permit Pre Construction Notifications. The terms of some of the General Permits include additional information requirements for preconstruction notifications:

* Maintenance – information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments, and canals.
* Temporary Construction, Access, and Dewatering – a restoration plan showing how all temporary fills and structures will be removed and the area restored to pre-project conditions.
* Repair of Uplands Damaged by Discrete Events – documentation, such as a recent topographic survey or photographs, to justify the extent of the proposed restoration.
* Commercial Shellfish Aquaculture Activities – (1) a map showing the boundaries of the project area, with latitude and longitude coordinates for each corner of the project area; (2) the name(s) of the species that will be cultivated during the period this GP is in effect; (3) whether canopy predator nets will be used; (4) whether suspended cultivation techniques will be used; and (5) general water depths in the project area (a detailed survey is not required).Dredging – (1) a proposed sampling and analysis plan shall be provided to USACE for approval prior to its execution. Pre-application meetings are encouraged.
* Beach Nourishment – sediment grain size should be determined for the length of the beach where nourishment is proposed. The frequency and locations of sediment sampling shall be sufficient to identify the sediment composition of the beach profile. This data shall be consolidated to generate a sediment gradation curve for each sampled transect. Each sampled transect should also be identified on the project plans (drawings).

If more space is needed, attach an extra sheet of paper marked Box 31.

Block 32. Signature of Applicant or Agent. The PCN must be signed by the person proposing to undertake the GP activity, and if applicable, the authorized party (agent) that prepared the PCN. The signature of the person proposing to undertake the GP activity shall be an affirmation that the party submitting the PCN possesses the requisite property rights to undertake the GP activity (including compliance with special conditions, mitigation, etc.).

DELINEATION OF WETLANDS, OTHER SPECIAL AQUATIC SITES, AND OTHER WATERS

Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current wetland delineation manual and regional supplement published by the USACE. The permittee may ask the USACE to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the USACE does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. The 60-day PCN review period will not start until a delineation has been completed.

DRAWINGS AND ILLUSTRATIONS

General Information.

Three types of illustrations are needed to properly depict the work to be undertaken. These illustrations or drawings are identified as a Vicinity Map, a Plan View or a Typical Cross Section Map. Identify each illustration with a figure or attachment number. For linear projects (e.g. roads, subsurface utility lines, etc.) gradient drawings should also be included. Please submit one copy of all drawings on 8½ x 11 inch plain white paper (electronic submissions preferred). Use the fewest number of sheets necessary for your drawings or illustrations. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view, or cross section). While illustrations need not be professional (many small, private project illustrations are prepared by hand), they should be clear, accurate, and contain all necessary information.

ADDITIONAL INFORMATION AND REQUIREMENTS

For proposed GP activities that involve discharges into waters of the United States, water quality certification from the State, Tribe, or EPA must be obtained or waived. Some States, Tribes, or EPA have issued water quality certification for one or more GPs. Please check the New England District website to see if water quality certification has already been issued for the GP(s) you wish to use. For proposed GP activities in coastal states, state Coastal Zone Management Act consistency concurrence must be obtained, or a presumption of concurrence must occur. Some States have issued Coastal Zone Management Act consistency concurrences for one or more GPs. Please check the New England District website to see if Coastal Zone Management Act consistency concurrence has already been issued for the GP(s) you wish to use.

APPENDIX C SELF-VERIFICATION NOTIFICATION

U.S. Army Corps of Engineers (USACE)

SELF-VERIFICATION NOTIFICATION (SVN)

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332.

Principal Purpose This information will be used in evaluating activities under Self-Verification procedures within Massachusetts.

Routine Uses Routine uses will include: (1) Documenting compliance with the terms and conditions of the General Permit (GP) for activities that may require authorization pursuant to one or more of USACE's Regulatory authorities. (2) Records may be referred to other Federal, State, and local agencies for evaluation and enforcement purposes.

Disclosure Failure to fully comply and abide by the GP terms and conditions prior to commencing work and after completion project may result in formal enforcement action, up to and including monetary penalties and/or legal action, pursuant to 33 CFR Part 326.

Instructions The permittee must complete ALL required sections of this document before commencing USACE-regulated activities. A copy of this completed SVN must be kept on site during construction and be made available for review by USACE and other Federal, State, & Local regulatory authorities at any time. Within 30 days of initiating project construction, the permittee shall submit the completed SVN to USACE. The SVN shall be submitted to USACE as **ONE signed document** that includes project plans and documentation that supports each field (e.g., emails, letters, description, phone calls, surveys). Electronic submissions to the following address are strongly preferred: cenae-r-ma-sv@usace.army.mil. The email subject line shall contain the following: GP #, SVN, City/Town, and date submitted.

(ITEMS 1 THRU 3 TO BE FILLED BY USACE)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED

APPLICANT AND AGENT INFORMATION

4. APPLICANT'S NAME	7. AGENT'S ADDRESS:
First - 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)

1 ☐	6 ☐	11 ☐	16 ☐	21 ☐
2 ☐	7 ☐	12 ☐	17 ☐	22 ☐
3 ☐	8 ☐	13 ☐	18 ☐	23 ☐
4 ☐	9 ☐	14 ☐	19 ☐	24 ☐
5 ☐	10 ☐	15 ☐	20 ☐	25 ☐

16. SUMMARY OF PROJECT IMPACTS (*see instructions*)

Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration

17. PROJECT PLANS (BY CHECKING THE BOXES BELOW, YOU CERTIFY THESE ITEMS ARE COMPLETE) (*see instructions*)

- ☐ a. Plans shall at least contain the following: Vicinity Map, Plan View, and Typical Cross Section View of the proposed activity.
- ☐ b. All direct, indirect and secondary impacts from USACE regulated activities are shown on the project plans.
- ☐ c. The size of the impact area for each activity (acre, square feet, linear feet) are shown on the project plans.
- ☐ d. For discharges of fill material (§404), the volume of fill material is identified on the project plans.
- ☐ e. The duration of each impact, permanent or temporary (X days), is identified on the project plans.
- ☐ f. Do activities with permanent impacts result in the loss of waters? If so, this is identified on the project plans.
- ☐ g. All aquatic resources in the vicinity of the USACE regulated activities are delineated on the project plans.

18. AVOIDANCE & MINIMIZATION (BY CHECKING THE BOXES BELOW, YOU CERTIFY THESE CRITERIA ARE MET) (*see instructions*)

- ☐ a. The project has been designed to avoid and minimize impacts to aquatic resources.
- ☐ b. The footprint of activities in waters of the U.S. has been reduced to only what is necessary to achieve the overall project purpose.
- ☐ c. All practicable measures have been taken to avoid and minimize impacts to aquatic resources through construction techniques and site access (e.g., Best Management Practices, Time of Year Restrictions).
- ☐ d. All temporary impacts from USACE regulated activities will be restored upon completion of construction and the project area will be returned to pre-construction contours and conditions.

COMPLIANCE WITH FEDERAL REGULATIONS & SUPPLEMENTAL INFORMATION

19. DUE DILIGENCE (*see instructions*)

Complete the entries below to document compliance with the following Federal requirements. Construction may NOT begin if a PCN is/may be required, and you must contact USACE to determine permitting requirements. Documentation that demonstrates how the activity complies with each field below shall be submitted to the USACE as noted in the instructions block. See each General Condition (GC) in the GP for how to comply with each requirement.

a. State Historic Preservation Officer	Select Option		
b. Massachusetts BUAR	Select Option		
c. Tribal Historic Preservation Officers	Select Option		
d. Endangered Species Act - NOAA	Select Option		
e. Endangered Species Act - USFWS	Select Option		
f. Northern Long Eared Bat (ESA)	Select Option		
g. Essential Fish Habitat	Select Option		
h. Wild & Scenic Rivers	Select Option		
i. 401 Water Quality Certification 401	Select Option		
	401 WQC/OOC File Number:	OOC issued:	401 issued:
j. Section 408 Permission	Select Option		
k. Coastal Zone	Select Option		
l. Construction Mats	Select Option		
m.Time of Year Restrictions	Select Option		
n. Vernal Pools	Select Option		
o. Sediment & Erosion Controls	Select Option		
p. Stream/Wetland Crossings	Select Option		

20. AQUACULTURE ACTIVITIES - GP 18 (*see instructions*)

- ☐ a. If required, an Aquaculture Certification from the Massachusetts Division of Marine Fisheries was obtained prior to commencing work.
- ☐ b. Coordination with the U.S. Coast Guard pursuant to Private Aids to Navigation has occurred prior to commencing work.
- ☐ c. If required, a MEPA Certificate was obtained from the Massachusetts Environmental Protection Agency prior to commencing work. Select Option
- ☐ d. The prospective permittee contacted local authorities (e.g. harbormaster, select board, shellfish constable) for authorization of their facility prior to commencing work.

21. ADDITIONAL INFORMATION/ATTACHMENTS (*see instructions*)

- ☐ a. The project plans are enclosed in this SVN submittal (see block 17).
- ☐ b. The activity Select Option funded through the Bipartisan Infrastructure Bill (also known as the Infrastructure Investment and Jobs Act).
- ☐ c. All required state, local and federal approvals were acquired prior to starting construction in USACE jurisdiction.
- ☐ d. After construction of the activity is completed, a complete Certificate of Compliance will be submitted to USACE.

22. IS THERE ANOTHER LEAD FEDERAL AGENCY:

☐ YES ☐ NO

23. STATEMENT OF AUTHORIZATION *(see instructions)*

I certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

24. SIGNATURES *(see instructions)*

I hereby certify that the information in this Self-Verification Notification is complete and accurate. As the applicant or their duly authorized agent, I certify the activity was completed in accordance with the terms and conditions of the GP. This includes all applicable terms, general conditions, and activity-specific GP criteria. I agree to allow the duly authorized representatives of the Corps of Engineers Regulatory Program and other regulatory or advisory agencies to enter upon the premises of the project site at reasonable times to evaluate inspect and photograph site conditions. This consent to enter the property is superior to, takes precedence over, and waives any communication to the contrary. For example, if the property is posted as “no trespassing” this consent specifically supersedes and waives that prohibition and grants permission to enter the property despite such posting.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Instructions for Preparing a
Department of the Army
General Permit (GP) Self-Verification

Blocks 1 through 3. To be completed by the Corps of Engineers.

Block 4. Applicant' Name. Enter the name and the e-mail address of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the name of the organization and responsible officer and title. If more than one party is associated with the self-verification, please attach a sheet of paper with the necessary information marked Block 4.

Block 5. Address of Applicant. Please provide the full address of the party or parties responsible for the self-verification. If more space is needed, attach an extra sheet of paper marked Block 5.

Block 6. Applicant Telephone Number(s). Please provide the telephone number where you can usually be reached during normal business hours.

Blocks 7 through 9. To be completed, if you choose to have an agent.

Block 7. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, consultant, or any other person or organization. Note: An agent is not required.

Blocks 8 and 9. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where they can be reached during normal business hours.

Block 10. Proposed General Permit Activity Name or Title. Please provide a name identifying the proposed GP activity, e.g., Windward Marina, Rolling Hills Subdivision, or Smith Commercial Center.

Block 11. File Number(s) of Previous USACE Actions on the Site Please provide any known USACE file number. If the activity does not have a known USACE file number, you may state N/A.

Block 12. Name of Waterbody. Please provide the name (if it has a name) of any stream, lake, marsh, or other waterway to be directly impacted by the GP activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 13. Proposed Activity Coordinates. Please enter the latitude and longitude of where the proposed GP activity is located. Indicate whether the project location provided is the center of the project or whether the project location is provided as the latitude and longitude for each of the "corners" of the project area. If there are multiple sites, please list the latitude and longitude of each site (center or corners) on a separate sheet of paper and mark as Block 13.

Block 14. Proposed Activity Street Address. If the proposed activity is located at a site having a street address (not a box number), enter it in Block 14.

Block 15. General Permit Activity Type. Please select all GP activity types that apply to the proposed activity. A list of GP activity types can be found in Section III of the GP.

Block 16. Summary of Project Impacts. Please provide ALL proposed impacts, both temporary and permanent in duration, that are located in Waters of the United States. The area of impact shall be provided in square feet (SF). When applicable, impacts that result in conversion of stream bank or shoreline must also be identified in linear feet (LF). Dredging or the discharge of dredged or fill material shall also include the volume, cubic yards (CY), of material removed from or placed into Waters of the U.S. If more entries are required, please attach a table matching the desired format in Block 16.

Block 17. Project Plans. Please verify that items a-g are included in the project plans. Three types of illustrations are necessary to properly depict the proposed work. These illustrations or drawings are identified as a Vicinity Map, a Plan View (Aerial view) and a Cross Section Map. For linear projects (e.g. roads, subsurface utility lines, etc.) gradient drawings (longitudinal profile) should also be included. Plans must accurately depict the existing conditions and all aspects of the proposed activity located in waters of the U.S. Please submit one copy of all drawings formatted to print on 8½ x 11 inch or 11 x 17 inch plain white paper. Use the fewest number of sheets necessary for your drawings or illustrations. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view, or cross section). While illustrations need not be certified engineering sheets; they should be clear, accurate, contain all necessary information, and depict all proposed work. Each submission must also include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current wetland delineation manual and regional supplement published by USACE.

Block 18. Avoidance & Minimization. Please verify that items a-d have been implemented for the proposed activity.

Block 19. Due Diligence. Please complete all the fields and submit documentation to USACE to demonstrate compliance with the above requirements. This Documentation may include emails, letters, meeting notes, phone call log, project narrative, project plans, a species list from the NOAA Section 7 Mapper, a completed copy of the IPAC determination keys, etc. Documentation should be limited to what is necessary to demonstrate how the proposed activity meets each requirement. Refer to the MA GP, Appendix A, for specific guidance on the identification of previously identified historic properties and previously unidentified historic properties. Endangered Species: *The applicant must be designated as the non-federal representative for the purposes of Section 7 consultation to select the Rangewide D-Key options. Otherwise, the applicant shall select the following option when IPAC indicates the NLEB is present: "The activity IS located within the NLEB Species Range (PCN Required)."

Block 20. Aquaculture Activities. Please verify that items a-d have been obtained or completed prior to commencing work in waters of the U.S.

Block 21. Additional Information/Attachments. Please verify that items a-d have been completed prior to commencing work in waters of the U.S.

Block 22. Lead Federal Agency. Please identify if there is another lead federal agency involved with the proposed activity. Enter the lead federal agency name (e.g., the Federal Emergency Management Agency, FEMA) and the agency's designated person of contact for the activity.

Block 23. Statement of Authorization. The applicant shall sign this section for all activities. If an agent is to be employed, the agent shall sign this section.

Block 24. Signatures. The SVN must be signed by the person proposing to undertake the GP activity, and if applicable, the authorized party (agent) that prepared the SVN. The signature of the person proposing to undertake the GP activity shall be an affirmation that the party submitting the SVN possesses the requisite property rights to undertake the GP activity.

US Army Corps of Engineers®
New England District

APPENDIX D: PCN APPLICATION CHECKLIST

The following information shall be submitted for all PCNs for USACE to properly evaluate your application. Some applications may require more information and this checklist is offered as a tool to assist applicants with submitting a complete application.

SECTION 1: GENERAL APPLICATION INFORMATION

1. ☐ Complete the Pre-Construction Notification document (Appendix B).
2. ☐ Specify which local/state/federal authorizations are required for the project and if any have been obtained or applied for at the time of USACE application submittal.
3. ☐ Identify all funding sources the project will receive or has received to date. Provide any relevant information in the application submission.
4. ☐ Is this part of a larger project that is being implemented in phases? If so, describe the project schedule and how each phase will be implemented.
5. ☐ Describe the existing conditions on the site and the general land use in the vicinity of the project at the time application submittal.
6. ☐ Provide any historic information available that you may have of project area, e.g., existing USACE permit numbers, the names under which the permits were obtained if the permit numbers are unknown, construction dates and proof of prior existence (aerials, photos, town hall records, affidavits, state or local permits, etc.) to verify that the project predates regulation and is "vested".[19]
7. ☐ The anticipated start and end dates for construction.

SECTION 2: WETLAND DELINEATION

8. ☐ Data used to support aquatic resource boundary determinations (delineation forms, delineation map(s) that show the locations of each aquatic resource in the project area, aerial and ground photographs, LIDAR imagery, national wetland inventory maps, soil maps, national hydrography dataset maps, floodplain maps, historical imagery, etc.).
9. ☐ Photographs of the wetland(s) and/or waterway(s) where impacts are proposed. Photos at low tide are preferred for work in tidal waters.
10. ☐ Indicate the relationship of the project area to waters of the U.S., i.e., adjacent wetlands, tidal influence or hydraulic connectivity through culverts, or other conveyances, etc.
11. ☐ At minimum the delineation map/figure should include the following:
    a. Contour lines showing topography.
    b. North arrow.
    c. Bar and text scale.
    d. Legend.
    e. Drawn project boundary.
    f. High tide line, mean high water, mean low water, ordinary high water mark, and/or wetland boundaries.
    g. Captions with a unique name for each aquatic resource and the area or length of the aquatic resource within the project area.

[19] Vested is exempt (someone or something) from a new law or regulation.

h. Appropriate landmarks and features (e.g., culverts, special aquatic sites, etc.).
i. Points showing the paired upland and wetland delineation locations for tidal and non-tidal wetlands only.

SECTION 3: AVOIDANCE & MINIMIZATION

12. ☐ Describe specific measures taken to avoid impacts to aquatic resources or describe why aquatic resources could not be avoided while achieving the project purpose and need.
13. ☐ For impacts to aquatic resources that could not be avoided, describe specific considerations/ measures taken to minimize the area of proposed impacts to aquatic resources in designing the project.
14. ☐ Describe specific measures taken to avoid and minimize the proposed direct, indirect, and secondary impacts to aquatic resources and their functions through construction techniques and timing.
15. ☐ If applicable, provide a restoration plan that describes how all temporary fills and structures will be removed and the area restored to pre-impact conditions (see GC 22).
16. ☐ If applicable, provide an Invasive Species Control Plan (see GC 29). For sample control plans, see www.nae.usace.army.mil/missions/regulatory/invasive-species.
17. ☐ If applicable, describe how the proposed wetland/waterbody crossing is compliant with GC 31, Stream Work and Crossings, and Wetland Crossings.

SECTION 4A: PROJECT IMPACTS

18. ☐ Describe the overall project and the activities located in Waters of the U.S. (WOTUS) that you are seeking authorization for.
19. ☐ Identify the following for project impacts in WOTUS:
    a. ☐ Direct, indirect, secondary impacts[20] within WOTUS.
    b. ☐ The size of each impact (square feet or acres, or linear feet).
    c. ☐ For discharges of fill material (§404), specify the volume of fill material to be discharged (cubic yards).
    d. ☐ The impact duration from each activity, permanent or temporary (X days).

SECTION 4B: PROJECT PLANS

20. ☐ Submit project plans that depict all impacts in WOTUS. On the project plans, applicants shall provide:

General Information

    a. ☐ Plan view and typical cross-section view sheets that show the existing and proposed conditions. These illustrations should each be identified with a figure number, date of the map, the project title, the name of the applicant and the type of illustration (vicinity map, plan view, or cross section).
    b. ☐ Drawings, sketches, or plans that are legible, reproducible (color is encouraged, but features must be distinguishable in black and white), drawn to scale, and no larger than 11”x17” and 10 MB when submitted in digital format. Numeric and graphic/bar scales must agree, and plan details must be measurable using a standard engineer’s scale on printed plans. Reduced plans are not acceptable.
    c. ☐ The north arrow and remove miscellaneous non-wetland or water project related features such as conduits, utility poles, guardrails, etc.

[20] See definitions section for the definitions of direct, indirect, secondary impacts.

d. ☐ Clearly draw the overall limits of work, staging areas, disposal sites, access routes, and any permittee responsible mitigation sites. These areas may include both aquatic resources and upland areas.
e. ☐ Names or numbers of all roads in the site's vicinity and ownership and numbers of abutting parcels.
f. ☐ Datum in plan and elevation views. The horizontal datum shall be in the NAD 83 Massachusetts State Plane Coordinate System (INSERT) in U.S. survey feet. The vertical data in coastal projects shall be referenced to either MLLW or the North American Vertical Datum of 1988 (NAVD 88). Both the distance and depth units shall be U.S. survey feet and specified on the project plans.

Aquatic Resources & Project Impacts

g. ☐ Delineation of all aquatic resource types on site including salt marsh; other special aquatic sites (vegetated shallows, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges); other waters, such as lakes, ponds, vernal pools, natural rocky habitat (tidal only), and perennial, intermittent, and ephemeral streams.
h. ☐ Identify the substrate type (cobble/gravel, organic detritus, sand/shell, silt, mud) and the approximate percentage of each substrate type on site. Grain sizes shall be based on Wentworth grain size classification scale for granules, pebbles, cobbles, and boulders. Sediment samples with a content of 10% or more of pebble-gravel-cobble and/or boulder in the top layer (6-12 inches) should be delineated and material with epifauna/macroalgae should be differentiated from bare pebble-gravel-cobble and boulder.
i. ☐ The direction of ebb and flood in tidal waters and direction of flow in non-tidal waters.
j. ☐ In tidal waters, the project boundary distance from special aquatic sites identified in 20g above if within 25 feet from that resource.
k. ☐ USACE jurisdictional boundaries including ordinary high-water mark (OHWM), high tide line (HTL), mean high water (MHW). Other boundaries include mean low water (MLW), mean lower low water (MLLW), as applicable.
   - Non-tidal: OHWM and/or wetland boundaries.
   - Tidal (structures/work only): MHW, MLW.
   - Tidal (Fill and Structures/work): HTL, MHW, MLW.
   - Tidal (Dredging/Beach Nourishment): HTL, MHW, MLW, MLLW.
l. ☐ Identification of each aquatic resource with a unique name (ex. Wetland 1, Wetland 2, Tributary 1, Beaver Brook, Atlantic Ocean) and the size of each aquatic resource within the project area (square feet or acres).
m. ☐ Impacts to each aquatic resource with captions denoting the size of each impact (square feet, acres, or linear feet) and the duration of the impact (ex. Permanent, Temporary (X days).

SECTION 4C: PROJECT PLANS - SPECIFIC PROJECT INFORMATION

21. ☐ For projects involving Navigation, Structures, Dredging, and/or Beach Nourishment, the applicant shall also address the following:

Navigation

a. ☐ Identify the locations of adjacent Federal navigation project (FNP) and/or state/local navigation projects on the project plans.
b. ☐ Specify the distance between the FNP and proposed project boundary, the authorized depths of the FNP, and state plane coordinates of seaward end(s) of project structures near an FNP.

Structures

a. ☐ Identification of the piling type (steel, timber, concrete) and diameter to be removed and/or installed.
b. ☐ Specify the minimal height of the structures' frame over saltmarsh. To meet the SV threshold, piers must be ≤4 feet in width and this minimal height must achieve a 1.5:1 ratio (i.e., a 4-foot-wide pier is 6 feet above a saltmarsh).
c. ☐ For floats, the methods of securing them (piles, bottom anchors) and for keeping them off substrate (skids, stops) at low water. To meet the SV threshold, a minimum depth of 18-inches of water should be maintained below a floating dock/structure at lower tide levels.

Dredging

a. ☐ The area (SF, acre) and volume (CY) of material to be dredged waterward of MHW for each dredge location.
b. ☐ Dredge boundaries.
c. ☐ Bathymetry for existing, proposed, and historical (include dates and USACE permits) dredge depths.
d. ☐ The likely final angle of repose of the side cuts based on the physical characterization of the material to be dredged and based upon the high/ medium/low, wave or current energy of the location.
e. ☐ Label area whether the dredging is new, maintenance, improvement, or a combination.
f. ☐ Location of the disposal site (include location sheet). NOTE: For projects proposing open water, nearshore disposal, or beach nourishment, contact USACE as early as possible for sampling and testing protocols. Sediment testing, including physical (e.g., grain-size analysis), chemical and biological testing may be required. Sampling/testing of sediments without such contact should not occur and if done, will be at the applicant's risk.
g. ☐ The methods and areas used to retain or prevent dredged material from running back into the wetland or waterway. Provide the capacity of the storage area and points of runback, including the overflow route, into the aquatic system.
h. ☐ For open-water disposal, explain why inland or beneficial reuse sites are not practicable.
i. ☐ Show the finished top elevation of the disposal site.

Beach Nourishment

a. ☐ For beach nourishment, identify the disposal footprint, existing and proposed nourishment profiles (multiple profiles are appropriate if the site is more than 150 feet long or non-contiguous), total fill area (SF) and volume (CY), fill area and volume waterward of the HTL, and delineation of dunes, banks, existing beach vegetation, and contours.
b. ☐ For beach nourishment identify the substrate type (fine sand, sand, cobble, boulder) and/or grain-size of existing material.

SECTION 5: STRUCTURES

22. ☐ For projects with the removal of existing pilings identify the number, type (steel, timber, concrete) and diameter of pilings to be removed and the methodology for removal (cut off at mud line, pulling, vibratory, etc.).
23. ☐ For projects with the installation of new pilings identify the number, type (steel, timber, concrete) and diameter of pilings to be installed and the methodology for installation (vibratory hammer, impact hammer etc.).
24. ☐ Identify any existing structures and moorings in waters adjacent to the proposed activity, their dimensions, and the distance to the limits and coordinates of any proposed mooring field or reconfiguration zone. For reconfiguration zone and mooring fields, provide the coordinates for all

corners based on the Massachusetts State Plane Coordinate System. Specify the maximum number of slips and/or moorings within proposed reconfiguration zones or anchorage areas.

25. ☐ The dimensions of the structure or work and extent of encroachment waterward of MHW and from affixed point on the shoreline or upland.
26. ☐ Shoreline of adjacent properties and property boundary offset for structures. In narrow waterbodies, the distance to opposite shoreline, waterway width, and structures across from proposed work.
27. ☐ For new commercial boating facilities, anchorage areas or reconfiguration zones, provide a description of the type of vessels that would use the facility, and any plans for sewage pump-out facilities, fueling facilities and contingency plans for oil spills.
28. ☐ See Sections 4A-C above.

SECTION 6: AQUACULTURE

29. ☐ Identify the coordinates for lease area corners and gear configuration area on the project plans.
30. ☐ Identify the proposed aquaculture gear type (buoys, floats, racks, trays, nets, lines, tubes, cages, containers, and other structures). Provide the impacts for each aquaculture gear type (see Section 4A 19a-d).
31. ☐ For a GP 18 to be valid, applicants must have (a) their MA DMF Aquaculture Certification letter for licensed shellfish aquaculture sites, (b) documentation that the applicant has coordinated with the U.S. Coast Guard regarding USCG Private Aids to Navigation standards, (c) their MEPA Certificate (if required), and (d) documentation that the applicant has contacted their local authorities (ex. harbormaster, select board, shellfish constable) for authorization of their facility.
32. Provide information on site the operation, maintenance, and access. Will the site be accessed via boat, kayak, etc.? Will cages be removed in the winter? How often will gear be checked on? Is there an operations plan for the proposed aquaculture area?
33. ☐ See Sections 4A-C above.

SECTION 7: DREDGING

34. ☐ Sampling plan requests for new, improvement or maintenance dredging must submit completed **Dredged Material Evaluation checklist found at Dredged Material Evaluation Checklist, Sampling and Analysis Plan Requirements from Applicant (army.mil)** and identify the method of handling/transporting the dredged material.
35. ☐ Identify grain-size of material to be dredged (e.g., silty sand) and provide any existing sediment grain size and bulk sediment chemistry data from the proposed project or nearby projects. Include information on any recent spills of oil and/or other hazardous materials and/or nearby outfalls. Document the information source, e.g., EPA database, the harbormaster or fire chief. If there are none, state “none”.
36. ☐ See Section 4A, 4B and 4C, Dredging 21(a-i) above.

SECTION 8: WETLAND/WATERBODY CROSSINGS

37. ☐ For the stream crossing, identify the crossing methodology on the project plan (e.g., dam and pump, dry, wet, etc.). Submit a waterway crossing sequencing plan with the application.
38. ☐ If the project includes a permanent crossing of a tidal waterway, your project design should be modified to match the velocity, depth, cross-sectional area, and substrate of the existing waterbody adjacent to the crossing and provide documentation (hydraulic analysis including low lying property analysis) that the size of the crossing will not restrict tidal flow over the full natural tide range and will not adversely affect abutting infrastructure.

39. ☐ If the work includes a permanent crossing of a non-tidal stream, your project design should be modified to match the culvert gradient of the existing stream channel profile, provide clearance for ≥1.2 times bank full width and conveyance should be embedded ≥1-2 feet for box culverts and pipe arches or ≥1-2 feet and at least 25 percent for rounded pipes/culverts in accordance with the Massachusetts Stream Crossing Standards. Provide the basis for any variation to this requirement.
40. ☐ If the work includes a permanent crossing of a non-tidal stream, the structure should be designed to include a natural bottom substrate within the conveyance that matches the characteristics of the substrate in the natural stream channel and the character of the banks (mobility, slope, stability, confinement, grain and rock size). The conveyance should be designed with a minimum openness ratio ≥0.82-feet (0.25-meters). For how to calculate openness ratio and stream simulation ecological approach for road and stream crossings, see https://www.nae.usace.army.mil/Missions/Regulatory/Stream-and-River-Continuity/.

SECTION 9: COMPENSATORY MITIGATION

41. ☐ Does the project require Compensatory Mitigation[21] for impacts to Waters of the U.S.? (See Section V in the 2023 Massachusetts General Permit)
42. ☐ If the project requires mitigation, does the selected compensatory mitigation option (i.e., In-Lieu Fee, permittee-responsible mitigation) deviate from the order of the options presented in §332.3(b)(2)-(6)? If so, please explain why. https://www.ecfr.gov/current/title-33/chapter-II/part-332/section-332.3
43. ☐ For any compensatory mitigation that involves preservation, the applicant must use a site protection instrument to preserve the parcel in perpetuity. (Conservation Easement, Deed Restriction, etc.) https://www.mass.gov/service-details/conservation-restriction-review-program.

SECTION 10: HISTORIC PROPERTIES & NOTIFICATIONS TO SHPO, THPOs, BUAR

44. ☐ Notify the SHPO, Massachusetts Historical Commission, of the Project via Certified Mail and include proof of delivery or receipt in the application package (See Appendix A).
45. ☐ As applicable, notify the THPOs, Narragansett Indian Tribe, Wampanoag Tribe of Gay Head (Aquinnah), and Mashpee Wampanoag Tribe, of the Project via email OR mail and include proof of delivery or receipt in the application package (See Appendix A).
46. ☐ As applicable, notify the BUAR via email (*strongly preferred*) OR mail and include proof of delivery or receipt in the application package (See Appendix A).
47. ☐ Include responses to this notification in the permit application.
48. ☐ As applicable, information on historic properties (Tribal and Archaeological) within the project area should be provided in the permit application.

SECTION 11: ENDANGERED SPECIES & ESSENTIAL FISH HABITAT

49. ☐ Provide a USFWS Information for Planning and Consultation (IPaC) Official Species List from https://ecos.fws.gov/ipac and the email of the individual who generated the list (see GC 10 of the 2023 Massachusetts General Permit for more information).
50. ☐ Provide a species list from the NMFS Section 7 Endangered Species Act mapper at https://noaa.maps.arcgis.com/apps/webappviewer/index.html.
51. ☐ Provide a species list from the NMFS Essential Fish Habitat Mapper at https://www.habitat.noaa.gov/apps/efhmapper/?page=page_3.

[21] Your mitigation proposal must be consistent with the December 29, 2020 Compensatory Mitigation Standard Operating Procedures at https://www.nae.usace.army.mil/Portals/74/docs/regulatory/Mitigation/Compensatory-Mitigation-SOP-2020.pdf and 2008 Mitigation Rule.

52. ☐ If the project will generate turbidity, describe the extent of turbidity and if erosion controls will be used to contain turbidity. If turbidity controls are not operationally feasible, explain the basis for your conclusion and identify any other measures that you will implement to minimize resuspension of sediment.
53. ☐ Identify the substrate type and any aquatic resources that will be affected by the proposed action. (SAV, salt marsh, sand, silt/clay, rocky/hard bottom)
54. ☐ For projects which will include the installation of pilings/sheet-piles, identify the substrate at the project site (sand, cobble, silt/mud/clay), the installation method (vibratory hammer, impact hammer, combination) and indicate whether the following “soft start” procedures at beginning of the workday and after a 30-minute period of rest will be deployed:
    a. ☐ Vibratory Pile Installation: pile driving will be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period will be repeated two additional times, followed immediately by pile-driving at full rate and energy.
    b. ☐ Impact Pile Installation: pile driving will commence with an initial set of three strikes by the hammer at 40% energy, followed by a one-minute wait period, then two subsequent 3-strike sets at 40% energy, with one-minute waiting periods, before initiating continuous impact driving.
55. ☐ If the project involves dredging, describe any dredge history, number of dredge events to be covered by the permit, erosion/sediment controls, dredge type, intake structures (mesh screen size), dredged material disposal site.
56. ☐ For project activities associated with structures, identify the number, type (drill barge, work boat, tugboat, etc.), and size of any temporary vessels that will be used. Specify measures that will be implemented to ensure vessels are not berthed in shallow water or will “ground out” at low tide.
57. ☐ For aquaculture projects identify whether any component of the gear is seasonal (will be removed annually) or will be in place year-round. If gear will be present year-round and will be variably managed (e.g., floating in summer, bottom in winter) identify month/date for such configurations.
58. ☐ For aquaculture projects identify whether the project will involve use of an existing vessel or new vessel. Identify the length for all work vessels and identify the distance round trip from vessel berthing location and aquaculture area.
59. ☐ For project activities associated with docking structures (either commercial, industrial, or recreational) identify the number, type (motorized/non-motorized, jet-ski, sailboat, kayak, canoe, other that will be berthed there and the sizes of each.
60. ☐ Information required for Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act:
    a. Results of an eelgrass survey completed per the INSERT.
    b. Essential Fish Habitat Assessment to determine project-related impacts to essential fish habitat, using guidance developed by the National Marine Fisheries Service.
61. ☐ A document containing the following information (requirements of 50 CFR §600.920(e)(3)):
    a. Description of proposed action.
    b. Analysis of potential adverse effects on essential fish habitat.
    c. Conclusions regarding the effects of the action on essential fish habitat.
    d. If applicable, proposed mitigation.
    e. Analysis of alternatives to the proposed action.
    f. Other:

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MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL PROTECTION

NOTICE OF INTENT

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WETLANDS WILDLIFE WATERWAYS

Notice of Intent Application and Wetland Resource Area Analysis

December 15, 2022

Subject Property

Washington Street (Route 138) Corridor Improvements

Stoughton, Massachusetts

Applicant & Owner

Massachusetts Department of Transportation-Highway Division

10 Park Plaza

Boston, MA 02116

LEC Environmental Consultants, Inc.

100 Grove Street

Suite 302

Worcester, MA 01605

508-753-3077

www.lecenvironmental.com

WETLANDS WILDLIFE WATERWAYS

December 15, 2022

FedEx and Email (jconlon@stoughton-ma.gov)

Stoughton Conservation Commission
Town Hall
10 Pearl Street
Stoughton, MA 02072

RE: Notice of Intent Application [LEC File #: NEI\17-144.04]
Washington Street (Route 138) Corridor Improvements
Stoughton, Massachusetts

Dear Members of the Commission:

On behalf of the Applicant, the Massachusetts Department of Transportation-Highway Division (MassDOT), LEC Environmental Consultants, Inc. (LEC) respectfully submits this Notice of Intent (NOI) Application for the Washington Street (Route 138) Corridor Improvement Project in Stoughton, Massachusetts. This filing is submitted pursuant to the *Massachusetts Wetlands Protection Act* (the *Act*, M.G.L.c.131 § 40) and its implementing Regulations (the *Act Regulations*, 310 CMR 10.00). As a state agency, MassDOT is not subject to local wetlands protection bylaws or ordinances.

Bordering Vegetated Wetland (BVW), Bordering Land Subject to Flooding (BLSF), and Riverfront Area occurs on and/or proximate to the project area and are protected under the *Act* and *Act Regulations.*

Project details are provided on the site plans, entitled *Corridor Improvements on Washington Street (Route 138)*, 11 sheets, dated October 21, 2022; and *Stormwater Report,* prepared by Nitsch Engineering, dated December 13, 2022.

As part of the proposed activities, the Applicant will implement erosion controls, establish a clearly defined Limit-of-Work, and provide stormwater management measures and BVW and BLSF mitigation in accordance with the *Act Regulations*. Proposed permanent BVW impacts of 152± square feet will be replaced with a 525± square foot wetland replication area, 300± sf of temporary BVW impacts will be restored, and permanent BLSF impacts of 355± cubic feet will be replaced with a 900± cubic feet compensatory flood storage area.

As a MassDOT-Highway Division sponsored project, notification of abutters is not required per the *Wetlands Protection Act* (M.G.L, Chapter 131§40). Therefore, a certified abutters list or notification to abutters has not been provided.

Enclosed please find one check made payable to the Town of Stoughton in the amount of Three Hundred, Eighty-Seven Dollars and Fifty Cents ($387.50) for the purpose of filing this Application under State guidelines as well as a check made payable to *GateHouse Media* in the amount of Twelve Dollars and Eighty-Five Cents ($12.85) in order for the Commission to place the legal advertisement. In addition, electronic payment to the Commonwealth of Massachusetts in the amount of Three Hundred, Sixty-Two Dollars and Fifty Cents ($362.50) has been made via *eDEP*. It is our understanding that the Conservation Commission will legally post the NOI Application and required public hearing so as to appear on the Conservation Commission's January 5, 2023 agenda.

We trust that the information included herein is sufficient to facilitate your review. Should you have any questions regarding this NOI or require additional information, please contact me in our Worcester office at 508-753-3077 or at akendall@lecenvironmental.com.

Thank you for your consideration of this NOI. We look forward to meeting with the Commission on January 5, 2023.

Sincerely,

LEC Environmental Consultants, Inc.

Andrea Kendall, PWS
Senior Environmental Scientist

cc: DEP, Southeast Region
Massachusetts Department of Transportation
Nitsch Engineering

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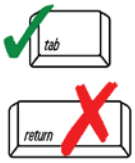
Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



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 138 (Washington Street) & York Street — a. Street Address
Stoughton — b. City/Town
02072 — c. Zip Code

Latitude and Longitude:
42.141889 — d. Latitude
-71.103141 — e. Longitude

Roadway Right-of-Way — f. Assessors Map/Plat Number
N/A — g. Parcel /Lot Number

2. Applicant:

Melissa — a. First Name
Lenker — b. Last Name
Massachusetts Department of Transportation-Highway Division — c. Organization
10 Park Plaza, Room 7360 — d. Street Address
Boston — e. City/Town
MA — f. State
02116 — g. Zip Code
978-429-1772 — h. Phone Number
(blank) — i. Fax Number
melissa.lenker@dot.state.ma.us — j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

(blank) — a. First Name
(blank) — b. Last Name
Massachusetts Department of Transportation-Highway Division — c. Organization
10 Park Plaza — d. Street Address
Boston — e. City/Town
MA — f. State
02116 — g. Zip Code
(blank) — h. Phone Number
(blank) — i. Fax Number
(blank) — j. Email address

4. Representative (if any):

Andrea — a. First Name
Kendall — b. Last Name
LEC Environmental Consultants, Inc. — c. Company
100 Grove Street, Suite 302 — d. Street Address
Worcester — e. City/Town
MA — f. State
01605 — g. Zip Code
508-753-3077 — h. Phone Number
508-753-3177 — i. Fax Number
akendall@lecenvironmental.com — j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

$750.00 — a. Total Fee Paid
$362.50 — b. State Fee Paid
$387.50 — c. City/Town Fee Paid

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A. General Information (continued)

6. General Project Description:

The Project consists of roadway updates that enhance safety and mobility for all modes of transportation. The project includes reconstruction and cross section modifications to Washington Street, improved traffic operations, new pedestrian and bicycle accommodations, and improved stormwater management. Minor widening along roadways will allow new sidewalks and bicycle accommodations along the corridor that provide new multi-modal connections. Existing drainage, water, sewer, and utility pole modifications are also proposed within the project limits. Portions of the work are located within BVW, BLSF, Riverfront Area associated with Beaver Meadow Brook, and the 100-foot Buffer Zone.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☒ Transportation
9. ☐ 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 and improvement of existing public roadways

2. Limited Project Type

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:

Bristol County North
a. County

b. Certificate # (if registered land)

N/A
c. Book

d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ 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.
2. ☒ 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. ☐ Bank	1. linear feet	2. linear feet
b. ☒ Bordering Vegetated Wetland	152 (perm) 300 (temp) 1. square feet	525 replace + 300 restoration 2. square feet
c. ☐ Land Under Waterbodies and Waterways	1. square feet 3. cubic yards dredged	2. square feet

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☒ Bordering Land Subject to Flooding	355 (perm) 525 (temp-i.e., BVW replication) 1. square feet 355 (perm) 3. cubic feet of flood storage lost	810 replace + 525 restoration 2. square feet 900 4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☒ Riverfront Area	Beaver Meadow Brook (aka Redwing Brook)- inland 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: 7,850 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.
7,275 (temp) 575 (perm)	50 (temp)	7,225 (temp); 575 (perm)

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.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ 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. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ 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. ☐ 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

August 2021
b. Date of map

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 https://www.mass.gov/ma-endangered-species-act-mesa-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 https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review).
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, https://www.mass.gov/service-details/exemptions-from-review-for-projectsactivities-in-priority-habitat; 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@mass.gov

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@mass.gov

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.

c. ☐ Is this an aquaculture project? d. ☐ Yes ☐ No

If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).

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C. Other Applicable Standards and Requirements (cont'd)

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

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.

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

Stoughton
City/Town

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.

Corridor Improvements on Washington Street (Route 138), Stoughton, MA
a. Plan Title

MassDOT
b. Prepared By

Matthew J. Soltys, PE
c. Signed and Stamped by

October 21, 2022
d. Final Revision Date

20
e. Scale

Stormwater Report, prepred by Nitsch Engineering
f. Additional Plan or Document Title

December 13, 2022
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:

41280
2. Municipal Check Number

12/14/2022
3. Check date

Electronic payment through *eDEP*
4. State Check Number

5. Check date

LEC Environmental Consultants, Inc.
6. Payor name on check: First Name

7. Payor name on check: Last Name

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

Stoughton
City/Town

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.

Melissa Lenker

1. Signature of Applicant Melissa Lenker, MassDOT-Highway Division

12/12/2022

2. Date

3. Signature of Property Owner (if different)

4. Date

Andrea Kendall

5. Signature of Representative Andrea Kendall, LEC Environmental Consultants, Inc.

12/14/2022

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.

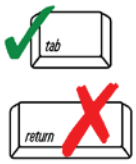
The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

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:

Washington Street (Route 138) & York Street	Stoughton
a. Street Address	b. City/Town
Electronic payment through *eDEP*	$362.50
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Melissa	Lenker	
a. First Name	b. Last Name	
Massachusetts Department of Transportation-Highway Division		
c. Organization		
10 Park Plaza, Room 7360		
d. Mailing Address		
Boston	MA	02116
e. City/Town	f. State	g. Zip Code
978-429-1772		melissa.lenker@dot.state.ma.us
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

a. First Name	b. Last Name	
Massachusetts Department of Transporation-Highway Division		
c. Organization		
10 Park Plaza		
d. Mailing Address		
Boston	MA	02116
e. City/Town	f. State	g. Zip Code
h. Phone Number	i. Fax Number	j. Email Address

B. Fees

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

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.

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

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Category 2e (inland limited project)	1	$500.00 x 1.5	$750.00

Step 5/Total Project Fee: $750.00

Step 6/Fee Payments:

Total Project Fee:	$750.00 (a. Total Fee from Step 5)
State share of filing Fee:	$362.50 (b. 1/2 Total Fee **less $**12.50)
City/Town share of filling Fee:	$387.50 (c. 1/2 Total Fee **plus** $12.50)

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

LEC

Notice of Intent Application
& Wetland Resource Area Analysis

Washington Street (Route 138) Corridor Improvements

Stoughton, Massachusetts

December 15, 2022

1. Introduction

On behalf of the Applicant, Massachusetts Department of Transportation (MassDOT), LEC Environmental Consultants, Inc. (LEC) is submitting this Notice of Intent (NOI) Application for the Washington Street (Route 138) Corridor Improvement Project in Stoughton, Massachusetts. The NOI Application is filed under the *Massachusetts Wetlands Protection Act* (*Act*, M.G.L., c. 131, s. 40) and its implementing *Regulations* (*Act Regulations*, 310 CMR 10.00). As an agency of the Commonwealth of Massachusetts, MassDOT is exempt from the *Town of Stoughton Wetlands Protection Bylaw* (Chapter 191) and implementing *Town of Stoughton Wetlands Protection Bylaw Regulations*.

The purpose of the proposed project is to enhance safety and mobility for all modes of transportation. Designed as a *Complete Street*, the project includes reconstruction and cross section modifications to Washington Street, improved traffic operations, new pedestrian and bicycle accommodations, and improved stormwater management. These improvements are aligned with MassDOT's sustainability initiative known as GreenDOT, which promotes the healthy transportation modes of walking, bicycling, and public transit, and supportive smart growth development. Construction activities will be conducted, in part, within Bordering Vegetated Wetland (BVW), Bordering Land Subject to Flooding (BLSF), Riverfront Area, and the 100-foot Buffer Zone. Wetland resource areas will be protected from impacts during construction through the implementation of erosion and sedimentation controls. The erosion and sedimentation controls will function as the limit of work and will minimize areas of disturbance, as will phasing and sequencing of the work. Runoff generated from the project will be collected and treated in accordance with design guidelines developed by MassDEP (DEP, 2008 Massachusetts Stormwater Handbook) and standards contained in the *Massachusetts Wetlands Protection Act* (WPA) *Regulations*.

The proposed work activities are depicted on the site plans entitled, *Corridor Improvements on Washington Street (Route 138)*, dated October 21, 2022 (*Site Plans*, Appendix C).

A Request for Determination of Applicability has been filed concurrently with the Canton Conservation Commission for minor work proposed within Buffer Zone and Riverfront Area.

The following report provides a description of the site, the associated Wetland Resource Areas, proposed activities, and a description of the measures used to mitigate potential impacts to Wetland Resource Areas and their associated Buffer Zones. The project qualifies as a limited project under 310 CMR 10.53(3)(f) for maintenance and improvement of an existing public roadway.

2. General Site Description

Washington Street (Route 138) is a two-way single-lane north-south roadway extending from Easton to the Canton town line and is actively maintained and managed by MassDOT. Classified as an urban principal arterial route, Washington Street traverses through business and industrial zoned districts. In 2017, Washington Street supported almost 23,500 average daily trips (ADT) and by 2027, traffic volume is projected to increase to more than 25,800 ADT. The proposed project limits (herein referred to as "the site") occur within the north-central portion of Stoughton and include the right-of-way (ROW) and directly adjacent areas from the town of Canton municipal boundary south to Lincoln Street approximately 6,350 feet, and York Street from the intersection of Washington Street east approximately 265 feet (Appendix A, Figure 1). While commercial and industrial uses border the majority of the site, forested uplands and wetlands and an athletic field owned by the Town of Canton are adjacent to Washington Street, north of York Street. Currently, the project corridor poses several operational and safety issues, including high crash frequency in some segments, as well as substandard bicycle and pedestrian facilities. Existing sidewalks, where present in the project corridor, directly abut the roadway, and some are in poor condition. There are no bicycle accommodations present along the corridor.

Guardrails extend along select sections of Washington Street where slopes adjacent to the roadway are steep. Overhead electric and telecommunication lines attached to wooden utility poles are located within the ROW on the east side of Washington Street and south side of York Street. Sewer, gas, water, and electric utilities occur belowground within the ROW. Vegetation immediately along the roadsides consists of mowed grasses and

forbs, shrubs, and small caliper trees. Wetlands generally occur within 100 feet of the site along Washington Street, between STA 21 and 26, and along York Street, north of STA 502. These wetlands occur at the bottom of the steep embankments and typically between 10 to 15 feet lower than the roadway surface.

Proximate to the wetlands, stormwater runoff sheet flows untreated to paved swales (i.e., breaks in the curbing) on either side of Washington Street that direct roadway runoff to the wetlands/Vernal Pool via hillside embankment (refer to Photos 1. and 2.) or country drainage. In addition, where no curbing exists, stormwater runoff flows overland via country drainage to the wetlands/Vernal Pool. Specifically, untreated runoff is directed to the Vernal Pool via two paved swales at STA 22+75 and STA 24+50 and overland flow at approximately STA 20+50. As depicted in Photo 2, erosion along the steep hillside embankment downgradient of the paved swale at STA 22+75 has been noted adjacent to the Vernal Pool proximate to Wetland Flag #11. Sand from winter application and trash has also washed onto the embankment. Elsewhere, stormwater runoff is collected in a closed drainage system via catch basins with outfalls located along Washington Street adjacent to the wetlands/Vernal Pool. Limited water quality treatment is currently provided by the catch basins as most are likely not equipped with deep sumps/hoods.

Photo 1. View of paved swale at STA 22+75 directing untreated stormwater runoff onto the hillside embankment and into the Vernal Pool proximate to Wetland Flag #11.

Photo 2. View of steep hillside embankment with rip-rap downgradient of paved swale at STA 22+75. Untreated stormwater runoff flows over the embankment and into the Vernal Pool proximate to Wetland Flag #11. Note erosion of embankment and trash. Sediment accumulation observed at bottom of slope (not pictured).

According to the regional Natural Resources Conservation Service (NRCS) soil survey, soils mapped at the site primarily include Hinckley loamy sand, 15 to 35 percent slopes, Udorthents, sandy, and pits, sand and gravel.

Upland vegetation within the western forested embankment is largely comprised of northern red oak (*Quercus rubra*) and white ash (*Fraxinus americana*) and the eastern forested embankment includes northern red oak, white pine (*Pinus strobus*), black cherry (*Prunus serotina*), pignut hickory (*Carya glabra)*, and American beech (*Fagus grandifolia*). The understory includes saplings from the canopy and sweet pepperbush (*Clethra alnifolia*), and non-native species of multiflora rose (*Rosa multiflora*) and barberry (*Berberis* sp.).

Utilizing a hand-held, Dutch-style auger, LEC inspected soil conditions within the upland along the BVW boundary and observed a 5-inch thick, sandy loam topsoil (A Horizon) with a soil matrix color of 10YR 3/2 underlain by a 14-inch- thick sandy loam subsoil (B-Horizon) with a soil matrix color of 10YR 5/6. This soil profile is not considered hydric according to *Field Indicators for Identifying Hydric Soils in New England* (Version 4, April 2019, the *Field Indicators Guide*).

The site is not located within an Area of Critical Environmental Concern (ACEC), and according to DEP, the site is not located in an area designated as an Outstanding Resource Water or a contributor to a public water supply.

2.1 MA Natural Heritage & Endangered Species Program Designation

According to the 15th Edition of the Massachusetts Natural Heritage Atlas (valid from August 1, 2021) published by the Natural Heritage & Endangered Species Program (NHESP) and the MassGIS database, the project area is not located within *Priority Habitats of Rare Species or Estimated Habitats for Rare Wildlife.* A certified vernal pool (#7459) is located on the west side of Washington Street immediately adjacent to the project footprint between STA 21+00 and 23+50; (Appendix A, Figure 2).

3. Wetland Boundary Determination Methodology

LEC conducted a site evaluation on November 30, 2017 to identify, characterize, and determine the extent of Wetland Resource Areas located adjacent to the site. On September 19, 2022, LEC conducted an additional site evaluation to review and confirm the prior wetland delineation. The wetland boundaries were determined through observations of the existing plant communities, using the "fifty percent criteria" to determine dominance of wetland/upland vegetation, the interpretation of soil characteristics, and other indicators of wetland hydrology in accordance with the MassDEP handbook, *Delineating Bordering Vegetated Wetlands under the Massachusetts Wetlands Protection Act* (March 1995), the *Field Indicators for Identifying Hydric Soils in New England* (May, 2017), and the criteria set forth in 310 CMR 10.55.

The boundary of BVW was demarcated in the field with sequentially-numbered, blaze orange surveyor's flagging tape embossed with the words "LEC Resource Area

Boundary" in bold, black print. Except when coincident with the outermost wetland resource area, Bank associated with the western pond was not delineated. BVW Flags for the western wetland system are numbered W-1 through W-15 and BVW Flags for the eastern wetland system are numbered W-16 through W-38. All BVW flags were survey located by Nitsch Engineering.

4. Wetland Resource Area Descriptions

Wetland Resource Areas located adjacent to the site include BVW, BLSF, and Riverfront Area. A brief description of the Wetland Resource Areas and 100-foot Buffer Zone are provided below.

4.1 Bordering Vegetated Wetland (BVW)

Bordering Vegetated Wetland (BVW) is defined at 310 CMR 10.55 (2) as *freshwater wetlands that border on creeks, rivers, streams, ponds and lakes. The types of freshwater wetlands are wet meadows, marshes, swamps and bogs. Bordering Vegetated Wetlands are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The boundary of Bordering Vegetated Wetland is the line within which 50% or more of the vegetational community consists of wetland indicator plants and saturated or inundated conditions exist.*

Wetland areas proximate to the site were delineated in the field, and the wetland boundaries are shown on the accompanying plans. A 100-foot buffer zone extends horizontally from the delineated wetland boundary.

Two vegetated wetlands are located adjacent to the project corridor and are regulated as BVW under the *Act*. The U.S. Fish and Wildlife Service National Wetlands Inventory classifies the wetland on the east side of Washington Street/north side of York Street (W16 through W38) as a palustrine scrub-shrub wetland (PSS) transitioning to a palustrine emergent marsh (PEM). The canopy includes red maple (*Acer rubrum),* green ash *(Fraxinus pennsylvanica),* white oak (*Quercus alba*), and elm *(Ulmus sp.)*, while the understory includes sweet pepperbush, northern arrowwood (*Viburnum dentatum*), white pine, multiflora rose, and species from the canopy. The groundcover includes woolgrass (*Scirpus cyperinus*), cinnamon fern (*Osmunda cinnamomea*), and species from the

understory and canopy. The emergent marsh is dominated by common cattail (*Typha latifolia*).

The wetland on the west side of Washington Street (W1 through W15) is classified as a freshwater pond (palustrine unconsolidated bottom/emergent marsh (PUB/EM)) and designated as a Certified Vernal Pool by NHESP. The outer wetland perimeter is vegetated by scrub-shrub vegetation. A partially submerged and likely obstructed culvert is located at the toe of slope along the wetland's eastern edge between wetland flags 6 and 7. The canopy is dominated by red maple and elm, the understory includes highbush blueberry (*Vaccinium corymbosum*), sweet pepperbush, red-osier dogwood (*Cornus sericea*), fetterbush (*Lyonia lucida*), northern arrowwood, meadowsweet (*Spirea sp.*), and glossy buckthorn (*Frangula alnus*), and the groundcover is dominated by tussock sedge (*Carex stricta*) and woolgrass.

LEC inspected soils within the wetland using a hand-held, Dutch-style auger and observed a 9-inch-thick mucky sandy loam topsoil (A-Horizon) with a soil matrix color of 10YR 2/1 underlain by a greater than 6-inch thick, sandy gravel subsoil (B_w-Horizon) with a soil matrix color of 2.5Y 4/1. Prominent redoximorphic features of 7YR 5/6 were observed within the subsoil. This soil profile meets the F3 (Depleted Matrix) indicator for a hydric soil according to the *Field Indicators Guide.*

MassDEP Bordering Vegetated Wetland Delineation Field Data Forms for a representative wetland transect proximate to LEC flagging station 21 are included in Appendix B.

4.2 Inland Bank and Land Under Water

According to the *Act Regulations, Bank is the first observable break in slope or the mean annual flood level, whichever is lower. The lower boundary of a Bank is the mean annual low flow level* [310 CMR 10.54 (2) (c)].

Land Under Water Bodies and Waterways is the land beneath any creek, river, stream, pond or lake. Said land may be composed of organic muck or peat, fine sediments, rocks or bedrock [310 CMR 10.56 (2)(a)].

According to 310 CMR 10.04, a stream means a body of running water, including brooks and creeks, which moves in a definite channel in the ground due to a hydraulic gradient, and which flows within, into or out of an Area Subject to Protection under M.G.L. c. 131, § 40. A portion of a stream may flow through a culvert or beneath a bridge. Such a body

of running water which does not flow throughout the year (i.e., which is intermittent) is a stream. except for that portion upgradient of all bogs, swamps, wet meadows and marshes [Underline added].

Channelized flow is located upgradient to the eastern BVW proximate to BVW flag 16 but is not a jurisdictional stream containing Bank and Land Under Water until it flows into the wetland. LEC inspected areas upgradient and adjacent to the channelized flows and did not observe any wetland or hydrologic connections to the wetland located on the west side of Washington Street. This non-jurisdictional intermittent stream is depicted on the *Site Plan* for informational purposes only. The intermittent stream interior of the eastern BVW was not delineated but also contains protectable Bank and Land Under Water.

The Pond interior of the western BVW (not delineated) also contains Bank and Land Under Water.

4.3 Bordering Land Subject to Flooding

Bordering Land Subject to Flooding (BLSF) is an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds or lakes. It extends from the banks of these waterways and water bodies; where a bordering vegetated wetland occurs, it extends from said wetland [310 CMR 10.57(2)(a)1].

According to the July 17, 2012 Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Norfolk County (*Community Panel 25021C0213E*), the vast majority of the site is located in a Zone X (unshaded): *Areas determined to be outside the 100-year floodplain.* However, areas adjacent to Beaver Meadow Brook (aka Redwing Brook) are subject to flooding during a 100-year storm. These areas are designated as a Zone AE: *Special Flood Hazard Areas subject to inundation by the 1% chance flood (base flood elevation determined)* (EL 186-187) (Appendix A, Figure 3). Land extending from the BVW to the Floodplain elevation is considered BLSF. Based on the existing conditions plan, elevation 187 occurs upgradient to the BVW proximate to STA 24 and 25.

4.4 **Riverfront Area**

According to 310 CMR 10.58 2 (a): *Riverfront Area is defined as the area of land between a river's mean annual high water line and a parallel line measured horizontally 200 feet away.*

Riverfront Area includes land within 200 feet of the Bank-MAHW line associated with the off-site Beaver Meadow Brook located in the town of Canton. The on-site Riverfront Area includes the northern most portion of Washington Street. The roadway surface and adjacent shoulders are considered 'Degraded' in accordance with 310 CMR 10.58 (5).

5. Proposed Project

The Project consists of roadway updates that enhance safety and mobility for all modes of transportation. Designed as a *Complete Street*, the project includes reconstruction and cross section modifications to Washington Street, improved traffic operations, new pedestrian and bicycle accommodations, and improved stormwater management. New sidewalks and bicycle accommodations are proposed along the corridor, providing new multi-modal connections. Existing drainage, water, sewer, and utility pole modifications are also proposed within the project limits. Specifically, the project will:

- Reconstruct roadways with new pavement by milling and overlay;
- Minor widening along roadways as necessary to provide bicycle accommodations on each direction of vehicular travel via buffered bicycle lanes;
- Resurface the roadway, reset curb, modify drainage, sewer, water, and overhead wire infrastructure within the Project limits;
- Construct Americans with Disabilities Act (ADA)/Architectural Access Board (AAB) compliant accessible sidewalks and pedestrian ramps to improve pedestrian accommodations along the entire project (sidewalks on east and west side of Washington Street south of York Street intersection and sidewalk on west side of Washington Street north of York Street intersection);
- Restore vegetated areas with loam and seed mix;
- Install new traffic signage & striping;
- Install new guardrail, where required, throughout the project limits;
- New traffic signal at the York Street intersection;

- Traffic signal replacement/upgrades at Stop and Shop Driveway and Central Street intersections.

The existing closed drainage system, where present, is being retained and modified to accommodate the proposed improvements. Existing paved swales will be eliminated and runoff will be collected and pre-treated in new deep sump/hooded catch basins prior to discharging to four (4) outfall locations along the vegetated slope. Outlets are proposed to have stone energy dissipation pads.

A portion of the work noted above will result in temporary and/or permanent impacts to BVW (152±sf permanent; 300±sf temporary), BLSF (355±cf), Riverfront Area (190±sf permanent; 2,310±sf temporary), and/or the 100-foot buffer zone. As discussed below, the work has been designed to comply with applicable performance standards to the extent practicable. The work proposed by MassDOT and as an agency of the Commonwealth of Massachusetts is exempt from the *Town of Stoughton Wetlands Protection Bylaw* (Chapter 191) and implementing *Town of Stoughton Wetlands Protection Bylaw Regulations*.

5.1 **Alternatives Analysis**

MassDOT considered providing pedestrian accommodations (i.e., sidewalk) on both sides of Washington Street north of York Street, consistent with the layout provided south of York Street. It is important to note that buffered bicycle lanes are proposed on each direction of vehicular travel in order to provide continuity throughout the project corridor. Eliminating all pedestrian accommodations or eliminating or reducing bicycle lanes to just one direction of vehicular travel is infeasible since it would not fulfill MassDOT's Complete Streets and GreenDOT initiatives, including reduction of greenhouse gas emissions, promotion of healthy transportation modes of walking, bicycling, and public transit, and support for smart growth development.

As depicted on the Critical Section Plan STA 23+50 Alternative Design (Attachment), providing a sidewalk on both sides of Washington Street would extend the proposed 2H:1V slope further into the eastern BVW at the bottom of the slope since widening would be required to accommodate the eastern sidewalk. The eastern sidewalk would yield an additional 475 sf of BVW impacts (or more for a less steep slope) as compared to the 152± sf of BVW impacts from the roadway layout with one sidewalk. The 2-sidewalk layout would similarly increase impacts to Riverfront Area and require the

permanent easement to increase by approximately 2,500 sf on the Town of Canton's Article 97 property.

In contrast, the western sidewalk is aligned with an existing level area and requires minimal site grading and avoids impact to the western BVW/vernal pool. It also provides a connection from York Street to the residential community on Windsor Woods Lane and adjacent athletic fields in Canton.

In an effort to minimize BVW, BLSF, and Riverfront Area impacts, the project limits between York Street and the Canton town line have been minimized to the maximum extent practicable, while still achieving the project design goals. As noted above, south of York Street, sidewalks are provided on both sides of Washington Street; however, north of York Street, a single sidewalk will be provided on the west side of Washington Street. BVW impacts have been further avoided by grading a steeper 2H:1V slope. Where wetland impacts are unavoidable, mitigation will be provided, as described below.

6. Assessment of Impacts and Mitigation Measures

The following provides an Assessment of Impacts and proposed Mitigation associated with construction of the Proposed Project.

6.1 Wetland Resource Area Impacts

As noted above, the project will result in temporary and permanent impacts to wetland resource areas, including the eastern BVW, BLSF, and Riverfront Area. There are no direct proposed impacts to the western BVW containing the certified vernal pool. Appropriate sediment and erosion controls will be implemented during construction and stormwater management improvements will further protect the vernal pool.

6.2 Mitigation Measures

The Applicant proposes to implement a sedimentation and erosion control program, comprised of structural and non-structural practices, during construction as well as provide a comprehensive stormwater management system for post construction conditions.

6.2.1 **Erosion and Sedimentation Standards and Controls**

A sedimentation and erosion control program will be implemented to protect the adjacent wetland resource areas and vernal pool from sedimentation during the proposed construction activities. The program incorporates BMPs specified in the guidelines developed by the DEP and the U.S. Environmental Protection Agency (EPA).

Proper implementation of the erosion and sedimentation control program will:

- Minimize exposed soil areas through sequencing and temporary stabilization;
- Place structures to manage stormwater runoff; and
- Establish a permanent vegetative cover or other forms of stabilization as soon as practicable.

The following sections describe the controls that will be used and practices that will be followed during construction. These practices comply with the criteria contained in NPDES General Permit for Discharges from Large and Small Construction Activities issued by the EPA.

Non-Structural Practices

Non-structural practices to be used during construction include temporary stabilization, temporary seeding, and permanent seeding. These practices will be initiated as soon as practicable in appropriate areas of the site.

Structural Practices

Structural erosion and sedimentation controls to be used on the site include erosion control barriers, catch basin inlet protection, and dewatering filters.

Erosion Control Barriers

Prior to any ground disturbance, sediment and erosion controls such as compost filter tubes or equivalent will be installed at the downgradient side of the limit of work and will provide additional assurance that construction equipment will not further intrude upon the 100-foot Buffer Zone, BVW, BLSF, and Riverfront Area. As construction progresses, additional barriers will be installed at the base of stockpiles and other erosion prone areas. All barriers will remain in place until disturbed areas are stabilized.

Dewatering Filters

If necessary, sediment-laden water that collects in trenches or excavated areas will be pumped into a dewatering BMP as determined by the contractor. All dewatering BMPs

will be placed as far away from wetlands and streams as possible and removed for proper disposal.

6.2.2 Stormwater Management Measures

Nitsch Engineering has designed a construction and post-construction phase comprehensive stormwater management system to manage stormwater runoff associated with the project in compliance with DEP's Stormwater Management Standards. The existing paved swales and passive overland discharge points, as described above, have been eliminated such that all runoff will be incorporated into a closed drainage system comprised of new catch basins equipped with deep sumps and hoods and energy dissipating pads or sediment forebay at the drainage outfalls. As compared to existing conditions, water quality of runoff will be improved prior to reaching the wetlands/Vernal Pool. The three existing Vernal Pool discharge points have been eliminated and consolidated into a single discharge area located at STA 21+00. In addition, the existing catch basin outfall on the steep embankment immediately adjacent to the Vernal Pool has been eliminated. The new drainage outfall with sediment forebay is approximately 44 feet from the Vernal Pool (40 feet from the end of the sediment forebay) and will discharge onto a more gradual slope when compared to existing conditions. Due to subsurface utilities (i.e., Eversource electric transmission line) and existing topography there were no opportunities to locate the outfall further up the slope, away the Vernal Pool. It is important to note that in addition to the improvement of water quality, the Vernal Pool's water balance will be maintained as noted in the *Drainage Report*. Details regarding the design and supporting calculations are contained on the *Site Plans* and in the *Drainage Report* (Attachment).

7. Regulatory Compliance

Proposed construction activities will occur within the 100-foot Buffer Zone, BVW, BLSF, and Riverfront Area. The Project complies with the general provision of the Regulations as they pertain to work in 100-foot Buffer Zone and resource areas as noted below. In addition, the planned roadway improvements comply with the provisions of a limited project in accordance with 310 CMR 10.53(3)(f) for "*maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving inadequate*

drainage systems" and as such, the provisions of 310 CMR 10.55, 310 CMR 10.57, and 310 CMR 10.58 are notwithstanding. However, it is important to note that the project fully complies with the performance standards for BVW and BLSF.

7.1 **100-Foot Buffer Zone (310 CMR 10.53(1))**

As identified in 310 CMR 10.53(3)(1), "*the issuing authority should consider the characteristics of the buffer zone, such as the presence of steep slopes, that may increase the potential for adverse impacts on resource areas. Conditions may include limitations on the scope and location of work in the buffer zone as necessary to avoid alteration of resource areas. The issuing authority may require erosion and sedimentation controls during construction, a clear limit of work, and the preservation of natural vegetation adjacent to the resource area and/or other measures commensurate with the scope and location of the work within the buffer zone to protect the interests of the Act.*"

The overall character and function of the previously developed/disturbed buffer zone will essentially remain unchanged following corridor improvements. As required, the limit of work will be clearly demarcated and a construction level stormwater management program is planned to protect adjacent resource areas. Following construction of stormwater BMPs, the buffer zone's capacity to protect the interests of the *Act* will be improved beyond existing conditions. The new slope will be comprised of a modified rockfill with compost over the stone to allow for a vegetated cover.

7.2 **Resource Area Impacts**

Resource area alteration has been avoided and minimized to the extent practicable and will be restricted to 152± sf of permanent and 300±sf of temporary BVW impacts, 355±cf of BLSF impacts, and 2,310± sf of temporary and 190±sf of permanent Riverfront Area impacts.

In an effort to minimize BVW, BLSF, and Riverfront Area impacts, the project limits between York Street and the Canton town line have been minimized to the maximum extent practicable, while still achieving the project design goals. Specifically, south of York Street, sidewalks are provided on both sides of Washington Street; however, north of York Street, sidewalks will be provided on only one side of Washington Street. BVW impacts have been further avoided by grading a steeper 2H:1V slope. Where wetland impacts are unavoidable, mitigation will be provided.

With the implementation of short-term mitigating measures during construction (e.g., erosion control barriers and catch basin silt sacks), all construction-related impacts will be confined and isolated from the adjacent wetlands resulting in no permanent alteration of resource areas, beyond the permanent/temporary impacts previously noted.

7.2.1 Bordering Vegetated Wetlands

Permanent impacts to BVW have been avoided and minimized to the maximum extent practicable by incorporating steeper side slopes, eliminating a sidewalk along the east side of Washington Street, and by establishing the smallest acceptable construction work footprint. Approximately 152 sf of slope grading will occur within BVW located on the east side of Washington Street and temporary BVW impacts of 300±sf are anticipated for the construction of the wetland replication area. Impacts to the western BVW/vernal pool habitat has been avoided. A wetland replication area (525±sf) will be located within a forested buffer zone adjacent to wetland flags 16-19 resulting in a replacement to impact ratio of approximately 3.5:1, thus exceeding the 1:1 requirement. The wetland replication area will be planted with native groundcover, shrubs, and trees and seeded with a wetland seed mix, as noted in Table 1 and *Sheet 10* of the *Site Plans*. In addition, the temporary wetland impact area will be similarly planted and seeded.

Table 1. Wetland Replication and Restoration Planting Schedule (Replication Area = 525sf)

Plant Species (Common Name)	Plant Species (Latin Name)	Spacing	Size	Quantity
Red maple	*Acer rubrum*	10-12’ O.C.+	3’-4’ minimum	2
Northern Arrowwood	*Viburnum dentatum*	6’ O.C, clustered	2’-3’ minimum	4
Swamp azalea	*Rhododendron viscosum*	6’ O.C, clustered	2’-3’ minimum	4
Highbush blueberry	*Vaccinium corymbosum*	6’ O.C, clustered	2’-3’ minimum	4
Sweet pepperbush	*Clethra alnifolia*	6’ O.C, clustered	2’-3’ minimum	4
Cinnamon fern	*Osmunda cinnamomea*	1’ O.C., clustered	1#	25
Tussock sedge	*Carex stricta*	1’ O.C., clustered	2” plug	25
			Total	68

Wetland Seed Mix; application rate 2,500 SF/lb

The following addresses the applicable Performance Standards for BVW under the State Regulations.

According to 310 CMR 10.55(4)(b), *Notwithstanding the provisions of 310 CMR 10.55(4)(a), the issuing authority may issue an Order of Conditions permitting work*

which results in the loss of up to 5000 square feet of Bordering Vegetated Wetland when said area is replaced in accordance with the following general conditions and any additional, specific conditions the issuing authority deems necessary to ensure that the replacement area will function in a manner similar to the area that will be lost:

1. *the surface of the replacement area to be created ("the replacement area") shall be equal to that of the area that will be lost ("the lost area");*

   The lost area is approximately 152 square feet and the proposed WRA is approximately 525 square feet; therefore, the project complies with and surpasses the requirements of this Performance Standard. The approximately 300± sf of temporary BVW impacts will be fully restored.

2. *the ground water and surface elevation of the replacement area shall be approximately equal to that of the lost area;*

   The WRA requires excavation to appropriate sub-grades to allow for introduction of organic rich soils and creation of final elevations that will be coincident with elevations within the adjacent BVW. In addition, a qualified Wetland Scientist will be on-site during construction of the WRA to ensure appropriate sub-grades are reached to intercept groundwater and create wetland hydrology.

3. *the overall horizontal configuration and location of the replacement area with respect to the bank shall be similar to that of the lost area;*

   The WRA is located in close proximity to the lost area with a similar horizontal configuration, as depicted on the site plans.

4. *the replacement area shall have an unrestricted hydraulic connection to the same water body or waterway associated with the lost area;*

   The WRA will become part of the same BVW system as the lost area.

5. *the replacement area shall be located within the same general area of the water body or reach of the waterway as the lost area;*

   The proposed WRA is located in close proximity to the BVW alterations.

6. *at least 75% of the surface of the replacement area shall be reestablished with indigenous wetland plant species within two growing seasons, and prior to said vegetative reestablishment any exposed soil in the replacement area shall be*

temporarily stabilized to prevent erosion in accordance with standard U.S. Soil Conservation Service methods; and

The *Wetland Details* (Sheet 10 of the *Site Plans*) provides a planting schedule, designed by LEC, which includes installation of native trees, shrubs, and groundcover plantings to ensure that prescribed coverage is achieved. The WRA will be monitored during construction as specified in the permit conditions.

7. *the replacement area shall be provided in a manner which is consistent with all other General Performance Standards for each resource area in Part III of 310 CMR 10.00. In the exercise of this discretion, the issuing authority shall consider the magnitude of the alteration and the significance of the project site to the interests identified in M.G.L. c. 131, § 40, the extent to which adverse impacts can be avoided, the extent to which adverse impacts are minimized, and the extent to which mitigation measures, including replication or restoration, are provided to contribute to the protection of the interests identified in M.G.L. c. 131, § 40.*

   The proposed Washington Street Corridor Improvements have been designed to avoid and minimize impacts to the greatest extent practical, as described above. There are no alternative configurations of the project that avoid or substantially minimize wetland disturbance given the adjacent steep slopes and the BVW. As described above, the project includes stormwater management features, a WRA, compensatory flood storage, and erosion and sedimentation controls to ensure that the interests of the *Act* are protected.

7.2.2 Bordering Land Subject to Flooding

The following addresses the applicable Performance Standards for BLSF under the State Regulations.

According to 310 CMR 10.57(4)(a):

1. Compensatory storage shall be provided for all flood storage volume that will be lost as the result of a proposed project within Bordering Land Subject to Flooding, when in the judgment of the issuing authority said loss will cause an increase or will contribute incrementally to an increase in the horizontal extent and level of flood waters during peak flows. Compensatory storage shall mean a volume not previously used for flood storage and shall be incrementally equal to the theoretical volume of flood water at each elevation, up to and including the 100-year flood elevation, which would be displaced by

the proposed project. Such compensatory volume shall have an unrestricted hydraulic connection to the same waterway or water body. Further, with respect to waterways, such compensatory volume shall be provided within the same reach of the river, stream or creek.

Approximately 355 sf of slope grading will occur within BLSF (Zone AE) and will result in the loss of 355± cubic feet of flood storage between elevations 186 to 187. Compensatory flood storage (900± cubic feet) has been provided and results in an overall increase in flood storage capacity. Compensatory flood storage will be located adjacent to the wetland replication area in the vicinity to wetland flag 19. New flood storage will be created at the same incremental 1-foot elevations as the impact areas, as noted on Table 2 and Sheet 10 of the *Site Plans*.

Table 2. Compensatory Flood Storage

Elevation	Volume Impacted (CF)	Volume Replicated (CF)
186-187	355	810
185-186	0	90
TOTAL	355	900

The compensatory flood storage area will be planted with native shrubs and trees and seeded with a conservation seed mix, as detailed on Table 3 and *Sheet 10* of the *Site Plans*.

Table 3. Buffer Zone/Compensatory Flood Storage Area Planting Schedule

Plant Species (Common Name)	Plant Species (Latin Name)	Spacing	Size	Quantity
Red oak	*Quercus rubra*	10-12’ O.C.+	3’-4’ min	2
Black cherry	*Prunus serotina*	10-12’ O.C.+	3’-4’ min	2
Nannyberry	*Viburnum lentago*	6’ O.C, clustered	2’-3’ min	8
Witch hazel	*Hamamelis virginiana*	6’ O.C, clustered	2’-3’ min	8
Bayberry	*Morella (Myrica) pensylvanica*	6’ O.C, clustered	2’-3’ min	8
Sweet pepperbush	*Clethra alnifolia*	6’ O.C, clustered	2’-3’ min	8
Conservation seed mix			TOTAL	36

2. Work within Bordering Land Subject to Flooding, including that work required to provide the above-specified compensatory storage, shall not restrict flows so as to cause an increase in flood stage or velocity.

The proposed fill and resulting compensatory storage area will not restrict flows to cause an increase in flood stage or velocity.

3. Work in those portions of bordering land subject to flooding found to be significant to the protection of wildlife habitat shall not impair its capacity to provide important wildlife habitat functions. Except for work which would adversely affect vernal pool habitat, a project or projects on a single lot, for which Notice(s) of Intent is filed on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 5,000 square feet (whichever is less) of land in this resource area found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold, or altering vernal pool habitat, may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures contained in 310 CMR 10.60.

The limited extent of slope grading within BLSF (i.e., 355± sf) will not impair important wildlife habitat functions, to the extent they occur.

7.2.3 Riverfront Area

The new sidewalk will result in the addition of approximately 190 sf of impervious surface within Riverfront Area. The remaining 2,310± sf of activities within Riverfront Area include reconstruction and improvement of the existing developed/impervious roadway and grading and seeding the adjacent forested hillside and lawn to accommodate associated site improvements. Removal of select shrubs, saplings, and/or trees may be required to accommodate site grading in order to install the new sidewalk on the west side of the roadway. As noted above in Section 5, the elimination of the sidewalk from the east side of Washington Street has minimized project-related impacts to resource areas, including Riverfront Area. As such, the proposed activities represent the minimally acceptable footprint that achieves the project goals.

The following addresses the applicable Performance Standards for Riverfront Area under the State Regulations.

According to 310 CMR 10.58(5):

(a) At a minimum, proposed work shall result in an improvement over existing conditions of the capacity of the riverfront area to protect the interests identified in M.G.L. c. 131 § 40. When a lot is previously developed but no portion of the riverfront area is degraded, the requirements of 310 CMR 10.58(4) shall be met.

(b) Stormwater management is provided according to standards established by the Department.
(c) Within 200 foot riverfront areas, proposed work shall not be located closer to the river than existing conditions or 100 feet, whichever is less, or not closer than existing conditions within 25 foot riverfront areas, except in accordance with 310 CMR 10.58(5)(f) or (g).
(d) Proposed work, including expansion of existing structures, shall be located outside the riverfront area or toward the riverfront area boundary and away from the river, except in accordance with 310 CMR 10.58(5)(f) or (g).
(e) The area of proposed work shall not exceed the amount of degraded area, provided that the proposed work may alter up to 10% if the degraded area is less than 10% of the riverfront area, except in accordance with 310 CMR 10.58(5)(f) or (g).
(f) When an applicant proposes restoration on-site of degraded riverfront area, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), and (e) at a ratio in square feet of at least 1:1 of restored area to area of alteration not conforming to the criteria…

The planned roadway improvements comply with the provisions of a limited project in accordance with 310 CMR 10.53(3)(f) for "*maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving inadequate drainage systems*" and as such, the provisions of 310 CMR 10.58 are notwithstanding. However, while compliance with some performance standards are achieved, i.e., 310 CMR 10.58(5)(a) and (b) for improvement to stormwater management and 310 CMR 10.58(5)(c) and (d) since work is not located closer to the river than existing conditions and expansion of the roadway to accommodate the new sidewalk is located toward the outer Riverfront Area boundary, compliance with 310 CMR 10.58(5)(e) and (f) are not feasible given the existing site constraints of the right-of-way and adjacent land use.

8. Wetland Mitigation

The 525± sf Wetland Replication Area (WRA) will tie into existing grades of the adjacent wetland, taking into consideration that minor grading within the existing wetland may be required to achieve a suitable hydrologic connection to the WRA. Minor grading

within BVW (i.e., 300±sf of temporary BVW impact) will be fully restored with wetland soils and hydrophytic vegetation.

8.1. Installation of Siltation/Erosion Control Devices

Siltation devices comprised of compost filter tubes or similar will be installed between the BVW limit of grading and Wetland Replication Area. These siltation barriers will remain in place until all proposed replication activities have been completed and all areas have been stabilized by vegetation.

8.2 Preparation of Replication Area

Preparing an area for wetland creation for this project involves the following activities: removal of existing soil; excavation to appropriate sub-grades; and introduction of organic soils. Following removal of topsoil, the replacement area will be excavated to a sub-grade elevation approximately one foot below the adjacent BVW. A wetland scientist will be present to monitor and supervise this excavation effort in order to ensure that appropriate subgrades are established and groundwater hydrology is intercepted.

8.3 Introduction of Hydric Soil

Following the creation of the sub-grade, the area will be back-filled with approximately 1 foot of wetland soils. The wetland soils will be established by mixing topsoil with leaf compost at a roughly 1:1 ratio, resulting in a wetland soil with 15-20% organic content (wetland soils can be manufactured by combining topsoil with a soil textural class of sandy loam, fine sandy loam, or silt loam with decomposed leaf litter at a 1:1 ratio). If translocated soils are not used immediately, then they will be stockpiled within a ring of erosion controls and covered to ensure the soil remains moist.

Final grades (following anticipated settling of soils) are proposed to be similar to those within the adjacent BVW.

8.4 Interception of Hydrology

Successful establishment of the appropriate surficial wetland hydrology is proposed to be achieved by reducing existing surficial elevations and intercepting groundwater within the adjacent BVW. The proposed excavation activities will be supervised by a qualified wetland scientist to ensure establishment of appropriate sub-grades and, ultimately, the desired hydrologic regime. LEC anticipates that the water table is within 12 inches of the

surface during the majority of the growing season given observations of standing water within the existing wetland.

8.5 Re-Vegetation of Replacement Area and Temporary BVW Impact Area

The impacted BVW has a hydrophytic plant community comprised of shrub and tree specimens. The objective is to establish a dense cover of native hydrophytic plants that will compete with and preclude the spread of invasive species into the WRA. Compensatory Flood Area/Buffer Zone plantings will also be established adjacent to the WRA. The plant community and native seed mixes will be established in accordance with the *Site Plans*.

9. Summary

On behalf of the Applicant, MassDOT, LEC is submitting this NOI Application with the Stoughton Conservation Commission for the Washington Street corridor improvements, a roadway update project that enhances safety and mobility for all modes of transportation.

The project will occur within BVW, BLSF, and the previously developed/disturbed Riverfront Area and 100-foot Buffer Zone and fully complies with the *Regulations* under the *Act*. In addition, the project addresses the Massachusetts Stormwater Management Standards to the maximum extent possible. Erosion and sedimentation controls will be employed throughout the construction period to mitigate temporary impacts. As a result, LEC respectfully requests the Stoughton Conservation Commission find these measures adequately protective of the interests identified in the *Act* and issue an Order of Conditions approving the work described in this NOI and shown on the accompanying Site Plans.

Federal Emergency Management Agency Flood Insurance Rate Map for Norfolk County (*Community Panel 25021C0213E*), effective July 7, 2012

Massachusetts Natural Heritage Atlas, 15th Edition. Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries and Wildlife, Route 135, Westborough, MA 01581, http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm

Massachusetts Wetlands Protection Act (M.G.L. c. 131, §. 40), www.state.ma.us/dep

Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00), www.state.ma.us/dep

Massachusetts Department of Environmental Protection, 1997, Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas; A Guide for Planners, Designers and Municipal Officials

Massachusetts Department of Environmental Protection, Division of Wetlands and Waterways 1995. *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act, A Handbook*. 89 pp.

New England Hydric Soils Technical Committee. 2019, 4th ed., *Field Indicators for Identifying Hydric Soils in New England,* New England Interstate Water Pollution Control Commission, Wilmington, MA. P. 76

Reed, P.B. 1988. *National List of Plant Species that Occur in Wetlands: 1988 Massachusetts*. U.S. Department of the Interior, Fish and Wildlife Service. NERC-88/18.21

U.S. Environmental Protection Agency, 2007, Interim Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites. Office of Water. Report EPA 833-R060-04

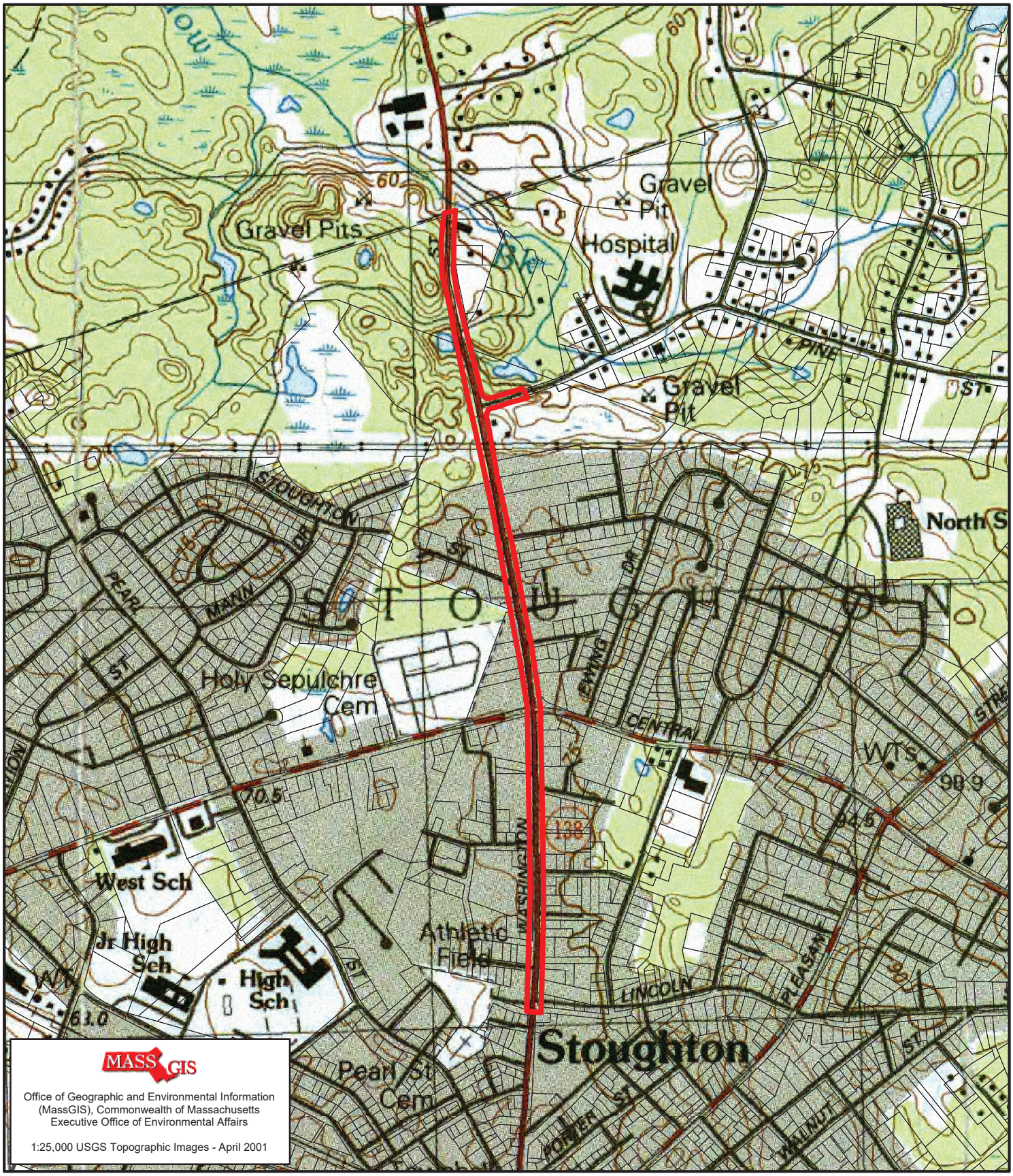
Appendix A

Locus Maps

Figure 1: USGS Topographic Quadrangle

Figure 2: MassGIS Orthophoto

Figure 3: FEMA Flood Insurance Rate Map

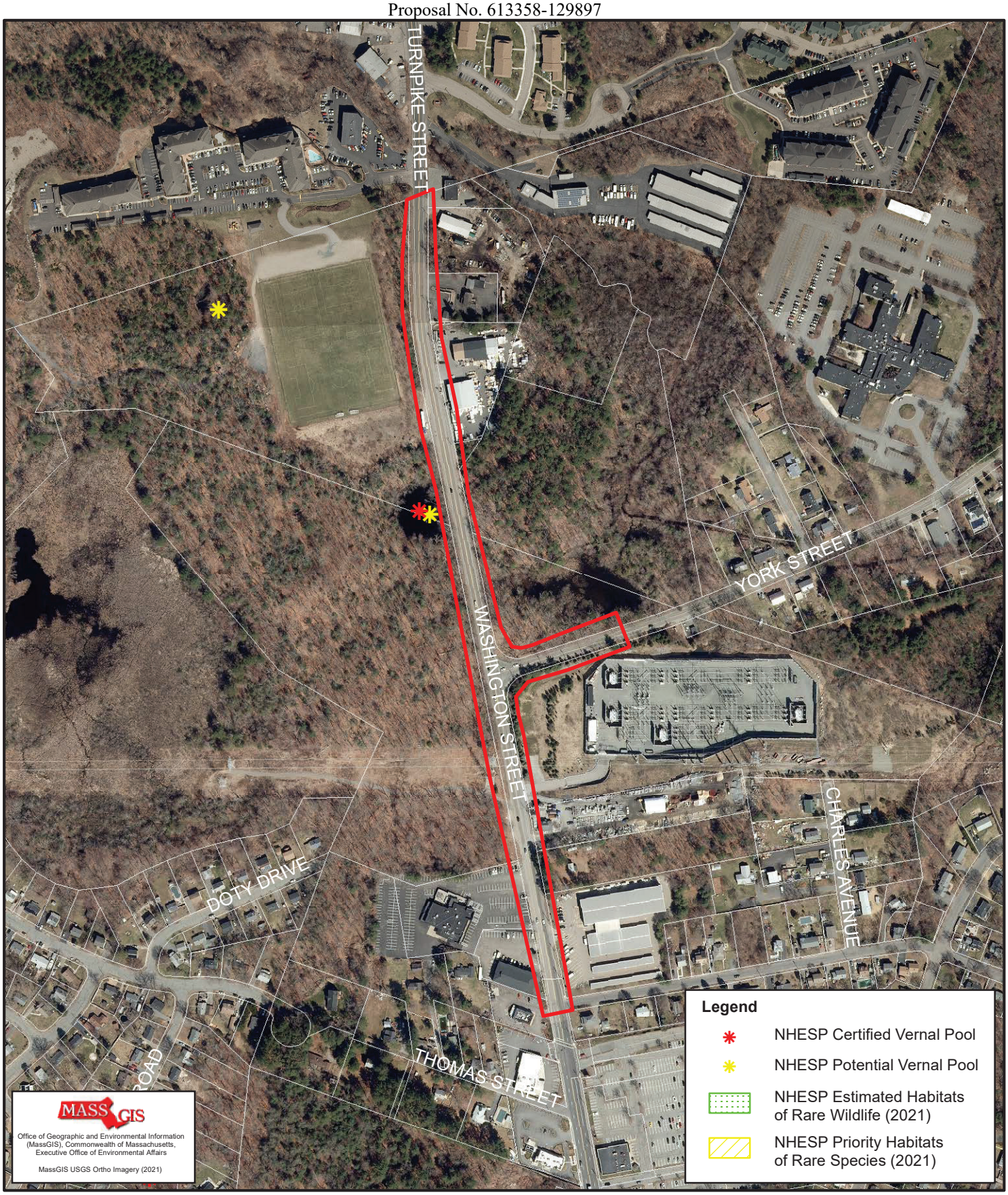


LEC
Environmental Consultants, Inc.
Wakefield, MA
781.245.2500
www.lecenvironmental.com

Figure 1: USGS Topographic Map
Washington Street (Route 138) Corridor Improvements
Stoughton, MA

December 15, 2022

N
0 500 1,000 Feet



LEC
Environmental Consultants, Inc.
Wakefield, MA
781.245.2500
www.lecenvironmental.com

Figure 2: MassGIS Orthophoto & NHESP Map
Washington Street (Route 138) Corridor Improvements
Stoughton, MA

December 15, 2022

N
0 200 400 Feet

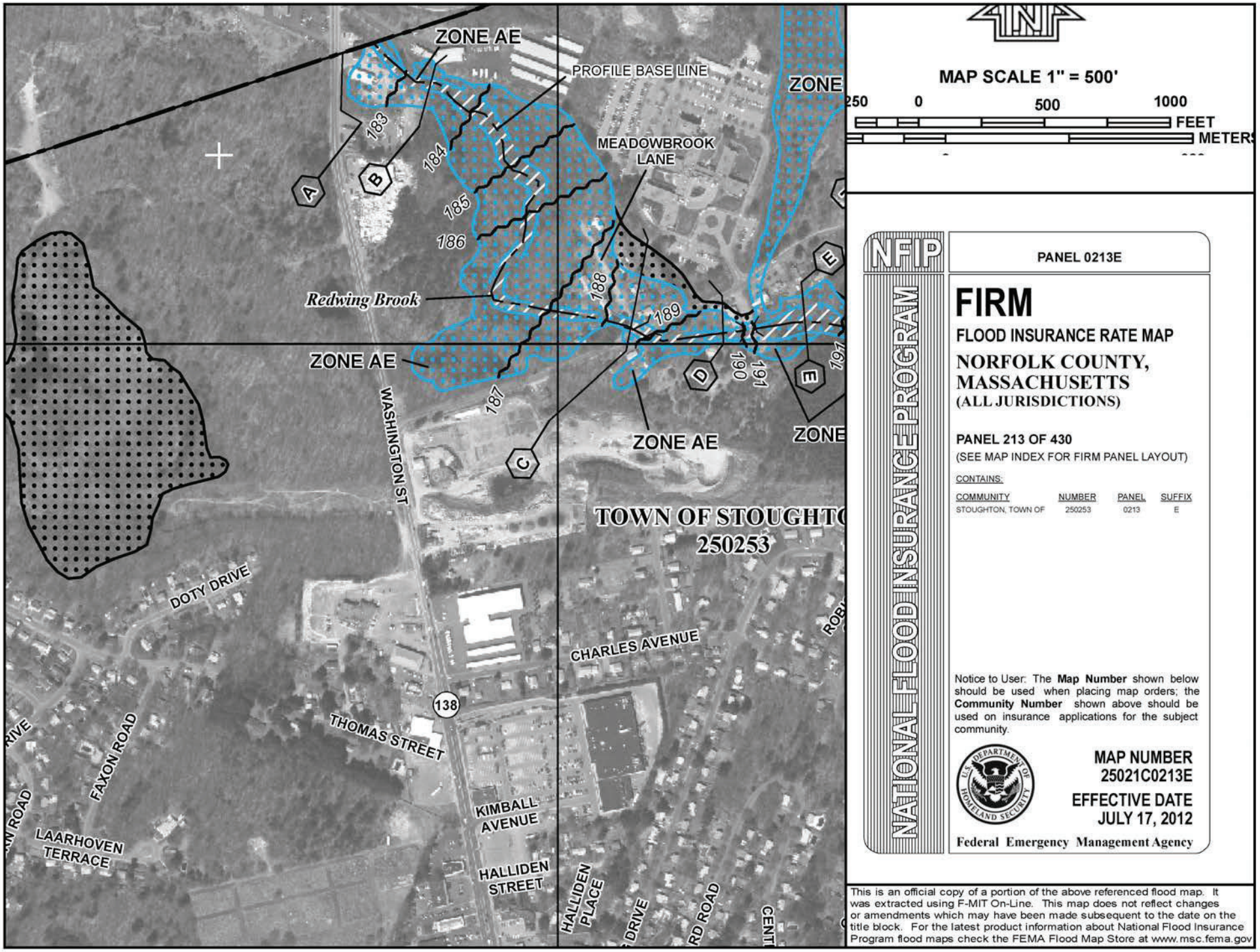


Figure 3A: FEMA Flood Insurance Rate Map

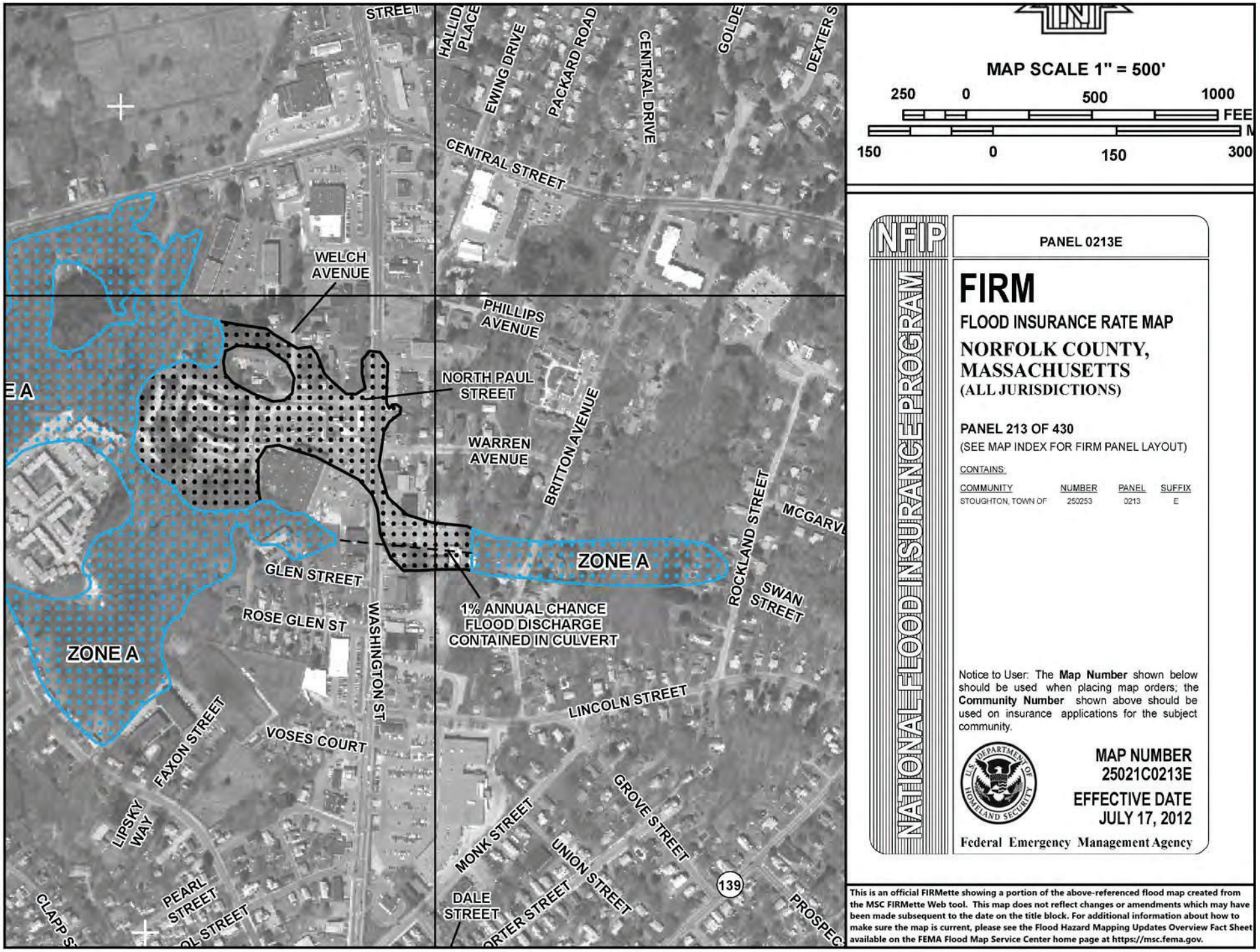


Figure 3B: FEMA Flood Insurance Rate Map

Appendix B

MassDEP Bordering Vegetated Wetland Delineation Field Data Forms

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: MassDOT Prepared by: LEC Environmental Consultants Project location: Washington Street, Stoughton DEP File #:_____
LEC Project #:NEI\17-144.04

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: 2 (upland)		Transect Number: 1 (W-21)	Date of Delineation: 11/30/2017
A. Sample Layer & 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 oak (*Quercus rubra*)	38.0%	64%	Yes	FacU-
Ash (*Fraxinus* sp.)	10.5%	18%	No	
Norway maple (*Acer platanoides*)	10.5%	18%	No	
Shrubs				
Northern arrowwood (*Viburnum dentatum*)	10.5%	78%	Yes	*FacW
Black cherry (*Prunus serotina*)	3.0%	22%	Yes	FacU
Groundcover				
Christmas fern (*Polystichum acrostichoides*)	3.0%	50%	Yes	FacU-
Marginal wood fern (*Dryopteris marginalis*)	3.0%	50%	Yes	FacU-

* *Use an asterisk to mark wetland 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:

Number of dominant wetland indicator plants: 1 Number of dominant non-wetland indicator plants: 4

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? 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

1. Soil Survey

Is there a published soil survey for this site? (yes) no
title/date: Soil Survey of Norfolk and Suffolk County, MA, Version 12, September 15, 2016
map number: Web Soil Survey
soil type mapped: Hinckley loamy sand, 8 to 35 percent slopes
hydric soil inclusions: none

Are field observations consistent with soil survey? (yes) no
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
A	0”-5”	10YR 3/2 loamy sand	
Bw	5”-19”	10YR 5/6 loamy sand	

Remarks:

3. Other:

Conclusion: Is soil hydric? yes (no)

Other Indicators of Hydrology: (check all that apply & 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 (streams, lake, or tidal gauge; aerial photo; other):
  _____
  _____
  _____
- ❑ Other: _____

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants		X
Wetland hydrology present:		
Hydric soil present		X
Other indicators of hydrology present		X
Sample location is in a BVW		X

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: MassDOT Prepared by: LEC Environmental Consultants Project location: Washington Street, Stoughton DEP File #:_____
LEC Project #:NEI\17-144.04

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: 1 (wetland)		Transect Number: 1 (W-21)	Date of Delineation: 11/30/2017
A. Sample Layer & 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				
Ash (*Fraxinus* sp)	10.5%	44%	Yes	*listed in WPA
Red maple (*Acer rubrum*)	10.5%	44%	Yes	*Fac
Red oak (*Quercus rubra*)	3.0%	12%	No	
Shrubs				
Northern arrowwood (*Viburnum dentatum*)	20.5%	55%	Yes	*FacW
Red maple (*Acer rubrum*)	10.5%	28%	Yes	*Fac
White pine (*Pinus strobus*)	3.0%	8%	No	
Black cherry (*Prunus serotina*)	3.0%	8%	No	
Groundcover				
Marsh fern (*Thelypterus palustris*)	3.0%	100%	Yes	*FacW+

* *Use an asterisk to mark wetland 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:

Number of dominant wetland indicator plants: 5 Number of dominant non-wetland indicator plants: 0

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? (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

1. Soil Survey

Is there a published soil survey for this site? (yes) no
title/date: Soil Survey of Norfolk and Suffolk County, MA, Version 12, September 15, 2016
map number: Web Soil Survey
soil type mapped: Swansea muck, 0 to 1 percent slopes
hydric soil inclusions:

Are field observations consistent with soil survey? (yes) no
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
A	0”-9”	10YR 2/1 mucky gravelly sandy loam	
Bw	9”-15”	2.5Y 4/1 gravelly sand	10YR 5/6

Remarks:

3. Other:

Conclusion: Is soil hydric? (yes) no

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: portions of the wetland are inundated
- ☑ Depth to free water in observation hole: 4 inches
- ☑ Depth to soil saturation in observation hole: at surface
- ❑ Water marks: _____
- ❑ Drift lines: _____
- ❑ Sediment Deposits: _____
- ☑ Drainage patterns in BVW: _____
- ❑ Oxidized rhizospheres: _____
- ❑ Water-stained leaves: _____
- ❑ Recorded Data (streams, lake, or tidal gauge; aerial photo; other):
  _____
  _____
  _____
- ❑ Other: _____

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	X	
Wetland hydrology present:		
Hydric soil present	X	
Other indicators of hydrology present	X	
Sample location is in a BVW	X	

Submit this form with the Request for Determination of Applicability or Notice of Intent.

Appendix C

Corridor Improvements on Washington Street (Route 138), October 21, 2022 (11x17)

Alternatives Analysis (11x17)

Critical Section – Station 23+50-Proposed Design

Critical Section – Station 23+50-Alternative Design

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

PLAN AND PROFILE OF

CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)

IN THE TOWN OF

STOUGHTON

NORFOLK COUNTY

FEDERAL AID PROJECT NO.

NOTICE OF INTENT
NOT FOR CONSTRUCTION

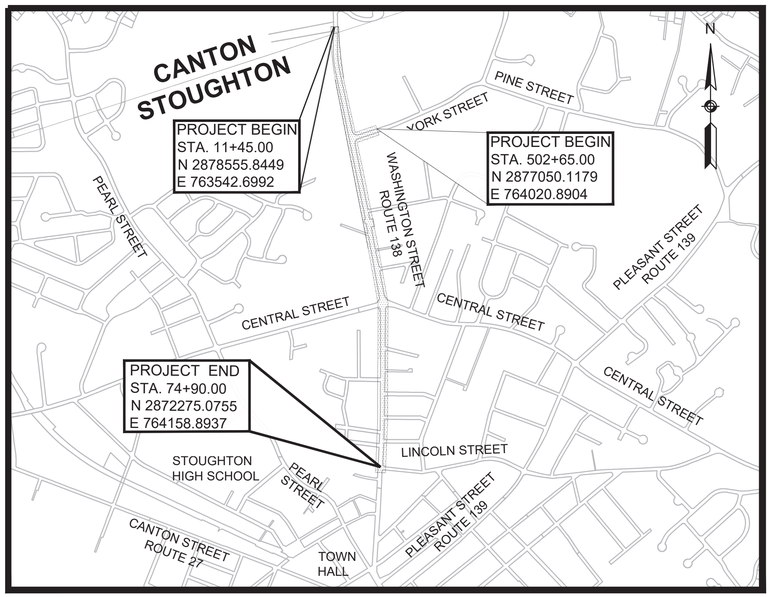
STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	12
PROJECT FILE NO.	607403		

TITLE SHEET & INDEX

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.

INDEX



0 1,000 2,000 3,000 4,000

SCALE: 1" = 1,000'

LENGTH OF PROJECT = 6,345.00 FEET = 1.202 MILES

DESIGN DESIGNATION (WASHINGTON STREET (ROUTE 138))

DESIGN SPEED	40/50 MPH
ADT (2017)	23,394
ADT (2027)	25,842
K	7.5%
D	52% NB
T (PEAK HOUR)	4.6%
T (AVERAGE DAY)	3.8%
DHV	1,940
DDHV	1,331
FUNCTIONAL CLASSIFICATION	URBAN PRINCIPAL ARTERIAL

DESIGN DESIGNATION (YORK STREET)

DESIGN SPEED	30 MPH
ADT (2017)	5,229
ADT (2027)	5,776
K	8.8%
D	50% WB
T (PEAK HOUR)	4.7%
T (AVERAGE DAY)	3.0%
DHV	506
DDHV	324
FUNCTIONAL CLASSIFICATION	URBAN COLLECTOR

Nitsch Engineering
www.nitscheng.com
2 Center Plaza, Suite 430
Boston, MA 02108
T: (617) 338-0063
F: (617) 338-6472
- Civil Engineering
- Land Surveying
- Transportation Engineering
- Structural Engineering
- Senior Infrastructure Planning
- GIS

DATE	DESCRIPTION	REV #
10/21/22	NOI SUBMISSION	

NITSCH PROJECT # 9720.16

COMMONWEALTH OF MASSACHUSETTS
MATTHEW J. SOLTYS
CIVIL
No. 53326
REGISTERED PROFESSIONAL ENGINEER

10-21-2022

massDOT
Massachusetts Department of Transportation
Highway Division

APPROVED

CHIEF ENGINEER **DATE**

HIGHWAY GUARD DETAILS

GUARDRAIL TANGENT END TREATMENT, TL-3 STA 13+20.07 LT TO STA 13+70.07 LT
GUARDRAIL, TL-3 (SINGLE FACED) STA 13+70.07 LT TO STA 14+77.08 LT
GUARDRAIL - CURVED, TL-3 (SINGLE FACED) STA 14+77.08 LT TO STA 14+87.07 LT
TRAILING ANCHORAGE STA 14+87.07 LT

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 91

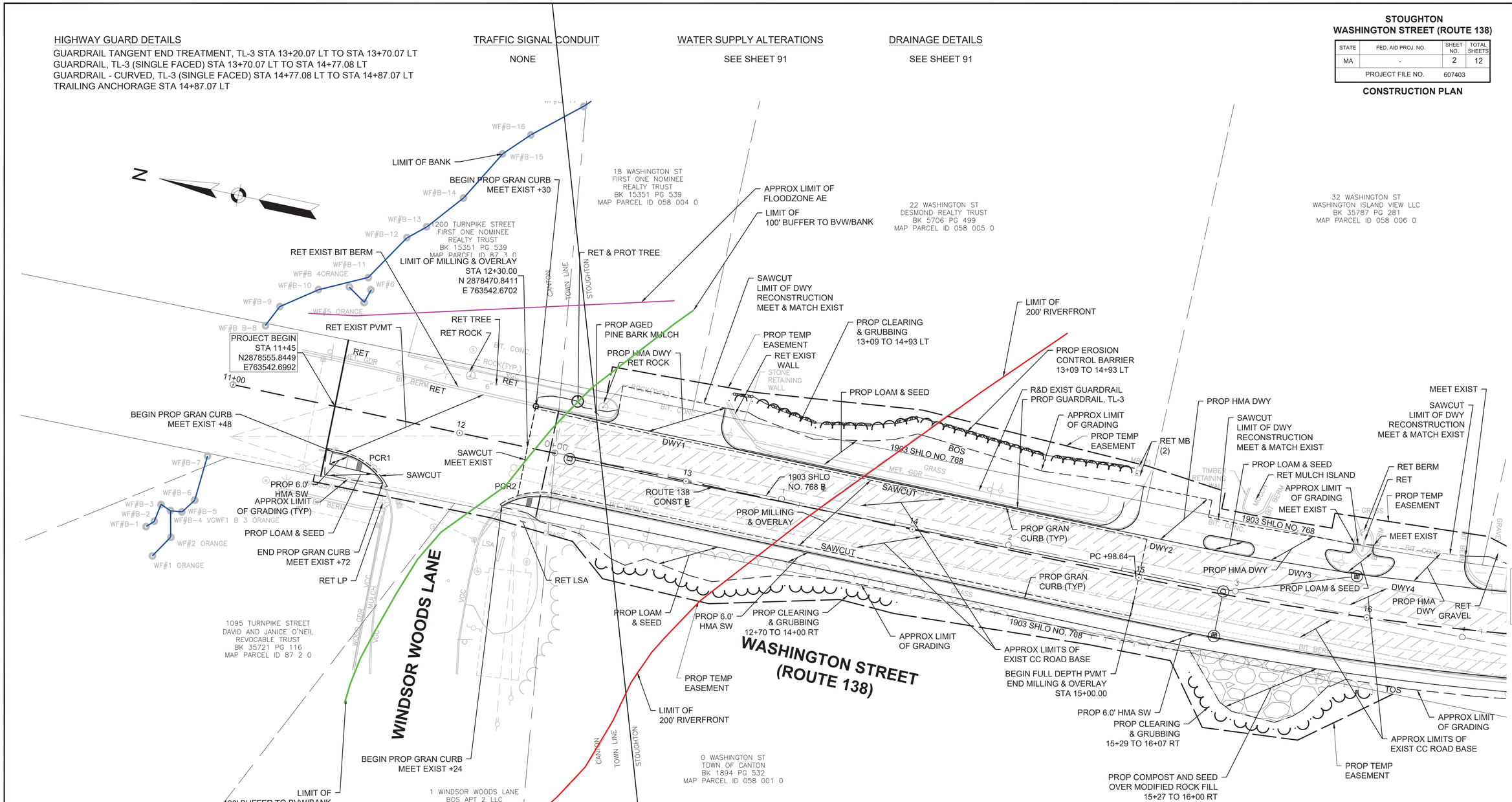
DRAINAGE DETAILS

SEE SHEET 91

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	12
PROJECT FILE NO.		607403	

CONSTRUCTION PLAN



FOR PROFILE SEE SHEET 41

0 20 50 100
SCALE: 1" = 20'

MASTER PLANT SCHEDULE				
QUANTITY	SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE
DECIDOUS TREES				
1	LA	TILIA AMERICANA REDMOND	REDMOND LINDEN	2-2.5" CAL, SINGLE TRUNK
1	AR	ACER RUBRUM 'OCTOBER GLORY'	OCTOBER GLORY RED MAPLE	2-2.5" CAL, SINGLE TRUNK
12	AL	AMELANCHIER LAEVIS	TREE FORM SHADE	2-2.5" CAL, SINGLE TRUNK
11	PSC	PRUNUS SARGENTII COLUMNARIS	COLUMNAR SARGENT CHERRY	2-2.5" CAL, SINGLE TRUNK
260	HS	HELICTOTRICON SEMPERVIRENS	BLUE OAT GRASS	1 GALLON

PRIOR TO PLANTING:
1. TREE LOCATIONS ON THE PLANS ARE SCHEMATIC. ACTUAL LOCATIONS MAY BE ADJUSTED IN THE FIELD. ALL LOCATIONS SHALL BE STAKED OUT AND APPROVED BY MASSDOT LANDSCAPE ARCHITECT AND TOWN OF STOUGHTON REPRESENTATIVE.
2. WHERE APPLICABLE, THE TOWN SHALL COORDINATE WITH PRIVATE PROPERTY OWNERS FOR RIGHT OF ACCESS PERMIT AND SIGNED ACKNOWLEDGEMENT OF PUBLIC SHADE TREES PLANTED ON PRIVATE LAND.

CONTINUED ON SHEET NO. 29

HIGHWAY GUARD DETAILS

GUARDRAIL, TL-3 (SINGLE FACED) STA 13+70.07 LT TO STA 14+77.08 LT
GUARDRAIL - CURVED, TL-3 (SINGLE FACED) STA 14+77.08 LT TO STA 14+87.07 LT
TRAILING ANCHORAGE STA 14+87.07 LT

PERMANENT IMPACT ATTENUATOR, REDIRECTIVE, TL3 20+06.25 RT TO 20+36.25 RT
PERMANENT CONCRETE BARRIER - SINGLE FACED (F TYPE) 20+36.25 RT TO 21+46.22 RT

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 91

DRAINAGE DETAILS

SEE SHEET 91

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	12
PROJECT FILE NO.	607403		

CONSTRUCTION PLAN

WASHINGTON STREET (ROUTE 138)

32 WASHINGTON ST
WASHINGTON ISLAND VIEW LLC
BK 35787 PG 281
MAP PARCEL ID 058 006 0

50 WASHINGTON ST
SALT ISLAND REALTY LLC
BK 32527 PG 325
MAP PARCEL ID 058 008 0

TOWN OF STOUGHTON
MAP PARCEL ID 058 009 0

0 WASHINGTON ST
TOWN OF CANTON
BK 1894 PG 532
MAP PARCEL ID 058 001 0

LIMIT OF 200' RIVERFRONT
PROP EROSION CONTROL BARRIER 13+09 TO 14+93 LT
R&D EXIST GUARDRAIL
PROP GUARDRAIL, TL-3
APPROX LIMIT OF GRADING
PROP TEMP EASEMENT
RET MB
PROP HMA DWY
SAWCUT LIMIT OF DWY RECONSTRUCTION MEET & MATCH EXIST
PROP LOAM & SEED
RET MULCH ISLAND
APPROX LIMIT OF GRADING
MEET EXIST
RET BERM
RET
PROP TEMP EASEMENT
MEET EXIST
RET FENCE
RET
PROP LOAM & SEED
APPROX LIMIT OF GRADING
RET MAILBOX & TIMBER
RET PAD
RET TIMBER
RET GRAVEL
RET POST
PROP HMA DWY
MEET EXIST
RET
SAWCUT LIMIT OF DWY RECONSTRUCTION MEET & MATCH EXIST
PROP TEMP EASEMENT
MEET EXIST
APPROX LIMIT OF GRADING
END FULL DEPTH PVMT
BEGIN MILLING & OVERLAY
STA 20+75.00
RET FENCE
APPROX LIMIT OF EXIST CC ROAD BASE
RET FENCE
PUE
PROP LOAM & SEED
1903 SHLO NO. 768
BOS
PROP GRAN CURB (TYP)
PC +98.64
DWY2
DWY3
DWY4
PROP HMA DWY
PROP LOAM & SEED
PROP HMA DWY
RET GRAVEL
PROP FULL DEPTH PVMT
1903 SHLO NO. 768 ℄
PT +85.64
DWY5
PROP GRAN CURB (TYP)
PROP GRAN CURB (TYP)
ROUTE 138 CONST ℄
DWY6
END PROP GRAN CURB +06
ROUTE 138 CONST ℄
1903 SHLO NO. 768 ℄
PROP HMA SW (4' MIN CLEAR)
PROP 6.0' HMA SW
DWY7
1903 SHLO NO. 768
APPROX LIMITS OF EXIST CC ROAD BASE
BEGIN FULL DEPTH PVMT
END MILLING & OVERLAY
STA 15+00.00
PROP 6.0' HMA SW
PROP CLEARING & GRUBBING 15+29 TO 16+07 RT
PROP COMPOST AND SEED OVER MODIFIED ROCK FILL 15+27 TO 16+00 RT
PROP TEMP EASEMENT
R&D EXIST CC ROAD BASE
APPROX LIMIT OF GRADING
1903 SHLO NO. 768
TOS
R&D
PROP 6.0' HMA SW
APPROX LIMIT OF GRADING
PROP LOAM & SEED
PROP HMA DWY
LIMIT OF DWY RECONSTRUCTION MEET & MATCH EXIST
PROP TEMP EASEMENT
PROP LOAM & SEED
PROP HMA DWY
TOS
APPROX LIMIT OF GRADING
PROP TEMP EASEMENT
PROP CLEARING & GRUBBING 20+32 TO 29+71 RT
LIMIT OF DWY RECONSTRUCTION MEET & MATCH EXIST
PROP F TYPE BARRIER
LIMIT OF 100' BUFFER TO BVW
1903 SHLO NO. 768
BIT. PVMT
+35.81
PI

CONTINUED ON SHEET NO. 24
CONTINUED ON SHEET NO. 26

FOR PROFILE SEE SHEET 37

0 20 50 100
SCALE: 1" = 20'

HIGHWAY GUARD DETAILS

PERMANENT IMPACT ATTENUATOR, REDIRECTIVE, TL-3 20+01.22 RT TO 20+31.22 RT
PERMANENT CONCRETE BARRIER - SINGLE FACED (F TYPE) 20+31.22 RT TO 21+51.22 RT
TRANSITION TO RIGID BARRIER (SINGLE FACED W/ RUB RAIL) 21+51.22 RT TO 21+63.72 RT
GUARDRAIL, TL-3 (SINGLE FACED W/ RUB RAIL) STA 21+63.72 RT TO STA 24+81.67 RT
TRAILING ANCHORAGE STA 24+81.67 RT STA 24+91.00 RT

TRAILING ANCHORAGE STA 21+80.42 LT TO STA 21+89.80 LT
GUARDRAIL, TL-3 (SINGLE FACED) STA 21+89.80 LT TO STA 26+32.47 LT
GUARDRAIL TANGENT END TREATMENT, TL-3 STA 26+32.47 TO 26+82.47 LT

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 93

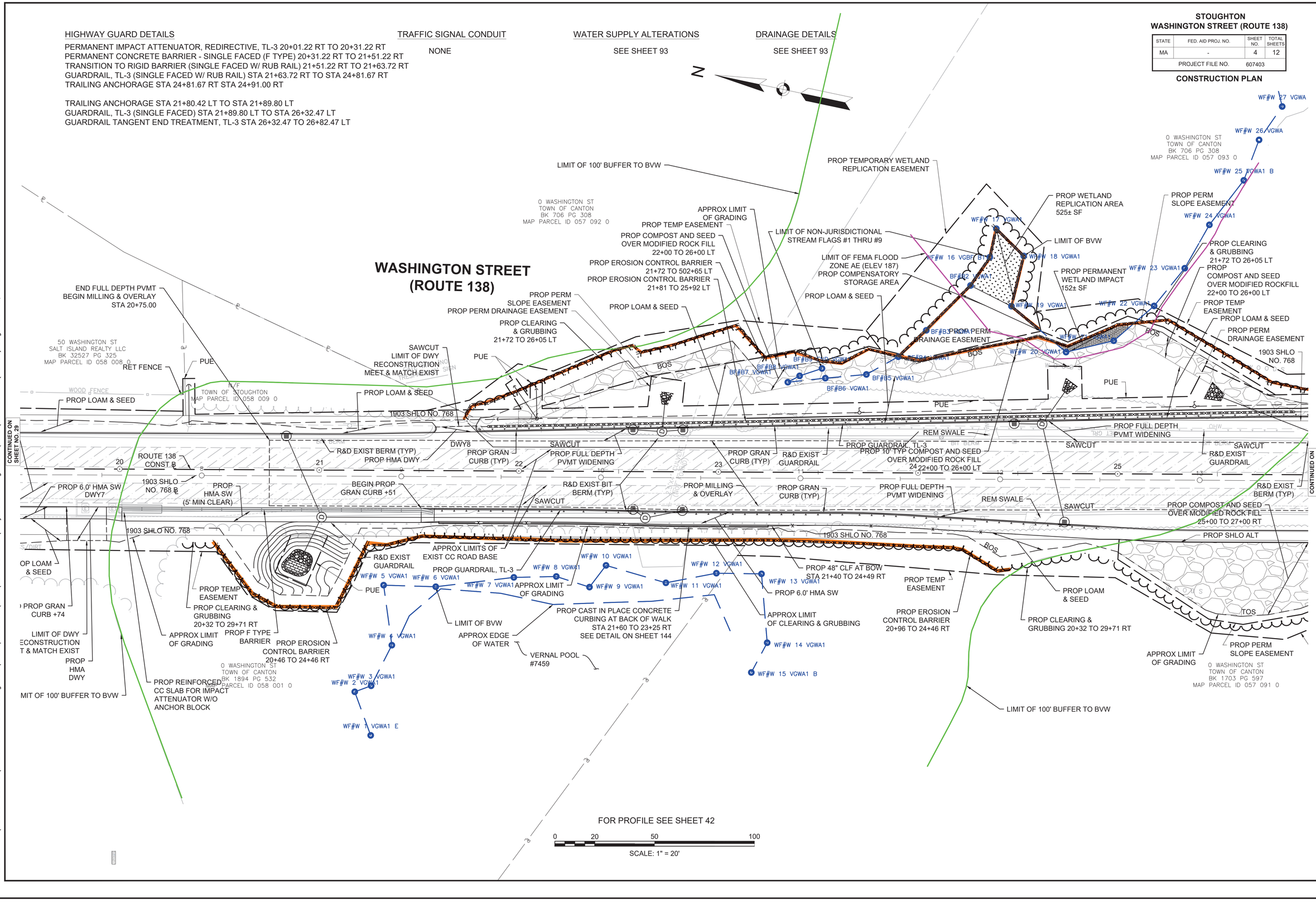
DRAINAGE DETAILS

SEE SHEET 93

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	4	12
PROJECT FILE NO.	607403		

CONSTRUCTION PLAN



STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	5	12
PROJECT FILE NO.	607403		

CONSTRUCTION PLAN

TRAFFIC SIGNAL CONDUIT

SEE SHEET 121

WATER SUPPLY ALTERATIONS

SEE SHEET 94

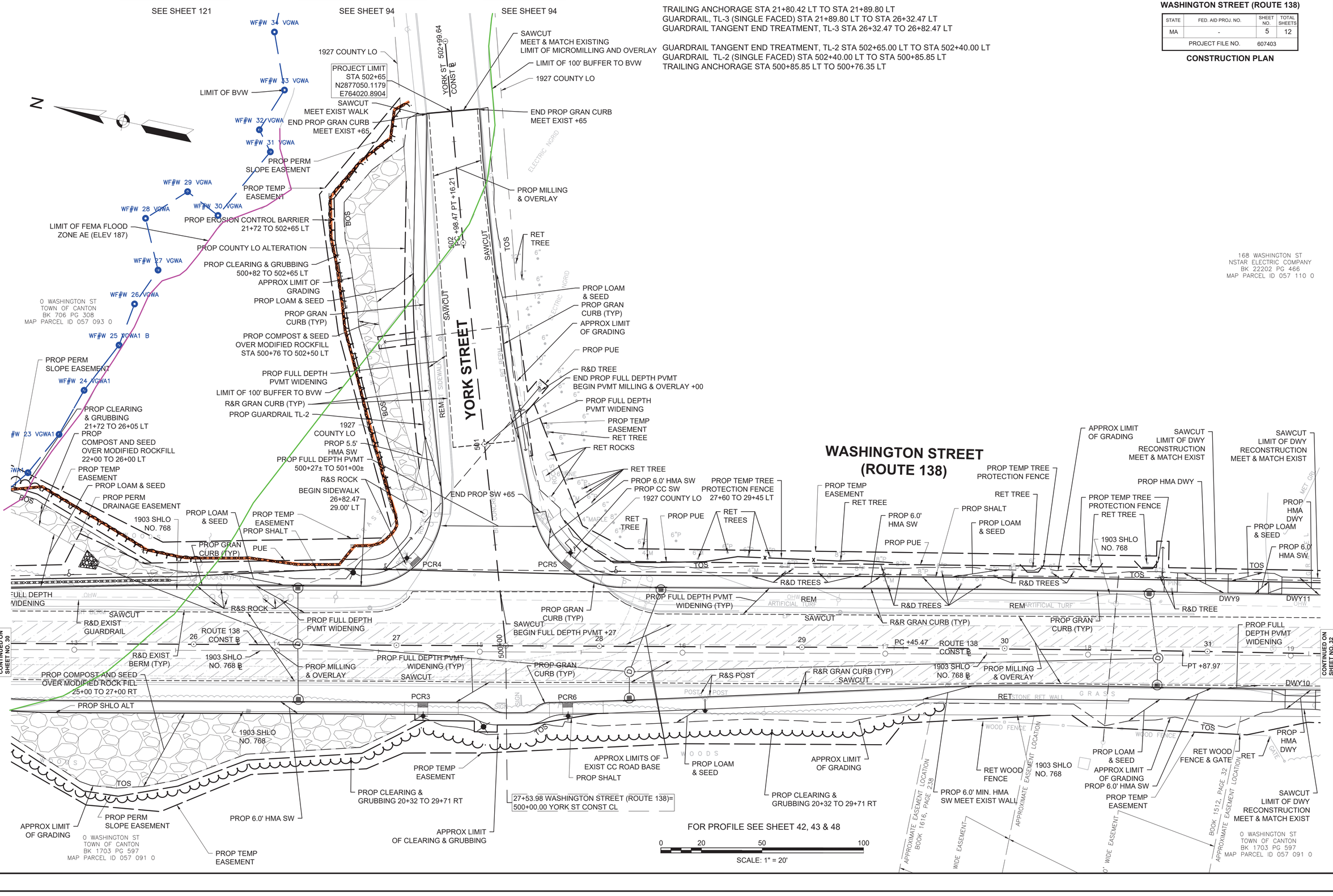
DRAINAGE DETAILS

SEE SHEET 94

HIGHWAY GUARD DETAILS

TRAILING ANCHORAGE STA 21+80.42 LT TO STA 21+89.80 LT
GUARDRAIL, TL-3 (SINGLE FACED) STA 21+89.80 LT TO STA 26+32.47 LT
GUARDRAIL TANGENT END TREATMENT, TL-3 STA 26+32.47 TO 26+82.47 LT

GUARDRAIL TANGENT END TREATMENT, TL-2 STA 502+65.00 LT TO STA 502+40.00 LT
GUARDRAIL TL-2 (SINGLE FACED) STA 502+40.00 LT TO STA 500+85.85 LT
TRAILING ANCHORAGE STA 500+85.85 LT TO 500+76.35 LT



UTILITY NOTES:

1. FOR ALL POLES THAT ARE IN OR ADJACENT TO SIDEWALKS, THE GRAVEL MUST BE PLACED AND COMPACTED WITHIN 5-FEET OF THE POLE WITHIN 2 HOURS OF EXCAVATION.
2. ALL POLES WITHIN SIDEWALKS MUST BE WRAPPED WITH AN APPROVED EXPANSION MATERIAL TO AVOID POLE MOVEMENT FROM CRACKING THE SIDEWALK.
3. ANY POLE HOLDS REQUIRED TO ACCOMODATE THE CONTRACTOR'S ACTIVITIES, SUCH AS BUT NOT LIMITED TO: WATER, SEWER AND DRAINAGE WORK, WILL NEED TO BE COORDINATED BY THE CONTRACTOR AND PAID FOR AT THEIR EXPENSE. THE CONTRACTOR WILL NEED TO COORDINATE WITH VERIZON ON ANY POLES HOLDS BY INITIATING AN ENGINEERING WORK ORDER BY CALLING 774-409-3160. THE CONTRACTOR IS REQUIRED TO SCHEDULE THE POLE HOLDS IN ADVANCE OF PERFORMING THE WORK NEAR THE POLES.
4. AT LOCATIONS WHERE AN EXISTING MANHOLE, HANDHOLE, OR OTHER SURFACE TYPE STRUCTURE THAT CANNOT BE REMOVED OR RESET WITHIN THE PROPOSED OR EXISTING ACCESSIBLE SURFACE, THE STRUCTURE SHALL BE ADJUSTED SUCH THAT THE TOPMOST SURFACE OF THE STRUCTURE COVER IS FLUSH WITH THE ACCESSIBLE SURFACE.

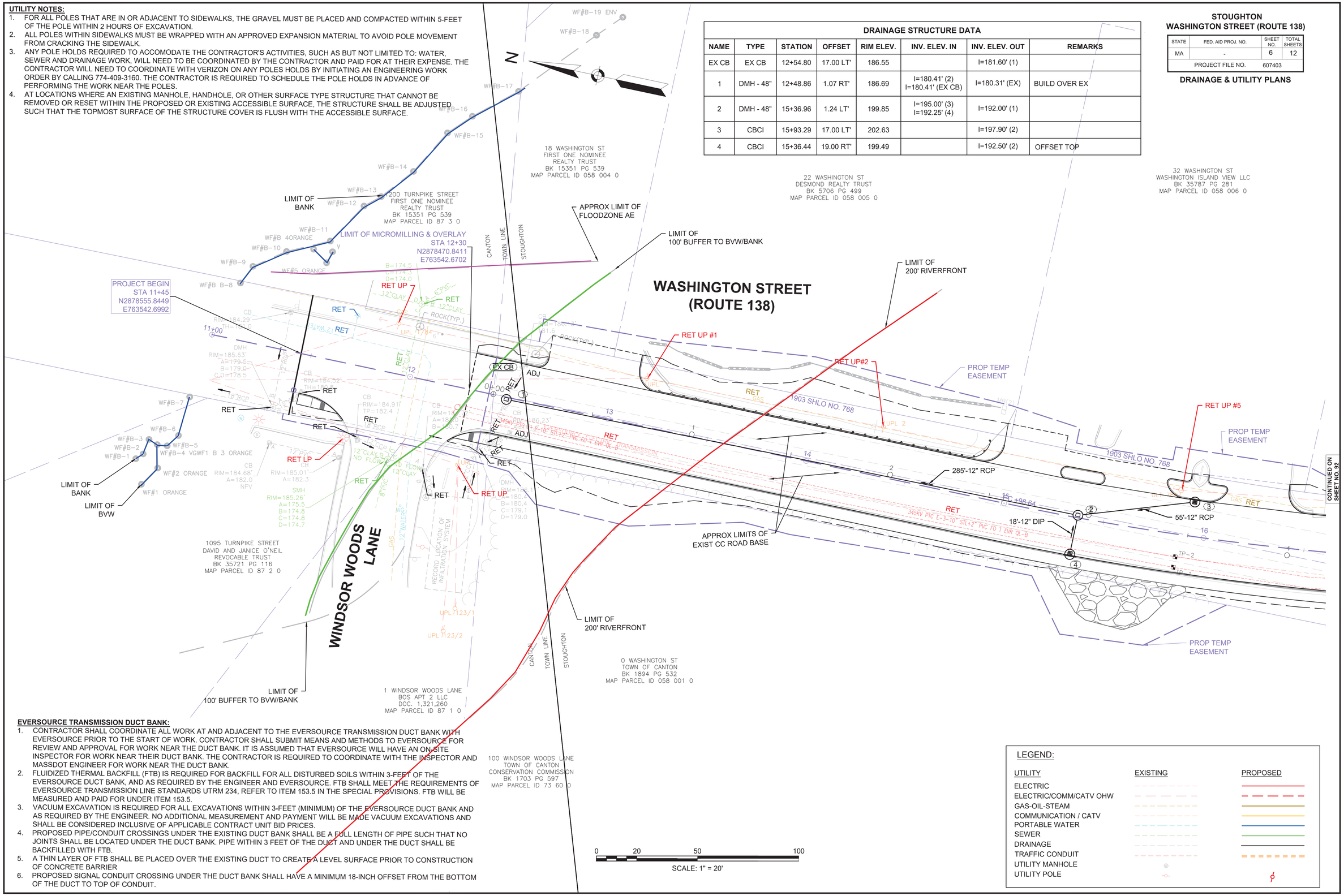
DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
EX CB	EX CB	12+54.80	17.00 LT'	186.55		I=181.60' (1)	
1	DMH - 48"	12+48.86	1.07 RT'	186.69	I=180.41' (2) I=180.41' (EX CB)	I=180.31' (EX)	BUILD OVER EX
2	DMH - 48"	15+36.96	1.24 LT'	199.85	I=195.00' (3) I=192.25' (4)	I=192.00' (1)	
3	CBCI	15+93.29	17.00 LT'	202.63		I=197.90' (2)	
4	CBCI	15+36.44	19.00 RT'	199.49		I=192.50' (2)	OFFSET TOP

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	12
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS



EVERSOURCE TRANSMISSION DUCT BANK:

1. CONTRACTOR SHALL COORDINATE ALL WORK AT AND ADJACENT TO THE EVERSOURCE TRANSMISSION DUCT BANK WITH EVERSOURCE PRIOR TO THE START OF WORK. CONTRACTOR SHALL SUBMIT MEANS AND METHODS TO EVERSOURCE FOR REVIEW AND APPROVAL FOR WORK NEAR THE DUCT BANK. IT IS ASSUMED THAT EVERSOURCE WILL HAVE AN ON-SITE INSPECTOR FOR WORK NEAR THEIR DUCT BANK. THE CONTRACTOR IS REQUIRED TO COORDINATE WITH THE INSPECTOR AND MASSDOT ENGINEER FOR WORK NEAR THE DUCT BANK.
2. FLUIDIZED THERMAL BACKFILL (FTB) IS REQUIRED FOR BACKFILL FOR ALL DISTURBED SOILS WITHIN 3-FEET OF THE EVERSOURCE DUCT BANK, AND AS REQUIRED BY THE ENGINEER AND EVERSOURCE. FTB SHALL MEET THE REQUIREMENTS OF EVERSOURCE TRANSMISSION LINE STANDARDS UTRM 234, REFER TO ITEM 153.5 IN THE SPECIAL PROVISIONS. FTB WILL BE MEASURED AND PAID FOR UNDER ITEM 153.5.
3. VACUUM EXCAVATION IS REQUIRED FOR ALL EXCAVATIONS WITHIN 3-FEET (MINIMUM) OF THE EVERSOURCE DUCT BANK AND AS REQUIRED BY THE ENGINEER. NO ADDITIONAL MEASUREMENT AND PAYMENT WILL BE MADE VACUUM EXCAVATIONS AND SHALL BE CONSIDERED INCLUSIVE OF APPLICABLE CONTRACT UNIT BID PRICES.
4. PROPOSED PIPE/CONDUIT CROSSINGS UNDER THE EXISTING DUCT BANK SHALL BE A FULL LENGTH OF PIPE SUCH THAT NO JOINTS SHALL BE LOCATED UNDER THE DUCT BANK. PIPE WITHIN 3 FEET OF THE DUCT AND UNDER THE DUCT SHALL BE BACKFILLED WITH FTB.
5. A THIN LAYER OF FTB SHALL BE PLACED OVER THE EXISTING DUCT TO CREATE A LEVEL SURFACE PRIOR TO CONSTRUCTION OF CONCRETE BARRIER
6. PROPOSED SIGNAL CONDUIT CROSSING UNDER THE DUCT BANK SHALL HAVE A MINIMUM 18-INCH OFFSET FROM THE BOTTOM OF THE DUCT TO TOP OF CONDUIT.

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	12
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS

DRAINAGE STRUCTURE DATA							
NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
2	DMH - 48"	15+36.96	1.24 LT'	199.85	I=195.00' (3) I=192.25' (4)	I=192.00' (1)	
3	CBCI	15+93.29	17.00 LT'	202.63		I=197.90' (2)	
4	CBCI	15+36.47	19.00 RT'	199.49		I=192.50' (2)	

WASHINGTON STREET (ROUTE 138)

32 WASHINGTON ST
WASHINGTON ISLAND VIEW LLC
BK 35787 PG 281
MAP PARCEL ID 058 006 0

50 WASHINGTON ST
SALT ISLAND REALTY LLC
BK 32527 PG 325
MAP PARCEL ID 058 008 0

N/F
TOWN OF STOUGHTON
MAP PARCEL ID 058 009 0

0 WASHINGTON ST
TOWN OF CANTON
BK 1894 PG 532
MAP PARCEL ID 058 001 0

LIMIT OF
200' RIVERFRONT

PROP TEMP EASEMENT

RET UP #5

PROP TEMP EASEMENT

1903 SHLO NO. 768

285'-12" RCP

55'-12" RCP

18'-12" DIP

RET UP #6

RET UP #7

RET UPL #8 W/ PROP 20' PUSH BRACE (BO)

PUE

ADJ/REMOD EMH (2) FRAME & COVER TO FINISHED GRADE (BO)

EVERSOURCE ELECTRIC TRANSMISSION
345KV PTC E-3-10" STL+2" PVC FO T EVR QL-B

RET UP #6-84

APPROX LIMITS OF EXIST CC ROAD BASE

PROP TEMP EASEMENT

CONTINUED ON SHEET NO. 90

CONTINUED ON SHEET NO. 92

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

0 20 50 100
SCALE: 1" = 20'

Nitsch – P:\08000-09999\9720.16 Rt138 Stoughton\Transportation\CAD\607403 CAD\Project Drawing Data\DWG\607403_HD(UTILITY).dwg Oct 17, 2022 11:01 AM

607403_HD(UTILITY).DWG Plotted on 17-Oct-2022 11:01 AM

DRAINAGE STRUCTURE DATA							
NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
6	CBCI	20+83.45	17.00 LT'	206.43		I=200.11' (7)	PROP HOOD
7	DMH	21+01.29	23.58 RT'	205.84	I=197.61' (11) I=198.45' (6)	I=197.61' (8)	
8	FES	20+90.96	42.76 RT'		I=197.50' (7)		
9	CBCI	22+57.11	21.00 LT'	202.27		I=198.03' (12)	
10	CBCI-E	22+57.26	18.97 RT'	202.30		I=198.40' (11)	OFFSET TOP, PROP HOOD
11	DMH - 48"	22+63.44	243.26 RT'	202.71	I=198.36' (10) I=198.36' (13)	I=198.36' (7)	
12	DMH	22+71.62	20.15 LT'	202.25	I=197.93' (9) I=197.93' (14)	I=197.93' (15)	
13	CBCI-E	22+82.19	19.00 RT'	202.26		I=198.50' (11)	OFFSET TOP, PROP HOOD
14	CBCI	22+82.10	21.00 LT'	202.23		I=198.03' (12)	
15	FES	22+72.95	33.74 LT'		I=197.86' (12)		
16	CBCI	24+48.09	25.00 LT'	205.98		I=201.53' (18)	
17	CBCI	24+73.48	24.31 RT'	207.18		I=201.03' (18)	
18	DMH	24+62.08	24.78 LT'	206.63	I=200.78' (17) I=201.28' (16)	I=200.78' (19)	
19	FES	24+73.27	40.84 LT'		I=200.69' (18)		

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	8	11
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS

N

WASHINGTON STREET
(ROUTE 138)

0 WASHINGTON ST
TOWN OF CANTON
BK 706 PG 308
MAP PARCEL ID 057 092 0

0 WASHINGTON ST
TOWN OF CANTON
BK 706 PG 308
MAP PARCEL ID 057 093 0

50 WASHINGTON ST
SALT ISLAND REALTY LLC
BK 32527 PG 325
MAP PARCEL ID 058 008 0

N/F
TOWN OF STOUGHTON
MAP PARCEL ID 058 009 0

0 WASHINGTON ST
TOWN OF CANTON
BK 1894 PG 532
MAP PARCEL ID 058 001 0

0 WASHINGTON ST
TOWN OF CANTON
BK 1703 PG 597
MAP PARCEL ID 057 091 0

LIMIT OF NON-JURISDICTIONAL STREAM FLAGS #1 THRU #9
LIMIT OF BVW
PROP TEMPORARY WETLAND REPLICATION EASEMENT
PROP TEMP EASEMENT
PROP PERM SLOPE EASEMENT
PROP DRAINAGE EASEMENT
PROP TEMP EASEMENT
PROP SHALT
PUE
1903 SHLO NO. 768
APPROX LIMITS OF EXIST CC ROAD BASE
GATE WITH "NO TRESPASSING" SIGN
REM GPL (BO)
R&R 45' UP #9 W/15' GUY, 20' GUY & 20' PUSH BRACE (BO)
RET UPL #8 W/ PROP 20' PUSH BRACE (BO)
ADJ/REMOD EMH (2) FRAME & COVER TO FINISHED GRADE (BO)
PROP STONE FOR PIPE ENDS
PROP OHW (BO) (TYP)
R&R 45' UP #11 (BO)
R&R 45' UP #12 (BO)
RELOCATE 6" GAS MAIN (BO)
PROP SEDIMENT FOREBAY BOTTOM ELEV 197.50 SEE DETAIL
EDGE OF RIPRAP ELEV 199
VERNAL POOL #7459
APPROX EDGE OF WATER
1902 RECORD LOCATION OF 2.5'X4' STONE CULVERT NOT FOUND - ASSUMED TO BE ABANDONED
P-SW FILL IS POURED AGAINST EXISTING CB STRUCTURE
REM EX CB
41'-12" DIP
48'-12" DIP
12'-12" RCP
11'-12" RCP
9'-12" RCP
10'-12" RCP
19'-12" RCP
159'-12" RCP
5'-12" RCP
16'-12" RCP
20'-15" RCP
INV 197.50
205
198
199
200
WF#W 27 VGWA
WF#W 26 VGWA
WF#W 25 VGWA1 B
WF#W 24 VGWA1
WF#W 23 VGWA1
WF#W 22 VGWA1
WF#W 21 VGWA1
WF#W 20 VGWA1
WF#W 19 VGWA1
WF#W 18 VGWA1
WF#W 17 VGWA1
WF#W 16 VCBF B1
BF#B2 VGWA1
BF#B3 VGWA1
BF#B4 VGWA1
BF#B5 VGWA1
BF#B6 VGWA1
BF#B7 VGWA1
BF#B8 VGWA1
BF#B9 END VGWA1
WF#W 15 VGWA1 B
WF#W 14 VGWA1
WF#W 13 VGWA1
WF#W 12 VGWA1
WF#W 11 VGWA1
WF#W 10 VGWA1
WF#W 9 VGWA1
WF#W 8 VGWA1
WF#W 7 VGWA1
WF#W 6 VGWA1
WF#W 5 VGWA1
WF#W 4 VGWA1
WF#W 3 VGWA1
WF#W 2 VGWA1
WF#W 1 VGWA1 E
345KV PTC E-3-10" STL+2" PVC FO T EVR QL-B
6"CS HP COLUMBIA GAS
6"CI WATER - ABAN.
12"DI WATER
TP-4
TP-5
TP-6
TP-7
TP-8

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

0 20 50 100
SCALE: 1" = 20'

CONTINUED ON SHEET NO. 92

CONTINUED ON SHEET NO. 92

Nitsch – P:\08000-09999\9720.16 Rt138 Stoughton\Transportation\CAD\607403 CAD\Project Drawing Data\DWG\607403_HD(UTILITY).dwg Dec 12, 2022 10:50 AM

607403_HD(UTILITY).DWG Plotted on 12-Dec-2022 10:50 AM

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9	12
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS

DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
20	CBCI	26+51.31	28.00 LT'	215.55		I=211.22' (22)	
21	CBCI	26+51.79	27.00 RT'	215.60		I=208.20' (22)	
22	DMH	26+51.41	0.45 LT'	216.11	I=208.00' (21) I=210.92' (20) I=211.00' (26)	I=207.95' (23)	
23	FES	25+52.37	38.48 LT'		I=207.43' (22)		
24	CBCI	28+28.72	28.00 LT'	224.39		I=219.46' (26)	
25	CBCI	28+15	25.53 RT'	223.92		I=219.51' (26)	
26	DMH - 48"	28+15.02	12.49 RT'	224.18	I=219.30' (25) I=219.14' (24) I=219.50' (29)	I=217.20' (22)	
27	CBCI	30+70.80	28.00 LT'	236.67		I=232.27' (29)	
28	CBCI	30+75.52	17.00 RT'	237.13		I=232.72' (29)	
29	DMH - 48"	30+75.71	3.72 RT'	237.40	I=232.59' (28) I=232.10' (27)	I=231.85' (26)	

N

0 WASHINGTON ST
TOWN OF CANTON
BK 706 PG 308
MAP PARCEL ID 057 093 0

168 WASHINGTON ST
NSTAR ELECTRIC COMPANY
BK 22202 PG 466
MAP PARCEL ID 057 110 0

0 WASHINGTON ST
TOWN OF CANTON
BK 1703 PG 597
MAP PARCEL ID 057 091 0

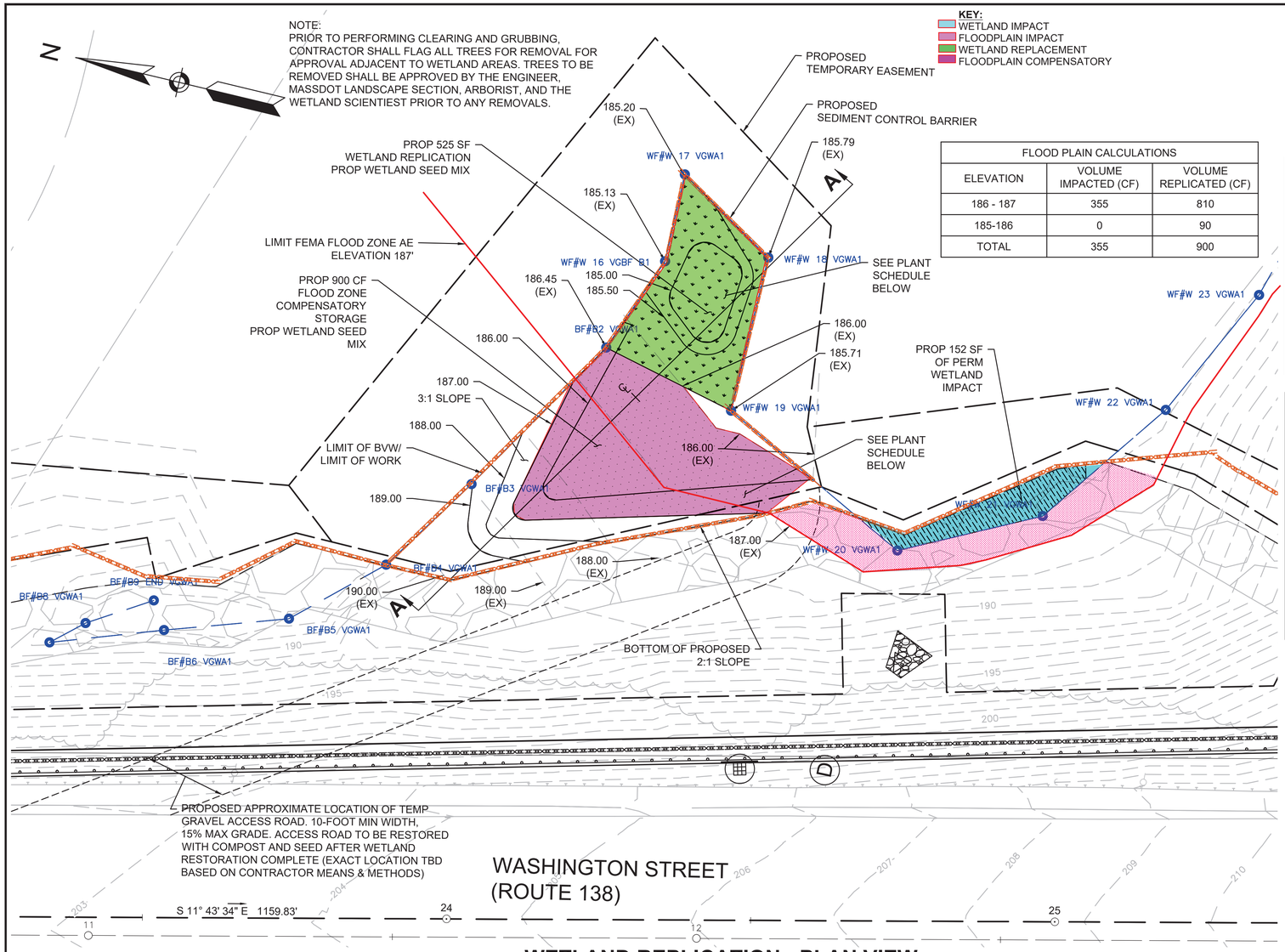
0 WASHINGTON ST
TOWN OF CANTON
BK 1703 PG 597
MAP PARCEL ID 057 091 0

1903 SHLO NO. 768

SCALE: 1" = 20'

CONTINUED ON SHEET NO. 93

CONTINUED ON SHEET NO. 95



FLOOD PLAIN CALCULATIONS		
ELEVATION	VOLUME IMPACTED (CF)	VOLUME REPLICATED (CF)
186 - 187	355	810
185-186	0	90
TOTAL	355	900

NOTE:
1.EXACT PLANT LOCATION TO BE WITHIN PROPOSED WETLAND REPLICATION OR BUFFER ZONE REPLICATION AREA. EXACT LOCATION TO BE FIELD MARKED AND APPROVED BY MASSDOT, WETLAND SPECIALIST, AND THE ENGINEER
2. SEED MIX, PLANTINGS, EXCAVATION, GRADING, AND COMPLETION OF THE WETLAND RESTORATION AND FLOODZONE COMPENSATORY AREAS SHALL BE INCLUDED UNDER ITEM 755.35 - WETLAND REPLICATION AREA.

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	10	12
PROJECT FILE NO.	607403		

WETLAND DETAILS

BUFFER ZONE/COMPENSATORY PLANT SCHEDULE			
QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
2	Quercus rubra	RED OAK	10-12' O.C., 3'-4'
2	Prunus serotina	BLACK CHERRY	10-12' O.C., 3'-4'
8	Viburnum lentago	NANNYBERRY	6' O.C. CLUSTERED, 2'-3'
8	Hamamelis virginiana	WITCH HAZEL	6' O.C. CLUSTERED, 2'-3'
8	Morella (Myrica) pensylvanica	BAYBERRY	6' O.C. CLUSTERED, 2'-3'
8	Clethra alnifolia	SWEET PEPPERBUSH	6' O.C. CLUSTERED, 2'-3'

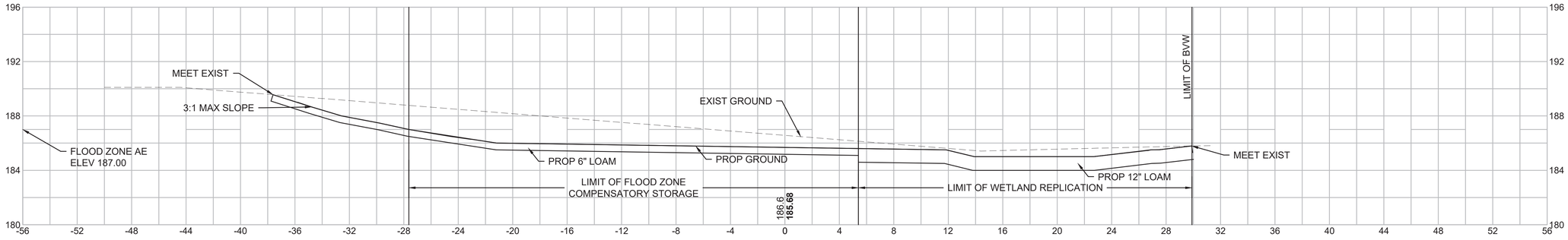
WETLAND REPLICATION PLANT SCHEDULE			
QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE/SPACING
2	Acer Rubrum	RED MAPLE	10-12' O.C., 3'-4'
4	Viburnum dentatum	NORTHERN ARROWWOOD	6' O.C. CLUSTERED, 2'-3'
4	Rhododendron viscosum	SWAMP AZALEA	6' O.C. CLUSTERED, 2'-3'
4	Vaccinium corymbosum	HIGHBUSH BLUEBERRY	6' O.C. CLUSTERED, 2'-3'
4	Clethra alnifolia	SWEET PEPPERBUSH	6' O.C. CLUSTERED, 2'-3'
25	Osmunda cinnamomea	CINNAMON FERN	1' O.C. CLUSTERED, 1#'
25	Carex stricta	TUSSOCK SEDGE	1' O.C. CLUSTERED, 1#

Wetland Replication Area Construction Sequence

1. A qualified Wetland Scientist shall supervise all aspects of the proposed Wetland Replication Area during construction; eg., erosion controls, site preparatory, grading, backfilling, planting and seeding.
2. Flag or stake limits of Wetland Replication Area. Flag trees and/or shrubs adjacent to the existing wetland boundary to remain. Install erosion control barrier along intersection of the Wetland Replication Area and adjacent wetland, taking into considering that grading within the wetland will be required to achieve a suitable hydrologic connection to the WRA. Once the Wetland Replication Area and adjacent side slope have been graded, install an erosion control barrier at the toe of slope to protect the Wetland Replication Area.
3. During construction of the Wetland Replication Area, the supervisory Wetland Scientist shall oversee the proposed grading and planting scheme. The final elevation shall be determined in the field and will correspond to the elevation of the adjacent wetland. During construction, the Wetland Replication Area shall be excavated to final grade unless a suitable topsoil is not encountered, at which time the area will be excavated to one foot below the final design grade to facilitate the placement of approved clean wetland soil (12% organic carbon content (or 20% organic matter content) and pH of 6.2-6.8) as a suitable substrate for the establishment of wetland vegetation. Wetland soils will consist of the topsoil (A Horizon) from the Wetland Impact Area and/or a wetland soil mixture manufactured by combining topsoil with a soil textural class of sandy loam, fine sandy loam, or silt loam with decomposed leaf litter at a 1:1 ratio. The wetland soil shall be free of stumps, roots, heavy or stiff clay, stones, coarse sand, noxious weeds, weed seeds or other litter. Settling of soils shall be taken into consideration for final elevations.
4. Apply wetland seed mix at the specified application rate or higher if applied at the end of the growing season and lightly rake to insure seed-to-soil contact. There shall be no seeding in areas of standing water. Do not apply within 1-foot of shrub and tree plantings.
5. Apply conservation seed mix to side slopes at the specified application rate and lightly rake to insure seed-to-soil contact.
6. Apply a light mulch of clean weed free straw.
7. The supervisory Wetland Scientist shall reserve the right to reject acceptance of wetland plant species upon delivery based on plant vigor/conditions, unauthorized substitutions, and/or non- conformance with the planting plan and specifications. All plantings shall be native varieties with no landscape cultivars accepted. During transport, the plants shall be protected to minimize stress.
8. The supervisory wetland scientist shall reserve the right to require a supplemental watering program of plantings.
9. Remove erosion control barriers upon stabilization of the side slope and Wetland Replication Area and Wetland Restoration Area.

0 10 20 30 40
SCALE: 1" = 10'

WETLAND REPLICATION - PLAN VIEW
SCALE: 1" = 10'



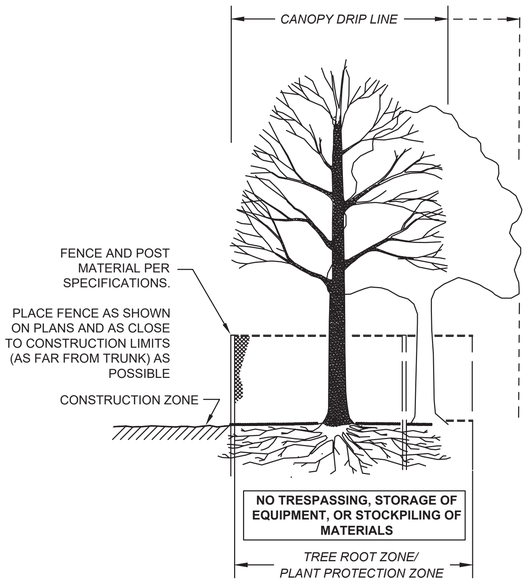
HOR. SCALE IN FEET
4 0 4 8
VER. SCALE IN FEET
4 0 4 8

WETLAND REPLICATION - SECTION A-A VIEW
SCALE: 1" = 4'

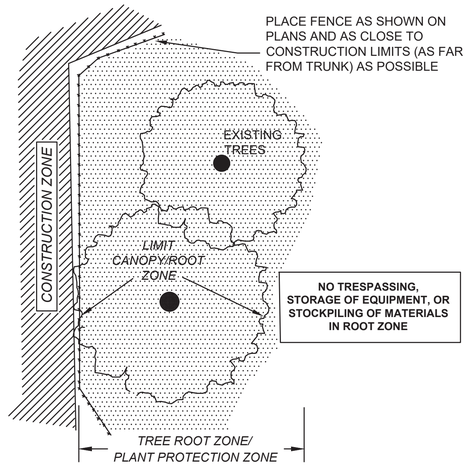
STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	12
PROJECT FILE NO.	607403		

CONSTRUCTION DETAILS



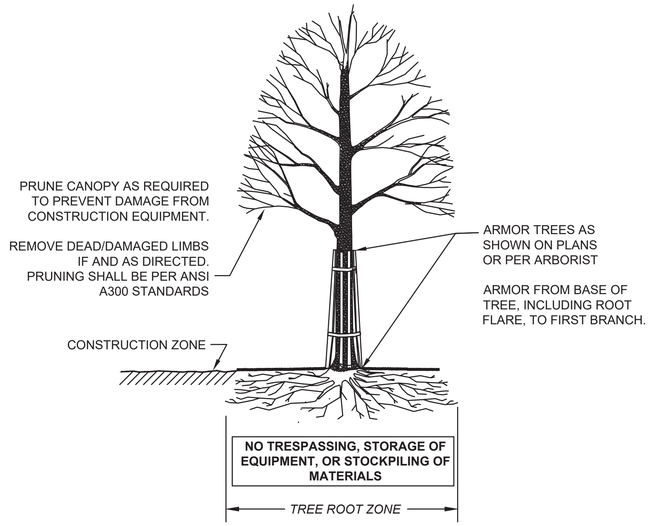
SECTION - FENCE PROTECTION OF ROOT ZONE



PLAN VIEW - FENCE PROTECTION OF ROOT ZONE

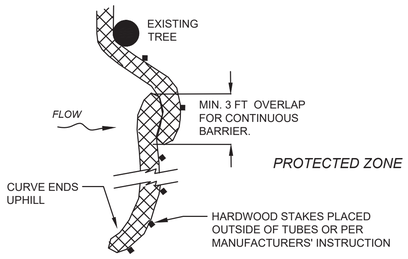
TREE PROTECTION - ROOT ZONE

NOT TO SCALE



SECTION - TRUNK ARMORING & PRUNING

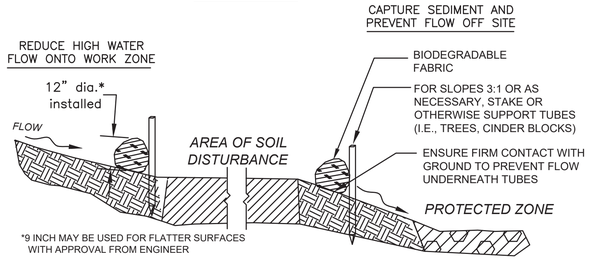
TREE PROTECTION - TRUNK



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

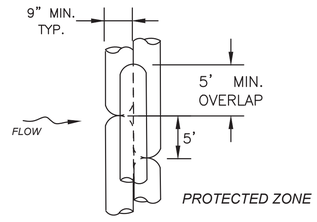


SECTION

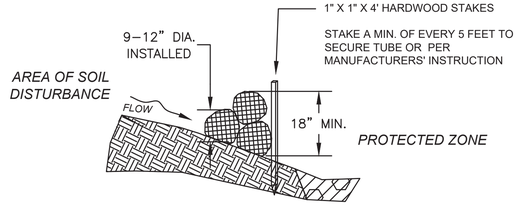
SEDIMENT BARRIER - COMPOST FILTER TUBE

NOT TO SCALE

WHERE SPECIFIED ON CONSTRUCTION PLANS OR AS REQUIRED



PLAN VIEW



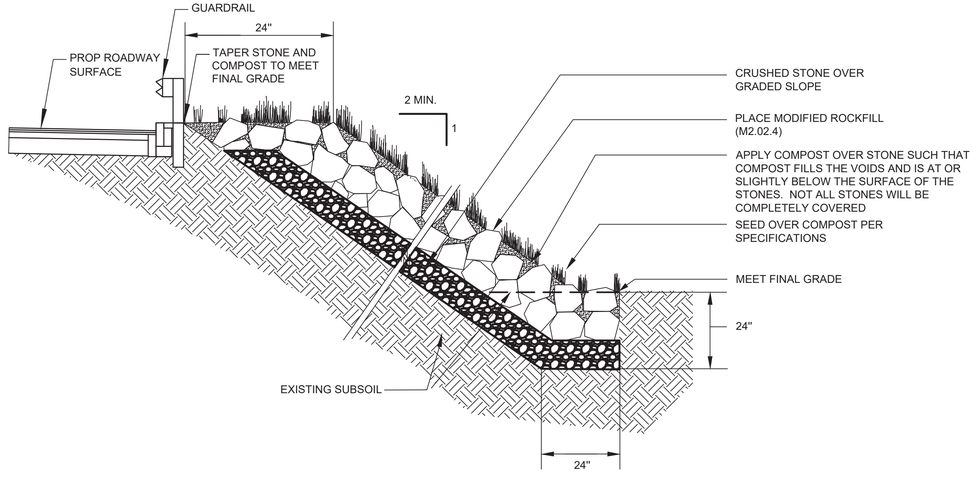
SECTION

COMPOST FILTER TUBES STACKED

NOT TO SCALE

SECTION - TRUNK ARMORING & PRUNING

TREE PROTECTION - TRUNK



COMPOST AND SEED OVER MODIFIED ROCKFILL (NON-WATERWAY)

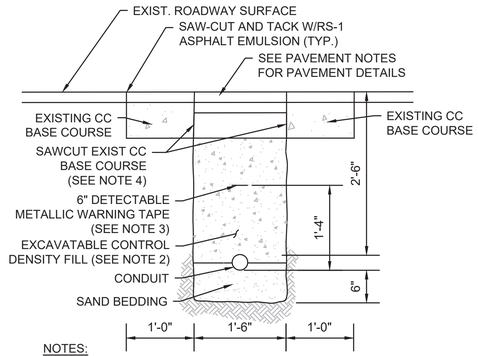
NOT TO SCALE

20160320_MassDOT

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	12
PROJECT FILE NO.	607403		

CONSTRUCTION DETAILS



NOTES:

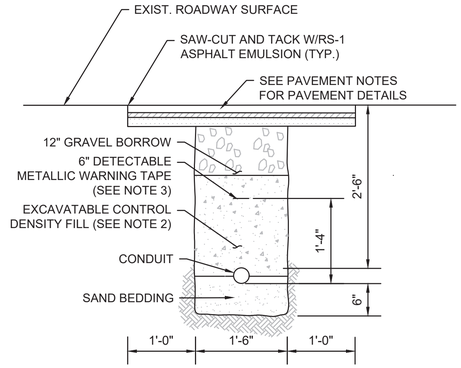
1. SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE, UNLESS OTHERWISE APPROVED BY MASSDOT.

2. CONTROLLED DENSITY FILL SHALL MEET THE REQUIREMENTS OF SUBSECTION M4.08.0

3. WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.

4. SAWCUTTING OF EXISTING CEMENT CONCRETE BASE COURSE SHALL WILL BE INCLUDED IN THE CONTRACT UNIT PRICE FOR PROPOSED CONDUIT.

CONDUIT CROSSING ROADWAY
(EX CC ROAD BASE COURSE)
NOT TO SCALE



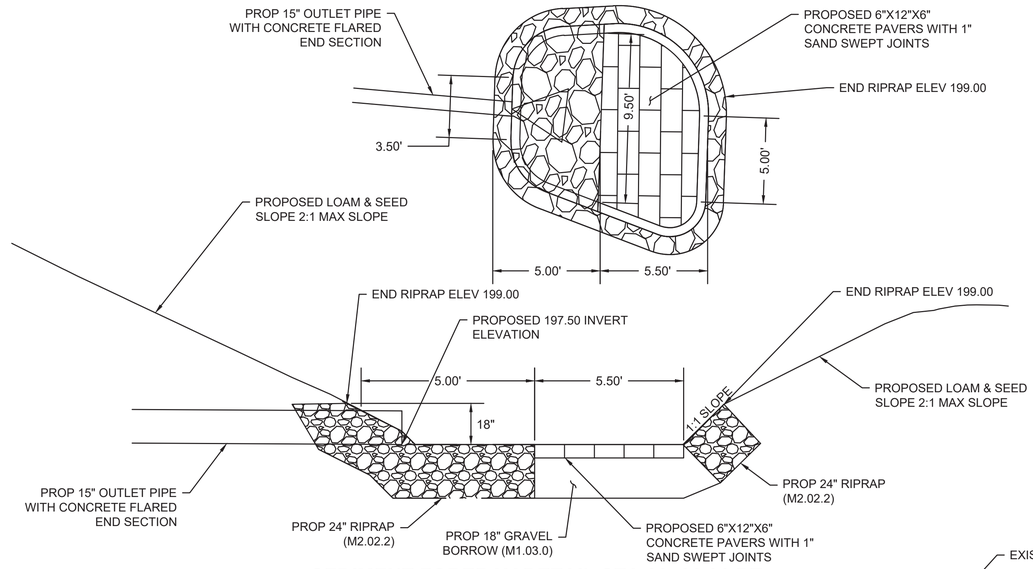
NOTES:

1. SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE, UNLESS OTHERWISE APPROVED BY MASSDOT.

2. CONTROLLED DENSITY FILL SHALL MEET THE REQUIREMENTS OF SUBSECTION M4.08.0

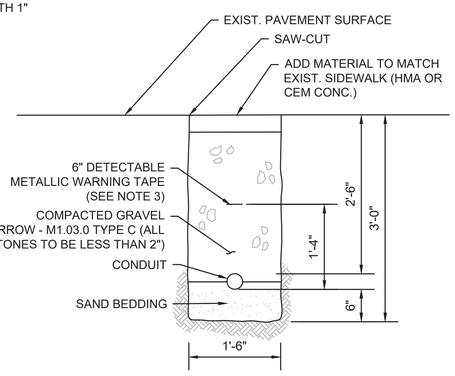
3. WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.

CONDUIT CROSSING ROADWAY
NOT TO SCALE



SEDIMENT FOREBAY DETAIL STA 20+90.96 RT

NOT TO SCALE

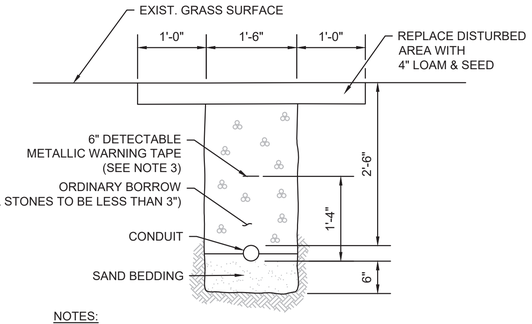


NOTES:

1. SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE, UNLESS OTHERWISE APPROVED BY MASSDOT.

2. WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.

CONDUIT UNDER SIDEWALK
NOT TO SCALE

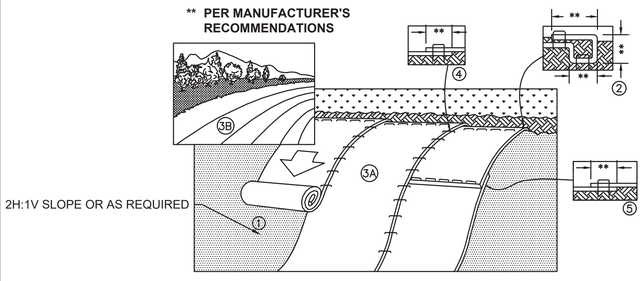


NOTES:

1. SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE, UNLESS OTHERWISE APPROVED BY MASSDOT.

2. WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.

CONDUIT UNDER GRASS AREAS
NOT TO SCALE



SLOPE INSTALLATION

NOTES:

1. PREPARE SOIL BEFORE INSTALLING JUTE MESH, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.

2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE JUTE MESH IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING PORTION OF THE JUTE MESH BACK OVER SEED AND COMPACTED SOIL. SECURE JUTE MESH OVER COMPACTED SOIL WITH A ROW OF STAKES/STAPLES SPACED ACCORDANCE TO THE MANUFACTURER'S RECOMMENDATIONS ACROSS THE WIDTH OF THE JUTE MESH.

3. ROLL THE JUTE MESH DOWN (A) OR HORIZONTALLY (B) ACROSS THE SLOPE. JUTE MESH WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL JUTE MESH MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAKES/STAPLES IN APPROPRIATE LOCATIONS AS SHOWN ON THE STAKE/STAPLE PATTERN GUIDE.

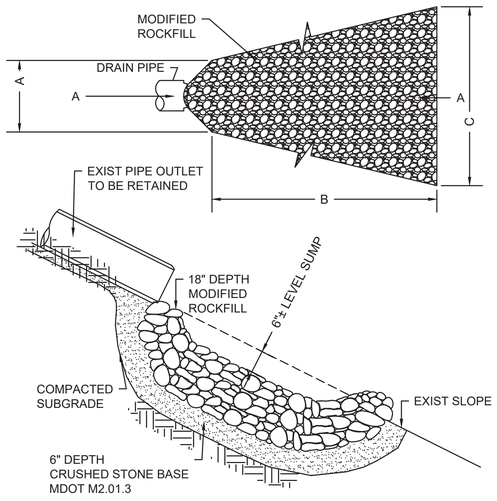
4. THE EDGES OF PARALLEL JUTE MESH MUST BE STAKED/STAPLED WITH OVERLAP DEPENDING ON JUTE MESH TYPE. SEE THE MANUFACTURER'S RECOMMENDATIONS.

5. CONSECUTIVE JUTE MESH SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN OVERLAP (SEE THE MANUFACTURER'S RECOMMENDATIONS). STAKE/STAPLE THROUGH OVERLAPPED AREA, ACROSS ENTIRE JUTE MESH WIDTH PER MANUFACTURER'S RECOMMENDATIONS.

6. IN LOOSE SOIL CONDITIONS, THE USE OF STAKE OR STAPLE LENGTHS GREATER THAN 6" MAY BE NECESSARY TO PROPERLY SECURE THE JUTE MESH.

7. THE CONTRACTOR SHALL FOLLOW ALL INSTALLATION INSTRUCTIONS AS RECOMMENDED BY THE MANUFACTURER.

JUTE MESH FOR STEEP SLOPES DETAIL
NOT TO SCALE



STONE PAD DETAIL

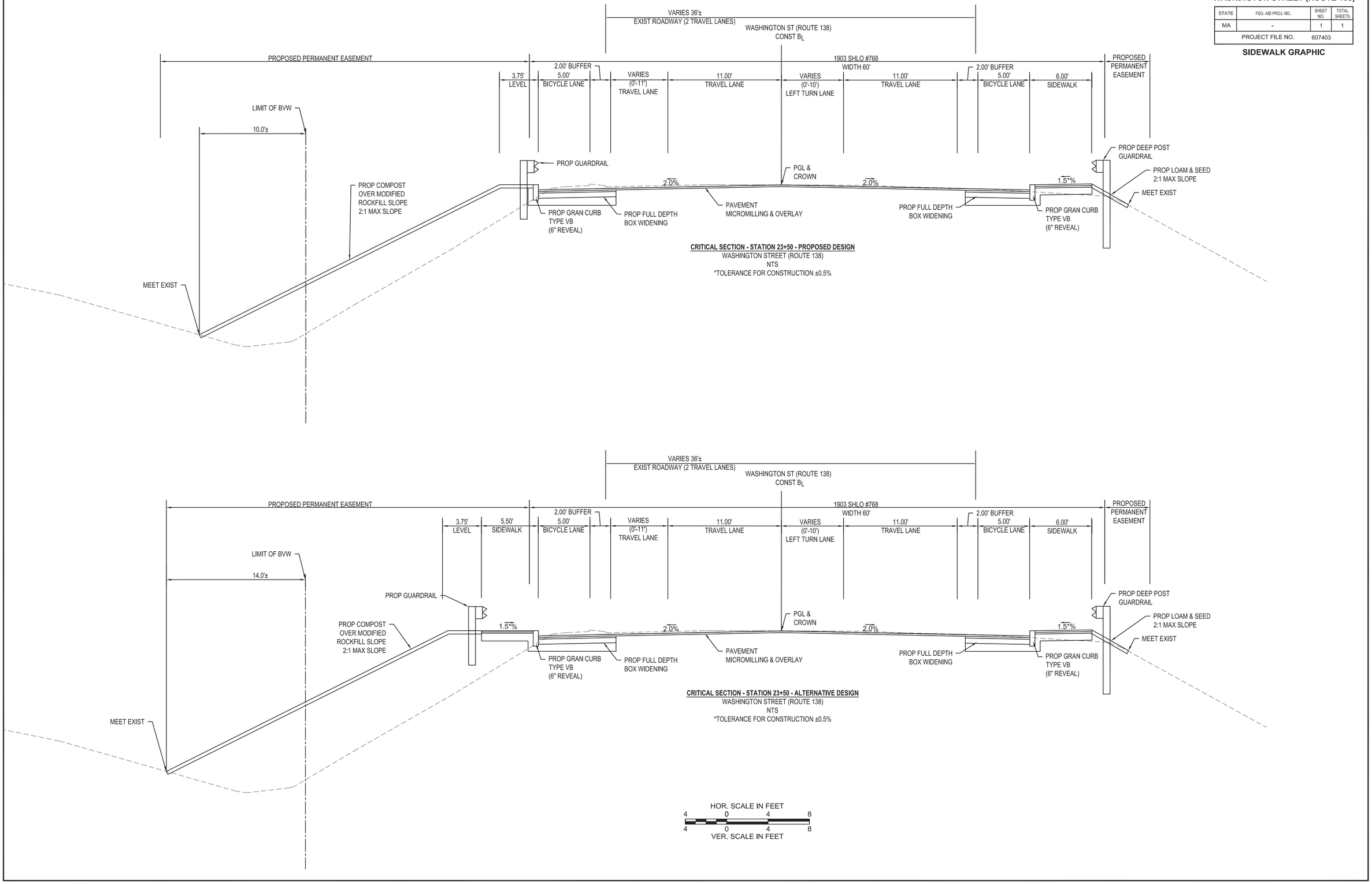
NOT TO SCALE

PROPOSED DRAINAGE STONE PADS				
STATION	DIAMETER (INCHES)	A (FEET)	B (FEET)	C (FEET)
22+73 LT	12	3	6	7
24+73 LT	12	3	6	7
25+52 LT	15	3.75	8	9.25

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	1
PROJECT FILE NO.	607403		

SIDEWALK GRAPHIC



CRITICAL SECTION - STATION 23+50 - PROPOSED DESIGN
WASHINGTON STREET (ROUTE 138)
NTS
*TOLERANCE FOR CONSTRUCTION ±0.5%

CRITICAL SECTION - STATION 23+50 - ALTERNATIVE DESIGN
WASHINGTON STREET (ROUTE 138)
NTS
*TOLERANCE FOR CONSTRUCTION ±0.5%

HOR. SCALE IN FEET
4 0 4 8
4 0 4 8
VER. SCALE IN FEET

607403_HD(BASE1).DWG Plotted on 22-Sep-2020 9:56 AM

Attachments

Site Plans and Drainage Report

Corridor Improvements on Washington Street (Route 138), October 21, 2022 (full size)

Stormwater Report, prepared by Nitsch Engineering, December 13, 2022

Alternatives Analysis

Critical Section – Station 23+50-Proposed Design

Critical Section – Station 23+50-Alternative Design

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DOCUMENT A00861

MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL PROTECTION

ORDER OF CONDITIONS

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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
& c.191 of the Stoughton Code, Wetlands By-law

Provided by MassDEP:
298-0880
MassDEP File #

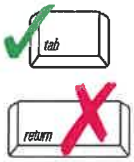
eDEP Transaction #

Stoughton
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: Stoughton
Conservation Commission

2. This issuance is for (check one): a. ☒ Order of Conditions b. ☐ Amended Order of Conditions

3. To: Applicant:

Melissa — a. First Name
Lenker — b. Last Name
Massachusetts Department of Transportation-Highway Division — c. Organization
10 Park Plaza, Room 7360 — d. Mailing Address
Boston — e. City/Town
MA — f. State
02116 — g. Zip Code

4. Property Owner (if different from applicant):

See Attached List of Owners Along Route. — a. First Name
b. Last Name
Principal: Massachusetts Department of Transportation-Highway Division — c. Organization
10 Park Plaza — d. Mailing Address
Boston — e. City/Town
MA — f. State
02116 — g. Zip Code

5. Project Location:

Rt. 138 (Washington Street) & York Street. — a. Street Address
Stoughton — b. City/Town
State Highway Layout — c. Assessors Map/Plat Number
N/A — d. Parcel/Lot Number
Latitude and Longitude, if known: 42°d8m30.696sN — d. Latitude
71°d6m11.7sW — 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
& c.191 of the Stoughton Code, Wetlands By-law

Provided by MassDEP:
298-0880
MassDEP File #

eDEP Transaction #
Stoughton
City/Town

A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):
Norfolk
a. County | b. Certificate Number (if registered land)
c. Book | d. Page

7. Dates: 12-15-2022 a. Date Notice of Intent Filed | 1-26-2022 b. Date Public Hearing Closed | 02/13/2023 c. Date of Issuance

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):
Massachusetts Department of Transportation Corridor Improvements on Washington Street
a. Plan Title
Nitsch Engineering
b. Prepared By
Mathew J. Soltys
c. Signed and Stamped by
10-21-22
d. Final Revision Date
1 in. = 50 ft.
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. ☒ Public Water Supply b. ☒ Land Containing Shellfish c. ☒ Prevention of Pollution
d. ☐ Private Water Supply e. ☐ Fisheries f. ☒ Protection of Wildlife Habitat
g. ☒ Groundwater Supply h. ☒ Storm Damage Prevention i. ☒ 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.

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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) — a. linear feet

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. ☐ Bank	a. linear feet	b. linear feet	c. linear feet	d. linear feet
5. ☒ Bordering Vegetated Wetland	152+300(t) a. square feet	152+300(t) b. square feet	525 c. square feet	525 d. square feet
6. ☐ Land Under Waterbodies and Waterways	a. square feet e. c/y dredged	b. square feet f. c/y dredged	c. square feet	d. square feet
7. ☒ Bordering Land Subject to Flooding	355+450(t) a. square feet	355+450(t) b. square feet	805 c. square feet	805 d. square feet
Cubic Feet Flood Storage	355+450(t) e. cubic feet	355+450(t) f. cubic feet	900 g. cubic feet	900 h. cubic feet
8. ☐ Isolated Land Subject to Flooding	a. square feet	b. square feet		
Cubic Feet Flood Storage	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
9. ☒ Riverfront Area	2310(t)+190 a. total sq. feet	2500 b. total sq. feet		
Sq ft within 100 ft	2310(t)+190 c. square feet	2500 d. square feet	2500 e. square feet	2500 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.)

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. ☐ Land Under the Ocean	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. ☐ Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. ☐ Coastal Beaches	a. square feet	b. square feet	c. cu yd nourishment	d. cu yd nourishment
14. ☐ Coastal Dunes	a. square feet	b. square feet	c. cu yd nourishment	d. cu yd nourishment
15. ☐ Coastal Banks	a. linear feet	b. linear feet		
16. ☐ Rocky Intertidal Shores	a. square feet	b. square feet		
17. ☐ Salt Marshes	a. square feet	b. square feet	c. square feet	d. square feet
18. ☐ Land Under Salt Ponds	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. ☐ Land Containing Shellfish	a. square feet	b. square feet	c. square feet	d. square feet
20. ☐ Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged	b. c/y dredged		
21. ☐ Land Subject to Coastal Storm Flowage	a. square feet	b. square feet		
22. ☐ 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 *:

152
a. square feet of BVW

b. square feet of salt marsh Open water body

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 then two square feet or more than three square feet in size bearing the words,

"Massachusetts Department of Environmental Protection" [or, "MassDEP"]

"File Number 298-0880 "

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 Special Conditions

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 Stoughton 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:

   Stoughton Wetlands By-law (1. Municipal Ordinance or Bylaw) c. 191 (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.

02/13/2023
1. 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.

5
2. Number of Signers

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.

Mass Highway Washington Street (Route 138) Corridor Improvements

Signature	Printed Name
	Gerald J. McDonald, Chairman
William A. Francis	William A. Francis, Vice Chairman
	J. Lionel Lucien
	David M. Asack
	John H Morton
	John J. Malley
	Michael Horan

☐ by hand delivery on

Date

☒ by certified mail, return receipt requested, on

2/13/2023 # 7021 0950 0001 5060 8567
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.

Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

Conservation Commission

Please be advised that the Order of Conditions for the Project at:

Project Location | 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

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

Request for Departmental Action Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:

Provided by DEP

A. Request Information

1. Location of Project

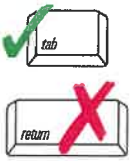
a. Street Address

b. City/Town, Zip

c. Check number

d. Fee amount

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



2. Person or party making request (if appropriate, name the citizen group's representative):

Name

Mailing Address

City/Town

State

Zip Code

Phone Number

Fax Number (if applicable)

3. Applicant (as shown on Determination of Applicability (Form 2), Order of Resource Area Delineation (Form 4B), Order of Conditions (Form 5), Restoration Order of Conditions (Form 5A), or Notice of Non-Significance (Form 6)):

Name

Mailing Address

City/Town

State

Zip Code

Phone Number

Fax Number (if applicable)

4. DEP File Number:

B. Instructions

1. When the Departmental action request is for (check one):

☐ Superseding Order of Conditions – Fee: $120.00 (single family house projects) or $245 (all other projects)

☐ Superseding Determination of Applicability – Fee: $120

☐ Superseding Order of Resource Area Delineation – Fee: $120

Massachusetts Department of Environmental Protection
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Request for Departmental Action Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:

Provided by DEP

B. Instructions (cont.)

Send this form and check or money order, payable to the *Commonwealth of Massachusetts,* to:

Department of Environmental Protection
Box 4062
Boston, MA 02211

2. On a separate sheet attached to this form, state clearly and concisely the objections to the Determination or Order which is being appealed. To the extent that the Determination or Order is based on a municipal bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

3. Send a **copy** of this form and a **copy** of the check or money order with the Request for a Superseding Determination or Order by certified mail or hand delivery to the appropriate DEP Regional Office (see https://www.mass.gov/service-details/massdep-regional-offices-by-community).

4. 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.

298-0880: Special Conditions of the Order of Conditions Issued by the Stoughton Conservation Commission to the Massachusetts Department of Transportation Highway Division for the proposed Highway Corridor Improvements of Washington Street, Route 138 and York Street including Stormwater Management System, Sidewalk, Sediment forebay, Wetlands Replication and Compensatory Flood Storage and other improvements under MGL CH. 131, Sec. 40, MA Wetlands Protection Act

21. This permit authorizes only the work shown on the plans referenced in on page one, items 4 & 5. No other work is approved or permitted.

22. **BEFORE ANY WORK BEGINS OR ANY BUILDING PERMIT APPLICATION SHALL BE SIGNED THE FOLLOWING MUST BE DONE:**

A. **PRECONSTRUCTION NOTIFICATION AND MEETING:** Before any work begins on this project, the applicant shall notify the Conservation Commission in writing of the beginning of work, and shall arrange an on-site conference between the contractor, the applicant, the site engineer, and the site surveyor to ensure that all of the conditions of this Order are understood. Written proof of this meeting shall be provided to the Commission by the engineer or site surveyor.

B. **RECORDING:** No work shall be undertaken until the Order is proven to be recorded at the Norfolk County Registry of Deeds. For building permit purposes, this applicant shall supply evidence of this recording by submittal of a receipt at the end of Form 5 (this Order form) per 310 CMR 10.99, bearing the stamp of the Registry of Deeds. For Certificate of Compliance purposes, a copy of the front page of the recorded Order shall be given to the Stoughton Conservation Commission.

C. **SEDIMENTATION CONTROL:** All sedimentation control shown on the approved plans shall be in place prior to any disturbance by construction equipment or activities on-site. Sedimentation control must be inspected by the site engineer or designated representative, surveyor, or Commission-approved environmental site monitor, who shall certify its proper installation to the Commission via a stamped, signed letter prior to any other work activity. The sedimentation control barrier shall be located for the applicant by the site surveyor, and a stamped, signed letter from the surveyor certifying the staking of the barrier shall be provided to the Commission. The sedimentation control barrier shall consist of compost filter tubes, in accordance with the approved site plans.

D. The site engineer, surveyor, or Commission-approved environmental site monitor shall certify to the Commission in writing that the required DEP sign is present, and is fastened to a post or dead tree.

E. **OTHER PERMITS:** Proof of issuance of all other required permits except the building permit shall be presented prior to requesting the Commission's signature on the building permit.

23. As the project proceeds, you must do the following or face issuance of a cease and desist order, as well as Commission refusal to approve a Certificate of Occupancy:

A. **PROJECT CHANGES: PLEASE RE-READ GENERAL CONDITION # 13, PAGE 6. THE APPLICANT SHOULD BE AWARE THAT FAILURE TO GAIN COMMISSION APPROVAL IN ADVANCE OF MAKING CHANGES MAY CAUSE THE COMMISSION TO REQUIRE THAT THE CHANGES BE REMOVED BEFORE A CERTIFICATE OF COMPLIANCE OR A CERTIFICATE OF OCCUPANCY CAN BE ISSUED. The DEP and Stoughton Conservation Commission intend that all changes be presented for review before either the plan or the construction is actually altered. This includes changes believed by the applicant, contractor, or new owner to be minor, or to have less impact to the wetlands than the original proposal.** A form is available in our office, for your use.

Continued on next page.

298-0880: Special Conditions of the Order of Conditions Issued by the Stoughton Conservation Commission to the Massachusetts Department of Transportation Highway Division for the proposed Highway Corridor Improvements of Washington Street, Route 138 and York Street including Stormwater Management System, Sidewalk, Sediment forebay, Wetlands Replication and Compensatory Flood Storage and other improvements under MGL CH. 131, Sec. 40, MA Wetlands Protection Act

B. **CORRECTIVE ACTIONS:** Any breach in the sedimentation control barrier shall be repaired within 24 hours, and shall be reported to the Commission in writing. If a failure to repair a breach results in sedimentation of the no-work zone or the wetland, removal of the sedimentation within 24 hours of discovery, by hand work, shall be required. In the event of a major sedimentation control failure, the Commission is to be notified by telephone immediately upon discovery, or at the start of the next regular business day, if the problem is discovered after regular working hours. Damage to wetland or buffer zone soils or vegetation shall be restored according to the Commission's preferences.

C. The Stoughton Conservation Commission requires the applicant to retain a qualified environmental site monitor to ensure compliance with this Order and its Special Conditions. Should this project violate the Conditions of this permit, monitoring of the site as frequently as bi-weekly may be required, with a written report of compliance with this Order required to be submitted to the Commission.

24. At the completion of the project, or prior to Commission approval of a Certificate of Occupancy, an application for a Certificate of Compliance with this Order must be made. The following items shall be done before a Certificate of Compliance shall be issued:

A. The DEP's form 8A, Request for a Certificate of Compliance, shall be completed and presented to the Commission. Please note that it is critical to include:

1. The date of Issuance of any Extension Permits for this Order.
2. The date this Order was recorded at the Registry of Deeds, and the Book and Page.
3. The date any Extension Permit was recorded, and the Book and Page.

B. The DEP form shall be accompanied by an Engineer's/Surveyor's As-Built Plan of the project, showing at least:

1. Any buildings, patios, decks, driveways, walkways, walls, or other structures.
2. All utilities, including any septic systems
3. All paved areas.
4. All site grading or other altered soils. (Topography)
5. The limit of work as surveyed.
6. The 100 foot buffer zone to the wetlands.
7. The wetland line to all resource areas.
8. Any 100 year flood line.
9. Any Town of Stoughton Zoned Wetlands or Watershed.

C. The packet shall also include a letter from a registered Professional Engineer and/or Land Surveyor, certifying substantial compliance with this Order and noting any deviations, however minor they may seem, from the approved plan. Re-reading General Condition # 13 and Special Condition # 20A is advisable.

D. The applicant shall submit to the Conservation Commission a signed statement by the buyer that he/she is aware of an outstanding Order of Conditions on the development and has received a copy of this Order.

E. A joint site inspection with the Commission's representative and a representative of the applicant is required when a complete Certificate of Compliance packet has been received. No inspection shall be scheduled until the packet is complete.

F. A vote of the Commission shall be made at the next available regular meeting, when the application for the Certificate of Compliance is complete. Continued on next page....

298-0880: Special Conditions of the Order of Conditions Issued by the Stoughton Conservation Commission to the Massachusetts Department of Transportation Highway Division for the proposed Highway Corridor Improvements of Washington Street, Route 138 and York Street including Stormwater Management System, Sidewalk, Sediment forebay, Wetlands Replication and Compensatory Flood Storage and other improvements under MGL CH. 131, Sec. 40, MA Wetlands Protection Act

PLEASE NOTE THAT NO CERTIFICATE OF OCCUPANCY SHALL BE SIGNED BY THIS COMMISSION UNTIL A CERTIFICATE OF COMPLIANCE HAS BEEN APPROVED BY VOTE.

25. Siltation Controls shall be removed upon permanent stabilization of the site prior to the issuance of a Certificate of Compliance at the discretion of the Conservation Agent.

    During the course of construction, there shall be no storage of fuel or any other hazardous substances with the 100 ft buffer zone of any wetland resource area on/adjacent to the site.

26. No stock plies of imported or excavated fill material shall be stored within 100 ft of the wetland resource area without sufficient erosion control provisions in place which are to be inspected and approved by the Environmental Affairs Officer of the Town.

Special Conditions under Chapter 191 & Local Authority

27. Work shall be performed in substantial conformance with the approved plan: "Massachusetts Department of Transportation Highway Division, Plan and Profile of Corridor Improvements on Washington Street in the Town of Stoughton in Norfolk County Stoughton Massachusetts, Notice of Intent"' dated; 10-21-2022; scale: 1 inch = 20 feet; Prepared by: Nitsch Engineering, 2 Center Plaza Suite 430, Boston, MA 02108.

28. All construction easements shall be secured by the applicant from the property owners as necessary, which shall include but shall not be limited to: temporary construction easements and utility easements.

29. A plan and program for the management of invasive exotic vegetative species such as Asian Knotweed, Phragmites and Asian Bittersweet should be implemented by the applicant in accordance with MADAR recommendations, policy and requirements. This should be maintained throughout the construction project and also prevent spreading off these species off site and into the protected Wetlands Resource Areas and the Stormwater structural BMP's.

PLEASE NOTE THAT NO CERTIFICATE OF OCCUPANCY SHALL BE SIGNED BY THIS COMMISSION UNTIL A CERTIFICATE OF COMPLIANCE HAS BEEN APPROVED BY VOTE.

END OF SPECIAL CONDITIONS

Town of Stoughton

10 Pearl Street • Stoughton, MA 02072 • (781) 341-1300 • FAX (781) 344-5048
www.stoughton-ma.gov

January 26, 2023

ATTACHED LIST OF PROPERTY OWNERS ALONG ROUTE UNDER NOTICE OF INTENT TO ORDER OF CONDITIONS

List of Property Owner along State Highways Route 138 for Corridor Improvements on Washington Street (Route 138) of Order of Conditions for298--880

1) 058 001 0
map 058
lot 001
Owner TOWN OF CANTON
owner2 TOWN HALL
801 WASHINGTON STREET
CANTON
MA
02021

2) 057 110 0
map 057
lot 110
Owner NSTAR ELECTRIC COMPANY
owner2 PROPERTY TAX DEPT
P O BOX 270
HARTFORD
CT
02202-466

3) 058 009 0
map 058
lot 009
Owner TOWN OF STOUGHTON
10 PEARL ST
STOUGHTON
MA
02072

4) 058 008 0
map 058
lot 008
Owner SALT ISLAND REALTY LLC
115 GLEN AVENUE

115 GLEN AVENUE
UPTON
MA
01568

Continued to next page.

5) 058 006 0
map 058
lot 006
Owner WASHINGTON ISLAND VIEW LLC
1024 TURNPIKE STREET
CANTON
MA
02021

6) 058 005 0
map 058
lot 005
Owner DESMOND DAVID F TRUSTEE
owner2 DAVID F DESMOND REV TRUST
154 PRESIDENTIAL CIRCLE
MARSHFIELD
MA
02050

7) 058 004 0
map 058
lot 004
Owner WHITTINGTON RICHARD P TRUSTEE
owner2 FIRST ONE NOMINEE REALTY TRUST
1200 TURNPIKE ST
CANTON
MA
02021

End.

DOCUMENT A00875

POLICY DIRECTIVE P-22-001
AND
POLICY DIRECTIVE P-22-002

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massDOT Massachusetts Department of Transportation Highway Division

Number: P-22-001
Date: 9/23/22

POLICY DIRECTIVE

Jonathan Gulliver (signature on original)
HIGHWAY ADMINISTRATOR

Off-Site Stockpiling of Soil from MassDOT Construction Projects

Purpose

The purpose of this Policy Directive is to formally establish a policy and procedures for managing and stockpiling soil generated and transported from MassDOT construction projects. This Policy Directive does not supersede any Federal, State, or Local regulations.

Date of Effect

This Policy Directive is effective immediately for all projects, including active construction projects.

For active construction projects and for other projects advertised prior to October 15, 2022, changes to the contract documents needed to implement the requirements of this Policy Directive will be considered on a case-by-case basis and shall be approved by the District Highway Director, as necessary.

For projects advertised on or after October 15, 2022, MassDOT will include the requirements and implementation procedures of this Policy Directive in the construction contract documents.

Policy Requirements

This policy is intended to prevent the off-site relocation of excavated soil generated from MassDOT projects to areas near residential receptors and to control potential fugitive dusts and/or contaminants. To that end, excavated soil may not be moved from the project site without knowledge of the content of the material. Knowledge may include visual field observations for presence of staining, odor, and/or debris, screening with a photoionization detector (PID), laboratory analysis, and/or site history. Pavement millings and other non-soil materials are not subject to the requirements of this Policy Directive.

Moving soil from a MassDOT project site to a temporary off-site storage location must be approved in writing by the District Highway Director.

The Contractor must select a storage location that is at least 500 feet away from residential receptors, as defined herein to include, but not be limited to, residential dwellings, residentially

zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities.

Temporary off-site storage of excavated soil from a MassDOT project is only permissible at a location approved and permitted by MassDOT. The temporary storage location should be located within the same municipality where the soil was excavated, where possible. Stockpiled soil must be securely covered, and appropriate measures must be taken to minimize fugitive dust and erosion.

Signs indicating the source of the soil, the date the soil was generated, and contact information must be erected and maintained until the stockpiled soils are transported to a disposal facility or reused on the project site.

Implementation Procedures

To ensure that off-site storage of excavated soils is managed properly on MassDOT projects, this policy requires the following:

1. **Off-Site Stockpile Storage Locations**
    a. The Contractor shall provide proposed off-site storage locations to the Engineer for approval at least 30 days prior to transporting soil off site. Off-site storage locations should be in the same municipality as the work site.
    b. The Contractor shall keep excavated soil on site until adequately characterized to the satisfaction of the Engineer.
    c. The Contractor shall provide notification of the approved off-site storage location to the local Board of Health and the Town Manager's/Mayor's Office at least 7-days prior to transporting soil off site.
    d. The Contractor shall provide the Engineer with at least 3-days' notice prior to transporting soil off site.
    e. For off-site storage locations on MassDOT property, the Contractor is required to obtain an Access Permit through the District Permits Office prior to storage of soil or other materials. MassDOT will issue these permits at no cost to the Contractor. Information to be submitted by the Contractor as part of the permit application shall include:
        i. A description of material to be stored off-site, including available analytical data;
        ii. A figure of the location with distances to residences and residential receptors; and
        iii. Anticipated duration of temporary storage.
    f. Stockpile locations should not be within 500 feet of residential receptors (e.g., residential dwellings, residentially zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities).
        i. If the stockpile location must be within 500 feet of residential receptors, then soil must be less than RCS-1 (per 310 CMR 40.1600) and free of potentially hazardous or regulated items.

g. For off-site storage locations on non-MassDOT property, the Contractor must notify the property owner(s) at least 7 days prior to transporting material.
h. Exceptions to these rules will be reviewed by MassDOT and may be approved by the District Highway Director on a case-by-case basis.

2. Off-Site Stockpile Management

a. The Contractor shall keep soil stockpiles on impermeable surfaces (e.g., asphalt or concrete) or on 10-mil polyethylene sheeting.
b. The Contractor shall cover soil stockpiles with 10-mil polyethylene sheeting and surround with a berm made of hay bales, straw wattles, or similar.
    i. Piles that are actively being worked on must be covered and re-secured at the end of the work shift.
c. The Contractor shall label stockpiles with signs, including:
    i. Location of origin (including any Release Tracking Numbers)
    ii. Stockpile ID number (including MassDOT District office-assigned tracking ID, if different)
    iii. Date of initial accumulation
    iv. Applicable telephone numbers for the Contractor and MassDOT.
d. The Contractor shall mitigate fugitive dust at storage locations under the direction of an appropriately trained/certified environmental professional.
e. The Contractor shall remedy noncompliance with this policy within 48 hours.
f. The Contractor shall remedy noncompliance with this policy on the SAME DAY for potentially hazardous material, as determined by the Engineer.
g. The Contractor shall handle excavated soil according to federal, state, and local regulations.
h. The Contractor shall use appropriate shipping documents for all movements of excavated soil on public roadways (e.g., Bill of Lading, Material Shipping Record, Manifest, Asbestos Waste Shipment Record, etc.).

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massDOT Massachusetts Department of Transportation Highway Division

Number: P-22-002
Date: 9/23/22

POLICY DIRECTIVE

Jonathan Gulliver (signature on original)
HIGHWAY ADMINISTRATOR

Use of MassDOT Property for Staging and other Construction-Related Operations

Purpose

This Policy Directive is intended to address the use of MassDOT property by MassDOT Contractors for construction staging and other construction-related operations that are not specifically defined in the construction contract. Such use of MassDOT property will only be allowed if permitted by the District Office in accordance with 700 CMR 13.00, Approval of Access to MassDOT Highways and Other Property. This includes the use of MassDOT property for staging, laydown, and storage of equipment and materials, including soil excavated from a project site.

This Policy Directive requires the Contractor/applicant to obtain a Non-Vehicular Access Permit from MassDOT to use MassDOT property for these purposes.

This Policy Directive is effective immediately and applies to all MassDOT construction projects.

General Permit Considerations and Conditions

In addition to other normal MassDOT Access Permit procedures, MassDOT shall consider the following during the application, review, implementation and monitoring processes of Access Permits required by this Policy Directive:

- Storage and placement of the Contractor's equipment and materials should not be allowed within the clear zone of the roadway.
- Stockpiled soils should not be located within 500 feet of residential receptors, as defined herein to include, but not be limited to, residential dwellings, residentially zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities.
- The Contractor/applicant shall identify the access/egress locations of the proposed storage areas. MassDOT will only approve locations determined to be safe for roadway users, construction workers and the general public.
- The Contractor may be required to submit a Traffic Management Plan and/or Lighting Plan for MassDOT review and approval as part of the permit application, depending on the proposed use of the area.

- The Contractor shall submit the permit application through MassDOT's online State Highway Access Permit System (SHAPS).
- MassDOT will waive the permit application fee for any application received from a MassDOT Contractor for any permit required by this Policy Directive and will waive any subsequent amendment and extension fees that may otherwise be required.
- MassDOT will review the permit application in accordance with applicable standard procedures and will apply standard permit terms and conditions, as necessary.
- The Resident Engineer will verify that the permit is approved before allowing the Contractor to use the affected area for the requested purpose.
- Areas permitted are for use by the approved applicant only and are not to be shared with or used by other vendors. Subcontractors specifically engaged with the applicant working on the specific MassDOT project will be allowed to use the area in accordance with the terms of the permit.
- Permits are issued on an annual basis and will require the Contractor to file for an extension each year to continue use.

Exemptions from Permit Requirements

Equipment and materials being used for active construction operations and located within the work zone of the construction contract are exempt from this permit requirement, provided they do not interfere with the safety or operation of the roadway or the work zone. Examples of these types of exempt uses are:

- Equipment and materials parked or stored within a protected (barriered) work zone.
- Materials placed in the work zone prior to same-day installation or use.
- Soils excavated temporarily and scheduled to be replaced, such as for trenching operations or for installation of drainage structures.

DOCUMENT A00888

EVERSOURCE UNDERGROUND TRANSMISSION LINE STANDARDS

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1. Scope

This standard establishes the minimum vertical, horizontal and diagonal design clearance requirements between underground transmission lines (69 kV through 345 kV), the top of grade, and other underground facilities. Underground facilities may include but are not limited to water, sewer and gas piping, and other buried conduit.

The clearances established by this standard shall be used both in the design of new underground transmission lines and the modification to existing underground transmission lines. The clearances in this standard may also be applied to underground transmission lines within substations. These clearances may also be used to evaluate the acceptability of other proposed underground facilities which may parallel or cross an existing transmission line.

Use of the clearances contained herein is not intended to negate the need for cathodic protection measures (either for ES infrastructure or neighboring facilities). A separate evaluation of the Electromagnetic interference ("EMI") is required to address the potential need for cathodic *protection or other remediation measures on adjacent facilities.*

Use of this standard is also not intended to negate the need for evaluations of the heat generation associated with new cables and existing nearby facilities. The clearances contained herein may be insufficient to accommodate heat generation and may therefore have to be increased.

2. Regulations and Related Codes and Standards

Conformance with this standard provides assurance that the design of new transmission lines and modification to existing transmission lines include provisions to achieve clearances with other underground facilities, services and structures which meet or exceed electrical safety code requirements.

A. In Connecticut and New Hampshire, conformance to ANSI C2, otherwise known as the National Electric Safety Code (NESC) Part 3, "Safety Rules for the Installation and Maintenance of Underground Electric Supply and Communications Lines", is required.

B. In Massachusetts, conformance to the Code of Massachusetts Regulations 220 CMR 125.00, "Installation and Maintenance of Electric Transmission Lines", is required.

3. Requirements:

New underground transmission lines, facilities or structures being installed in parallel, crossing or in proximity to other existing underground utilities shall be designed to meet or exceed the clearances specified below.

Unless otherwise noted, the clearances provided below are for all voltages between 69 kV and 345 kV. Conformance with these clearances satisfies all of the provisions of Massachusetts Department of Public Utilities Regulations 220 CMR 125.31(4) and Part 3 of the NESC.

A. Pipe-Type Cable/Conduit of Any Type

	CT/NH Requirements			MA Requirements		
Description of Encounter	**NESC Ref.**	**Distance** (Note 7)	**Notes**	**CMR Ref.**	**Distance** (Note 7,8)	**Notes**
Rails						
Top of Power Conduit to Top of Rails of Street Railway	320 A.5.a	48”	1	220 CMR 125.31(4)(b)	30”	9
Top of Power Conduit to Top of Rails of Railroad	320 A.5.a	62”	1	220 CMR 125.31(4)(b)	42”	9
Top of Power Conduit to Top of Rails for Secondary or Industrial Railway		60”		220 CMR 125.31(4)(b)	42”	9
Underground Structures						
Power Cable Horizontal Clearance to Underground Structure (concrete/masonry)	353.A.1	24”			6”	
Power Cable Vertical Clearance to Underground Structure (concrete/masonry)	353.A.1	24”			6”	
Communication Line						
Power Conduit to Communication Line Conduit Separated Using Concrete	320.B.2.	15”			18”/24”	10
Power Conduit to Communication Line Conduit Separated Using Masonry	320.B.2.	16”			18”/24”	10
Power Conduit to Communication Line Conduit Separated Using Well Tamped Earth	320.B.2.	24”			18”/24”	10
Water, Gas & Sewer Piping and Other Electrical Conduits & Ducts and Earth Surface						12
Vertical, Horizontal or Diagonal Clearance between Power Conduit and Welded Gas or Water Piping		24”			12”/24”	10
Vertical, Horizontal or Diagonal Clearance between Power Conduit and Bell & Spigot Water & Sewer Pipes		30”			18”/24”	10
Vertical, Horizontal or Diagonal Clearance between Power Conduit and Other Electric Supply Conduits or Ducts		30”			18”/24”	10, 11
Vertical Clearance between Power Conduit and Earth Surface	322.A.3	48”	3	220 CMR 125.30(2)	24”	

	CT/NH Requirements			MA Requirements		
Description of Encounter	**NESC Ref.**	**Distance** (Note 7)	**Notes**	**CMR Ref.**	**Distance** (Note 7,8)	**Notes**
Vertical Clearance between Power Conduit and Bottom of Stream Bed at Entrenched Water Crossings		72”	4		72”	4
Horizontal Clearance between Power Conduit and Parallel Flammable Liquid or 150 psi or greater Gas Piping	95.B.2	132”	5, 6	95.B.2	120”	5, 6
Metallic Conduit						
Vertical, Horizontal or Diagonal Clearance between any Water, Gas or Steam Metallic Pipe Systems in proximity of UG Cables in Metallic Pipes ONLY	353.A.1	24”	5	220 CMR 125.31(4)(c)	12”	5, 13

B. Direct Embedded Cables

	CT/NH Requirements			MA Requirements		
Description of Encounter	**NESC Ref.**	**Distance** (Note 7)	**Notes**	**CMR Ref.**	**Distance** (Note 7,8)	**Notes**
Rails						
Top of Power Cable to Top of Rails of Street Railway	351.C.3.b	48”	1	220 CMR 125.31(4)(b)	30”	9
Top of Power Cable to Top of Rails of Railroad	351.C.3.b	62”		220 CMR 125.31(4)(b)	42”	9
Longitudinal Installation Under Ballast Section of Railroad or Street Railway	351.C.3.a	62”		220 CMR 125.31(4)(b)	42”	9
Underground Structures						
Power Cable Horizontal Clearance to Underground Structure (concrete/masonry)	353.A.1	24”			12”	
Power Cable Vertical Clearance to Underground Structure (concrete/masonry)	353.A.1	24”			12”	

	CT/NH Requirements			MA Requirements		
Description of Encounter	**NESC Ref.**	**Distance** (Note 7)	**Notes**	**CMR Ref.**	**Distance** (Note 7,8)	**Notes**
Miscellaneous						
Power Cable Buried	352.D.2	54”		352.D.2	42”	
Horizontal or Diagonal Clearance Between Power Cable and Swimming Pool or Its Auxiliary Equipment	351.C.1	72”		351.C.1	60”	
Water, Gas & Sewer Piping and Other Electrical Conduits & Ducts						12
Vertical, Horizontal or Diagonal Clearance between Power Conduit and Welded Gas or Water Piping		24”			12”/24”	10
Vertical, Horizontal or Diagonal Clearance between Power Conduit and Bell & Spigot Water & Sewer Pipes		30”			18”/24”	10
Vertical, Horizontal or Diagonal Clearance between Power Conduit and Other Electric Supply Conduits or Ducts		30”			18”/24”	10, 11
Vertical Clearance between Power Conduit and Bottom of Stream Bed at Entrenched Water Crossings		72”	4		72”	4
Horizontal Clearance between Power Conduit and Parallel Flammable Liquid or 150 psi or greater Gas Piping	95.B.2	132”	5, 6	95.B.2	120”	5, 6

Notes for A and B above:

[1] May be reduced by more than 12”, but only by mutual agreement between parties, and cannot result in a facility above the bottom of ballast that is subject to working or clearing.

[2] Minimum design separation may be reduced to 24” for conduit carrying 69 kV power.

[3] Cover less than 36” allowed by NESC Section 322.A.3, if designed for live and impact loads.

[4] Subject to Special Permit

[5] As noted above, EMI study may be required to determine need for cathodic protection or other remediation for adjacent facilities.

[6] There are additional requirements for electrical installations in classified areas within power plants or substations [i.e., area where handling of flammable dusts, liquids and

gasses (Coal Dust, Gasoline, Hydrogen, Liquid Petroleum Gas & Natural Gas/Methane) occur]. See the latest version of NESC127/NFPA 70. Article 500.

[7] Unless otherwise defined, the “Distance” between the underground transmission line and other underground facility is the shortest measurable vertical, horizontal and diagonal edge to edge distance between the line and the facility.

[8] MA code 220 CMR 125.31 (4)(a) states that all minimum cover and clearance offsets shall met and maintained, where practicable. These distances may be reduced by agreement between all parties when the noted values cannot be maintained.

[9] Offsets to rail lines need to be per the MBTA directive – will most likely be more stringent than the values noted in MA code 220 CMR 125.31 (4)(b).

[10] The first noted value is the minimum distance to the outside of the duct bank envelope to an adjacent pipe/facility that is 12” diameter or less. The second noted value is the same but for an adjacent pipe/facility that is greater than 12” diameter.

[11] This value may need to be updated per project depending on ampacity calculations.

[12] Clearances to Massachusetts Water Resources Authority (MWRA) and Boston Water and Sewer Commission (BWSC) Sewer, Water, and Drain infrastructure will require final approval by the agencies to obtain permits.

[13] MA code 220 CMR 125.31 (c) states that if a buried metallic pipe is used as a conduit for underground cables, it shall not be laid in direct contact with any water, gas or steam metallic pipe systems. Where the clearance is less than 12” to any gas pipes and less than two inches for any other metallic structures, the metal conduit shall be adequately separated from other metallic pipe systems by a barrier of suitable material or electrically bonded together at the point of least separation. Where metallic electrical conduit is to be located within 4’ of other buried metallic structures, the owner of said structures should be notified relative to mutual protection.

C. Responsibilities

1) Transmission Line Engineering is responsible for implementing and administering the clearance requirements of this standard in new underground transmission line designs and to evaluate the clearances associated with any new or modified facilities which are in the proximity of existing transmission lines.
2) Transmission Department field personnel, including Conduit Inspectors and Construction Managers, are responsible for identifying to the Project Manager and UG Transmission Project Engineer, situations in which conformance with the clearances specified above cannot be reasonably maintained.

D. Reductions in Clearances – CT and NH Clearance Requirements Only

The minimum design clearances in the above tables were developed by adding 12 inches to the most limiting applicable code minimum clearance. During construction, conditions may be discovered which could result in maintenance of these clearances becoming impractical. The above clearances may be reduced by removing some of the margin between the design clearances and code minimums. The following individuals may reduce the design clearances on a case by case basis, where those clearances cannot be reasonably maintained:

1) The ES Owner’s Representative responsible for monitoring construction of ES facilities may reduce a specific design clearance shown above by up to six (6) inches.

The Project Engineer or Manager of Transmission and Civil Engineering shall be informed of the reduction and of the actual “as-measured” clearance.

2) The ES Project Engineer, where construction of a new underground ES Transmission facility is involved, may approve a reduction of a specific design clearance shown above by up to a total maximum of nine (9) inches. This is a total reduction from the design clearance and includes any clearance waivers which the ES Owner’s Representative may have previously authorized.
3) The Manager of Transmission and Civil Engineering may approve a reduction of a specific design clearance shown above by up to a total maximum of twelve (12) inches. This is a total reduction from the design clearance and includes any clearance waivers which the ES Owner’s Representative and/or the Project Engineer may have previously authorized.

In order to reduce the clearances provided in the tables in 3A and 3B above, an actual field measurement of the minimum clearance between the line and the existing facility must be obtained and verified to be within the allowable reductions specified in D1 through D3 above.

4. Deviations

This standard sets forth the current ES 'best practices' for most applications of this subject matter. Therefore, deviation from this standard is generally not permitted. However, in unique instances a user may submit a written deviation request including justification to the listed Subject Matter Expert (SME). The SME must approve or deny the request in writing prior to the user commencing any non-standard activities. The SME may consult with his/her supervisor, co-SME if any and co-SME supervisor, and subsequently must copy any approval to them.

5. Cognizant Engineering Groups

1. Transmission Line and Civil Engineering – CT/WMA
2. Transmission Line Engineering – EMA
3. Transmission Engineering – NH

Revision History
Rev.0 – original issue 09/29/2008
Rev.1– removal of Northeast Utilities, addition of Eversource, addition of MA specific clearance requirements

1. Scope

   A. This standard addresses the requirements for furnishing, field installation, testing and inspection of a transmission underground concrete encased, FTB™ backfilled or with both concrete and FTB™ encased, Duct Bank System. Projects that do not require an entire duct bank with conduits and backfill can reference appropriate sections of this standard.

   B. This standard does not govern duct banks having a voltage of less than 69kV.

2. Related Standards

   A. UTRM 235 - Conduit Material and Installation.

   B. SUB 034.1 - Underground Conduits and Systems.

   C. UTRM 077 – Clearance Requirements - Clearances shall be measured from the edge of the concrete encased sections, not the conduit ducts.

   D. UTRM 109 – Thermal Sand.

3. Responsibility for Supplying Materials

   A. The duct bank system shall be furnished by the Contractor as shown on the Plan and Profile drawings and any other drawings that it references.

   B. The Contractor is also responsible for furnishing and installing all conduits, spacers, and related hardware.

   C. The Contractor shall provide details on all properties of the mix designs for Eversource review, such as composition of specific materials and their size and properties.

4. Definitions

   A. Ready-Mixed Concrete and FTB™ - Cement, aggregate and potable water, in addition to all the required additive ingredients, measured and mixed according to approved mix design at an approved ES or certified NRMCA concrete batch plant and shipped to the site with an approved NRMCA concrete truck mixer. On site mixing of FTB is subject to Eversource approval.

   B. Concrete and FTB™ Mix Designs - ACI concrete mix deign shall be submitted for review and acceptance with the supporting trial batch test results performed by ACI testing laboratory submitted to ES for review and acceptance. Use of Fly Ash or slag cement is not permitted in any mix where 28 days compressive strength design is less than 500 psi.

   C. Fly ash shall be limited by weight to a maximum of 25% of the total cementitious.

5. Field Check of Utilities and Clearances

   A. Contractor shall construct and complete all duct bank systems as shown on the Plan and Profile Drawings and/or as specified in the contract with these constraints:

1) The information reflecting verified depths of utilities is provided in the potholing (test pit) data displayed in plan-view of the Plan & Profiles. This data supersedes any representations made in the plan and profile views.
2) At utility crossings, Contractor shall field verify existing utility embedment depths in advance of duct bank construction to ensure designed bending radii will be maintained. In instances where existing utilities are at depths substantially different than the design documents and clearances cannot be maintained, notify the engineer for direction.

6. Conduit Materials and Installation
   A. Refer to UTRM 235.
7. Duct/Conduit Proofing
   A. Refer to UTRM 237.
8. Visual Inspection of Conduits
   A. Refer to UTRM 237.
9. Duct/Conduit Taping and Report
   A. Refer to UTRM 237.
10. Temperature Monitoring (See applicable distributed Temperature Sensing UTRM 271 and UTRM 272)
11. Standards for Concrete
   A. IEEE STD 442 - - IEEE Guide for Soil Thermal Resistivity Measurements
   B. ASTM C31/C31M - Practice for Making and Curing Concrete Test Specimens in the Field
   C. ASTM C33/C33M - Specification for Concrete Aggregates
   D. ASTM C94/C94M - Standard Specification for Sampling Ready-Mixed Concrete
   E. ASTM C143/C143M - Test Method for Slump of Hydraulic-Cement Concrete
   F. ASTM C150/C150M - Specification for Portland Cement
   G. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete
   H. ASTM C231/C231M - Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
12. Concrete Materials
   A. Portland Cements: Cement for all classes of concrete shall conform to the requirements under ASTM C150.
   B. Aggregates:
      1) Aggregates shall conform to the specifications of ASTM C33 for use in concrete and C144 for use in masonry mortar.

2) The maximum aggregate size for use in concrete for duct lines shall be 3/8 inch.
3) Fine Aggregate. Fine aggregate shall be clean, hard, dense, free of foreign matter and shall consist of beach sand, manufactured fines, or a combination thereof.
4) Coarse Aggregate. Coarse aggregate shall consist of crushed stone or gravel manufactured from clean, hard, tough, dense, durable rock and free from adherent coatings.

C. Water: Water shall not contain injurious amounts of oil, acid, salt, alkali, organic matter, or other deleterious substances.

13. Concrete Strength and Admixtures

A. Unless specified otherwise on the construction drawings, all concrete shall meet the following requirements:
1) Strength: Minimum compressive strength 3,000 psi at twenty-eight (28) days
2) Slump: 6" ± 1"
3) Aggregate: Consisting of mixed sizes, but not to exceed 3/8".
4) Calcium shall not be used.
5) Admixture: Contractor shall obtain written approval from Eversource.
6) No air entrainment additives allowed. Maximum air entrainment from mixing is two percent (2%).

14. Concrete Quality Assurance

A. The Contractor shall be responsible for sourcing the material and thermal testing of the mix design. All costs associated with the design and testing shall also be borne by the Contractor.

B. The manufacturers of the products specified for work under this specification shall be in the business of manufacturing similar products and shall be able to provide a history of successful production of the specified products.

C. The facilities may be inspected by Eversource for approval. Any corrective work in the manufacture shall be performed at no cost to Eversource. The facilities shall be approved by Eversource before manufacture of materials is performed for the project.

D. A trial batch shall be made more than 30 days before any trench is opened and four cylinders tested in accordance with the Concrete Testing Requirements below. Contractor shall furnish certified reports of all tests to Eversource for approval. It is recommended the submittals (including test reports) be sent to Eversource's representative for review more than 10 days prior to ordering the materials needed for construction.

15. Concrete Quality, Mixing and Transporting

A. Ready-mixed concrete shall be used and the mixing, transporting, placing, and the quality shall meet the requirements as specified under ASTM C94.

16. Sampling of Concrete

A. For every fifty cubic yards placed, or portion thereof per worksite, one (1) thermal test cylinder shall be made. Each sample shall be taken and cast in four-inch (4") by eight-inch (8") test molds identified with the type of material, date of the sample, survey station location of the sample, and a copy of the batch ticket. Contractor shall send this set of samples to a test laboratory previously approved by Eversource's representative in writing for thermal testing.

B. Contractor shall keep a record of the sample numbers and the corresponding station locations (beginning and end) where the concrete mixture associated with each sample was installed.

C. Two (2) compression test cylinders shall be taken for each fifty (50) cubic yards of concrete placed. The cylinders shall be marked or tagged with the date, temperature, time of day cylinders were taken, survey station of the location, delivery truck or batch number and slump. The Contractor shall keep the cylinders protected from the weather in a manner that best approximates the concrete that was placed.

17. Concrete Testing Requirements

A. Field tests listed below shall be made at the point of placement in the presence of Eversource in accordance with ASTM C31, C94 and C172. Equipment supplies and qualified personnel for field-testing shall be supplied by Contractor. An independent testing lab, approved by Eversource in writing, retained, coordinated and paid by Contractor, shall take the test samples and perform the tests.

1) A slump test shall be made each day. Slump shall be in accordance with ASTM C143. After two successful slump tests, this requirement can be waived by the Eversource representative.

2) Air content shall be determined from each test cylinder taken, in accordance with ASTM C231.

3) Compression Tests:

a) Two (2) compression test cylinders shall be made for each fifty (50) cubic yards of concrete placed. One cylinder of each set shall be tested at seven (7) days with the other cylinder being tested at twenty-eight (28) days.

b) If the 7-day test falls more than 15% below the anticipated 7-day strength, notify the Eversource representative.

4) Thermal Tests:

a) One (1) thermal test cylinder shall be made for every fifty (50) cubic yards of concrete placed. The cylinders shall be sent to Geotherm USA or a testing laboratory approved by Eversource's representative. Contractor shall be responsible for all costs associated with this testing.

b) The maximum thermal resistivity, ρ, for the duct bank concrete shall be 55 C°·cm/W at two percent (2%) moisture content and 75 C°·cm/W at zero percent (0%) moisture.

5) Contractor shall furnish Eversource with the certified reports of all tests within 10 days of receipt.

18. Test Failures Concrete

A. If any test does not meet the requirements of this Technical Specification, the Contractor shall perform three (3) additional tests in locations specified by Eversource's representative. Any strength of thermal test failures should be brought to the attention of Eversource's representative.

B. In the event of a thermal test failure, the Contractor has the option of either replacing the failed thermal backfill or concrete or submitting remedial options to Eversource's representative for review and possible approval.

1) One alternative that can be assessed is to dig out additional native material adjacent to the duct bank and placing either FTB™ or additional thermal concrete. However, the amount and type of replacement fill needs to be determined by Eversource or an engineer knowledgeable with thermal heat transfer theory calculations.

19. Requirements for Placing Concrete:

A. Eversource's representative shall be present for the placement of concrete.

B. Concrete shall be batched only in such quantities as are required for immediate use and placement. Any concrete, as determined by Eversource's representative, having initial set before placing and finishing shall be discarded and shall not be used for the work. No remixing with water or with other materials will be permitted once the initial set has taken place.

C. Concrete shall be placed as near as possible to its final position to avoid segregation of the materials and displacement of ducts, spreaders, inserts and reinforcement. The placement shall be completed within thirty (30) minutes after water is first added to the mix. However, when the concrete is continually agitated, the time may be extended to one and one-half (1-½) hours. Retamping will not be permitted after the concrete has had its initial set.

D. Concrete shall be placed on clean, damp surfaces, free from water to the full depth of the duct bank.

E. Concrete shall not be dropped a distance of more than five (5) feet unless approved in writing by Eversource.

F. A 10-mil polyethylene sheet material break shall be placed on top of concrete and prior to FTB™ placement. The polyethylene sheet shall extend four (4) to six (6) inches over the edge of the concrete encasement.

20. Consolidation of Concrete

A. Concrete vibration shall be done only with the greatest of care. Excessive vibration may cause aggregation separation damaging the integrity of duct bank system. Vibrator shall not come in contact with the ducts.

B. Any concern for inadequate flow of the concrete around the ducts should be improved by the use of 1" diameter "pencil" vibrators. Alternatively, if authorized, all duct bank concrete could be compacted by use of hand spades. If spades are selected, the spade

shall be inserted into the fresh concrete to the level of the bottom ducts, on both sides of each row of ducts and at intervals not greater than nine (9) inches along the ducts. Only a minimum use of vibrators or spades should be used to ensure that there are no voids present around ducts in finished duct bank.

C. As the concrete is poured along the trench the vibrator should be inserted into the concrete before it gets more than one foot in depth. As the concrete depth is increased the vibrator should be inserted frequently enough to insure the concrete flows around all embedded items in the trench. No voids in concrete are permitted.

D. The placement of the concrete needs to be slow enough for the vibrator to be inserted sufficiently. Note that a rule of thumb for the zone of effectiveness is a radius of 4 X the vibrator diameter.

E. Vibrator shall not come in contact with the conduit in order to avoid inflicting damage.

F. Vibrator shall not be left in one area too long to avoid the separation of the aggregate.

21. Surface Finishes for Concrete

A. All concrete surfaces exposed at or above grade shall be smooth and free from defects. Metal ties, where used, shall be removed and the resulting holes filled with mortar. The tops of encased duct bank over which backfill is to be placed shall be sufficiently level prior to the commencement of backfilling.

22. Curing of Concrete:

A. Curing operations shall be started as soon as the concrete has attained initial set. The heat generated by concrete hydration shall not have adverse effect on PVC conduits.

B. Concrete for encased duct lines shall be sufficiently cured to avoid compromise of the installation, whether backfilled with Fluidized Thermal Backfill (FTB™) or with soil backfill. After curing, motor traffic is allowed to pass over the duct bank provided an asphalt road base or non-skid steel plate has been installed over the trench of the duct bank.

23. Cold Weather Concreting:

A. All concrete materials, all forms and ground, with which the concrete is to come in contact with, shall be free from frost.

B. When atmospheric temperature is below 40°F, the aggregates and/or water for the concrete shall be heated uniformly such that the temperature of the aggregates and water mixture at the time of introduction of the cement and the temperature of the concrete at the time of placement shall be not less than 60°F or more than 95°F. The aggregates shall be free from ice, frost and frozen lumps when introduced into the mixture.

C. All concrete which has not attained an age of twenty-four (24) hours before the atmospheric temperature falls below 40°F shall be covered by a framework of satisfactory material then at least six (6) inches of loose dirt or other insulating material that will maintain an air temperature surrounding the new concrete at a minimum of 50°F for at least seven days. If the concrete curing has not been assisted by methods such as

spraying with a liquid curing agent, water ponding or spraying a mist over the concrete, this period must be extended to at least 10 days with a temperature of above 50°F. It shall be Contractor's responsibility to see that the concrete test cylinders receive the same protection as the concrete duct bank.

D. Concrete placement will not be allowed to continue when the atmospheric temperature is 38°F and falling. Concrete placement will not be allowed to begin until the atmospheric temperature is 34°F and rising. Cold weather concrete work is not approved unless approved by Eversource in writing.

24. Hot Weather Concreting

As follows are requirements for all concrete work done when the temperature is 80°F (or forecasted to rise above this temperature within twenty-four (24) hours after concrete placement):

A. Mixing water shall be kept cool

B. Aggregate stockpiles shall be saturated, and the surface kept moist by intermittent sprinkling or by a continuous fog spray

C. The basic water-cement ratio shall be maintained

D. Forms, reinforcing and subgrade surfaces shall be wetted just before concrete is place. Wetting down of areas around the work is recommended.

E. If the temperature is above 85°F or is 80°F to 85°F and windy, then the provisions of ACI 305R shall be followed.

25. Concrete Forms

A. The finished forms shall be true to the required dimensions and grades, with smooth surfaces, mortar tight joints, and of sufficient strength to resist springing out of shape during the placing of concrete. The inside surfaces shall be thoroughly coated with commercial quality form oil. Forms may be of wood, metal, or any material approved by Eversource's representative and shall be free of defects. All vertical exposed surfaces shall be formed with new plywood or with metal.

B. Any form proposed to be abandoned in place requires approval by Eversource.

26. Standards for Testing FTB™

A. IEEE STD 442 - IEEE Guide for Soil Thermal Resistivity Measurements

B. ASTM C31/C31M - Practice for Making and Curing Concrete Test Specimens in the Field

C. ASTM C94/C94M - Standard Specification for Sampling Ready-Mixed Concrete

D. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete

27. Fluidized Thermal Backfill ("FTB™") Description and Requirements

A. FTB™ is a free-flowing slurry, controlled density fill, consisting of stone aggregate, sand, cement, and a fluidizing agent, specifically engineered to meet thermal resistivity and stability criteria.

B. FTB™ shall not contain any aggregates exceeding the lesser of ¾ inch or 4 times the clear distance the FTB must flow between.

C. FTB™ shall be designed by a qualified firm approved by Eversource's representative. Testing must be repeated on re-used mixed designs if no test was performed within the previous 12 months.

D. The Contractor shall be responsible for sourcing the material and thermal testing of the mix design. All costs associated with the design and testing shall also be borne by the Contractor.

E. To qualify the FTB (as noted below in Section 27.C), the maximum thermal resistivity, ρ, for the backfill material shall be 60 C°·cm/W at three percent (3%) moisture and 120 C°·cm/W at zero percent (0%) moisture.

F. The in-situ field maximum thermal resistivity, ρ, for the backfill material shall be 65 C°·cm/W at three percent (3%) moisture and 130 C°·cm/W at zero percent (0%) moisture.

G. The FTB shall have adequate compressive strength to support HS-20 AASHTO Truck wheel load plus impact, but shall not less than 50 psi and not more than 200 psi at 28 days curing.

H. Slump
   1) When vibrator is needed: Slump of 6" (with a variance of -1" or +2" (I.e. 5" to 8")).
   2) Without vibrator: Slump of 9" (with a variance of -1" or +2" (I.e. 8" to 11")).

28. Quality Assurance of FTB™

A. Manufacturers of the products specified for work under this specification shall be in the business of manufacturing similar products and shall be able to provide a history of successful production of the specified products.

B. The facilities may be inspected by Eversource's representative for approval. Any corrective work in the manufacture shall be performed at no cost to Eversource. The facilities shall be approved by Eversource's representative before manufacture of materials is performed for the project.

C. A trial batch shall be made and tested (see Laboratory Testing and Submittals below) more than 30 days before any trench is opened (in which FTB™ would be used). The Contractor shall furnish certified reports of all tests to Eversource's representative for approval. It is recommended the submittals (of mix design and test reports) be sent to Eversource for review more than 10 days prior to ordering the materials needed for construction.

29. Laboratory Testing and Submittals for FTB™

A. The FTB™ and specific quarry from which the aggregate was obtained shall be submitted to Eversource's representative based on testing done by a laboratory pre-approved by Eversource's representative. The approved quarry, perhaps even a restricted sector of the quarry, is then the only approved source of the aggregate for FTB™.

B. Materials mixtures shall be determined and approved by Eversource's representative. In general, with the guidance of the laboratory, mix samples will be selected and sent to the laboratory for testing.

C. The laboratory test shall be done by Geotherm USA or at a laboratory approved by Eversource's representative. All thermal testing shall be performed in accordance with IEEE Std 442 guidelines

D. Thermal dry-out curves showing the thermal resistivity, ρ, as a function of moisture shall be provided to Eversource initially and every time the FTB™ mix, quarry, or concrete supplier changes

E. The cylinders taken for strength testing shall be tested after the FTB™ would normally reach its full strength.

F. The laboratory shall inform Contractor which mixture is suitable.

G. Contractor shall furnish certified reports of all tests to Eversource's representative. It is recommended that submittals to Eversource's representative be made more than 10 days prior to ordering the materials needed for construction.

30. Sampling and testing FTB™

A. Field tests listed below shall be made at the point of placement in the presence of Eversource in accordance with ASTM C31, C94 and C172. Excessive rodding shall be avoided. Equipment supplies and qualified personnel for field-testing shall be supplied by Contractor. An independent testing lab, approved by Eversource in writing, retained and paid by Contractor, shall take the test samples and perform the tests.

1) Compression Tests:

a) Two (2) compression test cylinders shall be taken for each fifty (50) cubic yards of FTB™ placed. The cylinders shall be marked or tagged with the date, temperature, time of day cylinders were taken, survey station of the location, delivery truck or batch number and slump. The Contractor shall keep the cylinders protected from the weather in a manner that best approximates the FTB™ that was placed. One cylinder of each set shall be tested at twenty-eight (28) days with the other cylinder being saved for retesting as necessary.

2) Thermal Tests:

a) For every fifty cubic yards placed, or portion thereof per worksite, one (1) thermal test cylinder shall be made. Each sample shall be taken and cast in four-inch (4") by eight-inch (8") test molds identified with the type of material, date of the sample, survey station location of the sample, and a copy of the batch ticket. The Contractor shall send this set of samples to a test laboratory previously approved by Eversource's representative in writing for thermal testing.

3) The Contractor shall keep a record of the sample numbers and the corresponding station locations (beginning and end) where the FTB™ mixture associated with each sample was installed.
4) Contractor shall furnish Eversource with the certified reports of all tests within 10 days of receipt.

31. Test Failures of FTB™

A. If any test does not meet the requirements of this Technical Specification, the Contractor shall perform three (3) additional tests in locations specified by Eversource's representative. Any strength of thermal test failures should be brought to the attention of Eversource's representative.

B. In the event of a thermal test failure, the Contractor has the option of either replacing the failed thermal backfill or submitting remedial options to Eversource's representative for review and possible approval.
1) One alternative that can be assessed is to dig out additional native material adjacent to the duct bank and place additional FTB™. However, the amount and type of replacement fill needs to be determined by Eversource or an engineer knowledgeable with thermal heat transfer theory calculations.

32. Timing of Backfilling and Traffic Loading

A. Backfilling with fluidized thermal backfill (FTB™) may commence after the duct bank concrete has cured sufficiently to avoid compromise of the installation.

B. Concrete for encased duct lines, backfilled with fluidized thermal backfill, shall be sufficiently cured to avoid compromise of the installation before motor traffic is allowed to pass over it, provided that the asphalt road base has also been installed over the duct lines, or non-skid steel plating has been installed. In CT see ConnDOT Encroachment Agreement, ConnDOT standards and ConnDOT specifications.

C. After backfilling with soil, traffic may pass, provided that the asphalt road base or non-skid steel plate has also been installed over the duct lines.

33. Thermal Sand

A. In specific circumstances, thermal sand may be identified as the required backfill as noted for certain areas in the "Issued for Construction" Plan and Profile drawings.

B. Thermal sand shall be procured and qualified as per the specifications outlined in UTRM 109.

34. Thermal Sand Compaction

A. Approved compaction devices for trench backfilling of thermal sand are plate vibrators, vibratory rollers, and jumping jack compactors. The vibratory type compactors are more efficient with granular (non-cohesive) soils and impact type (sheep foot rollers) are more effective with clayey soils. Small compactors such as plate vibrator and jumping jack are

easy to maneuver and achieve good compaction in narrow areas, and therefore are preferred over larger roller types, which tend to bridge over loose spots at depth.

B. Thickness of the layers of un-compacted materials should be kept as this as practicably possible.

C. When large areas are the be filled in, conventional, larger size equipment for grading and compaction can be used at Eversource's approval.

D. Standard civil engineering practices for installation and ASTM quality control testing should be followed.

E. The material should be installed in thin lifts of no more than 6"-8" of un-compacted thickness having moisture content close to its optimum moisture content.

F. Backfill must be compacted to a dry density of not less than 95% of Standard Proctor Density (unless otherwise specified by the field engineer).

1) In areas of heavy structures and deep foundations, or where any settlement is not acceptable, the installed density may have to be increased to 100% Standard Proctor Density. These instances should be submitted to Eversource for review and approval.

35. Quality Assurance and Testing of Thermal Sand During Construction

A. Select backfills should be free of organic material such as root matter and vegetation.

B. Moisture content of the backfill should be +/- 1% of the specified optimum moisture content value.

C. Appropriate and/or approved compaction equipment such as vibratory roller or jumping jack compacter should be utilized.

D. Density and Moisture Content Measurements:

1) In-situ density and moisture content measurements must be made every 50' along the trench or every fifty (50) cubic yards of installed backfill. These measurements must be conducted by an independent material testing firm approved by Eversource's representative. The most commonly used test equipment is the nuclear density gauge (Troxler).

2) If the installed density falls below the specified value, additional compaction runs must be made.

3) Records of all field tests must be submitted to the field engineer each day.

E. Thermal Tests:

1) One (1) thermal test cylinder shall be made for every fifty (50) cubic yards of concrete placed. The cylinders shall be sent to Geotherm USA or a testing laboratory approved by Eversource's representative. Contractor shall be responsible for all costs associated with this testing.

2) The contractor will need to provide the density and moisture values at each location submitted for thermal analysis. Where the thickness of the installed backfill is greater than 2', these values will be required for each layer above the cable or duct bank.

3) The maximum thermal resistivity, ρ, for the thermal sand at 95% compaction shall be 60 C°·cm/W at three percent (3%) moisture content and 100 C°·cm/W at zero percent (0%) moisture, as outlined in UTRM 109.
4) Contractor shall furnish Eversource with the certified reports of all tests within 10 days of receipt.

36. Documentation of Testing and Inspection

A. All test reports, inspection reports, video and photographs shall be listed and documented in a single file for future audit/review. This file must be either created in an electronic form or be converted into an electronic form suitable for email.

B. All of these documents, or a copy of them, must be kept in the same office and provided to Eversource as part of the final QA/QC package.

37. As Built requirements –Survey in X, Y, Z State Plane coordinates.

A. Survey requirements
1) All Survey work shall be performed by or under the direct supervision of a licensed Land Surveyor, licensed in the applicable State.
2) Survey measurements shall be taken at every 25 linear feet of duct bank, at whole foot stations when achievable. Survey measurements shall be taken at all PC and PT stations as well.
3) Survey measurements shall include the horizontal and vertical locations of the duct bank at the top left, top right, bottom center of concrete and top of FTB at the duct bank centerline.
4) As-built location of vaults require the Survey location of all vault MH covers, top four corners of the vault chamber and a measurement from the MH rim to bottom of chamber
5) The Survey shall depict the horizontal and vertical as-built location of project features in relationship to existing site features. Base-line stations, vaults MH, existing or realigned utilities and other features to be shown.
6) Final deliverables shall include one (1) electronic record set per Town/City, pdf copy of the signed final plan, dwg in AutoCAD or compatible format. Copies of all field notes, survey control and raw data shall be provided to Eversource Survey Engineering for their use. Point file in CSV or TXT format shall be provided in P. N. E. Z. D. comma delineated format. Point file to list all field located points, survey control, etc.

All survey work shall be reviewed by the Eversource Survey Engineering department, and when possible, photos shall be taken and provided.

B. Survey shall be done using a continuous geospatial X, Y, Z coordinate recording system.
1) The Contractor shall submit a USB flash drive containing a video inspection report for the inside of each section of conduit.

2) The Contractor shall submit geospatial coordinates for the installed duct bank system based upon the State Plane Coordinate System (SPCS) in Microsoft Excel file format, P. N. E. Z. D, comma delineated format.
3) The Contractor is responsible for updating and revising the “Issued for Construction” Plan and Profile drawings in AutoCAD.
4) The Contractor shall keep on site a complete hard copy of the most up to date as-builts reflecting the installation progress. The Contractor shall provide a copy of these as-builts to the Project Construction Field Representative at the end of each work week. A copy is then to be transmitted to Engineering for reference.

38. Price Adjustments

A. Price adjustments will not be provided for utilities shown in the plan view on the Plan Drawings. Price adjustments will be provided for unknown utilities only, not for utilities incorrectly drawn.

39. Deviations

This standard sets forth the current Eversource 'best practices' for most applications of this subject matter. Therefore, deviation from this standard is generally not permitted. However, in unique instances a user may submit a written deviation request including justification to the listed Subject Matter Expert (SME). The SME must approve or deny the request in writing prior to the user commencing any non-standard activities. The SME may consult with his/her supervisor, co-SME if any and co-SME supervisor, and subsequently must copy any approval to them.

40. Cognizant Engineering Groups

Transmission Line and Civil Engineering

Transmission Engineering

Revision History:

Rev. 0 – Original Issued 12/13/2007.

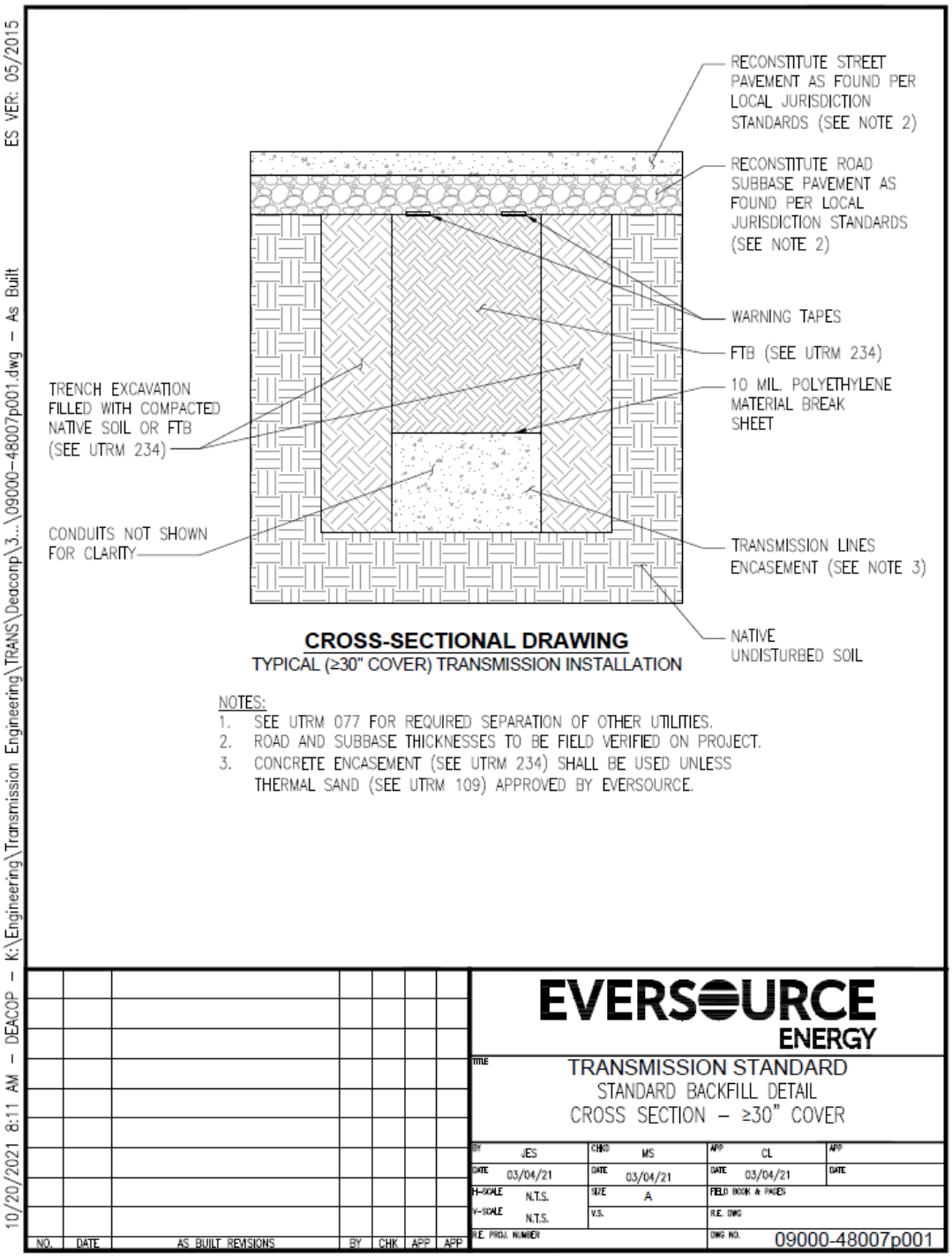
Rev. 1 – Added Annex A & Annex B, Duct Bank Sketches. Sections 4, 6.E, 7, 11, 15, 19, 20.B, and 25.F revised. 1/22/2009.

Rev. 2 – Changed all instances of Northeast Utilities and NU to Eversource; Specifying UTRM 271 and 272 for temperature monitoring, field utility verification, Addition of Polyethylene sheet, FTB dyed red for Conn DOT, As-built requirements. 01/14/2020.

Rev. 3 – Specifying UTRM 237 for conduit testing, update to FTB testing section, revision of FTB strength requirements, revision of Annex A & B, removal of Annex C, 04/05/2021

Rev. 4 – Addition of Thermal Sand installation and QA/QC requirements and definitions of concrete mix designs. Definition of ready mix and concrete or FTB mix design. Addition of required details on mixes, FTB max aggregate size and re-use of previously qualified design, 11/30/2021

Appendix A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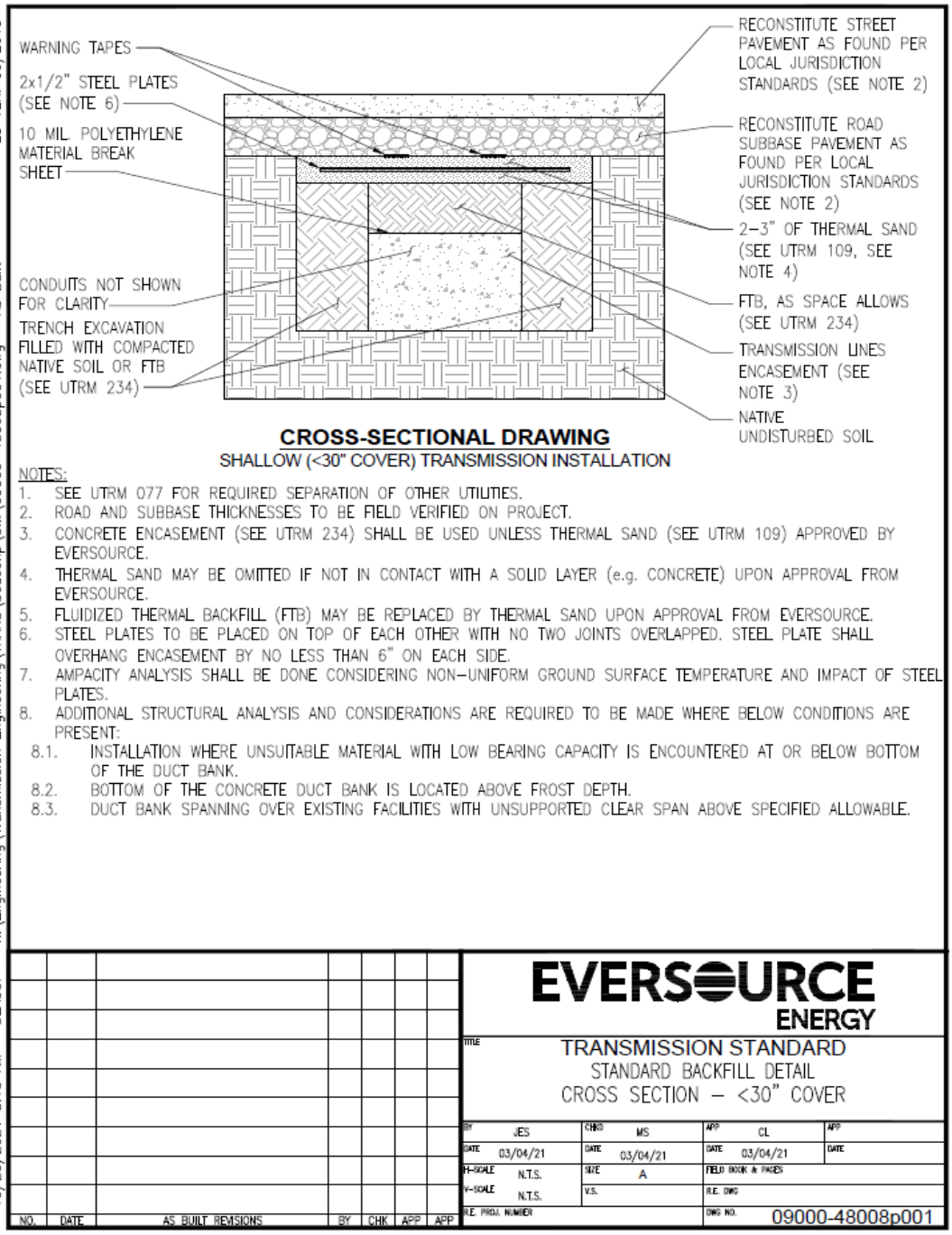
10/20/2021 8:11 AM - DEACOP - K:\Engineering\Transmission Engineering\TRANS\Deaconp\3...\09000-48007p001.dwg - As Built
RECONSTITUTE STREET PAVEMENT AS FOUND PER LOCAL JURISDICTION STANDARDS (SEE NOTE 2)
RECONSTITUTE ROAD SUBBASE PAVEMENT AS FOUND PER LOCAL JURISDICTION STANDARDS (SEE NOTE 2)
WARNING TAPES
FTB (SEE UTRM 234)
10 MIL. POLYETHYLENE MATERIAL BREAK SHEET
TRENCH EXCAVATION FILLED WITH COMPACTED NATIVE SOIL OR FTB (SEE UTRM 234)
CONDUITS NOT SHOWN FOR CLARITY
TRANSMISSION LINES ENCASEMENT (SEE NOTE 3)
NATIVE UNDISTURBED SOIL
CROSS-SECTIONAL DRAWING
TYPICAL (≥30" COVER) TRANSMISSION INSTALLATION
NOTES:
1. SEE UTRM 077 FOR REQUIRED SEPARATION OF OTHER UTILITIES.
2. ROAD AND SUBBASE THICKNESSES TO BE FIELD VERIFIED ON PROJECT.
3. CONCRETE ENCASEMENT (SEE UTRM 234) SHALL BE USED UNLESS THERMAL SAND (SEE UTRM 109) APPROVED BY EVERSOURCE.
NO. DATE AS BUILT REVISIONS BY CHK APP APP
EVERSOURCE ENERGY
TITLE
TRANSMISSION STANDARD
STANDARD BACKFILL DETAIL
CROSS SECTION – ≥30" COVER
BY JES
CHKD MS
APP CL
APP
DATE 03/04/21
DATE 03/04/21
DATE 03/04/21
DATE
H-SCALE N.T.S.
V-SCALE N.T.S.
SIZE A
V.S.
FIELD BOOK & PAGES
R.E. DWG
R.E. PROJ. NUMBER
DWG NO. 09000-48007p001

Appendix B



CROSS-SECTIONAL DRAWING
SHALLOW (<30" COVER) TRANSMISSION INSTALLATION

NOTES:
1. SEE UTRM 077 FOR REQUIRED SEPARATION OF OTHER UTILITIES.
2. ROAD AND SUBBASE THICKNESSES TO BE FIELD VERIFIED ON PROJECT.
3. CONCRETE ENCASEMENT (SEE UTRM 234) SHALL BE USED UNLESS THERMAL SAND (SEE UTRM 109) APPROVED BY EVERSOURCE.
4. THERMAL SAND MAY BE OMITTED IF NOT IN CONTACT WITH A SOLID LAYER (e.g. CONCRETE) UPON APPROVAL FROM EVERSOURCE.
5. FLUIDIZED THERMAL BACKFILL (FTB) MAY BE REPLACED BY THERMAL SAND UPON APPROVAL FROM EVERSOURCE.
6. STEEL PLATES TO BE PLACED ON TOP OF EACH OTHER WITH NO TWO JOINTS OVERLAPPED. STEEL PLATE SHALL OVERHANG ENCASEMENT BY NO LESS THAN 6" ON EACH SIDE.
7. AMPACITY ANALYSIS SHALL BE DONE CONSIDERING NON–UNIFORM GROUND SURFACE TEMPERATURE AND IMPACT OF STEEL PLATES.
8. ADDITIONAL STRUCTURAL ANALYSIS AND CONSIDERATIONS ARE REQUIRED TO BE MADE WHERE BELOW CONDITIONS ARE PRESENT:
   - 8.1. INSTALLATION WHERE UNSUITABLE MATERIAL WITH LOW BEARING CAPACITY IS ENCOUNTERED AT OR BELOW BOTTOM OF THE DUCT BANK.
   - 8.2. BOTTOM OF THE CONCRETE DUCT BANK IS LOCATED ABOVE FROST DEPTH.
   - 8.3. DUCT BANK SPANNING OVER EXISTING FACILITIES WITH UNSUPPORTED CLEAR SPAN ABOVE SPECIFIED ALLOWABLE.

NO.	DATE	AS BUILT REVISIONS	BY	CHK	APP	APP

EVERSOURCE ENERGY

TITLE: TRANSMISSION STANDARD
STANDARD BACKFILL DETAIL
CROSS SECTION – <30" COVER

BY JES	CHKD MS	APP CL	APP
DATE 03/04/21	DATE 03/04/21	DATE 03/04/21	DATE
H-SCALE N.T.S.	SIZE A	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E. DWG	
R.E. PROJ. NUMBER		DWG NO. 09000-48008p001	

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10/20/2021 8:15 AM – DEACOP – K:\Engineering\Transmission Engineering\TRANS\Deaconp\3...\09000-48008p001.dwg – As Built

NORFOLK COUNTY, MASSACHUSETTS
TOWN OF STOUGHTON

LEGEND

- PROPOSED PIPE TYPE CABLE
- CENTER LINE TRENCH AS-BUILT
- PROPERTY LINE
- EDGE OF PAVEMENT
- CONTOUR (10-FOOT INTERVAL)
- CONTOUR (2-FOOT INTERVAL)
- FENCE
- GUARD RAIL
- OVERHEAD WIRES (OHW)
- DRAIN LINE (D)
- SEWER LINE (S)
- WATER LINE (W)
- GAS LINE (G)
- ELECTRICAL LINE (E)
- TELEPHONE LINE (T)
- CABLE TV LINE (CA)
- STEAM LINE (ST)
- UNKNOWN LINE (U)
- CONCRETE BOUND
- IRON PIN
- UTILITY MANHOLE (E) (D) (G) (S) (T) (CA) (U)
- CATCH BASIN
- UTILITY POLE
- GUY ANCHOR
- ELECTRICAL SIGNAL BOX (SB)
- EMERGENCY FIRE BOX
- WATER GATE (WG)
- GAS GATE (G)
- HYDRANT
- TRAFFIC SIGN
- TRAFFIC SIGNAL
- ELECTRICAL SIGNAL BOX
- GATE POST / BOLLARD
- TREE
- SOIL PROBE (SP-1)
- WELD

ENVIRONMENTAL CONDITIONS LEGEND

- SILT FENCE
- HAY BALES
- PRESUMPTIVE WETLAND BOUNDARY
- GUTTER BUDDY (GB)
- CATCH BASIN PROTECTION* (CBP)

* SEE DRAWING 100768-DETAIL.DWG FOR DETAILS AND CATCH BASIN PROTECTION OPTIONS

NOTES

1. SITE DETAIL SHOWN HEREON IS A RESULT OF AN ON-THE-GROUND FIELD SURVEY PERFORMED BY COLER & COLANTONIO, INC. WINTER 2004.

2. AS-BUILT DETAIL SHOWN HEREON IS A RESULT OF AN ON-THE-GROUND FEILD SURVEY PERFORMED BY BOND BROTHERS, INC. MARCH 2006.

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5. SURVEY WAS CONDUCTED IN MASSACHUSETTS MAINLAND ZONE 2001, NAD83 HORIZONTAL COORDINATE SYSTEM. ELEVATIONS ARE BASED ON BOSTON CITY DATUM AND REFERENCED TO TEMPORARY BENCHMARKS AS SHOWN ON THE PLAN.

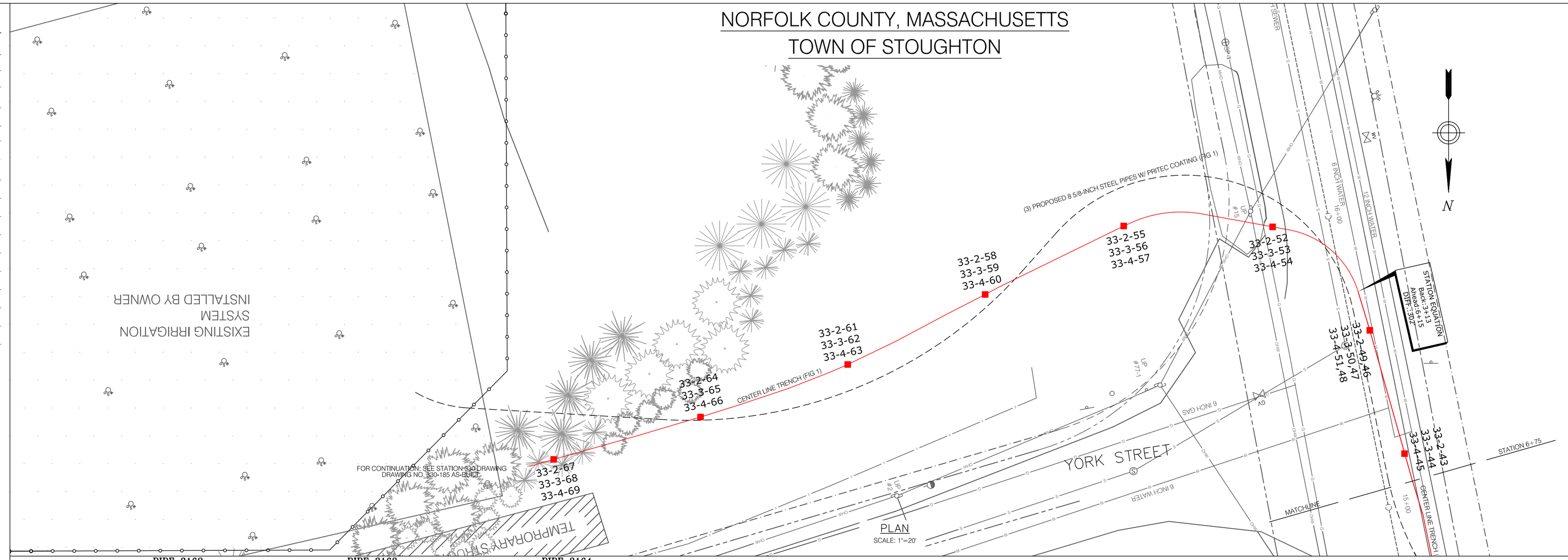
6. ENVIRONMENTAL CONDITIONS INFORMATION PROVIDED BY SHAW ENVIRONMENTAL, INC.

7. THE LOCUS LIES IN FIRM ZONE "C", DESCRIBED ON COMMUNITY PANEL NUMBER 250286 0021C, EFFECTIVE DATE APRIL 1, 1982, PREPARED BY F.E.M.A.

8. PURPOSE OF THIS PLAN IS TO IDENTIFY THE TRENCH LOCATION, PIPE DEPTH, AND STRUCTURE LOCATIONS.

9. SEE GZA GEOENVRIONMENTAL, INC. BORING LOGS FOR SOIL PROBE DATA.

10. FOR LINE DETAILS, REFERENCE S-4782-172, S-4782-173, S-4782-174, & S-4782-175.



PLAN
SCALE: 1"=20'

* STATION EQUATION IS USED TO FOLLOW THE PROPOSED STATIONNING WITHOUT MODIFICATION.

* REFER TO TRENCH DETAIL (FIG.) FOR BACKFILL TYPE UNLESS OTHERWISE NOTE.

WELD TABLE

PIPE 3162

Weld	Northing	Easting	Station
33-2-67	2876989.2	764039.0	0+09
33-2-64	2876974.9	763889.5	0+60
33-2-61	2876957.3	763940.0	1+13
33-2-58	2876933.7	763893.7	1+65
33-2-55	2876910.6	763847.1	2+17
33-2-52	2876910.9	763797.0	2+68
33-2-49,46	2876945.7	763764.2	6+22
33-2-43	2876987.2	763752.5	6+65

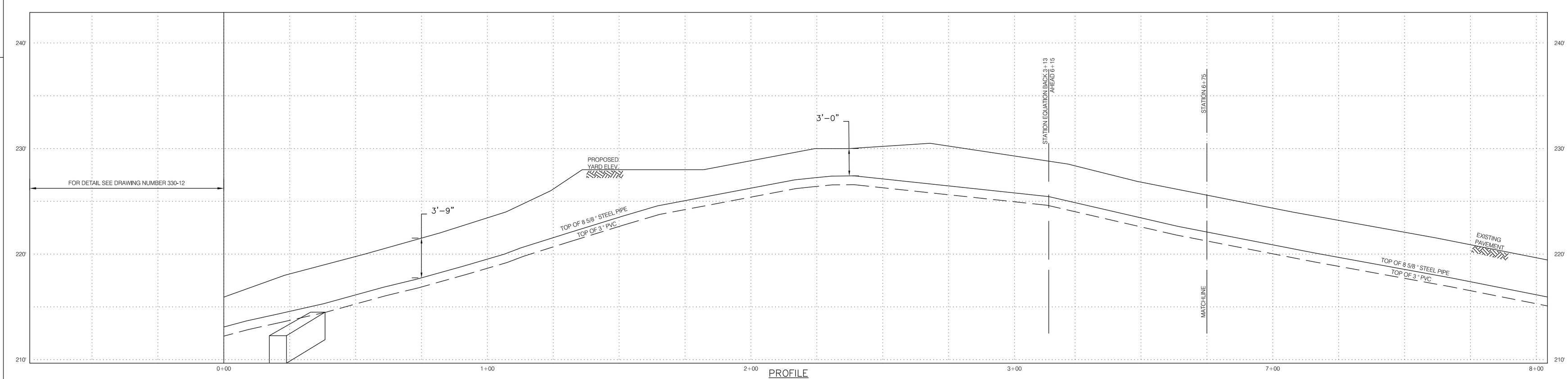
PIPE 3163

Weld	Northing	Easting	Station
33-3-68	2876989.2	764039.0	0+09
33-3-65	2876974.9	763889.5	0+60
33-3-62	2876957.3	763940.0	1+13
33-3-59	2876933.7	763893.7	1+65
33-3-56	2876910.6	763847.1	2+17
33-3-53	2876910.9	763797.0	2+68
33-3-50,47	2876945.7	763764.2	6+22
33-3-44	2876987.2	763752.5	6+65

PIPE 3164

Weld	Northing	Easting	Station
33-4-69	2876989.2	764039.0	0+09
33-4-66	2876974.9	763889.5	0+60
33-4-63	2876957.3	763940.0	1+13
33-4-60	2876933.7	763893.7	1+65
33-4-57	2876910.6	763847.1	2+17
33-4-54	2876910.9	763797.0	2+68
33-4-51,48	2876945.7	763764.2	6+22
33-4-45	2876987.2	763752.5	6+65

ENVIRONMENTAL CONDITIONS



PROFILE
HOR. SCALE: 1"=20'
VER. SCALE: 1"=5'

REFERENCE DRAWINGS

DRAWING NO.	TITLE	DRAWING NO.	TITLE
S-4782-172	TRENCH DETAILS		
S-4782-173	TRENCH DETAILS		
S-4782-174	TRENCH DETAILS		

REVISIONS

NO.	DATE	REMARKS	REV.	CKD.	COR.	APP.
0	03/06	DRAFT AS-BUILT	BBI	JL		ED
	05/06	FINAL AS-BUILT				

Design/Engineering
POWER ENGINEERS
COLER & COLANTONIO INC
ENGINEERS AND SCIENTISTS

Owner/Operator
NSTAR ELECTRIC GAS

General Contractor
BOND Brothers

SPECIFICATIONS

NSTAR ELECTRIC COMPANY
345 KV PIPE TYPE CABLE
STOUGHTON TO K STREET
AS-BUILT

File No.: S-4782-001-004AB.dwg

APPROVED BY

DATE: 3/24/06 MANAGER

NSTAR ELECTRIC COMPANY

S-4782-001AB

A00888 - 24

Proposal No. 613558-129697

NORFOLK COUNTY, MASSACHUSETTS
TOWN OF STOUGHTON

LEGEND

- PROPOSED PIPE TYPE CABLE
- CENTER LINE TRENCH AS-BUILT
- PROPERTY LINE
- EDGE OF PAVEMENT
- CONTOUR (10-FOOT INTERVAL)
- CONTOUR (2-FOOT INTERVAL)
- FENCE
- GUARD RAIL
- OVERHEAD WIRES
- DRAIN LINE
- SEWER LINE
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- GAS LINE
- ELECTRICAL LINE
- TELEPHONE LINE
- CABLE TV LINE
- STEAM LINE
- UNKNOWN LINE
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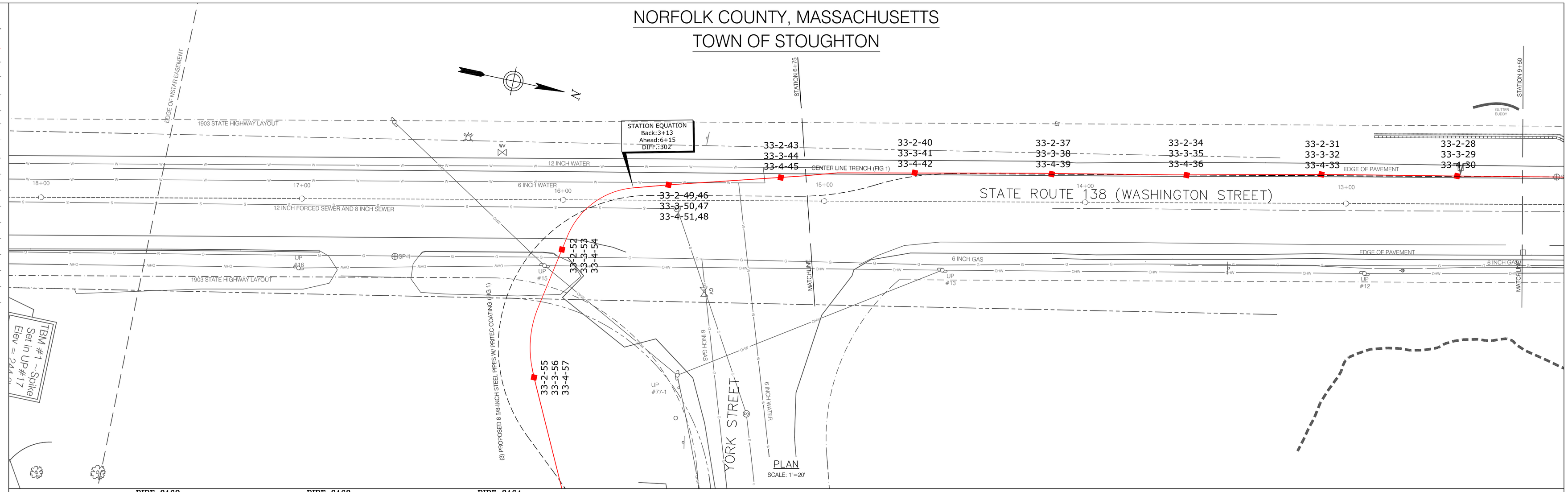
- IRON PIN
- UTILITY MANHOLE
- CATCH BASIN
- UTILITY POLE
- GUY ANCHOR
- ELECTRICAL SIGNAL BOX
- EMERGENCY FIRE BOX
- WATER GATE
- GAS GATE
- HYDRANT
- TRAFFIC SIGN
- TRAFFIC SIGNAL
- ELECTRICAL SIGNAL BOX
- GATE POST / BOLLARD
- TREE
- SOIL PROBE
- WELD



WELD TABLE

PIPE 3162

Weld	Northing	Easting	Station
33-2-55	2876910.6	763847.1	2+17
33-3-52	2876910.9	763797.0	2+68
33-2-49,46	2876945.7	763764.2	6+22
33-2-43	2876987.2	763752.5	6+65
33-2-40	2877037.0	763740.1	7+17
33-2-37	2877088.5	763729.7	7+69
33-2-34	2877139.1	763719.3	8+21
33-2-31	2877189.5	763708.3	8+73
33-2-28	2877240.5	763698.1	9+25

PIPE 3163

Weld	Northing	Easting	Station
33-3-56	2876910.6	763847.1	2+17
33-3-53	2876910.9	763797.0	2+68
33-3-50,47	2876945.7	763764.2	6+22
33-3-44	2876987.2	763752.5	6+65
33-3-41	2877037.0	763740.1	7+17
33-3-38	2877088.5	763729.7	7+69
33-3-35	2877139.1	763719.3	8+21
33-3-32	2877189.5	763708.3	8+73
33-3-29	2877240.5	763698.1	9+25

PIPE 3164

Weld	Northing	Easting	Station
33-4-57	2876910.6	763847.1	2+17
33-4-54	2876910.9	763797.0	2+68
33-4-51,48	2876945.7	763764.2	6+22
33-4-45	2876987.2	763752.5	6+65
33-4-42	2877037.0	763740.1	7+17
33-4-39	2877088.5	763729.7	7+69
33-4-36	2877139.1	763719.3	8+21
33-4-33	2877189.5	763708.3	8+73
33-4-30	2877240.5	763698.1	9+25

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* REFER TO TRENCH DETAIL (FIG.) FOR BACKFILL TYPE UNLESS OTHERWISE NOTE.

ENVIRONMENTAL CONDITIONS LEGEND

- SILT FENCE
- HAY BALES
- PRESUMPTIVE WETLAND BOUNDARY
- GUTTER BUDDY (GB)
- CATCH BASIN PROTECTION* (CBP)

* SEE DRAWING 100768-DETAIL.DWG FOR DETAILS AND CATCH BASIN PROTECTION OPTIONS

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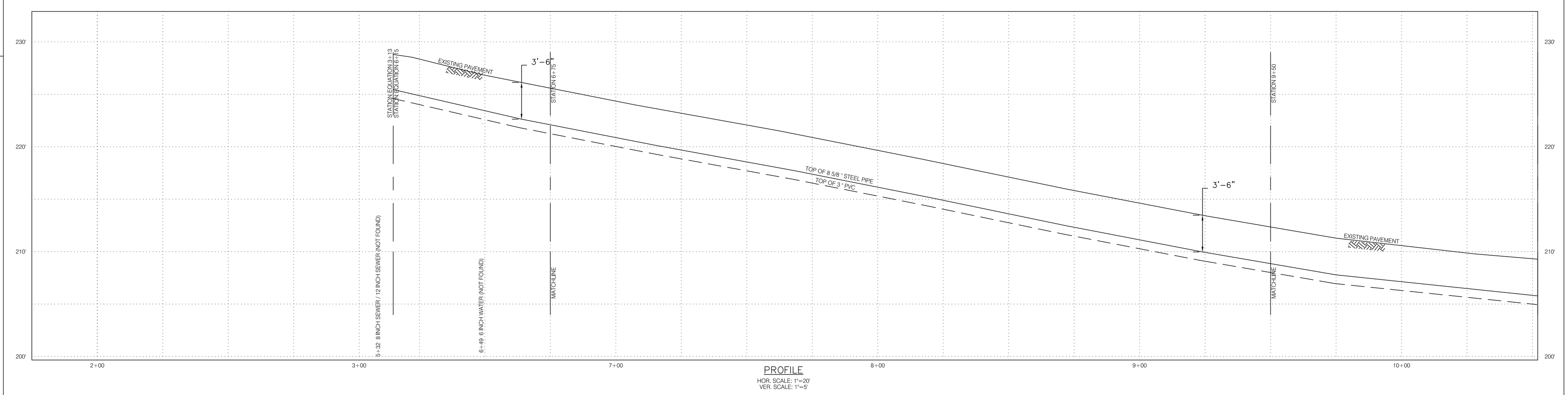
10. FOR LINE DETAILS, REFERENCE S-4782-172, S-4782-173, S-4782-174, & S-4782-175.

ENVIRONMENTAL CONDITIONS

(CBP) (GB)

BEGIN HAY BALES & SILT FENCE (WEST SIDE)



PROFILE
HOR. SCALE: 1"=20'
VER. SCALE: 1"=5'

REFERENCE DRAWINGS

DRAWING NO.	TITLE	DRAWING NO.	TITLE
S-4782-172	TRENCH DETAILS		
S-4782-173	TRENCH DETAILS		
S-4782-174	TRENCH DETAILS		

REVISIONS

NO.	DATE	REMARKS	REV.	CKD.	COR.	APP.
0	03/06	DRAFT AS-BUILT	BBI	JL.		ED

Design/Engineering: POWER ENGINEERS; COLER & COLANTONIO INC ENGINEERS AND SCIENTISTS

Owner/Operator: NSTAR ELECTRIC GAS

General Contractor: BOND Brothers

SPECIFICATIONS

NSTAR ELECTRIC COMPANY
345 KV PIPE TYPE CABLE
STOUGHTON TO K STREET
AS-BUILT

File No.: S-4782-001-004AB.dwg

APPROVED BY

DATE: 3/24/06 MANAGER

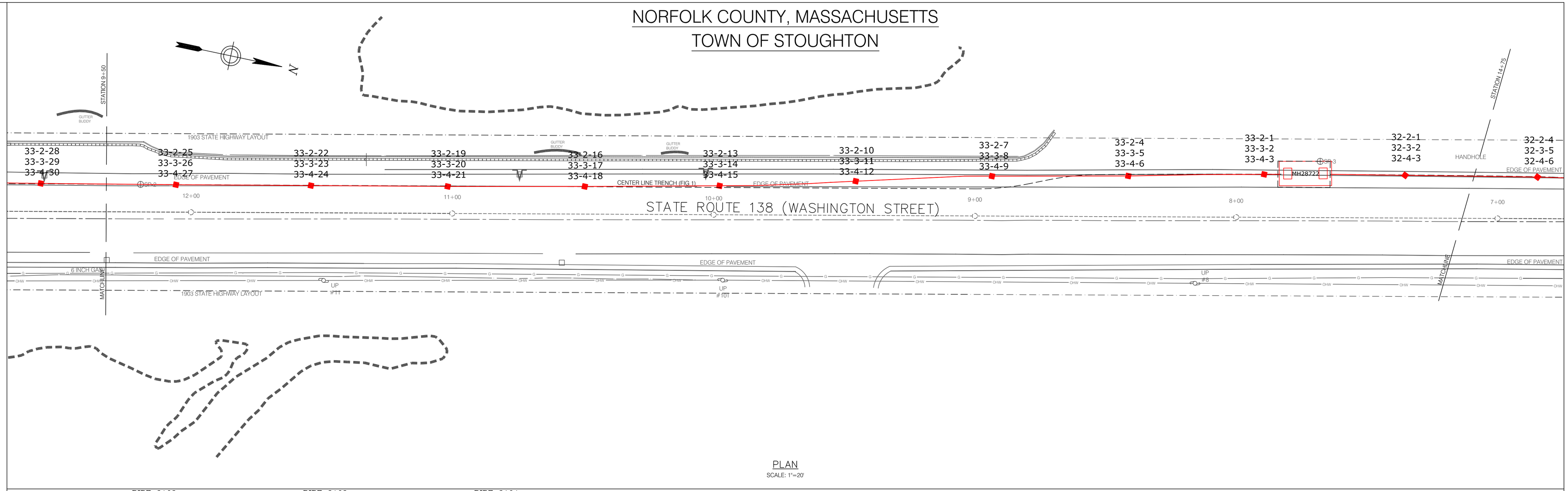
NSTAR ELECTRIC COMPANY

S-4782-002AB

A00888 - 25

Proposal No. 613558-129697

NORFOLK COUNTY, MASSACHUSETTS
TOWN OF STOUGHTON



PLAN
SCALE: 1"=20'

PIPE 3162

Weld	Northing	Easting	Station
33-2-28	2877240.5	763698.1	9+25
33-2-25	2877291.2	763687.9	9+76
33-2-22	2877341.8	763677.4	10+28
33-2-19	2877393.1	763666.9	10+80
33-2-16	2877444.4	763656.0	11+33
33-2-13	2877494.8	763645.0	11+84
33-2-10	2877545.4	763632.5	12+36
33-2-7	2877596.0	763619.7	12+89
33-2-4	2877647.0	763608.8	13+41
33-2-1	2877697.7	763597.4	13+93
32-2-1	2877750.6	763586.5	14+47
32-2-4	2877800.3	763576.7	14+98

PIPE 3163

Weld	Northing	Easting	Station
33-3-29	2877240.5	763698.1	9+25
33-3-26	2877291.2	763687.9	9+76
33-3-23	2877341.8	763677.4	10+28
33-3-20	2877393.1	763666.9	10+80
33-3-17	2877444.4	763656.0	11+33
33-3-14	2877494.8	763645.0	11+84
33-3-11	2877545.4	763632.5	12+36
33-3-8	2877596.0	763619.7	12+89
33-3-5	2877647.0	763608.8	13+41
33-3-2	2877697.7	763597.4	13+93
32-3-2	2877750.6	763586.5	14+47
32-3-5	2877800.3	763576.7	14+98

PIPE 3164

Weld	Northing	Easting	Station
33-4-30	2877240.5	763698.1	9+25
33-4-27	2877291.2	763687.9	9+76
33-4-24	2877341.8	763677.4	10+28
33-4-21	2877393.1	763666.9	10+80
33-4-18	2877444.4	763656.0	11+33
33-4-15	2877494.8	763645.0	11+84
33-4-12	2877545.4	763632.5	12+36
33-4-9	2877596.0	763619.7	12+89
33-4-6	2877647.0	763608.8	13+41
33-4-3	2877697.7	763597.4	13+93
32-4-3	2877750.6	763586.5	14+47
32-4-6	2877800.3	763576.7	14+98

WELD TABLE

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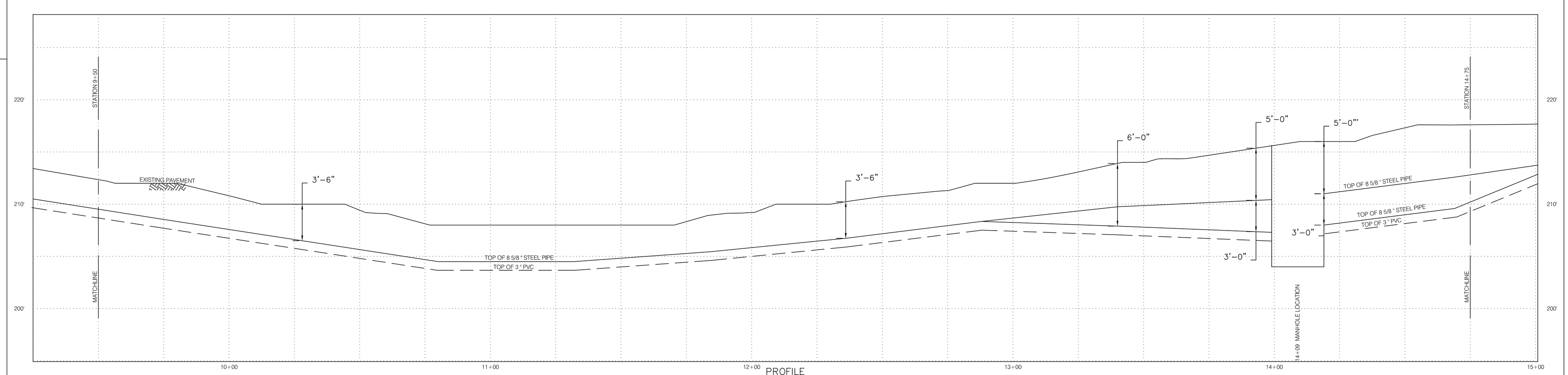
ENVIRONMENTAL CONDITIONS

CONTINUE HAY BALES & SILT FENCE (WEST SIDE)



PROFILE
HOR. SCALE: 1"=20'
VER. SCALE: 1"=5'

LEGEND

- PROPOSED PIPE TYPE CABLE
- CENTER LINE TRENCH AS-BUILT
- PROPERTY LINE
- EDGE OF PAVEMENT
- CONTOUR (10-FOOT INTERVAL)
- CONTOUR (2-FOOT INTERVAL)
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- OVERHEAD WIRES (OHW)
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- HYDRANT
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ENVIRONMENTAL CONDITIONS LEGEND

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S-4782-174	TRENCH DETAILS		

REVISIONS

NO.	DATE	REMARKS	REV.	CKD.	COR.	APP.
0	03/06	DRAFT AS-BUILT	BBI	JL		ED

Design/Engineering: POWER ENGINEERS; COLER & COLANTONIO INC ENGINEERS AND SCIENTISTS

Owner/Operator: NSTAR ELECTRIC GAS

General Contractor: BOND Brothers

SPECIFICATIONS

NSTAR ELECTRIC COMPANY
345 KV PIPE TYPE CABLE
STOUGHTON TO K STREET
AS-BUILT

File No.: S-4782-001-004AB.dwg

APPROVED BY

DATE: 3/23/06 MANAGER

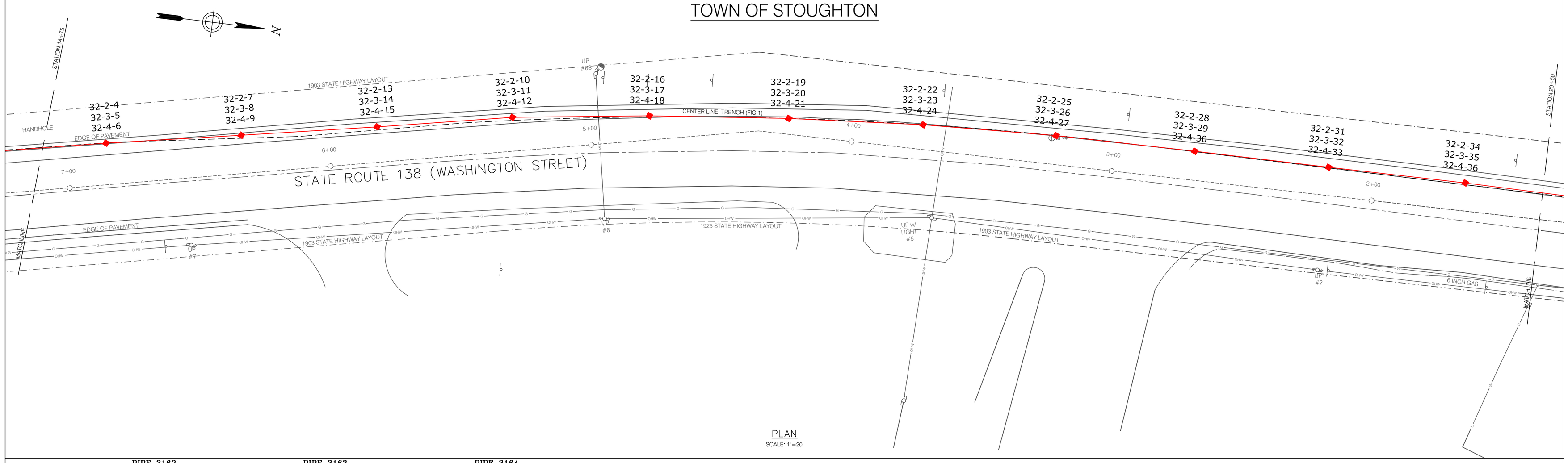
NSTAR ELECTRIC COMPANY

S-4782-003AB

A00888 - 26

Proposal No. 613558-129697

NORFOLK COUNTY, MASSACHUSETTS
TOWN OF STOUGHTON



PLAN
SCALE: 1"=20'

WELD TABLE

PIPE 3162

Weld	Northing	Easting	Station
32-2-4	2877800.3	763576.7	14+98
32-2-7	2877851.2	763567.4	15+50
32-2-13	2877902.4	763557.8	16+02
32-2-10	2877953.3	763547.9	16+54
32-2-16	2878005.1	763541.0	17+06
32-2-19	2878058.1	763535.5	17+59
32-2-22	2878109.4	763531.6	18+11
32-2-25	2878160.4	763529.5	18+62
32-2-28	2878213.7	763529.0	19+15
32-2-31	2878265.2	763528.9	19+67
32-2-34	2878317.8	763528.5	20+19

PIPE 3163

Weld	Northing	Easting	Station
32-3-5	2877800.3	763576.7	14+98
32-3-8	2877851.2	763567.4	15+50
32-3-14	2877902.4	763557.8	16+02
32-3-11	2877953.3	763547.9	16+54
32-3-17	2878005.1	763541.0	17+06
32-3-20	2878058.1	763535.5	17+59
32-3-23	2878109.4	763531.6	18+11
32-3-26	2878160.4	763529.5	18+62
32-3-29	2878213.7	763529.0	19+15
32-3-32	2878265.2	763528.9	19+67
32-3-35	2878317.8	763528.5	20+19

PIPE 3164

Weld	Northing	Easting	Station
32-4-6	2877800.3	763576.7	14+98
32-4-9	2877851.2	763567.4	15+50
32-4-15	2877902.4	763557.8	16+02
32-4-12	2877953.3	763547.9	16+54
32-4-18	2878005.1	763541.0	17+06
32-4-21	2878058.1	763535.5	17+59
32-4-24	2878109.4	763531.6	18+11
32-4-27	2878160.4	763529.5	18+62
32-4-30	2878213.7	763529.0	19+15
32-4-33	2878265.2	763528.9	19+67
32-4-36	2878317.8	763528.5	20+19

* STATION EQUATION IS USED TO FOLLOW THE PROPOSED STATIONNING WITHOUT MODIFICATION.

* REFER TO TRENCH DETAIL (FIG.) FOR BACKFILL TYPE UNLESS OTHERWISE NOTE.

LEGEND

- PROPOSED PIPE TYPE CABLE
- CENTER LINE TRENCH AS-BUILT
- PROPERTY LINE
- EDGE OF PAVEMENT
- CONTOUR (10-FOOT INTERVAL)
- CONTOUR (2-FOOT INTERVAL)
- FENCE
- GUARD RAIL
- OVERHEAD WIRES (OHW)
- DRAIN LINE (D)
- SEWER LINE (S)
- WATER LINE (W)
- GAS LINE (G)
- ELECTRICAL LINE (E)
- TELEPHONE LINE (T)
- CABLE TV LINE (CA)
- STEAM LINE (ST)
- UNKNOWN LINE (U)
- CONCRETE BOUND
- IRON PIN
- UTILITY MANHOLE (E) (D) (S) (S) (CA) (T)
- CATCH BASIN
- UTILITY POLE
- GUY ANCHOR
- ELECTRICAL SIGNAL BOX
- EMERGENCY FIRE BOX (FB)
- WATER GATE (WV)
- GAS GATE (GV)
- HYDRANT
- TRAFFIC SIGN
- TRAFFIC SIGNAL
- ELECTRICAL SIGNAL BOX
- GATE POST / BOLLARD
- TREE
- SOIL PROBE (SP-1)
- WELD

ENVIRONMENTAL CONDITIONS LEGEND

- SILT FENCE
- HAY BALES
- PRESUMPTIVE WETLAND BOUNDARY
- GUTTER BUDDY (GB)
- CATCH BASIN PROTECTION* (CBP)

* SEE DRAWING 100768-DETAIL.DWG FOR DETAILS AND CATCH BASIN PROTECTION OPTIONS

NOTES

1. SITE DETAIL SHOWN HEREON IS A RESULT OF AN ON-THE-GROUND FIELD SURVEY PERFORMED BY COLER & COLANTONIO, INC. WINTER 2004.

2. AS-BUILT DETAIL SHOWN HEREON IS A RESULT OF AN ON-THE-GROUND FEILD SURVEY PERFORMED BY BOND BROTHERS, INC. AUGUST 2005.

3. PROPERTY LINES SHOWN HEREON ARE BASED ON TAX MAP LOCATION AND DO NOT REPRESENT A PROPERTY LINE RETRACEMENT SURVEY EFFORT

4. LOCATION OF ANY IDENTIFIED UNDERGROUND UTILITIES BELOW TRENCH WORK IS APPROXIMATE ONLY, AND IS NOT WARRANTED TO BE CORRECT. ADDITIONAL UTILITIES MAY EXIST WHICH ARE NOT INDICATED ON THESE PLANS. ALL EXISTING UTILITIES INSIDE TRENCH AREA WERE VERIFIED BY THE CONTRACTOR FOR SERVICE, TOP OF PIPE ELEVATION, LOCATION, ETC.

5. SURVEY WAS CONDUCTED IN MASSACHUSETTS MAINLAND ZONE 2001, NAD83 HORIZONTAL COORDINATE SYSTEM. ELEVATIONS ARE BASED ON BOSTON CITY DATUM AND REFERENCED TO TEMPORARY BENCHMARKS AS SHOWN ON THE PLAN.

6. ENVIRONMENTAL CONDITIONS INFORMATION PROVIDED BY SHAW ENVIRONMENTAL, INC.

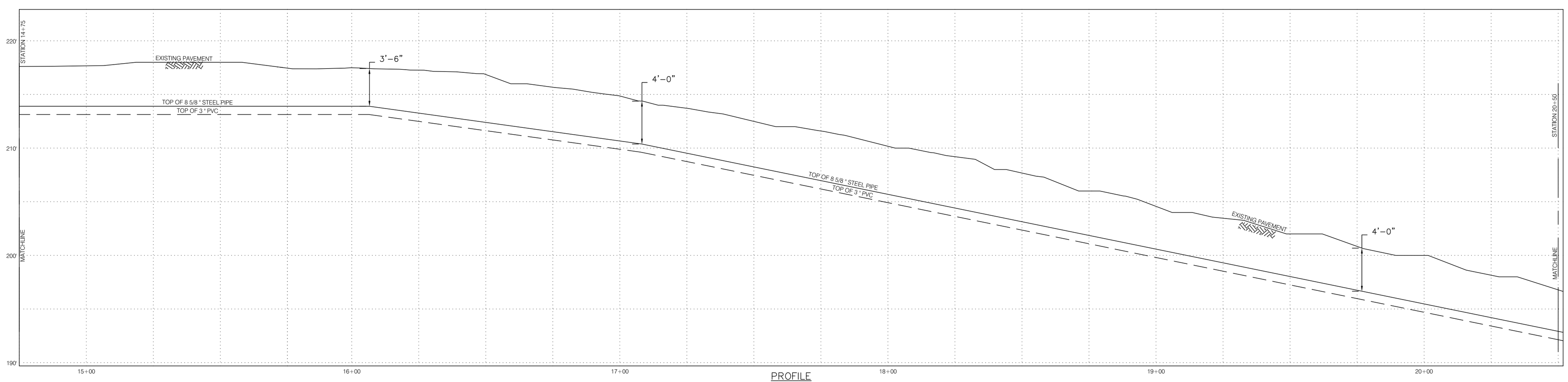
7. THE LOCUS LIES IN FIRM ZONE "C", DESCRIBED ON COMMUNITY PANEL NUMBER 250286 0021C, EFFECTIVE DATE APRIL 1, 1982, PREPARED BY F.E.M.A.

8. PURPOSE OF THIS PLAN IS TO IDENTIFY THE TRENCH LOCATION, PIPE DEPTH, AND STRUCTURE LOCATIONS.

9. SEE GZA GEOENVRIONMENTAL, INC. BORING LOGS FOR SOIL PROBE DATA.

10. FOR LINE DETAILS, REFERENCE S-4782-172, S-4782-173, S-4782-174, & S-4782-175.

ENVIRONMENTAL CONDITIONS



PROFILE
HOR. SCALE: 1"=20'
VER. SCALE: 1"=5'

REFERENCE DRAWINGS

DRAWING NO.	TITLE	DRAWING NO.	TITLE
S-4782-172	TRENCH DETAILS		
S-4782-173	TRENCH DETAILS		
S-4782-174	TRENCH DETAILS		

REVISIONS

NO.	DATE	REMARKS	REV.	CKD.	COR.	APP.
0	09/05	DRAFT AS-BUILT	BBI	JL		ED
	04/06	FINAL AS-BUILT	BBI	JL		ED

Design/Engineering
POWER ENGINEERS
COLER & COLANTONIO INC
ENGINEERS AND SCIENTISTS

Owner/Operator
NSTAR ELECTRIC GAS

General Contractor
BOND Brothers

SPECIFICATIONS

NSTAR ELECTRIC COMPANY
345 KV PIPE TYPE CABLE
STOUGHTON TO K STREET
AS-BUILT

File No.: S-4782-001-004AB.dwg

APPROVED BY

DATE:04/14/06 MANAGER

NSTAR ELECTRIC COMPANY

S-4782-004AB

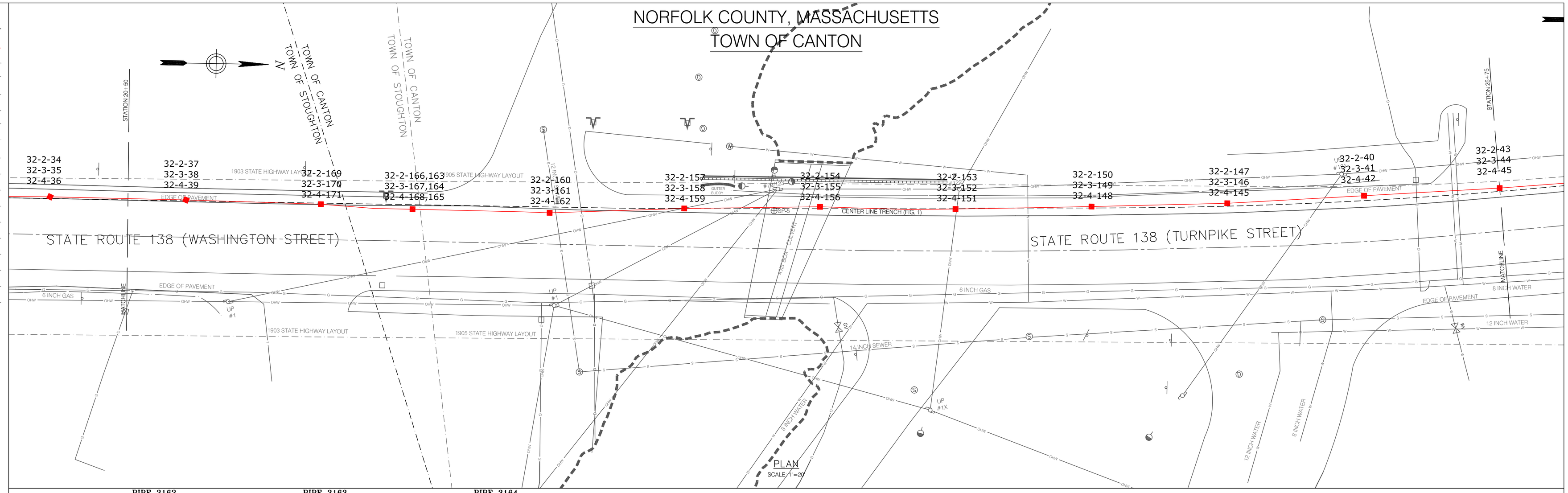
A00888 - 27

Proposal No. 613558-129697

NORFOLK COUNTY, MASSACHUSETTS
TOWN OF CANTON

LEGEND

- PROPOSED PIPE TYPE CABLE
- CENTER LINE TRENCH AS-BUILT
- PROPERTY LINE
- EDGE OF PAVEMENT
- CONTOUR (10-FOOT INTERVAL)
- CONTOUR (2-FOOT INTERVAL)
- FENCE
- GUARD RAIL
- OVERHEAD WIRES
- DRAIN LINE
- SEWER LINE
- WATER LINE
- GAS LINE
- ELECTRICAL LINE
- TELEPHONE LINE
- CABLE TV LINE
- STEAM LINE
- UNKNOWN LINE
- CONCRETE BOUND
- IRON PIN
- UTILITY MANHOLE
- CATCH BASIN
- UTILITY POLE
- GUY ANCHOR
- ELECTRICAL SIGNAL BOX
- EMERGENCY FIRE BOX
- WATER GATE
- GAS GATE
- HYDRANT
- TRAFFIC SIGN
- TRAFFIC SIGNAL
- ELECTRICAL SIGNAL BOX
- GATE POST / BOLLARD
- TREE
- SOIL PROBE
- WELD



WELD TABLE

PIPE 3162

Weld	Northing	Easting	Station
32-2-34	2878317.8	763528.5	20+19
32-2-37	2878369.9	763528.7	20+71
32-2-169	2878421.5	763529.5	21+23
32-2-166,163	2878456.7	763530.8	21+58
32-2-160	2878509.2	763531.2	22+10
32-2-157	2878560.8	763528.7	22+62
32-2-154	2878612.8	763527.1	23+14
32-2-153	2878664.7	763527.1	23+66
32-2-150	2878716.8	763525.2	24+18
32-2-147	2878768.8	763523.1	24+70
32-2-40	2878821.1	763519.2	25+23
32-2-43	2878873.0	763515.4	25+75

PIPE 3163

Weld	Northing	Easting	Station
32-3-35	2878317.8	763528.5	20+19
32-3-38	2878369.9	763528.7	20+71
32-3-170	2878421.5	763529.5	21+23
32-3-167,164	2878456.7	763530.8	21+58
32-3-161	2878509.2	763531.2	22+10
32-3-158	2878560.8	763528.7	22+62
32-3-155	2878612.8	763527.1	23+14
32-3-152	2878664.7	763527.1	23+66
32-3-149	2878716.8	763525.2	24+18
32-3-146	2878768.8	763523.1	24+70
32-3-41	2878821.1	763519.2	25+23
32-3-44	2878873.0	763515.4	25+75

PIPE 3164

Weld	Northing	Easting	Station
32-4-36	2878317.8	763528.5	20+19
32-4-39	2878369.9	763528.7	20+71
32-4-171	2878421.5	763529.5	21+23
32-4-168,165	2878456.7	763530.8	21+58
32-4-162	2878509.2	763531.2	22+10
32-4-159	2878560.8	763528.7	22+62
32-4-156	2878612.8	763527.1	23+14
32-4-151	2878664.7	763527.1	23+66
32-4-148	2878716.8	763525.2	24+18
32-4-145	2878768.8	763523.1	24+70
32-4-42	2878821.1	763519.2	25+23
32-4-45	2878873.0	763515.4	25+75

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* REFER TO TRENCH DETAIL (FIG.) FOR BACKFILL TYPE UNLESS OTHERWISE NOTE.

ENVIRONMENTAL CONDITIONS LEGEND

- SILT FENCE / HAY BALES
- PRESUMPTIVE WETLAND BOUNDARY
- GUTTER BUDDY (GB)
- CATCH BASIN PROTECTION* (CBP)

* SEE DRAWING 100768-DETAIL.DWG FOR DETAILS AND CATCH BASIN PROTECTION OPTIONS

NOTES

1. SITE DETAIL SHOWN HEREON IS A RESULT OF AN ON-THE-GROUND FIELD SURVEY PERFORMED BY COLER & COLANTONIO, INC. WINTER 2004.

2. AS-BUILT DETAIL SHOWN HEREON IS A RESULT OF AN ON-THE-GROUND FEILD SURVEY PERFORMED BY BOND BROTHERS, INC. AUGUST 2005 & FEBRUARY 2006.

3. PROPERTY LINES SHOWN HEREON ARE BASED ON TAX MAP LOCATION AND DO NOT REPRESENT A PROPERTY LINE RETRACEMENT SURVEY EFFORT

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6. ENVIRONMENTAL CONDITIONS INFORMATION PROVIDED BY SHAW ENVIRONMENTAL, INC.

7. THE LOCUS LIES IN FIRM ZONE "C", DESCRIBED ON COMMUNITY PANEL NUMBER 250286 0021C, EFFECTIVE DATE APRIL 1, 1982, PREPARED BY F.E.M.A.

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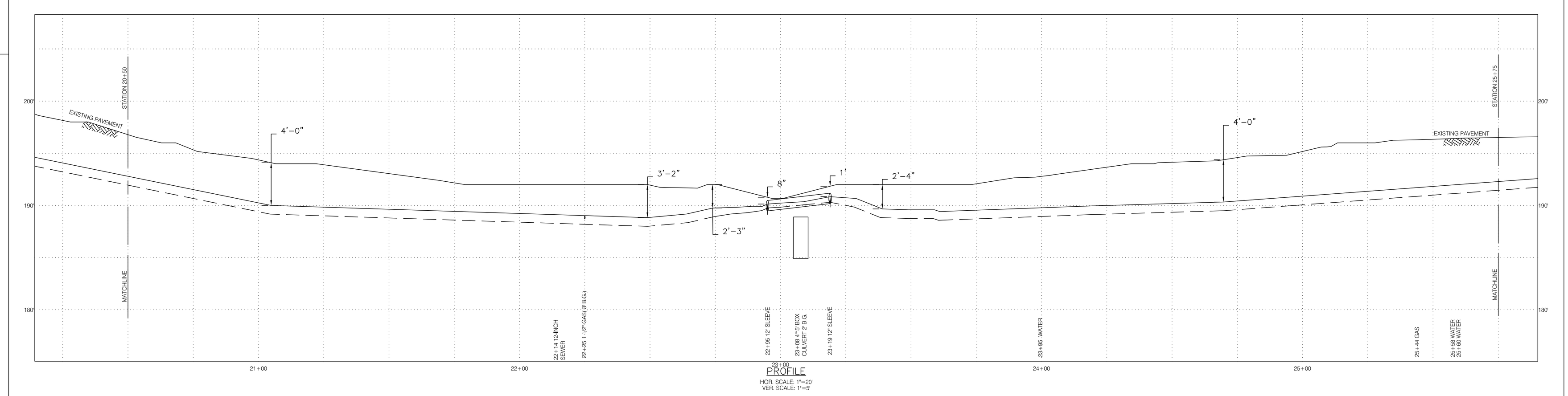
9. SEE GZA GEOENVRIONMENTAL, INC. BORING LOGS FOR SOIL PROBE DATA.

10. FOR LINE DETAILS, REFERENCE S-4782-172, S-4782-173, S-4782-174, & S-4782-175.

ENVIRONMENTAL CONDITIONS

(CBP) (CBP) (CBP) (GB)

HAY BALES & SILT FENCE (WEST SIDE)



PROFILE
HOR. SCALE: 1"=20'
VER. SCALE: 1"=5'

REFERENCE DRAWINGS			
DRAWING NO.	TITLE	DRAWING NO.	TITLE
S-4782-005A	CULVERT DETAILS		
S-4782-172	TRENCH DETAILS		
S-4782-173	TRENCH DETAILS		
S-4782-174	TRENCH DETAILS		

REVISIONS						
NO.	DATE	REMARKS	REV.	CKD.	COR.	APP.
0	2/06	DRAFT AS-BUILT	BBI	JL		ED
	4/06	FINAL AS-BUILT	BBI	JL		ED

Design/Engineering: POWER ENGINEERS; COLER & COLANTONIO INC ENGINEERS AND SCIENTISTS

Owner/Operator: NSTAR ELECTRIC GAS

General Contractor: BOND Brothers

SPECIFICATIONS

NSTAR ELECTRIC COMPANY
345 KV PIPE TYPE CABLE
STOUGHTON TO K STREET
AS-BUILT

File No.S-4782-005-012AB.dwg

APPROVED BY

DATE: 04/14/06 MANAGER

NSTAR ELECTRIC COMPANY

S-4782-005AB

A00888 - 28

Proposal No. 613558-129697

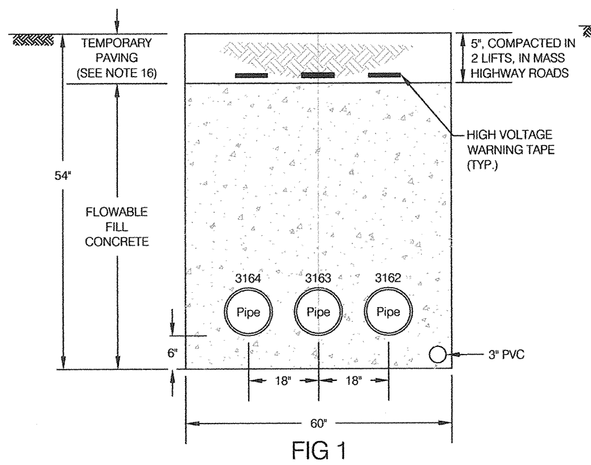


FIG 1

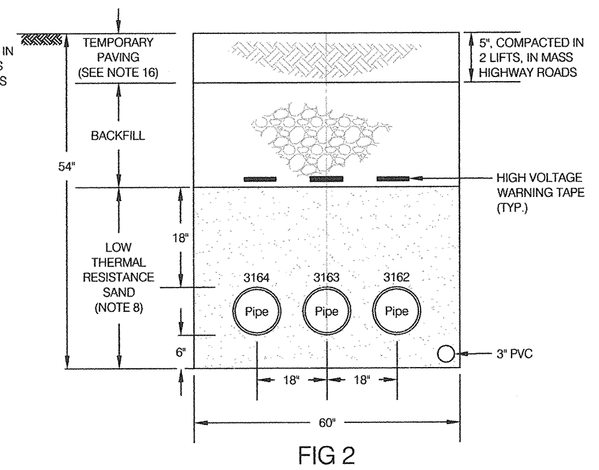


FIG 2

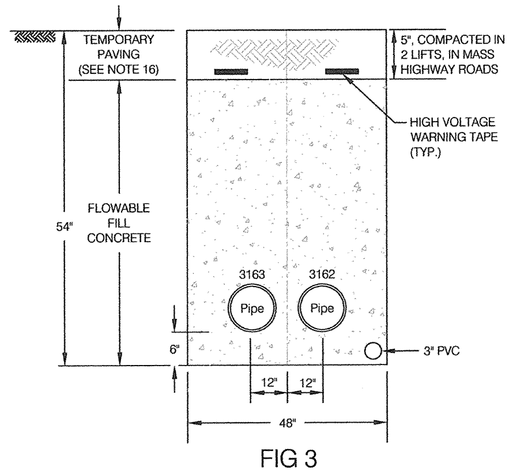


FIG 3

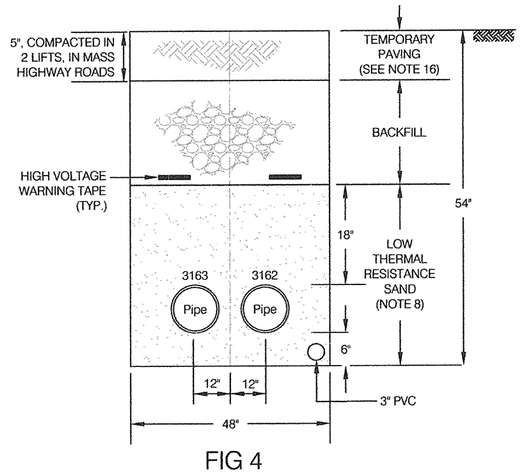


FIG 4

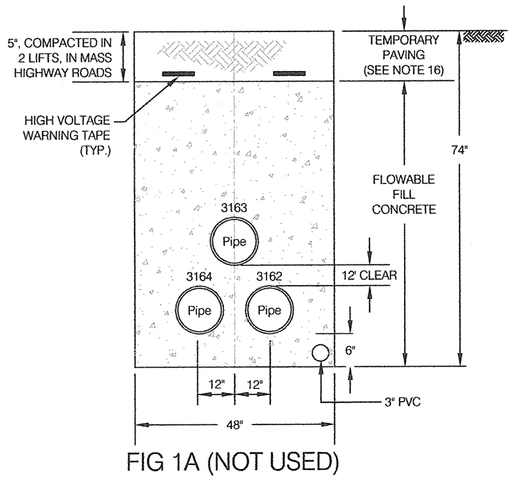


FIG 1A (NOT USED)

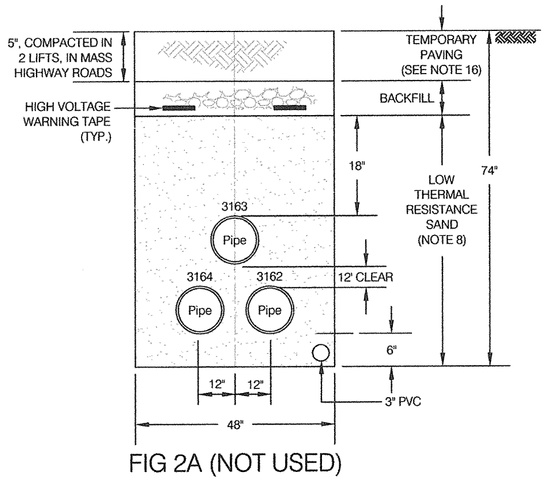


FIG 2A (NOT USED)

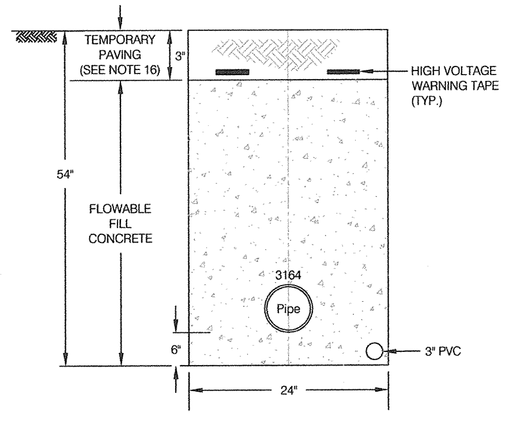


FIG 5

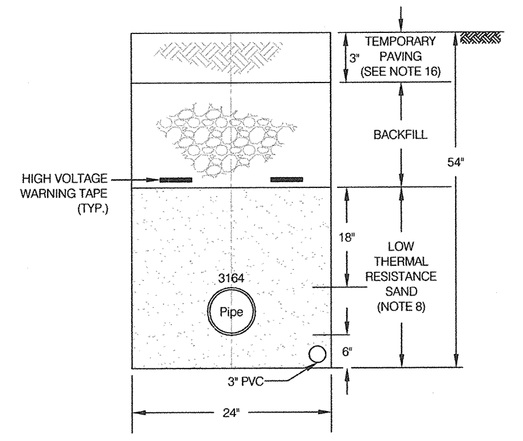
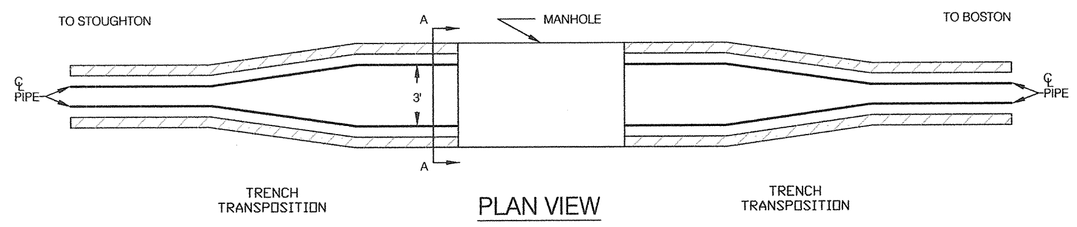
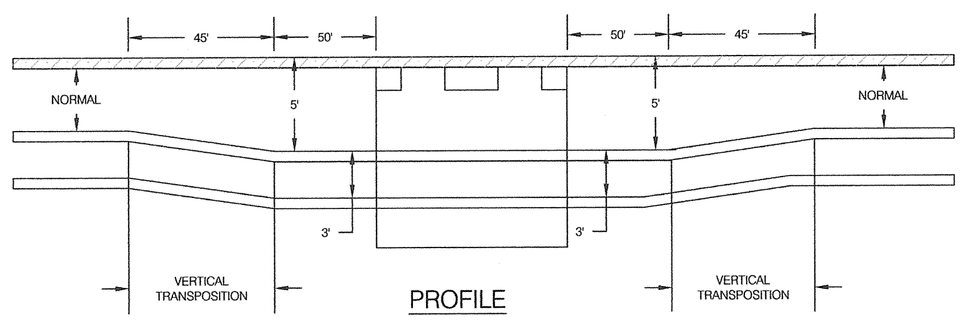


FIG 6

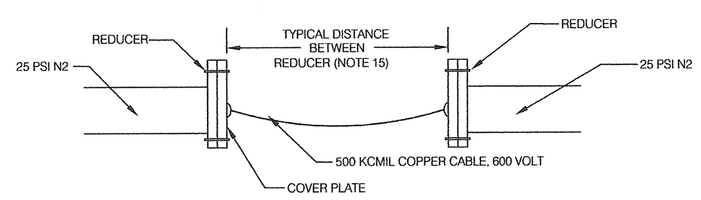
TRENCH DIMENSIONS AT MANHOLES
THREE PIPE TYPE CABLE LINES



PLAN VIEW
N.T.S.

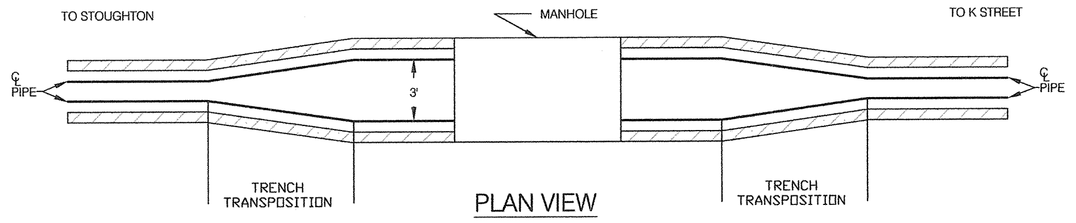


PROFILE
N.T.S.

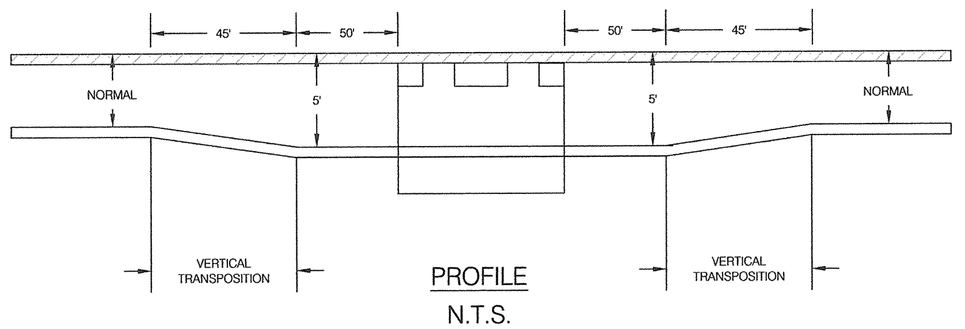


LINE 3163 PIPE
MH 1-28 & 32

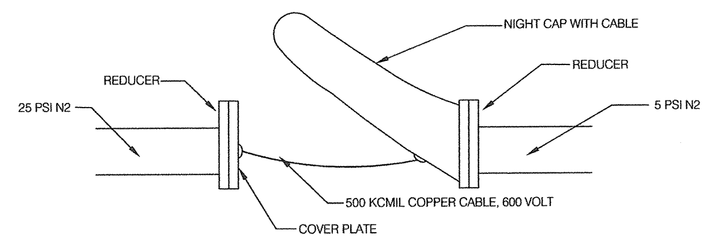
TRENCH DIMENSIONS AT MANHOLES
TWO PIPE TYPE CABLE LINES



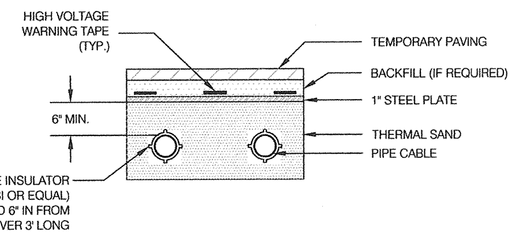
PLAN VIEW
N.T.S.



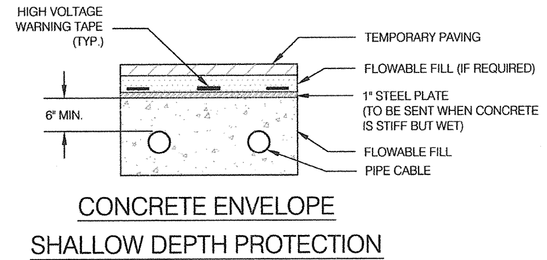
PROFILE
N.T.S.



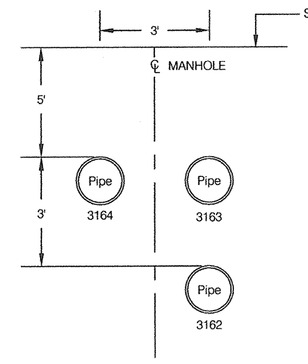
LINE 3163 PIPE
IN MH 29



THERMAL SAND
SHALLOW DEPTH PROTECTION



CONCRETE ENVELOPE
SHALLOW DEPTH PROTECTION



SECTION A-A

NOTES

1. LINE PIPE SHALL BE INSTALLED OVER WATER LATERAL CONNECTION WHEREVER PRACTICAL.

2. FIGURE 1A MAY BE SUBSTITUTED FOR FIGURE 1 WHERE SPACE DOES NOT ALLOW THREE PIPES TO INSTALLED IN A HORIZONTAL CONFIGURATION.

3. FIGURE 2A MAY BE SUBSTITUTED FOR FIGURE 2 WHERE SPACE DOES NOT ALLOW THREE PIPES TO INSTALLED IN A HORIZONTAL CONFIGURATION.

4. A PLASTIC SPACER SHALL BE USED TO PROVIDE THE 12 INCH SEPARATION BETWEEN THE TWO ROWS OF PIPE IN FIGURES 1A AND FIGURE 2A

5. TRENCH DEPTHS MAY BE REDUCED BY 12 INCHES WHERE LEDGE IS CONTIGUOUS FOR 50 FEET OR MORE. INSTALL SHALLOW DEPTH PROTECTION AS REQUIRED.

6. ALL FIGURES SHOWN LOOKING TOWARD K STREET STATION 385 OR HYDE PARK STATION 496

7. LOW THERMAL RESISTIVITY SAND SHALL CONFORM TO THE FOLLOWING.

MINIMUM DRY DENSITY = 105 LB./CU. FT.
RETAINED ON NO. 4 SIEVE 0 TO 5 % NO. 30 SIEVE 40 TO 705
NO. 8 SIEVE 10 TO 20 % NO. 50 SIEVE 70 TO 85 %
NO. 16 SIEVE 20 TO 40 % NO. 100 SIEVE 92 TO 96 %

8. FLOWABLE FILL SHALL BE CONTROL DENSITY FILL (CDF), TYPE 2E, FLOWABLE (EXCAVATABLE). CDF MUST BE BATCHED AT A CONCRETE PLANT AND SHALL MEET THE FOLLOWING SPECIFICATIONS;

PORTLAND CEMENT:	AASHTO M 85
FLY ASH:	AASHTO M4 . 05 . 02
SAND:	AASHTO M4 . 05 . 02
WATER:	AASHTO M4 . 05 . 04
AIR ENTRAINING ADDITIVES:	AASHTO M4 . 05 . 05
COMPRESSIVE STRENGTH:	28 DAY = 30-80 PSI 90 DAY = 100 PSI
SLUMP:	10 - 12 INCHES

9. CONTRACTOR MAY PROVIDE ALTERNATE MIX DESIGNS FOR FLOWABLE FILL CONCRETE IF APPROVED BY NSTAR.

10. SHALLOW DEPTH PROTECTIONS SHALL BE PROVIDED WHERE DEPTH TO TOP OF PIPE IS LESS THAN 30 INCHES. PIPE SHALL HAVE A MINIMUM DEPTH TO TOP OF PIPE OF 12-INCHES. SHALLOW DEPTH PROTECTION FOR THREE PIPE CONFIGURATION AND ONE PIPE CONFIGURATION SHALL BE SIMILAR TO THE TWO PIPE CONFIGURATION SHOWN.

11. EMPTY PIPE FOR FUTURE LINE 3163 FROM STOUGHTON TO MH29 SHALL BE PRESSURE AND VACUUM TESTED AND LEFT WITH 25 PSI DRY NITROGEN.

12. PIPE WITH CABLE FROM MH 29 TO K STREET STATION 385 SHALL BE VACUUM TESTED AND FILLED WITH 5 PSI DRY NITROGEN AFTER CABLE SPLICE AND TERMINATION ARE INSTALLED.

13. THE CONTRACTOR SHALL USE SINGLE LUG COPPER CONNECTOR TO CONNECT 500 KCMIL COPPER CABLE TO REDUCER COVER PLATE. ALL EXPOSED CONDUCTORS SHALL BE COVERED WITH HEAT SHRINK.

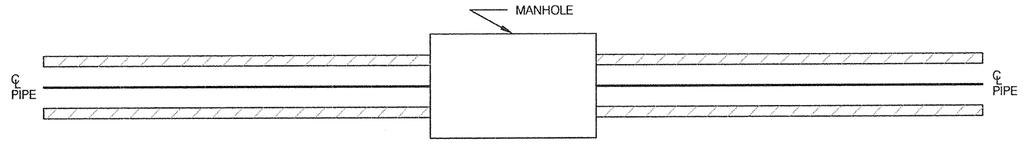
14. THE DISTANCE BETWEEN REDUCERS VARIES FOR STRAIGHT JOINTS AND SEMI STOP JOINTS. SEMI STOP JOINTS WILL BE USED IN MANHOLES 16 AND 17.

15. 2 INCH BALL VALVE SHALL BE LEFT IN THE SPLICE SLEEVE OF MANHOLES 10 AND 23 FOR SAMPLING. THE VALVES SHALL BE COVERED WITH A "HIGH HAT" SLEEVE WELDED GAS TIGHT TO THE SPLICE SLEEVE. THE "HIGH HAT" SHALL BE COVERED WITH HEAT SHRINK MATERIAL. VALVE FOR CIRCUIT 3162 IN MANHOLE 10 SHALL BE ALIGNED TO ALLOW ACCESS AFTER LINE 3163 IS INSTALLED.

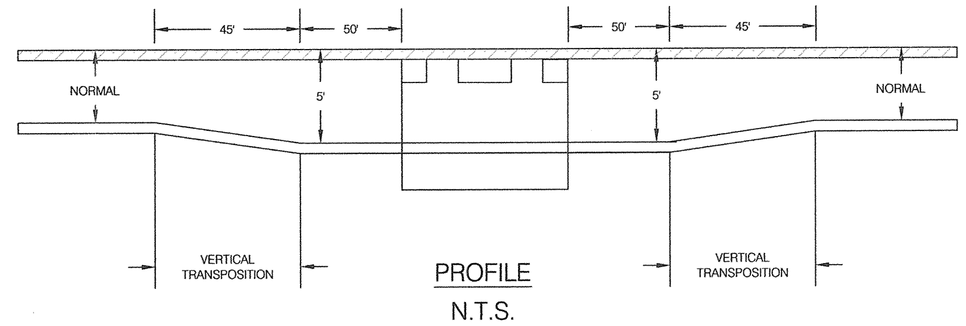
16. TEMPORARY PAVING REQUIREMENTS SHALL CONFORM TO THE SPECIFICATIONS ON THE CITY, TOWN, STATE OR OTHER AGENCY HAVING JURISDICTION. 5" PAVEMENT INSTALLED IN TWO COMPACTED LIFTS IS FOR ALL STATE HIGHWAY ROADS. PROVIDE 3" MINIMUM PAVEMENT THICKNESS IN OTHER ROADS."

17. PLAN GRAWINGS WITH STATION EQUATION BLOCK INDICATE ALIGNMENT REVISIONS AFTER DRAWINGS ISSUED FOR BID.

TRENCH DIMENSIONS AT MANHOLES
ONE PIPE TYPE CABLE LINE



PLAN VIEW
N.T.S.



PROFILE
N.T.S.

REFERENCE DRAWINGS

DRAWING NO.	TITLE	DRAWING NO.	TITLE
S-4782-001 TO S-4782-171	TRENCH DETAILS		
S-4783-001 TO S-4783-007	TRENCH DETAILS		

REVISIONS

NO.	DATE	REMARKS	REV.	CKD.	COR.	APP.
0	11/04	ISSUED FOR BID	C&C	JEO	NS	PFB
1	01/05	RESPONSE TO BWSC COMMENTS	C&C	JEO	NS	PFB
2	05/05	ISSUED FOR CONSTRUCTION	C&C	JEO	NS	PFB
3	05/05	RESPONSE TO MASS HIGHWAY COMMENTS	C&C	JEO	NS	PFB
4	01/07	ISSUED FOR AS-BUILT	C&C	JEO	NS	PFB

Design/Engineering: POWER ENGINEERS; COLER & COLANTONIO INC ENGINEERS AND SCIENTISTS

Owner/Operator: NSTAR ELECTRIC

SPECIFICATIONS

NSTAR ELECTRIC COMPANY
345kV PIPE TYPE CABLE TRENCH & MANHOLE DETAILS
NORFOLK & SUFFOLK COUNTIES

File No.: S-4782-172.DWG

APPROVED BY

DATE: 01/12/07 MANAGER

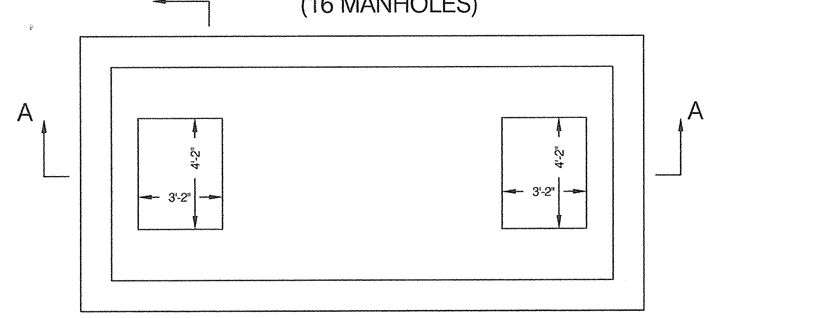
NSTAR ELECTRIC COMPANY

S-4782-172

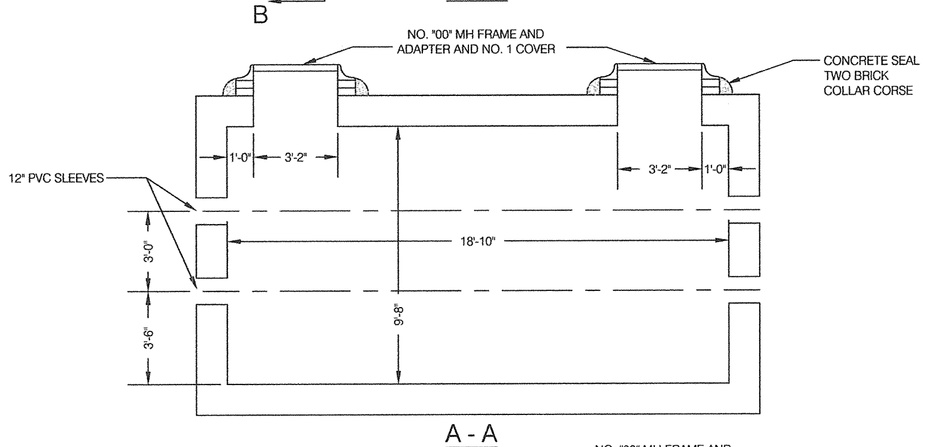
A00888 - 62

Proposal No. 61358-129897

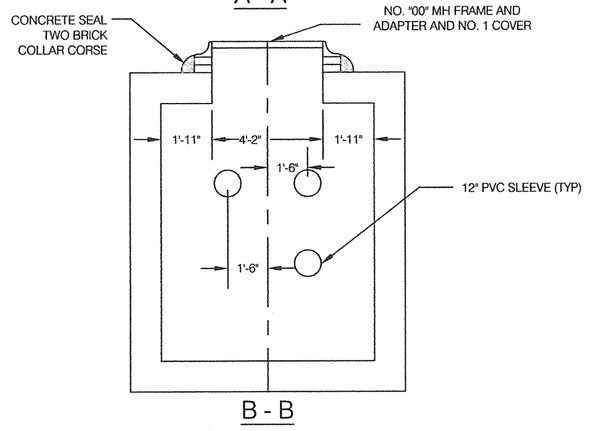
THREE CIRCUIT MANHOLE DETAILS (16 MANHOLES)



PLAN

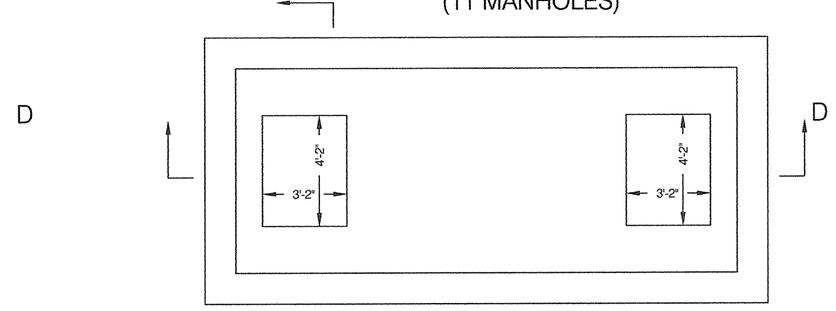


A - A



B - B

TWO CIRCUIT MANHOLE DETAILS (11 MANHOLES)



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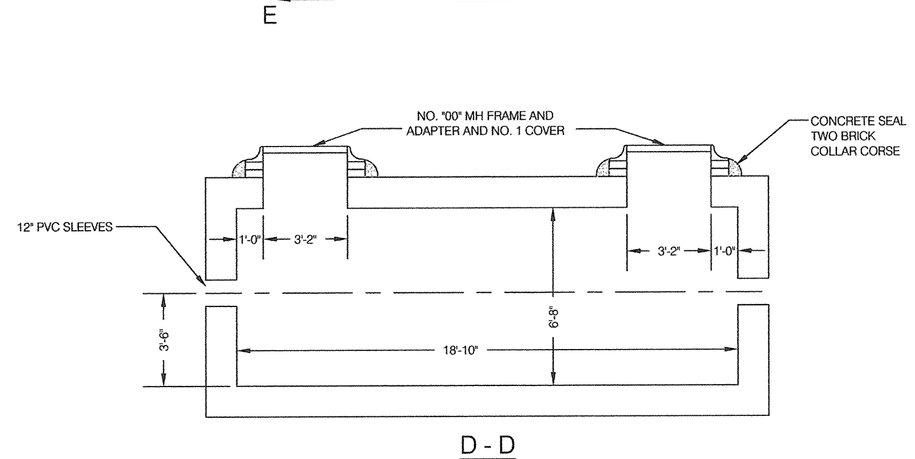
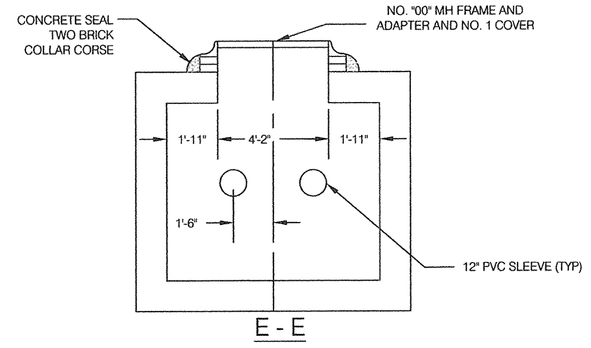
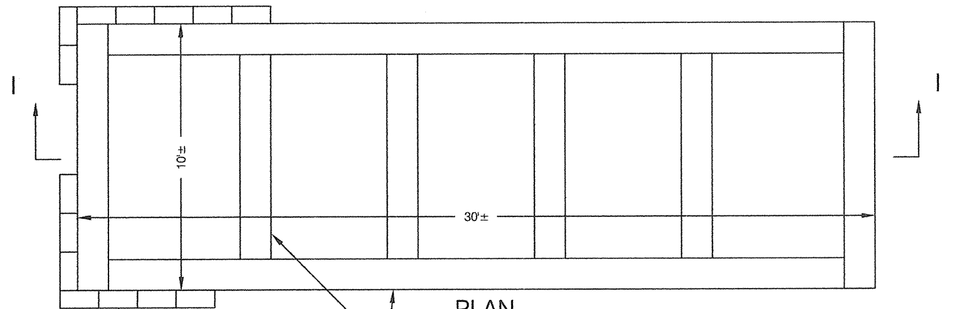


D - D

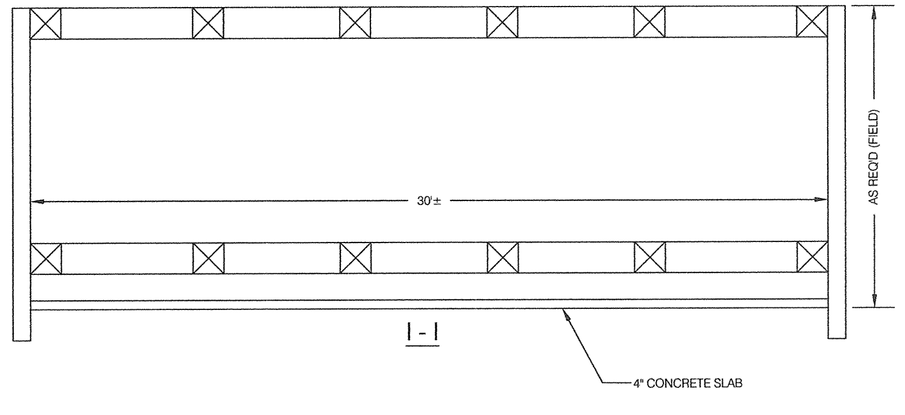


E - E

TEMPORARY SPLICE PIT (1 PIT)

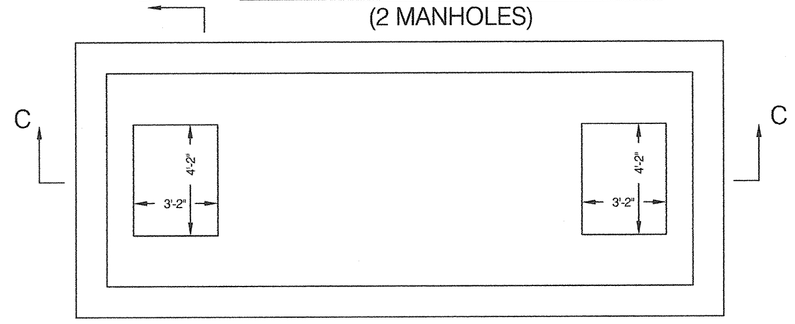


PLAN

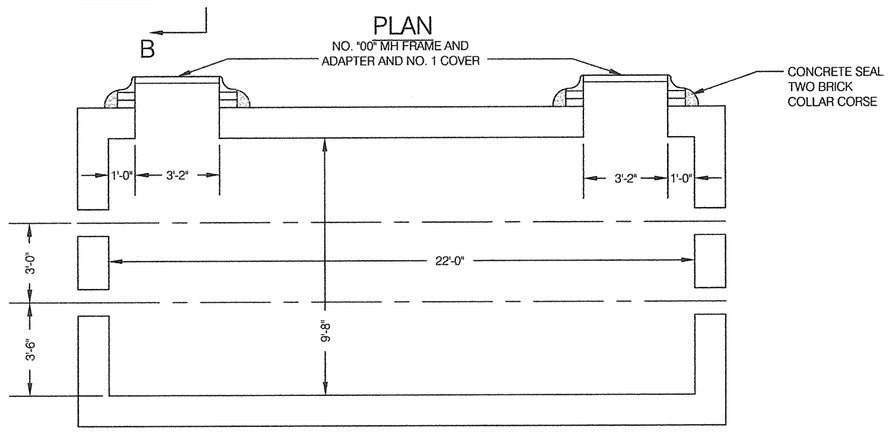


I - I

THREE CIRCUIT SEMI STOP JOINT MANHOLE DETAILS (2 MANHOLES)

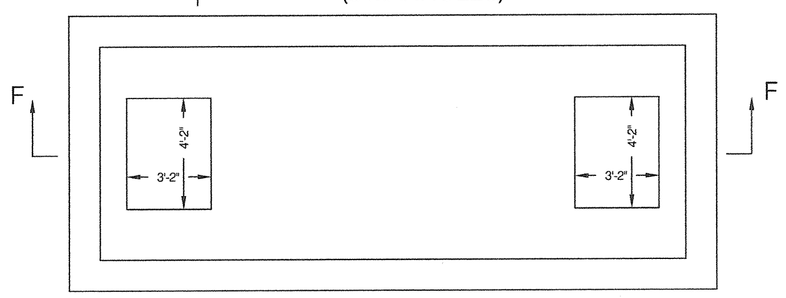


PLAN

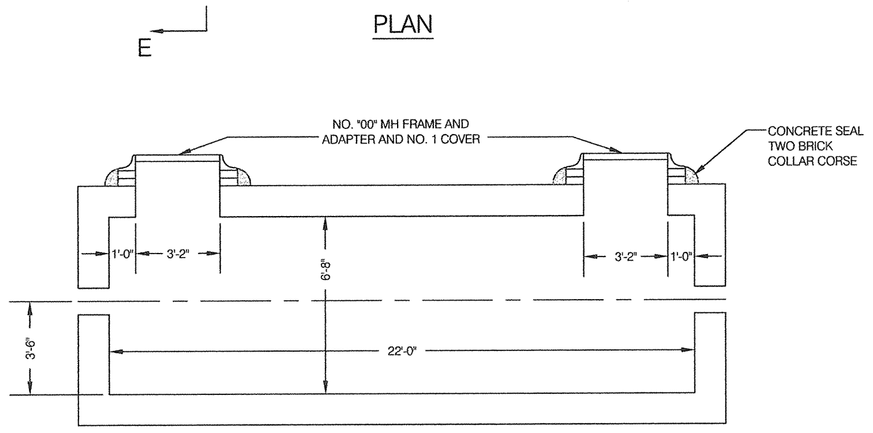


C - C

TWO CIRCUIT SEMI STOP JOINT MANHOLE DETAILS (2 MANHOLES)



PLAN



F - F

MANHOLE LOCATIONS:

THREE CIRCUIT MANHOLE: MH 28722, 28723, 28724, 28725, 28726, 28727, 28728, 28729, 28730, 28731, 28732, 28733, 28734, 28735, 28736 AND 287239

THREE CIRCUIT SEMI STOP JOINT MANHOLE: MH 28737 AND 28738

TWO CIRCUIT MANHOLE: MH 28740, 28741, 28742, 28743, 28744, 28745, 28746, 28747, 28748, 28749, AND 28751

TWO CIRCUIT SEMI STOP JOINT MANHOLE: MH 28750 AND 28752

TEMPORARY SPLICE PIT: MH 30

PRECAST CONCRETE MANHOLE FABRICATION NOTES:

1. THE FABRICATOR SHALL DESIGN THE PRECAST CONCRETE MANHOLES IN ACCORDANCE WITH ACI 318 AND AASHTO LOAD FACTOR DESIGN METHOD.

2. ALL MANHOLE DESIGN DRAWINGS SHALL BE STAMPED BY A REGISTERED PROFESSIONAL ENGINEER IN THE COMMONWEALTH OF MASSACHUSETTS.

3. THE MANHOLE SHALL BE FABRICATED IN ACCORDANCE WITH ACI 318.

4. CONCRETE SHALL BE A MINIMUM STRENGTH OF 3000 PSI AT 28 DAYS.

5. ALL CONCRETE MEMBERS SHALL BE A MINIMUM THICKNESS OF 6 INCHES.

6. REINFORCING STEEL SHALL BE ASTM A 615 GRADE 60.

7. PLASTIC SLEEVES SHALL BE 12 INCH DIAMETER SCHEDULE 40 PVC. SLEEVES ON OPPOSITE WALLS SHALL BE ALIGNED TO ALLOW A SINGLE PIPE TO BE INSTALLED CONTINUOUSLY THROUGH BOTH SLEEVES.

8. THE MANHOLE SHALL BE FABRICATED IN TWO PIECES FOR FIELD ASSEMBLY. ALL JOINTS SHALL INCLUDE A WATERTIGHT SEAL DESIGN.

9. DESIGN ASSUMPTIONS SHALL BE AS FOLLOWS:

GROUNDWATER DEPTH:	8 FT. MAXIMUM, 3 FT. MINIMUM BELOW FINISH GRADE
EARTH COVER:	3 FT. MAXIMUM, 1 FT. 6 IN. MINIMUM BELOW FINISH GRADE
COEFFICIENT OF EARTH AT REST:	K= 0.50
DRY EARTH DENSITY:	120 PCF
SATURATED EARTH DENSITY:	57.6 PCF
DESIGN TRUCK:	AASHTO H2O-S16

10. MANHOLE SHALL HAVE POSITIVE RESTRAINT FOR WATER FLOATATION.

11. DESIGN DRAWING AND CALCULATIONS SHALL BE SUBMITTED TO NSTAR FOR REVIEW. ALLOW TWO WEEKS FOR NSTAR COMMENTS BEFORE STARTING MANHOLE FABRICATION.

12. THE EXTERIOR SURFACES OF THE MANHOLE SHALL BE COVERED WITH A DAMPROOFING COATING.

TEMPORARY SPLICE PIT INSTALLATION NOTES:

1. CONTRACTOR SHALL DESIGN SIZE AND LOCATION OF TONGUE AND GROOVE SHEETING, WALES, AND STRUTS FOR SHEETED PIT.

2. THE SPLICE PIT SHALL BE COVERED WITH STEEL PLATES DURING NON-WORKING HOURS. STEEL PLATES SHALL BE INSTALLED FLUSH WITH PAVEMENT.

3. THE PIT FRAMING SHALL BE DESIGNED FOR THE CABLE PULLING FORCES AND TRAFFIC CONDITIONS.

4. A 4 INCH CONCRETE SLAB SHALL BE PROVIDED IN THE FLOOR TO CONTROL MOISTURE IN THE PIT DURING SPLICING.

5. CONTRACTOR SHALL PROVIDE A WOODEN ENCLOSURE AS REQUIRED FOR SPLICING. THE WOODEN ENCLOSURE SHALL BE INSTALLED AS LATE AS PRACTICAL AND REMOVED AS SOON AS PRACTICAL AFTER BOTH CIRCUITS IN THE PIT HAVE BEEN SPLICED.

6. PIPE THROUGH THE SHEETED PIT CAN BE INSTALLED AT TYPICAL DEPTHS BASED ON THE LOCATION OF UNDERGROUND UTILITIES.

7. CONTRACTOR SHALL PULL CABLE FOR BOTH CIRCUITS IN EACH DIRECTION AND SPLICE BOTH CIRCUITS SO THAT THE SPLICE PIT IS ONLY REQUIRED ONCE.

8. THE LENGTH OF THE SPLICE PIT ASSUMES THE SPLICES ARE STAGGERED. IF PRACTICAL THE LINE PIPE SPACING CAN BE INCREASED TO ALLOW THE SPLICES TO BE INSTALLED SIDE BY SIDE, AND THE PIT LENGTH SHORTENED.

9. THE TEMPORARY SPLICE PIT SHALL BE REMOVED AFTER BOTH SPLICES ARE COMPLETED AND THE SPLICE SLEEVES HAVE BEEN COATED. THE TIMBER SHEETING SHALL BE REMOVED AND THE AREA BACKFILLED WITH FLOW FILL CONCRETE.

PRECAST CONCRETE MANHOLE INSTALLATION

1. THE TWO PIECE PRECAST MANHOLE SHALL BE INSTALLED IN ACCORDANCE WITH THE FABRICATORS DRAWINGS AND INSTRUCTIONS.

2. THE JOINT BETWEEN MANHOLE SECTIONS SHALL BE SEALED WATERTIGHT.

3. THE ANNULAR SPACE BETWEEN THE STEEL PIPE AND THE PVC SLEEVE SHALL BE SEALED WITH A MODEL "C" LINK-SEAL MODULAR SEAL.

4. A HOLE SHALL BE CORE DRILLED IN THE MANHOLE WALLS FOR THE 3 INCH CONDUIT. THE CONDUIT PENETRATION SHALL BE SEALED WITH SILICON CAULKING.

5. STANDARD MANHOLE DEPTH SHALL INCLUDE SPACE FOR A TWO BRICK COLLAR, WHERE DEPTHS MUST BE GREATER , THE HEIGHT OF THE BRICK COLLAR SHALL BE INCREASED OR A CONCRETE CHIMNEY INSTALLED.

6. SEE BOSTON EDISON COMPANY UNDERGROUND STANDARD FOR DETAILS OF:

NO. 1 MANHOLE COVER	2.10-6.17 PAGE 4
NO. 00 MANHOLE FRAME	2.10-6.17 PAGE 9
ADAPTER FOR NO. 00 MANHOLE FRAME	2.10-6.17 PAGE 12

7. CONTRACTOR TO GROUT UNUSED SLEEVES IN MH 31 TO SEAL MANHOLE WATERTIGHT.

REFERENCE DRAWINGS

DRAWING NO.	TITLE	DRAWING NO.	TITLE
S-4782-001 TO S-4782-172	ALIGNMENT SHEETS		
S-4783-001 TO S-4783-007	ALIGNMENT SHEETS		

REVISIONS

NO.	DATE	REMARKS	REV.	CKD.	COR.	APP.
0	11/04	ISSUED FOR BID	C&C	JEO	NS	PFB
1	01/05	DESIGN REVISIONS	C&C	JEO	NS	PFB
2	01/05	RESPONSE TO BWSC COMMENTS	C&C	JEO	NS	PFB
3	05/05	ISSUED FOR CONSTRUCTION	C&C	JEO	NS	PFB
4	01/07	ISSUED FOR AS-BUILT	C&C	JEO	NS	PFB

Design/Engineering: POWER ENGINEERS; COLER & COLANTONIO INC ENGINEERS AND SCIENTISTS

Owner/Operator: NSTAR ELECTRIC

SPECIFICATIONS

NSTAR ELECTRIC COMPANY 345kV PIPE TYPE CABLE TRENCH & MANHOLE DETAILS NORFOLK & SUFFOLK COUNTIES

File No.: S-4782-173.DWG

APPROVED BY

DATE: 01/12/07 MANAGER

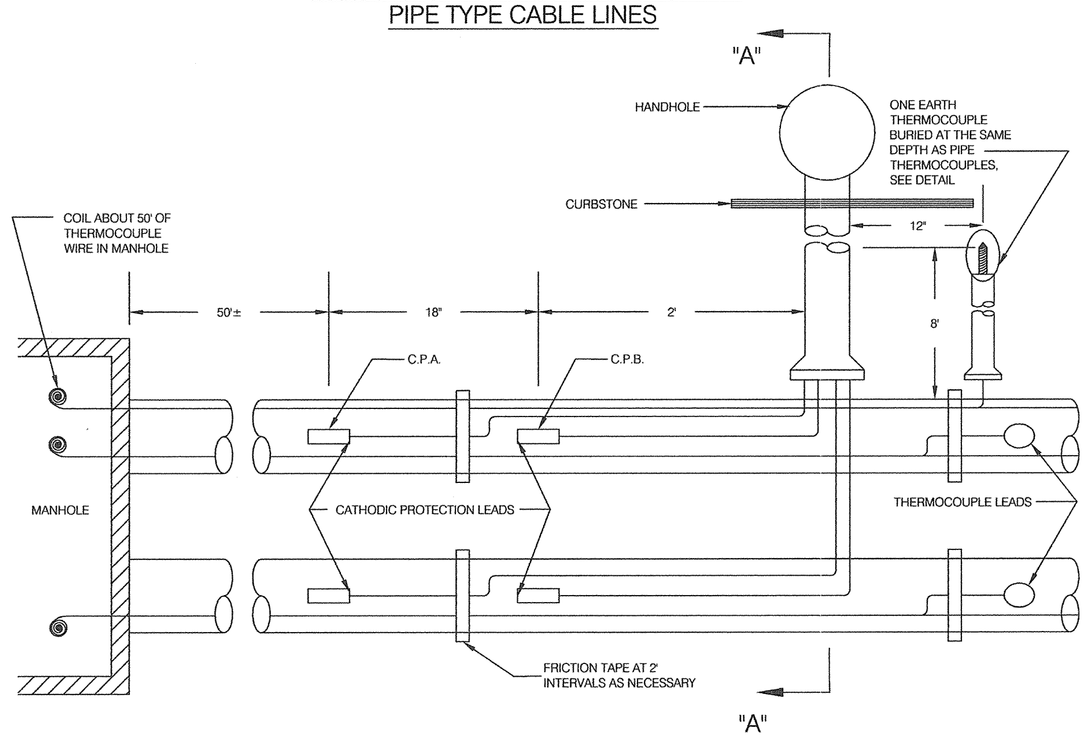
NSTAR ELECTRIC COMPANY

S-4782-173

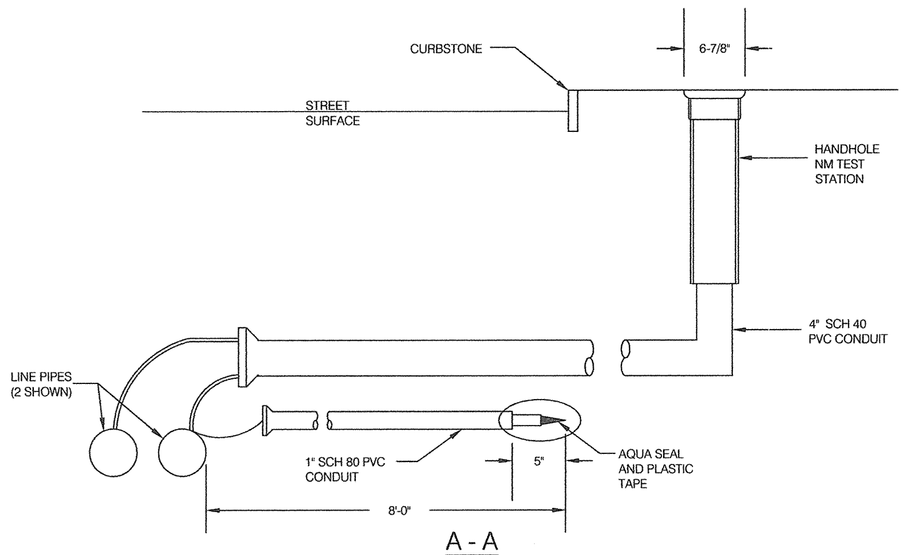
A00888 - 30

Proposal No. 61335R-129897

INSTALLATION OF THERMOCOUPLE & CATHODIC PROTECTION TEST LEADS PIPE TYPE CABLE LINES



PLAN VIEW



A - A

THERMOCOUPLE AND CATHOLIC PROTECTION LEAD NOTES:

1. HANDHOLE SHALL BE INSTALLED IN SIDEWALKS OR THE LOCATION SHOWN ON THE PLAN.

2. HANDHOLES SHALL HAVE A TWO PIECE TELESCOPING BODY AND SIX TERMINAL BOARD, NM TEST STATION BY STUART STEEL PROTECTION CORP. OR EQUAL.

3. TRAIN LEADS OVER AND AWAY FROM PIPES IN SUCH MANNERS THAT NO SHARP BENDS OR KINKS OCCUR.

4. LEAVE SLACK IN ALL LEADS TO ALLOW FOR SETTLING.

5. ALL LEADS SHALL BE CONTINUOUS (NO SPLICES) FROM ATTACHMENT TO HANDHOLE OR MANHOLE. LEADS SHALL BE SECURED TO THE TOP OF THE PIPES BY FRICTION TAPE AT 2' INTERVALS.

6. USE DUCT SEAL ON 4" PVC CONDUIT AND 1" PVC CONDUIT.

7. THE 4" PVC CONDUIT SHALL EXTEND 6" ABOVE BOTTOM OF HANDHOLE.

8. THERMOCOUPLE LEADS SHALL BE EXTENDED INTO THE MANHOLE WITH 50' OF COILED WIRE LEFT FOR OTHERS. EACH THERMOCOUPLE WIRE SHALL HAVE A PERMANENT IDENTIFICATION TAG ON EACH LEAD. IDENTIFICATION SHALL CONSIST OF THE TYPE OF LEAD AND LINE NUMBER AS FOLLOWS: THERMO (LINE #), GR. THERMO.

9. THERMOCOUPLE LEADS SHALL BE # 16 COPPPER-CONSTANTAN POLYVINYL PLASTIC INSULATED WIRE WITH POLYVINYL PLASTIC INSULATION OVERALL, A.S. RICHARDS CO. CAT #16 TX-PP EXTENSION WIRE OR APPROVED EQUAL.

10. THERMOCOUPLE LEADS SHALL BE ASSEMBLED BY REMOVING ALL INSULATION FOR A DISTANCE OF 3" FROM THE END OF THE CABLE, SCRAPING THE EXPOSED CONDUCTORS CLEAN USING THE BACK OF A KNIFE, AND TWISTING THE CONDUCTORS TIGHTLY TOGETHER.

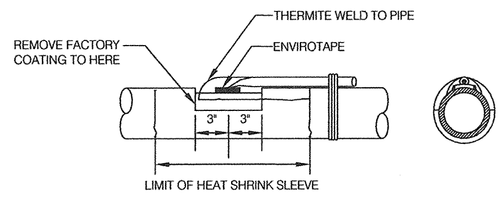
11. THE THERMOCOUPLE WIRE SHALL BE ATTACHED TO THE PIPE BY ALIGNING THE EXPOSED CONDUCTORS AGAINST THE SURFACE OF THE PIPE COATING AND SEALING OVER THE CONDUCTORS BY WRAPPING ONE LAYER OF TAPECOAT HT/MB A MINIMUM OF 1.5 TIMES AROUND THE PIPE.

12. CATHODIC PROTECTION LEADS SHALL BE #12 AWG COPPER CONDUCTOR, 600 VOLT CABLE WITH A HYPALON JACKET, DURASHEATH POWER CABLE BY BICC OR EQUAL.

13. EACH CATHODIC PROTECTION LEAD SHALL HAVE A PERMANENT IDENTIFICATION TAG ON EACH LEAD. IDENTIFICATION SHALL CONSIST OF THE TYPE OF LEAD AND LINE NUMBER AS FOLLOWS CP A (LINE #), CP B (LINE #).

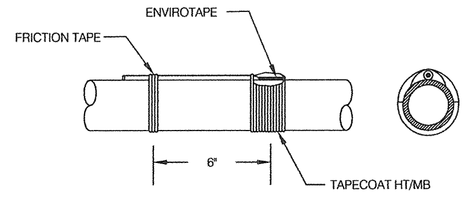
14. CATHODIC PROTECTION LEAD SHALL BE ATTACHED TO THE PIPE BY REMOVING THE PIPE COATING FROM THE TOP OF THE PIPE FOR A 3" x 3" SQUARE, THOROUGHLY CLEANING THE PIPE WITH A WIRE BRUSH AND TERMITE WELD THE LEAD TO THE PIPE. APPLY TWO 6" WIDE LAYER OF TAPECOAT ENVIROTAPE. THE FIRST LAYER SHALL BUTT UP AGAINST THE LEAD WIRE, THE LEAD WIRE SHALL BE BENT OVER THE TOP OF THE FIRST LAYER, AND THE SECOND LAYER SHALL BE INSTALLED OVER THE LEAD WIRE WITH A 1" OVERLAP OF THE FIRST LAYER. APPLY A 17" WIDE HEAT SHRINK SLEEVE OVER THE ENTIRE AREA.

DETAIL OF CATHODIC PROTECTION LEAD ATTACHMENT

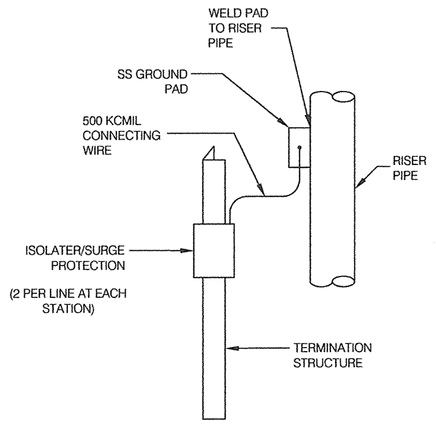


ELEVATION

DETAIL OF THERMOCOUPLE LEAD ATTACHMENT



ELEVATION



ISOLATOR/SURGE PROTECTOR DETAILS

ISOLATOR/SURGE PROTECTOR NOTES:

1. ISOLATOR/SURGE PROTECTOR (ISP) SHALL BE DAIRYLAND ELECTRICAL INDUSTRIES, ISOLATION/SURGE PROTECTOR MODEL ISP 100-B-68A-D-NS-RPB-TP CS#/REV. 2-40-L. TWO ISOLATOR/SURGE PROTECTORS SHALL BE INSTALLED IN PARALLEL FOR EACH LINE AT EACH SUBSTATION.

2. THE ISP CONNECTION TO THE PIPE FOR LINE 3163 AT THE STOUGHTON STATION SHALL BE CONNECTED TO THE TRIFURCATOR. ALL EXPOSED CONDUCTORS SHALL BE COVERED WITH HEAT SHRINK OR TAPECOAT.

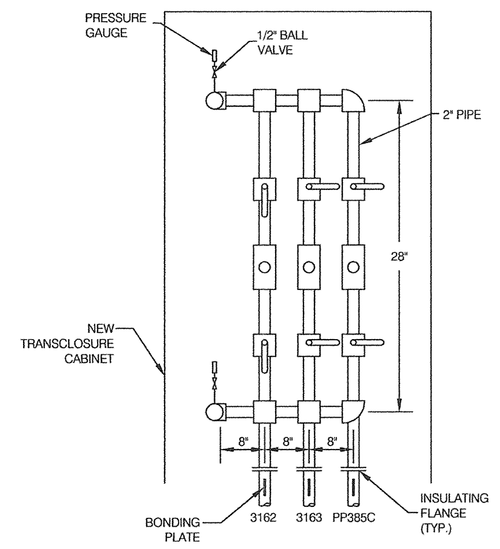
3. GROUNDING PAD SHALL BE AN A304 STAINLESS STEEL WELDED TO RISE PIPE BEFORE THE CABLE IS INSTALLED.

4. CONNECTING WIRE SHALL BE 500 KCMIL COPPER EP RUBBER AND HYPALON 600 VOLT CABLE.

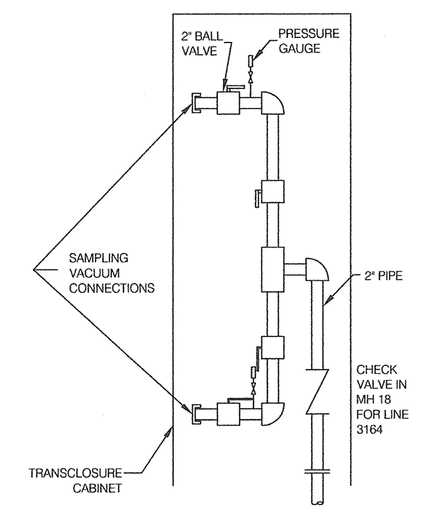
5. CONNECTORS SHALL BE 2 HOLE COPPER COMPRESSION TYPE.

6. CONTRACTOR TO MOUNT ISP TO TERMINATION STRUCTURE.

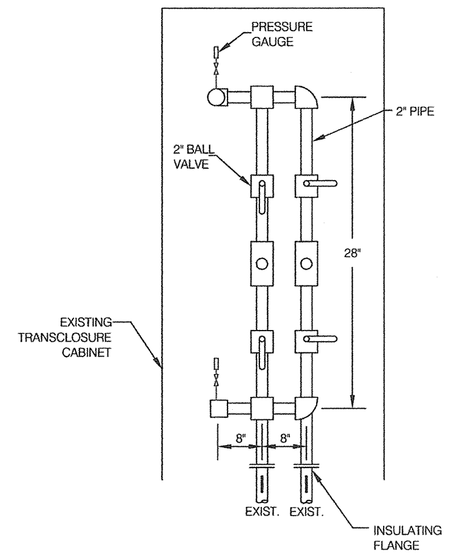
FRONT VIEW MANIFOLD AT K STREET



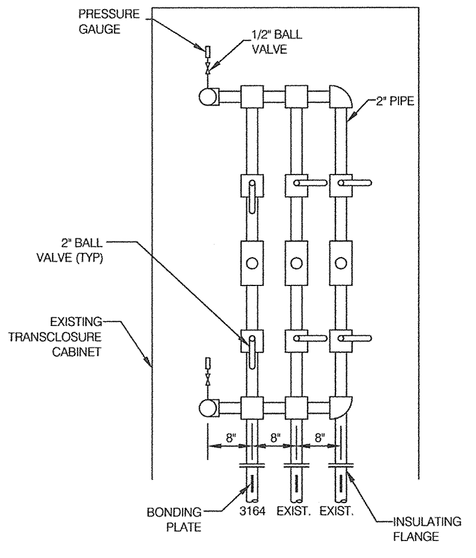
SIDE VIEW ALL MANIFOLDS



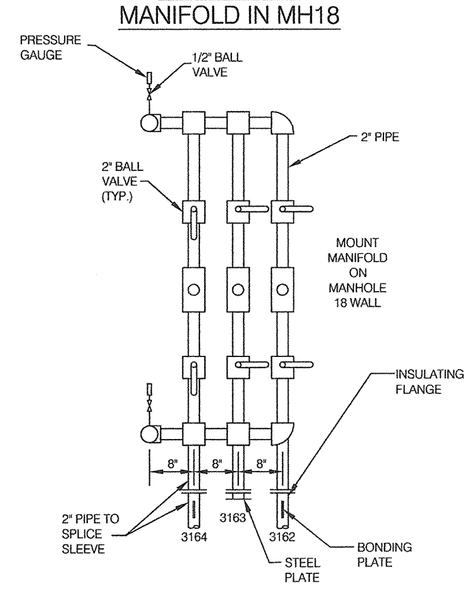
FRONT VIEW EXISTING MANIFOLD AT HYDE PARK



FRONT VIEW MODIFIED MANIFOLD AT HYDE PARK



FRONT VIEW MANIFOLD IN MH18



PIPE TYPE CABLE MANIFOLD NOTES:

1. ALL PIPE SHALL BE ASTM A53 GRADE A SCHEDULE 80.

2. ALL FITTINGS SHALL BE 2000 LB. MINIMUM SOCKET WELD, FORGED STEEL.

3. ALL PIPE BELOW THE GRADE SHALL BE COATED WITH PRITEC COATING. ALL PIPING ABOVE GRADE SHALL BE PAINTED. PIPING BELOW THE INSULATING FLANGE SHALL BE PAINTED GREY. PIPING ABOVE THE INSULATING FLANGE SHALL BE PAINTED YELLOW.

4. COMPLETE ASSEMBLY SHALL BE PRESSURE TESTED WITH 300 PSI MINIMUM OF DRY NITROGEN. AFTER TESTING MAINTAIN POSITIVE PRESSURE UNTIL FLUID FILLING.

5. CONTRACTOR SHALL PROVIDE MANIFOLD ENCLOSURE AT K STREET STATION.

6. CONTRACTOR SHALL BE RESPONSIBLE FOR LAYOUT, FURNISHINGS, AND INSTALLING SUPPORT SYSTEM FOR MANIFOLD LOCATED IN MANHOLE 18.

7. THE MANIFOLD AT MANHOLE, 18 SHALL BE CONNECTED TO THE SPLICE SLEEVE WITH 2 "SCHEDULE 80 STEEL PIPING. THE PIPING SHALL BE COVERED WITH PRITEC COATING OR HEAT SHRINK MATERIAL. THE PIPING FOR LINE 3163 WILL BE INSTALLED LATER. A STEEL PLATE SHALL BE PROVIDED FOR THE INSULATING FLANGE FOR LINE 3163.

8. THE 2" BALL VALVES SHALL BE WORCESTER CONTROLS 2-446-T-SW OR EQUAL.

9. CONTRACTOR SHALL CONNECT THE MANIFOLD AT K STREET STATION TO AN EXISTING SPARE POSITION IN PUMP PLANT 385C AT K STREET STATION

10. CONTRACTOR SHALL PROVIDE TWO PRESSURE GAUGES CAPABLE OF READING PRESSURE BETWEEN 0-400 PSI AT EACH MANIFOLD.

11. A CHECK VALVE SHALL BE PROVIDED IN THE MANIFOLD PIPING FOR LINE 3614 IN MANHOLE 18 THAT PREVENTS FLOW FROM LINE 3164 TO THE MANIFOLD.

12. CONTRACTOR SHALL MODIFY THE EXISTING MANIFOLD AT HYDE PARK STATION 498 TO ACCEPT THE NEW LINE 3164 PIPING.

REFERENCE DRAWINGS

DRAWING NO.	TITLE	DRAWING NO.	TITLE
S-4782-001 TO S-4782-171	ALIGNMENT SHEETS		
S-4783-001 TO S-4783-007	ALIGNMENT SHEETS		

REVISIONS

NO.	DATE	REMARKS	REV.	CK'D.	COR.	APP.
0	11/04	ISSUED FOR BID	C&C	JEO	NS	PFB
1	01/05	DESIGN REVISIONS	C&C	JEO	NS	PFB
2	01/05	RESPONSE TO BWSC COMMENTS	C&C	JEO	NS	PFB
3	05/05	ISSUED FOR CONSTRUCTION	C&C	JEO	NS	PFB
4	01/07	ISSUED FOR AS-BUILT	C&C	JEO	NS	PFB

Design/Engineering: POWER ENGINEERS; COLER & COLANTONIO INC, ENGINEERS AND SCIENTISTS

Owner/Operator: NSTAR ELECTRIC

SPECIFICATIONS

NSTAR ELECTRIC COMPANY 345kV PIPE TYPE CABLE TRENCH & MANHOLE DETAILS NORFOLK & SUFFOLK COUNTIES

File No.: S-4782-174.DWG

APPROVED BY

DATE: 01/12/07 MANAGER

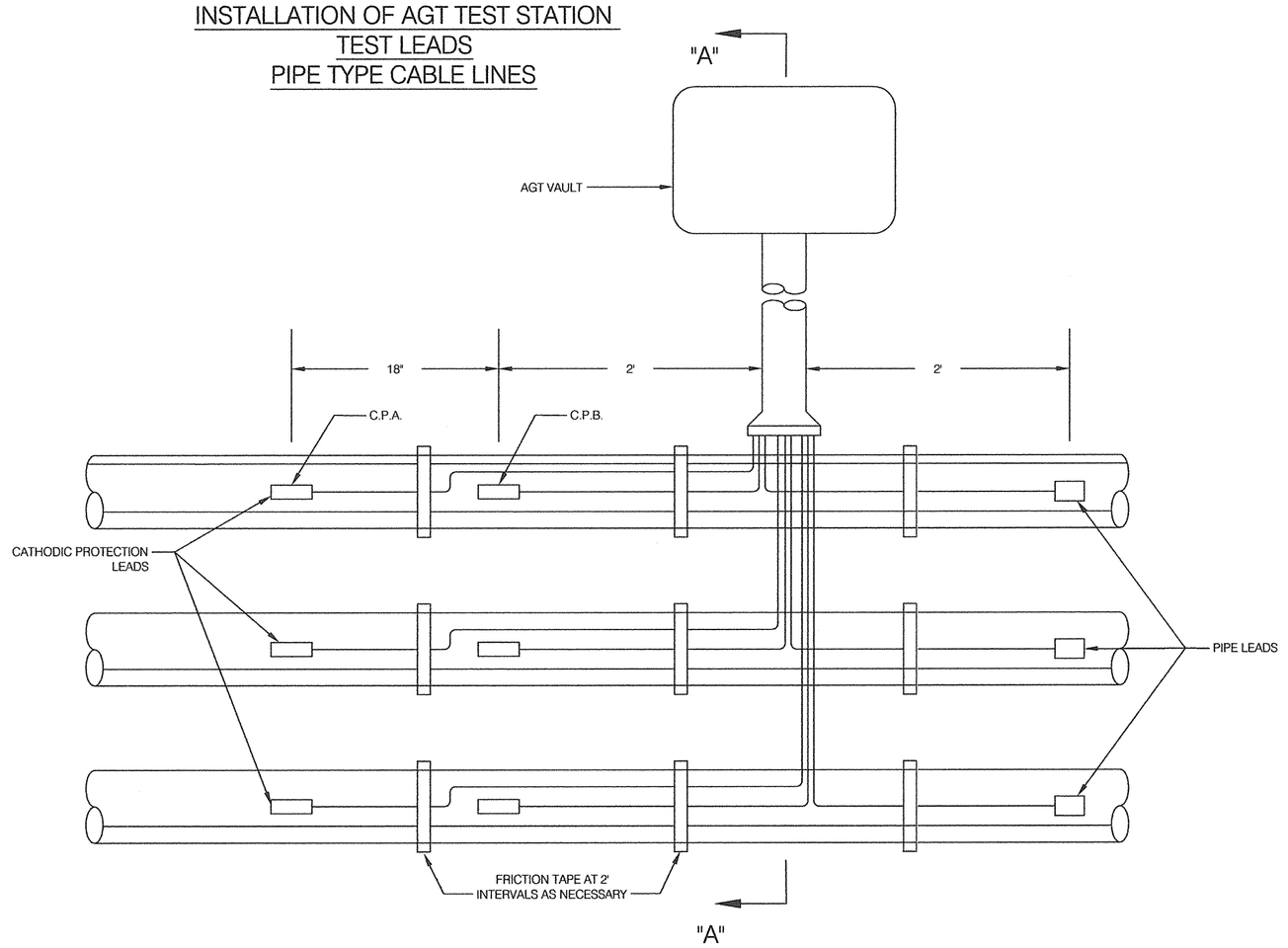
NSTAR ELECTRIC COMPANY

S-4782-174

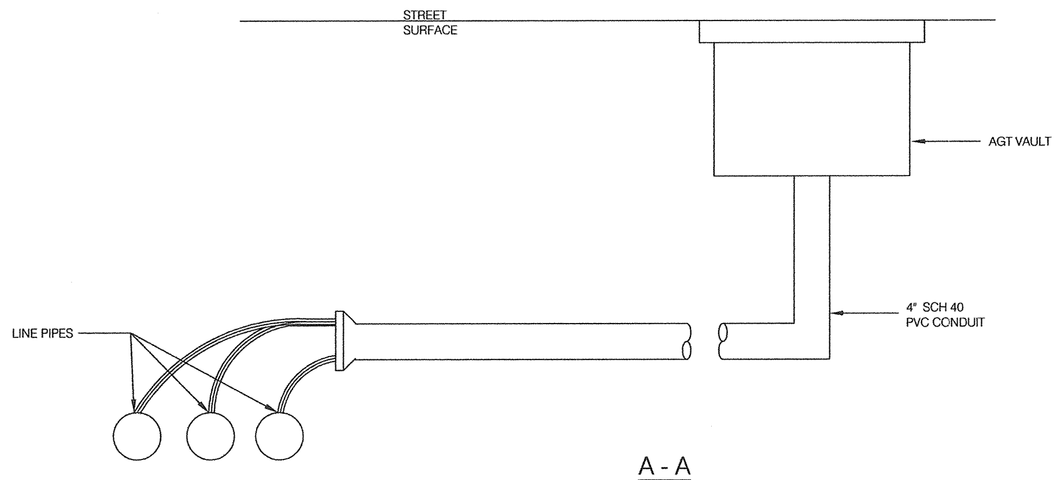
A00888 - 31

Proposal No. 613358-129697

INSTALLATION OF AGT TEST STATION TEST LEADS PIPE TYPE CABLE LINES

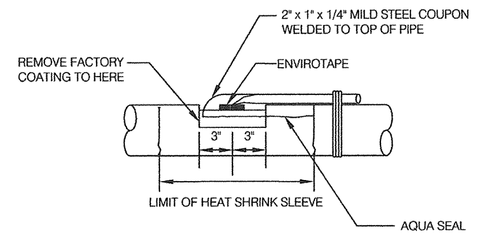


PLAN VIEW



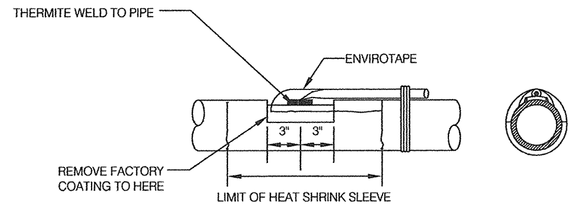
A - A

DETAIL OF PIPE LEAD ATTACHMENT



ELEVATION

DETAIL OF CATHODIC PROTECTION LEAD ATTACHMENT



ELEVATION

AGT TEST LEAD NOTES:

1. AGT VAULTS SHALL BE INSTALLED AS SHOWN ON THE PLANS AT THE CROSSINGS OF THE AGT GAS LINES.

2. AGT VAULTS SHALL BE A HEAVY DUTY POLYMER CONCRETE VAULT APPROXIMATELY 13 IN WIDE BY 20 IN LONG BY 12 IN DEEP WITH A COVER DESIGNED TO WITHSTAND H-20 LOADING, SUCH AS H1118-12 BY CARSON INDUSTRIES LLC.

3. TRAIN LEADS OVER AND AWAY FROM PIPES IN SUCH MANNERS THAT NO SHARP BENDS OR KINKS OCCUR.

4. LEAVE SLACK IN ALL LEADS TO ALLOW FOR SETTLING.

5. ALL LEADS SHALL BE CONTINUOUS (NO SPICES) FROM ATTACHMENT TO THE VAULT. LEADS SHALL BE SECURED TO THE TOP OF THE PIPES BY FRICTION TAPE AT 2 FT INTERVALS.

6. USE DUCT SEAL ON 4" PVC CONDUIT.

7. THE 4" PVC CONDUIT SHALL EXTEND 3" ABOVE BOTTOM OF THE VAULT.

8. CATHODIC PROTECTION LEADS SHALL BE #12 AWG COPPER CONDUCTOR, 600 VOLT CABLE WITH A HYPALON JACKET, DURASHEATH POWER CABLE BY BICC OR EQUAL.

9. EACH CATHODIC PROTECTION LEAD SHALL HAVE A PERMANENT IDENTIFICATION TAG ON EACH LEAD. IDENTIFICATION SHALL CONSIST OF THE TYPE OF LEAD AND LINE NUMBER AS FOLLOWS CP A (LINE #), CP B (LINE #).

10. CATHODIC PROTECTION LEAD SHALL BE ATTACHED TO THE PIPE BY REMOVING THE PIPE COATING FROM THE TOP OF THE PIPE FOR A 3" BY 3" SQUARE, THOROUGHLY CLEANING THE PIPE WITH A WIRE BRUSH AND TERMITE WELD THE LEAD TO THE PIPE. APPLY TWO 6" WIDE LAYER OF TAPECOAT ENVIROTAPE. THE FIRST LAYER SHALL BUTT UP AGAINST THE LEAD WIRE. THE LEAD WIRE SHALL BE BENT OVER THE TOP OF THE FIRST LAYER, AND THE SECOND LAYER SHALL BE APPLIED OVER THE LEAD WIRE WITH A 1" OVERLAP OF THE FIRST LAYER. APPLY A 17" WIDE HEAT SHRINK SLEEVE OVER THE ENTIRE AREA.

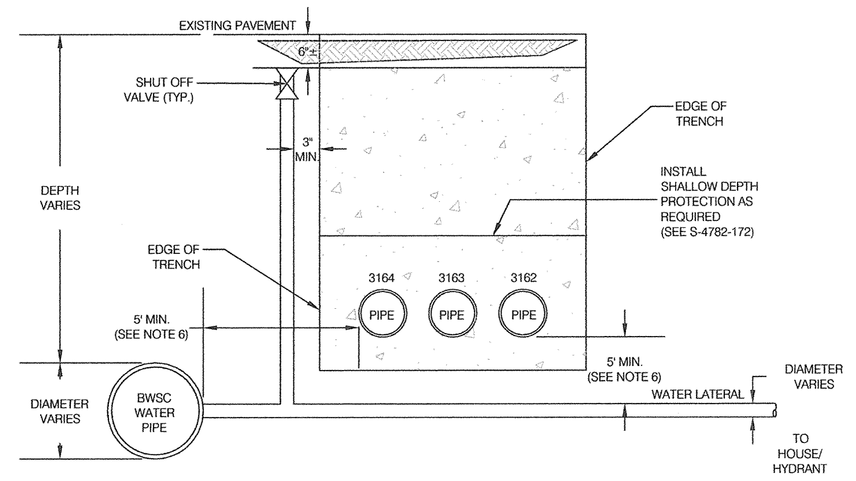
11. PIPE LEADS SHALL BE #6 AWG COPPER, 600 VOLT CABLE WITH A HYPALON JACKET, DURASHEATH POWER CABLE BY BICC OR EQUAL.

12. EACH PIPE LEAD SHALL BE HAVE A PERMANENT IDENTIFICATION TAG ON EACH LEAD. IDENTIFICATION SHALL CONSIST OF THE LEAD AND THE LINE NUMBER AS FOLLOWS PIPE (LINE #).

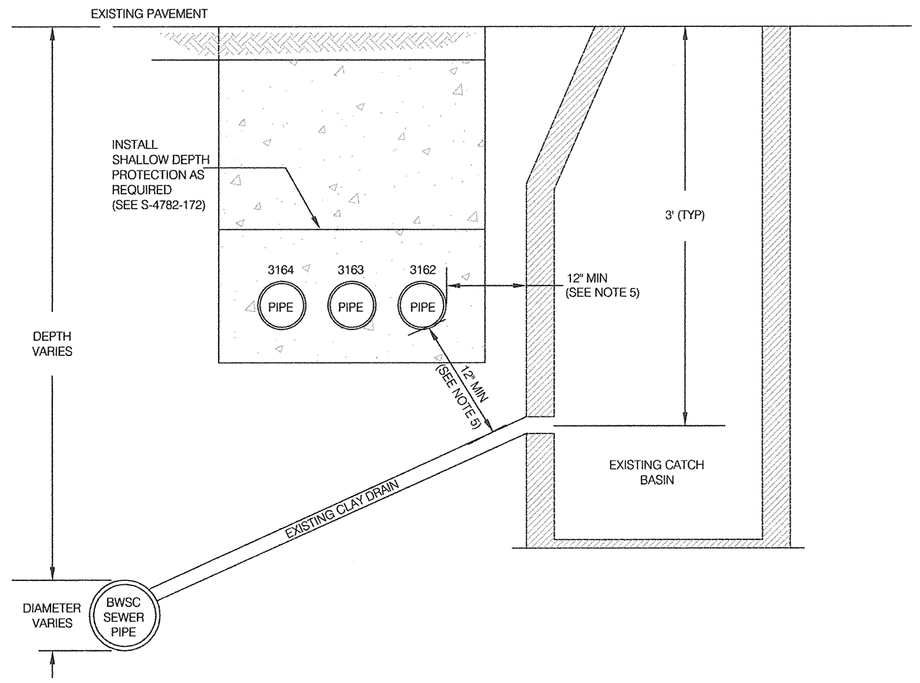
13. THE PIPE LEAD SHALL BE CUT TO THE REQUIRED LENGTH, REMOVE ALL CABLE INSTALLATION FOR 2 IN, PENCIL END OF CABLE FOR 1/2 IN., CLEAN THE EXPOSED CONDUCTOR, AND BRAZE THE CONDUCTOR TO THE MILD STEEL COUPON.

14. REMOVE PIPE COATING FROM THE TOP OF THE PIPE FOR 4 IN WIDE BY 6 IN LONG. ARC WELD THE MILD STEEL COUPON TO THE PIPE. APPLY TWO LAYERS OF 6" WIDE TAPECOAT ENVIROTAPE. THE FIRST LAYER SHALL BUTT UP AGAINST THE OF UNDER THE MILD STEEL COUPON AND THE SECOND LAYER SHALL BE APPLIED OVER THE COUPON WITH A 1" OVERLAP OF THE FIRST LAYER. APPLY A 17" WIDE HEAT SHRINK SLEEVE OVER THE ENTIRE AREA.

INSTALLATION OF PIPE TYPE CABLE LINES IN VICINITY TO BWSC WATERLINES



INSTALLATION OF PIPE TYPE CABLE LINES IN VICINITY TO EXISTING CATCH BASIN STRUCTURES



BWSC FACILITIES NOTES:

1. REALIGN PIPE PLAN LOCATION, CONFIGURATION, SPACING, AND DEPTH AS REQUIRED TO PROVIDE CLEARANCE TO BWSC FACILITIES.

2. 3 PIPES TRENCH DETAILS SHOWN, CLEARANCE REQUIREMENTS ARE VALID FOR ALL TRENCH DETAILS.

3. CONTRACTOR SHALL NOT DAMAGE EXITING BWSC FACILITIES.

4. THE ELEVATION OF EXISTING CLAY DRAINS FROM THE CATCH BASINS VARY WITH THE LOCATION AND DEPTH OF THE SEWER PIPE. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AT EACH CATCH BASIN BEFORE INSTALLING THE LINE PIPE.

5. CLAY LATERALS IN THE TRENCH SHALL BE REPLACED WITH DUCTILE IRON PIPE AND FEMCO TYPE ADAPTOR COUPLING FOR ALL LATERALS WITHIN 2-FEET OF THE PIPE.

6. OBTAIN BWSC APPROVAL IF MINIMUM DISTANCE CAN NOT BE MAINTAINED.

REFERENCE DRAWINGS

DRAWING NO.	TITLE	DRAWING NO.	TITLE
S-4782-012	ALIGNMENT SHEET		
S-4782-032	ALIGNMENT SHEET		
S-4782-091 TO S-4782-171	ALIGNMENT SHEET		
S-4783-001 TO S-4783-007	ALIGNMENT SHEET		

REVISIONS

NO.	DATE	REMARKS	REV.	CKD.	COR.	APP.
0	01/05	ISSUED FOR BID	C&C	JEO	NS	PFB
1	01/05	RESPONSE TO BWSC COMMENTS	C&C	JEO	NS	PFB
2	05/05	ISSUED FOR CONSTRUCTION	C&C	JEO	NS	PFB
3	01/07	ISSUED FOR AS-BUILT	C&C	JEO	NS	PFB

Design/Engineering: POWER ENGINEERS; COLER & COLANTONIO INC. ENGINEERS AND SCIENTISTS

Owner/Operator: NSTAR ELECTRIC

SPECIFICATIONS

NSTAR ELECTRIC COMPANY 345kV PIPE TYPE CABLE TRENCH & MANHOLE DETAILS NORFOLK & SUFFOLK COUNTIES

File No.: S-4782-175.DWG

APPROVED BY

DATE: 01/12/07 MANAGER

NSTAR ELECTRIC COMPANY

S-4782-175

AM0888: 32

Proposal No. 61358-125897

NORFOLK COUNTY, MASSACHUSETTS
TOWN OF MILTON

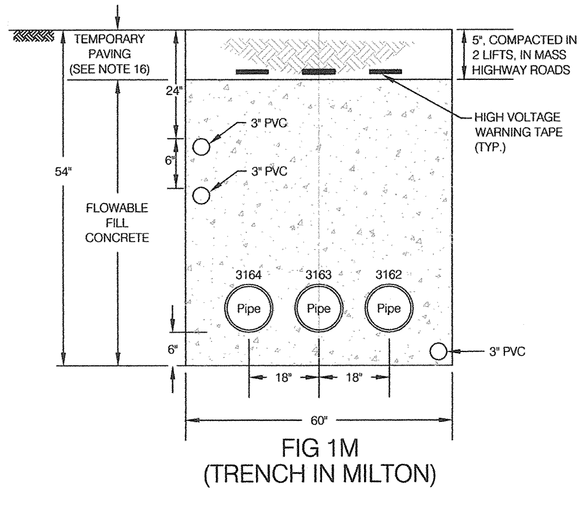


FIG 1M
(TRENCH IN MILTON)

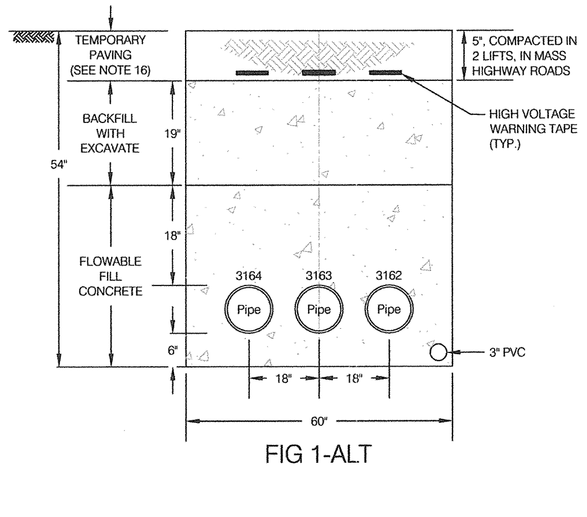


FIG 1-ALT

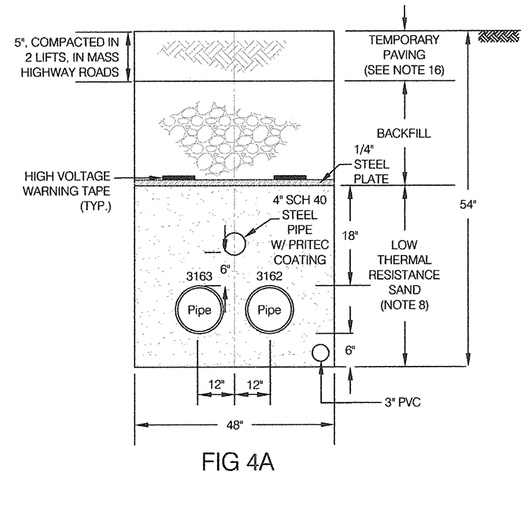


FIG 4A

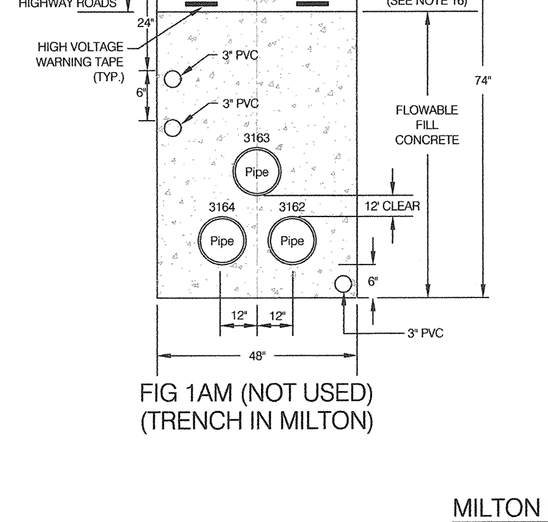
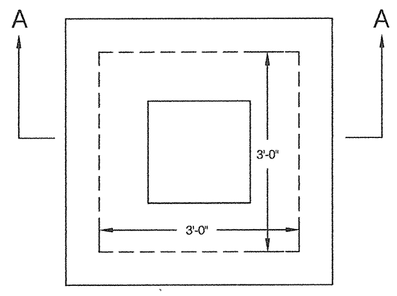
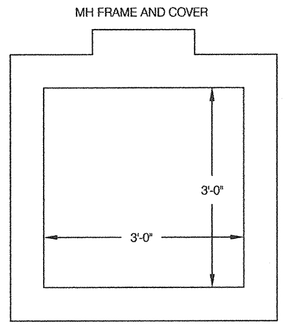


FIG 1AM (NOT USED)
(TRENCH IN MILTON)

MILTON HANDHOLE
(7 HANDHOLES)



PLAN



A - A

MILTON MANHOLE NOTES

1. FIG. 1 ALT SHALL BE USED WHERE DIRECTED BY NSTAR.
2. SEE NOTES ON S-4782-172 FOR PIPE TYPE CABLE INSTALLATION.
3. ALL FIGURES SHOWN LOOKING TOWARD K STREET STATION 385 OR HYDE PARK STATION 496.
4. CONTRACTOR TO FURNISH AND INSTALL TWO 3 PVC CONDUITS IN MILTON.
5. CONTRACTOR TO FURNISH AND INSTALL PRECAST CONCRETE HANDHOLE AND CAST IRON FRAME AND 26 IN NOMINAL HANDHOLE COVER.
6. MILTON HANDHOLE SHALL BE FABRICATED ACCORDING TO THE PRECAST CONCRETE FABRICATION NOTES ON S-4782-173.

RETURN PIPE NOTES

1. EXTEND THE RETURN PIPE NEAR STATION 861+70 18" BEYOND THE TRENCH TOWARDS THE EXISTING WYE JOINT MANHOLE IN COLUMBIA ROAD WEST OF G STREET. WELD A GAS TYPE CAP AT THE END OF THE RETURN PIPE.
2. EXTEND RETURN PIPE 18' INSIDE MH 29 AND WELD A GAS TIGHT CAP WITH A 1/2" BALL VALVE ON THE END OF THE RETURN PIPE.
3. PRESSURE TEST RETURN PIPE TO 300 PSI OF DRY NITROGEN GAS FOR 24 HOURS.
4. FILL RETURN PIPE WITH 25 PSI DRY NITROGEN AFTER PRESSURE TEST.

REFERENCE DRAWINGS

DRAWING NO.	TITLE	DRAWING NO.	TITLE
S-4782-001 TO S-4782-171	TRENCH DETAILS		
S-4783-001 TO S-4783-007	TRENCH DETAILS		

REVISIONS

NO.	DATE	REMARKS	REV.	CKD.	COR.	APP.
0	05/05	ISSUED FOR CONSTRUCTION	C&C	JEO	NS	PFB
1	05/05	RESPONSE TO MASS HIGHWAY COMMENTS	C&C	JEO	NS	PFB
2	11/05	ADD 4-INCH STEEL RETURN PIPE	C&C	JEO	NS	PFB
3	01/07	ISSUED FOR AS-BUILT	C&C	JEO	NS	PFB

Design/Engineering: POWER ENGINEERS; COLER & COLANTONIO INC ENGINEERS AND SCIENTISTS

Owner/Operator: NSTAR ELECTRIC

SPECIFICATIONS

NSTAR ELECTRIC COMPANY
345kV PIPE TYPE CABLE
TRENCH & MANHOLE DETAILS
NORFOLK & SUFFOLK COUNTIES
File No.: S-4782-176.DWG

APPROVED BY
DATE: 01/12/07 MANAGER
NSTAR ELECTRIC COMPANY
S-4782-176

A00888 - 33

Proposal No. 61358-129897

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DOCUMENT A00889

ARMY CORPS OF ENGINEERS
SELF VERIFICATION FORM

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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	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)

1 ☐	6 ☐	11 ☐	16 ☐	21 ☐
2 ☐	7 ☐	12 ☐	17 ☐	22 ☐
3 ☐	8 ☐	13 ☐	18 ☐	23 ☐
4 ☐	9 ☐	14 ☐	19 ☐	24 ☐
5 ☐	10 ☐	15 ☐	20 ☐	25 ☐

16. SUMMARY OF PROJECT IMPACTS (*see instructions*)

Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration

17. PROJECT PLANS (BY CHECKING THE BOXES BELOW, YOU CERTIFY THESE ITEMS ARE COMPLETE) (*see instructions*)

- ☐ a. Plans shall at least contain the following: Vicinity Map, Plan View, and Typical Cross Section View of the proposed activity.
- ☐ b. All direct, indirect and secondary impacts from USACE regulated activities are shown on the project plans.
- ☐ c. The size of the impact area for each activity (acre, square feet, linear feet) are shown on the project plans.
- ☐ d. For discharges of fill material (§404), the volume of fill material is identified on the project plans.
- ☐ e. The duration of each impact, permanent or temporary (X days), is identified on the project plans.
- ☐ f. Do activities with permanent impacts result in the loss of waters? If so, this is identified on the project plans.
- ☐ g. All aquatic resources in the vicinity of the USACE regulated activities are delineated on the project plans.

18. AVOIDANCE & MINIMIZATION (BY CHECKING THE BOXES BELOW, YOU CERTIFY THESE CRITERIA ARE MET) (*see instructions*)

- ☐ a. The project has been designed to avoid and minimize impacts to aquatic resources.
- ☐ b. The footprint of activities in waters of the U.S. has been reduced to only what is necessary to achieve the overall project purpose.
- ☐ c. All practicable measures have been taken to avoid and minimize impacts to aquatic resources through construction techniques and site access (e.g., Best Management Practices, Time of Year Restrictions).
- ☐ d. All temporary impacts from USACE regulated activities will be restored upon completion of construction and the project area will be returned to pre-construction contours and conditions.

COMPLIANCE WITH FEDERAL REGULATIONS & SUPPLEMENTAL INFORMATION

19. DUE DILIGENCE (*see instructions*)

Complete the entries below to document compliance with the following Federal requirements. Construction may NOT begin if a PCN is/may be required, and you must contact USACE to determine permitting requirements. Documentation that demonstrates how the activity complies with each field below shall be submitted to the USACE as noted in the instructions block. See each General Condition (GC) in the GP for how to comply with each requirement.

a. State Historic Preservation Officer	Select Option
b. Massachusetts BUAR	Select Option
c. Tribal Historic Preservation Officers	Select Option
d. Endangered Species Act - NOAA	Select Option
e. Endangered Species Act - USFWS	Select Option
f. Northern Long Eared Bat (ESA)	Select Option
g. Essential Fish Habitat	Select Option
h. Wild & Scenic Rivers	Select Option
i. 401 Water Quality Certification 401	Select Option
	401 WQC/OOC File Number: OOC issued: 401 issued:
j. Section 408 Permission	Select Option
k. Coastal Zone	Select Option
l. Construction Mats	Select Option
m.Time of Year Restrictions	Select Option
n. Vernal Pools	Select Option
o. Sediment & Erosion Controls	Select Option
p. Stream/Wetland Crossings	Select Option

20. AQUACULTURE ACTIVITIES - GP 18 (*see instructions*)

- ☐ a. If required, an Aquaculture Certification from the Massachusetts Division of Marine Fisheries was obtained prior to commencing work.
- ☐ b. Coordination with the U.S. Coast Guard pursuant to Private Aids to Navigation has occurred prior to commencing work.
- ☐ c. If required, a MEPA Certificate was obtained from the Massachusetts Environmental Protection Agency prior to commencing work. Select Option
- ☐ d. The prospective permittee contacted local authorities (e.g. harbormaster, select board, shellfish constable) for authorization of their facility prior to commencing work.

21. ADDITIONAL INFORMATION/ATTACHMENTS (*see instructions*)

- ☐ a. The project plans are enclosed in this SVN submittal (see block 17).
- ☐ b. The activity Select Option funded through the Bipartisan Infrastructure Bill (also known as the Infrastructure Investment and Jobs Act).
- ☐ c. All required state, local and federal approvals were acquired prior to starting construction in USACE jurisdiction.
- ☐ d. After construction of the activity is completed, a complete Certificate of Compliance will be submitted to USACE.

22. IS THERE ANOTHER LEAD FEDERAL AGENCY:

☐ YES ☐ NO

23. STATEMENT OF AUTHORIZATION *(see instructions)*

I certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE
	4/24/2024		4/24/2024

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
	4/24/2024		4/24/2024

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.

LEC
Environmental Consultants, Inc.
Wakefield, MA
781.245.2500
www.lecenvironmental.com

Figure 1: USGS Topographic Map
Washington Street (Route 138) Corridor Improvements
Stoughton, MA

April 18, 2024

N

0 500 1,000 Feet

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

STOUGHTON
WASHINGTON STREET (ROUTE 138) PHASE 2

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	11
PROJECT FILE NO.	613358		

TITLE SHEET & INDEX

PLAN AND PROFILE OF

CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)

IN THE TOWN OF

STOUGHTON

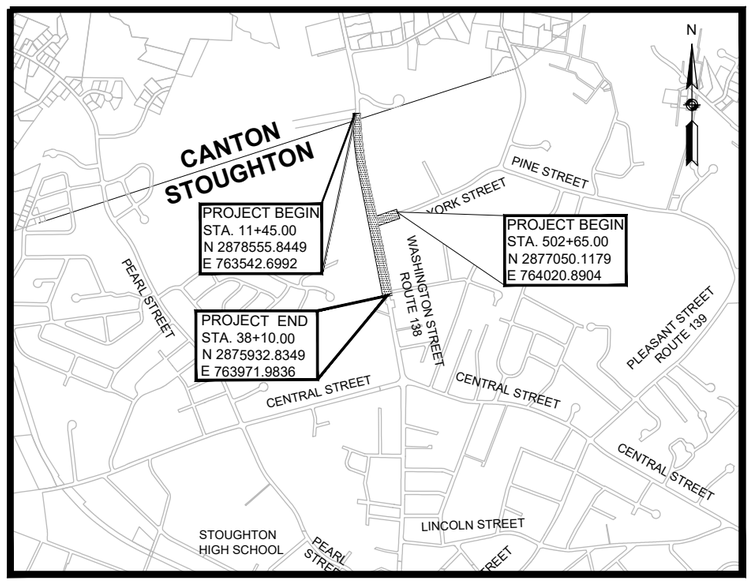
NORFOLK COUNTY

FEDERAL AID PROJECT NO.

USACE PERMIT SET
NOT FOR CONSTRUCTION

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.

INDEX



0 1,000 2,000 3,000 4,000

SCALE: 1" = 1,000'

LENGTH OF PROJECT = 2,665.00 FEET = 0.505 MILES

DATE	DESCRIPTION	REV #
12/8/2023	PS&E SUBMISSION	
4/7/23	PS&E SUBMISSION	
2/28/23	PS&E SUBMISSION	
10/27/22	100% SUBMISSION	
4/18/22	75% SUBMISSION	
10/9/20	25% RESUBMISSION	
12/21/18	25% SUBMISSION	

Nitsch Engineering
www.nitsch.com
2 Center Plaza, Suite 430
Boston, MA 02108
T: (617) 338-0063
F: (617) 338-6472
Civil Engineering
Land Surveying
Transportation Engineering
Structural Engineering
Water Resources
Planning
GIS

massDOT
Massachusetts Department of Transportation
Highway Division

APPROVED

CHIEF ENGINEER **DATE**

STOUGHTON
WASHINGTON STREET (ROUTE 138) PHASE 2

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	12
PROJECT FILE NO.	613358		

CONSTRUCTION PLAN

HIGHWAY GUARD DETAILS

GUARDRAIL TANGENT END TREATMENT, TL-3 STA 13+20.07 LT TO STA 13+70.07 LT
GUARDRAIL, TL-3 (SINGLE FACED) STA 13+70.07 LT TO STA 14+77.08 LT
GUARDRAIL - CURVED, TL-3 (SINGLE FACED) STA 14+77.08 LT TO STA 14+87.07 LT
TRAILING ANCHORAGE STA 14+87.07 LT

TRAFFIC SIGNAL CONDUIT

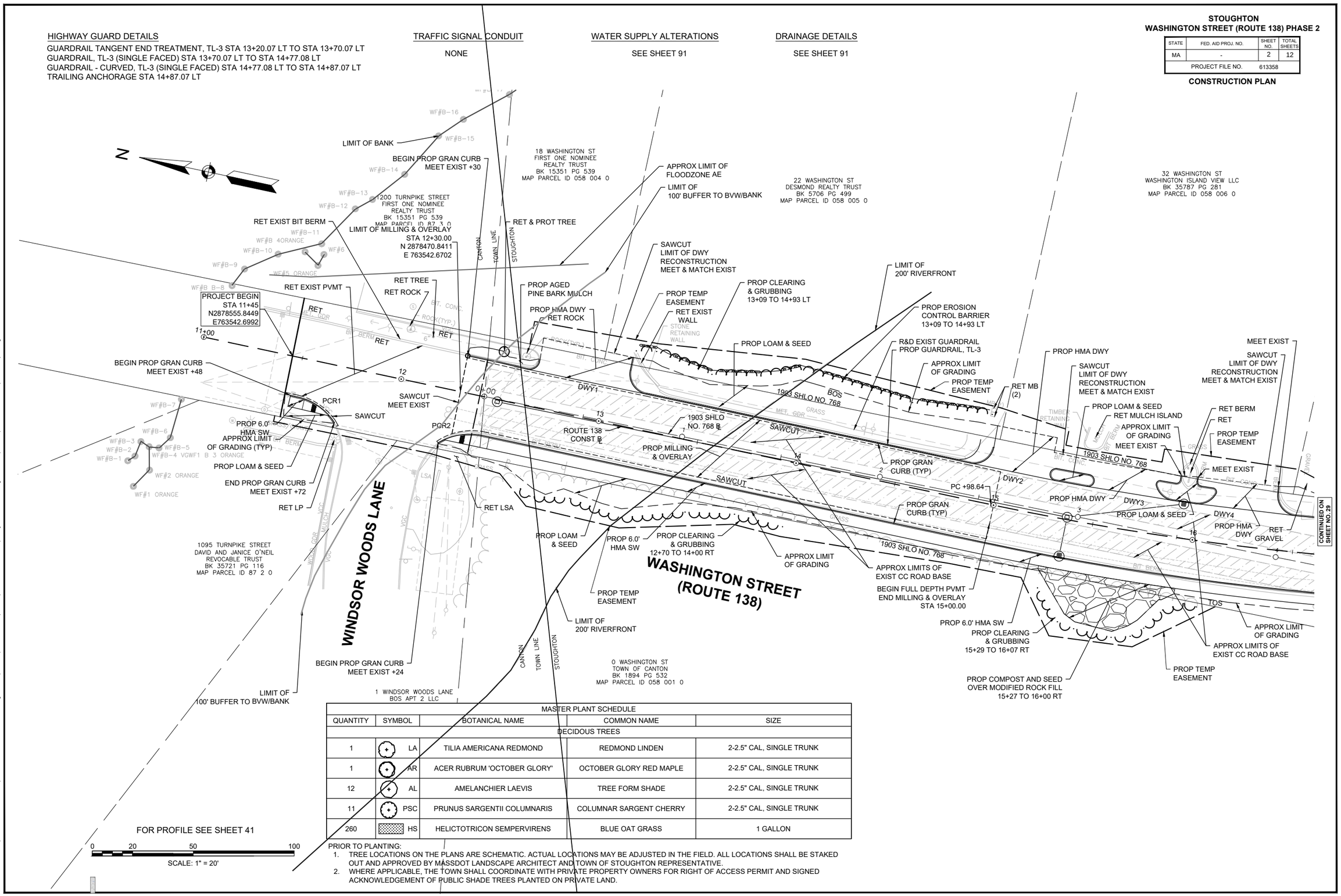
NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 91

DRAINAGE DETAILS

SEE SHEET 91



FOR PROFILE SEE SHEET 41

0 20 50 100
SCALE: 1" = 20'

MASTER PLANT SCHEDULE

QUANTITY	SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE
DECIDUOUS TREES				
1	LA	TILIA AMERICANA REDMOND	REDMOND LINDEN	2-2.5" CAL, SINGLE TRUNK
1	AR	ACER RUBRUM 'OCTOBER GLORY'	OCTOBER GLORY RED MAPLE	2-2.5" CAL, SINGLE TRUNK
12	AL	AMELANCHIER LAEVIS	TREE FORM SHADE	2-2.5" CAL, SINGLE TRUNK
11	PSC	PRUNUS SARGENTII COLUMNARIS	COLUMNAR SARGENT CHERRY	2-2.5" CAL, SINGLE TRUNK
260	HS	HELICTOTRICON SEMPERVIRENS	BLUE OAT GRASS	1 GALLON

PRIOR TO PLANTING:
1. TREE LOCATIONS ON THE PLANS ARE SCHEMATIC. ACTUAL LOCATIONS MAY BE ADJUSTED IN THE FIELD. ALL LOCATIONS SHALL BE STAKED OUT AND APPROVED BY MASSDOT LANDSCAPE ARCHITECT AND TOWN OF STOUGHTON REPRESENTATIVE.
2. WHERE APPLICABLE, THE TOWN SHALL COORDINATE WITH PRIVATE PROPERTY OWNERS FOR RIGHT OF ACCESS PERMIT AND SIGNED ACKNOWLEDGEMENT OF PUBLIC SHADE TREES PLANTED ON PRIVATE LAND.

STOUGHTON
WASHINGTON STREET (ROUTE 138) PHASE 2

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	12
PROJECT FILE NO.	613358		

CONSTRUCTION PLAN

HIGHWAY GUARD DETAILS

GUARDRAIL, TL-3 (SINGLE FACED) STA 13+70.07 LT TO STA 14+77.08 LT
GUARDRAIL - CURVED, TL-3 (SINGLE FACED) STA 14+77.08 LT TO STA 14+87.07 LT
TRAILING ANCHORAGE STA 14+87.07 LT

PERMANENT IMPACT ATTENUATOR, REDIRECTIVE, TL3 20+06.25 RT TO 20+36.25 RT
PERMANENT CONCRETE BARRIER - SINGLE FACED (F TYPE) 20+36.25 RT TO 21+46.22 RT

TRAFFIC SIGNAL CONDUIT

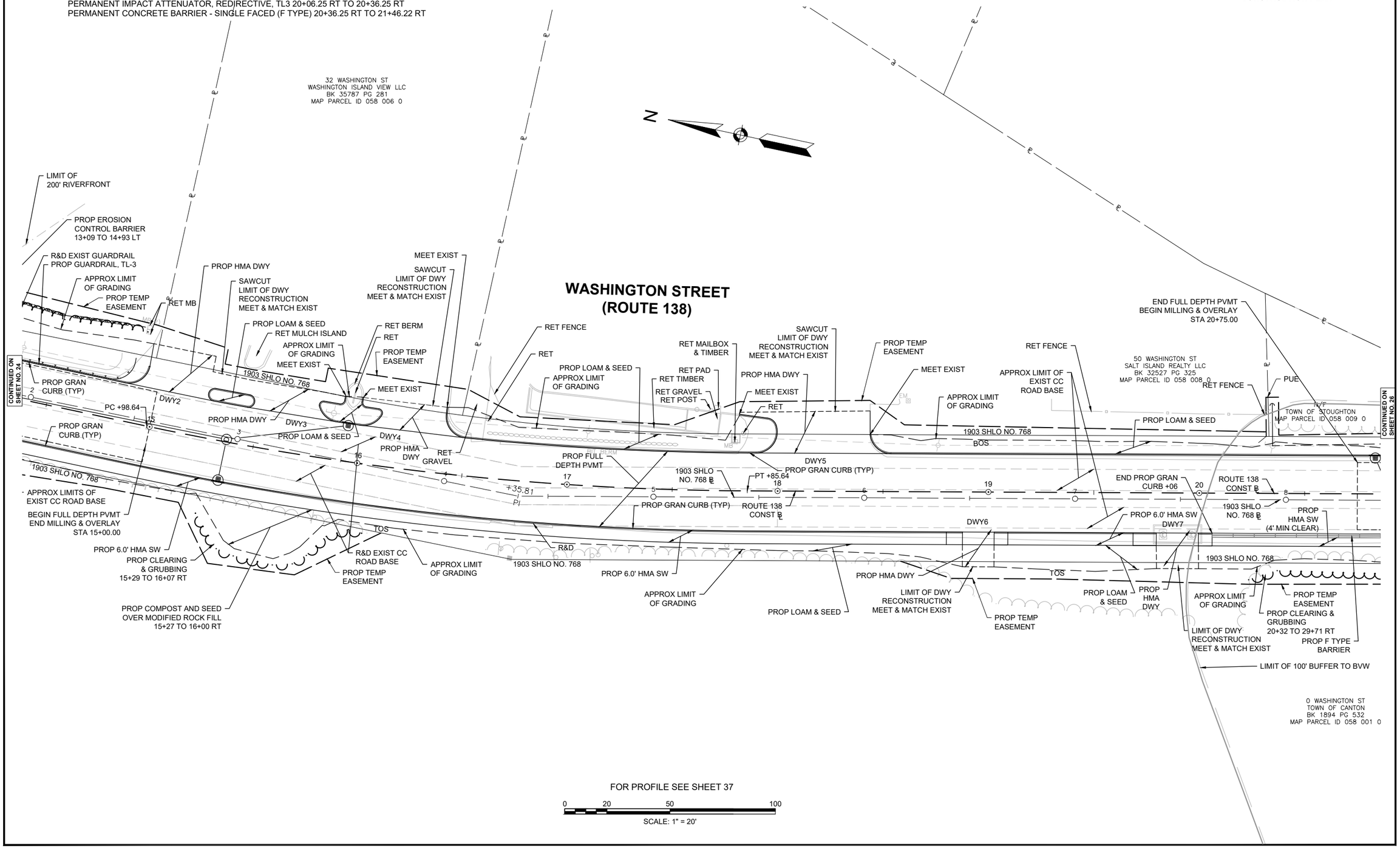
NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 91

DRAINAGE DETAILS

SEE SHEET 91



FOR PROFILE SEE SHEET 37

HIGHWAY GUARD DETAILS

PERMANENT IMPACT ATTENUATOR, REDIRECTIVE, TL-3 20+01.22 RT TO 20+31.22 RT
PERMANENT CONCRETE BARRIER - SINGLE FACED (F TYPE) 20+31.22 RT TO 21+51.22 RT
TRANSITION TO RIGID BARRIER (SINGLE FACED W/ RUB RAIL) 21+51.22 RT TO 21+63.72 RT
GUARDRAIL, TL-3 (SINGLE FACED W/ RUB RAIL) STA 21+63.72 RT TO STA 24+81.67 RT
TRAILING ANCHORAGE STA 24+81.67 RT STA 24+91.00 RT

TRAILING ANCHORAGE STA 21+80.42 LT TO STA 21+89.80 LT
GUARDRAIL, TL-3 (SINGLE FACED) STA 21+89.80 LT TO STA 26+32.47 LT
GUARDRAIL TANGENT END TREATMENT, TL-3 STA 26+32.47 TO 26+82.47 LT

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 93

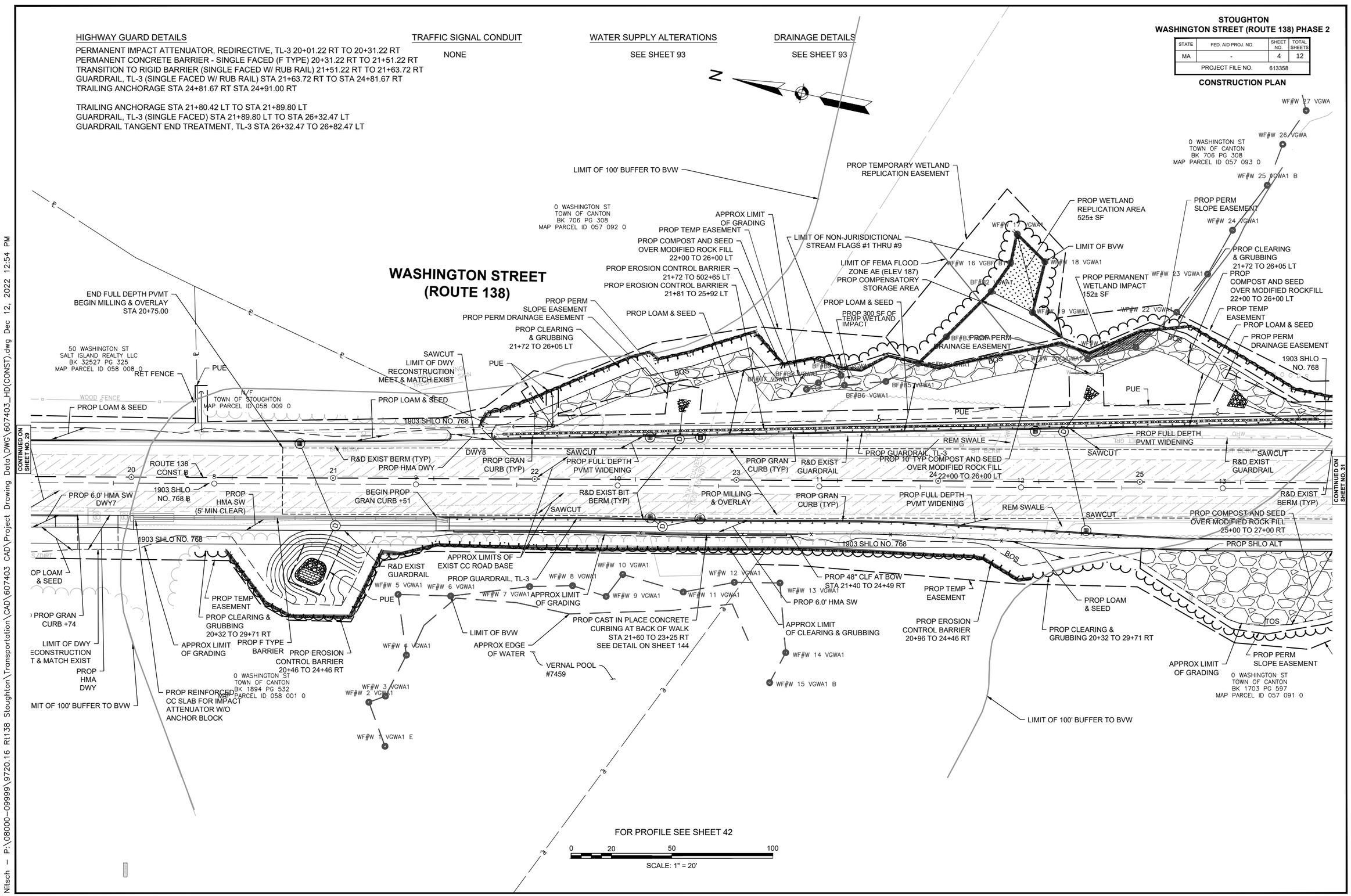
DRAINAGE DETAILS

SEE SHEET 93

STOUGHTON
WASHINGTON STREET (ROUTE 138) PHASE 2

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	4	12
PROJECT FILE NO.	613358		

CONSTRUCTION PLAN



TRAFFIC SIGNAL CONDUIT

SEE SHEET 121

WATER SUPPLY ALTERATIONS

SEE SHEET 94

DRAINAGE DETAILS

SEE SHEET 94

HIGHWAY GUARD DETAILS

TRAILING ANCHORAGE STA 21+80.42 LT TO STA 21+89.80 LT
GUARDRAIL, TL-3 (SINGLE FACED) STA 21+89.80 LT TO STA 26+32.47 LT
GUARDRAIL TANGENT END TREATMENT, TL-3 STA 26+32.47 TO 26+82.47 LT

GUARDRAIL TANGENT END TREATMENT, TL-2 STA 502+65.00 LT TO STA 502+40.00 LT
GUARDRAIL TL-2 (SINGLE FACED) STA 502+40.00 LT TO STA 500+85.85 LT
TRAILING ANCHORAGE STA 500+85.85 LT TO 500+76.35 LT

STOUGHTON
WASHINGTON STREET (ROUTE 138) PHASE 2

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	5	12
PROJECT FILE NO.	613358		

CONSTRUCTION PLAN

168 WASHINGTON ST
NSTAR ELECTRIC COMPANY
BK 22202 PG 466
MAP PARCEL ID 057 110 0

0 WASHINGTON ST
TOWN OF CANTON
BK 706 PG 308
MAP PARCEL ID 057 093 0

0 WASHINGTON ST
TOWN OF CANTON
BK 1703 PG 597
MAP PARCEL ID 057 091 0

0 WASHINGTON ST
TOWN OF CANTON
BK 1703 PG 597
MAP PARCEL ID 057 091 0

WASHINGTON STREET (ROUTE 138)

YORK STREET

27+53.98 WASHINGTON STREET (ROUTE 138)=
500+00.00 YORK ST CONST CL

CONTINUED ON SHEET NO. 30

CONTINUED ON SHEET NO. 32

FOR PROFILE SEE SHEET 42, 43 & 48

SCALE: 1" = 20'

UTILITY NOTES:

1. FOR ALL POLES THAT ARE IN OR ADJACENT TO SIDEWALKS, THE GRAVEL MUST BE PLACED AND COMPACTED WITHIN 5-FEET OF THE POLE WITHIN 2 HOURS OF EXCAVATION.
2. ALL POLES WITHIN SIDEWALKS MUST BE WRAPPED WITH AN APPROVED EXPANSION MATERIAL TO AVOID POLE MOVEMENT FROM CRACKING THE SIDEWALK.
3. ANY POLE HOLDS REQUIRED TO ACCOMODATE THE CONTRACTOR'S ACTIVITIES, SUCH AS BUT NOT LIMITED TO: WATER, SEWER AND DRAINAGE WORK, WILL NEED TO BE COORDINATED BY THE CONTRACTOR AND PAID FOR AT THEIR EXPENSE. THE CONTRACTOR WILL NEED TO COORDINATE WITH VERIZON ON ANY POLES HOLDS BY INITIATING AN ENGINEERING WORK ORDER BY CALLING 774-409-3160. THE CONTRACTOR IS REQUIRED TO SCHEDULE THE POLE HOLDS IN ADVANCE OF PERFORMING THE WORK NEAR THE POLES.
4. AT LOCATIONS WHERE AN EXISTING MANHOLE, HANDHOLE, OR OTHER SURFACE TYPE STRUCTURE THAT CANNOT BE REMOVED OR RESET WITHIN THE PROPOSED OR EXISTING ACCESSIBLE SURFACE, THE STRUCTURE SHALL BE ADJUSTED SUCH THAT THE TOPMOST SURFACE OF THE STRUCTURE COVER IS FLUSH WITH THE ACCESSIBLE SURFACE.

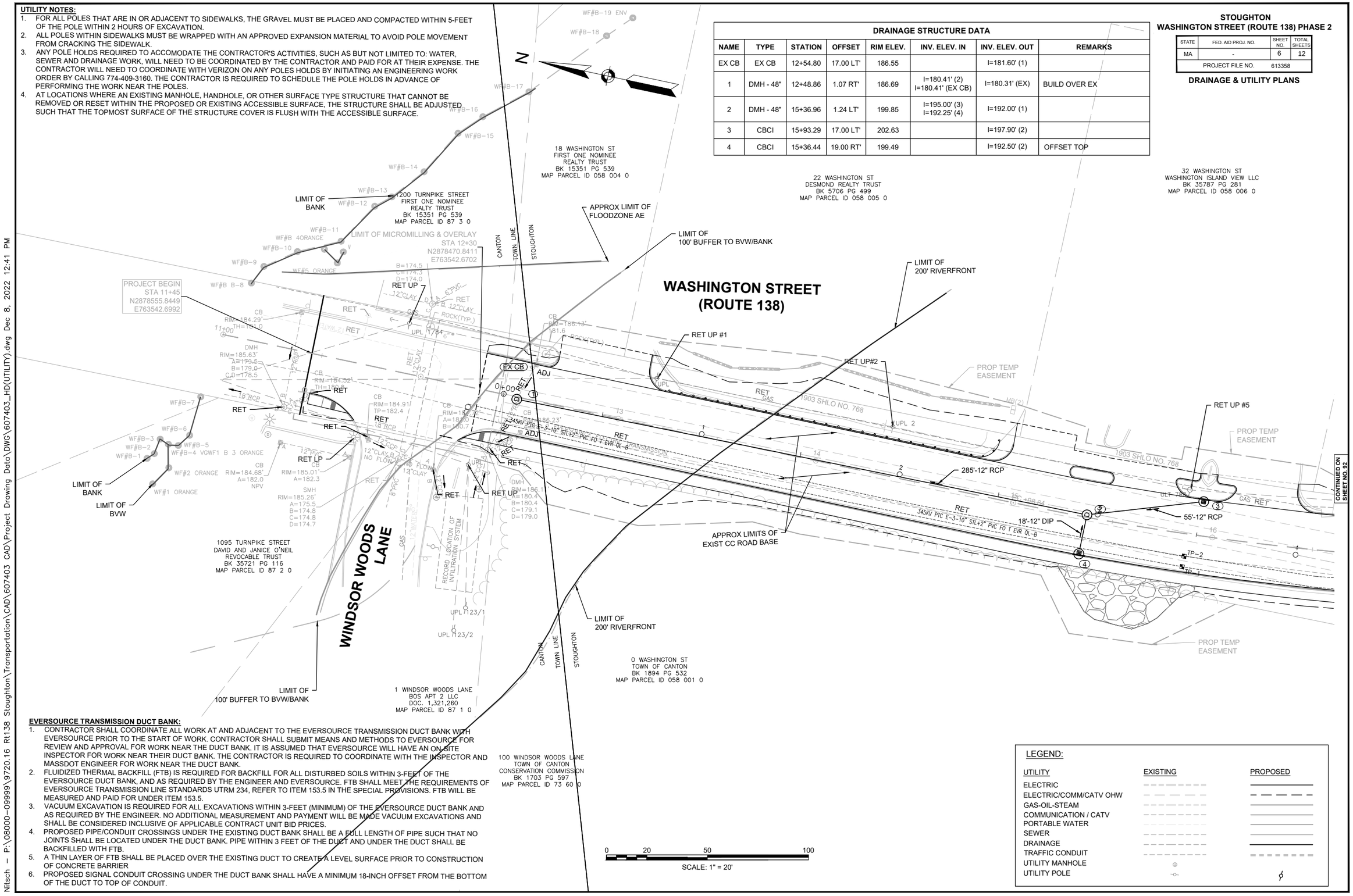
DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
EX CB	EX CB	12+54.80	17.00 LT'	186.55		I=181.60' (1)	
1	DMH - 48"	12+48.86	1.07 RT'	186.69	I=180.41' (2) I=180.41' (EX CB)	I=180.31' (EX)	BUILD OVER EX
2	DMH - 48"	15+36.96	1.24 LT'	199.85	I=195.00' (3) I=192.25' (4)	I=192.00' (1)	
3	CBCI	15+93.29	17.00 LT'	202.63		I=197.90' (2)	
4	CBCI	15+36.44	19.00 RT'	199.49		I=192.50' (2)	OFFSET TOP

STOUGHTON
WASHINGTON STREET (ROUTE 138) PHASE 2

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	12
PROJECT FILE NO.	613358		

DRAINAGE & UTILITY PLANS



0 20 50 100
SCALE: 1" = 20'

EVERSOURCE TRANSMISSION DUCT BANK:

1. CONTRACTOR SHALL COORDINATE ALL WORK AT AND ADJACENT TO THE EVERSOURCE TRANSMISSION DUCT BANK WITH EVERSOURCE PRIOR TO THE START OF WORK. CONTRACTOR SHALL SUBMIT MEANS AND METHODS TO EVERSOURCE FOR REVIEW AND APPROVAL FOR WORK NEAR THE DUCT BANK. IT IS ASSUMED THAT EVERSOURCE WILL HAVE AN ON-SITE INSPECTOR FOR WORK NEAR THEIR DUCT BANK. THE CONTRACTOR IS REQUIRED TO COORDINATE WITH THE INSPECTOR AND MASSDOT ENGINEER FOR WORK NEAR THE DUCT BANK.
2. FLUIDIZED THERMAL BACKFILL (FTB) IS REQUIRED FOR BACKFILL FOR ALL DISTURBED SOILS WITHIN 3-FEET OF THE EVERSOURCE DUCT BANK, AND AS REQUIRED BY THE ENGINEER AND EVERSOURCE. FTB SHALL MEET THE REQUIREMENTS OF EVERSOURCE TRANSMISSION LINE STANDARDS UTRM 234, REFER TO ITEM 153.5 IN THE SPECIAL PROVISIONS. FTB WILL BE MEASURED AND PAID FOR UNDER ITEM 153.5.
3. VACUUM EXCAVATION IS REQUIRED FOR ALL EXCAVATIONS WITHIN 3-FEET (MINIMUM) OF THE EVERSOURCE DUCT BANK AND AS REQUIRED BY THE ENGINEER. NO ADDITIONAL MEASUREMENT AND PAYMENT WILL BE MADE VACUUM EXCAVATIONS AND SHALL BE CONSIDERED INCLUSIVE OF APPLICABLE CONTRACT UNIT BID PRICES.
4. PROPOSED PIPE/CONDUIT CROSSINGS UNDER THE EXISTING DUCT BANK SHALL BE A FULL LENGTH OF PIPE SUCH THAT NO JOINTS SHALL BE LOCATED UNDER THE DUCT BANK. PIPE WITHIN 3 FEET OF THE DUCT AND UNDER THE DUCT SHALL BE BACKFILLED WITH FTB.
5. A THIN LAYER OF FTB SHALL BE PLACED OVER THE EXISTING DUCT TO CREATE A LEVEL SURFACE PRIOR TO CONSTRUCTION OF CONCRETE BARRIER
6. PROPOSED SIGNAL CONDUIT CROSSING UNDER THE DUCT BANK SHALL HAVE A MINIMUM 18-INCH OFFSET FROM THE BOTTOM OF THE DUCT TO TOP OF CONDUIT.

LEGEND:

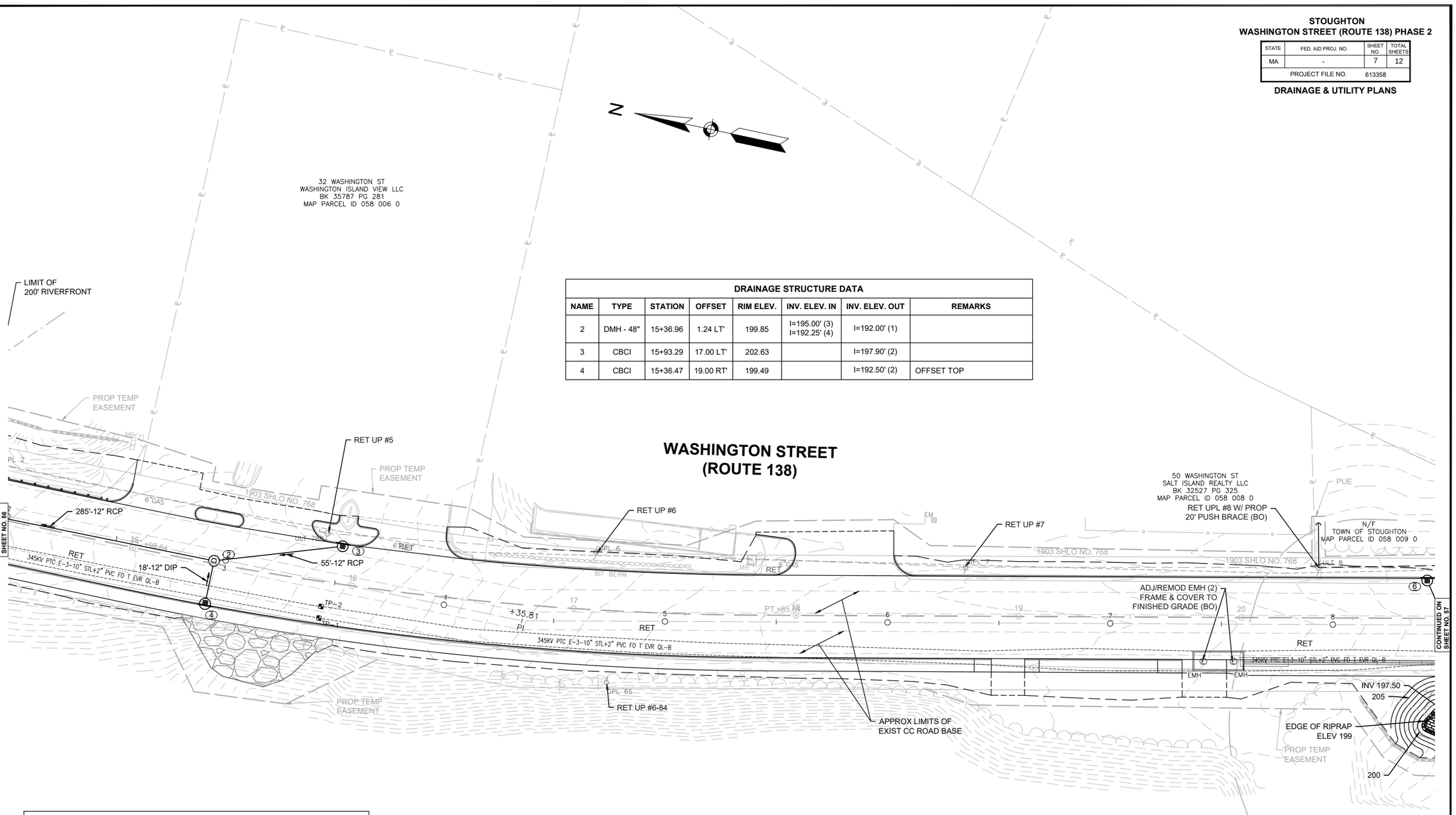
UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

STOUGHTON
WASHINGTON STREET (ROUTE 138) PHASE 2

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	12
PROJECT FILE NO.	613358		

DRAINAGE & UTILITY PLANS

DRAINAGE STRUCTURE DATA							
NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
2	DMH - 48"	15+36.96	1.24 LT'	199.85	I=195.00' (3) I=192.25' (4)	I=192.00' (1)	
3	CBCI	15+93.29	17.00 LT'	202.63		I=197.90' (2)	
4	CBCI	15+36.47	19.00 RT'	199.49		I=192.50' (2)	OFFSET TOP



LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

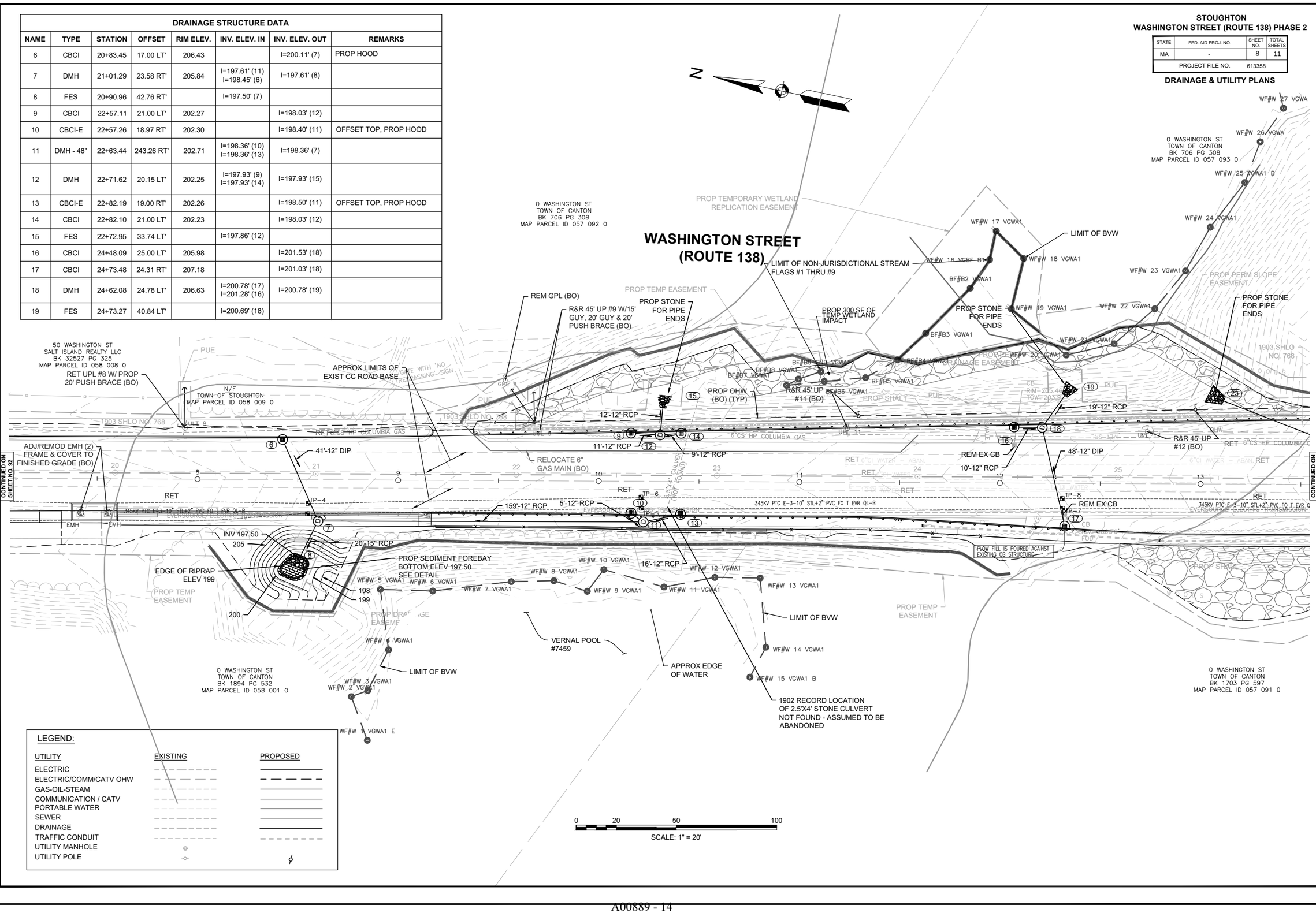
0 20 50 100
SCALE: 1" = 20'

DRAINAGE STRUCTURE DATA							
NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
6	CBCI	20+83.45	17.00 LT'	206.43		I=200.11' (7)	PROP HOOD
7	DMH	21+01.29	23.58 RT'	205.84	I=197.61' (11) I=198.45' (6)	I=197.61' (8)	
8	FES	20+90.96	42.76 RT'		I=197.50' (7)		
9	CBCI	22+57.11	21.00 LT'	202.27		I=198.03' (12)	
10	CBCI-E	22+57.26	18.97 RT'	202.30		I=198.40' (11)	OFFSET TOP, PROP HOOD
11	DMH - 48"	22+63.44	243.26 RT'	202.71	I=198.36' (10) I=198.36' (13)	I=198.36' (7)	
12	DMH	22+71.62	20.15 LT'	202.25	I=197.93' (9) I=197.93' (14)	I=197.93' (15)	
13	CBCI-E	22+82.19	19.00 RT'	202.26		I=198.50' (11)	OFFSET TOP, PROP HOOD
14	CBCI	22+82.10	21.00 LT'	202.23		I=198.03' (12)	
15	FES	22+72.95	33.74 LT'		I=197.86' (12)		
16	CBCI	24+48.09	25.00 LT'	205.98		I=201.53' (18)	
17	CBCI	24+73.48	24.31 RT'	207.18		I=201.03' (18)	
18	DMH	24+62.08	24.78 LT'	206.63	I=200.78' (17) I=201.28' (16)	I=200.78' (19)	
19	FES	24+73.27	40.84 LT'		I=200.69' (18)		

STOUGHTON
WASHINGTON STREET (ROUTE 138) PHASE 2

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	8	11
PROJECT FILE NO. 613358			

DRAINAGE & UTILITY PLANS



LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

Nitsch – P:\08000-09999\9720.16 Rt138 Stoughton\Transportation\CAD\607403 CAD\Project Drawing Data\DWG\607403_HD(UTILITY).dwg Dec 12, 2022 10:50 AM

Plotted on 12-Dec-2022 10:50 AM

STOUGHTON
WASHINGTON STREET (ROUTE 138) PHASE 2

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9	12
PROJECT FILE NO.	613358		

DRAINAGE & UTILITY PLANS

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		WF#W 34 VGWA
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		WF#W 33 VGWA
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

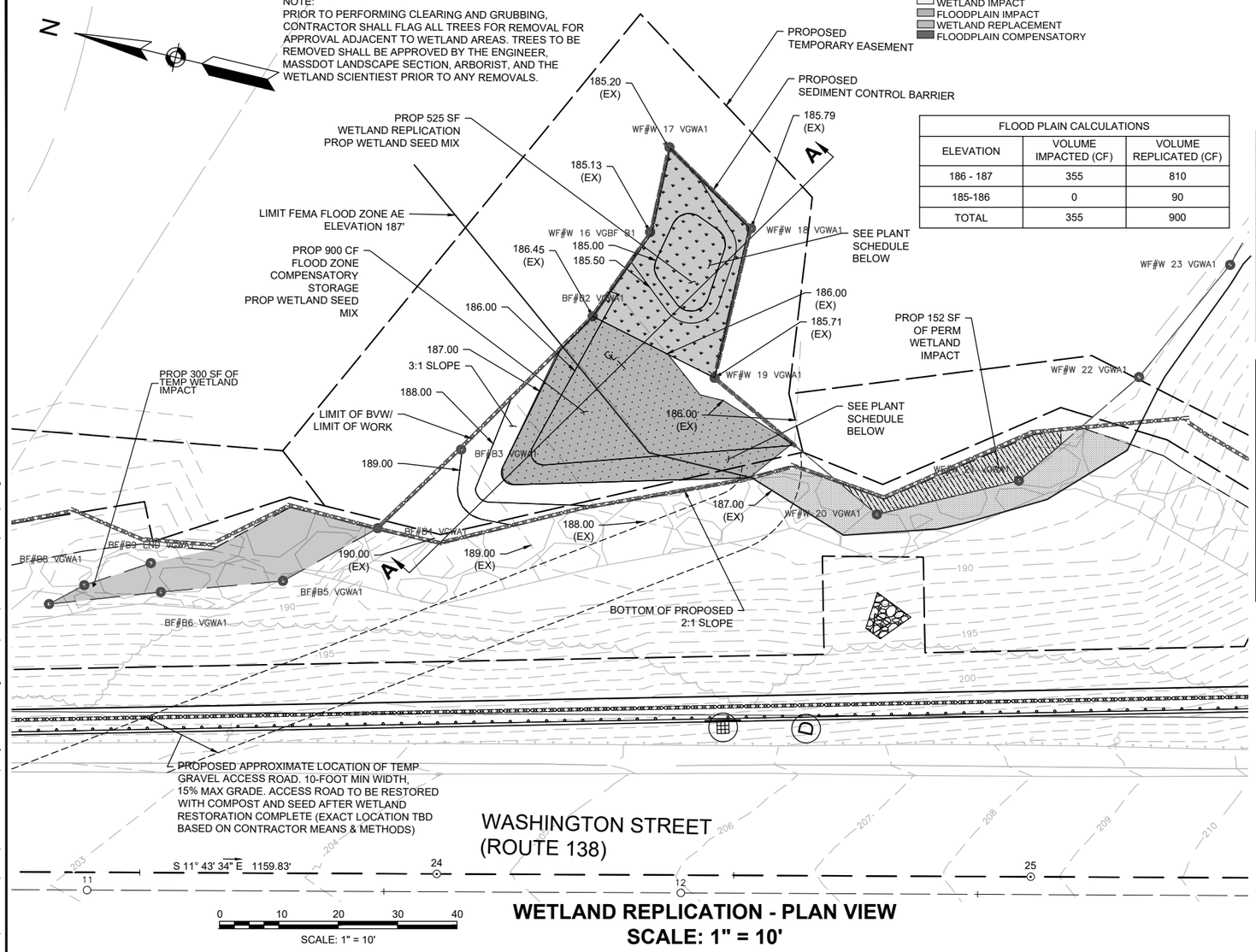
N

DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
20	CBCI	26+51.31	28.00 LT'	215.55		I=211.22' (22)	
21	CBCI	26+51.79	27.00 RT'	215.60		I=208.20' (22)	
22	DMH	26+51.41	0.45 LT'	216.11	I=208.00' (21) I=210.92' (20) I=211.00' (26)	I=207.95' (23)	
23	FES	25+52.37	38.48 LT'		I=207.43' (22)		
24	CBCI	28+28.72	28.00 LT'	224.39		I=219.46' (26)	
25	CBCI	28+15	25.53 RT'	223.92		I=219.51' (26)	
26	DMH - 48"	28+15.02	12.49 RT'	224.18	I=219.30' (25) I=219.14' (24) I=219.50' (29)	I=217.20' (22)	
27	CBCI	30+70.80	28.00 LT'	236.67		I=232.27' (29)	
28	CBCI	30+75.52	17.00 RT'	237.13		I=232.72' (29)	
29	DMH - 48"	30+75.71	3.72 RT'	237.40	I=232.59' (28) I=232.10' (27)	I=231.85' (26)	

NOTE:
PRIOR TO PERFORMING CLEARING AND GRUBBING, CONTRACTOR SHALL FLAG ALL TREES FOR REMOVAL FOR APPROVAL ADJACENT TO WETLAND AREAS. TREES TO BE REMOVED SHALL BE APPROVED BY THE ENGINEER, MASSDOT LANDSCAPE SECTION, ARBORIST, AND THE WETLAND SCIENTIEST PRIOR TO ANY REMOVALS.

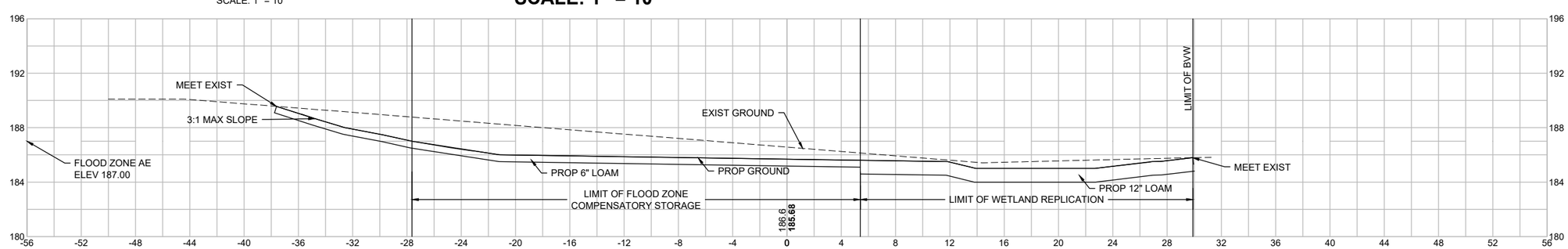
KEY:
- WETLAND IMPACT
- FLOODPLAIN IMPACT
- WETLAND REPLACEMENT
- FLOODPLAIN COMPENSATORY



FLOOD PLAIN CALCULATIONS		
ELEVATION	VOLUME IMPACTED (CF)	VOLUME REPLICATED (CF)
186 - 187	355	810
185-186	0	90
TOTAL	355	900

0 10 20 30 40
SCALE: 1" = 10'

WETLAND REPLICATION - PLAN VIEW
SCALE: 1" = 10'



HOR. SCALE IN FEET
4 0 4 8
VER. SCALE IN FEET
4 0 4 8

WETLAND REPLICATION - SECTION A-A VIEW
SCALE: 1" = 4'

NOTE:
1.EXACT PLANT LOCATION TO BE WITHIN PROPOSED WETLAND REPLICATION OR BUFFER ZONE REPLICATION AREA. EXACT LOCATION TO BE FIELD MARKED AND APPROVED BY MASSDOT, WETLAND SPECIALIST, AND THE ENGINEER
2. SEED MIX, PLANTINGS, EXCAVATION, GRADING, AND COMPLETION OF THE WETLAND RESTORATION AND FLOODZONE COMPENSATORY AREAS SHALL BE INCLUDED UNDER ITEM 755.35 - WETLAND REPLICATION AREA.

STOUGHTON
WASHINGTON STREET (ROUTE 138) PHASE 2

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	10	12
PROJECT FILE NO. 613358			

WETLAND DETAILS

BUFFER ZONE/COMPENSATORY PLANT SCHEDULE			
QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
2	Quercus rubra	RED OAK	10-12' O.C., 3'-4'
2	Prunus serotina	BLACK CHERRY	10-12' O.C., 3'-4'
8	Viburnum lentago	NANNYBERRY	6' O.C. CLUSTERED, 2'-3'
8	Hamamelis virginiana	WITCH HAZEL	6' O.C. CLUSTERED, 2'-3'
8	Morella (Myrica) pensylvanica	BAYBERRY	6' O.C. CLUSTERED, 2'-3'
8	Clethra alnifolia	SWEET PEPPERBUSH	6' O.C. CLUSTERED, 2'-3'

WETLAND REPLICATION PLANT SCHEDULE			
QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE/SPACING
2	Acer Rubrum	RED MAPLE	10-12' O.C., 3'-4'
4	Viburnum dentatum	NORTHERN ARROWWOOD	6' O.C. CLUSTERED, 2'-3'
4	Rhododendron viscosum	SWAMP AZALEA	6' O.C. CLUSTERED, 2'-3'
4	Vaccinium corymbosum	HIGHBUSH BLUEBERRY	6' O.C. CLUSTERED, 2'-3'
4	Clethra alnifolia	SWEET PEPPERBUSH	6' O.C. CLUSTERED, 2'-3'
25	Osmunda cinnamomea	CINNAMON FERN	1' O.C. CLUSTERED, 1#'
25	Carex stricta	TUSSOCK SEDGE	1' O.C. CLUSTERED, 1#

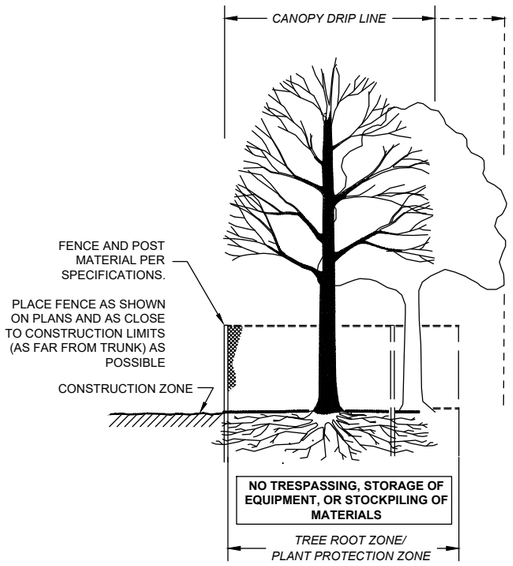
Wetland Replication Area Construction Sequence

1. A qualified Wetland Scientist shall supervise all aspects of the proposed Wetland Replication Area during construction; eg., erosion controls, site preparatory, grading, backfilling, planting and seeding.
2. Flag or stake limits of Wetland Replication Area. Flag trees and/or shrubs adjacent to the existing wetland boundary to remain. Install erosion control barrier along intersection of the Wetland Replication Area and adjacent wetland, taking into considering that grading within the wetland will be required to achieve a suitable hydrologic connection to the WRA. Once the Wetland Replication Area and adjacent side slope have been graded, install an erosion control barrier at the toe of slope to protect the Wetland Replication Area.
3. During construction of the Wetland Replication Area, the supervisory Wetland Scientist shall oversee the proposed grading and planting scheme. The final elevation shall be determined in the field and will correspond to the elevation of the adjacent wetland. During construction, the Wetland Replication Area shall be excavated to final grade unless a suitable topsoil is not encountered, at which time the area will be excavated to one foot below the final design grade to facilitate the placement of approved clean wetland soil (12% organic carbon content (or 20% organic matter content) and pH of 6.2-6.8) as a suitable substrate for the establishment of wetland vegetation. Wetland soils will consist of the topsoil (A Horizon) from the Wetland Impact Area and/or a wetland soil mixture manufactured by combining topsoil with a soil textural class of sandy loam, fine sandy loam, or silt loam with decomposed leaf litter at a 1:1 ratio. The wetland soil shall be free of stumps, roots, heavy or stiff clay, stones, coarse sand, noxious weeds, weed seeds or other litter. Settling of soils shall be taken into consideration for final elevations.
4. Apply wetland seed mix at the specified application rate or higher if applied at the end of the growing season and lightly rake to insure seed-to-soil contact. There shall be no seeding in areas of standing water. Do not apply within 1-foot of shrub and tree plantings.
5. Apply conservation seed mix to side slopes at the specified application rate and lightly rake to insure seed-to-soil contact.
6. Apply a light mulch of clean weed free straw.
7. The supervisory Wetland Scientist shall reserve the right to reject acceptance of wetland plant species upon delivery based on plant vigor/conditions, unauthorized substitutions, and/or non- conformance with the planting plan and specifications. All plantings shall be native varieties with no landscape cultivars accepted. During transport, the plants shall be protected to minimize stress.
8. The supervisory wetland scientist shall reserve the right to require a supplemental watering program of plantings.
9. Remove erosion control barriers upon stabilization of the side slope and Wetland Replication Area and Wetland Restoration Area.

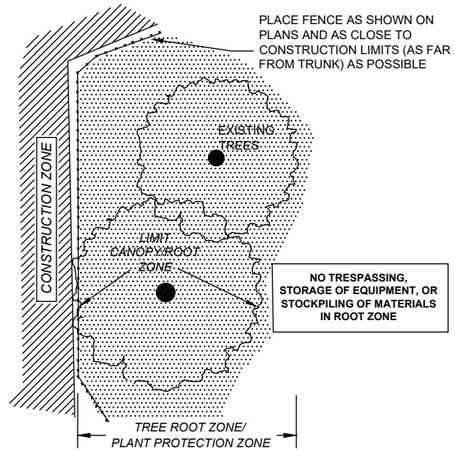
STOUGHTON
WASHINGTON STREET (ROUTE 138) PHASE 2

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	12
PROJECT FILE NO.	613358		

CONSTRUCTION DETAILS



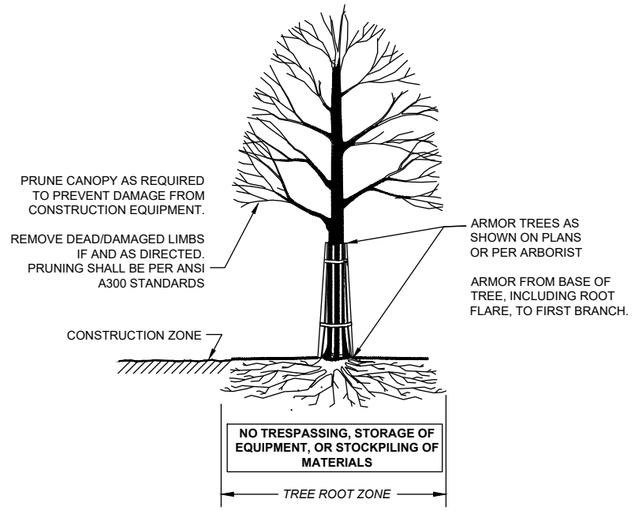
SECTION - FENCE PROTECTION OF ROOT ZONE



PLAN VIEW - FENCE PROTECTION OF ROOT ZONE

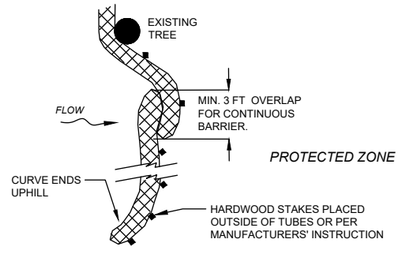
TREE PROTECTION - ROOT ZONE

NOT TO SCALE

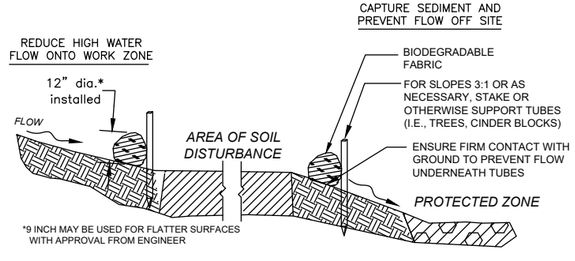


SECTION - TRUNK ARMORING & PRUNING

TREE PROTECTION - TRUNK



PLAN VIEW

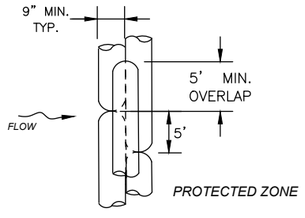


SECTION

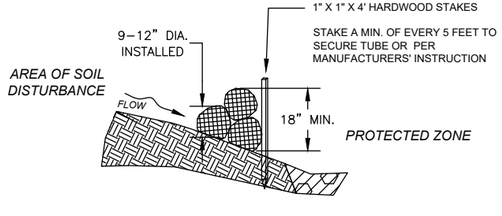
SEDIMENT BARRIER - COMPOST FILTER TUBE

NOT TO SCALE

WHERE SPECIFIED ON CONSTRUCTION PLANS OR AS REQUIRED



PLAN VIEW



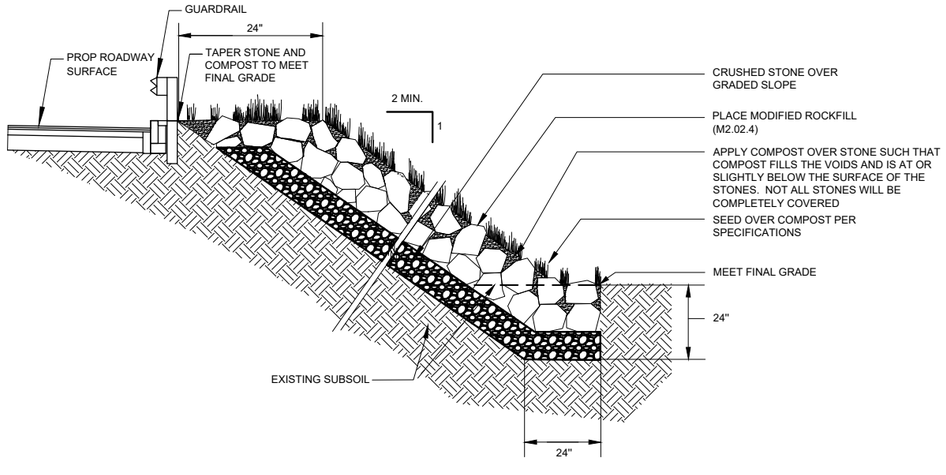
SECTION

COMPOST FILTER TUBES STACKED

NOT TO SCALE

SECTION - TRUNK ARMORING & PRUNING

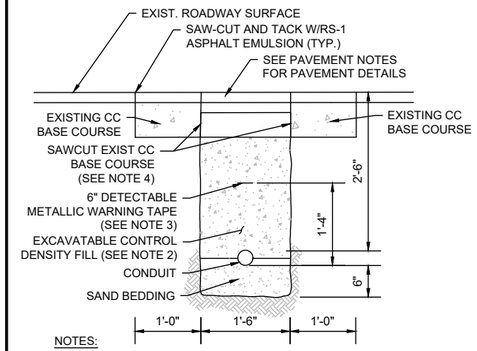
TREE PROTECTION - TRUNK



COMPOST AND SEED OVER MODIFIED ROCKFILL (NON-WATERWAY)

NOT TO SCALE

20160320_MassDOT



NOTES:

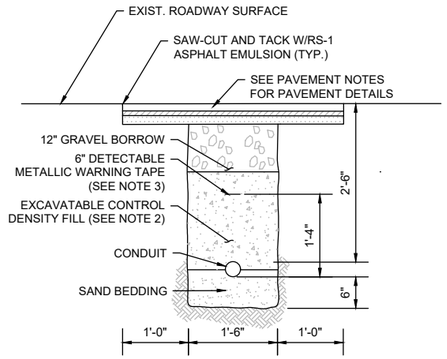
1. SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE, UNLESS OTHERWISE APPROVED BY MASSDOT.

2. CONTROLLED DENSITY FILL SHALL MEET THE REQUIREMENTS OF SUBSECTION M4.08.0

3. WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.

4. SAWCUTTING OF EXISTING CEMENT CONCRETE BASE COURSE SHALL WILL BE INCLUDED IN THE CONTRACT UNIT PRICE FOR PROPOSED CONDUIT.

CONDUIT CROSSING ROADWAY
(EX CC ROAD BASE COURSE)
NOT TO SCALE



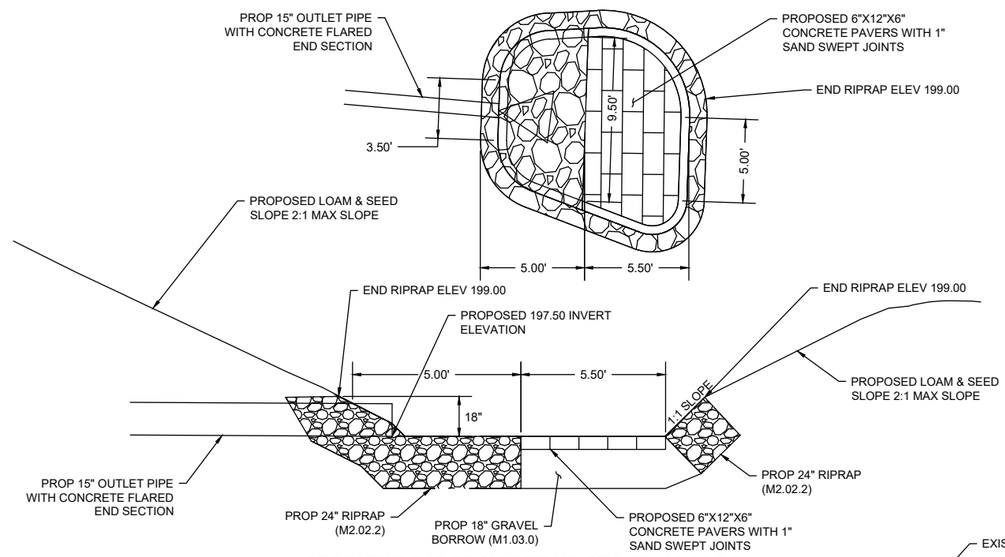
NOTES:

1. SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE, UNLESS OTHERWISE APPROVED BY MASSDOT.

2. CONTROLLED DENSITY FILL SHALL MEET THE REQUIREMENTS OF SUBSECTION M4.08.0

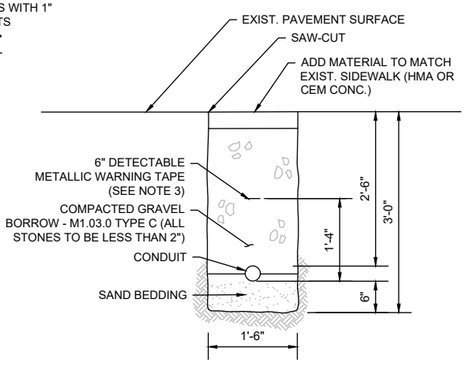
3. WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.

CONDUIT CROSSING ROADWAY
NOT TO SCALE



SEDIMENT FOREBAY DETAIL STA 20+90.96 RT

NOT TO SCALE

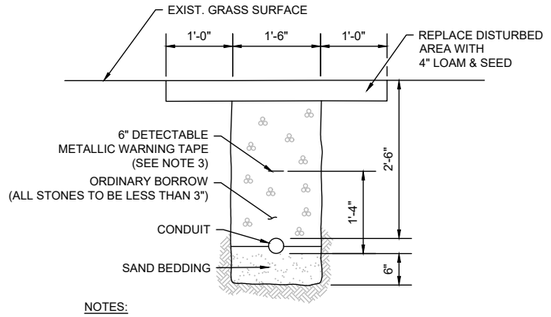


NOTES:

1. SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE, UNLESS OTHERWISE APPROVED BY MASSDOT.

2. WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.

CONDUIT UNDER SIDEWALK
NOT TO SCALE

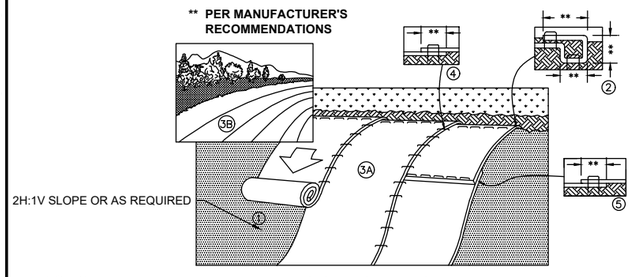


NOTES:

1. SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE, UNLESS OTHERWISE APPROVED BY MASSDOT.

2. WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.

CONDUIT UNDER GRASS AREAS
NOT TO SCALE



SLOPE INSTALLATION

NOTES:

1. PREPARE SOIL BEFORE INSTALLING JUTE MESH, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.

2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE JUTE MESH IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING PORTION OF THE JUTE MESH BACK OVER SEED AND COMPACTED SOIL. SECURE JUTE MESH OVER COMPACTED SOIL WITH A ROW OF STAKES/STAPLES SPACED ACCORDANCE TO THE MANUFACTURER'S RECOMMENDATIONS ACROSS THE WIDTH OF THE JUTE MESH.

3. ROLL THE JUTE MESH DOWN (A) OR HORIZONTALLY (B) ACROSS THE SLOPE. JUTE MESH WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL JUTE MESH MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAKES/STAPLES IN APPROPRIATE LOCATIONS AS SHOWN ON THE STAKE/STAPLE PATTERN GUIDE.

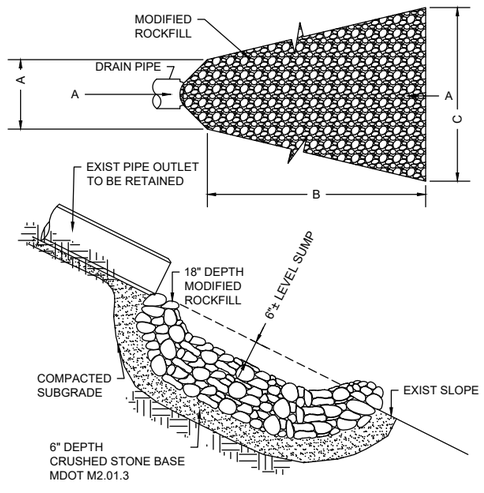
4. THE EDGES OF PARALLEL JUTE MESH MUST BE STAKED/STAPLED WITH OVERLAP DEPENDING ON JUTE MESH TYPE. SEE THE MANUFACTURER'S RECOMMENDATIONS.

5. CONSECUTIVE JUTE MESH SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN OVERLAP (SEE THE MANUFACTURER'S RECOMMENDATIONS). STAKE/STAPLE THROUGH OVERLAPPED AREA, ACROSS ENTIRE JUTE MESH WIDTH PER MANUFACTURER'S RECOMMENDATIONS.

6. IN LOOSE SOIL CONDITIONS, THE USE OF STAKE OR STAPLE LENGTHS GREATER THAN 6" MAY BE NECESSARY TO PROPERLY SECURE THE JUTE MESH.

7. THE CONTRACTOR SHALL FOLLOW ALL INSTALLATION INSTRUCTIONS AS RECOMMENDED BY THE MANUFACTURER.

JUTE MESH FOR STEEP SLOPES DETAIL
NOT TO SCALE



STONE PAD DETAIL

NOT TO SCALE

PROPOSED DRAINAGE STONE PADS				
STATION	DIAMETER (INCHES)	A (FEET)	B (FEET)	C (FEET)
22+73 LT	12	3	6	7
24+73 LT	12	3	6	7
25+52 LT	15	3.75	8	9.25

STOUGHTON
WASHINGTON STREET (ROUTE 138) PHASE 2

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	12
PROJECT FILE NO.	613358		

CONSTRUCTION DETAILS

RECEIVED
FEB 07 2024
MASS. HIST. COMM
RC.65685

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A
MASSACHUSETTS HISTORICAL COMMISSION
220 MORRISSEY BOULEVARD
BOSTON, MASS. 02125
617-727-8470, FAX: 617-727-5128

PROJECT NOTIFICATION FORM

Project Name: Corridor Improvements - Phase 2 (MassDOT Project #613358)

Location /Address: Route 138 from Canton Town Line to Charles Avenue

City/Town: Stoughton

Project Proponent

Name: Massachusetts Department of Transportation

Address: 10 Park Plaza

City/Town/Zip/Telephone: Boston, MA 02116

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.

Brona Simon 3/5/24

Brona Simon
Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission

Agency license or funding for the project (list all licenses, permits, approvals, grants or other entitlements being sought from state and federal agencies).

Agency Name	Type of License or funding (specify)
FHWA	Federal Funding (FHWA is lead federal agency)
USACOE	Section 404 Permit

Project Description (narrative):

MassDOT proposes Phase 2 corridor improvements along Route 138 in Stoughton from the Canton Town Line to Charles Avenue. The Phase 2 project will coordinate with the Phase I project (607403) which extends from Charles Avenue to Lincoln Street. The Phase 2 project work includes: installing new signal equipment at an unsignalized intersection of Washington Street (Route 138) at York Street; constructing ADA compliant pedestrian ramps, sidewalks, curbing, and driveways; full depth box widening; pavement milling and resurfacing; new pavement markings and signs; installing retaining walls; drainage improvements; existing utility pole relocations (by others) and placing loam and seeding. A small wetland replication area (525 sq. ft.) will be constructed near Station 24+50 LT. This location is surrounded by low lying wetlands. Temporary and permanent easements will be necessary to accommodate the project work.

Does the project include demolition? If so, specify nature of demolition and describe the building(s) which are proposed for demolition.

N/A

Does the project include rehabilitation of any existing buildings? If so, specify nature of rehabilitation and describe the building(s) which are proposed for rehabilitation.

N/A

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A (continued)

Does the project include new construction? If so, describe (attach plans and elevations if necessary).

See plans

To the best of your knowledge, are any historic or archaeological properties known to exist within the project's area of potential impact? If so, specify.

A review of MACRIS revealed no NR-listed or eligible properties or districts or inventoried areas, buildings, or structures in the vicinity of the project's area of potential effect.

A review of the MHC archaeological base maps on MACRIS revealed a cluster of recorded pre-contact archaeological sites to the west of the northern terminus of the project area. The nearest site, Site 19-NF-692, consists of a flake scatter that was identified in 2008 during the intensive (locational) survey conducted in advance of an N-Star transmission corridor project. Most of the recorded sites near the project area are low density scatters of chipping debris. Soil borings taken at the locations of the proposed mast arms and retaining walls revealed fill layers ranging from depths of 4-ft to 19-ft. It is the opinion of the MassDOT Archaeologist, Jameson Harwood, that low archaeological sensitivity may be ascribed to the project's direct APE based on past roadway, sidewalk, drainage, and utility construction, and roadside commercial development and unfavorable conditions (slope and wetlands). All proposed project work will be undertaken on previously disturbed areas within and adjacent to the existing roadway layout.

What is the total acreage of the project area?

			Productive Resources:		
Woodland	_____	acres			
Wetland	_____	acres	Agriculture	_____	acres
Floodplain	_____	acres	Forestry	_____	acres
Open Space	_____	acres	Mining/Extraction	_____	acres
Developed	_____	acres	Total Project Acreage	_____	acres

What is the acreage of the proposed new construction? _____ acres

What is the present land use of the project area?

Commercial development along Route 138.

Please attach a copy of the section of the USGS quadrangle map which clearly marks the project location.

This Project Notification Form has been submitted to the MHC in compliance with 950 CMR 71.00.

Signature of person submitting this form: _____ **Date:** 1/29/2024

Name: Jameson Harwood

Address: 10 Park Plaza – Room 7130

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A (continued)

City/Town/Zip: Boston, MA 02717

Telephone: Email: jameson.harwood@dot.state.ma.us

REGULATORY AUTHORITY

950 CMR 71.00: M.G.L. c. 9, §§ 26-27C as amended by St. 1988, c. 254.

CC:

Proposal No. 613358-129897

CULTURAL RESOURCES PROJECT RECORD

City/Town: Stoughton | Project # 613358 | Date Cleared 1/31/2024

Project Name: CORRIDOR IMPROVEMENTS ON ROUTE 138, FROM CANTON T.L. TO CHARLES AVENUE (PHASE 2) | Date Filed 1/31/2024 | Finding Under Review ☐

FHWA to MHC

Project Type: Highway Reconstr - Restr and Rehab | Early Coord. Letter Sent: ☑

Review: Section 106 (PA) | Comment Received: ☐ MHC ☐ LHC | Reviewer: JMH

Finding: Stip VB - No historic properties affected | Consultant

Comments: An early coordination letter was sent to the Stoughton Historical Commission on 2/6/2024. A copy was forwarded to the SHPO. Per the Corps permit, PNFs were submitted to the ATHPO, MTHPO, NTHPO, and BUAR (by email on 1/29/24) and the SHPO (by certified mail on 2/6/24). No comments received within 30 day review period.

Determination based on: ☑ Scope of Work ☑ Plan ☑ 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) :

- ☐ 1) Interstate bridge or roadway projects
- ☐ 2) Resurfacing, repair existing roadways
- * ☐ 3) Reconstruction on existing roadway
- * ☐ 4) Roadway geometrics, intersections
- * ☐ 5) Curbs and sidewalks
- ☐ 6) Pavement markings, rumble strips, etc
- ☐ 7) Curbs, sidewalks (MAAB, ADA)
- * ☐ 8) Removal of trees
- ☐ 9) Landscaping
- ☐ 10) Utilities
- ☐ 11) Railroad crossing
- ☐ 12) Stream stabilization and restoration
- ☐ 13) Wetland mitigation area
- * ☐ 14) Bridge (NR "Not Eligible" or "Conditionally Not Eligible")
- * ☐ 15) Bridge (concrete slab post 1900, steel stringer)
- ☐ 16) Bridge (less than 20' span)
- * ☐ 17) Highway safety improvement
- ☐ 18) Drainage system element
- * ☐ 19) Traffic signal, safety improvement
- * ☐ 20) Intelligent Transportation System project
- ☐ 21) Rest area, maintenance facility
- * ☐ 22) Bicycle, pedestrian lane, path or facility
- ☐ 23) Lighting system
- ☐ 24) Sign
- ☐ 25) Hazardous waste
- ☐ 26) Highway fencing
- ☐ 27) Emergency repair
- ☐ 28) Erosion control
- ☐ 29) Noise barrier

* 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: JMH

CULTURAL RESOURCES PROJECT RECORD

Summary of MassDOT Highway Division Finding
(Appendix 1 and Section V.B. Projects only)

MassDOT proposes Phase 2 corridor improvements along Route 138 in Stoughton from the Canton Town Line to Charles Avenue. The Phase 2 project will coordinate with the Phase I project (607403) which extends from Charles Avenue to Lincoln Street. The Phase 2 project work includes: installing new signal equipment at an unsignalized intersection of Washington Street (Route 138) at York Street; constructing ADA compliant pedestrian ramps, sidewalks, curbing, and driveways; full depth box widening; pavement milling and resurfacing; new pavement markings and signs; installing retaining walls; drainage improvements; existing utility pole relocations (by others) and placing loam and seeding. A small wetland replication area will be constructed near Station 24+50 LT. This location is surrounded by low lying wetlands. Temporary and permanent easements will be necessary to accommodate the project work.

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A review of the MHC archaeological base maps on MACRIS revealed a cluster of recorded pre-contact archaeological sites to the west of the northern terminus of the project area. The nearest site, Site 19-NF-692, consists of a flake scatter that was identified in 2008 during the intensive (locational) survey conducted in advance of an N-Star transmission corridor project. Most of the recorded sites near the project area are low density scatters of chipping debris. Soil borings taken at the locations of the proposed mast arms and retaining walls revealed fill layers ranging from depths of 4-ft to 19-ft. It is the opinion of the MassDOT Archaeologist, Jameson Harwood, that low archaeological sensitivity may be ascribed to the project's direct APE based on past roadway, sidewalk, drainage, and utility construction, and roadside commercial development and unfavorable conditions (slope and wetlands). All proposed project work will be undertaken on previously disturbed areas within and adjacent to the existing roadway layout.

Reviewer's Initials: _____

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: Bettina Washington
Sent: Monday, January 29, 2024 1:43 PM
Subject: Relayed: MassDOT Project #613358: Stoughton - Route 138

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

Bettina Washington (thpo@wampanoagtribe-nsn.gov)

Subject: MassDOT Project #613358: Stoughton - Route 138

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Monday, January 29, 2024 1:42 PM
To: Bettina Washington
Subject: MassDOT Project #613358: Stoughton - Route 138
Attachments: Stoughton Rt 138 (613358) - PNF and locus.pdf; Stoughton Rt 138 (613358) - Plans.pdf

Ms. Washington,

MassDOT is submitting information for the above-referenced project to the THPO to meet the Section 106 consultation requirements of FHWA (lead federal agency) and the US Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Carrie Lavallee, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

You also may send comments, questions, or requests for more information by email to Jameson.Harwood@state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza
Boston, MA 02116

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: Robinson, David S (EEA)
Sent: Monday, January 29, 2024 1:40 PM
Subject: Delivered: MassDOT Project #613358: Stoughton - Route 138

Your message has been delivered to the following recipients:

Robinson, David S (EEA) (David.S.Robinson@mass.gov)

Subject: MassDOT Project #613358: Stoughton - Route 138

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Monday, January 29, 2024 1:40 PM
To: Robinson, David S (EEA)
Subject: MassDOT Project #613358: Stoughton - Route 138
Attachments: Stoughton Rt 138 (613358) - PNF and locus.pdf; Stoughton Rt 138 (613358) - Plans.pdf

Tracking:

Recipient	Delivery
Robinson, David S (EEA)	Delivered: 1/29/2024 1:40 PM

David,

MassDOT is submitting information for the above-referenced project to the BUAR to meet the Section 106 consultation requirements of FHWA (lead federal agency) and the US Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Carrie Lavallee, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

You also may send comments, questions, or requests for more information by email to Jameson.Harwood@state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza
Boston, MA 02116

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: David Weeden (David.Weeden@mwtribe-nsn.gov); 106Review
Sent: Monday, January 29, 2024 1:41 PM
Subject: Relayed: MassDOT Project #613358: Stoughton - Route 138

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

David Weeden (David.Weeden@mwtribe-nsn.gov) (David.Weeden@mwtribe-nsn.gov)

106Review (106Review@mwtribe-nsn.gov)

Subject: MassDOT Project #613358: Stoughton - Route 138

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Monday, January 29, 2024 1:41 PM
To: David Weeden (David.Weeden@mwtribe-nsn.gov); 106Review
Subject: MassDOT Project #613358: Stoughton - Route 138
Attachments: Stoughton Rt 138 (613358) - PNF and locus.pdf; Stoughton Rt 138 (613358) - Plans.pdf

David,

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You also may send comments, questions, or requests for more information by email to Jameson.Harwood@state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza
Boston, MA 02116

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: Tashtesook@aol.com
Sent: Monday, January 29, 2024 1:43 PM
Subject: Relayed: MassDOT Project #613358: Stoughton - Route 138

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

Tashtesook@aol.com (Tashtesook@aol.com)

Subject: MassDOT Project #613358: Stoughton - Route 138

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Monday, January 29, 2024 1:43 PM
To: Tashtesook@aol.com
Subject: MassDOT Project #613358: Stoughton - Route 138
Attachments: Stoughton Rt 138 (613358) - PNF and locus.pdf; Stoughton Rt 138 (613358) - Plans.pdf

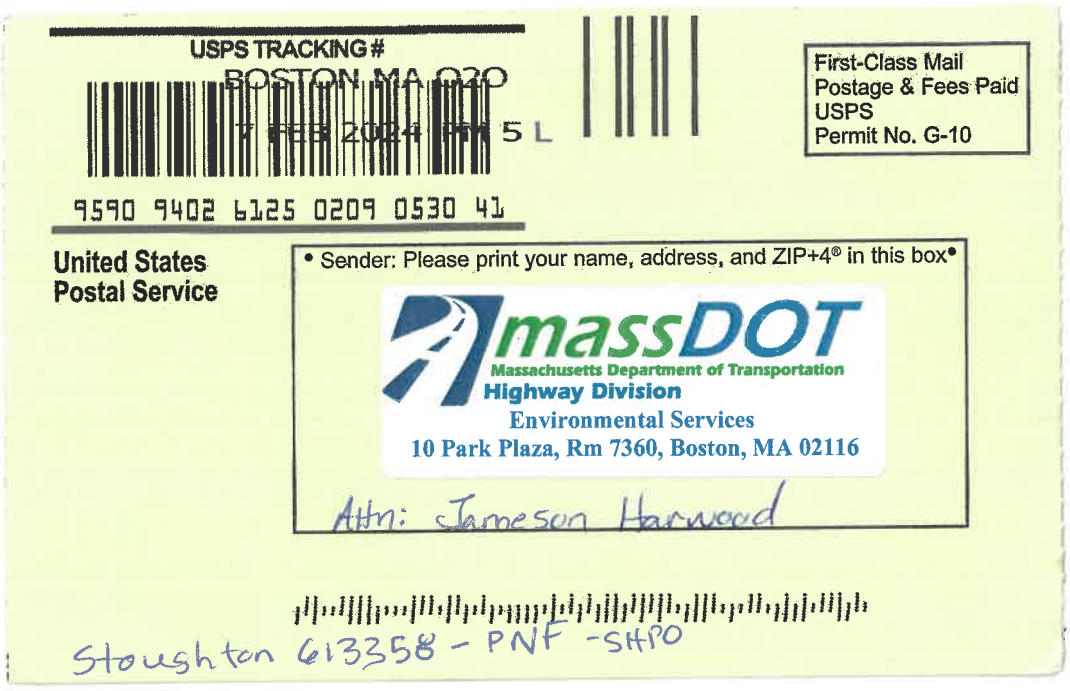
Dear Mr. Brown,

MassDOT is submitting information for the above-referenced project to the THPO to meet the Section 106 consultation requirements of FHWA (lead federal agency) and the US Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Carrie Lavallee, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

You also may send comments, questions, or requests for more information by email to Jameson.Harwood@state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza
Boston, MA 02116


USPS TRACKING #
BOSTON MA 020
FEB 2024
5 L
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First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10
United States
Postal Service
• Sender: Please print your name, address, and ZIP+4® in this box•
massDOT
Massachusetts Department of Transportation
Highway Division
Environmental Services
10 Park Plaza, Rm 7360, Boston, MA 02116
Attn: Jameson Harwood
Stoughton 613358 - PNF -SHPO

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

Ms. Brona Simon, SHPO
MA Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

9590 9402 6125 0209 0530 41

2. Article Number *(Transfer from service label)*

7020 2450 0001 6271 3976

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X ☐ Agent ☐ Addressee

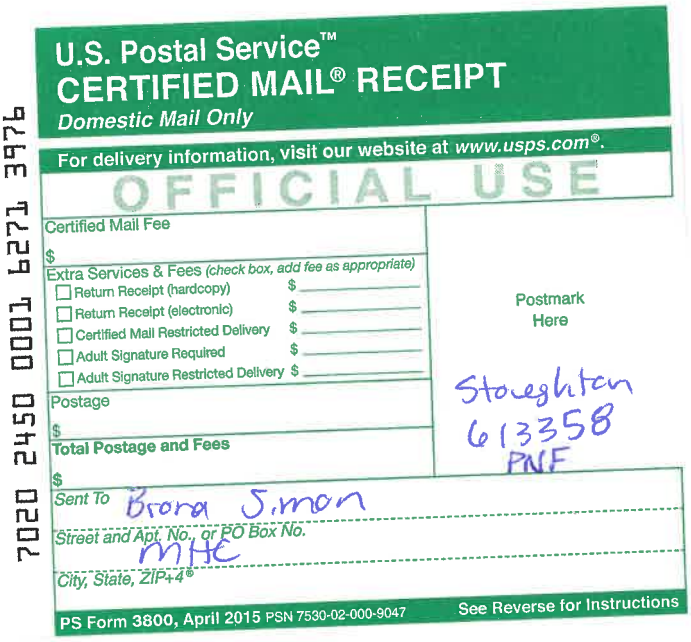
B. Received by *(Printed Name)* C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type

- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Return Receipt for Merchandise
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2015 PSN 7530-02-000-9053 Domestic Return Receipt



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613358
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950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A
MASSACHUSETTS HISTORICAL COMMISSION
220 MORRISSEY BOULEVARD
BOSTON, MASS. 02125
617-727-8470, FAX: 617-727-5128

PROJECT NOTIFICATION FORM

Project Name: Corridor Improvements - Phase 2 (MassDOT Project #613358)

Location /Address: Route 138 from Canton Town Line to Charles Avenue

City/Town: Stoughton

Project Proponent

Name: Massachusetts Department of Transportation

Address: 10 Park Plaza

City/Town/Zip/Telephone: Boston, MA 02116

Agency license or funding for the project (list all licenses, permits, approvals, grants or other entitlements being sought from state and federal agencies).

Agency Name	Type of License or funding (specify)
FHWA	Federal Funding (FHWA is lead federal agency)
USACOE	Section 404 Permit

Project Description (narrative):

MassDOT proposes Phase 2 corridor improvements along Route 138 in Stoughton from the Canton Town Line to Charles Avenue. The Phase 2 project will coordinate with the Phase I project (607403) which extends from Charles Avenue to Lincoln Street. The Phase 2 project work includes: installing new signal equipment at an unsignalized intersection of Washington Street (Route 138) at York Street; constructing ADA compliant pedestrian ramps, sidewalks, curbing, and driveways; full depth box widening; pavement milling and resurfacing; new pavement markings and signs; installing retaining walls; drainage improvements; existing utility pole relocations (by others) and placing loam and seeding. A small wetland replication area (525 sq. ft.) will be constructed near Station 24+50 LT. This location is surrounded by low lying wetlands. Temporary and permanent easements will be necessary to accommodate the project work.

Does the project include demolition? If so, specify nature of demolition and describe the building(s) which are proposed for demolition.

N/A

Does the project include rehabilitation of any existing buildings? If so, specify nature of rehabilitation and describe the building(s) which are proposed for rehabilitation.

N/A

Does the project include new construction? If so, describe (attach plans and elevations if necessary).

See plans

To the best of your knowledge, are any historic or archaeological properties known to exist within the project's area of potential impact? If so, specify.

A review of MACRIS revealed no NR-listed or eligible properties or districts or inventoried areas, buildings, or structures in the vicinity of the project's area of potential effect.

A review of the MHC archaeological base maps on MACRIS revealed a cluster of recorded pre-contact archaeological sites to the west of the northern terminus of the project area. The nearest site, Site 19-NF-692, consists of a flake scatter that was identified in 2008 during the intensive (locational) survey conducted in advance of an N-Star transmission corridor project. Most of the recorded sites near the project area are low density scatters of chipping debris. Soil borings taken at the locations of the proposed mast arms and retaining walls revealed fill layers ranging from depths of 4-ft to 19-ft. It is the opinion of the MassDOT Archaeologist, Jameson Harwood, that low archaeological sensitivity may be ascribed to the project's direct APE based on past roadway, sidewalk, drainage, and utility construction, and roadside commercial development and unfavorable conditions (slope and wetlands). All proposed project work will be undertaken on previously disturbed areas within and adjacent to the existing roadway layout.

What is the total acreage of the project area?

Woodland	_____	acres	Productive Resources:		
Wetland	_____	acres	Agriculture	_____	acres
Floodplain	_____	acres	Forestry	_____	acres
Open Space	_____	acres	Mining/Extraction	_____	acres
Developed	_____	acres	Total Project Acreage	_____	acres

What is the acreage of the proposed new construction? _____ acres

What is the present land use of the project area?

Commercial development along Route 138.

Please attach a copy of the section of the USGS quadrangle map which clearly marks the project location.

This Project Notification Form has been submitted to the MHC in compliance with 950 CMR 71.00.

Signature of person submitting this form: _____ **Date:** 1/31/2024

Name: Jameson Harwood

Address: 10 Park Plaza – Room 7130

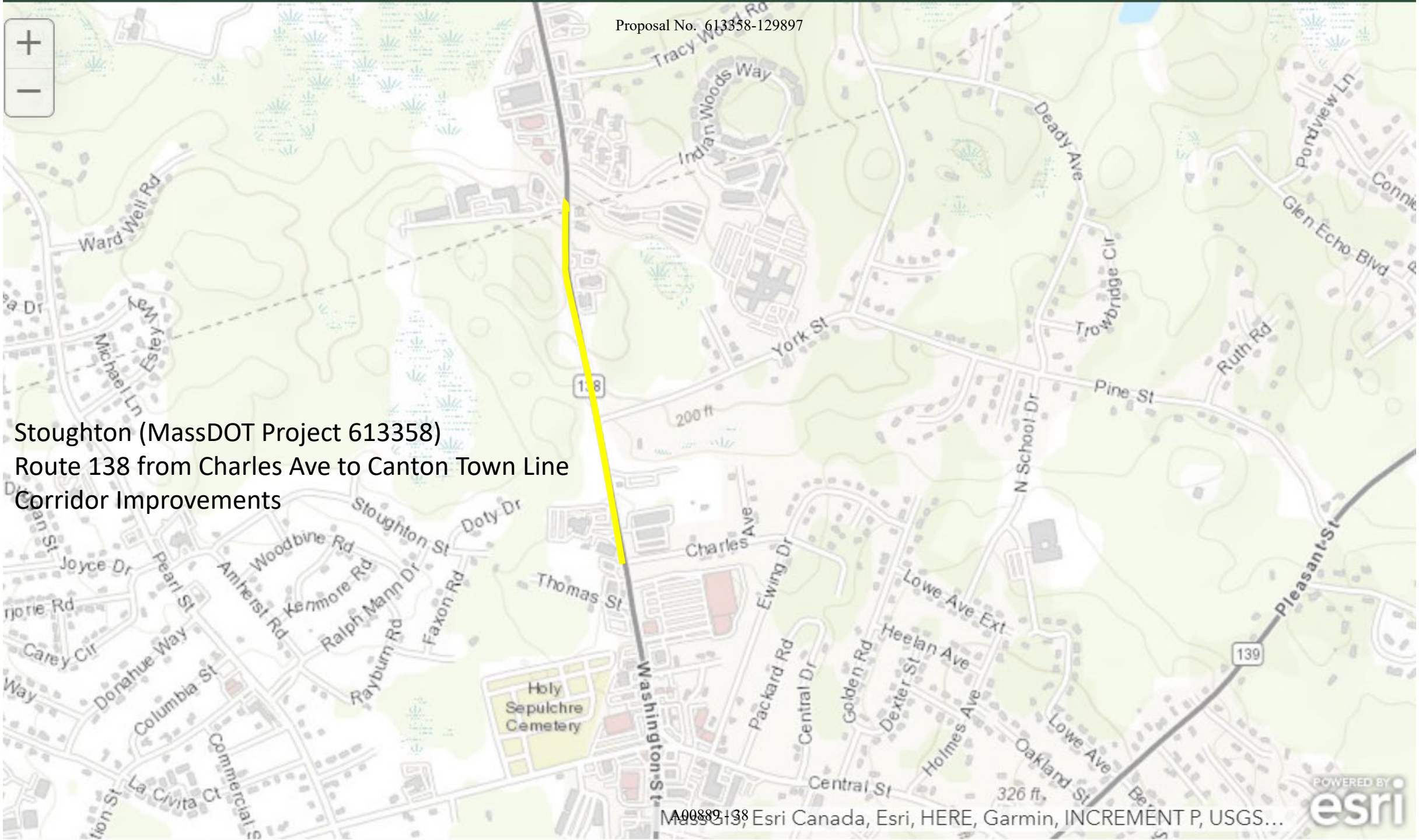
City/Town/Zip: Boston, MA 02717

Telephone: Email: jameson.harwood@dot.state.ma.us

REGULATORY AUTHORITY

950 CMR 71.00: M.G.L. c. 9, §§ 26-27C as amended by St. 1988, c. 254.

CC:


Stoughton (MassDOT Project 613358)
Route 138 from Charles Ave to Canton Town Line
Corridor Improvements
Tracy Wood Rd
Indian Woods Way
Deady Ave
Pondview Ln
Glen Echo Blvd
Ward Well Rd
Michael Ln
Estey Way
York St
Trowbridge Cir
Ruth Rd
Pine St
N School Dr
200 ft
Stoughton St
Doty Dr
Charles Ave
Ewing Dr
Thomas St
Lowe Ave Ext
Heelan Ave
Pleasant St
139
Joyce Dr
Pearl St
Woodbine Rd
Amherst Rd
Kenmore Rd
Ralph Mann Dr
Faxon Rd
Rayburn Rd
Carey Cir
Donahue Way
Columbia St
Commercial St
La Civita Ct
Holy Sepulchre Cemetery
Washington St
Packard Rd
Central Dr
Golden Rd
Dexter St
Holmes Ave
Oakland St
Lowe Ave
Central St
326 ft
MassGIS, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS…
POWERED BY esri

January 31, 2024

Stoughton Historical Commission
10 Pearl Street
Stoughton, MA 02072

RE: Stoughton: MassDOT – Project Number #613358
Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (Phase 2)
Section 106 Review – Early Environmental Coordination

Dear Commission Members:

The Massachusetts Department of Transportation, Highway Division (MassDOT) proposes Phase 2 corridor improvements along Route 138 in Stoughton from the Canton Town Line to Charles Avenue. The Phase 2 project will coordinate with the Phase I project (MassDOT Project #607403) which extends from Charles Avenue to Lincoln Street. The Phase 2 project work includes: installing new signal equipment at an unsignalized intersection of Washington Street (Route 138) at York Street; constructing ADA compliant pedestrian ramps, sidewalks, curbing, and driveways; full depth box widening; pavement milling and resurfacing; new pavement markings and signs; installing retaining walls; drainage improvements; existing utility pole relocations (by others), and placing loam and seeding.

This project will be supported in part with federal funds dispersed through MassDOT. The project, therefore, will require review under Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800). The enclosed project information is provided to the Stoughton Historical Commission to initiate consultation with appropriate representatives of local government in compliance with the regulations governing Section 106.

MassDOT requests that the Commission review the enclosed materials at their earliest convenience. Please submit written comments to: Carrie Lavallee, P.E., Chief Engineer, MassDOT, Highway Division, 10 Park Plaza, Room 4260, Boston, MA 02116, Attn: Jameson Harwood.

If you have any questions, please feel free to contact me at jameson.harwood@state.ma.us.

Sincerely,

Jameson Harwood
Cultural Resources Supervisor
Environmental Services

atts: Locus
cc: B. Simon, MHC w/att.

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: December 29, 2023
Project code: 2024-0031072
Project Name: 613358 STOUGHTON- CORRIDOR IMPROVEMENTS ON ROUTE 138, FROM CANTON T.L. TO CHARLES AVENUE (PHASE 2)

Subject: Consistency letter for the '613358 STOUGHTON- CORRIDOR IMPROVEMENTS ON ROUTE 138, FROM CANTON T.L. TO CHARLES AVENUE (PHASE 2)' 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 December 29, 2023 to verify that the **613358 STOUGHTON- CORRIDOR IMPROVEMENTS ON ROUTE 138, FROM CANTON T.L. TO CHARLES AVENUE (PHASE 2)** (Proposed Action) may rely on the amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion Opinion (dated March 23, 2023) for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (PBO) to satisfy requirements under section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 *et seq.*).

Based on the information you provided (Project Description shown below), you have determined that the Proposed Action will have no effect on the endangered Indiana bat (*Myotis sodalis*) or the endangered northern long-eared bat (*Myotis septentrionalis*). If the Proposed Action is not modified, **no consultation is required for these two species.** If the Proposed Action is modified, or new information reveals that it may affect the Indiana bat and/or northern long-eared bat in a manner or to an extent not considered in the PBO, further review to conclude the requirements of ESA section 7(a)(2) may be required.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities:
If your initial bridge/culvert or structure assessment failed to detect Indiana bats and/or NLEBs use or occupancy, yet later detected prior to, or during construction, please submit the Post Assessment Discovery of Bats at Bridge/Culvert or Structure Form (User Guide Appendix E) to this Service Office within 2 working days of the incident. In these instances, potential incidental

take of Indiana bats and/or NLEBs may be exempted provided that the take is reported to the Service.

If the Proposed Action may affect any other federally-listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Office is required. If the proposed action has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency accordingly.

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Candidate

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

613358 STOUGHTON- CORRIDOR IMPROVEMENTS ON ROUTE 138, FROM CANTON T.L. TO CHARLES AVENUE (PHASE 2)

DESCRIPTION

613358 STOUGHTON- CORRIDOR IMPROVEMENTS ON ROUTE 138, FROM CANTON T.L. TO CHARLES AVENUE (PHASE 2)

The project will include mill and overlay, new and reconstructed sidewalks on one side between Canton TL and York Street; south of York Street sidewalks on both sides, buffered bike lanes, ADA compliant curb ramps, and signs and pavement markings.

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/@42.1434728,-71.10367713532736,14z

DETERMINATION KEY RESULT

Based on the information you provided, you have determined that the Proposed Action will have no effect on the endangered Indiana bat and/or the endangered northern long-eared bat. Therefore, no consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required for these two species.

QUALIFICATION INTERVIEW

1. Is the project within the range of the Indiana bat[1]?

   [1] See Indiana bat species profile

   Automatically answered
   No

2. Is the project within the range of the northern long-eared bat[1]?

   [1] See northern long-eared bat species profile

   Automatically answered
   Yes

3. [Semantic] Does your proposed action intersect an area where Indiana bats and northern long-eared bats are not likely to occur?

   Automatically answered
   Yes

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING NLEB OR INDIANA BAT

This key was last updated in IPaC on October 30, 2023. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) for the endangered **Indiana bat** (*Myotis sodalis*) and the endangered **northern long-eared bat** (NLEB) (*Myotis septentrionalis*).

This decision key should only be used to verify project applicability with the Service's amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion (dated March 23, 2023) for Transportation Projects. The programmatic biological opinion covers limited transportation activities that may affect either bat species, and addresses situations that are both likely and not likely to adversely affect either bat species. This decision key will assist in identifying the effect of a specific project/activity and applicability of the programmatic consultation. The programmatic biological opinion is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic biological opinion, or that may affect ESA-listed species other than the Indiana bat or NLEB, or any designated critical habitat, may require additional ESA Section 7 consultation.

IPAC USER CONTACT INFORMATION

Agency: Massachusetts Department of Transportation
Name: Trevor Burns
Address: 10 Park Plaza
City: Boston
State: MA
Zip: 02116
Email trevor.b.burns@dot.state.ma.us
Phone: 8573010759

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

DOCUMENT A00890

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS ON THE FINAL ENVIRONMENTAL IMPACT REPORT

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The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Maura T. Healey
GOVERNOR

Kimberley Driscoll
LIEUTENANT GOVERNOR

Rebecca L. Tepper
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1081
http://www.mass.gov/eea

January 17, 2025

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
FINAL ENVIRONMENTAL IMPACT REPORT

PROJECT NAME	: Washington Street Corridor Improvements
PROJECT MUNICIPALITY	: Canton, Stoughton
PROJECT WATERSHED	: Boston Harbor
EEA NUMBER	: 16886
PROJECT PROPONENT	: Massachusetts Department of Transportation-Highway Division
DATE NOTICED IN MONITOR	: December 11, 2024

Pursuant to the Massachusetts Environmental Policy Act (MEPA; M.G.L. c. 30, ss. 61-62L) and Section 11.08 of the MEPA regulations (301 CMR 11.00), I have reviewed the Final Environmental Impact Report (FEIR) and hereby determine that it **adequately and properly** complies with MEPA and its implementing regulations. As noted in my Certificate on the Expanded Environmental Notification Form (EENF) and Proposed EIR (EENF/Proposed EIR) issued on November 29, 2024, the Proposed EIR was published for review as a FEIR pursuant to Section 11.06(14)(a) of the MEPA regulations and was subject to a 30-day public comment period during which time comments from the Massachusetts Water Resources Commission (MWRA) and Massachusetts Department of Environmental Protection (MassDEP) were received which noted no new concerns with the project.

Project Description

As described in the FEIR, the project aims to provide traffic, safety, and mobility improvements along Washington Street between Charles Avenue in Stoughton and Windsor Woods Lane in Canton, and portions of York Street. Existing drainage, water, sewer, and utility pole modifications are also proposed within the project limits. Specifically, the project includes:

- Reconstruction of roadways with new pavement by milling and overlay and full depth pavement;
- Minor widening along roadways as necessary to provide bicycle accommodations on each direction of vehicular travel via on-street buffered bicycle lanes;
- Resurfacing of roadway, resetting curb, modifying drainage, sewer, water, and overhead wire infrastructure within the project limits;
- Construction of Americans with Disabilities Act (ADA)/Architectural Access Board (AAB) compliant accessible sidewalks and pedestrian ramps to improve pedestrian accommodations along the entire project (sidewalks on east and west side of Washington Street south of York Street intersection and sidewalk on west side of Washington Street north of York Street intersection);
- Restoration of vegetated areas with loam and seed mix;
- Installation of new traffic signage & striping;
- Installation of new guardrail, where required, throughout the project limits;
- A new traffic signal at the York Street intersection; and
- Improved stormwater management.

Project Site

The project site occupies approximately 4.51 acres and consists of a 0.5-mile segment of Washington Street (Route 138) from Charles Avenue (Stoughton) to Windsor Woods Lane (Canton), and at the York Street intersection. Washington Street, which is classified as an urban principal arterial route, is a two-way single-lane north-south roadway extending from Easton into Canton. Land use around the project site is predominately commercial and industrial uses. Open space comprised of forested uplands and wetlands and an athletic field owned by the Town of Canton are adjacent to Washington Street, north of York Street.

Wetland resource areas within the project area include Bordering Vegetated Wetlands (BVW), Bordering Land Subject to Flooding (BLSF) and Riverfront Area. There is a Certified Vernal Pool #7459 located west of Washington Street immediately adjacent to the project site. A section of the project site is designated as Article 97 lands. No Area of Critical Environmental Concern (ACEC) or Outstanding Resource Water (ORW) is located within the project site.

The project site is located within three Environmental Justice ("EJ") populations characterized as minority and within one mile of nine EJ populations also characterized as minority. As described below, the FEIR identified the "Designated Geographic Area" (DGA) for the project as one mile around EJ populations, included a review of potential impacts and benefits to the EJ populations within this DGA, and described public involvement efforts undertaken to date.

Environmental Impacts and Mitigation

Potential environmental impacts associated with the project include the alteration of approximately 4.51 acres of land and the addition of 0.97 acres (total of 3.44 acres) of impervious area. The project will impact 452 square feet (sf) (300 sf temporary and 152 sf of permanent) of BVW, 880 sf (525 sf temporary and 355 sf permanent) of BLSF and 2,500 sf (2,310 temporary and 190 permanent) of

Riverfront Area. The project also involves the conversion of 0.56 acres of land subject to protection under Article 97 of the amendments to the state constitution.

Measures to avoid, minimize, and mitigate environmental impacts include upgrades to the existing stormwater management system, planting five public shade trees and funding to the Town of Canton for the replacement of Article 97 land. The project will provide wetland replication area (525 sf) to replace 152 sf of permanent BVW impacts. Restoration of temporary BVW impacts will also be provided. The project will provide compensatory flood storage (900 cubic feet) to replace the loss of 355 cubic feet of permanent flood storage. In addition, the improvements to intersection operations and enhancements to pedestrian and bicycling infrastructure will lead to a projected decrease of CO2 emissions of approximately 11.8 tons/yr.

Jurisdiction and Permitting

This project is subject to MEPA review because it requires Agency Action and meets/exceeds the MEPA review threshold at 301 CMR 11.03(1)(b)(3) for the conversion of land held for natural resources purposes in accordance with the Amendments to the Constitution of the Commonwealth Article 97 to a purpose not in accordance with Article 97 and 301 CMR 11.03(1)(b)(5) Release of an interest in land held for conservation, preservation or agricultural or watershed preservation purposes. The project is required to prepare an EIR pursuant to 301 CMR 11.06(7)(b) because it is located within a DGA of one or more EJ populations.

The project received an Order of Conditions ((DEP File No. 298-0880) from the Stoughton Conservation Commission on December 13, 2023, which was not appealed. The project will also require a National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) from the United States Environmental Protection Agency (EPA).

Because the project is being undertaken by an Agency (Massachusetts Department of Transportation (MassDOT)), MEPA jurisdiction is broad in scope and extends to all aspects of the project that may cause Damage to the Environment, as defined in the MEPA regulations

Review of the FEIR

The FEIR included a project description, alternatives analysis, existing and proposed conditions plans, estimates of project-related impacts, and an identification of measures to avoid, minimize and mitigate environmental impacts. It included a description of measures taken to enhance public involvement by EJ populations and a baseline assessment of any existing unfair or inequitable Environmental Burden and related public health consequences impacting EJ populations. Consistent with the MEPA Interim Protocol on Climate Change Adaptation and Resiliency, the EENF/Proposed EIR contained an output report from the Climate Resilience Design Standards Tool prepared by the Resilient Massachusetts Action Team (the "MA Resilience Design Tool"),[1] together with information on climate resilience strategies to be undertaken by the project. On November 20, 2024, the Proponent provided supplemental information to the MEPA Office providing an updated output report from the MA Resilience Design Tool and additional information on the project's impacts on Article 97 land. For

[1] Available at: https://resilientma.mass.gov/rmat_home/designstandards/

purposes of clarity, all supplemental materials provided by the Proponent are included in reference to the "FEIR."

Alternatives Analysis

The FEIR analyzed a series of alternatives for the multimodal access at the project site including a No-Build Alternative, the Sidewalk on Both Sides of Washington Street Alternative, the No Sidewalks Alternative, the No Sidewalks and No Bicycle Lanes Alternative and the Preferred Alternative. The No-Build Alternative would not result in additional environmental impacts nor would it implement any changes to the existing roadway. If left in its current state, poorly managed stormwater would degrade the hillside slope and potentially impact the adjacent vernal pool. In addition, the FEIR states that eliminating all pedestrian accommodations would not meet the project's goals of providing multimodal access at the project corridor. For these reasons, the No Build Alternative was dismissed.

The Sidewalk on Both Sides of Washington Street Alternative (Alternative 2) consists of two eleven-foot travel lanes in each direction, with variable width left turn lanes at the York Street intersection. This alternative also consists of two 5-foot-wide bicycle lanes with an adjacent 2-foot-wide buffer. For pedestrian accommodations, two six-foot wide sidewalks are proposed on each side of the roadway. According to the FEIR, this Alternative meets the project's goals of complying fully with MassDOT's Complete Streets Policy. However, this Alternative would result in greater impacts to Article 97 land, BVW, BLSF and more impervious area as compared to the Preferred Alternative (see the table below for a comparison of alternative impacts). For these reasons, this Alternative was dismissed.

The No Sidewalks Alternative (Alternative 3A) consists of two eleven-foot travel lanes in each direction, with variable width left turn lanes. This alternative also consists of two 5-foot-wide bicycle lanes with an adjacent 2-foot-wide buffer. Pedestrian accommodations are not proposed in this alternative. Although this Alternative has less impacts on Article 97 land, wetland resources and impervious area, it does not meet the project's goals of providing pedestrian accommodations at the project corridor and was therefore dismissed. The No Sidewalks and No Bicycle Lanes Alternative (Alternative 3B) consists of two eleven-foot travel lanes in each direction, with variable width left turn lanes, and two-foot outside shoulders. Pedestrian or bicycle accommodations are not proposed in this alternative. The No Sidewalks and No Bicycle Lanes Alternative has less environmental impacts than the Preferred Alternative, but does not meet the project's goals of providing any multimodal access to the project site and was therefore dismissed.

Alternative	Description	Requires Article 97	Improves Mobility	Feasible & Meets Purpose and Need	BVW Impacts (SF)	BLSF Impacts (SF/CY)	Stormwater Quality Improvements	Article 97 Permanent Easement/Taking (SF)	Temporary Easement Area (SF)
1	Sidewalk on west side	Y	Y	Y	152 (perm) 300 (temp)	355/355	Y	24,769	30,280
2	Sidewalks on both sides	Y	Y	N - Does not limit impacts	677	875/900	Y - Note additional increase in impervious area	26,370	30,808
3A	No sidewalks	Y	N - Only bicycle	N - Does not provide multi-modal access	153	355/355	Y	23,025	25,132
3B	No sidewalks & no bike lanes	Y	N	N - Does not provide multi-modal access	89	0/0	Y	14,878	22,295
No-Build	Retain Existing	N	N - No new connections	N - No improvements	0	0/0	N - No improvements	0	0

The Preferred Alternative consists of two eleven-foot travel lanes in each direction, with variable width left turn lanes for the York Street intersection. This alternative also consists of two 5-foot-wide bicycle lanes, with an adjacent 2-foot buffer. On the west side of the roadway, a 6-foot-wide sidewalk and variable width grading to tie into the existing grade is proposed. The FEIR explains that pedestrian accommodations are not proposed on the east side of the roadway, as there are only primarily commercial properties to the north. The FEIR states that this alternative meets the project's goals of improving pedestrian safety and mobility with the addition of a sidewalk on the west side of the roadway while minimalizing impacts as compared to Alternative 2. The sidewalk on the west side was selected to connect to the residential community off Windsor Woods Lane and the Town of Canton's athletic fields at the project limits.

Environmental Justice (EJ) / Public Health

As noted above, the project site is located within three EJ populations characterized as minority and located within one mile of nine EJ population characterized as minority. Within the census tracts containing the above EJ populations, Portuguese and Portuguese Creole, Hindi and Nepali are identified as those spoken by 5% of more of residents who also identify as not speaking English very well.

Effective January 1, 2022, all new projects in a DGA (as defined in 301 CMR 11.02) around EJ populations are subject to new requirements imposed by the Chapter 8 of the Acts of 2021: An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy (the "Climate Roadmap Map") and amended MEPA regulations at 301 CMR 11.00. Two related MEPA protocols—the MEPA Public Involvement Protocol for Environmental Justice Populations (the "MEPA EJ Public Involvement Protocol") and MEPA Interim Protocol for Analysis of project Impacts on Environmental Justice Populations (the "MEPA Interim Protocol for Analysis of EJ Impacts")—are also in effect for new projects filed on or after January 1, 2022. Under the new regulations and protocols, all projects located in a DGA around one or more EJ populations must take steps to enhance public involvement opportunities for EJ populations, and must submit analysis of impacts to such EJ populations in the form of an EIR.

The FEIR described public involvement activities conducted prior to filing, including advanced public notification to a list of community-based organizations (CBOs) and tribes/indigenous organizations (the EJ Reference List) provided by the MEPA Office. The Proponent circulated an EJ screening form with an overview of the project to these entities, and information on ways to request a community meeting (no requests were received). According to the FEIR, public involvement activities also included holding a virtual public hearing on February 16, 2022. The FEIR states that the virtual hearing was publicized in the Brockton Enterprise and the Patriot Ledger on February 2nd and 9th, 2022. Virtual hearing information was also provided on the MassDOT Event Calendar, Facebook, Twitter, the Town of Stoughton website, Town of Stoughton town hall, library, police department, the Town Manager's Facebook page, and the Portuguese National Club, a community-based organization in the Town of Stoughton. Direct abutters to the proposed project were also notified via certified mailings. The FEIR states that accommodations and/or language assistance were available upon request. The virtual public hearing was attended by 20 individuals. The FEIR states that comments made during the meeting pertained to project timeline and the project's use of retaining walls.

The FEIR contained a baseline assessment of any existing unfair or inequitable Environmental Burden and related public health consequences impacting EJ Populations in accordance with 301 CMR 11.07(6)(n)1. and the MEPA Interim Protocol for Analysis of EJ Impacts. The baseline assessment included a review of the data provided by the Department of Public Health (DPH) EJ Tool applicable to the DGA regarding "vulnerable health EJ criteria"; this term is defined in the DPH EJ Tool to include any one of four environmentally related health indicators that are measured to be 110% above statewide rates based on a five-year rolling average.[2] According to the FEIR, the data surveyed indicate that the Town of Stoughton exceeds the vulnerable health criteria for Childhood Asthma and the Town of Canton exceeds the vulnerable health criteria for Low Birth Weight. Within the project's DGA, one census tract (Stoughton) exhibits "vulnerable heath EJ criteria" for Childhood Blood Lead.

In addition, the FEIR indicates that the following sources of potential pollution exist within the identified EJ populations, based on the mapping layers available in the DPH EJ Tool:

- Tier II" Toxic Use Reporting Facilities: 10
- MassDEP Sites with AULs: 5
- Underground Storage Tanks: 12
- EPA Facilities: 4
- Road Infrastructure: 3
- MBTA Bus and Rapid Transit: 2
- Regional Transit Agencies: 2
- Energy Generation and Supply: 1

Although not required by the MEPA Interim Protocol for Analysis of EJ Impacts, the FEIR also surveyed environmental indicators tracked through the U.S. EPA's "EJ Screen," which shows a

[2] See https://matracking.ehs.state.ma.us/Environmental-Data/ej-vulnerable-health/environmental-justice.html. Four vulnerable health EJ criteria are tracked in the DPH EJ Viewer, which are tracked on a municipal level. Two indicators (childhood blood lead, and low birth weight) are also tracked on a census tract level.

percentile measure of each indicator by census block as compared to the MA statewide average. The FEIR evaluated the following indicators:

- Particulate Matter (PM) 2.5
- Ozone
- NATA Diesel Particulate Matter (DPM)
- NATA Air Toxics Cancer Risk
- NATA Respiratory Hazard Index Ratio
- Traffic Proximity
- Lead Paint
- Superfund Proximity
- RMP Facility Proximity
- Hazardous Waste Proximity
- Underground Storage Tanks
- Wastewater Discharge

Five indicators (PM 2.5, NATA Air Toxics Cancer Risk, Traffic Proximity, Superfund Proximity and Hazardous Waste Proximity) are shown to be 50th percentile or higher of statewide average (the remaining indicators are below the 50th percentile).

While the above indicators show some evidence of an existing "unfair or inequitable" burden impacting the identified EJ populations, the FEIR asserts that the project will not have disproportionate adverse effects on EJ populations. In particular, the project will improve the existing stormwater infrastructure through the installation of new deep sump catch basins, eliminating catch basin outlets, and providing energy dissipation at outfalls. To adapt to more extreme heat events, the project proposes to plant 5 new shade trees on site. Existing vegetated areas disturbed by construction activities will be stabilized with seed.

The FEIR also states that the project will include several public realm improvements near EJ populations. In particular, the filing indicates that the project will improve safety and transit operations, improve pedestrian and bicycle mobility and enhance public ADA/AAB access. In addition, the FEIR states that the improvements to intersection operations and enhancements to pedestrian and bicycling infrastructure will lead to a projected decrease of CO2 emissions of approximately 11.8 tons/yr. According to the filing, the emissions reduction was quantified based on traffic operational improvements that are projected to reduce delay and congestion using the Federal Highway Administration (FHWA) Energy and Emissions Reduction Policy Analysis Tool (EERPAT).[3]

Article 97

The project involves the conversion of land (0.56 acres) subject to protection under Article 97 of the amendments to the state constitution and will require temporary construction access easements (30,280± sf) and permanent land acquisition (2,179± sf) and easements (22,590± sf) for the construction of three drainage outfalls, grading, roadway widening, guardrail, overhead utilities, modified rock fill slopes, a wetland replication area, and compensatory flood storage. As noted in the FEIR, the impacted

[3] Climate Change, Air Quality, and Sustainability Analysis Tools | US Department of Transportation

Article 97 land is located in the overgrown shoulder along Washington Street that is not currently suitable for use by the public and the impacts will not impact the public's ability to access, benefit from, and/or utilize the remainder of the parcels subject to Article 97.

To mitigate for the loss of Article 97 land, Chapter 152 of the Acts of 2024 was signed into law on August 7, 2024 by Governor Healey. This legislation stipulates funding[4] to the Town of Canton to be used to acquire land for conservation or water supply purposes. Pursuant to M.G.L. c. 3, § 5A, a public entity may provide funding in lieu of replacement land if the Secretary of Energy and Environmental Affairs (the Secretary) makes a determination to allow funding in lieu of replacement Article 97 land. This determination was received on July 30, 2024.[5] According to the filing, the Town of Canton shall deposit such sum into its Conservation Law Fund and dedicate it for acquisition of land for conservation purposes. The Town of Canton shall use such funds within 3 years to acquire replacement land.

Any disposition or change in use of Article 97 land or interest in land requires legislative approval and compliance with the EEA Article 97 Land Disposition Policy (the "Policy"). Under new M.G.L. c. 3, § 5A, it also requires notification to the Executive Office of Energy and Environmental Affairs (EEA) with documentation of an alternatives analysis conducted for the transaction and explanation of how it satisfies the EEA's "no net loss" policy. A primary goal of the Policy is to ensure no net loss of Article 97 lands under the ownership and control of the Commonwealth or any political subdivisions thereof. Transfer of ownership or interests therein may occur only under exceptional circumstances, as defined in the Policy, including the determination that no feasible alternative is available, and a minimum amount of land or an interest therein is being disposed for the proposed use. Such a transfer also requires, and has received, legislative authorization by the General Court approved on August 7, 2024.

The Article 97 Policy establishes six criteria for determining when "exceptional circumstances" exist such that a disposition of Article 97 land may be appropriate. The FEIR detailed the project's compliance with the policy as summarized below.

1. *The Proponent of the disposition must conduct an analysis of alternatives, commensurate with the type and size of the proposed disposition, that achieve the purpose of the disposition without the use of Article 97 land, such as the use of other land available within the appropriate market area.*

As described above, the Preferred Alternative was selected as it accomplishes the need to provide multi-modal accommodations along Washington Street between Charles Avenue in Stoughton and Windsor Woods Lane in Canton. As stated in the FEIR, the Preferred Alternative also minimizes impacts to Article 97 properties by limiting pedestrian accommodations to one side of Washinton Street as compared to Alternative 2, the only other Alternative that provides multi-modal opportunities for both pedestrians and cyclists. The filing examined alternatives that minimalized impacts to Article 97 land; however, the filings states that these alternatives eliminate pedestrian accommodations (Alternative 3A) or pedestrian and bicycle accommodations (alternative 3B). The filings states that Alternative 3A and 3B are infeasible since they would not fulfill MassDOT's Complete Streets and GreenDOT initiatives.

[4] Real Estate appraisals are underway and once finalized, MassDOT will provide funding to the Town of Canton in accordance with the enacted Bill.
[5] Public Lands Preservation Act Tracker Document - Canton, EEA Responses

2. *The disposition of the subject parcel and its proposed use may not destroy or threaten a unique or significant resource (e.g., significant habitat, rare or unusual terrain, or areas of significant public recreation).*

As described in the filing, the disposition of land will not destroy or threaten a significant environmental resource. In addition, the permanent and temporary easements and fee takings occur immediately adjacent to the Right-of-Way in areas that are not directly used for public recreation and not characterized as rare or unusual terrain.

3. *Real estate of equal or greater value, and of significantly greater resource value is granted to the disposing agency.*

Chapter 152 of the Acts of 2024 was signed into law on August 7, 2024 by Governor Healey. This legislation stipulates funding to the Town of Canton is to be used to acquire land for conservation or water supply purposes. As noted above, the Proponent received approval to provide funding in lieu of replacement land by the Secretary on July 30, 2024.

4. *The minimum necessary area of Article 97 should be included in the disposition and the existing resources continue to be protected to the maximum extent possible*.

The filing states that the extent of permanent and temporary easements and fee takings have been minimized to the maximum extent feasible while meeting MassDOT's design goals. According to the FEIR, the easements and takings are necessary for three drainage outfalls, grading, roadway widening, guardrail, overhead utilities, modified rock fill slopes, a wetland replication area, and compensatory flood storage. As noted above, the filing analyzed two alternatives (Alternative 3A and 3B), that further minimalized Article 97 impacts as compared to the Preferred Alternative; however, these alternatives did not meet the project's goals of providing multimodal access to the project site.

5. *The disposition serves an Article 97 purpose or another public purpose without detracting from the mission, plans, policies and mandates of EEA and its appropriate department or division*.

The project serves a public purpose by providing improvements that include traffic signal installation, sidewalk construction, and buffered bicycles lanes. These improvements would bring this section of Washington Street into compliance with the Americans with Disabilities Act, Massachusetts Architectural Access Board guidelines, and MassDOT's Complete Streets and GreenDOT initiatives. As noted above, the impacted Article 97 land is located in the overgrown shoulder along Washington Street that is not currently suitable for use by the public and the impacts will not impact the public's ability to access, benefit from, and/or utilize the remainder of the parcels subject to Article 97.

6. *The disposition is not contrary to the express wishes of the person(s) who donated or sold the parcel or interests to the Commonwealth.*

The FEIR states that the Town of Canton acquired the properties through fee and takings[6] to serve recreational purposes. The filing states that the disposition of land from the Town of Canton to MassDOT is within the interests of the depositor and the Commonwealth.

Wetlands / Stormwater

As noted above, the project will impact 452 sf (300 sf temporary and 152 sf of permanent) of BVW, 880 sf (525 sf temporary and 355 sf permanent) of BLSF and 2,690 sf (2,500 temporary and 190 permanent) of Riverfront Area. The project is providing a 525 sf wetland replication area to replace 152 sf of permanent BVW impacts, resulting in a 3.5:1 replacement to impact ratio. The FEIR also states that restoration will be provided for the 300 sf of temporary impacts to BVW. The FEIR states that compensatory flood storage (900 cubic feet) will be provided to replace the loss of 355 cubic feet of permanent flood storage, resulting in a 2.5:1 replacement to impact ratio.

The Stoughton Conservation Commission reviewed the project for its consistency with the Wetlands Protections Act (WPA), the Wetland Regulations (310 CMR 10.00), and associated performance standards, including the Stormwater Management Standards (SMS), and issued an OOC on February 13, 2023; the OOC was not appealed. In addition, a Request for Determination of Applicability was filed on December 6, 2022 with the Canton Conservation Commission under the Massachusetts Wetlands Protection Act (M.G.L. c. 131, s. 40, the Act) and a Negative Determination of Applicability was issued on January 27, 2023.

The project includes the alteration of approximately 4.51 acres of land and the addition of 0.97 acres of impervious area for a total of 3.44 acres on the project site. In order to mitigate the proposed increase in impervious surface cover, the project proposes a closed drainage system comprised of new catch basins equipped with deep sumps and hoods and energy dissipating pads or sediment forebays at the drainage outfalls. The FEIR states that stormwater generated by the proposed project will be treated, infiltrated, and stored in accordance with the Massachusetts Stormwater Management Standards (SMS). The stormwater system will mitigate peak runoff rates for the current 100-year storm event and provide 80% total suspended solids (TSS) removal. The most current NOAA Atlas 14 precipitation data was used to evaluate peak runoff. Comments from the Massachusetts Water Resources Authority (MWRA) on the FEIR note that MWRA prohibits the discharge of groundwater and stormwater into the sanitary sewer system, pursuant to 360 C.M.R. 10.023(1) except in a combined sewer area when permitted by the Authority and the local municipality. Comments state that the project site has access to storm drains and is not located in a combined sewer area. Therefore, the discharge of groundwater or stormwater to the sanitary sewer system associated with this project is prohibited. The Proponent has confirmed that the project does not involve discharging groundwater or stormwater to the sanitary sewer system.[7]

Hazardous Waste

Previous comments from MassDEP indicated that there are Bureau of Waste Site Cleanup (BWSC) disposal sites within and near the proposed project area. Comments noted that the disposal sites have been closed under the Massachusetts Contingency Plan (MCP); however, given the large project area, it is possible that residual contaminated soil could be encountered during the work that may require

[6] These takings accorded between 1894-1930.

[7] Email from the Proponent, to Amina Miliani, MEPA Analyst, dated January 10, 2025.

notification and/or the implementation of a Utility Related Release Abatement Measure (URAM) or other mechanism to manage contaminated soil. Previous MassDEP comments stated that the Proponent is advised to include within their contingency plan a plan to manage contamination encountered during construction activities that are not related to spills or releases that occur while completing construction. Comments note that the Proponent is advised that if oil and/or hazardous material are identified during the implementation of this project, notification pursuant to the MCP (310 CMR 40.0000) must be made to MassDEP. A Licensed Site Professional (LSP) should be retained to determine if notification is required and, if need be, to render appropriate opinions. Previous MassDEP comments also stated that a spills contingency plan addressing prevention and management of potential releases of oil and/or hazardous materials from pre- and postconstruction activities should be presented to workers at the site and enforced. The contingency plan should include but not be limited to, refueling of machinery, storage of fuels, and potential on-site activity releases.

Previous MassDEP comments stated that the Proponent is advised that the resurfacing of a roadway, resetting curb, modifying drainage, and overhead wire infrastructure may involve pipe repair or replacement. As required by under 310 CMR 7.15(12A) “an owner or operator (including utilities conducting pipe repair or replacement), must conduct a “thorough inspection”7 to determine the location and amount of any asbestos-containing pipe. Comments from MassDEP note that there are no additional comments other than the ones previously raised in review of the EENF.

Climate Change

Adaptation and Resiliency

Effective October 1, 2021, all MEPA projects are required to submit an output report from the MA Resilience Design Tool to assess the climate risks of the project. Based on the output report attached to the FEIR, the project has a “High” exposure rating based on the project’s location for the following climate parameters: extreme precipitation (urban flooding) and extreme heat. Based on the 35-year useful life and the self-assessed criticality identified for the project, the MA Resilience Design Tool recommends a planning horizon of 2070 and a return period associated with a 50-year (2% chance) storm event when designing the roadway improvements. The tool recommends planning for the 90th percentile with respect to extreme heat (which indicates an increase in extremely hot days as compared to a historical baseline).

The MA Resilience Design Tool output indicates that the site has a maximum annual daily rainfall exceeding 10 inches within the overall project's useful life, is adding impervious area and is within 100 ft of a waterbody and is removing trees. These factors are indicated in the Tool as contributing to the High exposure for the extreme precipitation (urban flooding) parameter and extreme heat. The FEIR indicates that the project is adding resiliency through improvements to the stormwater management system, which is designed to provide groundwater recharge and water quality improvements. The FEIR indicates that the project’s storm water system will be able to accommodate the current 100-year storm (24-hour rainfall depth of 8.09”). This is an improvement over existing conditions and almost sufficient to be fully resilient to rainfall depths anticipated for the 2070 50-year storm (identified as 8.3” in the MA Resilience Design Tool). In addition, the project is planting at least five public shade trees within adjacent EJ neighborhoods. I encourage the Proponent to maximize

opportunities to improve climate resiliency including incorporation of LID techniques and additional tree planting.

Construction Period

Construction on the project is expected to commence in Spring of 2025 and be completed in Winter of 2026. All construction and demolition activities should be managed in accordance with applicable MassDEP's regulations regarding Air Pollution Control (310 CMR 7.01, 7.09-7.10), and Solid Waste Facilities (310 CMR 16.00 and 310 CMR 19.00, including the waste ban provision at 310 CMR 19.017). The project should include measures to reduce construction period impacts (e.g., noise, dust, odor, solid waste management) and emissions of air pollutants from equipment, including anti-idling measures in accordance with the Air Quality regulations (310 CMR 7.11). Previous comments from MassDEP request that all non-road diesel equipment shall be operated using only ultra-low sulfur diesel (ULSD) with a sulfur content of no greater than 15 ppm pursuant to 40 CFR 80.510. If a piece of equipment is not available in the Tier 4 configuration, then the Proponent should use construction equipment that has been retrofitted with appropriate emissions reduction equipment. Emission reduction equipment includes EPA-verified, CARB-verified, or MassDEP approved diesel oxidation catalysts (DOCs) or Diesel Particulate Filters (DPFs). The Proponent should maintain a list of the engines, their emission tiers, and, if applicable, the best available control technology installed on each piece of equipment on file for Departmental review. Off-road vehicles are required to use ultra-low sulfur diesel fuel (ULSD). Additionally, previous MassDEP comments state that a spills contingency plan addressing prevention and management of potential releases of oil and/or hazardous materials from pre- and post-construction activities should be presented to workers at the site and enforced. The plan should include but not be limited to, refueling of machinery, storage of fuels, and potential on-site activity releases. All construction activities should be undertaken in compliance with the conditions of all State and local permits. I encourage the Proponent to reuse or recycle construction and demolition (C&D) debris to the maximum extent.

Mitigation & Section 61 Findings

The FEIR includes a separate chapter summarizing proposed mitigation measures and includes draft Section 61 Findings. It contains commitments to implement these mitigation measures, identifies the parties responsible for implementation, and includes a schedule for implementation. As described in the FEIR, the Proponent has committed to implement the following measures to avoid, minimize and mitigate Damage to the Environment:

Environmental Justice

- The project will provide roadway operational and safety improvements near EJ populations.
- The project will improve safety and transit operations, improve pedestrian and bicycle mobility and enhance public ADA/AAB access at the project corridor.
- The stormwater design will result in a reduction of peak flows over existing conditions.
- The project proposes to plant at least 5 new public shade trees within nearby EJ populations.
- The improvements to intersection operations and enhancements to pedestrian and bicycling
- infrastructure will lead to a projected decrease of CO2 emissions of approximately 11.8 tons/yr.

Traffic and Transportation

- Installation of new buffered bicycle lanes in each direction of vehicular travel.
- Inclusion of a new sidewalk west of the Washington Stret that improves mobility and ADA accessibility for pedestrians.
- Installation of new traffic signage & striping.
- Installation of new guardrail, where required, throughout the project limits.

Wetlands and Stormwater

- Inclusion of a 525± sf Wetland Replication Area to replace 152± sf of permanent BVW impacts, resulting in a 3.5:1 replacement to impact ratio.
- Restoration of temporary 300± sf of BVW impacts will also be provided.
- Compensatory flood storage (900 cubic feet) to replace the loss of 355 cubic feet of permanent flood storage, resulting in a 2.5:1 replacement to impact ratio.
- Restoration of vegetated areas with loam and seed mix.
- Compliance with the SMS and will incorporate Best Management Practices (BMPs) into the design, including catch basins equipped with deep sumps and hoods and energy dissipating pads or sediment forebays at the drainage outfalls.
- The stormwater management system will reduce peak runoff rates for the current 2, 10, and 100-year storm events.

Article 97

- Compliance with requirements of Chapter 152 of the Acts of 2024, which stipulates that funding to the Town of Canton is to be used to acquire land for conservation or water supply purposes as mitigation for the loss of Article 97 land. Pursuant to M.G.L. c. 3, § 5A, a public entity may provide funding in lieu of replacement land if the Secretary decides to allow funding in lieu of replacement Article 97 land. This determination was received on July 30, 2024. Pursuant to this approval, the Town of Canton will deposit the required sum into its Conservation Law Fund and dedicate it for acquisition of land for conservation purposes. Such funds will be used within 3 years to acquire replacement land.
- Compliance with new requirements of new Open Space Act and EEA Article 97 policy, including conducting robust alternatives analysis8 similar to the one included herein to justify the Article 97 transfer, a finding that the minimum acreage of Article 97 land was used, an analysis that no unique or significant resource is impacted as a result of the transfer, mitigation in the form of funding to the Town of Canton to be used to acquire land for conservation or water supply purposes, a description that the project serves a public interest and is in the interest of the Commonwealth.

Climate Change

- The storm water system will be able to accommodate the current 100-year storm (24-hour rainfall depth of 8.09”). (24-hour rainfall depth of 8.09”). This is an improvement over existing

conditions and almost sufficient to be fully resilient to rainfall depths anticipated for the 2070 50-year storm (identified as 8.3" in the MA Resilience Design Tool).
- The project is planting at least 5 shade trees.
- The GHG impact assessment for this project has determined that the proposed improvements will result in a decrease in CO2 emissions of 11.8 tons/yr. This decrease will be achieved through improvements in intersection operations and the construction of measures to encourage walking and bicycling

Construction Period

- The project will implement dust control measures during active demolition and construction that will primarily consist of industry best practices such as watering and wetting agents regularly to control and suppress dust.
- A comprehensive sedimentation and erosion control program will be implemented to protect the adjacent Wetland Resource Areas from sedimentation during the proposed construction activities.
- Conform to MassDOT standards and guidelines and abide by the Massachusetts 5-minute idling law for any equipment not actively engaged in construction activities.
- Install emission control devices in all off-road vehicles in accordance with MassDOT's Revised Diesel Retrofit Specification, or technology must be used for non-road diesel powered construction equipment in excess of 50 horsepower on MassDOT job sites.
- Comply with the MassDOT Noise Policy and Procedures and 23 CFR 772 Procedures for Abatement of Highway Traffic and Construction Noise.
- Implement a comprehensive traffic control plan.
- Detours will be required only during full depth excavation and retaining wall construction.
- Provide temporary ramps for pedestrians.

Conclusion

Based on a review of the FEIR and consultation with Agencies, I find that the FEIR adequately and properly complies with MEPA and its implementing regulations. The project may proceed to permitting. Participating Agencies should forward copies of the final Section 61 Findings to the MEPA Office for publication in accordance with 301 CMR 11.12.

January 17, 2025
Date

Rebecca L. Tepper

Comments received:

1/10/2025 Massachusetts Water Resources Authority (MWRA)
1/10/2025 Massachusetts Department of Environmental Protection (MassDEP)

RLT/AM/am

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

Maura T. Healey
Governor

Kimberley Driscoll
Lieutenant Governor

Rebecca L. Tepper
Secretary

Bonnie Heiple
Commissioner

January 10, 2025

Rebecca L. Tepper
Secretary of Energy and Environment
Executive Office of Energy and Environmental Affairs
ATTN: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: FEIR Rollover Review.16886
STOUGHTON CANTON. Washington Street Corridor Improvements Project at Washinton St./York St. from Charles Ave. to Windsor Woods Lane

Dear Secretary Tepper,

The Southeast Regional Office of the Department of Environmental Protection (MassDEP) has reviewed the Final Environmental Impact Report Rollover (FEIR Rollover) for the Washington Street Corridor Improvements Project at Washinton St./York St. from Charles Avenue (Stoughton). to Windsor Woods Lane (Canton), Stoughton and Canton, Massachusetts (EOEEA #16886). The Project Proponent provides the following information for the Project:

The Proponent, Massachusetts Department of Transportation-Highway Division (MassDOT), proposes traffic, safety, and mobility improvements along Washington Street between Charles Avenue in Stoughton and Windsor Woods Lane in Canton, and portions of York Street.

Designed as a Complete Street, the project includes reconstruction and cross section modifications to Washington Street, improved traffic operations, new pedestrian and bicycle accommodations that provide new multi-modal connections, and improved stormwater management. These improvements are aligned with MassDOT's sustainability initiative known as GreenDOT, which promotes the healthy transportation modes of walking, bicycling, and public transit, and supportive smart growth development. Existing drainage, water, sewer, and utility pole modifications are also proposed within the project limits. Specifically, the project includes:

- **Reconstruction of roadways with new pavement by milling and overlay and full depth pavement;**
- **Minor widening along roadways as necessary to provide bicycle accommodations on each direction of vehicular travel via on-street buffered bicycle lanes;**
- **Resurfacing of roadway, resetting curb, modifying drainage, sewer, water, and overhead wire infrastructure within the project limits;**
- **Construction of Americans with Disabilities Act (ADA)/Architectural Access Board (AAB) compliant accessible sidewalks and pedestrian ramps to improve pedestrian accommodations**

along the entire project (sidewalks on east and west side of Washington Street south of York Street intersection and sidewalk on west side of Washington Street north of York Street intersection);

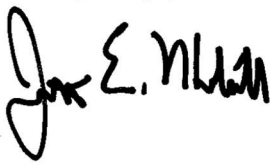
- **Restoration of vegetated areas with loam and seed mix;**
- **Planting of 5 new shade trees within the project limits;**
- **Installation of new traffic signage & striping;**
- **Installation of new guardrail, where required, throughout the project limits;**
- **A new traffic signal at the York Street intersection;**
- **Improved stormwater management;**
- **Funding to the Town of Canton to acquire land for conservation or water supply purposes (Attachment E), Chapter 152 of the Acts of 2024 (H3937));**
- **A 525± sf Wetland Replication Area to replace 152± sf of permanent BVW impacts, resulting in a 3.5:1 replacement to impact ratio. Restoration of temporary 300± sf of BVW impacts will also be provided; and • Compensatory flood storage (900 cubic feet) to replace the loss of 355 cubic feet of permanent flood storage, resulting in a 2.5:1 replacement to impact ratio**

Comments/Guidance

MassDEP has no additional comments other than the ones previously raised in review of the EENF.

The MassDEP Southeast Regional Office appreciates the opportunity to comment on this FEIR Rollover. If you have any questions regarding these comments, please contact George Zoto at George.Zoto@mass.gov or Jonathan Hobill at Jonathan.Hobill@mass.gov.

Very truly yours,



Jonathan E. Hobill,
Regional Engineer,
Bureau of Water Resources

JH/GZ

Cc: DEP/SERO

ATTN: Gerard Martin, Regional Director
John Handrahan, Deputy Regional Director, BWSC
Seth Pickering, Deputy Regional Director, BAW
Jennifer Viveiros, Deputy Regional Director, ADMIN
Maissoun Reda, Chief, Wetlands and Waterways, BWR
Whitney McClees, Wetlands, BWR

Brendan Mullaney, Waterways, BWR
Carlos Fragata, Waterways, BWR
Mark Dakers, Chief, Solid Waste, BAW
Jeffrey Hunter, Solid Waste, BAW
Jennifer Wharff, Solid Waste, BAW
Angela Gallagher, Chief, Site Management, BWSC
Amanda Cantara, Site Management, BWSC

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Executive Director

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January 10, 2025

Rebecca Tepper, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge St, Suite 900
MEPA Office, Amina Miliani
Boston, MA 02114

Subject: EOEEA #16886 – Proposed Environmental Impact Report
Washington Street Corridor Improvements,
Stoughton and Canton, MA

Dear Secretary Tepper,

The Massachusetts Water Resources Authority (MWRA) appreciates the opportunity to comment on the Proposed Environmental Impact Report (PEIR) submitted by the Massachusetts Department of Transportation - Highway Division (MassDOT) (the "Proponent") for Washington Street Corridor Improvements (the "Project") in Stoughton and Canton, Massachusetts. The Proponent proposes traffic, safety, and mobility improvements along Washington Street between Charles Avenue in Stoughton and Windsor Woods Lane in Canton, as well as portions of York Street. Designed as a Complete Street, the Project includes reconstruction and cross section modifications to Washington Street, improved traffic operations, new pedestrian and bicycle accommodations that provide new multi-model connections, and improved stormwater management. These improvements are aligned with MassDOT's sustainability initiative known as GreenDOT. The existing drainage, water, sewer, and utility pole modifications are also proposed within the Project limits.

MWRA previously commented on the Project Expanded Environmental Notification Form (EENF) on November 22, 2024. MWRA's comments on this PEIR continue to relate to Toxic Reduction and Control (TRAC) discharge permitting.

TRAC Discharge Permitting

MWRA prohibits the discharge of groundwater and stormwater into the sanitary sewer system, pursuant to 360 C.M.R. 10.023(1) except in a combined sewer area when permitted by the Authority and the local municipality. The Project Site has access to storm drains and is not located in a combined sewer area. Therefore, the discharge of groundwater or stormwater to the sanitary sewer system associated with this Project is prohibited.

On behalf of the MWRA, thank you for the opportunity to provide comments on this Project. Please do not hesitate to contact Hillary Monahan of my staff at (857) 324-0554 or Hillary.Monahan@mwra.com with any questions or concerns.

Sincerely,

Colleen C. Rizzi

Colleen Rizzi, P.E.
Director
Environmental and Regulatory Affairs

cc: George Zoto, MassDEP

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DOCUMENT A00891

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS ON THE EXPANDED ENVIRONMENTAL NOTIFICATION FORM AND PROPOSED ENVIRONMENTAL IMPACT REPORT

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The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Maura T. Healey
GOVERNOR

Kimberley Driscoll
LIEUTENANT GOVERNOR

Rebecca L. Tepper
SECRETARY

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November 29, 2024

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
EXPANDED ENVIRONMENTAL NOTIFICATION FORM AND
PROPOSED ENVIRONMENTAL IMPACT REPORT

PROJECT NAME	: Washington Street Corridor Improvements
PROJECT MUNICIPALITY	: Canton, Stoughton
PROJECT WATERSHED	: Neponset River
EEA NUMBER	: 16886
PROJECT PROPONENT	: Massachusetts Department of Transportation-Highway Division
DATE NOTICED IN MONITOR	: October 23, 2024

Pursuant to the Massachusetts Environmental Policy Act (MEPA; M.G.L. c. 30, ss. 61- 62L) and Section 11.06 of the MEPA Regulations (301 CMR 11.00), I have reviewed the Expanded Environmental Notification Form (EENF), and hereby determine that this project **requires** the submission of an Environmental Impact Report (EIR). In accordance with 301 CMR 11.06(13), the Proponent has submitted a Proposed EIR with a request that I allow a Rollover EIR in lieu of the usual two-stage Draft and Final EIR process. I hereby grant the request for a Rollover EIR, and, therefore, I will publish notice in the next Environmental Monitor that the Proposed EIR shall be reviewed as a Final EIR pursuant to Section 11.06(14) and shall be subject to a 30-day public comment period.

Project Description

As described in the EENF and Proposed EIR (the EENF/Proposed EIR), the project aims to provide traffic, safety, and mobility improvements along Washington Street between Charles Avenue in Stoughton and Windsor Woods Lane in Canton, and portions of York Street. Existing drainage, water, sewer, and utility pole modifications are also proposed within the project limits. Specifically, the project includes:

- Reconstruction of roadways with new pavement by milling and overlay and full depth pavement;

- Minor widening along roadways as necessary to provide bicycle accommodations on each direction of vehicular travel via on-street buffered bicycle lanes;
- Resurfacing of roadway, resetting curb, modifying drainage, sewer, water, and overhead wire infrastructure within the project limits;
- Construction of Americans with Disabilities Act (ADA)/Architectural Access Board (AAB) compliant accessible sidewalks and pedestrian ramps to improve pedestrian accommodations along the entire project (sidewalks on east and west side of Washington Street south of York Street intersection and sidewalk on west side of Washington Street north of York Street intersection);
- Restoration of vegetated areas with loam and seed mix;
- Installation of new traffic signage & striping;
- Installation of new guardrail, where required, throughout the project limits;
- A new traffic signal at the York Street intersection; and
- Improved stormwater management.

Project Site

The project site occupies approximately 4.51 acres and consists of a 0.5-mile segment of Washington Street (Route 138) from Charles Avenue (Stoughton) to Windsor Woods Lane (Canton), and at the York Street intersection. Washington Street, which is classified as an urban principal arterial route, is a two-way single-lane north-south roadway extending from Easton into Canton. Land use around the project site is predominately commercial and industrial uses. Open space comprised of forested uplands and wetlands and an athletic field owned by the Town of Canton are adjacent to Washington Street, north of York Street.

Wetland resource areas within the project area include Bordering Vegetated Wetlands (BVW), Bordering Land Subject to Flooding (BLSF) and Riverfront Area. There is a Certified Vernal Pool #7459 located west of Washington Street immediately adjacent to the project site. A section of the project site is designated as Article 97 lands. No Area of Critical Environmental Concern (ACEC) or Outstanding Resource Water (ORW) is located within the project site.

The project site is located within three Environmental Justice ("EJ") populations characterized as minority and within one mile of nine EJ populations also characterized as minority. As described below, the EENF/Proposed EIR identified the "Designated Geographic Area" (DGA) for the project as one mile around EJ populations, included a review of potential impacts and benefits to the EJ populations within this DGA, and described public involvement efforts undertaken to date.

Environmental Impacts and Mitigation

Potential environmental impacts associated with the project include the alteration of approximately 4.51 acres of land and the addition of 0.97 acres (total of 3.44 acres) of impervious area. The project will impact 452 square feet (sf) (300 sf temporary and 152 sf of permanent) of BVW, 880 sf (525 sf temporary and 355 sf permanent) of BLSF and 2,500 sf (2,310 temporary and 190 permanent) of Riverfront Area. The project also involves the conversion of 0.56 acres of land subject to protection under Article 97 of the amendments to the state constitution.

Measures to avoid, minimize, and mitigate environmental impacts include upgrades to the existing stormwater management system, planting five public shade trees and funding to the Town of Canton for the replacement of Article 97 land. The project will provide wetland replication area (525 sf) to replace 152 sf of permanent BVW impacts. Restoration of temporary BVW impacts will also be provided. The project will provide compensatory flood storage (900 cubic feet) to replace the loss of 355 cubic feet of permanent flood storage. In addition, the improvements to intersection operations and enhancements to pedestrian and bicycling infrastructure will lead to a projected decrease of CO2 emissions of approximately 11.8 tons/yr.

Jurisdiction and Permitting

This project is subject to MEPA review because it requires Agency Action and meets/exceeds the MEPA review threshold at 301 CMR 11.03(1)(b)(3) for the conversion of land held for natural resources purposes in accordance with the Amendments to the Constitution of the Commonwealth Article 97 to a purpose not in accordance with Article 97 and 301 CMR 11.03(1)(b)(5) Release of an interest in land held for conservation, preservation or agricultural or watershed preservation purposes. The project is required to prepare an EIR pursuant to 301 CMR 11.06(7)(b) because it is located within a DGA of one or more EJ populations.

The project received an Order of Conditions ((DEP File No. 298-0880) from the Stoughton Conservation Commission on December 13, 2023, which was not appealed. The project will also require a National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) from the United States Environmental Protection Agency (EPA).

Because the project is being undertaken by an Agency (Massachusetts Department of Transportation (MassDOT)), MEPA jurisdiction is broad in scope and extends to all aspects of the project that may cause Damage to the Environment, as defined in the MEPA regulations.

Request for Rollover EIR or Single EIR

The EENF/Proposed EIR included a request that I allow a Rollover EIR in accordance with 301 CMR 11.06(13) or alternatively, a Single EIR in accordance with 301 CMR 11.06(8). The MEPA regulations provide that for projects required to submit an EIR under 301 CMR 11.06(7)(b), the Proponent may submit an EENF with a request that I allow a Rollover EIR in accordance with 301 CMR 11.06(13). To support this request, the EENF must be accompanied by a Proposed EIR, which, if the request for Rollover EIR is granted, would be published as a Final EIR in a subsequent Environmental Monitor in lieu of the typical two-stage Draft and Final EIR process.

In order to allow a Rollover EIR, I must find that the dual EENF and Proposed EIR:

a. presents a complete and definitive description and analysis of the project and its alternatives, and an assessment of its potential environmental and public health impacts and mitigation measures sufficient to allow a Participating Agency to fulfill its obligations in accordance with M.G.L. c. 30, §§ 61 and 62K and 301 CMR 11.12(5)
b. demonstrates that the project will not materially exacerbate any existing unfair or inequitable Environmental Burden and related public health consequences impacting an EJ population,

and will not result in a disproportionate adverse effect or increased climate change effects on an EJ population
c. describes measures taken to provide meaningful opportunities for public involvement by EJ populations prior to filing the dual ENF and Proposed EIR, including any changes made to the project to address concerns raised by or on behalf of EJ populations
d. shows that comments received on the dual ENF and Proposed EIR do not raise substantial issues not previously considered by the Proponent
e. shows that no substantive issues remain to be resolved

The MEPA regulations at 301 CMR 11.06(8) indicate that a Single EIR may be allowed provided I find that the EENF:

a. describes and analyzes all aspects of the project and all feasible alternatives, regardless of any jurisdictional or other limitation that may apply to the Scope;
b. provides a detailed baseline in relation to which potential environmental impacts and mitigation measures can be assessed; and,
c. demonstrates that the planning and design of the project use all feasible means to avoid potential environmental impacts.

To support a request for Single EIR for any project for which an EIR is required in accordance with 301 CMR 11.06(7)(b), I must also find that the EENF:

d. describes and analyzes all aspects of the project that may affect Environmental Justice populations located in whole or in part within the Designated Geographic Area around the project; describes measures taken to provide meaningful opportunities for public involvement by Environmental Justice populations prior to filing the expanded ENF, including any changes made to the project to address concerns raised by or on behalf of Environmental Justice populations; and provides a detailed baseline in relation to any existing unfair or inequitable Environmental Burden and related public health consequences impacting Environmental Justice populations in accordance with 301 CMR 11.07(6)(n)1.

Consistent with these requests, the EENF/Proposed EIR was subject to an extended comment period under 301 CMR 11.05(9).

Review of the EENF

The EENF/Proposed EIR included a project description, alternatives analysis, existing and proposed conditions plans, estimates of project-related impacts, and an identification of measures to avoid, minimize and mitigate environmental impacts. It included a description of measures taken to enhance public involvement by EJ populations and a baseline assessment of any existing unfair or inequitable Environmental Burden and related public health consequences impacting EJ populations. Consistent with the MEPA Interim Protocol on Climate Change Adaptation and Resiliency, the EENF/Proposed EIR contained an output report from the Climate Resilience Design Standards Tool prepared by the Resilient Massachusetts Action Team (the "MA Resilience Design Tool"),[1] together with information on climate resilience strategies to be undertaken by the project. On November 20,

[1] Available at: https://resilientma.mass.gov/rmat_home/designstandards/

2024, the Proponent provided supplemental information to the MEPA Office providing an updated output report from the MA Resilience Design Tool and additional information on the project's impacts on Article 97 land. For purposes of clarity, all supplemental materials provided by the Proponent are included in reference to the "EENF/Proposed EIR."

Alternatives Analysis

The EENF/Proposed EIR analyzed a series of alternatives for the multimodal access at the project site including a No-Build Alternative, the Sidewalk on Both Sides of Washington Street Alternative, the No Sidewalks Alternative, the No Sidewalks and No Bicycle Lanes Alternative and the Preferred Alternative. The No-Build Alternative would not result in additional environmental impacts nor would it implement any changes to the existing roadway. If left in its current state, poorly managed stormwater would degrade the hillside slope and potentially impact the adjacent vernal pool. In addition, the EENF/Proposed EIR states that eliminating all pedestrian accommodations would not meet the project's goals of providing multimodal access at the project corridor. For these reasons, the No Build Alternative was dismissed.

The Sidewalk on Both Sides of Washington Street Alternative (Alternative 2) consists of two eleven-foot travel lanes in each direction, with variable width left turn lanes at the York Street intersection. This alternative also consists of two 5-foot-wide bicycle lanes with an adjacent 2-foot-wide buffer. For pedestrian accommodations, two six-foot wide sidewalks are proposed on each side of the roadway. According to the EENF/Proposed EIR, this Alternative meets the project's goals of complying fully with MassDOT's Complete Streets Policy. However, this Alternative would result in greater impacts to Article 97 land, BVW, BLSF and more impervious area as compared to the Preferred Alternative (see the table below for a comparison of alternative impacts). For these reasons, this Alternative was dismissed.

The No Sidewalks Alternative (Alternative 3A) consists of two eleven-foot travel lanes in each direction, with variable width left turn lanes. This alternative also consists of two 5-foot-wide bicycle lanes with an adjacent 2-foot-wide buffer. Pedestrian accommodations are not proposed in this alternative. Although this Alternative has less impacts on Article 97 land, wetland resources and impervious area, it does not meet the project's goals of providing pedestrian accommodations at the project corridor and was therefore dismissed. The No Sidewalks and No Bicycle Lanes Alternative (Alternative 3B) consists of two eleven-foot travel lanes in each direction, with variable width left turn lanes, and two-foot outside shoulders. Pedestrian or bicycle accommodations are not proposed in this alternative. The No Sidewalks and No Bicycle Lanes Alternative has less environmental impacts than the Preferred Alternative, but does not meet the project's goals of providing any multimodal access to the project site and was therefore dismissed.

Alternative	Description	Requires Article 97	Improves Mobility	Feasible & Meets Purpose and Need	BVW Impacts (SF)	BLSF Impacts (SF/CY)	Stormwater Quality Improvements	Article 97 Permanent Easement/Taking (SF)	Temporary Easement Area (SF)
1	Sidewalk on west side	Y	Y	Y	152 (perm) 300 (temp)	355/355	Y	24,769	30,280
2	Sidewalks on both sides	Y	Y	N - Does not limit impacts	677	875/900	Y - Note additional increase in impervious area	26,370	30,808
3A	No sidewalks	Y	N - Only bicycle	N - Does not provide multi-modal access	153	355/355	Y	23,025	25,132
3B	No sidewalks & no bike lanes	Y	N	N - Does not provide multi-modal access	89	0/0	Y	14,878	22,295
No-Build	Retain Existing	N	N - No new connections	N - No improvements	0	0/0	N - No improvements	0	0

The Preferred Alternative consists of two eleven-foot travel lanes in each direction, with variable width left turn lanes for the York Street intersection. This alternative also consists of two 5-foot-wide bicycle lanes, with an adjacent 2-foot buffer. On the west side of the roadway, a 6-foot-wide sidewalk and variable width grading to tie into the existing grade is proposed. The EENF/Proposed EIR explains that pedestrian accommodations are not proposed on the east side of the roadway, as there are only primarily commercial properties to the north. The EENF/Proposed states that this alternative meets the project's goals of improving pedestrian safety and mobility with the addition of a sidewalk on the west side of the roadway while minimalizing impacts as compared to Alternative 2. The sidewalk on the west side was selected to connect to the residential community off Windsor Woods Lane and the Town of Canton's athletic fields at the project limits.

Environmental Justice (EJ) / Public Health

As noted above, the project site is located within three EJ populations characterized as minority and located within one mile of nine EJ population characterized as minority. Within the census tracts containing the above EJ populations, Portuguese and Portuguese Creole, Hindi and Nepali are identified as those spoken by 5% of more of residents who also identify as not speaking English very well.

Effective January 1, 2022, all new projects in a DGA (as defined in 301 CMR 11.02) around EJ populations are subject to new requirements imposed by the Chapter 8 of the Acts of 2021: *An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy* (the "Climate Roadmap Map") and amended MEPA regulations at 301 CMR 11.00. Two related MEPA protocols—the MEPA Public Involvement Protocol for Environmental Justice Populations (the "MEPA EJ Public Involvement Protocol") and MEPA Interim Protocol for Analysis of project Impacts on Environmental Justice Populations (the "MEPA Interim Protocol for Analysis of EJ Impacts")—are also in effect for new projects filed on or after January 1, 2022. Under the new regulations and protocols, all projects located in a DGA around one or more EJ populations must take steps to enhance public involvement opportunities for EJ populations, and must submit analysis of impacts to such EJ populations in the form of an EIR.

The EENF/Proposed EIR described public involvement activities conducted prior to filing, including advanced public notification to a list of community-based organizations (CBOs) and tribes/indigenous organizations (the EJ Reference List) provided by the MEPA Office. The Proponent circulated an EJ screening form with an overview of the project to these entities, and information on ways to request a community meeting (no requests were received). According to the EENF/Proposed EIR, public involvement activities also included holding a virtual public hearing on February 16, 2022. The EENF/Proposed EIR states that the virtual hearing was publicized in the Brockton Enterprise and the Patriot Ledger on February 2nd and 9th, 2022. Virtual hearing information was also provided on the MassDOT Event Calendar, Facebook, Twitter, the Town of Stoughton website, Town of Stoughton town hall, library, police department, the Town Manager's Facebook page, and the Portuguese National Club, a community-based organization in the Town of Stoughton. Direct abutters to the proposed project were also notified via certified mailings. The EENF/Proposed EIR states that accommodations and/or language assistance were available upon request. The virtual public hearing was attended by 20 individuals. The EENF/Proposed EIR states that comments made during the meeting pertained to project timeline and the project's use of retaining walls.

The EENF/Proposed EIR contained a baseline assessment of any existing unfair or inequitable Environmental Burden and related public health consequences impacting EJ Populations in accordance with 301 CMR 11.07(6)(n)1. and the MEPA Interim Protocol for Analysis of EJ Impacts. The baseline assessment included a review of the data provided by the Department of Public Health (DPH) EJ Tool applicable to the DGA regarding "vulnerable health EJ criteria"; this term is defined in the DPH EJ Tool to include any one of four environmentally related health indicators that are measured to be 110% above statewide rates based on a five-year rolling average.[2] According to the EENF/Proposed EIR, the data surveyed indicate that the Town of Stoughton exceeds the vulnerable health criteria for Childhood Asthma and the Town of Canton exceeds the vulnerable health criteria for Low Birth Weight. Within the project's DGA, one census tract (Stoughton) exhibits "vulnerable heath EJ criteria" for Childhood Blood Lead.

In addition, the EENF/Proposed EIR indicates that the following sources of potential pollution exist within the identified EJ populations, based on the mapping layers available in the DPH EJ Tool:

- Tier II" Toxic Use Reporting Facilities: 10
- MassDEP Sites with AULs: 5
- Underground Storage Tanks: 12
- EPA Facilities: 4
- Road Infrastructure: 3
- MBTA Bus and Rapid Transit: 2
- Regional Transit Agencies: 2
- Energy Generation and Supply: 1

Although not required by the MEPA Interim Protocol for Analysis of EJ Impacts, the EENF/Proposed EIR also surveyed environmental indicators tracked through the U.S. EPA's "EJ

[2] See https://matracking.ehs.state.ma.us/Environmental-Data/ej-vulnerable-health/environmental-justice.html. Four vulnerable health EJ criteria are tracked in the DPH EJ Viewer, which are tracked on a municipal level. Two indicators (childhood blood lead, and low birth weight) are also tracked on a census tract level.

Screen," which shows a percentile measure of each indicator by census block as compared to the MA statewide average. The EENF/Proposed EIR evaluated the following indicators:

- Particulate Matter (PM) 2.5
- Ozone
- NATA Diesel Particulate Matter (DPM)
- NATA Air Toxics Cancer Risk
- NATA Respiratory Hazard Index Ratio
- Traffic Proximity
- Lead Paint
- Superfund Proximity
- RMP Facility Proximity
- Hazardous Waste Proximity
- Underground Storage Tanks
- Wastewater Discharge

Five indicators (PM 2.5, NATA Air Toxics Cancer Risk, Traffic Proximity, Superfund Proximity and Hazardous Waste Proximity) are shown to be 50th percentile or higher of statewide average (the remaining indicators are below the 50th percentile).

While the above indicators show some evidence of an existing "unfair or inequitable" burden impacting the identified EJ populations, the EENF/Proposed EIR asserts that the project will not have disproportionate adverse effects on EJ populations. In particular, the project will improve the existing stormwater infrastructure through the installation of new deep sump catch basins, eliminating catch basin outlets, and providing energy dissipation at outfalls. To adapt to more extreme heat events, the project proposes to plant 5 new shade trees on site. Existing vegetated areas disturbed by construction activities will be stabilized with seed.

The EENF/Proposed EIR also states that the project will include several public realm improvements near EJ populations. In particular, the filing indicates that the project will improve safety and transit operations, improve pedestrian and bicycle mobility and enhance public ADA/AAB access. In addition, the EENF/Proposed EIR states that the improvements to intersection operations and enhancements to pedestrian and bicycling infrastructure will lead to a projected decrease of CO2 emissions of approximately 11.8 tons/yr. According to the filing, the emissions reduction was quantified based on traffic operational improvements that are projected to reduce delay and congestion using the Federal Highway Administration (FHWA) Energy and Emissions Reduction Policy Analysis Tool (EERPAT).[3]

Article 97

The project involves the conversion of land (0.56 acres) subject to protection under Article 97 of the amendments to the state constitution and will require temporary construction access easements (30,280± sf) and permanent land acquisition (2,179± sf) and easements (22,590± sf) for the construction of three drainage outfalls, grading, roadway widening, guardrail, overhead utilities, modified rock fill

[3] Climate Change, Air Quality, and Sustainability Analysis Tools | US Department of Transportation

slopes, a wetland replication area, and compensatory flood storage. As noted in the EENF/Proposed EIR, the impacted Article 97 land is located in the overgrown shoulder along Washington Street that is not currently suitable for use by the public and the impacts will not impact the public's ability to access, benefit from, and/or utilize the remainder of the parcels subject to Article 97.

To mitigate for the loss of Article 97 land, Chapter 152 of the Acts of 2024 was signed into law on August 7, 2024 by Governor Healey. This legislation stipulates funding[4] to the Town of Canton to be used to acquire land for conservation or water supply purposes. Pursuant to M.G.L. c. 3, § 5A, a public entity may provide funding in lieu of replacement land if the Secretary of Energy and Environmental Affairs (the Secretary) makes a determination to allow funding in lieu of replacement Article 97 land. This determination was received on July 30, 2024.[5] According to the filing, the Town of Canton shall deposit such sum into its Conservation Law Fund and dedicate it for acquisition of land for conservation purposes. The Town of Canton shall use such funds within 3 years to acquire replacement land.

Any disposition or change in use of Article 97 land or interest in land requires legislative approval and compliance with the EEA Article 97 Land Disposition Policy (the "Policy"). Under new M.G.L. c. 3, § 5A, it also requires notification to the Executive Office of Energy and Environmental Affairs (EEA) with documentation of an alternatives analysis conducted for the transaction and explanation of how it satisfies the EEA's "no net loss" policy. A primary goal of the Policy is to ensure no net loss of Article 97 lands under the ownership and control of the Commonwealth or any political subdivisions thereof. Transfer of ownership or interests therein may occur only under exceptional circumstances, as defined in the Policy, including the determination that no feasible alternative is available, and a minimum amount of land or an interest therein is being disposed for the proposed use. Such a transfer also requires, and has received, legislative authorization by the General Court approved on August 7, 2024.

The Article 97 Policy establishes six criteria for determining when "exceptional circumstances" exist such that a disposition of Article 97 land may be appropriate. The EENF/Proposed EIR detailed the project's compliance with the policy as summarized below.

1. *The Proponent of the disposition must conduct an analysis of alternatives, commensurate with the type and size of the proposed disposition, that achieve the purpose of the disposition without the use of Article 97 land, such as the use of other land available within the appropriate market area.*

As described above, the Preferred Alternative was selected as it accomplishes the need to provide multi-modal accommodations along Washington Street between Charles Avenue in Stoughton and Windsor Woods Lane in Canton. As stated in the EENF/Proposed EIR, the Preferred Alternative also minimizes impacts to Article 97 properties by limiting pedestrian accommodations to one side of Washinton Street as compared to Alternative 2, the only other Alternative that provides multi-modal opportunities for both pedestrians and cyclists. The filing examined alternatives that minimalized impacts to Article 97 land; however, the filings states that these alternatives eliminate pedestrian accommodations (Alternative 3A) or pedestrian and bicycle accommodations (alternative 3B). The

[4] Real Estate appraisals are underway and once finalized, MassDOT will provide funding to the Town of Canton in accordance with the enacted Bill.
[5] Public Lands Preservation Act Tracker Document - Canton, EEA Responses

filings states that Alternative 3A and 3B are infeasible since they would not fulfill MassDOT's Complete Streets and GreenDOT initiatives.

2. *The disposition of the subject parcel and its proposed use may not destroy or threaten a unique or significant resource (e.g., significant habitat, rare or unusual terrain, or areas of significant public recreation).*

As described in the filing, the disposition of land will not destroy or threaten a significant environmental resource. In addition, the permanent and temporary easements and fee takings occur immediately adjacent to the Right-of-Way in areas that are not directly used for public recreation and not characterized as rare or unusual terrain.

3. *Real estate of equal or greater value, and of significantly greater resource value is granted to the disposing agency.*

Chapter 152 of the Acts of 2024 was signed into law on August 7, 2024 by Governor Healey. This legislation stipulates funding to the Town of Canton is to be used to acquire land for conservation or water supply purposes. As noted above, the Proponent received approval to provide funding in lieu of replacement land by the Secretary on July 30, 2024.

4. *The minimum necessary area of Article 97 should be included in the disposition and the existing resources continue to be protected to the maximum extent possible*.

The filing states that the extent of permanent and temporary easements and fee takings have been minimized to the maximum extent feasible while meeting MassDOT's design goals. According to the EENF/Proposed EIR, the easements and takings are necessary for three drainage outfalls, grading, roadway widening, guardrail, overhead utilities, modified rock fill slopes, a wetland replication area, and compensatory flood storage. As noted above, the filing analyzed two alternatives (Alternative 3A and 3B), that further minimalized Article 97 impacts as compared to the Preferred Alternative; however, these alternatives did not meet the project's goals of providing multimodal access to the project site.

5. *The disposition serves an Article 97 purpose or another public purpose without detracting from the mission, plans, policies and mandates of EEA and its appropriate department or division*.

The project serves a public purpose by providing improvements that include traffic signal installation, sidewalk construction, and buffered bicycles lanes. These improvements would bring this section of Washington Street into compliance with the Americans with Disabilities Act, Massachusetts Architectural Access Board guidelines, and MassDOT's Complete Streets and GreenDOT initiatives. As noted above, the impacted Article 97 land is located in the overgrown shoulder along Washington Street that is not currently suitable for use by the public and the impacts will not impact the public's ability to access, benefit from, and/or utilize the remainder of the parcels subject to Article 97.

6. *The disposition is not contrary to the express wishes of the person(s) who donated or sold the parcel or interests to the Commonwealth.*

The EENF/Proposed EIR states that the Town of Canton acquired the properties through fee and takings[6] to serve recreational purposes. The filing states that the disposition of land from the Town of Canton to MassDOT is within the interests of the depositor and the Commonwealth.

Wetlands and Stormwater

As noted above, the project will impact 452 square feet (sf) (300 sf temporary and 152 sf of permanent) of BVW, 880 sf (525 sf temporary and 355 sf permanent) of BLSF and 2,500 sf (2,310 temporary and 190 permanent) of Riverfront Area. The project is providing a 525 sf wetland replication area to replace 152 sf of permanent BVW impacts, resulting in a 3.5:1 replacement to impact ratio. The EENF/Proposed EIR also states that restoration will be provided for the 300 sf of temporary impacts to BVW. The EENF/Proposed EIR states that compensatory flood storage (900 cubic feet) will be provided to replace the loss of 355 cubic feet of permanent flood storage, resulting in a 2.5:1 replacement to impact ratio.

The Stoughton Conservation Commission reviewed the project for its consistency with the Wetlands Protections Act (WPA), the Wetland Regulations (310 CMR 10.00), and associated performance standards, including the Stormwater Management Standards (SMS), and issued an OOC on February 13, 2023; the OOC was not appealed. In addition, a Request for Determination of Applicability was filed on December 6, 2022 with the Canton Conservation Commission under the Massachusetts Wetlands Protection Act (M.G.L. c. 131, s. 40, the Act) and a Negative Determination of Applicability was issued on January 27, 2023.

The project includes the alteration of approximately 4.51 acres of land and the addition of 0.97 acres of impervious area for a total of 3.44 acres on the project site. In order to mitigate the proposed increase in impervious surface cover, the project proposes a closed drainage system comprised of new catch basins equipped with deep sumps and hoods and energy dissipating pads or sediment forebays at the drainage outfalls. The EENF/Proposed EIR states that stormwater generated by the proposed project will be treated, infiltrated, and stored in accordance with the Massachusetts Stormwater Management Standards (SMS). The stormwater system will mitigate peak runoff rates for the current 100-year storm event and provide 80% total suspended solids (TSS) removal. The most current NOAA Atlas 14 precipitation data was used to evaluate peak runoff. Comments from the Massachusetts Water Resources Authority (MWRA) note that MWRA prohibits the discharge of groundwater and stormwater into the sanitary sewer system, pursuant to 360 C.M.R. 10.023(1) except in a combined sewer area when permitted by the Authority and the local municipality. Comments state that the project site has access to storm drains and is not located in a combined sewer area. Therefore, the discharge of groundwater or stormwater to the sanitary sewer system associated with this project is prohibited.

Hazardous Waste

Comments from MassDEP state that there are Bureau of Waste Site Cleanup (BWSC) disposal sites within and near the proposed project area. Comments note that the disposal sites have been closed under the Massachusetts Contingency Plan (MCP); however, given the large project area, it is possible that residual contaminated soil could be encountered during the work that may require notification

[6] These takings accorded between 1894-1930.

and/or the implementation of a Utility Related Release Abatement Measure (URAM) or other mechanism to manage contaminated soil. MassDEP comments state that the Proponent is advised to include within their contingency plan a plan to manage contamination encountered during construction activities that are not related to spills or releases that occur while completing construction. Comments note that the Proponent is advised that if oil and/or hazardous material are identified during the implementation of this project, notification pursuant to the MCP (310 CMR 40.0000) must be made to MassDEP. A Licensed Site Professional (LSP) should be retained to determine if notification is required and, if need be, to render appropriate opinions. MassDEP comments state that a spills contingency plan addressing prevention and management of potential releases of oil and/or hazardous materials from pre- and postconstruction activities should be presented to workers at the site and enforced. The contingency plan should include but not be limited to, refueling of machinery, storage of fuels, and potential on-site activity releases.

MassDEP comments state that the Proponent is advised that the resurfacing of a roadway, resetting curb, modifying drainage, and overhead wire infrastructure may involve pipe repair or replacement. As required by under 310 CMR 7.15(12A) "an owner or operator (including utilities conducting pipe repair or replacement), must conduct a "thorough inspection"[7] to determine the location and amount of any asbestos-containing pipe.

Climate Change

Adaptation and Resiliency

Effective October 1, 2021, all MEPA projects are required to submit an output report from the MA Resilience Design Tool to assess the climate risks of the project. Based on the output report attached to the EENF/Proposed EIR, the project has a "High" exposure rating based on the project's location for the following climate parameters: extreme precipitation (urban flooding) and extreme heat. Based on the 35-year useful life and the self-assessed criticality identified for the project, the MA Resilience Design Tool recommends a planning horizon of 2070 and a return period associated with a 50-year (2% chance) storm event when designing the roadway improvements. The tool recommends planning for the 90th percentile with respect to extreme heat (which indicates an increase in extremely hot days as compared to a historical baseline).

The MA Resilience Design Tool output indicates that the site has a maximum annual daily rainfall exceeding 10 inches within the overall project's useful life, is adding impervious area and is within 100 ft of a waterbody and is removing trees. These factors are indicated in the Tool as contributing to the High exposure for the extreme precipitation (urban flooding) parameter and extreme heat. The EENF/Proposed EIR indicates that the project is adding resiliency through improvements to the stormwater management system, which is designed to provide groundwater recharge and water quality improvements. The EENF/Proposed EIR indicates that the project's storm water system will be able to accommodate the current 100-year storm (24-hour rainfall depth of 8.09"). This is an improvement over existing conditions and almost sufficient to be fully resilient to rainfall depths anticipated for the 2070 50-year storm (identified as 8.3" in the MA Resilience Design Tool). In addition, the project is planting at least five public shade trees within adjacent EJ neighborhoods. I

[7] Please refer to MassDEP's detailed comments for details on what constitutes a "thorough inspection".

encourage the Proponent to maximize opportunities to improve climate resiliency including incorporation of LID techniques and additional tree planting.

Construction Period

Construction on the project is expected to commence in Spring of 2025 and be completed in Winter of 2026. All construction and demolition activities should be managed in accordance with applicable MassDEP's regulations regarding Air Pollution Control (310 CMR 7.01, 7.09-7.10), and Solid Waste Facilities (310 CMR 16.00 and 310 CMR 19.00, including the waste ban provision at 310 CMR 19.017). The project should include measures to reduce construction period impacts (e.g., noise, dust, odor, solid waste management) and emissions of air pollutants from equipment, including anti-idling measures in accordance with the Air Quality regulations (310 CMR 7.11). Comments from MassDEP request that all non-road diesel equipment shall be operated using only ultra-low sulfur diesel (ULSD) with a sulfur content of no greater than 15 ppm pursuant to 40 CFR 80.510. If a piece of equipment is not available in the Tier 4 configuration, then the Proponent should use construction equipment that has been retrofitted with appropriate emissions reduction equipment. Emission reduction equipment includes EPA-verified, CARB-verified, or MassDEP approved diesel oxidation catalysts (DOCs) or Diesel Particulate Filters (DPFs). The Proponent should maintain a list of the engines, their emission tiers, and, if applicable, the best available control technology installed on each piece of equipment on file for Departmental review. Off-road vehicles are required to use ultra-low sulfur diesel fuel (ULSD). Additionally, comments state that a spills contingency plan addressing prevention and management of potential releases of oil and/or hazardous materials from pre- and post-construction activities should be presented to workers at the site and enforced. The plan should include but not be limited to, refueling of machinery, storage of fuels, and potential on-site activity releases. All construction activities should be undertaken in compliance with the conditions of all State and local permits. I encourage the Proponent to reuse or recycle construction and demolition (C&D) debris to the maximum extent.

Mitigation & Section 61 Findings

The EENF/Proposed EIR includes a separate chapter summarizing proposed mitigation measures and includes draft Section 61 Findings. It contains commitments to implement these mitigation measures, identifies the parties responsible for implementation, and includes a schedule for implementation. As described in the EENF/Proposed EIR, the Proponent has committed to implement the following measures to avoid, minimize and mitigate Damage to the Environment:

Environmental Justice

- The project will provide roadway operational and safety improvements near EJ populations.
- The project will improve safety and transit operations, improve pedestrian and bicycle mobility and enhance public ADA/AAB access at the project corridor.
- The stormwater design will result in a reduction of peak flows over existing conditions.
- The project proposes to plant at least 5 new public shade trees within nearby EJ populations.
- The improvements to intersection operations and enhancements to pedestrian and bicycling infrastructure will lead to a projected decrease of CO2 emissions of approximately 11.8 tons/yr.

Traffic and Transportation

- Installation of new buffered bicycle lanes in each direction of vehicular travel.
- Inclusion of a new sidewalk west of the Washington Stret that improves mobility and ADA accessibility for pedestrians.
- Installation of new traffic signage & striping.
- Installation of new guardrail, where required, throughout the project limits.

Wetlands and Stormwater

- Inclusion of a 525± sf Wetland Replication Area to replace 152± sf of permanent BVW impacts, resulting in a 3.5:1 replacement to impact ratio.
- Restoration of temporary 300± sf of BVW impacts will also be provided.
- Compensatory flood storage (900 cubic feet) to replace the loss of 355 cubic feet of permanent flood storage, resulting in a 2.5:1 replacement to impact ratio.
- Restoration of vegetated areas with loam and seed mix.
- Compliance with the SMS and will incorporate Best Management Practices (BMPs) into the design, including catch basins equipped with deep sumps and hoods and energy dissipating pads or sediment forebays at the drainage outfalls.
- The stormwater management system will reduce peak runoff rates for the current 2, 10, and 100-year storm events.

Article 97

- Compliance with requirements of Chapter 152 of the Acts of 2024, which stipulates that funding to the Town of Canton is to be used to acquire land for conservation or water supply purposes as mitigation for the loss of Article 97 land. Pursuant to M.G.L. c. 3, § 5A, a public entity may provide funding in lieu of replacement land if the Secretary decides to allow funding in lieu of replacement Article 97 land. This determination was received on July 30, 2024. Pursuant to this approval, the Town of Canton will deposit the required sum into its Conservation Law Fund and dedicate it for acquisition of land for conservation purposes. Such funds will be used within 3 years to acquire replacement land.
- Compliance with new requirements of new Open Space Act and EEA Article 97 policy, including conducting robust alternatives analysis[8] similar to the one included herein to justify the Article 97 transfer, a finding that the minimum acreage of Article 97 land was used, an analysis that no unique or significant resource is impacted as a result of the transfer, mitigation in the form of funding to the Town of Canton to be used to acquire land for conservation or water supply purposes, a description that the project serves a public interest and is in the interest of the Commonwealth.

[8] Public Lands Preservation Act Tracker Document - Canton, Alternatives Analysis

Climate Change

- The storm water system will be able to accommodate the current 100-year storm (24-hour rainfall depth of 8.09”). (24-hour rainfall depth of 8.09”). This is an improvement over existing conditions and almost sufficient to be fully resilient to rainfall depths anticipated for the 2070 50-year storm (identified as 8.3” in the MA Resilience Design Tool).
- The project is planting at least 5 shade trees.
- The GHG impact assessment for this project has determined that the proposed improvements will result in a decrease in CO2 emissions of 11.8 tons/yr. This decrease will be achieved through improvements in intersection operations and the construction of measures to encourage walking and bicycling.

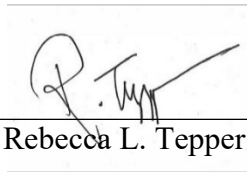
Construction Period

- The project will implement dust control measures during active demolition and construction that will primarily consist of industry best practices such as watering and wetting agents regularly to control and suppress dust.
- A comprehensive sedimentation and erosion control program will be implemented to protect the adjacent Wetland Resource Areas from sedimentation during the proposed construction activities.
- Conform to MassDOT standards and guidelines and abide by the Massachusetts 5-minute idling law for any equipment not actively engaged in construction activities.
- Install emission control devices in all off-road vehicles in accordance with MassDOT’s Revised Diesel Retrofit Specification, or technology must be used for non-road diesel powered construction equipment in excess of 50 horsepower on MassDOT job sites.
- Comply with the MassDOT Noise Policy and Procedures and 23 CFR 772 Procedures for Abatement of Highway Traffic and Construction Noise.
- Implement a comprehensive traffic control plan.
- Detours will be required only during full depth excavation and retaining wall construction.
- Provide temporary ramps for pedestrians.

Conclusion

Based on a review of the EENF and Proposed EIR and consultation with Agencies, I find that the Proposed EIR meets the standard for a Rollover EIR under 301 CMR 11.06(13)-(14). Accordingly, I will publish notice in the next Environmental Monitor that the Proposed EIR shall be reviewed as a Final EIR pursuant to the provisions at 11.06(14); the Final EIR shall be subject to a 30- day public comment period.

November 29, 2024
Date



Rebecca L. Tepper

Comments received:

11/22/2024	Massachusetts Department of Environmental Protection (MassDEP) Southeast Regional Office (SERO)
11/22/2024	Massachusetts Water Resources Authority (MWRA)

RLT/NSP/nsp

MASSACHUSETTS WATER RESOURCES AUTHORITY
Deer Island
33 Tafts Avenue
Boston, MA 02128

Frederick A. Laskey
Executive Director

Telephone: (617) 242-6000
Fax: (617) 788-4899
TTY: (617) 788-4971

November 22, 2024

Rebecca Tepper, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge St, Suite 900
MEPA Office, Nicholas Perry
Boston, MA 02114

Subject: EOEEA #16886 – Expanded Environmental Notification Form
Washington Street Corridor Improvements,
Stoughton and Canton, MA

Dear Secretary Tepper,

The Massachusetts Water Resources Authority (MWRA) appreciates the opportunity to comment on the Expanded Environmental Notification Form (EENF) submitted by the Massachusetts Department of Transportation - Highway Division (MassDOT) (the "Proponent") for Washington Street Corridor Improvements (the "Project") in Stoughton and Canton, Massachusetts. The Proponent proposes traffic, safety, and mobility improvements along Washington Street between Charles Avenue in Stoughton and Windsor Woods Lane in Canton, as well as portions of York Street. Designed as a Complete Street, the Project includes reconstruction and cross section modifications to Washington Street, improved traffic operations, new pedestrian and bicycle accommodations that provide new multi-model connections, and improved stormwater management. These improvements are aligned with MassDOT's sustainability initiative known as GreenDOT. The existing drainage, water, sewer, and utility pole modifications are also proposed within the Project limits.

MWRA's comments on this EENF relate to Toxic Reduction and Control (TRAC) discharge permitting.

TRAC Discharge Permitting

MWRA prohibits the discharge of groundwater and stormwater into the sanitary sewer system, pursuant to 360 C.M.R. 10.023(1) except in a combined sewer area when permitted by the Authority and the local municipality. The Project Site has access to storm drains and is not located in a combined sewer area. Therefore, the discharge of groundwater or stormwater to the sanitary sewer system associated with this Project is prohibited.

On behalf of the MWRA, thank you for the opportunity to provide comments on this Project. Please do not hesitate to contact Hillary Monahan of my staff at (857) 324-0554 or Hillary.Monahan@mwra.com with any questions or concerns.

Sincerely,

Colleen C. Rizzi

Colleen Rizzi, P.E.
Director
Environmental and Regulatory Affairs

cc: George Zoto, MassDEP

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

Maura T. Healey
Governor

Kimberley Driscoll
Lieutenant Governor

Rebecca L. Tepper
Secretary

Bonnie Heiple
Commissioner

November 22, 2024

Rebecca L. Tepper
Secretary of Energy and Environment
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
ATTN: MEPA Office
Boston, MA 02114

RE: EENF Review.#16886. STOUGHTON CANTON. Washington Street Corridor Improvements Project at Washinton St./York St. from Charles Ave. to Windsor Woods Lane

Dear Secretary Tepper,

The Southeast Regional Office of the Department of Environmental Protection (MassDEP) has reviewed the Expanded Environmental Notification Form (EENF) for the Washington Street Corridor Improvements Project at Washinton St./York St. from Charles Avenue (Stoughton). to Windsor Woods Lane (Canton), Stoughton and Canton, Massachusetts (EOEEA #16886). The Project Proponent provides the following information for the Project:

The Proponent, Massachusetts Department of Transportation-Highway Division (MassDOT), proposes traffic, safety, and mobility improvements along Washington Street between Charles Avenue in Stoughton and Windsor Woods Lane in Canton, and portions of York Street. Designed as a Complete Street, the project includes reconstruction and cross section modifications to Washington Street, improved traffic operations, new pedestrian and bicycle accommodations that provide new multi-modal connections, and improved stormwater management. These improvements are aligned with MassDOT's sustainability initiative known as GreenDOT, which promotes the healthy transportation modes of walking, bicycling, and public transit, and supportive smart growth development. Existing drainage, water, sewer, and utility pole modifications are also proposed within the project limits. Specifically, the project includes:

- **Reconstruction of roadways with new pavement by milling and overlay and full depth pavement;**
- **Minor widening along roadways as necessary to provide bicycle accommodations on each direction of vehicular travel via on-street buffered bicycle lanes;**

- **Resurfacing of roadway, resetting curb, modifying drainage, sewer, water, and overhead wire infrastructure within the project limits;**
- **Construction of Americans with Disabilities Act (ADA)/Architectural Access Board (AAB) compliant accessible sidewalks and pedestrian ramps to improve pedestrian accommodations along the entire project (sidewalks on east and west side of Washington Street south of York Street intersection and sidewalk on west side of Washington Street north of York Street intersection);**
- **Restoration of vegetated areas with loam and seed mix;**
- **Planting of 5 new shade trees within the project limits;**
- **Installation of new traffic signage & striping;**
- **Installation of new guardrail, where required, throughout the project limits;**
- **A new traffic signal at the York Street intersection;**
- **Improved stormwater management;**
- **Funding to the Town of Canton to acquire land for conservation or water supply purposes (Attachment E), Chapter 152 of the Acts of 2024 (H3937));**
- **A 525± sf Wetland Replication Area to replace 152± sf of permanent BVW impacts, resulting in a 3.5:1 replacement to impact ratio. Restoration of temporary 300± sf of BVW impacts will also be provided; and • Compensatory flood storage (900 cubic feet) to replace the loss of 355 cubic feet of permanent flood storage, resulting in a 2.5:1 replacement to impact ratio.**

Bureau of Water Resources (BWR) Comments

Wetlands. An Order of Conditions (File No. 298-0880) was issued for this Project on February 13, 2023, and was not appealed to or by the Department. The Proponent has received a negative Determination of Applicability (File No. 136-23) on January 27, 2023 from the Canton Conservation Commission. No further comments from SERO Wetlands Program.

Waterways. Pursuant to the Department's internal review, no work appears within a geographic area subject to jurisdiction pursuant to Chapter 91 and its regulations at 310 CMR 9.00.

National Pollutant Discharge Elimination System (NPDES) Construction General Stormwater Permit. The Project construction activities are scheduled to disturb more than an acre of land and therefore may require a NPDES Stormwater Permit for Construction Activities. The Proponent can access information regarding the NPDES Stormwater requirements and an application for the Construction General Permit by completing and submitting a Notice of Intent (NOI) to EPA via the Stormwater Discharges from Construction Activities | National Pollutant Discharge Elimination System (NPDES) | US EPA. The Proponent has acknowledged the need to file for coverage under this permit.

The Proponent is advised to consult with Margarita Chatterton at Chatterton.Margarita@epa.gov or by phone at 601-918-1034 for questions regarding EPA's NPDES Construction General Permit requirements.

In addition, the Proponent is reminded that local Planning Boards (and/or

other local authorities) may require stormwater controls beyond that of the Wetlands protection Act. These controls are usually created to keep stormwater onsite so as not to create nuisance conditions offsite.

Bureau of Waste Site Cleanup (BWSC) Comments

Based upon the information provided, the Bureau of Waste Site Cleanup (BWSC) searched its databases for disposal sites and release notifications that have occurred at or might impact the proposed Project area. A disposal site is a location where there has been a release to the environment of oil and/or hazardous material that is regulated under M.G.L. c. 21E, and the Massachusetts Contingency Plan [MCP – 310 CMR 40.0000].

Please be advised that there are listed BWSC disposal sites located within and near the proposed Project area. The disposal sites have been closed under the MCP; however, given the large Project area, it is possible that residual contaminated soil could be encountered during the work that may require notification and/or the implementation of a Utility Related Release Abatement Measure (URAM) or other mechanism to manage contaminated soil. Please refer to the paragraph below for additional information pertaining to discovery of contamination. The Project Proponent is also advised to include within their contingency plan a plan to manage contamination encountered during construction activities that are not related to spills or releases that occur while completing construction.

Interested parties may view a map showing the location of BWSC disposal sites using the MassGIS data viewer at MassMapper. Under the Available Data Layers listed on the right sidebar, select "Regulated Areas", and then "DEP Tier Classified 21E Sites". MCP reports and the compliance status of specific disposal sites may be viewed using the BWSC Waste Sites/Reportable Release Lookup at: https://eeaonline.eea.state.ma.us/portal/dep/wastesite/.

The Proponent is advised that if oil and/or hazardous materials are encountered during the modification of utilities to support reconstruction addressing contamination might be accomplished using the Utility -Related Abatement Measures provisions at 310 CMR 40.0461 through 40.0469.

The Project Proponent is advised that if oil and/or hazardous material are identified during the implementation of this Project, notification pursuant to the Massachusetts Contingency Plan (310 CMR 40.0000) must be made to MassDEP, if necessary. A Licensed Site Professional (LSP) should be retained to determine if notification is required and, if need be, to render appropriate opinions. The LSP may evaluate whether risk reduction measures are necessary if contamination is present. The BWSC may be contacted for guidance if questions arise regarding cleanup.

Spill Prevention and Control. A spills contingency plan addressing prevention and management of potential releases of oil and/or hazardous materials from pre- and post-construction activities should be presented to workers at the site and enforced. The contingency plan should include but not be limited to, refueling of machinery, storage of fuels, and potential on-site activity releases.

The Project Proponent is advised that if contaminated media is encountered a Licensed Site Professional (LSP) must be employed or engaged to manage, supervise or actually perform the necessary response actions at the site for excavating, removing and/or disposing of contaminated soil or contaminated media (which includes contaminated sediment) must be conducted under the provisions of Massachusetts General Law Chapter 21E (and, potentially, c.21C) and all other applicable federal (including the Environmental Protection Agencies Toxic Substance Control Act - TSCA), state, and local laws, regulations, and bylaws. Contaminated media cannot be managed without prior submittal of appropriate plan to MassDEP (such as a Release Abatement Measure (RAM) Plan), which describes the proposed handling and disposal approach for any contaminated media encountered and health and safety precautions for those conducting the work. If contamination at the site is known or suspected, the appropriate tests should be conducted well in advance of the start of construction and professional environmental consulting services should be readily available to provide technical guidance to facilitate any necessary permits.

Bureau of Air and Waste (BAW) Comments

Air Quality. Construction and operation activities shall not cause or contribute to a condition of air pollution due to dust, odor, or noise. To determine the appropriate requirements please refer to:

- 310 CMR 7.09 Dust, Odor, Construction, and Demolition
- 310 CMR 7.10 Noise

Construction-Related Measures.
The Project Proponent reports: "MassDOT aims to reduce greenhouse gas emissions; promote the healthy transportation options for walking, bicycling, and public transit; and support smart growth and development whenever possible."

"The Project has been designed to conform to all MassDOT standards and guidelines pertaining to construction equipment and emissions. Contractor specifications will require that the contractor comply with the provisions of MGL Chapter 90 Section 16A and the DEP Anti-Idling Regulations (310 CMR 7.11(b)) which prohibit unnecessary engine idling and require that engines be shut down if the vehicle will be stopped for more than five minutes, i.e., will abide by the Massachusetts 5-minute idle law. Furthermore, MassDOT requires that contractors install emissions control devises in all off-road vehicles. MassDOT's Revised Diesel Retrofit Specifications states that emissions control standards must be met, or technology must be used for non-road diesel powered construction equipment in excess of 50 horsepower on MassDOT job sites."

MassDEP requests that all non-road diesel equipment rated 50 horsepower or greater meet EPA's Tier 4 emission limits, which are the most stringent emission standards currently available for off-road engines. If a piece of equipment is not available in the Tier 4 configuration, then the Proponent should use construction equipment that has been retrofitted with appropriate emissions reduction equipment. Emission reduction equipment includes EPA-verified, CARB-verified, or MassDEP-approved diesel oxidation catalysts (DOCs) or Diesel Particulate Filters (DPFs). The Proponent should maintain a list of the engines, their emission

tiers, and, if applicable, the best available control technology installed on each piece of equipment on file for Departmental review. The Proponent has acknowledged this requirement in the EENF

MassDEP reminds the Proponent that unnecessary idling (i.e., in excess of five minutes), with limited exception, is not permitted during the construction and operations phase of the Project (Section 7.11 of 310 CMR 7.00). Regarding construction period activity, typical methods of reducing idling include driver training, periodic inspections by site supervisors, and posting signage. In addition, to ensure compliance with this regulation once the Project is occupied, MassDEP requests that the Proponent install permanent signs limiting idling to five minutes or less on-site.

Asbestos-Concrete Pipes: The Project Proponent is advised that the "Resurfacing of a roadway, resetting curb, modifying drainage, and overhead wire infrastructure may involve pipe repair or replacement. As required by under 310 CMR 7.15(12A) "an owner or operator (including utilities conducting pipe repair or replacement), must conduct a "thorough inspection" to determine the location and amount of any asbestos-containing pipe. A "thorough inspection" shall be satisfied by one of the following three options:

- Document Review: The owner or operator shall review as-built plans or other documents identifying the content of particular cement pipes or pipe segments and any other material in the conduit that may be affected by a removal or repair project, provided that the documentation has been updated to reflect any repairs or alterations. "Other documents" may include analytical results from bulk sampling and asbestos analysis using an EPA-approved method, a manufacturer's Safety Data Sheet for the product as actually installed, or other irrefutable identifying information.
- Visual Observation: A person who has successfully completed a DLS-approved training course specific to asbestos cement pipe worker safety (e.g., the "8 hour OSHA Class II Asbestos Training: Asbestos Cement Pipe (ACP) Worker Safety" course) or another course similar in length and content that has been reviewed and approved in writing by DLS shall conduct a visual identification through field observations of the pipe to be worked on (e.g., the manufacturer's brand-label markings indicating transite material or July 2019 Update Page 5 of 20 the source of the pipe).
- Presumption of Asbestos Containing Material: The owner or operator may presume that a pipe or pipe segment contains asbestos and manage any repairs or removals in accordance with this guidance and 310 CMR 7.15(12A). If the pipe or pipe segment is not identified as asbestos cement pipe by one of the options listed above, then the owner or operator shall comply with the requirements of 310 CMR 7.15(4) by performing a survey if the pipe contains suspect asbestos-containing material

If the pipe or pipe segment is not identified as asbestos cement pipe by one of the options listed above, then the owner or operator shall comply with the requirements of 310 CMR 7.15(4) by performing a survey if the pipe contains suspect asbestos-containing material.

Guidance on asbestos-cement pipe replacement can be found at the MassDEP website https://www.mass.gov/doc/asbestos-cement-pipe-guidance-document-2019/download

or by contacting Colleen Ferguson at Colleen.Ferguson@mass.gov or by phone at 617-680-6657.

Solid Waste Management. The EENF states "MassDOT currently uses a range of recycled materials in pavement, including recycled asphalt pavement, recycled tires, and shingles, as well as warm mix asphalt. MassDOT is working to increase the use of environmentally friendly technologies and continues to conduct research so that it can maximize the use of recycled materials in warm-mix asphalt paving. The solid waste generated from this Project will include, but is not limited to asphalt pavement, concrete, and wood. The disposal of these items will be conducted in accordance with all local, state, and federal laws."

Given this information, the Project Proponent is advised of the following requirements:

1. *Reuse of any material associated with the Project requires submittal of MassDEP's BWP SW41 – Beneficial Use Determination* – Restricted Applications. The permit is intended to protect public health, safety, and the environment by comprehensively regulating the reuse of waste materials as effective substitutes for a commercial product or commodity. Information pertaining to this requirement is available at https://www.mass.gov/doc/instructions-sw-39-40-41-42-beneficial-use-determinations/download.

2. *Compliance with Waste Ban Regulations*: Waste materials discovered during construction that are determined to be solid waste (e.g., construction and demolition waste) and/or recyclable material (e.g., metal, asphalt, brick, and concrete) shall be disposed, recycled, and/or otherwise handled in accordance with the Solid Waste Regulations including *310 CMR 19.017: Waste Bans*. Waste Ban regulations prohibit the disposal, transfer for disposal, or contracting for disposal of certain hazardous, recyclable, or compostable items at solid waste facilities in Massachusetts, including, but not limited to, metal, wood, asphalt pavement, brick, concrete, and clean gypsum wallboard. The goals of the waste bans are to: promote reuse, waste reduction, or recycling; reduce the adverse impacts of solid waste management on the environment; conserve capacity at existing solid waste disposal facilities; minimize the need for construction of new solid waste disposal facilities; and support the recycling industry by ensuring that large volumes of material are available on a consistent basis. Further guidance can be found at: https://www.mass.gov/guides/massdep-waste-disposal-bans.

   MassDEP recommends the Proponent consider source separation or separating different recyclable materials at the job site. Source separation may lead to higher recycling rates and lower recycling costs. Further guidance can be found at: https://recyclingworksma.com/construction-demolition-materials-guidance/.

   For more information on how to prevent banned materials from entering the waste stream the Proponent should contact the RecyclingWorks in Massachusetts program at (888) 254-5525 or via email at info@recyclingworksma.com. RecyclingWorks in Massachusetts also provides a website that includes a searchable database of recycling service providers, available at http://www.recyclingworksma.com.

3. *Tree removal/land clearing:* As defined in 310 CMR 16.02, clean wood means "discarded material consisting of trees, stumps and brush, including but limited to sawdust, chips, shavings, bark, and new or used lumber"…etc. Clean wood does not include wood from commingled construction and demolition waste, engineered wood products, and wood containing or likely to contain asbestos, chemical preservatives, or paints, stains or other coatings, or adhesives. The Proponent should be aware that wood is not allowed to be buried or disposed of at the Site pursuant to 310 CMR 16.00 & 310 CMR 19.000 unless otherwise approved by MassDEP. Clean wood may be handled in accordance with 310 CMR 16.03(2)(c)7 which allows for the on-site processing (i.e., chipping) of wood for use at the Site (i.e., use as landscaping material) and/or the wood to be transported to a permitted facility (i.e., wood waste reclamation facility) or other facility that is permitted to accept and process wood.

If you have any questions regarding the Solid Waste Management Program comments above, please contact Michelle McCloud at Michelle.McCloud@mass.gov or Mark Dakers at Mark.Dakers@mass.gov for solid waste comments.

The Project Proponent is advised that the "Resurfacing of a roadway, resetting curb, modifying drainage, and overhead wire infrastructure may involve pipe repair or replacement. As required by under 310 CMR 7.15(12A) "an owner or operator (including utilities conducting pipe repair or replacement), must conduct a "thorough inspection" to determine the location and amount of any asbestos-containing pipe. A "thorough inspection" shall be satisfied by one of the following three options:

- Document Review: The owner or operator shall review as-built plans or other documents identifying the content of particular cement pipes or pipe segments and any other material in the conduit that may be affected by a removal or repair project, provided that the documentation has been updated to reflect any repairs or alterations. "Other documents" may include analytical results from bulk sampling and asbestos analysis using an EPA-approved method, a manufacturer's Safety Data Sheet for the product as actually installed, or other irrefutable identifying information.
- Visual Observation: A person who has successfully completed a DLS-approved training course specific to asbestos cement pipe worker safety (e.g., the "8 hour OSHA Class II Asbestos Training: Asbestos Cement Pipe (ACP) Worker Safety" course) or another course similar in length and content that has been reviewed and approved in writing by DLS shall conduct a visual identification through field observations of the pipe to be worked on (e.g., the manufacturer's brand-label markings indicating transite material or July 2019 Update Page 5 of 20 the source of the pipe).
- Presumption of Asbestos Containing Material: The owner or operator may presume that a pipe or pipe segment contains asbestos and manage any repairs or removals in accordance with this guidance and 310 CMR 7.15(12A). If the pipe or pipe segment is not identified as asbestos cement pipe by one of the options listed above, then the owner or operator shall comply with the requirements of 310 CMR 7.15(4) by performing a survey if the pipe contains suspect asbestos-containing material

Guidance can be found at the MassDEP website https://www.mass.gov/doc/asbestos-cement-pipe-guidance-document-2019/download
or by contacting Colleen Ferguson at Colleen.Ferguson@mass.gov or by phone at 617-680-6657.

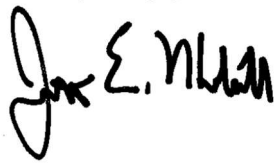
Proposed s.61 Findings

The "Certificate of the Secretary of Energy and Environmental Affairs on the Expanded Environmental Notification Form" may indicate that this Project requires further MEPA review and the preparation of an Environmental Impact Report. Pursuant to MEPA Regulations 301 CMR 11.12(5)(d), the Proponent will prepare Proposed Section 61 Findings to be included in the EIR in a separate chapter updating and summarizing proposed mitigation measures. In accordance with 301 CMR 11.07(6)(k), this chapter should also include separate updated draft Section 61 Findings for each State agency that will issue permits for the Project. The draft Section 61 Findings should contain clear commitments to implement mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation.

Other Comments/Guidance

The MassDEP Southeast Regional Office appreciates the opportunity to comment on this EENF. If you have any questions regarding these comments, please contact George Zoto at George.Zoto@mass.gov or Jonathan Hobill at Jonathan.Hobill@mass.gov.

Very truly yours,



Jonathan E. Hobill,
Regional Engineer,
Bureau of Water Resources

JH/GZ

Cc: DEP/SERO

ATTN: Gerard Martin, Regional Director
John Handrahan, Deputy Regional Director, BWSC
Seth Pickering, Deputy Regional Director, BAW
Jennifer Viveiros, Deputy Regional Director, ADMIN
Maissoun Reda, Chief, Wetlands, BWR
Whitney McClees, Wetlands, BWR
Brendan Mullaney, Chief, Waterways, BWR
Carlos Fragata, Waterways, BWR
Mark Dakers, Chief, Solid Waste, BAW
Jeffrey Hunter, Solid Waste, BAW

Jennifer Wharff, Solid Waste, BAW
Michelle McCloud, Solid Waste, BAW
Colleen Ferguson, Chief, Asbestos, BAW
Mark Poudrier, Chief, Air/Operating Permits, BAW
Christopher Redus, Air/Operating Permits, BAW
Angela Gallagher, Chief, Site Management, BWSC
Amanda Cantara, Site Management, BWSC

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DOCUMENT A00892

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS ON THE EXPANDED ENVIRONMENTAL NOTIFICATION FORM AND PROPOSED ENVIRONMENTAL IMPACT REPORT

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Nitsch Engineering

STORMWATER REPORT

Complies with Department of Environmental Protection Stormwater Standards

Project Name:	Route 138 (Washington Street) Corridor Improvements Stoughton, MA
Project Location:	Route 138 Washington Street – Stoughton, MA
Prepared for:	Town of Stoughton
MassDOT Project #:	#607403
Nitsch Project #:	9720.16
Date Prepared:	December 13, 2022

NITSCH PROJECT # 9720.16

COMMONWEALTH OF MASSACHUSETTS
MATTHEW J. SOLTYS
CIVIL
No. 53326
REGISTERED PROFESSIONAL ENGINEER

12-13-2022

ATTACHMENTS

Attachment A: **Precipitation and Stormwater Management Standards Documentation**

MassDEP Checklist for Stormwater Report
Standard 10: Illicit Discharge Compliance Statement

Attachment B: **Closed Drainage System Design**
Drainage Plans
Drainage Analyses & Drainage Catchment Areas
TSS Removal Calculation Worksheets (Form S4-C)

Attachment C: **Long-Term Pollution Prevention – Stormwater Operation and Maintenance Plan**

Attachment D: **Soil Investigations – Geotechnical Report & NRCS Soil Map**

Introduction	Nitsch Engineering has prepared this Stormwater Report to support the Notice of Intent (NOI) application for the Route 138 (Washington Street) Corridor Improvements Project (the Project) in Stoughton, Massachusetts. The Massachusetts Department of Transportation (MassDOT) – Highway Division is the proponent and Owner of the Project. The Project limits extend along Route 138 from Windsor Woods Lane (just north of the Town of Canton municipal boundary) to Lincoln Street. The Project is being proposed as a complete street and includes reconstruction and cross section modifications to Route 138. The Project will enhance traffic operations, increase safety, and provide pedestrian and bicycle accommodations. The Project will be a complete street including continuous sidewalks and separated bicycle lanes on both sides of the roadway. The Project will reconstruct the two (2) signalized intersections (at Stop & Shop and Central Street), install a new signal system at the intersection of York Street, and relocate utility poles. The Project scope consists of milling and overlay of existing pavement, limited roadway widening, adding turning lanes, new pavement markings, sidewalk reconstruction, drainage improvements, utility modifications, and traffic signal and signage replacement. The Project will provide for pedestrian accommodations on both sides of Route 138, except between York Street and the Canton Townline, where a sidewalk is being proposed on the west side only. Bicycle accommodations are being provided with buffered bike lanes on both sides of Route 138. The Project is considered to be a redevelopment project under Standard 7 of the Stormwater Standards. The Project will be modifying the existing roadway to improve safety by adding bicycle lanes and new sidewalks within the project limits. This Stormwater Report provides calculations only for the proposed drainage system that is discharged to the wetlands on either side of Route 138, north of York Street, as it pertains to the NOI. The remaining project's drainage system proposes to modify the existing closed drainage system to match the new roadway geometry, retaining the existing outfall locations and is discussed for reference.
EXISTING STORMWATER CONDITIONS	
Existing Drainage Infrastructure	There is no closed drainage system that exists directly adjacent to the wetland areas. There are two (2) paved swales, on either side of Route 138, that direct roadway runoff directly down the steep embankment to the wetlands. There are two (2) existing catch basins along the roadway that are assumed to outlet directly to the slope, however no outfalls were observed. Some country drainage is located along this portion of the roadway. Roadway runoff is primarily routed to flow away from the roadway to the adjacent properties. Below is a table showing the existing discharge points near the resource areas.

Existing Drainage Infrastructure (Continued)

Table 1: Existing Drainage Discharge Points

Existing Location	Impervious Area (SF)	Pervious Area (SF)	Total Contributing Area (SF)
22+30 Left – Paved/rock lined swale & Catch Basin	10,285	2,550	12,835
22+25 Right – Catch Basin	12,190	8,300	20,490
24+35, Left – Paved Swale & Catch Basin	15,270	11,400	26,670
24+60, Right – Paved Swale & Catch Basin	15,755	28,890	44,645

Near the northerly project limits, in Canton, an existing closed drainage system captures runoff from Route 138 at Windsor Woods Lane and outlets to Beaver Meadow Brook crossing Route 138, approximately 200 feet north of Windsor Woods Lane.

Multiple closed drainage systems are present along Route 138, beginning at Charles Avenue to the southerly limits at Lincoln Street. These closed drainage systems capture runoff via catch basins and are conveyed in concrete pipes to outlets noted below. Currently there are no water quality Best Management Practices (BMPs) or Water Quality Structures on the site other than deep sumps in some of the catch basin structures. Most of the existing drainage structures do not appear to have deep sumps/hoods. Outlets are as follows:

- Route 138 (Charles Avenue to Central Street): Drainage system flows south along Route 138, then westerly along Central Street. Drainage discharges to a location south of Central Street, approximately 900 feet west of Route 138;
- Route 138 (Central Street to Phillips Avenue): Drainage system flows south to a cross country pipe system opposite of 438 Washington Street. The closed drainage continues to an outlet south of Central Street, approximately 900 feet west of Route 138; and
- Route 138 (Phillips Avenue to Lincoln Street): Closed drainage systems outlet in wooded area west of Route 138, near 549 Washington Street.

Onsite Soil Investigations

Soil testing has not been completed for the drainage design. Soil borings were performed for the geotechnical design. A copy of the geotechnical report is included in Attachment D. Based on the soil borings performed within the area (SB1 – SB2, MA1 & MA2), the existing soils were found to be fill over sand/gravel, with assumed hydraulic soil rating A, consistent with the Natural Resources Conservation Service (NRCS) soil information – see below.

NRCS Soils

NRCS information was used for the drainage design – see Soil Maps in Attachment D. Soils onsite include:

- Charlton-Hollis-Rock Outcrop complex – No Rating;
- Hinckley loamy sand – Hydraulic Soil Rating A;
- Merrimac fine sandy loam – Hydraulic Soil Rating A;
- Pits, sand, and gravel – No Rating; and
- Udorthents, sandy – Hydraulic Soil Rating A.

See **Attachment D** for locations of soil on the site.

FEMA Flood Zone	The southern section of the Project on Washington Street (Route 138) falls within the 0.2% Annual Chance of Flooding Federal Emergency Management Agency (FEMA) National Flood Zone. Milling and overlay with sidewalk construction is proposed with no major grade changes are planned within this portion of the project. A Zone AE is shown on the FEMA Flood Insurance Rate Maps (FIRM) at the northern end of the Project on the eastern side of the roadway, just outside of the State Layout. The elevation associated with this AE Floodplain is 182.6 feet. There is no proposed work at this elevation or impacts within the Zone AE near the north portion of the project. Based on the FEMA FIRM, the same Zone AE continues southerly near the intersection of Washington Street and York Street. The elevation associated with this area is 187 feet. The proposed compost mulch, loam and seed slope impacts approximately 500 cubic feet of Zone AE. The project proposes approximately 900 cubic feet of compensatory storage.
Wetland Resource Areas	Two (2) wetland areas are located just north of the intersection of York Street and Route 138, on both sides of the roadway. Proposed work falls within the wetland area on the east side only. Proposed work occurs within the 100-foot wetland buffer zone of both wetlands and the 200-foot Riverfront Area associated with Beaver Meadow Brook. Proposed wetland impacts of 152 Square Feet (SF) are required for revised slope construction along the east side of Route 138. A wetland replication area totaling 525 SF is proposed. Proposed work within the buffer zone and Riverfront Area includes sidewalk reconstruction, roadway widening and resurfacing, and a proposed compost mulch rock slope directly adjacent to the wetland. Wetland areas, related to Beaver Meadow Brook crossing Route 138, are also located just north of project limits in Canton. Proposed work only occurs within the 100-foot wetland buffer zone and the 200-foot Riverfront Area associated with Beaver Meadow Brook. No impacts to these wetlands are proposed.
PROPOSED CONDITIONS	
Project Description	The Project's purpose is to enhance safety and mobility for all modes of transportation. MassDOT is proposing vehicular safety and mobility improvements along Route 138 (Washington Street) in Stoughton. The Project limits extend from Windsor Woods Lane in Canton (just north of its Townline with the Town Canton) to just south of Lincoln Street. The Project is being proposed as a complete street and includes reconstruction and cross section modifications to Route 138. The Project will enhance traffic operations, increase safety, and provide pedestrian and bicycle accommodations. New sidewalks and bicycle accommodations are proposed along the corridor, providing new multimodal connections. Included as part of the roadway project is improving the closed drainage system. Existing drainage, water, sewer, and utility pole modifications are also proposed within the Project limits. The proposed Project improvements include the following: • Reconstruct roadways with a new pavement by milling and overlay; • Minor widening along roadways as necessary to provide bicycle accommodations via buffered bicycle lanes; • Resurface the roadway, reset curb, modify drainage, sewer, water, and overhead wire infrastructure within the Project limits; • Construct Americans with Disabilities Act (ADA)/Architectural Access Board (AAB) compliant accessible sidewalks and pedestrian ramps to improve pedestrian accommodations along the entire Project; • Restore vegetated areas with loam and seed mix; • Install new traffic signage and striping; • Install new guardrail, where required, throughout the Project limits;

Project Description (Continued)

- New traffic signal at the York Street intersection; and
- Traffic signal replacement/upgrades at Stop & Shop driveway and Central Street intersections.

The existing closed drainage system, where present, is being retained and modified to accommodate the proposed improvements. Where existing closed drainage exists south of York Street (33+11 to 75+75), it is being retained and modified to accommodate the new roadway geometry and the existing outfall locations (outside of the Project limits) are being retained. Near the York Street intersection with Washington Street, there is no existing closed drainage system. Paved swales and existing catch basins outlet directly to the vegetated areas/wetlands. A new closed drainage system with deep sump catch basins and outlets are proposed near York Street to capture and treat the collected runoff. Outlets are proposed to have stone energy dissipation pads. Outlet #8, the one near the vernal pool is proposed to have a sediment forebay. The catch basins will continue via pipe to the flared end sections on the roadway slopes. There are four (4) proposed outlets to convey the runoff from Route 138 between the two (2) roadway high points at Station 18+67 to 33+11. The table below shows the proposed drainage areas contributing to each proposed outfall location.

Table 2: Contributing Areas at Proposed Outfall Locations

Outfall Location	Proposed Impervious Area (SF)	Proposed Pervious Area (SF)	Total Contributing Area (SF)
#8 – STA 21+10, Right	11,550	3,065	14,615
#15 – STA 22+72, Left	15,900	0	15,900
#19 – STA 24+73, Left	11,675	8,710	20,385
#23 – STA 25+52, Left	42,360	11,865	54,225

Land Use Table

Table 3. Proposed vs. Existing Land Use (in square feet)

Land Use	Existing (SF)	Proposed (SF)	Change
Roadway	53,500	57,118	+3,618
Sidewalks	0	9,930	+9,930
Bicycle Lanes	0	14,963	+14,963
Vegetated/Pervious	51,663	23,152	-28,511
Total	105,163	105,163	---

Table 3 shows the change in cover along Route 138 for the drainage contributary area that outfalls near the resource areas. As shown in Table 3, there is a 27% decrease in the total pervious area. This is mostly due to the addition and construction of new sidewalks and bicycle lanes that are required by MassDOT's Healthy Transportation Policy. The existing roadways are lacking sidewalks and bicycle lanes. The increase in impervious area from the roadway is from minor roadway widening to provide a consistent cross section along the Project roadway. The increase in impervious areas of the roadway is 7%.

STORMWATER MANAGEMENT ANALYSIS	
Stormwater Analysis	The proposed improvements provide an opportunity to install a new stormwater management system that meets Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards to the maximum extent practicable. Although there is an increase in impervious area due to additional sidewalks and bicycle lanes, the Project proposes to improve the overall drainage system by installing new deep sump catch basins (hoods for catch basis that outlet to the vernal pool), eliminating catch basin outlets, and providing energy dissipation at outfalls. The Project is constrained due to lack of space (existing ROW, close proximity of buildings, urban context, steep topography), wetlands, and existing utilities within the roadway. The existing paved swales and catch basin outlets along the wetland areas are being replaced with a new closed drainage system. The closed drainage system is proposed to have deep sump catch basins and four (4) outfalls. Hoods are proposed within the three (3) catch basins that discharge to the outfall near the vernal pool (#7459) Stone at the pipe ends is proposed at the four (4) outfall locations; the stone pads were sized based on the peak flow rate for the 10-year storm. Where the existing steep slope is impacted due to the roadway widening, a new loam and seed slope with a partial compost and seed modified rockfill slope is proposed. The partially vegetated slope will promote vegetation growth. A 2:1 slope is proposed to limit impacts to the wetlands.
MASSDEP STORMWATER MANAGEMENT STANDARDS	
Standard 1	**No New Untreated Discharges:** This Project is considered a Redevelopment Project under Standard 7 and has been designed to comply with Standard 1. The Project will not create any new untreated outfalls as part of the proposed improvements. Stormwater runoff from the Project roadway will be collected in a closed drainage system via deep sump catch basins and treated to the maximum extent practicable. The closed drainage system proposes four (4) new outfall locations with stone energy dissipation pads. The stone pads have been designed and sized to accommodate a 10-year storm event peak flow. The outlets will be established on steep down slopes, near the wetlands. These outfalls will replace the direct runoff discharge from the existing paved swales. The proposed outfalls are designed at an angle along the slope so the flow path distance to the resource area is maximized. A sediment forebay is proposed for the drainage outlet on the west side of the roadway, closest to the vernal pool.
Standard 2	**Peak Rate Attenuation:** This Project is considered a Redevelopment Project under Standard 7 and has been designed to comply with Standard 2 to the maximum extent practicable. The proposed stormwater management system was designed to limit peak attenuation rate; however, due to an increase in impervious areas the post-development peak discharge rates do exceed pre-development peak discharge rates within the subject area. The Project proposes to restore degraded natural vegetation with new loam and seed areas. Steep slopes impacted by the widening will consist of loam and seed and compost and seed mix over a modified rockfill. The Project proposes to enhance the existing roadway by providing new complete pavement structure including new gravel base (in widened sections), and new hot mix asphalt. The existing roadway is in poor condition and has no proper shoulders/edge. The existing steep slope is highly vegetated.

Standard 2 (Continued)

Existing catch basins and paved swales that outlet directly to the slopes are being eliminated and captured within the new closed drainage system. The Project proposes to establish a well-defined shoulder and install curb where appropriate. Refer to the table below for a pre- and post-development peak runoff rate comparison. From the tables, the overall project peak rate is being increased, which is due to the increase in impervious area from the additional sidewalks and bicycle lanes/shoulders. Per Standard 7, this project shall comply with this standard to the maximum extent practicable.

Table 4. Proposed vs. Existing Peak Rates in Cubic Feet per Second (CFS) for Project Area with Drainage Contributing to the Wetlands

Storm Event	Existing (CFS)	Proposed (CFS)
2-Year	3.69	8.03
10-Year	8.94	14.40
100-Year	18.31	24.52

Standard 3

Groundwater Recharge: This Project is considered a Redevelopment Project under Standard 7 and has been designed to comply with Standard 3 to the maximum extent practicable. Since this is a Redevelopment Project, the Project will maintain the existing drainage patterns with proposed stone pads to provide recharge. Additionally, the Project is improving existing conditions because it is utilizing low impact development (LID) techniques such as extended flow paths. Due to existing steep topography, urban environment, right-of-way limitations, proximity to resource areas, proximity to dwellings, and other existing features, no new dedicated recharge system is proposed. However, existing recharge patterns are being improved and retained. The proposed design includes seeded/compost and seed rockfill slopes that promote infiltration; the proposed outfalls also daylight to these slopes. The outfalls will daylight to stone dissipation pads which will reduce velocity and further promote infiltration to the adjacent compost and seed rockfill slopes. Below is the calculation of the existing recharge volume, per outfall location. The calculation is Contributing Area (square feet) X Recharge Rate (inches/12 inch/foot) = Recharge Volume (cubic feet).

Table 5: Existing Recharge Volume per Outfall Location

Outfall location	Contributing Area (SF) X	Recharge Rate (IN) =	Total Recharge Volume (CF)
#8 – STA 21+10, Right	14,615 X	0.60 =	780
#15 – STA 22+72, Left	15,900 X	0.60 =	795
#19 – STA 24+73, Left	20,385 X	0.60 =	1,020
#23 – STA 25+52, Left	54,225 X	0.60 =	2,711
Total Existing Recharge Volume =			5,306

<table>
<tr>
<td>Standard 4</td>
<td>
Water Quality Treatment: This Project is considered a Redevelopment Project under Standard 7 and has been designed to comply with Standard 4 to the maximum extent practicable. Due to existing steep topography, proximity to dwellings, and other existing features, new water quality treatment opportunities are limited.

Pretreatment will be provided using deep sump catch basins (25% TSS removal). The closed drainage system along the site is being pretreated by deep sump catch basins prior to its outlet locations. New stone outlet pads are proposed at the outfalls within the Project limits. Source control and pollution prevention measures are included in the Long-Term Pollution Prevention Plan and Operation and Maintenance Plan (Attachment C).

For the three (3) catch basins that outlet to the vernal pool, deep sump catch basins with hoods are proposed. The addition of the hooded connections will help contain spills and trash that may enter the catch basin from the roadway surface, further improving the water quality to the vernal pool. These deep sump hooded catch basins receive 25% TSS removal. Also, the drainage outlet that is adjacent to the vernal pool will be a proposed sediment forebay, consisting of an energy dissipation pad, a paver area for sediment to collect, and an earthen overflow berm. The forebay will be lined with stone, except for the paver area. This sediment forebay will receive 25% TSS removal. The treatment train of the deep sump hooded catch basins and the sediment forebay yield a 44% TSS removal for the runoff flowing to the vernal pool.

Proposed stormwater control measures, for other outlets, include deep sump catch basins and stone dissipation pads at flared end sections. Table 6 below shows the calculated water quality volume for each. As deep sump catch basins are standard throughout the Project, water quality volume at each design point is not provided. Also, per the Massachusetts Stormwater Handbook, energy dissipation pads are a BMP accessory and do not provide water quality treatment.

Table 6: Water Quality Volume per Stormwater Control Measure
<table>
<tr><th>Stormwater Control Measure</th><th>Calculated Water Quality Volume (CF)</th></tr>
<tr><td>Deep Sump Catch Basin</td><td>4’ DIAx4’ Sump = 50 CF</td></tr>
<tr><td>Energy Dissipation Stone Pads at Outlet</td><td>N/A, BMP accessory</td></tr>
<tr><td>Sediment Forebay</td><td>1.5’DepthX90 SF area = 135 CF</td></tr>
</table>
MassDEP Standard 4 Form S4-C TSS Calculation Sheets are included within Attachment B.

Per Standard 7, this Project shall comply with this standard to the maximum extent practicable.
</td>
</tr>
<tr>
<td>Standard 5</td>
<td>Water Quality Treatment – Land Uses with Higher Potential Pollutant Loads (LUHPPLs): The Project is not considered a LUHPPL (>1000 trips per day) since it is a Roadway Reconstruction Project. This Standard does not apply to this Project.</td>
</tr>
</table>

Standard 6

Critical Areas: A portion of the proposed stormwater discharges to a wetland containing a certified vernal pool (#7459). The wetland is located along the west side of Route 138, near Station 21+00 Right. The vernal pool is separated from the roadway edge by a vegetated slope, consisting primarily of brush and trees. The vernal pool is approximately 31 feet from the proposed roadway edge, and 40 feet from the proposed drainage outlet. At the proposed drainage outlet (outlet #8, 21+10 Right), a new flared end section, with a sediment forebay is proposed. The outlet is oriented in such that the flow will be diverted away from the vernal pool, creating a longer overland flow path before it enters the vernal pool. No other slope work is proposed and there are no impacts to the wetland. Hoods will be provided within the catch basins that lead directly to the vernal pool to increase protection of critical area. All roadway grading and construction of a new sidewalk will be done at the top of the existing slope without grading along the slope. The proposed sediment forebay is an improvement to the existing condition which consists of country drainage, direct discharge, and catch basins that outlet directly to the wetland/vernal pool. The existing catch basins are assumed to not contain deep sumps. The existing direct discharge, which consists of a paved swale, will be removed as part of the design.

The vernal pool was modeled in HydroCAD to evaluate the change in total watershed runoff volume to the vernal pool as a result of the proposed roadway and drainage improvements along Route 138. Table 7 below shows the change in total runoff volume to the vernal pool. These values only represent the stormwater runoff to the vernal pool and may not be representative of other factors impacting the total water levels of the vernal pool, i.e. groundwater. Table 8 shows the change in watershed area. The vernal pool watershed area is primarily wooded (11.35 acres), which remains unchanged pre- and post-construction. The change in watershed area is from the change in the impervious areas of Route 138, which is being increased on the project as a whole but decreased in the watershed to the vernal pool. The Project proposes to upgrade the existing drainage outfall on the western side of the roadway that contributes to the vernal pool. The other outfalls are located on the east side of the roadway, causing the decrease in impervious area to the vernal pool. The change in volume (measured acre-feet) is 7% for the 100-year, 24-hour storm event. This change in volume (0.196 acre-feet for 100-year storm) is insignificant to the total watershed volume of the vernal pool. It should also be noted that the limits of vernal the pool are relatively large, extending approximately 175 feet x 150 feet.

Table 7: Total Volume Runoff Summary for the Vernal Pool for the 1-, 2-, 10-, and 100-year, 24-hour Storms in Acre-Feet

Design Iteration	1-Year Storm	2-Year Storm	10-Year Storm	100-Year Storm
Existing	0.219	0.421	1.268	3.070
Proposed Design	0.190	0.375	1.166	2.874

Standard 6 (Continued)

Table 8: Total Watershed Area Runoff Summary for the Vernal Pool in Acres

Design Iteration	Pervious	Impervious	Total
Existing	11.35	0.63	11.98
Proposed Design	11.35	0.27	11.62

Deep sump hooded catch basins are proposed as a pretreatment before the discharge location. The existing discharge locations are being retained but replaced with new pipes, as the existing catch basins are assumed to directly discharge to the wetlands. The proposed flared end section is designed at an angle away from the vernal pool to increase flow paths to the wetland. The proposed sediment forebay at the outlet will provide additional treatment to the runoff. The sediment forebay consists of an energy dissipation pad and a sediment collection area with pavers. The forebay is 18-inches in depth and is lined with stone to limit erosion. The proposed treatment train of the sediment forebay and deep sump hooded catch basins yield 44% TSS removal. Once runoff exits the forebay, it will flow over a vegetated wooded area until discharging to the vernal pool, providing some natural treatment. Additional BMPs were reviewed at this location, but due to topography restraints with the road being above the vernal pool, additional BMPS would require significant slope construction and likely work within the vernal pool itself.

Soil borings, to a depth of 25-feet, were done on the northbound lanes of Route 138 for the roadway widening along the east side. During the drilling of the soil borings, groundwater was encountered at approximately elevation 196' for the two borings closest to the vernal pool. The vernal pool is estimated to have a surface elevation of 190', based on water levels at the time of our topographic land survey. Based on this information presented, it can be concluded that groundwater is a factor of the vernal pool's water levels.

Per Standard 7, this Project complies with this standard to the maximum extent practicable.

Standard 7

Redevelopments: The Project is considered a redevelopment under the MassDEP Stormwater Management Standards since it is an improvement of an existing roadway that does not widen more than a lane, adds shoulders, and improves the existing drainage system.

Since the Project is a linear project, reconstructing an existing roadway with minor widening for complete streets improvements, the entire project area is considered a redevelopment area. The roadway, as described herein, is in an urban area adjacent to multiple commercial properties. Under the existing conditions, stormwater directly runs off the roadway/impervious area to the wetlands via paved swales or catch basins. The existing drainage system is proposed to be modified/replaced and to keep the same discharge locations. The design includes new deep sump catch basins proposed throughout, providing TSS removal. New drainage outlets are proposed with stormwater treatments, complying with Standard 1. Standards 2, 3, 4, 5, and 6 are met to the maximum extent practicable as described herein. The Project proposes to enhance the natural vegetation with establishment of loam and seed areas. BMPs were evaluated during design but due to site constraints, wetlands, and steep topography, including right-Of-way, they are not feasible. The overall drainage design improves the existing condition by creating a proper shoulder and capturing the runoff, discharging the runoff to energy dissipation pads, providing deep sump catch basins, enhancing/restoring vegetation, restoring the pavement structure, and enhancing the steep slopes adjacent to the wetlands. The Project will comply with Standards 8, 9, and 10.

Standard 8	**Construction Period Pollution Prevention and Sedimentation Control:** The Project has been designed to comply with Standard 8. The Contractor will be responsible for stormwater management of the active construction site and is required to adhere to the conditions of the 2022 Construction General Permit under the Environmental Protection Agency (EPA) (through the preparation and implementation of a Stormwater Pollution Prevention Plan [SWPPP]). The SWPPP, which is to be kept onsite, includes erosion and sediment controls (stabilization practices and structural practices), temporary and permanent stormwater management measures, Contractor inspection schedules and reporting of all SWPPP features, materials management, waste disposal, offsite vehicle tracking, spill prevention and response, sanitation, and non-stormwater discharges. A draft SWPPP will be submitted to the Commission prior to the start of construction.
Standard 9	**Operation and Maintenance Plan:** The Project has been designed to comply with Standard 9. A post-construction Operation and Maintenance Plan has been prepared and will be implemented to ensure that stormwater management systems function as designed. Source control and stormwater BMP operation requirements for the site are summarized in the Long-Term Pollution Prevention Plan and Operation and Maintenance Plan provided in **Attachment C**.
Standard 10	**Prohibition of Illicit Discharges:** The Project has been designed to comply with Standard 10. There will be no illicit discharges to the stormwater management system associated with the Project. An Illicit Discharge Compliance Statement is provided in **Attachment A**.

CONCLUSION

In conclusion, the Project's stormwater management system will improve the water quality of stormwater being discharged from the site. The Project proposes to add a significant number of new drainage structures and to capture and treat stormwater runoff that eventually leads into the wetlands. The Project is being designed to meet the MassDEP Stormwater Management Standards to the maximum extent practicable.

ATTACHMENT A

Stormwater Management Standards Documentation

MassDEP Checklist for Stormwater Report
Standard 10: Illicit Discharge Compliance Statement

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

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[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.

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Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

12/13/2022

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

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Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☒ Other (describe): Sediment Forebay

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.

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Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☐ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

☐ Site is comprised solely of C and D soils and/or bedrock at the land surface

☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000

☐ Solid Waste Landfill pursuant to 310 CMR 19.000

☒ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Massachusetts Department of Environmental Protection
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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Nitsch Engineering

2 Center Plaza, Suite 430
Boston, MA 02108-1928
T: 617-338-0063
F: 617-338-6472
www.nitscheng.com

STANDARD 10: Illicit Discharge Compliance Statement

Project Name: Corridor Improvements along Route 138 (Washington Street)	Nitsch Project #: 9720.16
Location: Route 138 (Washington Street) – Stoughton, MA	MassDOT Project #: 607403
Prepared by: MJS	Sheet No. 1 of 1
Date: April 1, 2022	

Standard 10 states: All illicit discharges to the stormwater management system are prohibited.

This is to verify:

1. Based on the information available there are no known or suspected illicit discharges to the stormwater management system on Route 138 (Washington Street), from the Canton Town line to Lincoln Street, as defined in the MassDEP Stormwater Handbook.

2. The design of the stormwater system includes no proposed illicit discharges.

Matthew Soltys, PE, RSP, ENV SP

04-01-2022
Date

ATTACHMENT B

Closed Drainage System Design

Drainage Plans
HydroCAD Analyses

NOAA Atlas 14, Volume 10, Version 3
Location name: Stoughton, Massachusetts, USA*
Latitude: 42.1248°, Longitude: -71.102°
Elevation: 235.26 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.307** (0.246-0.381)	**0.381** (0.304-0.473)	**0.501** (0.398-0.625)	**0.601** (0.475-0.754)	**0.738** (0.564-0.979)	**0.840** (0.628-1.14)	**0.950** (0.690-1.36)	**1.08** (0.733-1.57)	**1.29** (0.834-1.93)	**1.46** (0.922-2.24)
10-min	**0.435** (0.348-0.540)	**0.539** (0.431-0.670)	**0.709** (0.564-0.884)	**0.851** (0.673-1.07)	**1.05** (0.799-1.39)	**1.19** (0.890-1.62)	**1.35** (0.978-1.92)	**1.53** (1.04-2.22)	**1.82** (1.18-2.74)	**2.07** (1.31-3.18)
15-min	**0.512** (0.409-0.635)	**0.635** (0.507-0.788)	**0.835** (0.664-1.04)	**1.00** (0.791-1.26)	**1.23** (0.940-1.63)	**1.40** (1.05-1.91)	**1.58** (1.15-2.26)	**1.80** (1.22-2.61)	**2.14** (1.39-3.22)	**2.43** (1.54-3.74)
30-min	**0.707** (0.565-0.877)	**0.879** (0.702-1.09)	**1.16** (0.923-1.45)	**1.40** (1.10-1.75)	**1.72** (1.31-2.28)	**1.96** (1.46-2.66)	**2.21** (1.61-3.15)	**2.52** (1.71-3.65)	**2.99** (1.94-4.50)	**3.39** (2.15-5.21)
60-min	**0.902** (0.721-1.12)	**1.12** (0.897-1.40)	**1.49** (1.18-1.86)	**1.79** (1.41-2.25)	**2.20** (1.68-2.92)	**2.51** (1.88-3.42)	**2.84** (2.06-4.05)	**3.24** (2.19-4.69)	**3.84** (2.49-5.78)	**4.35** (2.75-6.69)
2-hr	**1.14** (0.917-1.41)	**1.45** (1.16-1.78)	**1.94** (1.55-2.41)	**2.35** (1.87-2.94)	**2.92** (2.25-3.86)	**3.34** (2.52-4.53)	**3.80** (2.78-5.39)	**4.36** (2.96-6.25)	**5.22** (3.40-7.78)	**5.96** (3.79-9.07)
3-hr	**1.32** (1.07-1.62)	**1.68** (1.35-2.06)	**2.25** (1.81-2.78)	**2.73** (2.18-3.40)	**3.39** (2.62-4.46)	**3.88** (2.93-5.24)	**4.41** (3.25-6.24)	**5.07** (3.46-7.23)	**6.07** (3.97-9.00)	**6.94** (4.43-10.5)
6-hr	**1.74** (1.41-2.12)	**2.17** (1.76-2.65)	**2.88** (2.32-3.53)	**3.46** (2.78-4.27)	**4.26** (3.31-5.55)	**4.86** (3.69-6.49)	**5.51** (4.07-7.69)	**6.29** (4.32-8.90)	**7.49** (4.93-11.0)	**8.52** (5.47-12.8)
12-hr	**2.29** (1.87-2.78)	**2.79** (2.28-3.39)	**3.61** (2.93-4.39)	**4.28** (3.46-5.25)	**5.22** (4.06-6.72)	**5.91** (4.50-7.80)	**6.65** (4.92-9.16)	**7.53** (5.21-10.5)	**8.85** (5.86-12.8)	**9.96** (6.43-14.8)
24-hr	**2.81** (2.31-3.39)	**3.42** (2.80-4.12)	**4.41** (3.60-5.33)	**5.23** (4.24-6.36)	**6.35** (4.98-8.13)	**7.19** (5.52-9.42)	**8.09** (6.02-11.1)	**9.16** (6.37-12.7)	**10.8** (7.17-15.5)	**12.1** (7.87-17.8)
2-day	**3.21** (2.65-3.84)	**3.97** (3.27-4.76)	**5.21** (4.29-6.27)	**6.25** (5.10-7.55)	**7.67** (6.06-9.76)	**8.72** (6.74-11.4)	**9.86** (7.42-13.4)	**11.3** (7.87-15.5)	**13.4** (8.99-19.1)	**15.3** (10.00-22.2)
3-day	**3.51** (2.91-4.18)	**4.33** (3.59-5.17)	**5.68** (4.68-6.80)	**6.79** (5.57-8.18)	**8.33** (6.60-10.6)	**9.46** (7.35-12.3)	**10.7** (8.08-14.5)	**12.2** (8.57-16.7)	**14.6** (9.82-20.7)	**16.7** (10.9-24.1)
4-day	**3.79** (3.15-4.51)	**4.64** (3.85-5.52)	**6.03** (4.98-7.20)	**7.18** (5.90-8.62)	**8.77** (6.97-11.1)	**9.93** (7.73-12.9)	**11.2** (8.49-15.2)	**12.8** (8.99-17.4)	**15.3** (10.3-21.5)	**17.4** (11.4-25.0)
7-day	**4.58** (3.82-5.41)	**5.46** (4.55-6.46)	**6.90** (5.73-8.19)	**8.09** (6.68-9.67)	**9.74** (7.78-12.2)	**11.0** (8.56-14.1)	**12.3** (9.32-16.4)	**13.9** (9.82-18.8)	**16.4** (11.1-22.9)	**18.6** (12.3-26.5)
10-day	**5.31** (4.45-6.26)	**6.22** (5.20-7.33)	**7.69** (6.41-9.10)	**8.92** (7.39-10.6)	**10.6** (8.49-13.2)	**11.9** (9.28-15.1)	**13.2** (10.0-17.5)	**14.8** (10.5-19.9)	**17.3** (11.7-24.0)	**19.4** (12.8-27.5)
20-day	**7.46** (6.29-8.73)	**8.44** (7.11-9.89)	**10.0** (8.43-11.8)	**11.4** (9.48-13.4)	**13.2** (10.6-16.2)	**14.6** (11.4-18.3)	**16.0** (12.1-20.7)	**17.6** (12.6-23.4)	**19.8** (13.5-27.2)	**21.6** (14.3-30.2)
30-day	**9.23** (7.81-10.8)	**10.3** (8.69-12.0)	**12.0** (10.1-14.0)	**13.4** (11.2-15.8)	**15.4** (12.3-18.7)	**16.9** (13.2-20.9)	**18.4** (13.8-23.4)	**19.9** (14.3-26.2)	**21.9** (15.0-29.8)	**23.4** (15.6-32.5)
45-day	**11.4** (9.72-13.3)	**12.6** (10.7-14.6)	**14.4** (12.2-16.8)	**15.9** (13.3-18.6)	**18.0** (14.5-21.7)	**19.6** (15.4-24.1)	**21.2** (15.9-26.7)	**22.7** (16.3-29.7)	**24.5** (16.9-33.1)	**25.7** (17.2-35.6)
60-day	**13.3** (11.3-15.4)	**14.5** (12.3-16.8)	**16.4** (13.9-19.0)	**18.0** (15.1-21.0)	**20.2** (16.3-24.2)	**21.9** (17.2-26.7)	**23.5** (17.7-29.4)	**25.0** (18.1-32.5)	**26.7** (18.5-35.9)	**27.8** (18.7-38.2)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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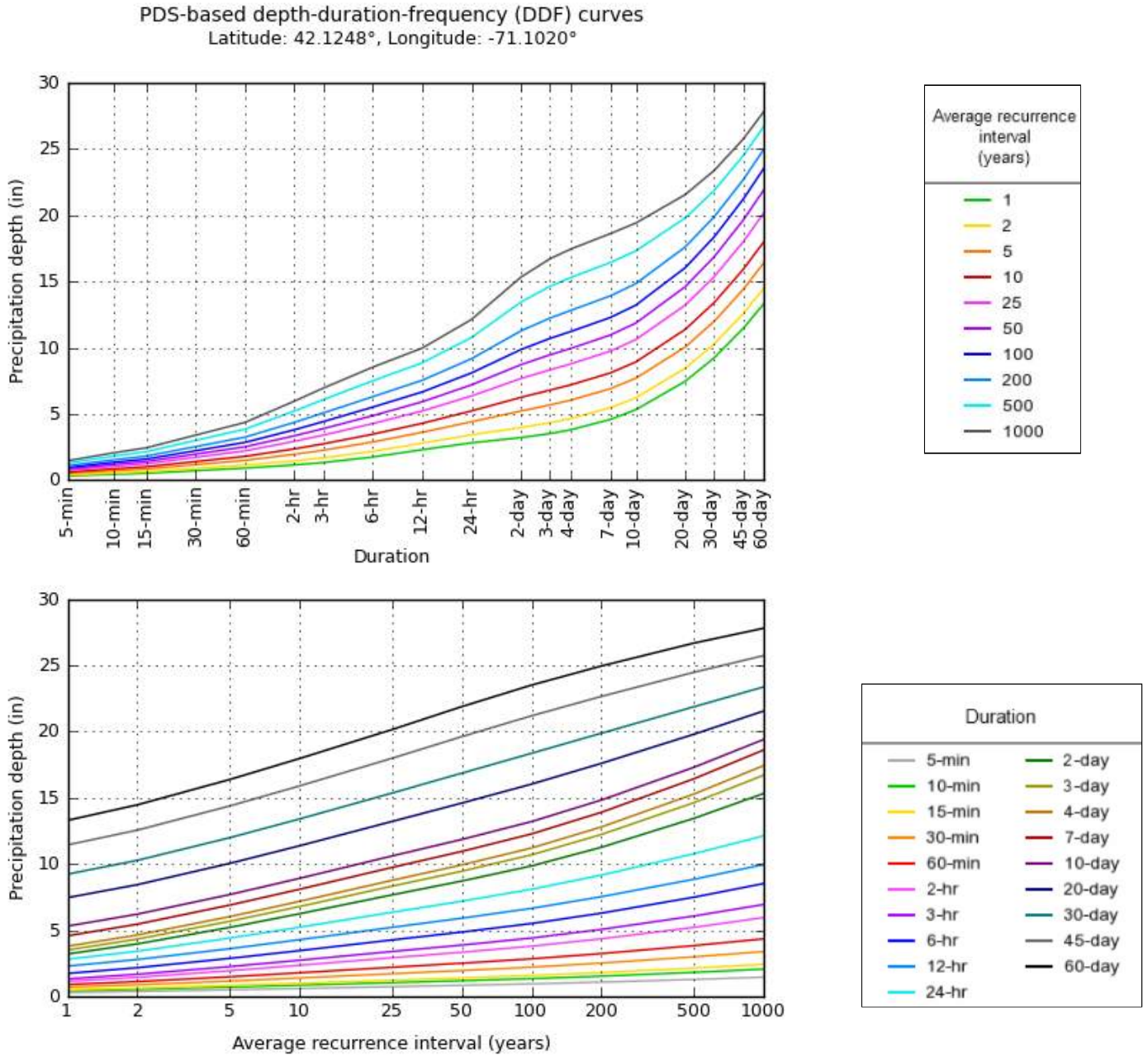
PF graphical



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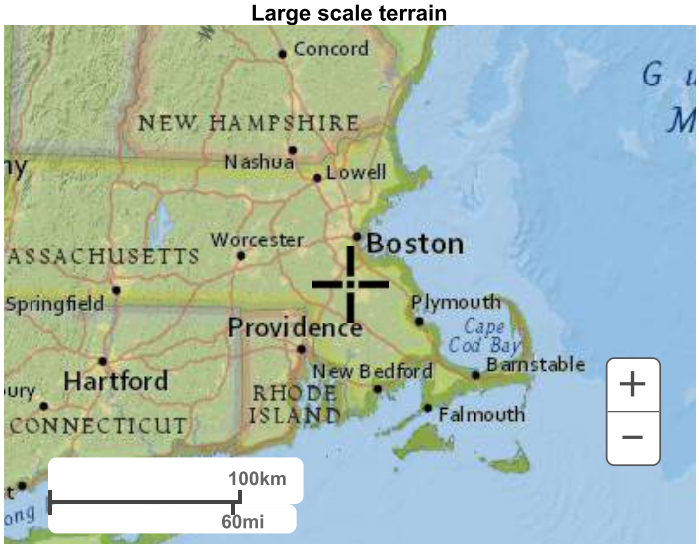
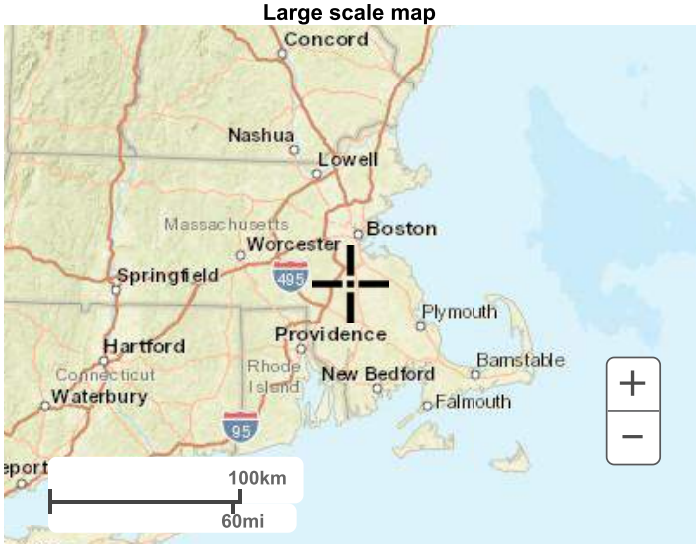
Maps & aerials

Small scale terrain

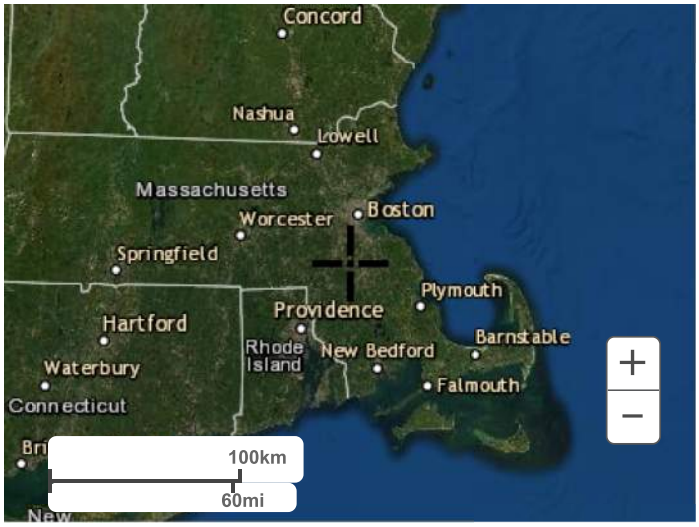
Large scale terrain



Large scale map



Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
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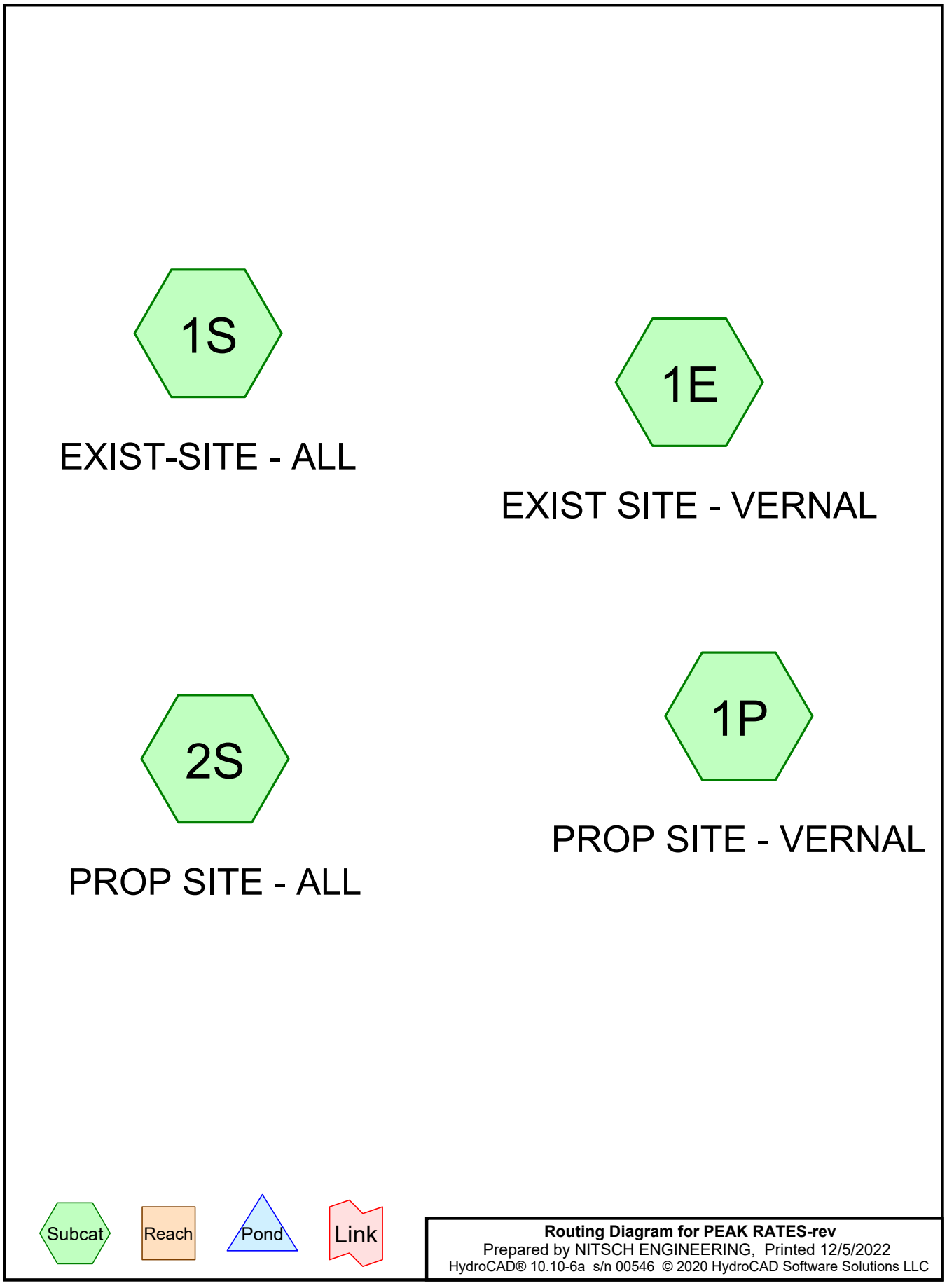
Questions?: HDSC.Questions@noaa.gov


1S
EXIST-SITE - ALL
1E
EXIST SITE - VERNAL
2S
PROP SITE - ALL
1P
PROP SITE - VERNAL
Subcat
Reach
Pond
Link
Routing Diagram for PEAK RATES-rev
Prepared by NITSCH ENGINEERING, Printed 12/5/2022
HydroCAD® 10.10-6a s/n 00546 © 2020 HydroCAD Software Solutions LLC

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PEAK RATES-rev
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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1 YEAR	Type II 24-hr		Default	24.00	1	2.81	2
2	2 YEAR	Type II 24-hr		Default	24.00	1	3.42	2
3	10 YEAR	Type II 24-hr		Default	24.00	1	5.23	2
4	100 YEAR	Type II 24-hr		Default	24.00	1	8.09	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.718	39	>75% Grass cover, Good, HSG A (1S, 2S)
4.005	98	Paved roads w/curbs & sewers, HSG A (1E, 1P, 1S, 2S)
22.700	58	Woods/grass comb., Good, HSG B (1E, 1P)
28.423	**62**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
5.723	HSG A	1E, 1P, 1S, 2S
22.700	HSG B	1E, 1P
0.000	HSG C	
0.000	HSG D	
0.000	Other	
28.423		**TOTAL AREA**

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PEAK RATES-rev
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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
1.718	0.000	0.000	0.000	0.000	1.718	>75% Grass cover, Good	1S, 2S
4.005	0.000	0.000	0.000	0.000	4.005	Paved roads w/curbs & sewers	1E, 1P, 1S, 2S
0.000	22.700	0.000	0.000	0.000	22.700	Woods/grass comb., Good	1E, 1P
5.723	**22.700**	**0.000**	**0.000**	**0.000**	**28.423**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: EXIST SITE - VERNAL Runoff Area=11.980 ac 5.26% Impervious Runoff Depth>0.22"
Tc=30.0 min CN=60 Runoff=1.30 cfs 0.219 af

Subcatchment1P: PROP SITE - VERNAL Runoff Area=11.615 ac 2.28% Impervious Runoff Depth>0.20"
Tc=30.0 min CN=59 Runoff=1.02 cfs 0.190 af

Subcatchment1S: EXIST-SITE - ALL Runoff Area=2.414 ac 50.87% Impervious Runoff Depth>0.50"
Tc=6.0 min CN=69 Runoff=2.20 cfs 0.101 af

Subcatchment2S: PROP SITE - ALL Runoff Area=2.414 ac 77.96% Impervious Runoff Depth>1.32"
Tc=6.0 min CN=85 Runoff=5.94 cfs 0.265 af

Total Runoff Area = 28.423 ac Runoff Volume = 0.775 af Average Runoff Depth = 0.33"
85.91% Pervious = 24.418 ac 14.09% Impervious = 4.005 ac

Summary for Subcatchment 1E: EXIST SITE - VERNAL

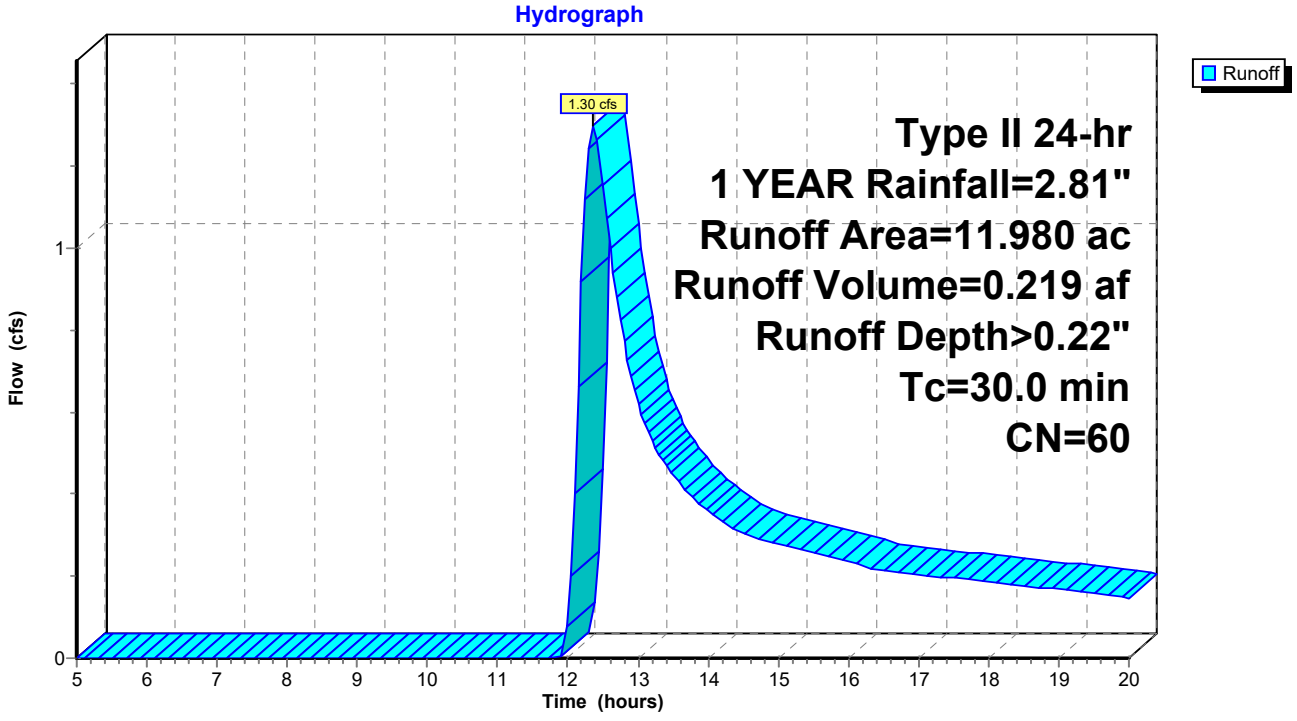
Runoff = 1.30 cfs @ 12.37 hrs, Volume= 0.219 af, Depth> 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 YEAR Rainfall=2.81"

Area (ac)	CN	Description
11.350	58	Woods/grass comb., Good, HSG B
0.630	98	Paved roads w/curbs & sewers, HSG A
11.980	60	Weighted Average
11.350		94.74% Pervious Area
0.630		5.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment 1E: EXIST SITE - VERNAL



Summary for Subcatchment 1P: PROP SITE - VERNAL

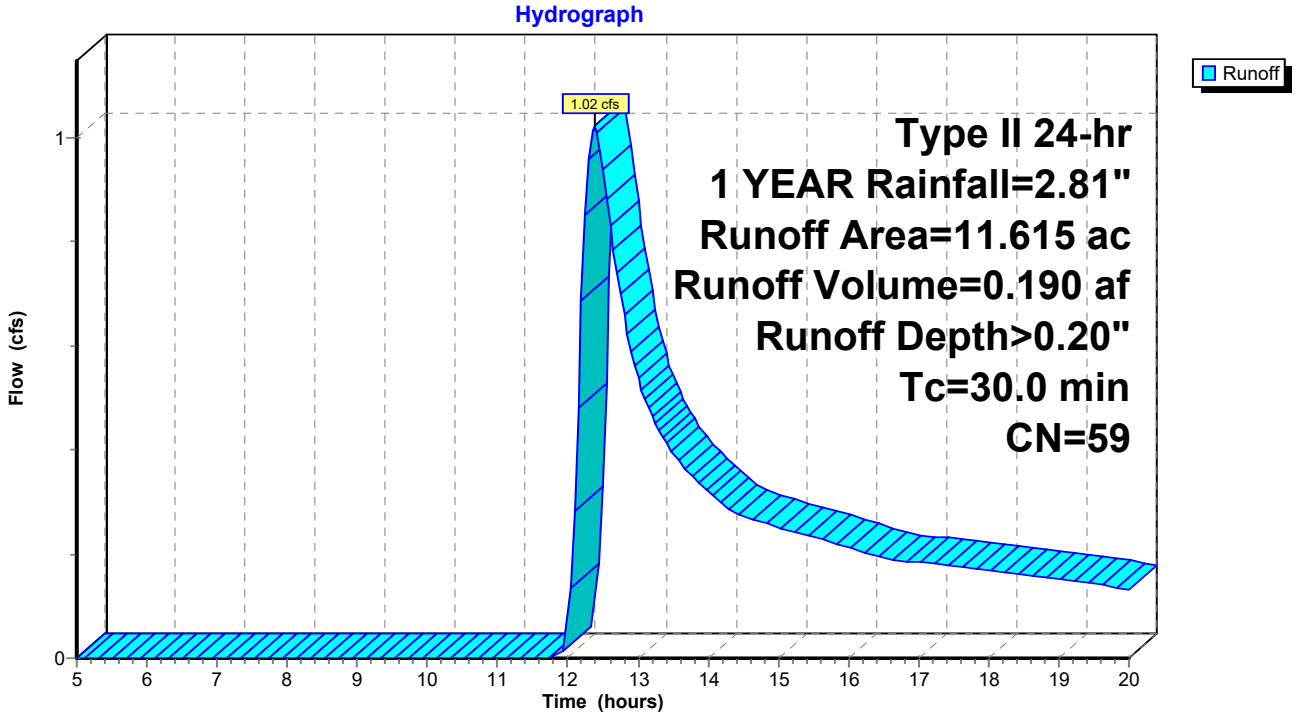
Runoff = 1.02 cfs @ 12.39 hrs, Volume= 0.190 af, Depth> 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 YEAR Rainfall=2.81"

Area (ac)	CN	Description
11.350	58	Woods/grass comb., Good, HSG B
0.265	98	Paved roads w/curbs & sewers, HSG A
11.615	59	Weighted Average
11.350		97.72% Pervious Area
0.265		2.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment 1P: PROP SITE - VERNAL



Summary for Subcatchment 1S: EXIST-SITE - ALL

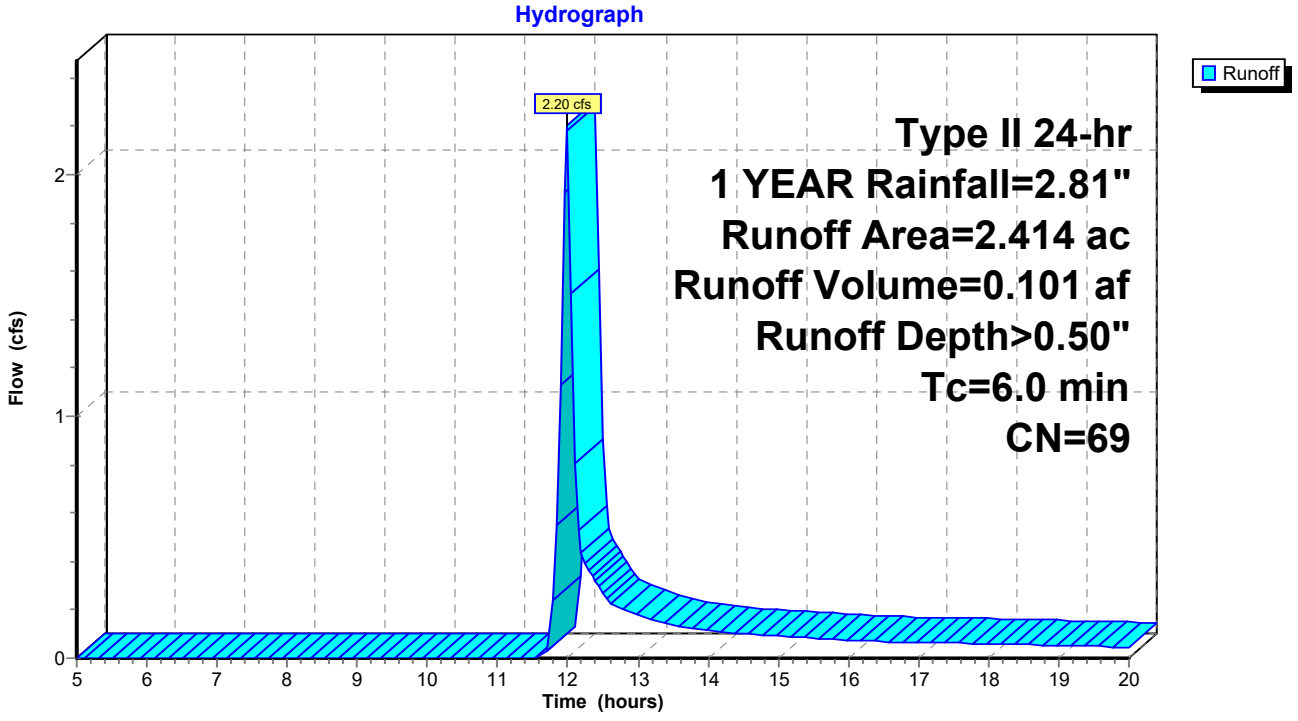
Runoff = 2.20 cfs @ 11.99 hrs, Volume= 0.101 af, Depth> 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 YEAR Rainfall=2.81"

Area (ac)	CN	Description
1.186	39	>75% Grass cover, Good, HSG A
1.228	98	Paved roads w/curbs & sewers, HSG A
2.414	69	Weighted Average
1.186		49.13% Pervious Area
1.228		50.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 1S: EXIST-SITE - ALL



Summary for Subcatchment 2S: PROP SITE - ALL

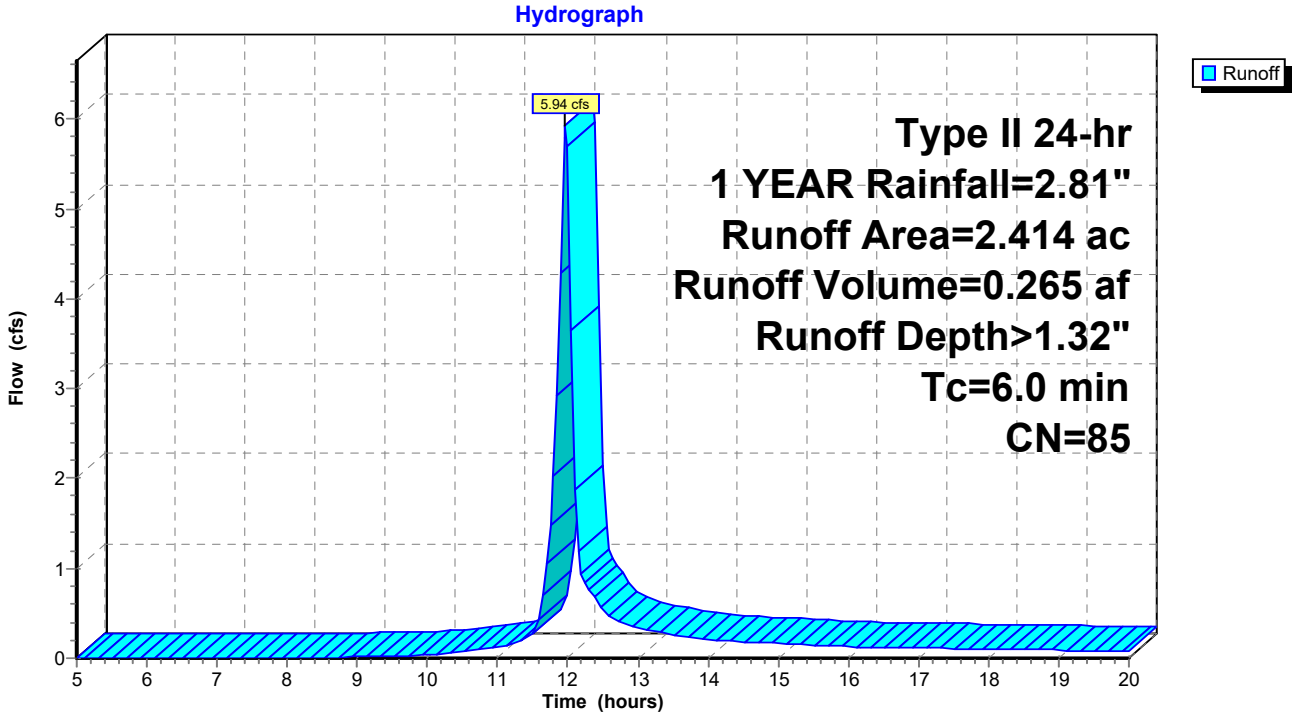
Runoff = 5.94 cfs @ 11.97 hrs, Volume= 0.265 af, Depth> 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 YEAR Rainfall=2.81"

Area (ac)	CN	Description
0.532	39	>75% Grass cover, Good, HSG A
1.882	98	Paved roads w/curbs & sewers, HSG A
2.414	85	Weighted Average
0.532		22.04% Pervious Area
1.882		77.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 2S: PROP SITE - ALL



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: EXIST SITE - VERNAL Runoff Area=11.980 ac 5.26% Impervious Runoff Depth>0.42"
Tc=30.0 min CN=60 Runoff=3.39 cfs 0.421 af

Subcatchment1P: PROP SITE - VERNAL Runoff Area=11.615 ac 2.28% Impervious Runoff Depth>0.39"
Tc=30.0 min CN=59 Runoff=2.86 cfs 0.375 af

Subcatchment1S: EXIST-SITE - ALL Runoff Area=2.414 ac 50.87% Impervious Runoff Depth>0.81"
Tc=6.0 min CN=69 Runoff=3.69 cfs 0.163 af

Subcatchment2S: PROP SITE - ALL Runoff Area=2.414 ac 77.96% Impervious Runoff Depth>1.80"
Tc=6.0 min CN=85 Runoff=8.03 cfs 0.363 af

Total Runoff Area = 28.423 ac Runoff Volume = 1.322 af Average Runoff Depth = 0.56"
85.91% Pervious = 24.418 ac 14.09% Impervious = 4.005 ac

Summary for Subcatchment 1E: EXIST SITE - VERNAL

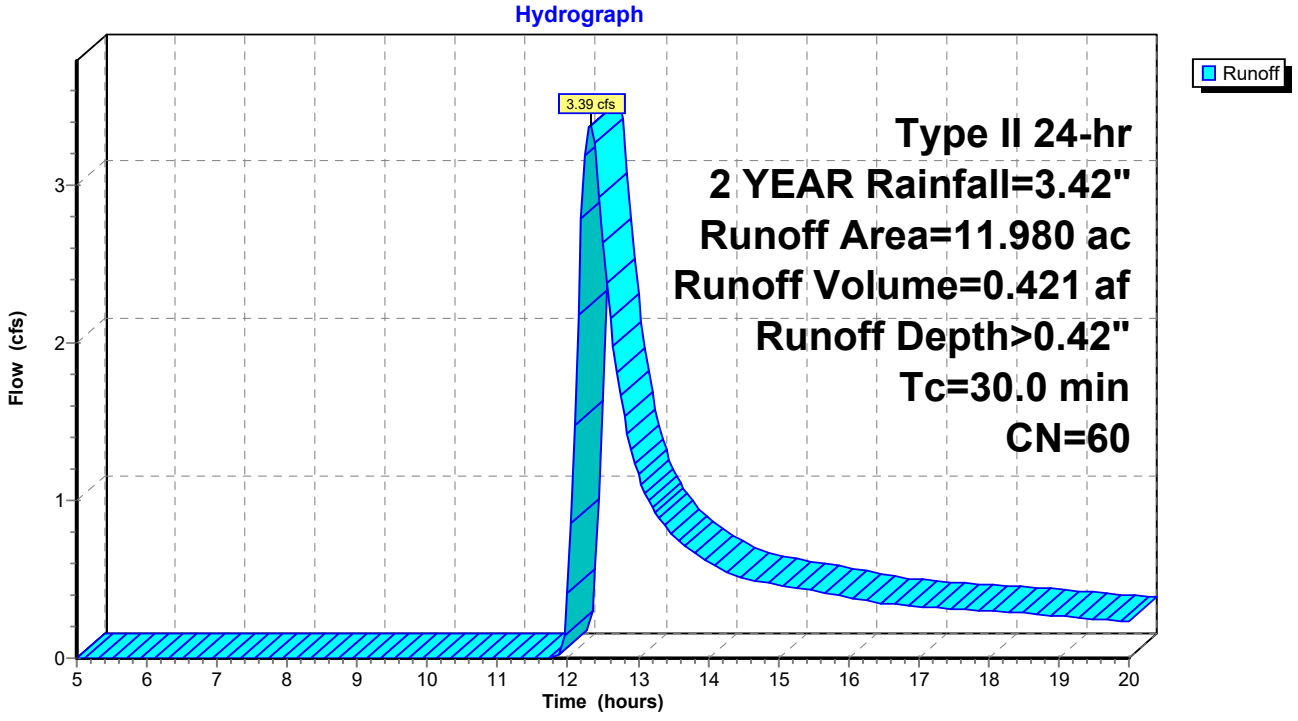
Runoff = 3.39 cfs @ 12.32 hrs, Volume= 0.421 af, Depth> 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YEAR Rainfall=3.42"

Area (ac)	CN	Description
11.350	58	Woods/grass comb., Good, HSG B
0.630	98	Paved roads w/curbs & sewers, HSG A
11.980	60	Weighted Average
11.350		94.74% Pervious Area
0.630		5.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment 1E: EXIST SITE - VERNAL



Summary for Subcatchment 1P: PROP SITE - VERNAL

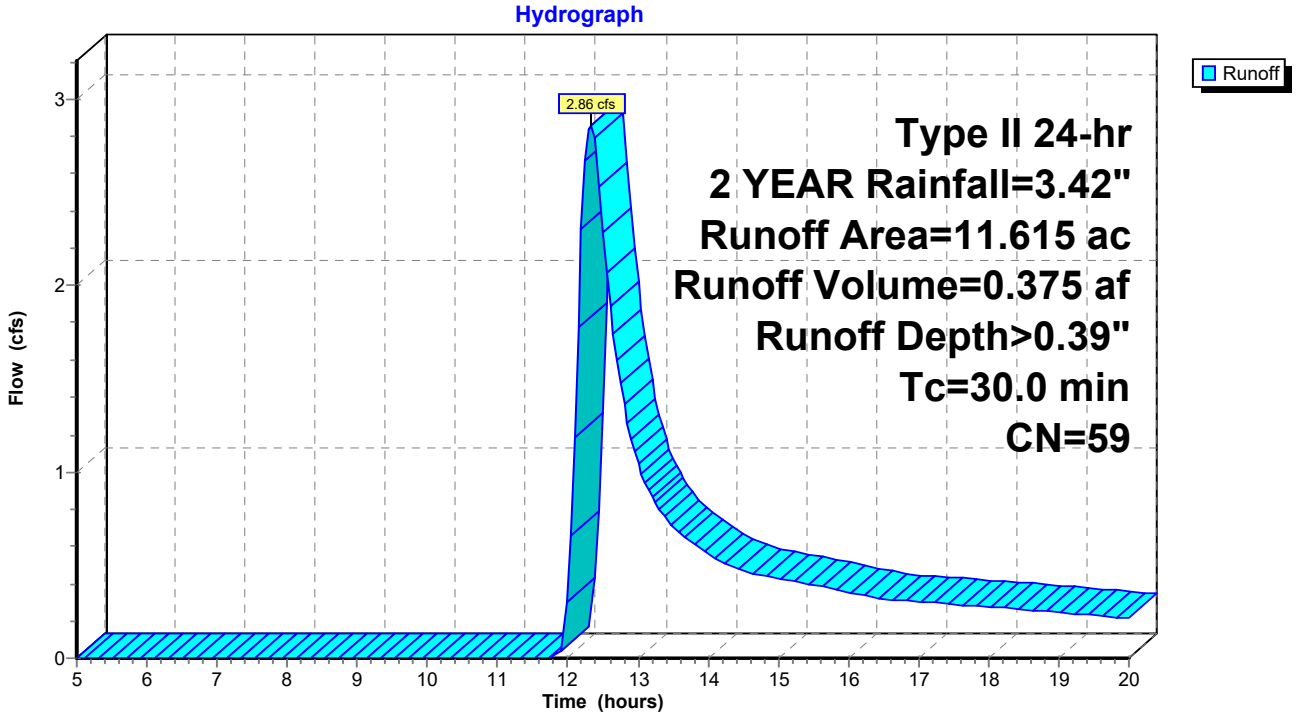
Runoff = 2.86 cfs @ 12.33 hrs, Volume= 0.375 af, Depth> 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YEAR Rainfall=3.42"

Area (ac)	CN	Description
11.350	58	Woods/grass comb., Good, HSG B
0.265	98	Paved roads w/curbs & sewers, HSG A
11.615	59	Weighted Average
11.350		97.72% Pervious Area
0.265		2.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment 1P: PROP SITE - VERNAL



Summary for Subcatchment 1S: EXIST-SITE - ALL

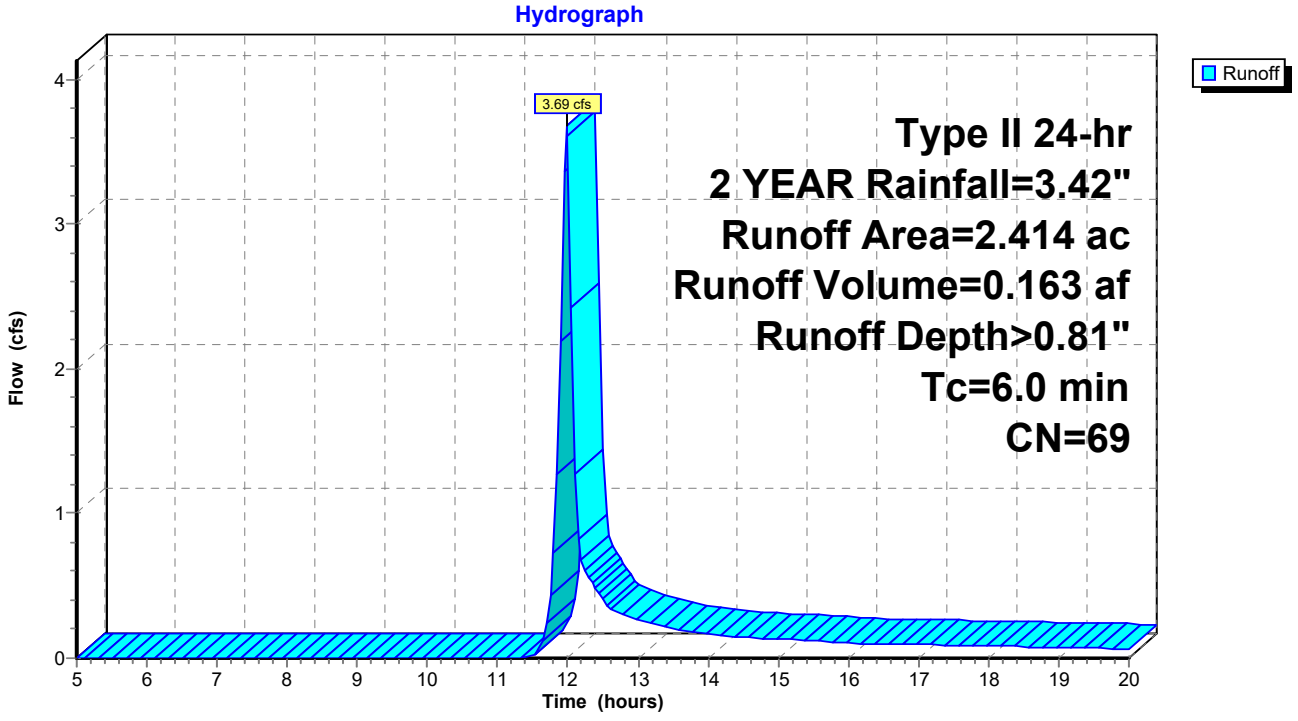
Runoff = 3.69 cfs @ 11.98 hrs, Volume= 0.163 af, Depth> 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YEAR Rainfall=3.42"

Area (ac)	CN	Description
1.186	39	>75% Grass cover, Good, HSG A
1.228	98	Paved roads w/curbs & sewers, HSG A
2.414	69	Weighted Average
1.186		49.13% Pervious Area
1.228		50.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 1S: EXIST-SITE - ALL



Summary for Subcatchment 2S: PROP SITE - ALL

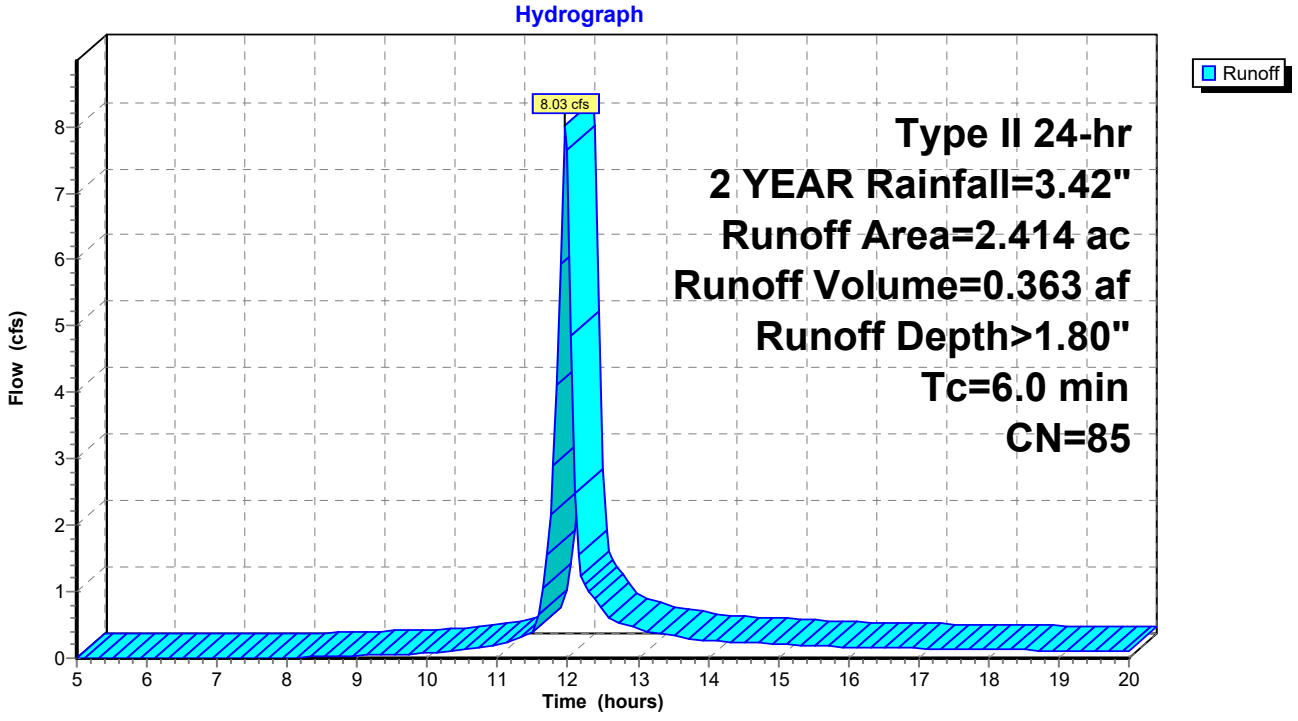
Runoff = 8.03 cfs @ 11.97 hrs, Volume= 0.363 af, Depth> 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YEAR Rainfall=3.42"

Area (ac)	CN	Description
0.532	39	>75% Grass cover, Good, HSG A
1.882	98	Paved roads w/curbs & sewers, HSG A
2.414	85	Weighted Average
0.532		22.04% Pervious Area
1.882		77.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 2S: PROP SITE - ALL



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: EXIST SITE - VERNAL Runoff Area=11.980 ac 5.26% Impervious Runoff Depth>1.27"
Tc=30.0 min CN=60 Runoff=13.29 cfs 1.268 af

Subcatchment1P: PROP SITE - VERNAL Runoff Area=11.615 ac 2.28% Impervious Runoff Depth>1.20"
Tc=30.0 min CN=59 Runoff=12.03 cfs 1.166 af

Subcatchment1S: EXIST-SITE - ALL Runoff Area=2.414 ac 50.87% Impervious Runoff Depth>1.94"
Tc=6.0 min CN=69 Runoff=8.94 cfs 0.390 af

Subcatchment2S: PROP SITE - ALL Runoff Area=2.414 ac 77.96% Impervious Runoff Depth>3.34"
Tc=6.0 min CN=85 Runoff=14.40 cfs 0.673 af

Total Runoff Area = 28.423 ac Runoff Volume = 3.497 af Average Runoff Depth = 1.48"
85.91% Pervious = 24.418 ac 14.09% Impervious = 4.005 ac

Summary for Subcatchment 1E: EXIST SITE - VERNAL

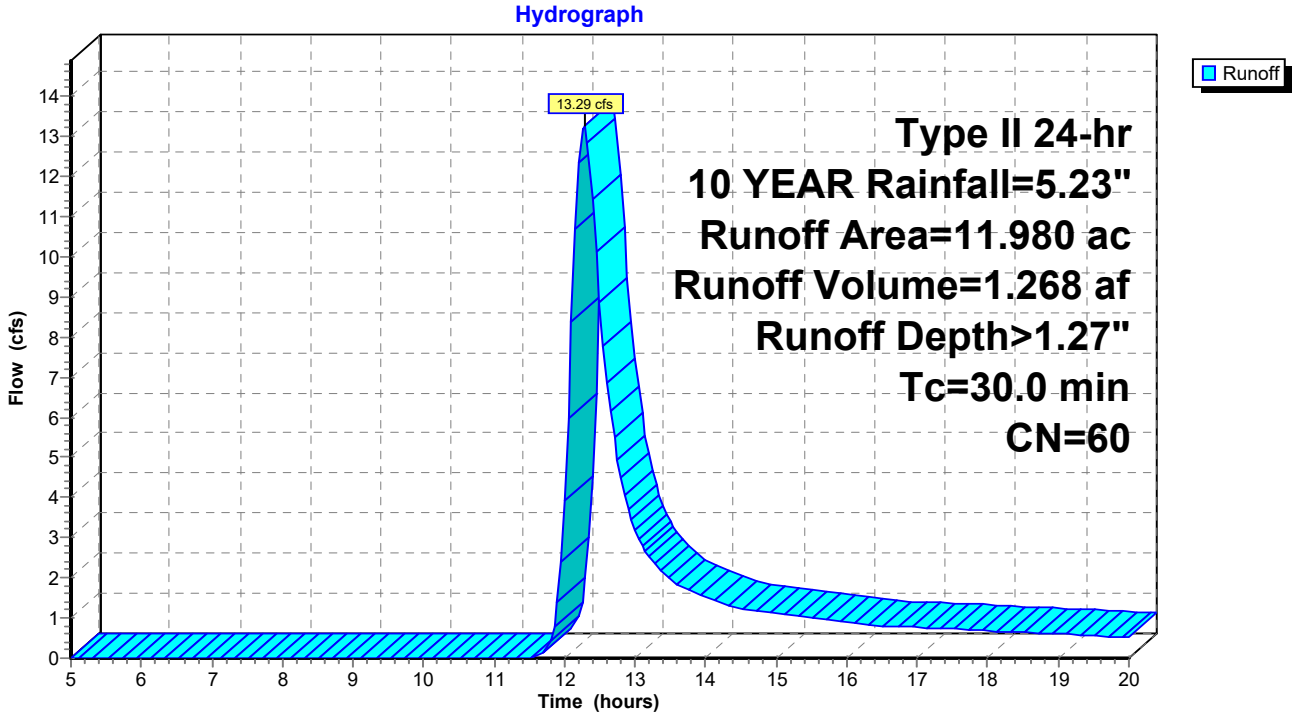
Runoff = 13.29 cfs @ 12.27 hrs, Volume= 1.268 af, Depth> 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YEAR Rainfall=5.23"

Area (ac)	CN	Description
11.350	58	Woods/grass comb., Good, HSG B
0.630	98	Paved roads w/curbs & sewers, HSG A
11.980	60	Weighted Average
11.350		94.74% Pervious Area
0.630		5.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment 1E: EXIST SITE - VERNAL



Summary for Subcatchment 1P: PROP SITE - VERNAL

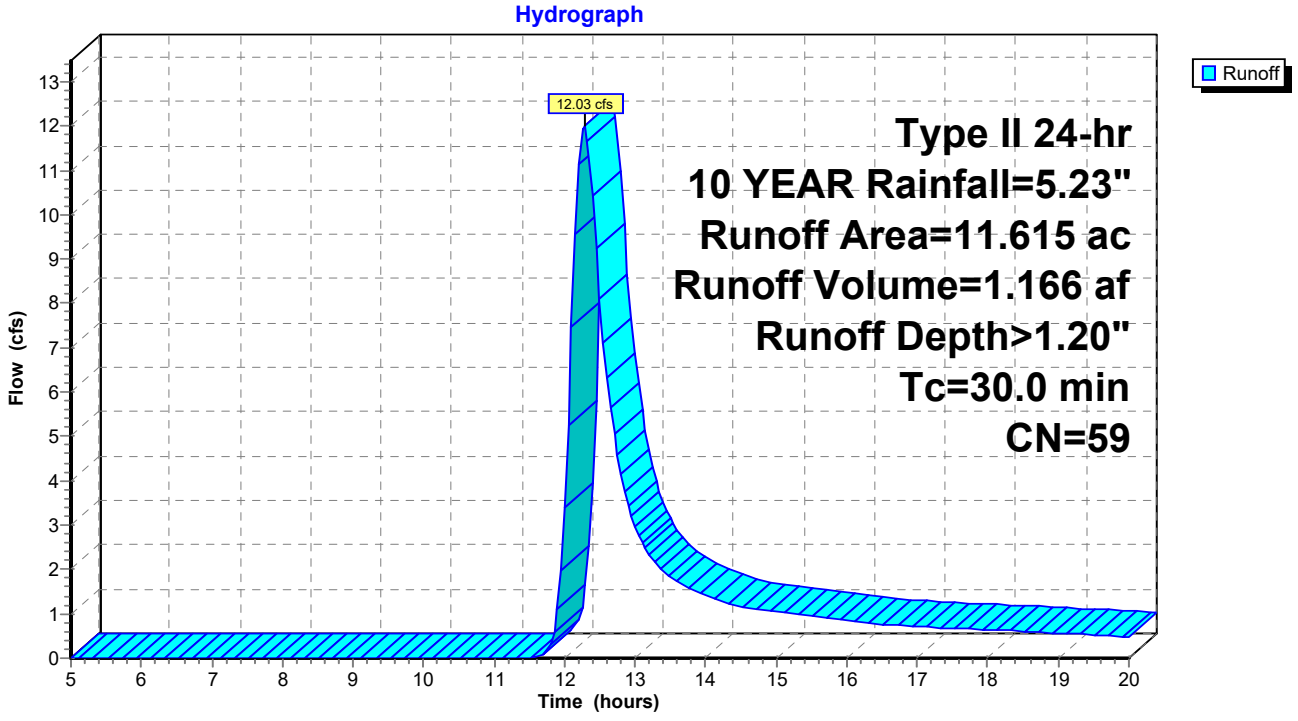
Runoff = 12.03 cfs @ 12.28 hrs, Volume= 1.166 af, Depth> 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YEAR Rainfall=5.23"

Area (ac)	CN	Description
11.350	58	Woods/grass comb., Good, HSG B
0.265	98	Paved roads w/curbs & sewers, HSG A
11.615	59	Weighted Average
11.350		97.72% Pervious Area
0.265		2.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment 1P: PROP SITE - VERNAL



Summary for Subcatchment 1S: EXIST-SITE - ALL

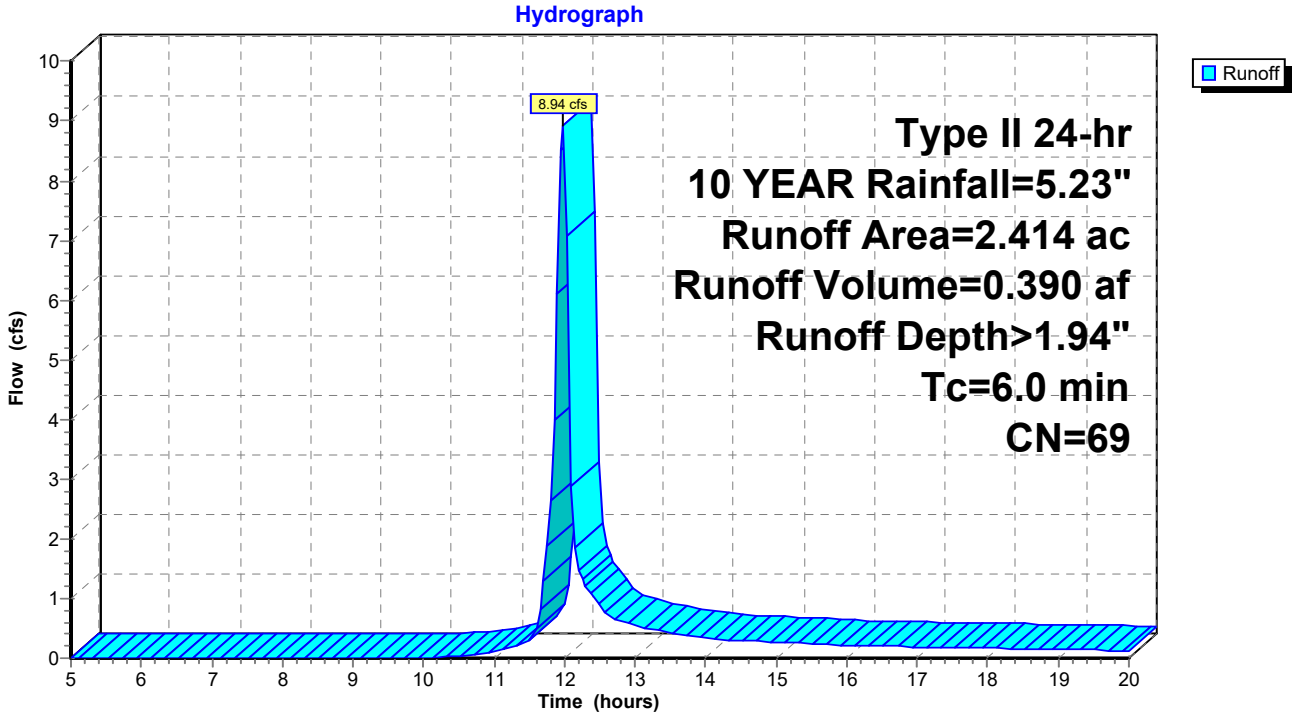
Runoff = 8.94 cfs @ 11.98 hrs, Volume= 0.390 af, Depth> 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YEAR Rainfall=5.23"

Area (ac)	CN	Description
1.186	39	>75% Grass cover, Good, HSG A
1.228	98	Paved roads w/curbs & sewers, HSG A
2.414	69	Weighted Average
1.186		49.13% Pervious Area
1.228		50.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 1S: EXIST-SITE - ALL



Summary for Subcatchment 2S: PROP SITE - ALL

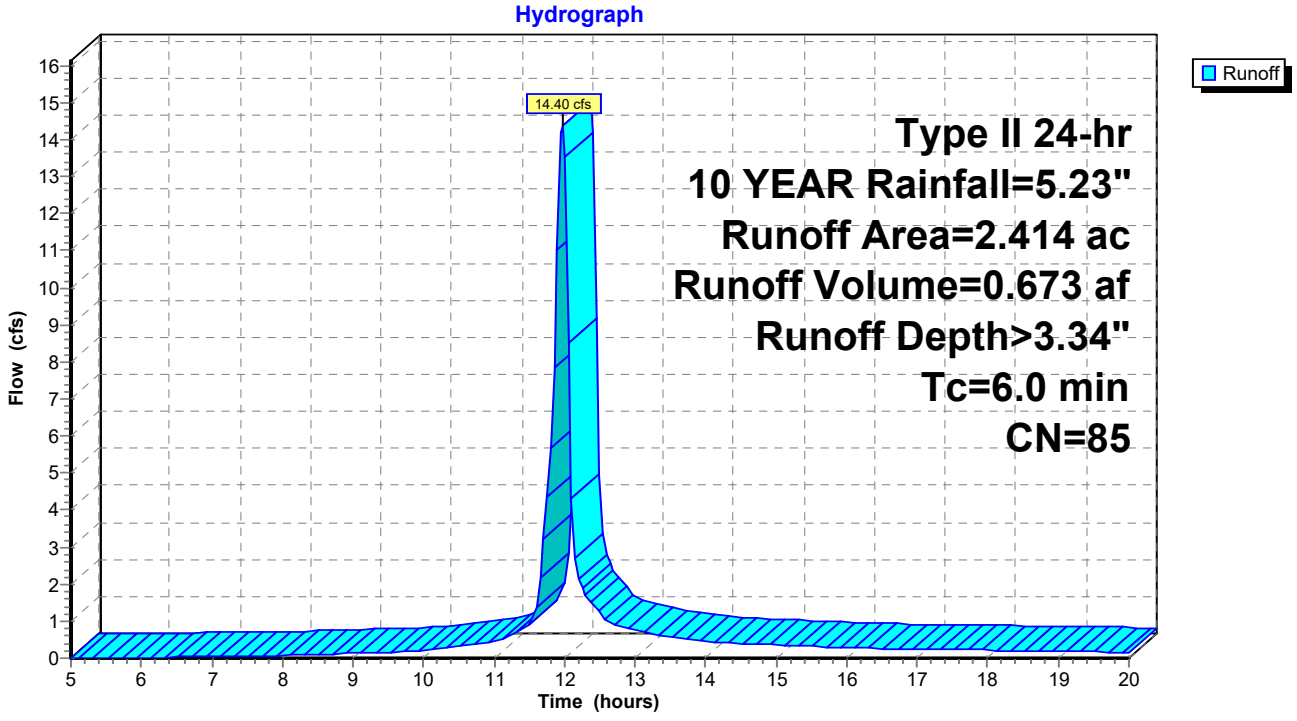
Runoff = 14.40 cfs @ 11.97 hrs, Volume= 0.673 af, Depth> 3.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YEAR Rainfall=5.23"

Area (ac)	CN	Description
0.532	39	>75% Grass cover, Good, HSG A
1.882	98	Paved roads w/curbs & sewers, HSG A
2.414	85	Weighted Average
0.532		22.04% Pervious Area
1.882		77.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 2S: PROP SITE - ALL



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1E: EXIST SITE - VERNAL Runoff Area=11.980 ac 5.26% Impervious Runoff Depth>3.08"
Tc=30.0 min CN=60 Runoff=34.45 cfs 3.070 af

Subcatchment1P: PROP SITE - VERNAL Runoff Area=11.615 ac 2.28% Impervious Runoff Depth>2.97"
Tc=30.0 min CN=59 Runoff=32.15 cfs 2.874 af

Subcatchment1S: EXIST-SITE - ALL Runoff Area=2.414 ac 50.87% Impervious Runoff Depth>4.09"
Tc=6.0 min CN=69 Runoff=18.31 cfs 0.823 af

Subcatchment2S: PROP SITE - ALL Runoff Area=2.414 ac 77.96% Impervious Runoff Depth>5.91"
Tc=6.0 min CN=85 Runoff=24.52 cfs 1.189 af

Total Runoff Area = 28.423 ac Runoff Volume = 7.956 af Average Runoff Depth = 3.36"
85.91% Pervious = 24.418 ac 14.09% Impervious = 4.005 ac

Summary for Subcatchment 1E: EXIST SITE - VERNAL

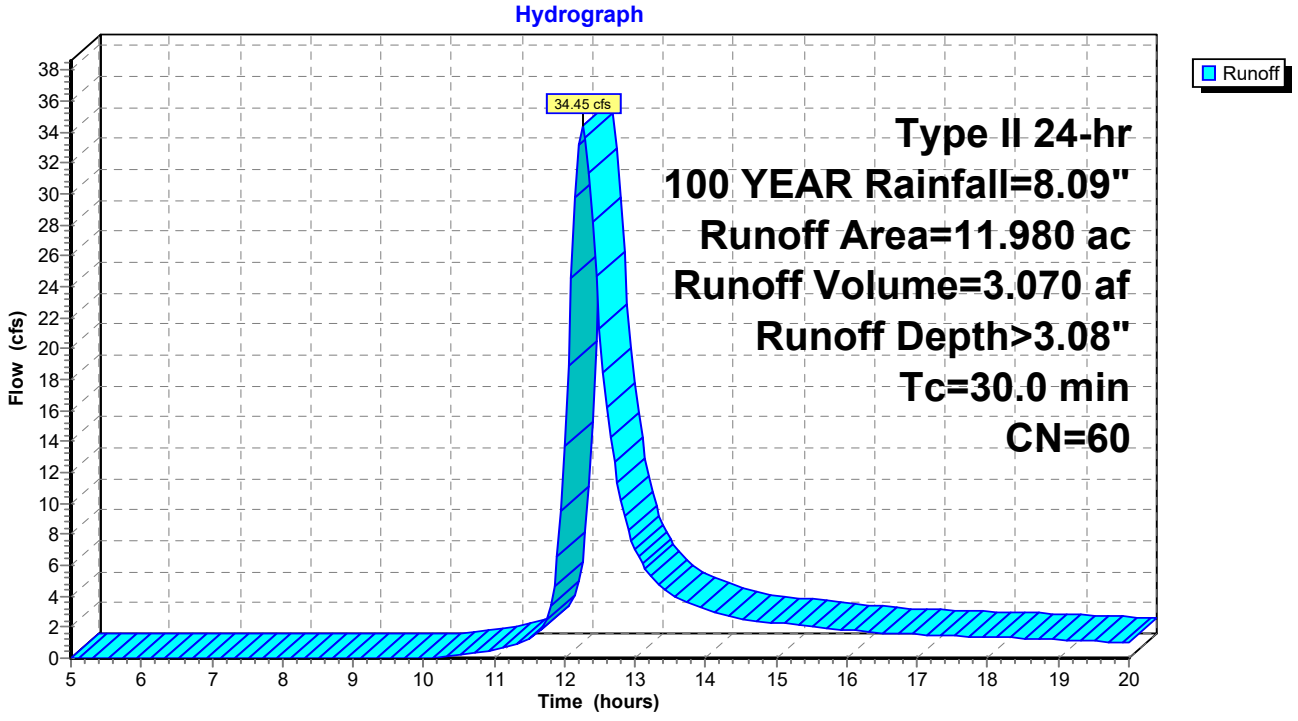
Runoff = 34.45 cfs @ 12.26 hrs, Volume= 3.070 af, Depth> 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 YEAR Rainfall=8.09"

Area (ac)	CN	Description
11.350	58	Woods/grass comb., Good, HSG B
0.630	98	Paved roads w/curbs & sewers, HSG A
11.980	60	Weighted Average
11.350		94.74% Pervious Area
0.630		5.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment 1E: EXIST SITE - VERNAL



Summary for Subcatchment 1P: PROP SITE - VERNAL

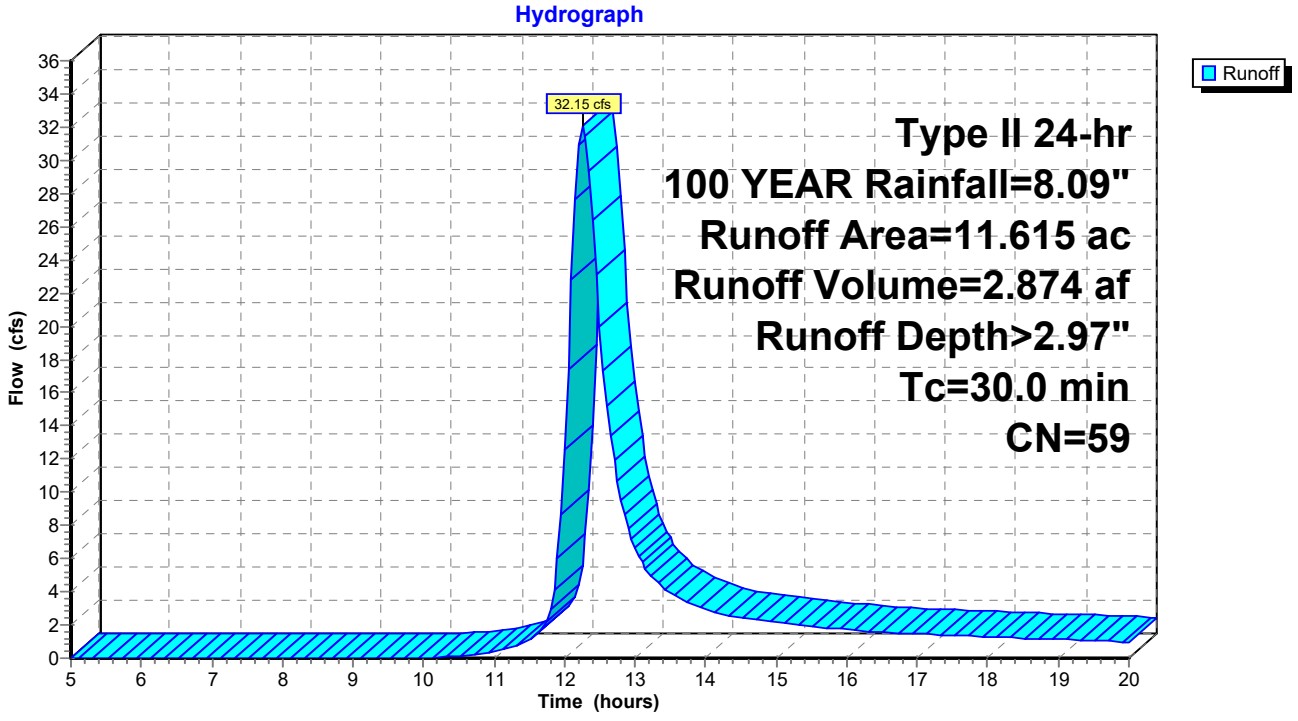
Runoff = 32.15 cfs @ 12.26 hrs, Volume= 2.874 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 YEAR Rainfall=8.09"

Area (ac)	CN	Description
11.350	58	Woods/grass comb., Good, HSG B
0.265	98	Paved roads w/curbs & sewers, HSG A
11.615	59	Weighted Average
11.350		97.72% Pervious Area
0.265		2.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment 1P: PROP SITE - VERNAL



Summary for Subcatchment 1S: EXIST-SITE - ALL

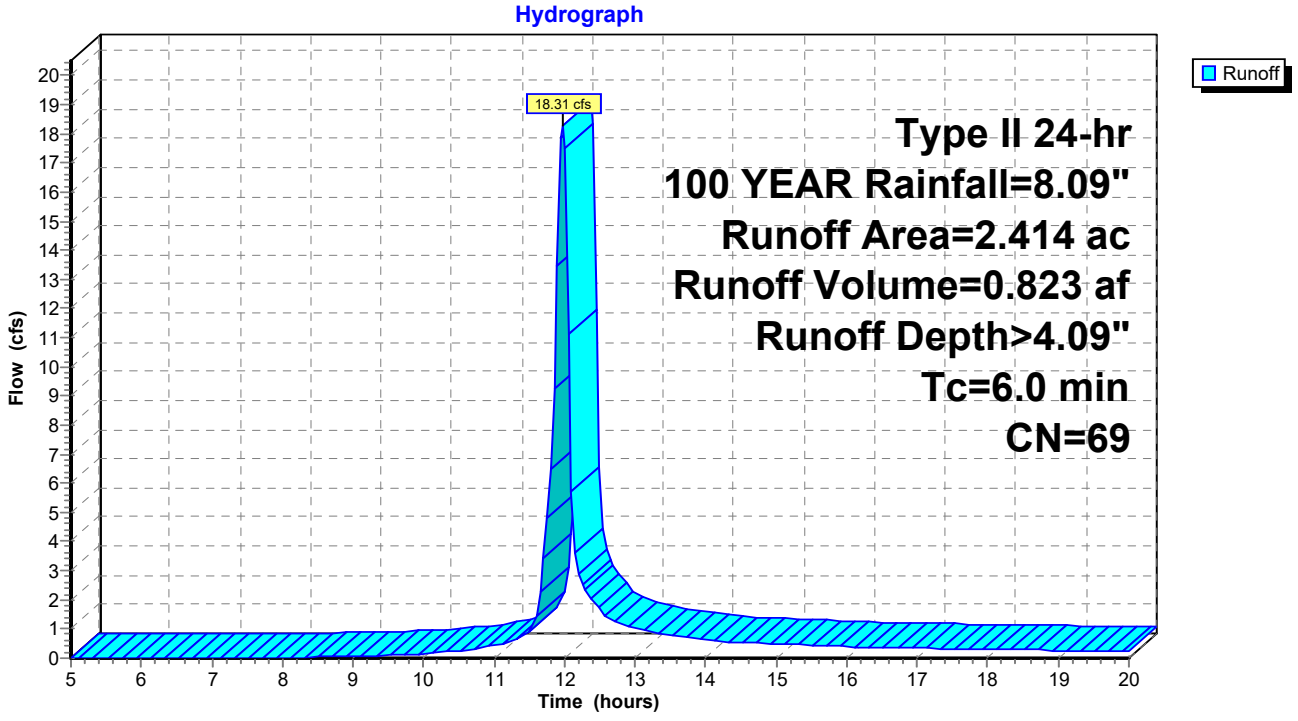
Runoff = 18.31 cfs @ 11.97 hrs, Volume= 0.823 af, Depth> 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 YEAR Rainfall=8.09"

Area (ac)	CN	Description
1.186	39	>75% Grass cover, Good, HSG A
1.228	98	Paved roads w/curbs & sewers, HSG A
2.414	69	Weighted Average
1.186		49.13% Pervious Area
1.228		50.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 1S: EXIST-SITE - ALL



Summary for Subcatchment 2S: PROP SITE - ALL

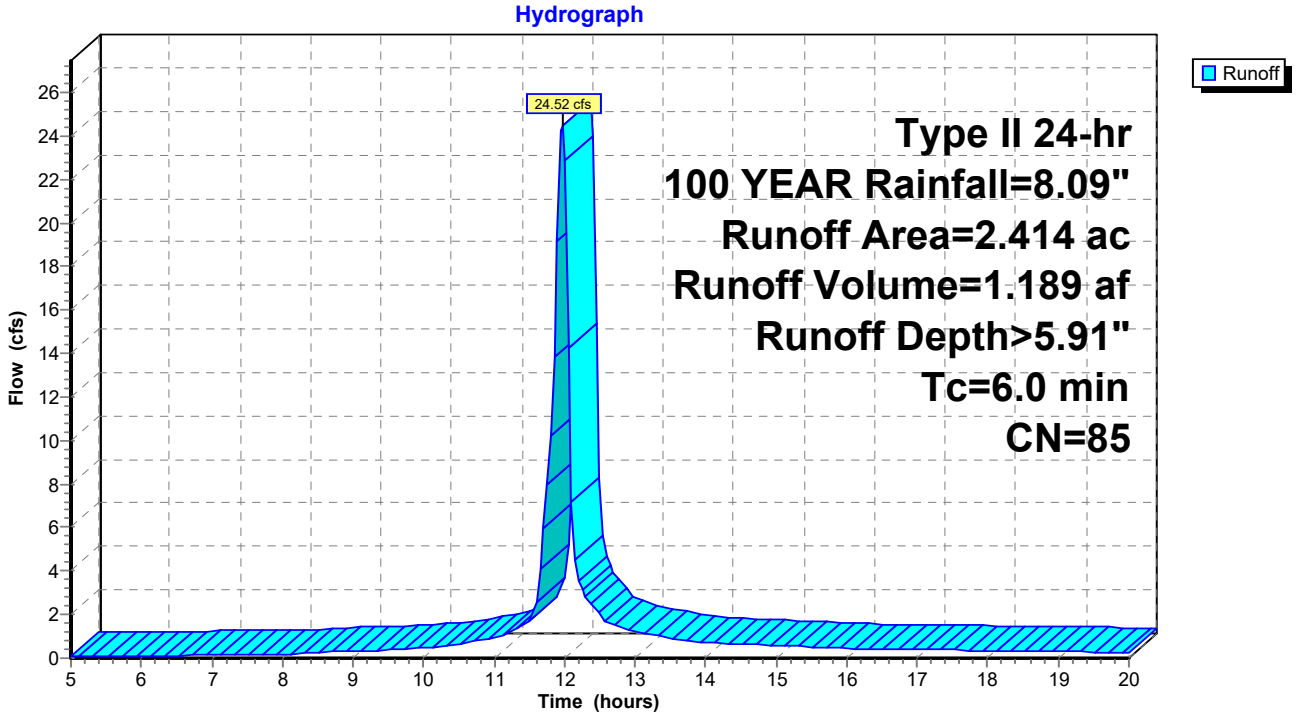
Runoff = 24.52 cfs @ 11.96 hrs, Volume= 1.189 af, Depth> 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 YEAR Rainfall=8.09"

Area (ac)	CN	Description
0.532	39	>75% Grass cover, Good, HSG A
1.882	98	Paved roads w/curbs & sewers, HSG A
2.414	85	Weighted Average
0.532		22.04% Pervious Area
1.882		77.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 2S: PROP SITE - ALL



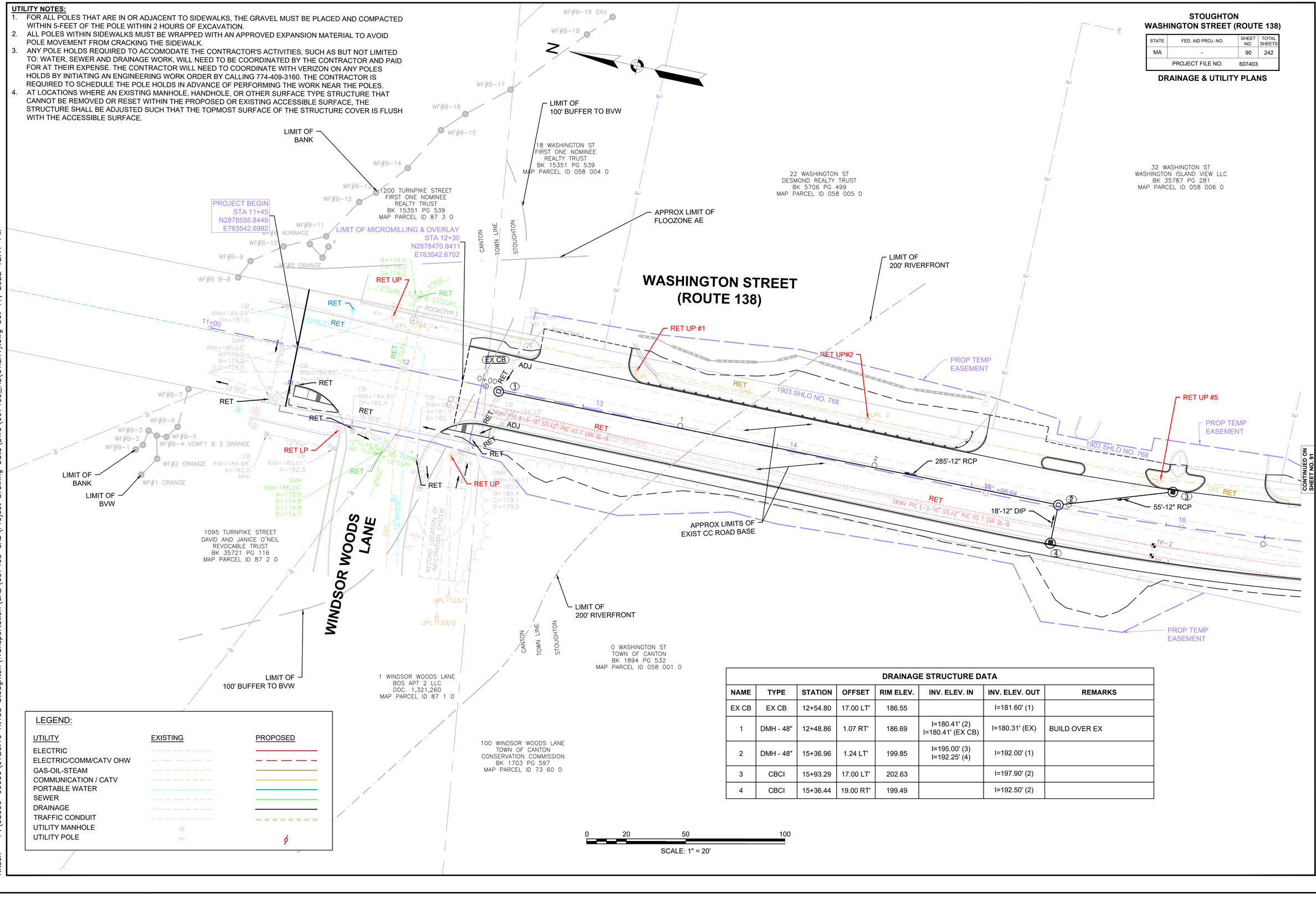
UTILITY NOTES:

1. FOR ALL POLES THAT ARE IN OR ADJACENT TO SIDEWALKS, THE GRAVEL MUST BE PLACED AND COMPACTED WITHIN 5-FEET OF THE POLE WITHIN 2 HOURS OF EXCAVATION.
2. ALL POLES WITHIN SIDEWALKS MUST BE WRAPPED WITH AN APPROVED EXPANSION MATERIAL TO AVOID POLE MOVEMENT FROM CRACKING THE SIDEWALK.
3. ANY POLE HOLDS REQUIRED TO ACCOMODATE THE CONTRACTOR'S ACTIVITIES, SUCH AS BUT NOT LIMITED TO: WATER, SEWER AND DRAINAGE WORK, WILL NEED TO BE COORDINATED BY THE CONTRACTOR AND PAID FOR AT THEIR EXPENSE. THE CONTRACTOR WILL NEED TO COORDINATE WITH VERIZON ON ANY POLES HOLDS BY INITIATING AN ENGINEERING WORK ORDER BY CALLING 774-409-3160. THE CONTRACTOR IS REQUIRED TO SCHEDULE THE POLE HOLDS IN ADVANCE OF PERFORMING THE WORK NEAR THE POLES.
4. AT LOCATIONS WHERE AN EXISTING MANHOLE, HANDHOLE, OR OTHER SURFACE TYPE STRUCTURE CANNOT BE REMOVED OR RESET WITHIN THE PROPOSED OR EXISTING ACCESSIBLE SURFACE, THE STRUCTURE SHALL BE ADJUSTED SUCH THAT THE TOPMOST SURFACE OF THE STRUCTURE COVER IS FLUSH WITH THE ACCESSIBLE SURFACE.

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	90	242
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS



LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

SCALE: 1" = 20'

DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
EX CB	EX CB	12+54.80	17.00 LT'	186.55		I=181.60' (1)	
1	DMH - 48"	12+48.86	1.07 RT'	186.69	I=180.41' (2) I=180.41' (EX CB)	I=180.31' (EX)	BUILD OVER EX
2	DMH - 48"	15+36.96	1.24 LT'	199.85	I=195.00' (3) I=192.25' (4)	I=192.00' (1)	
3	CBCI	15+93.29	17.00 LT'	202.63		I=197.90' (2)	
4	CBCI	15+36.44	19.00 RT'	199.49		I=192.50' (2)	

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	91	242
PROJECT FILE NO.		607403	

DRAINAGE & UTILITY PLANS

DRAINAGE STRUCTURE DATA							
NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
2	DMH - 48"	15+36.96	1.24 LT'	199.85	I=195.00' (3) I=192.25' (4)	I=192.00' (1)	
3	CBCI	15+93.29	17.00 LT'	202.63		I=197.90' (2)	
4	CBCI	15+36.47	19.00 RT'	199.49		I=192.50' (2)	

WASHINGTON STREET (ROUTE 138)

32 WASHINGTON ST
WASHINGTON ISLAND VIEW LLC
BK 35787 PG 281
MAP PARCEL ID 058 006 0

50 WASHINGTON ST
SALT ISLAND REALTY LLC
BK 32527 PG 325
MAP PARCEL ID 058 008 0

N/F
TOWN OF STOUGHTON
MAP PARCEL ID 058 009 0

0 WASHINGTON ST
TOWN OF CANTON
BK 1894 PG 532
MAP PARCEL ID 058 001 0

LIMIT OF
200' RIVERFRONT

PROP TEMP EASEMENT

RET UP #5

PROP TEMP EASEMENT

RET UP #6

RET UP #7

RET UPL #8 W/ PROP 20' PUSH BRACE (BO)

PUE

285'-12" RCP

55'-12" RCP

18'-12" DIP

1903 SHLO NO. 768

345KV PTC E-3-10" STL+2" PVC FO T EVR QL-B

EVERSOURCE ELECTRIC TRANSMISSION

ADJ/REMOD EMH (2) FRAME & COVER TO FINISHED GRADE (BO)

RET UP #6-84

PROP TEMP EASEMENT

APPROX LIMITS OF EXIST CC ROAD BASE

CONTINUED ON SHEET NO. 90

CONTINUED ON SHEET NO. 92

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

0 20 50 100
SCALE: 1" = 20'

DRAINAGE STRUCTURE DATA							
NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
6	CBCI	20+83.45	17.00 LT'	206.43		I=200.11' (7)	PROP HOOD
7	DMH	21+01.29	23.58 RT'	205.84	I=197.61' (11) I=198.45' (6)	I=197.61' (8)	
8	FES	20+90.96	42.76 RT'		I=197.50' (7)		
9	CBCI	22+57.11	21.00 LT'	202.27		I=198.03' (12)	
10	CBCI-E	22+57.26	18.97 RT'	202.30		I=198.40' (11)	OFFSET TOP, PROP HOOD
11	DMH - 48"	22+63.44	243.26 RT'	202.71	I=198.36' (10) I=198.36' (13)	I=198.36' (7)	
12	DMH	22+71.62	20.15 LT'	202.25	I=197.93' (9) I=197.93' (14)	I=197.93' (15)	
13	CBCI-E	22+82.19	19.00 RT'	202.26		I=198.50' (11)	OFFSET TOP, PROP HOOD
14	CBCI	22+82.10	21.00 LT'	202.23		I=198.03' (12)	
15	FES	22+72.95	33.74 LT'		I=197.86' (12)		
16	CBCI	24+48.09	25.00 LT'	205.98		I=201.53' (18)	
17	CBCI	24+73.48	24.31 RT'	207.18		I=201.03' (18)	
18	DMH	24+62.08	24.78 LT'	206.63	I=200.78' (17) I=201.28' (16)	I=200.78' (19)	
19	FES	24+73.27	40.84 LT'		I=200.69' (18)		

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	93	244
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS

N

WASHINGTON STREET
(ROUTE 138)

0 WASHINGTON ST
TOWN OF CANTON
BK 706 PG 308
MAP PARCEL ID 057 092 0

0 WASHINGTON ST
TOWN OF CANTON
BK 706 PG 308
MAP PARCEL ID 057 093 0

50 WASHINGTON ST
SALT ISLAND REALTY LLC
BK 32527 PG 325
MAP PARCEL ID 058 008 0

N/F
TOWN OF STOUGHTON
MAP PARCEL ID 058 009 0

0 WASHINGTON ST
TOWN OF CANTON
BK 1894 PG 532
MAP PARCEL ID 058 001 0

0 WASHINGTON ST
TOWN OF CANTON
BK 1703 PG 597
MAP PARCEL ID 057 091 0

PROP TEMPORARY WETLAND REPLICATION EASEMENT
LIMIT OF NON-JURISDICTIONAL STREAM FLAGS #1 THRU #9
LIMIT OF BVW
PROP TEMP EASEMENT
PROP PERM SLOPE EASEMENT
PROP DRAINAGE EASEMENT
PROP TEMP EASEMENT
PROP DRAINAGE EASEMENT
PROP TEMP EASEMENT
PROP SHALT
PROP SHALT
PUE
1903 SHLO NO. 768
APPROX LIMITS OF EXIST CC ROAD BASE
RET UPL #8 W/ PROP 20' PUSH BRACE (BO)
REM GPL (BO)
R&R 45' UP #9 W/15' GUY, 20' GUY & 20' PUSH BRACE (BO)
PROP STONE FOR PIPE ENDS
PROP OHW (BO) (TYP)
R&R 45' UP #11 (BO)
R&R 45' UP #12 (BO)
ADJ/REMOD EMH (2) FRAME & COVER TO FINISHED GRADE (BO)
RELOCATE 6" GAS MAIN (BO)
41'-12" DIP
48'-12" DIP
12'-12" RCP
11'-12" RCP
9'-12" RCP
19'-12" RCP
10'-12" RCP
16'-12" RCP
5'-12" RCP
159'-12" RCP
20'-15" RCP
REM EX CB
INV 197.50
205
198
199
200
EDGE OF RIPRAP ELEV 199
PROP SEDIMENT FOREBAY BOTTOM ELEV 197.50 SEE DETAIL
VERNAL POOL #7459
APPROX EDGE OF WATER
1902 RECORD LOCATION OF 2.5'X4' STONE CULVERT NOT FOUND - ASSUMED TO BE ABANDONED
FROM FILL IS POURED AGAINST EXISTING CB STRUCTURE
6"CS HP COLUMBIA GAS
6"CI WATER - ABAN.
12"DI WATER
345KV PTC E-3-10" STL+2" PVC FO T EVR QL-B
WF#W 27 VGWA
WF#W 26 VGWA
WF#W 25 VGWA1 B
WF#W 24 VGWA1
WF#W 23 VGWA1
WF#W 22 VGWA1
WF#W 19 VGWA1
WF#W 18 VGWA1
WF#W 17 VGWA1
WF#W 16 VGBF B1
BF#B2 VGWA1
BF#B3 VGWA1
BF#B5 VGWA1
BF#B6 VGWA1
WF#W 15 VGWA1 B
WF#W 14 VGWA1
WF#W 13 VGWA1
WF#W 12 VGWA1
WF#W 11 VGWA1
WF#W 10 VGWA1
WF#W 9 VGWA1
WF#W 8 VGWA1
WF#W 7 VGWA1
WF#W 6 VGWA1
WF#W 5 VGWA1
WF#W 4 VGWA1
WF#W 3 VGWA1
WF#W 2 VGWA1
WF#W 1 VGWA1 E
CONTINUED ON SHEET NO. 92
CONTINUED ON SHEET NO. 92

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

0 20 50 100
SCALE: 1" = 20'

607403_HDUTILITY).DWG Plotted on 12-Dec-2022 10:50 AM

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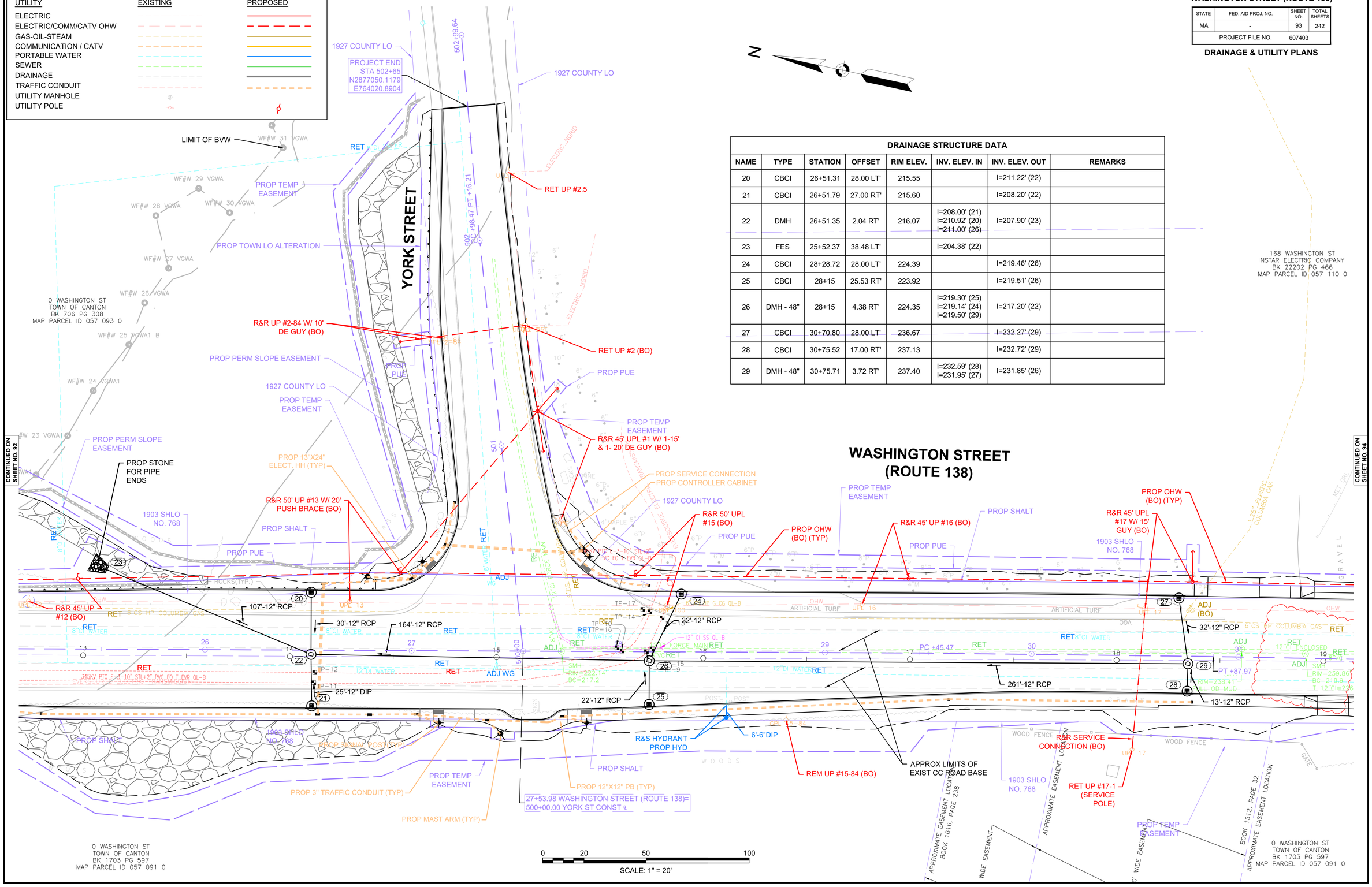
STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	93	242
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		



DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
20	CBCI	26+51.31	28.00 LT'	215.55		I=211.22' (22)	
21	CBCI	26+51.79	27.00 RT'	215.60		I=208.20' (22)	
22	DMH	26+51.35	2.04 RT'	216.07	I=208.00' (21) I=210.92' (20) I=211.00' (26)	I=207.90' (23)	
23	FES	25+52.37	38.48 LT'		I=204.38' (22)		
24	CBCI	28+28.72	28.00 LT'	224.39		I=219.46' (26)	
25	CBCI	28+15	25.53 RT'	223.92		I=219.51' (26)	
26	DMH - 48"	28+15	4.38 RT'	224.35	I=219.30' (25) I=219.14' (24) I=219.50' (29)	I=217.20' (22)	
27	CBCI	30+70.80	28.00 LT'	236.67		I=232.27' (29)	
28	CBCI	30+75.52	17.00 RT'	237.13		I=232.72' (29)	
29	DMH - 48"	30+75.71	3.72 RT'	237.40	I=232.59' (28) I=231.95' (27)	I=231.85' (26)	

DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
30	CBCI	36+36.20	17.00 RT'	238.07		I=232.70' (32)	
31	CBCI	36+36.53	28.00 LT'	237.84		I=234.10' (32)	
32	DMH - 48"	36+47.01	15.61 RT'	237.94	I=233.59' (31) I=232.45' (30)	I=232.44' (34)	
33	CBCI	36+63.33	28.00 LT'	237.45		I=233.60' (34)	
34	DMH - 48"	36+75.72	16.10 RT'	237.51	I=232.01' (32) I=233.18' (33)	I=232.91' (35)	

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	94	242
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS

168 WASHINGTON ST
NSTAR ELECTRIC COMPANY
BK 22202 PG 466
MAP PARCEL ID 057 110 0

198 WASHINGTON ST
FRANCIS WILL
aka FRANCIS A. WILL
TRUSTEE OF AREA REALTY
TRUST II
BK 7563 PG 306
MAP PARCEL ID 057 111 0

214 WASHINGTON ST
PETER H. P. & ANGELA F LEE,
TRUSTEES OF YUNG-LAU
REALTY TRUST
BK 7110 PG 583
MAP PARCEL ID 057 112 0

234 WASHINGTON ST
UH STORAGE (DE)
LIMITED PARTNERSHIP
BK 21043 PG 108
MAP PARCEL ID 057 113 0

WASHINGTON STREET (ROUTE 138)

PROP TEMP EASEMENT
R&R SERVICE CONNECTION (BO)
R&R 45' UP #18 (BO)
PROP OHW (BO) (TYP)
PROP PUE
R&R 45' UPL #19 (BO)
PROP TEMP EASEMENT
END 1903 SHLO NO. 768
BEGIN 1902 SHLO NO. 675
R&R 45' UP #20 (BO)
EXIST CONCRETE PAD
EXIST ELEC TRANSFORMER
PROP OHW (BO) (TYP)
PROP 2-3P ELEC SERVICE RELOCATION:
4" RGS RISER & SWEEP, 4'-4" PVC CONC. ENCASED &
NGRID APPROVED HANDHOLE (POLYMER CONC)
CONNECT TO EXISTING (ITEM 826.7)
R&R 45' UP #21 (BO)
PROP TEMP EASEMENT
R&R 45' UP #21-1 (BO)
PROP SHALT
PROP PUE
1902 SHLO NO. 675
R&R 45' UPL #22 W/ 10' SW GUY (BO)
1903 SHLO NO. 768
APPROX LIMITS OF EXIST CC ROAD BASE
ADJ HYD & WG
PROP TEMP EASEMENT
END 1903 SHLO NO. 768
BEGIN 1902 SHLO NO. 675
PROP TEMP EASEMENT
PROP TEMP EASEMENT
1902 SHLO NO. 675
R&R 50' UP #22-1 SET EXTRA DEEP W/ 4' SW GUY (BO) (SERVICE POLE)
PROP PUE
R&R SERVICE (BO)
42'-12" RCP
41'-12" RCP
8'-12" RCP
25'-12" RCP
212'-12" RCP
21+35.25
21+35.86
CONTINUED ON SHEET NO. 93
CONTINUED ON SHEET NO. 95

0 WASHINGTON ST
TOWN OF CANTON
BK 1703 PG 597
MAP PARCEL ID 057 091 0

217 WASHINGTON ST
ALLIOS LLC
BK 31856 PG 458
MAP PARCEL ID 057 089 0

247 WASHINGTON ST
V AND D
ASSOCIATES LLC
BK 34715 PG 31
MAP PARCEL ID
057 090 0

265 WASHINGTON ST
D E FOODS LLC
BK 28810 PG 270
MAP PARCEL ID 057 087 0

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

0 20 50 100
SCALE: 1" = 20'

Nitsch – P:\08000-09999\9720.16 Rt138 Stoughton\Transportation\CAD\607403 CAD\Project Drawing Data\DWG\607403_HD(UTILITY).dwg Oct 17, 2022 12:19 PM

607403_HD(UTILITY).DWG Plotted on 17-Oct-2022 12:19 PM

DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
35	DMH - 48"	38+91.93	19.62 RT'	235.07	I=230.50' (34) I=230.50' (36)	I=230.45' (37)	
36	CB	38+87.19	28.00 RT'	234.92		I=230.55' (35)	
37	DMH - 48"	39+22.55	7.81 RT'	235.21	I=231.00' (35) I=231.05' (38)	I=231.00' (121)	REM EX DMH CONNECT TO EX PIPES
38	CB	38+90.75	28.00 LT'	234.90		I=231.29' (37)	
39	CB	39+56.80	28.00 RT'	234.77		I=230.95' (40)	
40	DMH	39+89.30	7.86 RT'	235.23	I=230.75' (39) I=230.69' (121) I=230.20' (EX)	I=230.69' (43)	ADJ
41	CBCI	40+30.97	28.00 RT'	234.99		I=230.97' (43)	
42	CBCI	40+30.68	28.00 LT'	234.99		I=230.97' (43)	
43	DMH - 48"	40+30.97	7.75 RT'	235.40	I=230.72' (41) I=230.64' (42) I=230.50' (40)	I=230.50' (46)	
44	CBCI	40+72.72	28.00 RT'	235.28		I=232.11' (46)	
45	CBCI	40+98.91	28.00 LT'	235.52		I=230.60' (46)	
46	DMH	41+12.08	7.56 RT'	236.05	I=231.80' (44) I=230.35' (45) I=230.10' (43)	I=230.10' (EX)	ADJ, CONNECT TO EX
121	DMH	39+52.54	7.40 RT'	235.18	I=230.86' (37) I=230.91' (EX) I=230.91' (EX)	I=230.86' (40)	ADJ

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	95	242
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS

CONTINUED ON SHEET NO. 94

CONTINUED ON SHEET NO. 96

234 WASHINGTON ST
UH STORAGE (DE)
LIMITED PARTNERSHIP
BK 21043 PG 108
MAP PARCEL ID 057 113 0

270 WASHINGTON ST
FERNANDES JEFFREY B
BK 29882 PG 582
MAP PARCEL ID 057 146 0

0 WASHINGTON ST
STOUGHTON MZL LLC
BK 29634 PG 451
CERT. 183805
MAP PARCEL ID 057 147 0

0 WASHINGTON ST
STOUGHTON MZL LLC
BK 29634 PG 451
CERT. 183805
MAP PARCEL ID 057 148 0

247 WASHINGTON ST
V AND D
ASSOCIATES LLC
BK 34715 PG 31
MAP PARCEL ID
057 090 0

N/F
LNT CAPITAL PARTNERS, LLC
MAP 56, PARCEL 105
BK.35386, PG.583

N/F
THE ROMAN CATHOLIC
ARCHBISHOP OF BOSTON
BOOK 1076, PAGE 635
MAP 56, PARCEL 99

CHARLES AVENUE

WASHINGTON STREET (ROUTE 138)

STOP AND SHOP DRIVEWAY

THOMAS STREET

1939 TOWN LO

PRIVATE LO

UPGRADE UP #2 IN PLACE (BO) (SERVICE)

RET UP #2

R&R SERVICE CONNECTION (BO)

R&R 45' UPL #1 W/ 20' PUSH BRACE (BO)

R&R 45' UP #1 W/ 15' DE GUY (BO)

PROP. SLACK SPAN (BO)

R&S EXIST CONTROLLER, PROP 13"X24" ELECT HH

PROP CONTROLLER CABINET

PROP SERVICE CONNECTION

PROP TEMP EASEMENT

R&R 50' UPL #23 W/ 15' GUY (BO)

PROP PUE

PROP SHALT

RET HYD

RET 6" CS-HP COLUMBIA GAS

R&R SERVICE (BO)

RET 12" CI

RET 8" SEWER

212'-12" RCP

REM EX CB & 10" DIP PIPE

6'-12" RCP

29'-12" RCP

ABAN & PLUG EX PIPE

REM EX CB 44'-12" RCP

30'-12" RCP

27'-15" RCP

34'-15" RCP

36'-12" RCP

37'-15" RCP

35'-12" RCP

REM EX

32'-12" RCP

REM EX CB 34'-12" RCP

77'-15" RCP

40'-12" RCP CLASS V

16'-12" RCP

REM EX CB

RET LIGHT POLE

REM UP #24-1 (BO)

PROP SIGNAL POST(TYP)

R&R 50' UPL #24 (BO)

PROP TEMP EASEMENT

PUE

PROP 12"X12" PB (TYP)

R&R 45' UP #25 W/ 6' SW GUY (BO)

PROP OHW (BO) (TYP)

APPROX LIMITS OF EXIST CC ROAD BASE

R&R 45' UPL #26 (BO)

1902 SHLO NO. 675

UPGRADE UP #27-1 IN PLACE (BO)

R&R 45' UPL #27 (BO)

PROP 9'-12" DI

6'-6" DIP

R&R SERVICE (BO)

RET UP #27-30

REM EX DRAIN PROP TRENCH DRAIN

PROP 6'-12" DI

R&R 50' UP #22-1 SET EXTRA DEEP W/ 4' SW GUY (BO) PROP TEMP POLE HOLD (BO)

R&R 50' UP #23-1 W/ 8' SW GUY (BO) R&R SERVICE

PROP 13"X24" ELECT. HH (TYP)

PROP 3" TRAFFIC CONDUIT (TYP)

PROP 2-3P ELEC SERVICE RELOCATION: 4" RGS RISER & SWEEP, 9'-4" PVC CONC. ENCASED & NGRID APPROVED HANDHOLE (POLYMER CONC) CONNECT TO EXISTING (ITEM 826.7)

RET UP #25-1 (BO)

R&S HYD PROP HYD

REM EX DRAIN PROP TRENCH DRAIN

PROP SHALT

PROP TEMP EASEMENT

1 STORY BLOCK BUILDING

1 STORY METAL OFFICE & WAREHOUSE FF=236.93

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

0 20 50 100
SCALE: 1" = 20'

DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
47	CBCI	45+80.78	30.76 RT'	237.34		I=233.65' (49)	
48	CBCI	45+85.51	31.00 LT'	237.31		I=234.29' (EX)	CONNECT TO EX PIPE
49	DMH	46+07.90	5.45 RT'	237.65	I=233.44' (47) I=228.84' () I=228.39' ()	I=228.49' (50)	ADJ
50	DMH	46+71.73	7.33 RT'	237.35	I=232.47' (51) I=228.47' (49) I=232.47' ()	I=228.47' (53)	ADJ
51	CBCI	46+52.48	33.00 RT'	236.86		I=232.70' (50)	
52	CBCI	46+55.73	33.00 LT'	236.86			CONNECT TO EX
53	DMH	47+01.28	7.68 RT'	237.41	I=232.43' (54) I=228.43' (50) I=232.23' (EX) I=232.23' (55)	I=228.43' (56)	ADJ
54	CBCI	46+77.90	33.00 RT'	236.84		I=232.68' (53)	
55	CBCI	46+79.59	33.00 LT'	236.84		I=233.10' (53)	CONNECT TO EX
56	DMH	48+55.72	9.65 RT'	238.49	I=234.09' (58) I=234.94' (57) I=227.64' (53)	I=227.64' (EX)	ADJ
57	CBCI	48+40.02	33.00 LT'	237.85		I=235.25' (56)	
58	CB	48+53.66	16.04 RT'	238.34	I=234.80' (59)	I=234.25' (56)	PROP F&C
59	GICI	48+47.99	33.00 RT'	237.94		I=235.44' (58)	

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	96	242
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS

N/F
STOUGHTON MZL LLC
MAP 56, PARCEL 109
BK.29634, PG.460

N/F
GLOBAL MONTELLO
GROUP CORP.
MAP 56, PARCEL 1
BK.35085, PG.16

KIMBALL AVENUE
WASHINGTON STREET (ROUTE 138)
HALLIDEN STREET
1950 TOWN LO

UPGRADE UP #27-1 IN PLACE (BO)
RET UP #187/1
UPL 187/1
PROP 2-3P ELEC SERVICE RELOCATION: 4" RGS RISER & SWEEP, 26'-4" PVC CONC. ENCASED & NGRID APPROVED HANDHOLE (POLYMER CONC) CONNECT TO EXISTING (ITEM 826.7)
PROP 2-3P ELEC SERVICE RELOCATION: 4" RGS RISER & SWEEP, 10'-4" PVC CONC. ENCASED & NGRID APPROVED HANDHOLE (POLYMER CONC) CONNECT TO EXISTING (ITEM 826.7)
R&R 45' UPL #27 (BO)
R&R 45' UPL #29 (BO)
R&R 45' UP #30 (BO)
R&R SERVICE (BO)
R&R UP #31 (BO)
R&R 45' UP #32 (BO)
R&R 45' UP #27-50 (BO)
R&R 45' UPL #28 W/ 10' DE GUY (BO)
PROP OHW (BO) (TYP)
BUILD OVER EXIST PIPE
REM EX CB
REM EX CB
2'-12" RCP CONNECT TO EX
REM EX CB
REM EX PIPE
REM EX CB
REM EX CB
REM EX 8" METAL PIPE
REM EX CB
REM EX 6" METAL PIPE
REM EX TRENCH DRAIN
PROP TRENCH DRAIN(2)
33'-12" RCP CLASS V
28'-12" RCP
30'-12" RCP
42'-12" DIP
19'-6" DIP PROP 90° BEND
3'-12" RCP
15'-12" DIP
45° BEND
12" DIP
PROP CS
REM EX CB & PIPE
REM EX DRAIN PROP TRENCH DRAIN
PROP 6'-12" DI
RET UP #27-30
RET UP #28-1 (SERVICE POLE) PROP 10' GUY (BO) FOR SERVICE
RET UP #1 (SERVICE POLE)
R&R SERVICE (BO)
R&S HYD PROP HYD
RET LPL
PROP SHALT
PROP TEMP EASEMENT
PROP PUE
1902 SHLO NO. 675
RET
ADJ
ADJ (BO)
REM
CBCI
PRIVATE LO
6" WATER
8" SEWER
12" RCP
24" RCP
18" VC
4" VINYL FENCE
6" STONEWALL
4' CHAINLINK FENCE
UNDERGROUND GASLINE
SEWER
CANOPY OVER GAS PUMPS
OVERHANG
MULCH AREA
CONC. WALK
STEEL BEAM GUARDRAIL
DRAIN EASEMENT BOOK 4961 PAGE 27

BANK OF AMERICA
1 STORY BRICK
FF=239.77
#330
DRIVE THRU

PAPA GINO'S
1 STORY BRICK
FF=240.46
#319

WENDY'S
1 STORY BRICK
FF=
#351

1 STORY BRICK
FF=240.53
#341-345

N/F
WS REALTY TRUST
MAP 56, PARCEL 103
BK.18023, PG.405

N/F
353-355 WASHINGTON
STREET, STOUGHTON LLC
MAP 56, PARCEL 101
BK.16358, PG.80

N/F
LEON S. FINKEL
MAP 56, PARCEL 102
BK.3078, PG.181

N/F
STOUGHTON WASHINGTON
LIMITED PARTNERSHIP
MAP 56, PARCEL 100
CERT. No.151368

N/F
THE ROMAN CATHOLIC
ARCHBISHOP OF BOSTON
BOOK 1076, PAGE 635
MAP 56, PARCEL 99

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

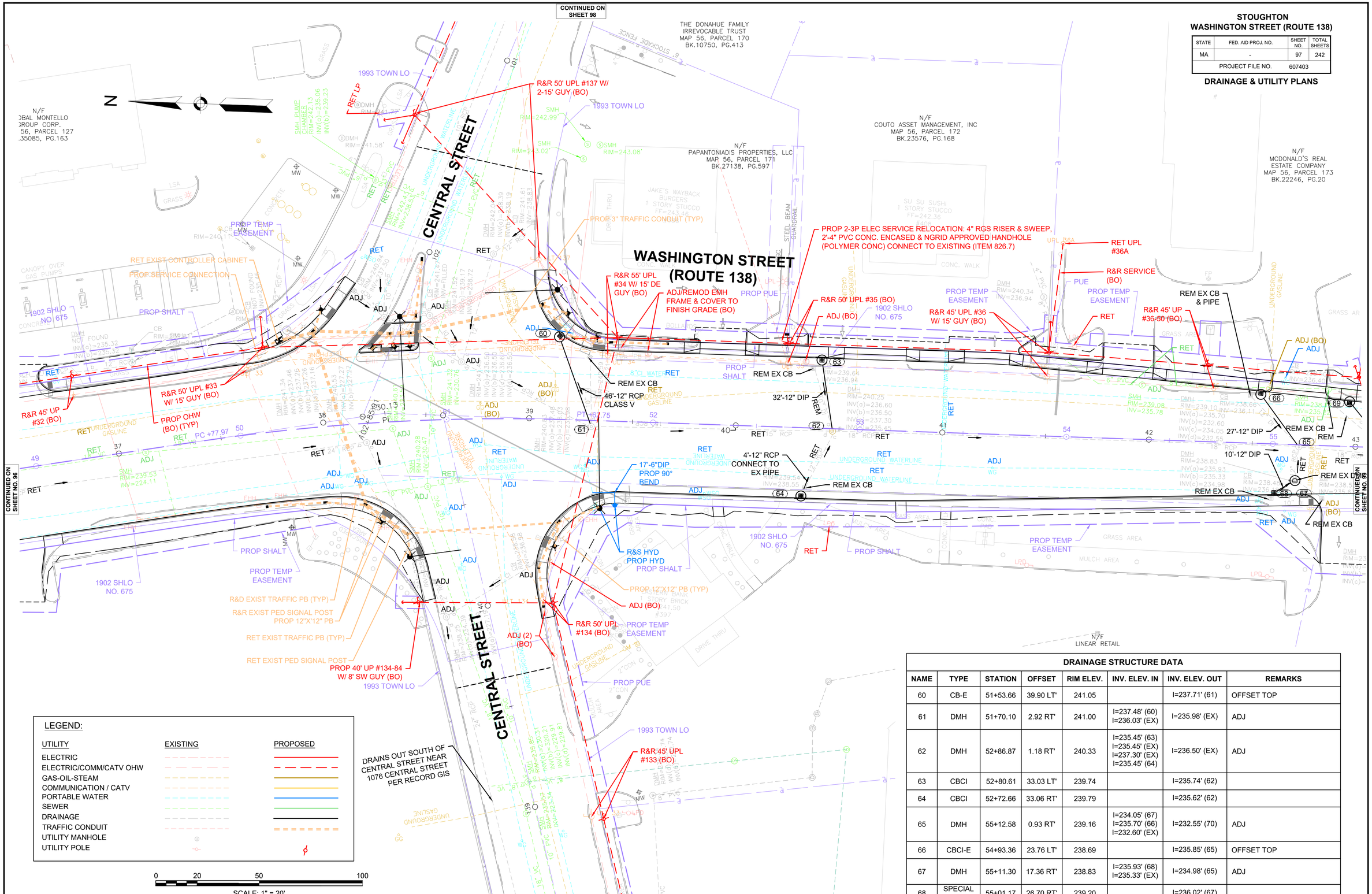
0 20 50 100
SCALE: 1" = 20'

CONTINUED ON SHEET NO. 95
CONTINUED ON SHEET NO. 97

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	97	242
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS



LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

0 20 50 100

SCALE: 1" = 20'

DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
60	CB-E	51+53.66	39.90 LT'	241.05		I=237.71' (61)	OFFSET TOP
61	DMH	51+70.10	2.92 RT'	241.00	I=237.48' (60) I=236.03' (EX)	I=235.98' (EX)	ADJ
62	DMH	52+86.87	1.18 RT'	240.33	I=235.45' (63) I=235.45' (EX) I=237.30' (EX) I=235.45' (64)	I=236.50' (EX)	ADJ
63	CBCI	52+80.61	33.03 LT'	239.74		I=235.74' (62)	
64	CBCI	52+72.66	33.06 RT'	239.79		I=235.62' (62)	
65	DMH	55+12.58	0.93 RT'	239.16	I=234.05' (67) I=235.70' (66) I=232.60' (EX)	I=232.55' (70)	ADJ
66	CBCI-E	54+93.36	23.76 LT'	238.69		I=235.85' (65)	OFFSET TOP
67	DMH	55+11.30	17.36 RT'	238.83	I=235.93' (68) I=235.33' (EX)	I=234.98' (65)	ADJ
68	SPECIAL CBCI	55+01.17	26.70 RT'	239.20		I=236.02' (67)	

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	98	242
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS

DRAINS OUT SOUTH OF CENTRAL STREET NEAR 1076 CENTRAL STREET PER RECORD GIS

CENTRAL STREET

UPGRADE UP #131 IN PLACE W/ PROP POLE TO POLE GUY (BO)

R&R 45' UPL #132 W/ (2) 15' GUY (BO)

PROP PUE

R&R 45' UPL #133 (BO)

PROP 40' UP #134-84 W/ 8' SW GUY (BO)

1993 TOWN LO

ADJ (2) (BO)

R&R 50' UPL #134 (BO)

PROP PUE 1993 TOWN LO

PROP TEMP EASEMENT ADJ (BO)

PROP 32' X12' PB (TYP)

R&S HYD PROP HYD

0 20 50 100

SCALE: 1" = 20'

CONTINUED ON SHEET NO. 97

PROP TEMP EASEMENT

RET LP

1993 TOWN LO

R&R 45' UPL #138 W/ 6' SW GUY & 10' GUY (BO)

RET ULT #139

R&R SERVICE (BO)

R&R 50' UPL #137 W/ 2-15' GUY (BO)

EWING DRIVE

PACKARD ROAD

BK.5195, PG.657

AUXILIARY BASELINE B – LAYOUT NO. 7066

98+00

PROP 3" TRAFFIC CONDUIT (TYP)

N/F THE DONAHUE FAMILY IRREVOCABLE TRUST MAP 56, PARCEL 170

N/F

CONTINUED ON SHEET NO. 97

0 20 50 100

SCALE: 1" = 20'

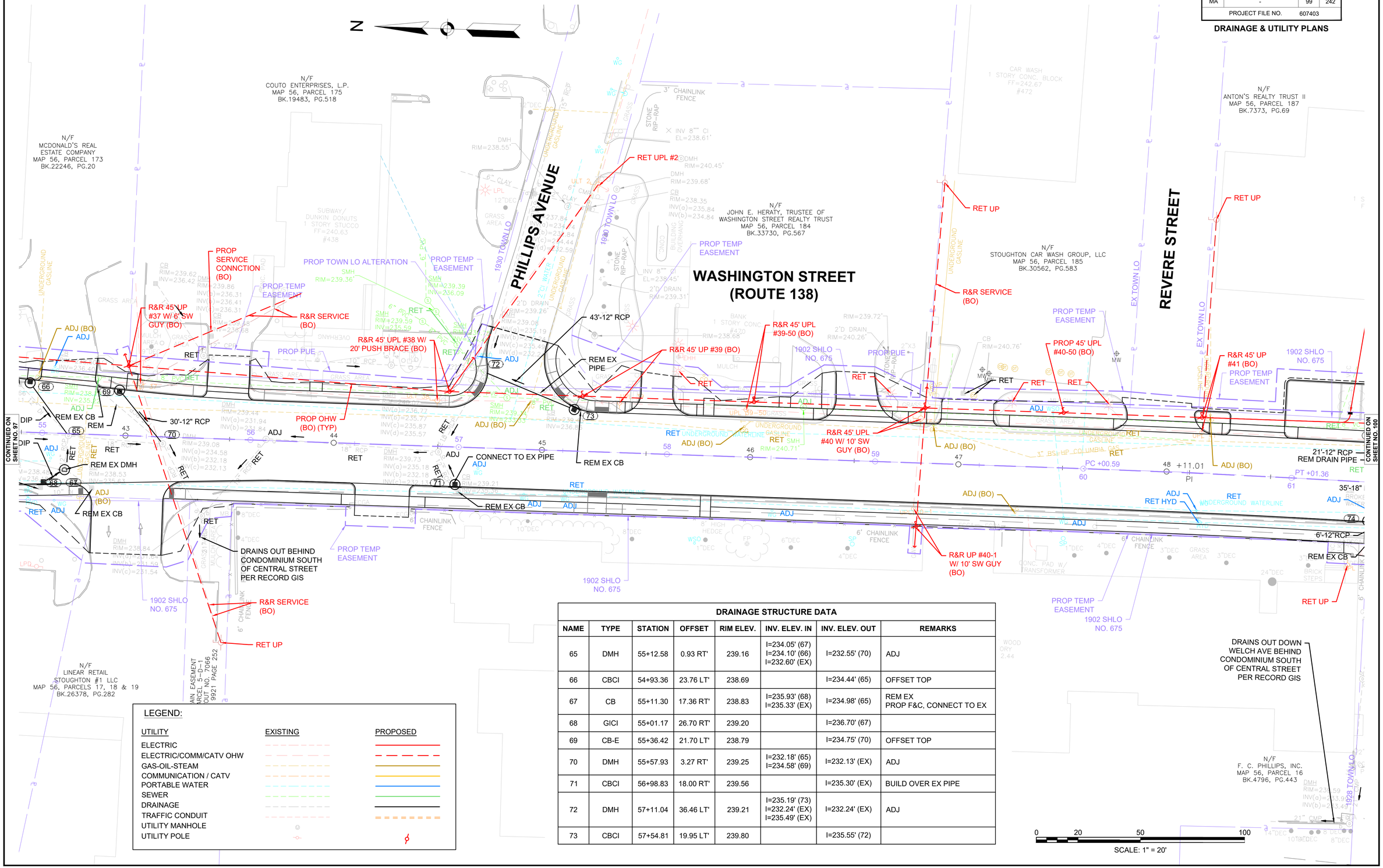
LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	99	242
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS



DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
65	DMH	55+12.58	0.93 RT'	239.16	I=234.05' (67) I=234.10' (66) I=232.60' (EX)	I=232.55' (70)	ADJ
66	CBCI	54+93.36	23.76 LT'	238.69		I=234.44' (65)	OFFSET TOP
67	CB	55+11.30	17.36 RT'	238.83	I=235.93' (68) I=235.33' (EX)	I=234.98' (65)	REM EX PROP F&C, CONNECT TO EX
68	GICI	55+01.17	26.70 RT'	239.20		I=236.70' (67)	
69	CB-E	55+36.42	21.70 LT'	238.79		I=234.75' (70)	OFFSET TOP
70	DMH	55+57.93	3.27 RT'	239.25	I=232.18' (65) I=234.58' (69)	I=232.13' (EX)	ADJ
71	CBCI	56+98.83	18.00 RT'	239.56		I=235.30' (EX)	BUILD OVER EX PIPE
72	DMH	57+11.04	36.46 LT'	239.21	I=235.19' (73) I=232.24' (EX) I=235.49' (EX)	I=232.24' (EX)	ADJ
73	CBCI	57+54.81	19.95 LT'	239.80		I=235.55' (72)	

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
74	CB-E	61+37.69	17.97 RT'	240.14		I=235.97' (75)	OFFSET TOP
75	DMH - 48"	61+47.67	17.97 RT'	240.14	I=235.92' (74) I=235.07' (76)	I=234.77' ()	
76	DMH - 48"	61+81.87	0.19 LT'	240.52	I=235.92' (81) I=235.18' (78) I=235.17' (82)	I=234.87' (75)	
77	CB-E	61+41.26	18.59 LT'	240.12		I=235.96' (78)	OFFSET TOP
78	DMH - 48"	61+65.75	12.61 LT'	240.25	I=235.83' (77) I=235.87' (80) I=235.38' (79)	I=235.28' (76)	
79	CIT	61+65.79	27.05 LT'	240.25	I=235.09' () I=235.09' ()	I=234.99' (78)	CIT
80	CB-E	61+93.84	18.59 LT'	240.18		I=236.02' (78)	OFFSET TOP
81	CBCI	61+92.50	18.05 RT'	240.19		I=236.03' (76)	
82	DMH - 48"	63+85.93	0.10 RT'	241.19	I=236.62' (83) I=236.62' (101)	I=236.62' (76)	
83	CBCI	64+16.94	18.01 RT'	240.96		I=236.80' (82)	
84	CBCI	66+70.79	17.99 RT'	242.75		I=238.58' (85)	
85	DMH - 48"	66+80.14	16.41 RT'	242.85	I=238.53' (84) I=236.39' (87)	I=236.19' ()	CONNECT TO EX
86	CBCI	66+80.06	36.90 LT'	242.55		I=238.05' (87)	
87	DMH	66+91.57	32.96 LT'	242.59	I=237.96' (86) I=242.09' (88) I=238.76' () I=236.71' (89)	I=236.46' (85)	ADJ
101	CBCI	64+12.88	18.00 LT'	240.94		I=236.80' (82)	OFFSET TOP

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	100	242
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

N

WASHINGTON STREET (ROUTE 138)

WARREN AVENUE

BOYDEN STREET

N PAUL STREET

RET UP

PROP 2-3P ELEC SERVICE RELOCATION: 3" RGS RISER & SWEEP, 73'-3" PVC CONC. ENCASED & NGRID APPROVED HANDHOLE (POLYMER CONC) CONNECT TO EXISTING (ITEM 826.7)

RET UP #2

R&R 45' UP #41 (BO)

PROP TEMP EASEMENT

1902 SHLO NO. 675

11'-18" RCP ADJ (BO)

R&R 45' UPL #42 W/ 15' DE GUY (BO)

ADJ

R&R 45' UP #43 (BO)

PROP 45' UP #43-50 (BO)

R&R 45' UPL #44 W/ 15' GUY (BO)

REM EX CB & PIPE

28'-12" RCP

PROP 2-3P ELEC SERVICE RELOCATION: 4" RGS RISER & SWEEP, 49'-4" PVC CONC. ENCASED & NGRID APPROVED HANDHOLE (POLYMER CONC) CONNECT TO EXISTING (ITEM 826.7)

RET UP #1

R&R SERVICE (BO)

8'-12" RCP

21'-12" RCP REM DRAIN PIPE

ADJ (BO)

PROP GAS RELOCATION (BO)

PROP PUE

PROP OHW (BO) (TYP)

16'-12"RCP

25'-12"RCP

200'-12" RCP

35'-18" RCP

17'-12"RCP

REM EX CB

6'-12"RCP

32'-12" RCP

PROP 5'-6" DIP

R&S HYD

PROP HYD

REM EX DMH

R&R 45' UPL #45 (BO)

PROP 45' UP #45-50 (BO)

5'-12" RCP

RET UP #1

RET UP #2

R&D

R&R 45' UP #43-1 W/ 10' DE SW GUY (BO)

R&R 40' UP #44-1 W/ 10' DE GUY (BO)

RET UP #45-1

DRAINS OUT DOWN WELCH AVE BEHIND CONDOMINIUM SOUTH OF CENTRAL STREET PER RECORD GIS

DRAINS OUT BEHIND 549 WASHINGTON STREET PER RECORD GIS

PROP DRAINAGE EASEMENT

N/F PAUL J. RICARDO & KRISTIN A. GOLDEN MAP 55, PARCEL 111 BK.19006, PG.331

N/F 516 WASHINGTON STREET REALTY, LLC MAP 55, PARCEL 11 BK.24773, PG.75

N/F EUGENIA M. GEORGES MAP 55, PARCEL 126 BK.6200, PG.155

N/F TRILIKO FROSCO REALTY TRUST MAP 55, PARCEL 124 BK.30477, PG.294

N/F RANDOLPH SAVINGS BANK MAP 55, PARCEL 107 BK.33773, PG.353

N/F CB STOUGHTON, LLC MAP 55, PARCEL 106 BK.33664, PG.117

N/F CB STOUGHTON, LLC MAP 55, PARCEL 105 BK.33664, PG.117

N/F F. C. PHILLIPS, INC. MAP 56, PARCEL 16 BK.4796, PG.443

CONTINUED ON SHEET NO. 99

CONTINUED ON SHEET NO. 101

0 20 50 100

SCALE: 1" = 20'

Nitsch – P:\08000-09999\9720.16 Rt138 Stoughton\Transportation\CAD\607403 CAD\Project Drawing Data\DWG\607403_HD(UTILITY).dwg Oct 17, 2022 12:22 PM

607403_HD(UTILITY).DWG Plotted on 17-Oct-2022 12:22 PM

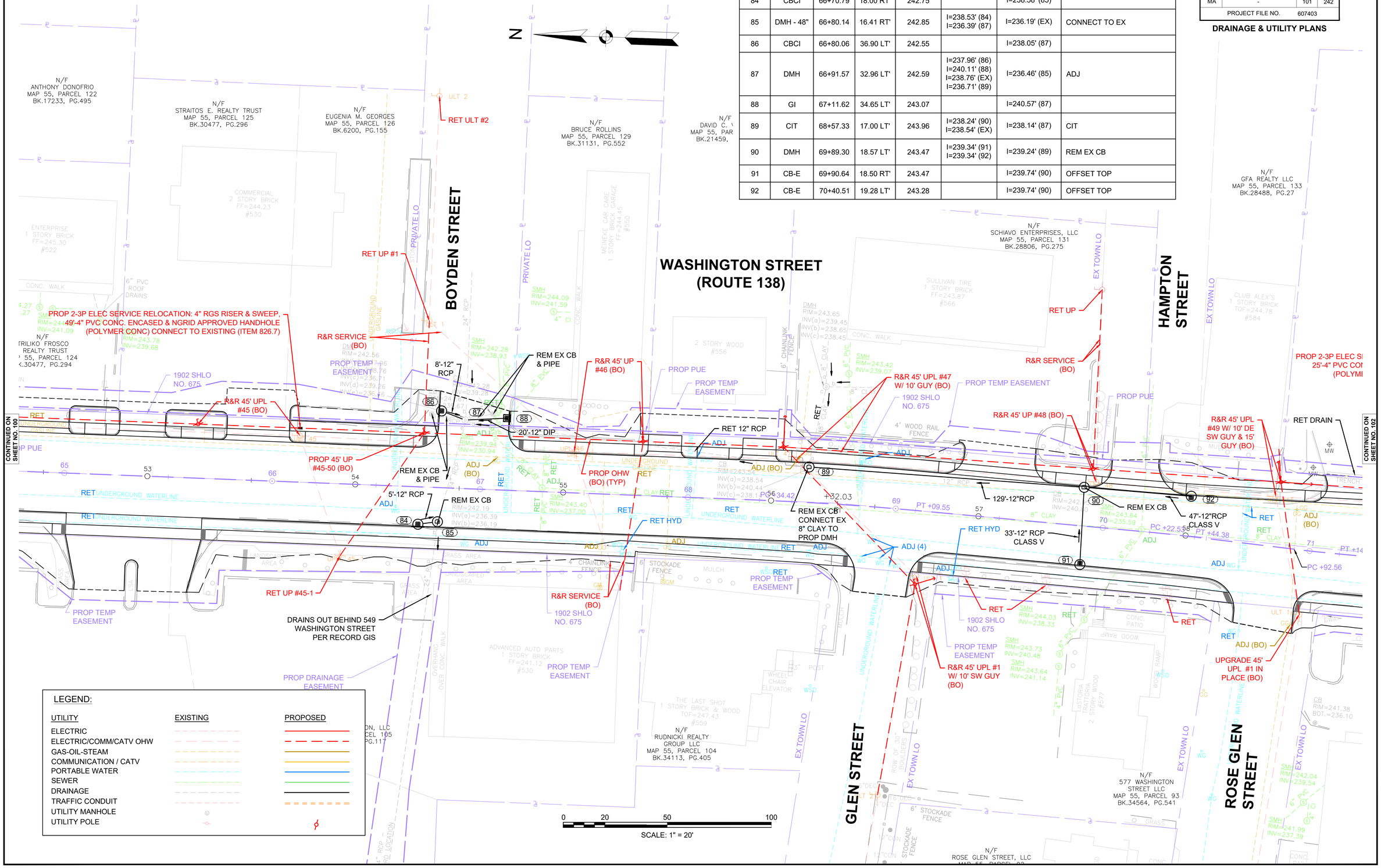
DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
84	CBCI	66+70.79	18.00 RT'	242.75		I=238.58' (85)	
85	DMH - 48"	66+80.14	16.41 RT'	242.85	I=238.53' (84) I=236.39' (87)	I=236.19' (EX)	CONNECT TO EX
86	CBCI	66+80.06	36.90 LT'	242.55		I=238.05' (87)	
87	DMH	66+91.57	32.96 LT'	242.59	I=237.96' (86) I=240.11' (88) I=238.76' (EX) I=236.71' (89)	I=236.46' (85)	ADJ
88	GI	67+11.62	34.65 LT'	243.07		I=240.57' (87)	
89	CIT	68+57.33	17.00 LT'	243.96	I=238.24' (90) I=238.54' (EX)	I=238.14' (87)	CIT
90	DMH	69+89.30	18.57 LT'	243.47	I=239.34' (91) I=239.34' (92)	I=239.24' (89)	REM EX CB
91	CB-E	69+90.64	18.50 RT'	243.47		I=239.74' (90)	OFFSET TOP
92	CB-E	70+40.51	19.28 LT'	243.28		I=239.74' (90)	OFFSET TOP

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	101	242
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS



LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

DRAINAGE STRUCTURE DATA

NAME	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
92	CB-E	70+40.51	19.28 LT'	243.28		I=239.74' (90)	OFFSET TOP
93	CBCI	73+29.32	28.00 LT'	242.06		I=237.90' (95)	
94	CBCI	73+40.41	18.00 RT'	242.18		I=238.79' (95)	
95	DMH - 48"	73+70.20	9.25 RT'	242.14	I=237.62' (93) I=237.62' (94)	I=237.52' (96)	
96	DMH - 48"	74+05.43	9.32 LT'	242.00	I=237.33' (95) I=235.75' (97)	I=235.75' (100)	BUILD OVER EX
97	DMH - 48"	73+93.19	53.35 LT'	241.96	I=237.46' (98) I=236.51' (99)	I=236.41' (96)	BUILD OVER EX
98	CBCI	73+75.70	42.01 LT'	242.10		I=237.60' (97)	
99	CIT	73+86.26	77.71 LT'	242.45	I=236.98' (EX) I=236.98' (EX) I=239.75' (EX) I=236.98' (EX) I=236.98' (EX)	I=236.88' (97)	CIT
100	DMH	75+50.08	27.91 LT'	240.28	I=235.28' (EX) I=235.28' (EX) I=235.08' (96)	I=235.08' (EX)	RET

STOUGHTON
WASHINGTON STREET (ROUTE 138)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	102	242
PROJECT FILE NO.	607403		

DRAINAGE & UTILITY PLANS

N

WASHINGTON STREET (ROUTE 138)

HAMPTON STREET

ROSE GLEN STREET

LINCOLN STREET

formerly WASHINGTON COURT (18' WIDE)

MARGANELLA
MAP 55, PARCEL 137
BK.5606, PG.323

N/F
CITY REALTY TRUST
MAP 55, PARCEL 168
CERT. NO.122193

N/F
CUMBERLAND EAT STOUGHTON, LLC
MAP 55, PARCEL 135
BK.32559, PG.175

N/F
BOSWICK REALTY TRUST
MAP 55, PARCEL 136
BK.13274, PG.598

N/F
STOUGHTON HARLEQUIN, LLC
MAP 55, PARCEL 167
BK.31412, PG.195

N/F
STOUGHTON HARLEQUIN, LLC
MAP 55, PARCEL 166
BK.31412, PG.195

N/F
577 WASHINGTON STREET LLC
MAP 55, PARCEL 93
BK.34564, PG.541

N/F
WASHINGTON CIRCLE REALTY TRUST
MAP 55, PARCEL 80
BK.14082, PG.492

N/F
TOWN OF STOUGHTON
MAP 55, PARCEL 75
BK.– PG.–

CONTINUED ON SHEET NO. 101

PROP 1-3P ELEC SERVICE RELOCATION: 4" RGS RISER & SWEEP, 52'-4" PVC CONC. ENCASED & NGRID APPROVED HANDHOLE (POLYMER CONC) CONNECT TO EXISTING (ITEM 826.7) CONTRACTOR TO COORDINATE CABLE AND TELEPHONE SERVICE WITH EACH RESPECTIVE UTILITY COMPANY WHERE AN ELECTRIC SERVICE RELOCATION IS REQUIRED. CONDUIT FOR THE CABLE AND TELEPHONE SERVICE WILL BE PAID FOR UNDER ITEM 804.2 - 2 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC (UL).

PROP 2-3P ELEC SERVICE RELOCATION: 4" RGS RISER & SWEEP, 25'-4" PVC CONC. ENCASED & NGRID APPROVED HANDHOLE (POLYMER CONC) CONNECT TO EXISTING (ITEM 826.7)

PROP 2-3P ELEC SERVICE RELOCATION: 4" RGS RISER & SWEEP, 104'-4" PVC CONC. ENCASED & NGRID APPROVED HANDHOLE (POLYMER CONC) CONNECT TO EXISTING (ITEM 826.7)

RET UP #2 W/ PROP 15' GUY (BO)

R&R 45' UP #1 W/ 10' SW DE GUY (BO)

PROP SLACK SPAN BETWEEN UP #1 & UPL #52 (BO)

R&R 45' UPL #52 W/ 10' SW GUY (BO)

RET UPL #53 W/ PROP 20' PUSH BRACE (BO)

PROP 45' UP #52-50 (BO)

R&R 45' UP #50 W/ 15' GUY (BO)

R&R 45' UPL #49 W/ 10' DE SW GUY & 15' GUY (BO)

R&R 45' UPL #51 (BO)

RET UPL #54 PROP 20' GUY (BO) (LOCATION BASED ON TIE MEASUREMENTS)

PROP 45' UP #49-50 (BO)

PROP OHW (BO) (TYP)

PROP 24' TRENCH DRAIN

PROP 9'-6" DIP

R&S HYD PROP HYD

UPGRADE 45' UPL #1 IN PLACE (BO)

REM EX CB

REM EX DRAIN

RET DRAIN

47'-12"RCP CLASS V

51'-12"RCP

27'-12"RCP

17'-12"RCP

36'-12"RCP

142'-12"RCP

RET EX PIPE

ABAN PIPE

PROP PUE

PROP TEMP EASEMENT

PROP SHALT

1902 SHLO NO. 675

1980 TOWN LO

1930 COUNTY LO

END1902 SHLO NO. 6750
BEGIN 1930 COUNTY LO

LIMIT OF MILLING & OVERLAY
STA 74+90.00
N 2872275.0755
E 764158.8937

PROJECT END
STA 75+75
N2872190.2215
E764153.9802

SEE INSET "A"

INSET "A"
SCALE: 1" = 20'

LEGEND:

UTILITY	EXISTING	PROPOSED
ELECTRIC		
ELECTRIC/COMM/CATV OHW		
GAS-OIL-STEAM		
COMMUNICATION / CATV		
PORTABLE WATER		
SEWER		
DRAINAGE		
TRAFFIC CONDUIT		
UTILITY MANHOLE		
UTILITY POLE		

0 20 50 100
SCALE: 1" = 20'

Project Description

File Name	9720.16_SSA-rev.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	00:00:00	0:00:00
End Analysis On	00:00:00	1:00:00
Start Reporting On	00:00:00	0:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	13
Nodes	26
Junctions	9
Outfalls	4
Flow Diversions	0
Inlets	13
Storage Nodes	0
Links	20
Channels	0
Pipes	20
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	10 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-06	0.12	0.7500	0.66	0.49	0.06	0.59	0 00:06:00
2	Sub-09	0.09	0.9000	0.66	0.59	0.05	0.53	0 00:06:00
3	Sub-10	0.26	0.8100	0.66	0.53	0.14	1.38	0 00:06:00
4	Sub-13	0.13	0.9000	0.66	0.59	0.08	0.78	0 00:06:00
5	Sub-14	0.10	0.9000	0.66	0.59	0.06	0.59	0 00:06:00
6	Sub-16	0.13	0.9000	0.66	0.59	0.08	0.77	0 00:06:00
7	Sub-17	0.34	0.5500	0.66	0.36	0.12	1.23	0 00:06:00
8	Sub-20	0.14	0.9000	0.66	0.59	0.08	0.82	0 00:06:00
9	Sub-21	0.28	0.5700	0.66	0.38	0.10	1.05	0 00:06:00
10	Sub-24	0.21	0.9000	0.66	0.59	0.12	1.23	0 00:06:00
11	Sub-25	0.24	0.7100	0.66	0.47	0.11	1.10	0 00:06:00
12	Sub-27	0.21	0.9000	0.66	0.59	0.12	1.22	0 00:06:00
13	Sub-28	0.18	0.7400	0.66	0.49	0.09	0.88	0 00:06:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	7	Junction	197.61	206.04	197.61	206.04	0.00	2.69	198.52	0.00	7.52	0 00:00	0.00	0.00
2	11	Junction	198.36	202.30	197.50	202.30	10.00	2.12	198.90	0.00	3.40	0 00:00	0.00	0.00
3	12	Junction	197.08	202.18	197.08	202.18	0.00	1.12	197.35	0.00	4.83	0 00:00	0.00	0.00
4	18	Junction	201.18	207.06	201.18	207.06	0.00	1.96	201.43	0.00	5.63	0 00:00	0.00	0.00
5	22	Junction	210.82	216.07	210.82	216.07	0.00	5.93	211.45	0.00	4.63	0 00:00	0.00	0.00
6	26	Junction	219.00	233.90	219.00	233.90	0.00	4.23	219.60	0.00	14.30	0 00:00	0.00	0.00
7	29	Junction	231.85	237.32	231.85	237.32	0.00	2.07	232.23	0.00	5.09	0 00:00	0.00	0.00
8	Out-1D-7	Junction	197.18	203.18	197.18	203.18	0.00	0.00	197.18	0.00	6.00	0 00:00	0.00	0.00
9	Out-1D-9	Junction	197.67	203.67	197.67	203.67	0.00	0.00	197.67	0.00	6.00	0 00:00	0.00	0.00
10	Out-1D-15	Outfall	193.00					1.12	193.00					
11	Out-1D-19	Outfall	194.20					1.96	194.41					
12	Out-1D-23	Outfall	204.00					5.91	204.00					
13	Out-1D-8	Outfall	197.50					2.68	198.16					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	D-10	Pipe	7	Out-1D-8	33.23	197.61	197.50	0.3300	15.000	0.0150	2.68	3.96	0.68	3.31	0.78	0.63	0.00	Calculated
2	D-11	Pipe	22	Out-1D-23	106.95	210.82	204.38	6.0200	15.000	0.0150	5.91	13.74	0.43	10.15	0.60	0.48	0.00	Calculated
3	D-12	Pipe	18	Out-1D-19	16.00	201.18	194.20	43.6200	12.000	0.0150	1.96	20.39	0.10	14.53	0.23	0.23	0.00	Calculated
4	D-13	Pipe	12	Out-1D-15	13.65	197.08	195.58	10.9900	12.000	0.0150	1.12	10.23	0.11	7.39	0.25	0.25	0.00	Calculated
5	D-14	Pipe	21	22	24.97	211.27	211.02	1.0000	12.000	0.0150	1.04	3.09	0.34	3.14	0.44	0.44	0.00	Calculated
6	D-16	Pipe	20	22	30.06	211.22	210.92	1.0000	12.000	0.0150	0.81	3.09	0.26	2.40	0.46	0.46	0.00	Calculated
7	D-17	Pipe	28	29	13.28	232.72	232.59	1.0000	12.000	0.0150	0.87	3.09	0.28	2.96	0.40	0.40	0.00	Calculated
8	D-18	Pipe	27	29	32.10	232.27	231.95	1.0000	12.000	0.0150	1.20	3.09	0.39	3.37	0.46	0.46	0.00	Calculated
9	D-19	Pipe	25	26	21.15	219.51	219.30	1.0000	12.000	0.0150	1.09	3.09	0.35	3.21	0.45	0.45	0.00	Calculated
10	D-2	Pipe	6	7	32.13	202.11	201.79	1.0000	12.000	0.0150	0.58	3.09	0.19	2.82	0.31	0.31	0.00	Calculated
11	D-20	Pipe	24	26	32.45	219.46	219.14	1.0000	12.000	0.0150	1.21	3.09	0.39	3.30	0.48	0.48	0.00	Calculated
12	D-21	Pipe	29	26	260.65	231.85	219.50	4.7400	12.000	0.0150	1.99	6.72	0.30	7.34	0.38	0.38	0.00	Calculated
13	D-22	Pipe	26	22	163.67	219.00	211.00	4.8900	12.000	0.0150	4.17	6.83	0.61	8.79	0.58	0.58	0.00	Calculated
14	D-3	Pipe	17	18	49.15	202.74	202.25	1.0000	12.000	0.0150	1.20	3.09	0.39	3.44	0.46	0.46	0.00	Calculated
15	D-4	Pipe	16	18	25.27	201.53	201.28	1.0000	12.000	0.0150	0.75	3.09	0.24	2.97	0.36	0.36	0.00	Calculated
16	D-5	Pipe	10	11	13.24	198.50	138.36	454.3400	12.000	0.0150	1.36	3.18	0.43	2.95	0.57	0.57	0.00	Calculated
17	D-6	Pipe	13	11	14.17	198.50	198.36	0.9900	12.000	0.0150	0.76	3.07	0.25	1.95	0.50	0.50	0.00	Calculated
18	D-7	Pipe	11	7	32.29	198.36	197.61	2.3200	12.000	0.0150	2.11	4.71	0.45	3.47	0.72	0.72	0.00	Calculated
19	D-8	Pipe	9	12	14.54	197.83	197.68	1.0000	12.000	0.0150	0.53	7.31	0.07	4.88	0.20	0.20	0.00	Calculated
20	D-9	Pipe	14	12	10.52	197.78	197.08	6.6600	12.000	0.0150	0.59	7.97	0.07	4.04	0.24	0.24	0.00	Calculated

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft^2)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	6	FHWA HEC-22 GENERIC	N/A	On Sag	1	202.11	206.43	202.11	10.00	0.59	N/A	N/A	N/A	7.00	2.66	206.50
2	9	FHWA HEC-22 GENERIC	N/A	On Sag	1	198.50	202.16	197.83	10.00	0.53	N/A	N/A	N/A	7.00	2.54	202.24
3	10	FHWA HEC-22 GENERIC	N/A	On Sag	1	198.50	202.24	197.86	0.00	1.38	N/A	N/A	N/A	7.00	7.90	202.50
4	13	FHWA HEC-22 GENERIC	N/A	On Sag	1	197.86	202.19	197.86	0.00	0.78	N/A	N/A	N/A	7.00	2.99	202.35
5	14	FHWA HEC-22 GENERIC	N/A	On Sag	1	197.78	202.11	197.78	10.00	0.59	N/A	N/A	N/A	7.00	2.66	202.19
6	16	FHWA HEC-22 GENERIC	N/A	On Sag	1	201.53	205.86	201.53	10.00	0.76	N/A	N/A	N/A	7.00	2.96	205.94
7	17	FHWA HEC-22 GENERIC	N/A	On Sag	1	202.74	207.07	202.74	10.00	1.23	N/A	N/A	N/A	7.00	7.24	207.24
8	20	FHWA HEC-22 GENERIC	N/A	On Sag	1	211.22	215.72	211.22	10.00	0.82	N/A	N/A	N/A	7.00	5.26	215.85
9	21	FHWA HEC-22 GENERIC	N/A	On Sag	1	211.27	215.60	211.27	10.00	1.05	N/A	N/A	N/A	7.00	6.40	215.75
10	24	FHWA HEC-22 GENERIC	N/A	On Sag	1	219.46	223.79	219.46	10.00	1.23	N/A	N/A	N/A	7.00	7.24	223.96
11	25	FHWA HEC-22 GENERIC	N/A	On Sag	1	219.51	523.84	219.51	10.00	1.10	N/A	N/A	N/A	7.00	6.64	524.00
12	27	FHWA HEC-22 GENERIC	N/A	On Sag	1	232.27	236.76	232.27	10.00	1.22	N/A	N/A	N/A	7.00	7.21	236.93
13	28	FHWA HEC-22 GENERIC	N/A	On Sag	1	232.72	237.22	232.72	10.00	0.88	N/A	N/A	N/A	7.00	5.56	237.35

Subbasin Hydrology

Subbasin : Sub-06

Input Data

Area (ac) 0.12
Weighted Runoff Coefficient 0.75

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.12	-	0.75
Composite Area & Weighted Runoff Coeff.	0.12		0.75

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

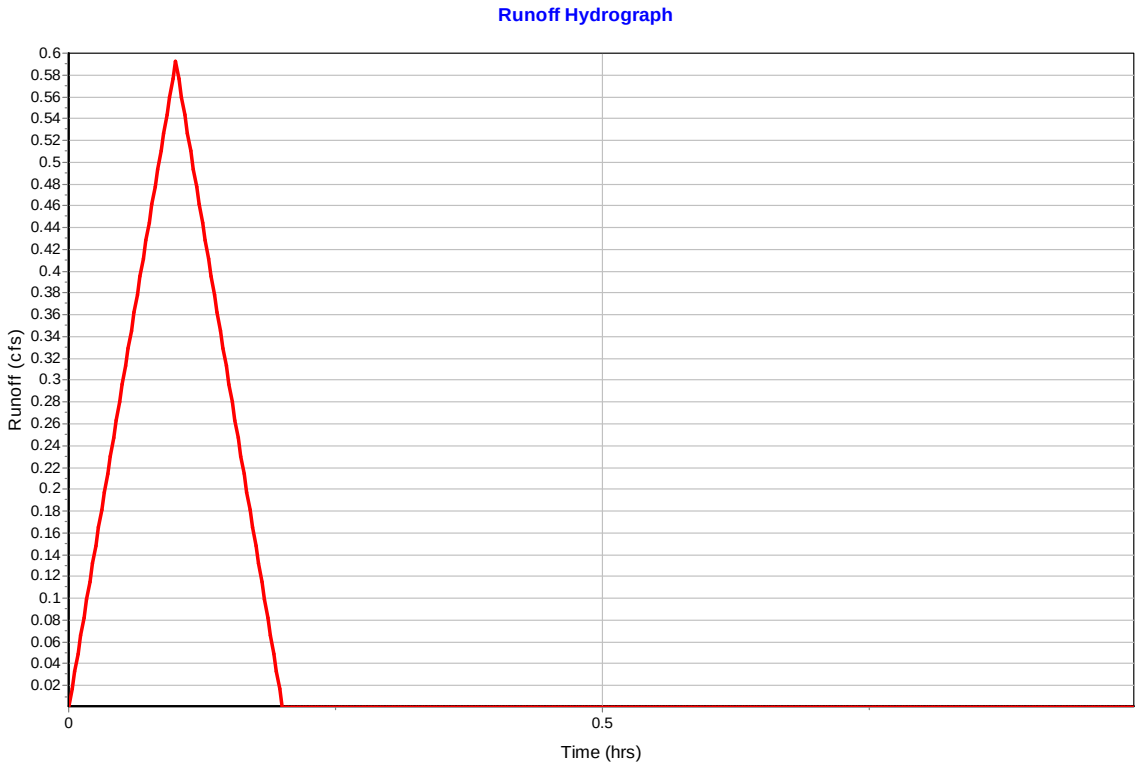
Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.66
Total Runoff (in) 0.49
Peak Runoff (cfs) 0.59
Rainfall Intensity 6.586
Weighted Runoff Coefficient 0.75
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-06



Subbasin : Sub-09

Input Data

Area (ac) 0.09
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.09	-	0.9
Composite Area & Weighted Runoff Coeff.	0.09		0.9

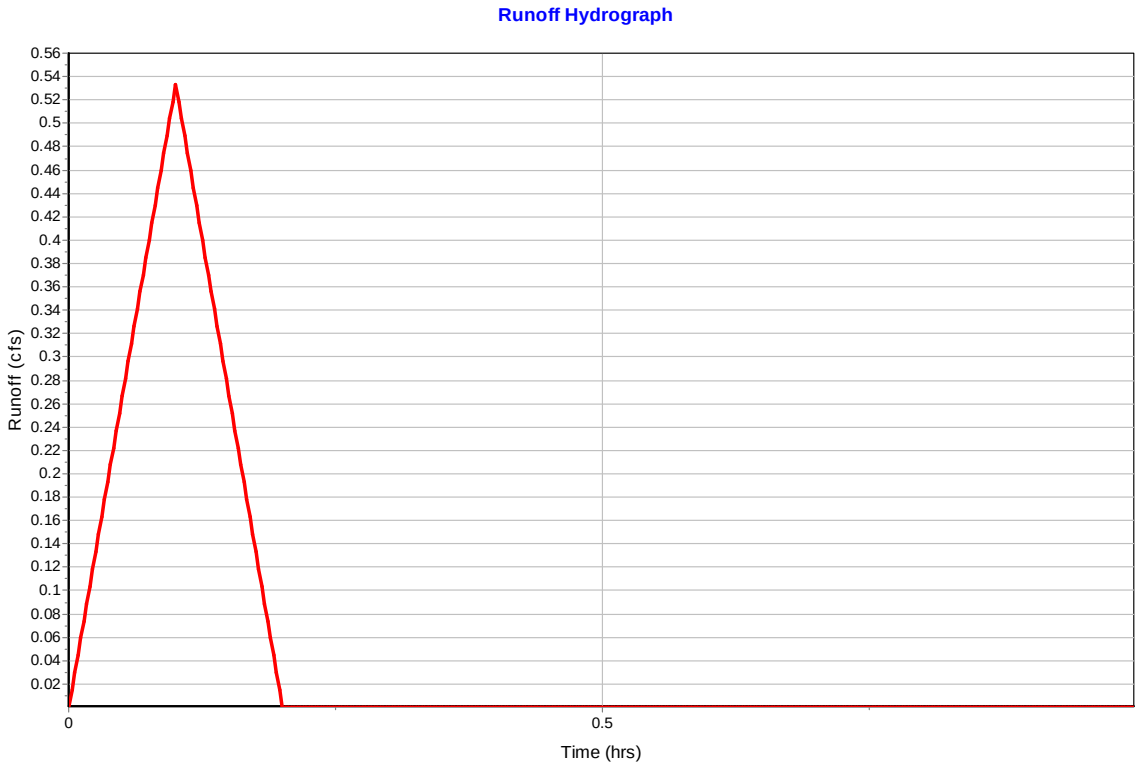
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.66
Total Runoff (in) 0.59
Peak Runoff (cfs) 0.53
Rainfall Intensity 6.586
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-09



Subbasin : Sub-10

Input Data

Area (ac) 0.26
Weighted Runoff Coefficient 0.81

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.26	-	0.81
Composite Area & Weighted Runoff Coeff.	0.26		0.81

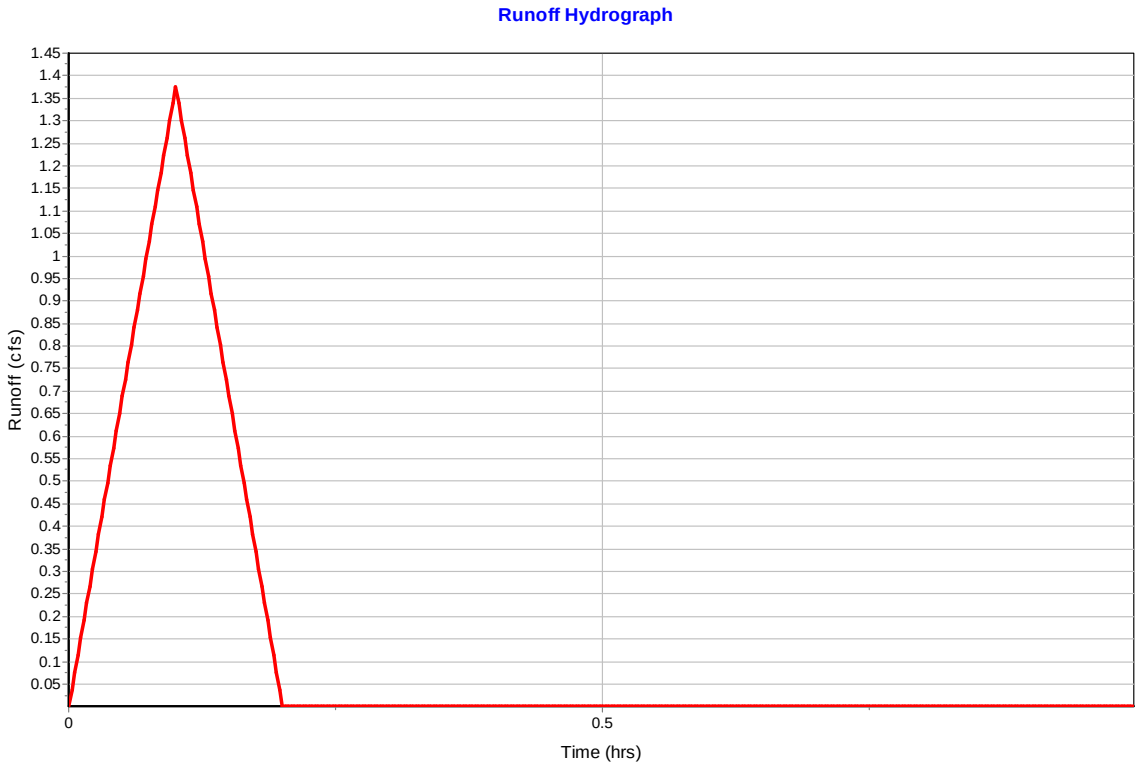
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.66
Total Runoff (in) 0.53
Peak Runoff (cfs) 1.38
Rainfall Intensity 6.586
Weighted Runoff Coefficient 0.81
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-10



Subbasin : Sub-13

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.13	-	0.9
Composite Area & Weighted Runoff Coeff.	0.13		0.9

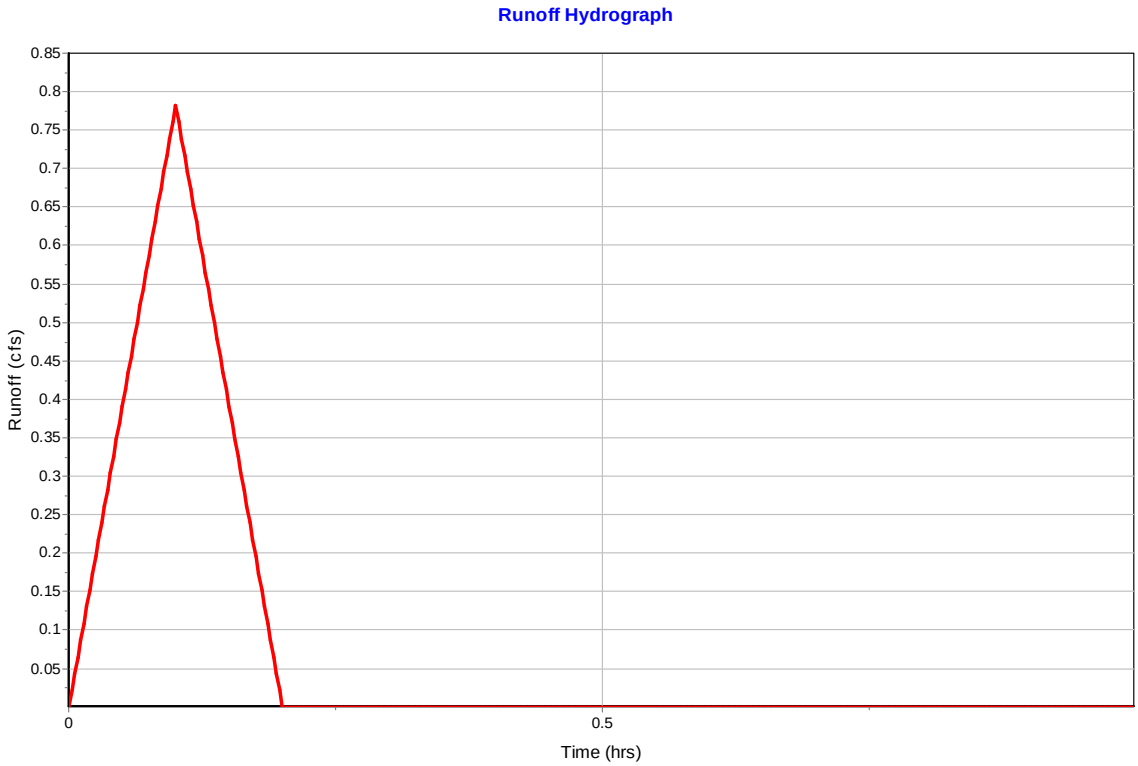
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.66
Total Runoff (in) 0.59
Peak Runoff (cfs) 0.78
Rainfall Intensity 6.586
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-13



Subbasin : Sub-14

Input Data

Area (ac) 0.1
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.1	-	0.9
Composite Area & Weighted Runoff Coeff.	0.1		0.9

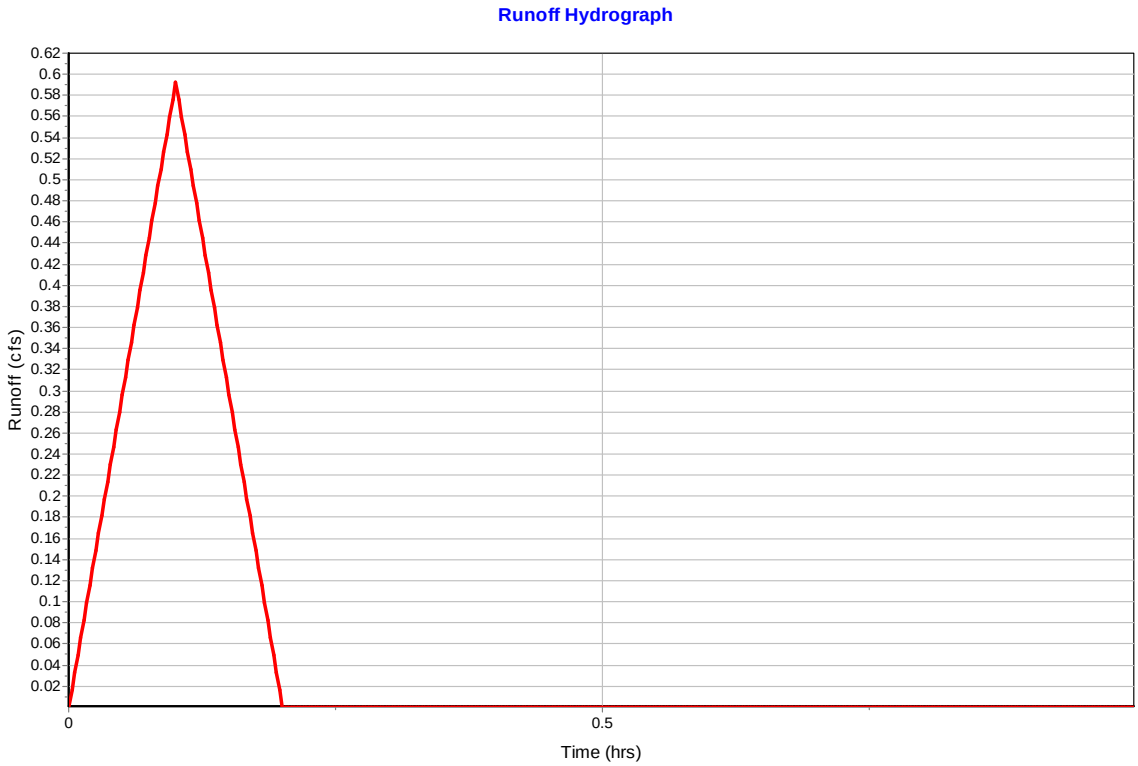
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.66
Total Runoff (in) 0.59
Peak Runoff (cfs) 0.59
Rainfall Intensity 6.586
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-14



Subbasin : Sub-16

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.13	-	0.9
Composite Area & Weighted Runoff Coeff.	0.13		0.9

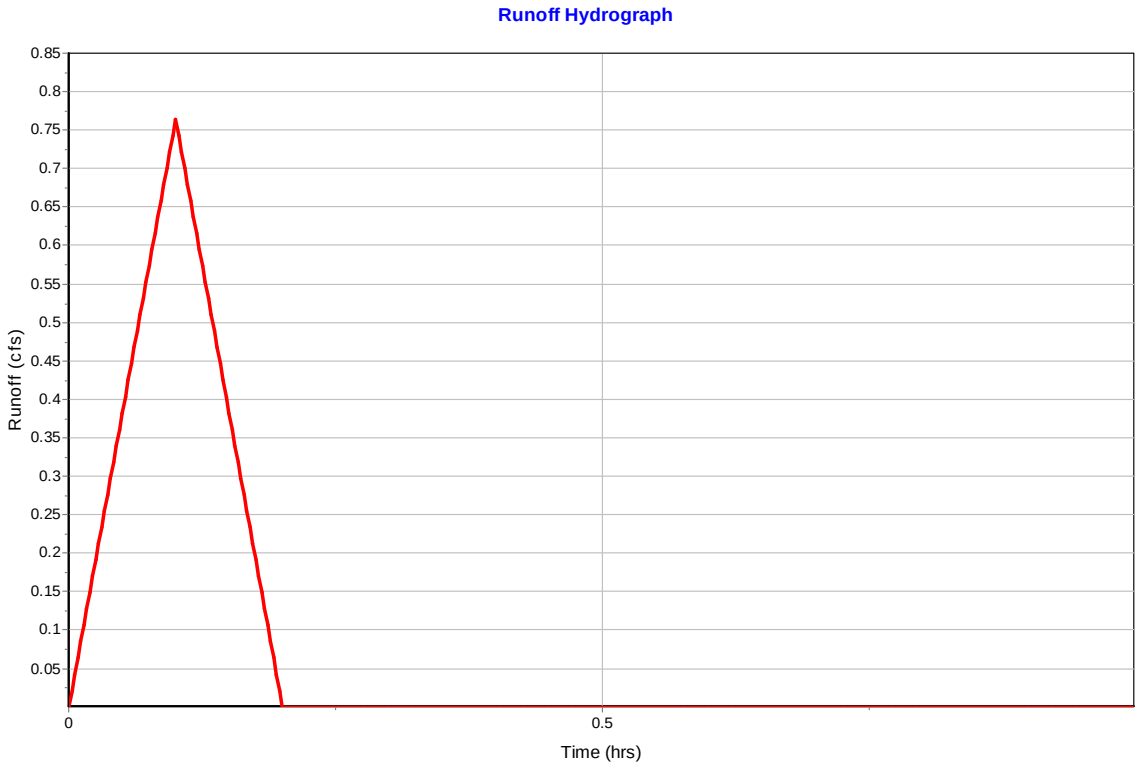
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.66
Total Runoff (in) 0.59
Peak Runoff (cfs) 0.77
Rainfall Intensity 6.586
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-16



Subbasin : Sub-17

Input Data

Area (ac) 0.34
Weighted Runoff Coefficient 0.55

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.34	-	0.55
Composite Area & Weighted Runoff Coeff.	0.34		0.55

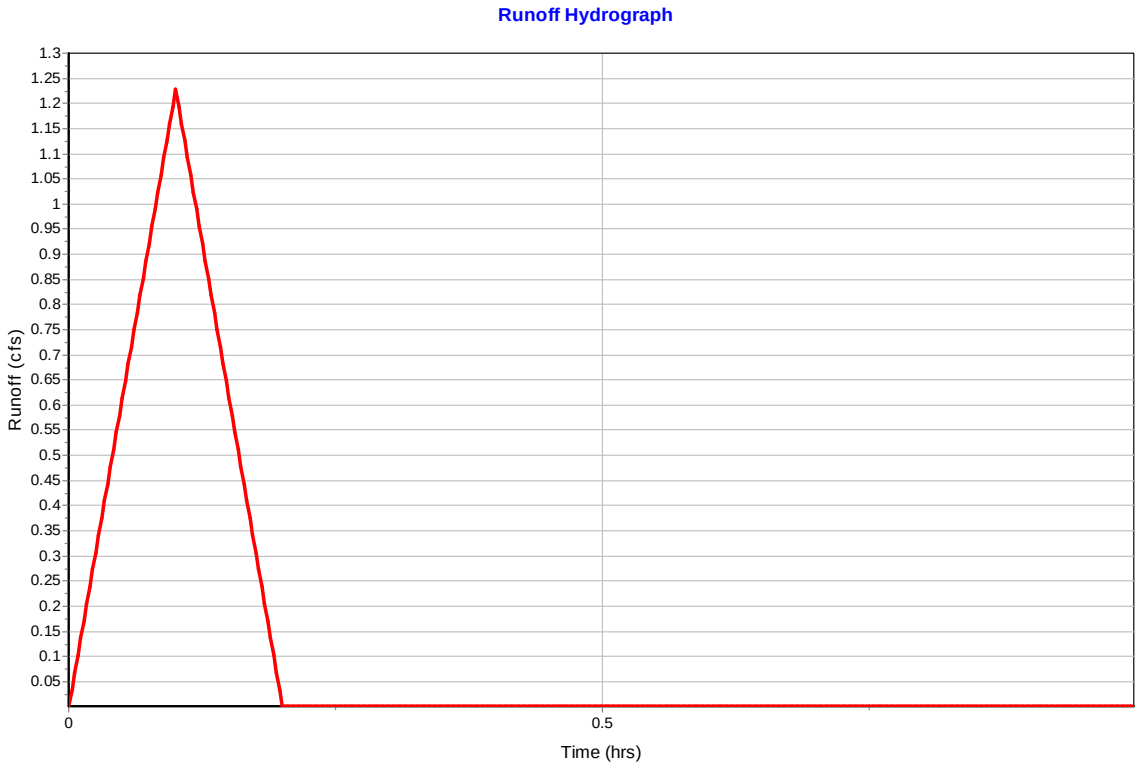
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.66
Total Runoff (in) 0.36
Peak Runoff (cfs) 1.23
Rainfall Intensity 6.586
Weighted Runoff Coefficient 0.55
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-17



Subbasin : Sub-20

Input Data

Area (ac) 0.14
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.14	-	0.9
Composite Area & Weighted Runoff Coeff.	0.14		0.9

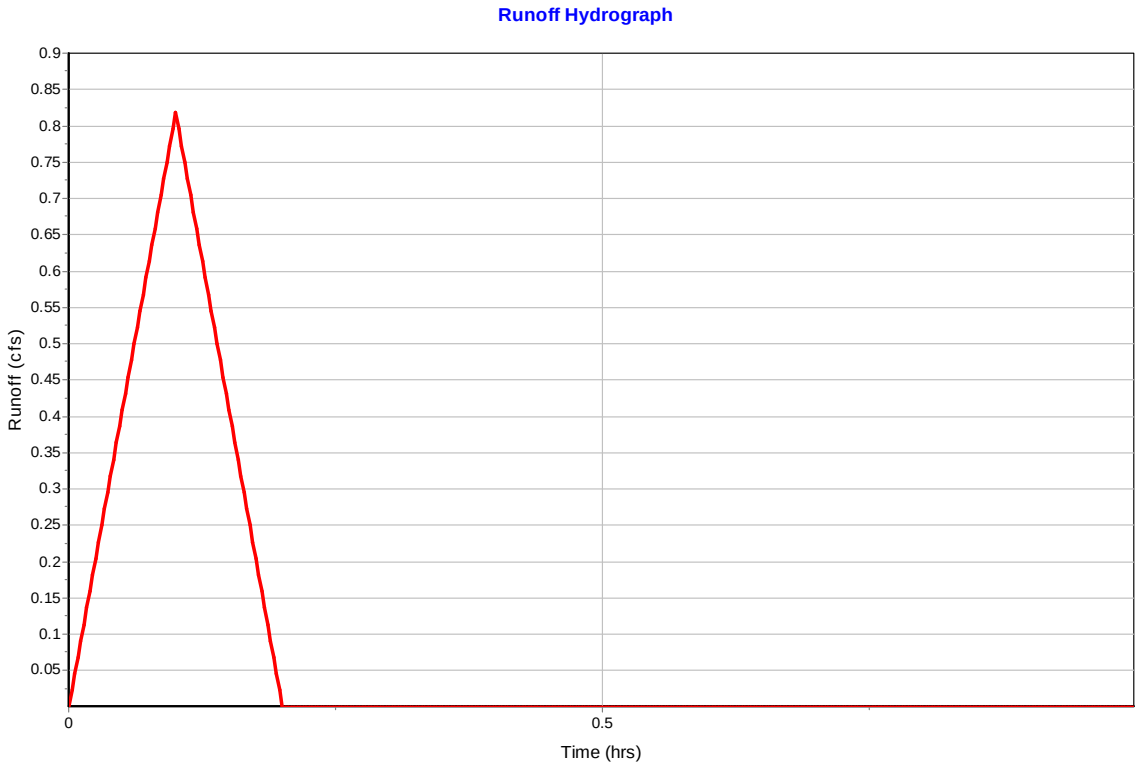
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.66
Total Runoff (in) 0.59
Peak Runoff (cfs) 0.82
Rainfall Intensity 6.586
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-20



Subbasin : Sub-21

Input Data

Area (ac) 0.28
Weighted Runoff Coefficient 0.57

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.28	-	0.57
Composite Area & Weighted Runoff Coeff.	0.28		0.57

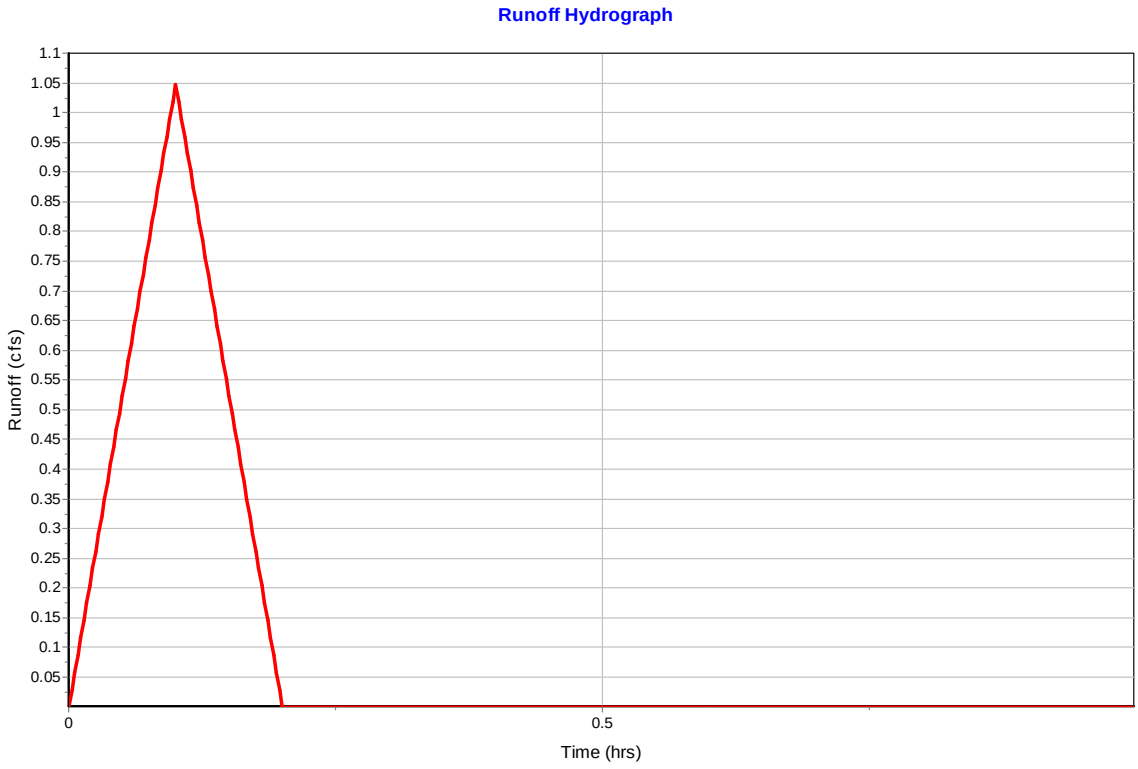
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.66
Total Runoff (in) 0.38
Peak Runoff (cfs) 1.05
Rainfall Intensity 6.586
Weighted Runoff Coefficient 0.57
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-21



Subbasin : Sub-24

Input Data

Area (ac) 0.21
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.21	-	0.9
Composite Area & Weighted Runoff Coeff.	0.21		0.9

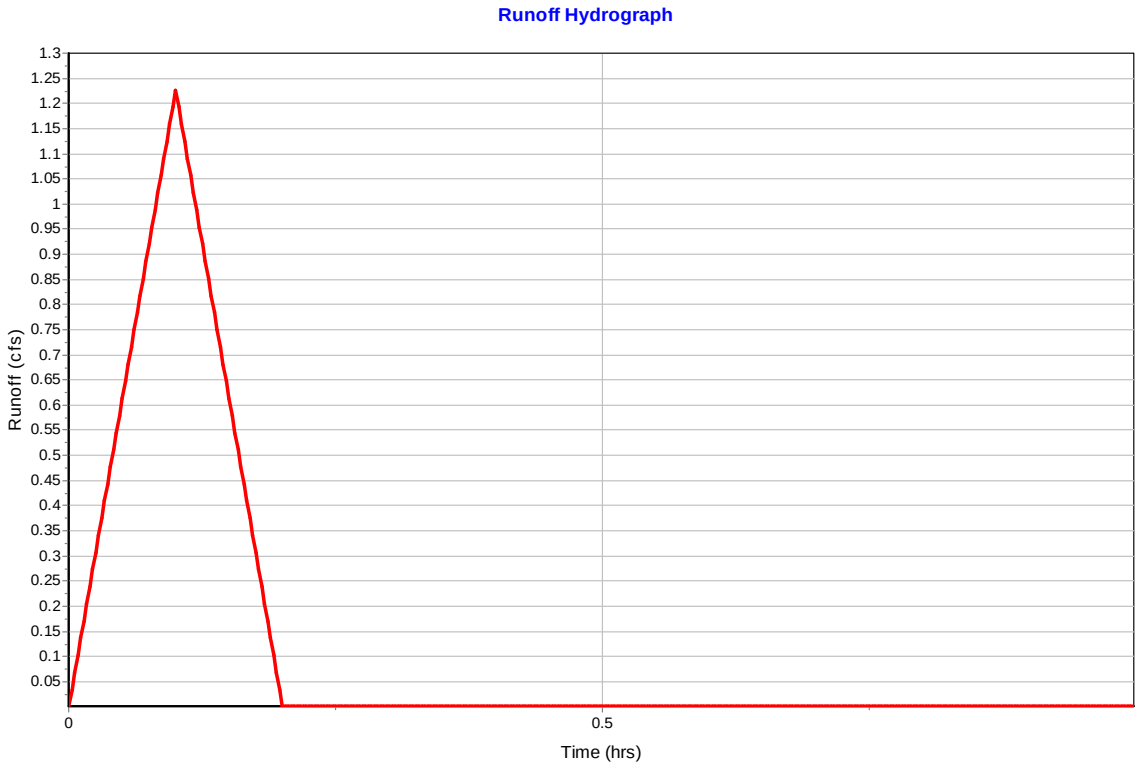
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.66
Total Runoff (in) 0.59
Peak Runoff (cfs) 1.23
Rainfall Intensity 6.586
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-24



Subbasin : Sub-25

Input Data

Area (ac) 0.24
Weighted Runoff Coefficient 0.71

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.24	-	0.71
Composite Area & Weighted Runoff Coeff.	0.24		0.71

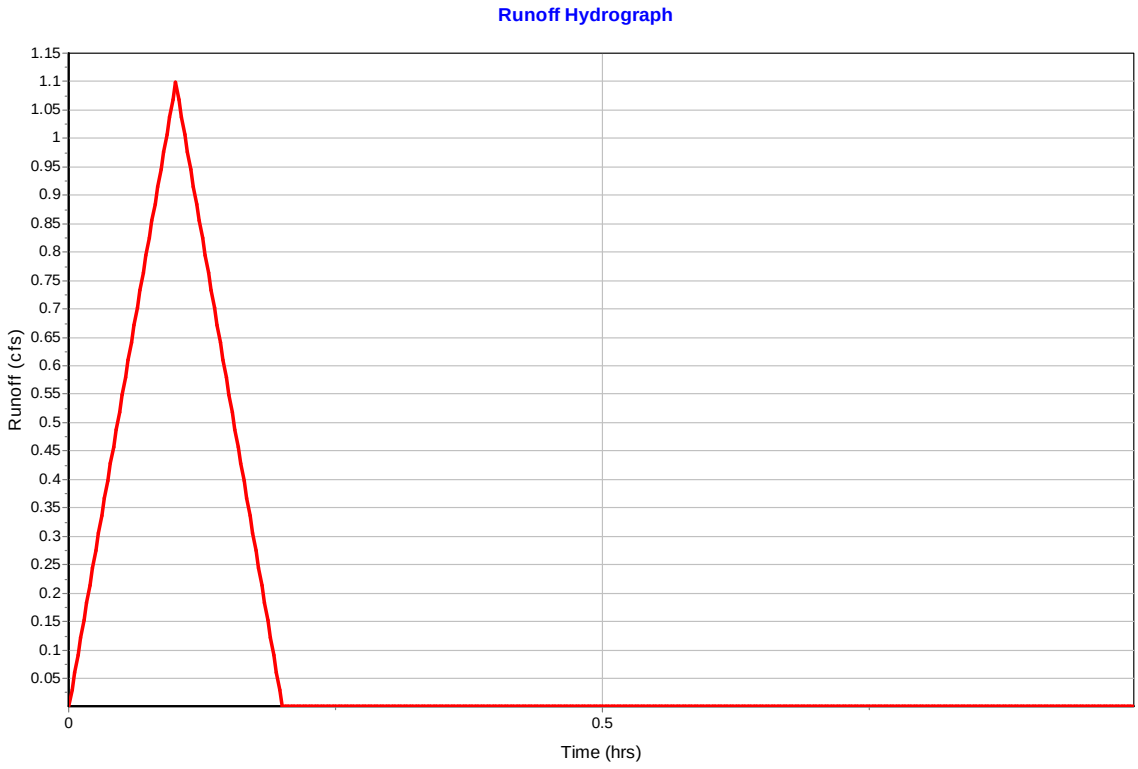
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.66
Total Runoff (in) 0.47
Peak Runoff (cfs) 1.1
Rainfall Intensity 6.586
Weighted Runoff Coefficient 0.71
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-25



Subbasin : Sub-27

Input Data

Area (ac) 0.21
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.21	-	0.9
Composite Area & Weighted Runoff Coeff.	0.21		0.9

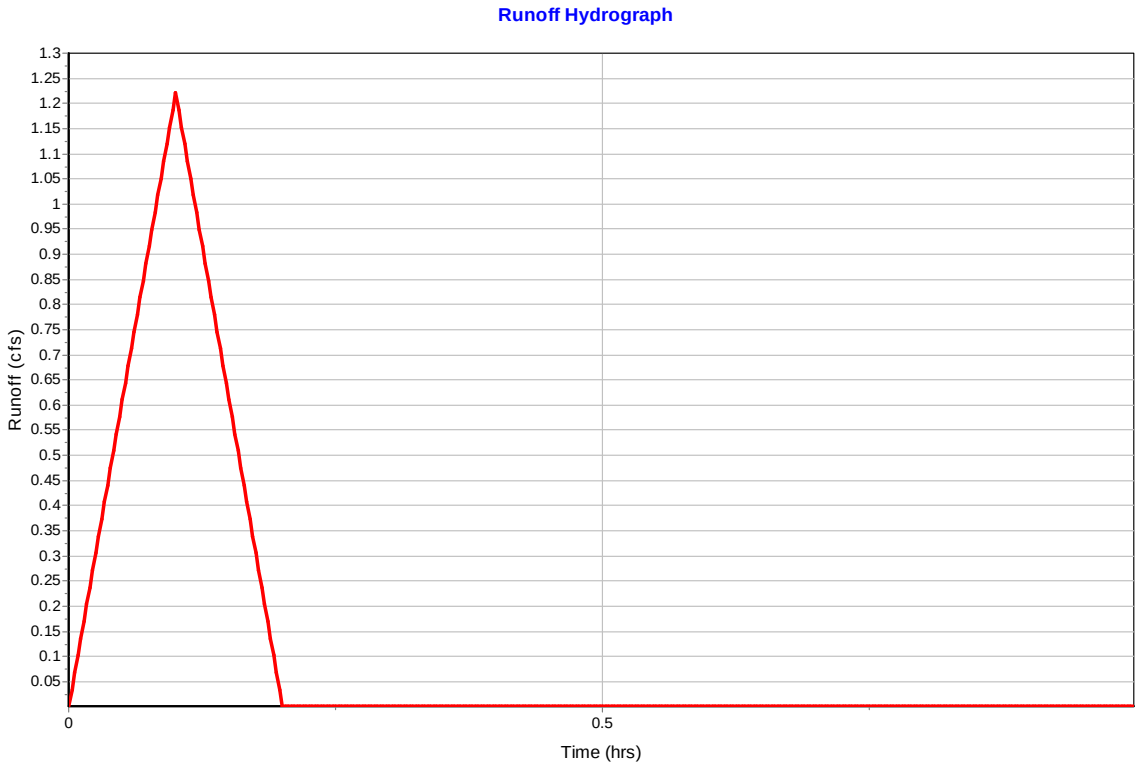
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.66
Total Runoff (in) 0.59
Peak Runoff (cfs) 1.22
Rainfall Intensity 6.586
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-27



Subbasin : Sub-28

Input Data

Area (ac)	0.18
Weighted Runoff Coefficient	0.74

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.18	-	0.74
Composite Area & Weighted Runoff Coeff.	0.18		0.74

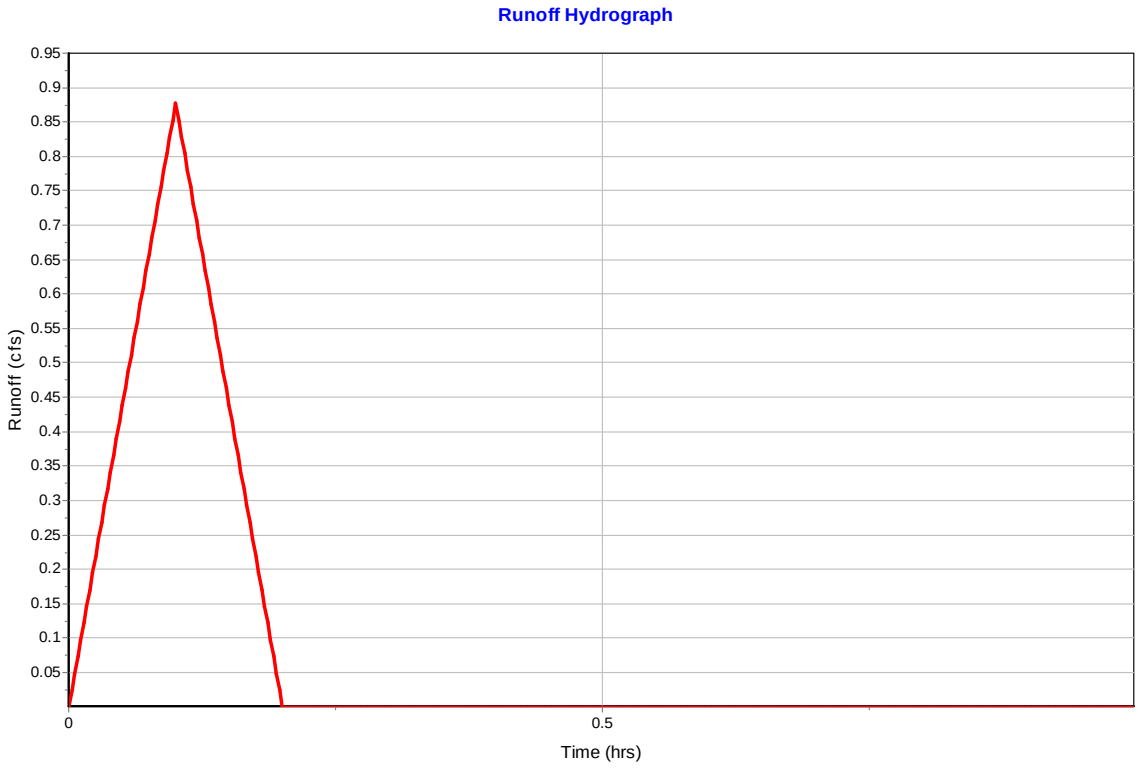
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in)	0.66
Total Runoff (in)	0.49
Peak Runoff (cfs)	0.88
Rainfall Intensity	6.586
Weighted Runoff Coefficient	0.74
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : Sub-28



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	7	197.61	206.04	8.43	197.61	0.00	206.04	0.00	0.00	0.00
2	11	198.36	202.30	3.94	197.50	-0.86	202.30	0.00	10.00	0.00
3	12	197.08	202.18	5.10	197.08	0.00	202.18	0.00	0.00	0.00
4	18	201.18	207.06	5.88	201.18	0.00	207.06	0.00	0.00	0.00
5	22	210.82	216.07	5.25	210.82	0.00	216.07	0.00	0.00	0.00
6	26	219.00	233.90	14.90	219.00	0.00	233.90	0.00	0.00	0.00
7	29	231.85	237.32	5.47	231.85	0.00	237.32	0.00	0.00	0.00
8	Out-1D-7	197.18	203.18	6.00	197.18	0.00	203.18	0.00	0.00	0.00
9	Out-1D-9	197.67	203.67	6.00	197.67	0.00	203.67	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	7	2.69	0.00	198.52	0.91	0.00	7.52	197.76	0.15	0 00:06	0 00:00	0.00	0.00
2	11	2.12	0.00	198.90	0.54	0.00	3.40	198.44	0.08	0 00:06	0 00:00	0.00	0.00
3	12	1.12	0.00	197.35	0.27	0.00	4.83	197.12	0.04	0 00:06	0 00:00	0.00	0.00
4	18	1.96	0.00	201.43	0.25	0.00	5.63	201.22	0.04	0 00:06	0 00:00	0.00	0.00
5	22	5.93	0.00	211.45	0.63	0.00	4.63	210.93	0.11	0 00:06	0 00:00	0.00	0.00
6	26	4.23	0.00	219.60	0.60	0.00	14.30	219.10	0.10	0 00:06	0 00:00	0.00	0.00
7	29	2.07	0.00	232.23	0.38	0.00	5.09	231.92	0.07	0 00:06	0 00:00	0.00	0.00
8	Out-1D-7	0.00	0.00	197.18	0.00	0.00	6.00	197.18	0.00	0 00:00	0 00:00	0.00	0.00
9	Out-1D-9	0.00	0.00	197.67	0.00	0.00	6.00	197.67	0.00	0 00:00	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	D-10	33.23	197.61	0.00	197.50	0.00	0.11	0.3300	CIRCULAR	15.000	15.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
2	D-11	106.95	210.82	0.00	204.38	0.38	6.44	6.0200	CIRCULAR	15.000	15.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
3	D-12	16.00	201.18	0.00	194.20	0.00	6.98	43.6200	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
4	D-13	13.65	197.08	0.00	195.58	2.58	1.50	10.9900	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
5	D-14	24.97	211.27	0.00	211.02	0.20	0.25	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
6	D-16	30.06	211.22	0.00	210.92	0.10	0.30	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
7	D-17	13.28	232.72	0.00	232.59	0.74	0.13	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
8	D-18	32.10	232.27	0.00	231.95	0.10	0.32	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
9	D-19	21.15	219.51	0.00	219.30	0.30	0.21	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
10	D-2	32.13	202.11	0.00	201.79	4.18	0.32	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
11	D-20	32.45	219.46	0.00	219.14	0.14	0.32	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
12	D-21	260.65	231.85	0.00	219.50	0.50	12.35	4.7400	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
13	D-22	163.67	219.00	0.00	211.00	0.18	8.00	4.8900	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
14	D-3	49.15	202.74	0.00	202.25	1.07	0.49	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
15	D-4	25.27	201.53	0.00	201.28	0.10	0.25	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
16	D-5	13.24	198.50	0.00	138.36	-60.00	60.14	454.3400	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
17	D-6	14.17	198.50	0.64	198.36	0.00	0.14	0.9900	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
18	D-7	32.29	198.36	0.00	197.61	0.00	0.75	2.3200	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
19	D-8	14.54	197.83	-0.67	197.68	0.60	0.15	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
20	D-9	10.52	197.78	0.00	197.08	0.00	0.70	6.6600	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	D-10	2.68	0 00:06	3.96	0.68	3.31	0.17	0.78	0.63	0.00		Calculated
2	D-11	5.91	0 00:06	13.74	0.43	10.15	0.18	0.60	0.48	0.00		Calculated
3	D-12	1.96	0 00:06	20.39	0.10	14.53	0.02	0.23	0.23	0.00		Calculated
4	D-13	1.12	0 00:06	10.23	0.11	7.39	0.03	0.25	0.25	0.00		Calculated
5	D-14	1.04	0 00:06	3.09	0.34	3.14	0.13	0.44	0.44	0.00		Calculated
6	D-16	0.81	0 00:06	3.09	0.26	2.40	0.21	0.46	0.46	0.00		Calculated
7	D-17	0.87	0 00:06	3.09	0.28	2.96	0.07	0.40	0.40	0.00		Calculated
8	D-18	1.20	0 00:06	3.09	0.39	3.37	0.16	0.46	0.46	0.00		Calculated
9	D-19	1.09	0 00:06	3.09	0.35	3.21	0.11	0.45	0.45	0.00		Calculated
10	D-2	0.58	0 00:06	3.09	0.19	2.82	0.19	0.31	0.31	0.00		Calculated
11	D-20	1.21	0 00:06	3.09	0.39	3.30	0.16	0.48	0.48	0.00		Calculated
12	D-21	1.99	0 00:06	6.72	0.30	7.34	0.59	0.38	0.38	0.00		Calculated
13	D-22	4.17	0 00:06	6.83	0.61	8.79	0.31	0.58	0.58	0.00		Calculated
14	D-3	1.20	0 00:06	3.09	0.39	3.44	0.24	0.46	0.46	0.00		Calculated
15	D-4	0.75	0 00:06	3.09	0.24	2.97	0.14	0.36	0.36	0.00		Calculated
16	D-5	1.36	0 00:06	3.18	0.43	2.95	0.07	0.57	0.57	0.00		Calculated
17	D-6	0.76	0 00:06	3.07	0.25	1.95	0.12	0.50	0.50	0.00		Calculated
18	D-7	2.11	0 00:06	4.71	0.45	3.47	0.16	0.72	0.72	0.00		Calculated
19	D-8	0.53	0 00:06	7.31	0.07	4.88	0.05	0.20	0.20	0.00		Calculated
20	D-9	0.59	0 00:06	7.97	0.07	4.04	0.04	0.24	0.24	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	6	FHWA HEC-22 GENERIC	N/A	On Sag	1	202.11	206.43	4.32	202.11	0.00	10.00	0.00
2	9	FHWA HEC-22 GENERIC	N/A	On Sag	1	198.50	202.16	3.66	197.83	-0.67	10.00	0.00
3	10	FHWA HEC-22 GENERIC	N/A	On Sag	1	198.50	202.24	3.74	197.86	-0.64	0.00	0.00
4	13	FHWA HEC-22 GENERIC	N/A	On Sag	1	197.86	202.19	4.33	197.86	0.00	0.00	0.00
5	14	FHWA HEC-22 GENERIC	N/A	On Sag	1	197.78	202.11	4.33	197.78	0.00	10.00	0.00
6	16	FHWA HEC-22 GENERIC	N/A	On Sag	1	201.53	205.86	4.33	201.53	0.00	10.00	0.00
7	17	FHWA HEC-22 GENERIC	N/A	On Sag	1	202.74	207.07	4.33	202.74	0.00	10.00	0.00
8	20	FHWA HEC-22 GENERIC	N/A	On Sag	1	211.22	215.72	4.50	211.22	0.00	10.00	0.00
9	21	FHWA HEC-22 GENERIC	N/A	On Sag	1	211.27	215.60	4.33	211.27	0.00	10.00	0.00
10	24	FHWA HEC-22 GENERIC	N/A	On Sag	1	219.46	223.79	4.33	219.46	0.00	10.00	0.00
11	25	FHWA HEC-22 GENERIC	N/A	On Sag	1	219.51	523.84	304.33	219.51	0.00	10.00	0.00
12	27	FHWA HEC-22 GENERIC	N/A	On Sag	1	232.27	236.76	4.49	232.27	0.00	10.00	0.00
13	28	FHWA HEC-22 GENERIC	N/A	On Sag	1	232.72	237.22	4.50	232.72	0.00	10.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	6	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
2	9	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
3	10	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
4	13	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
5	14	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
6	16	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
7	17	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
8	20	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
9	21	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
10	24	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
11	25	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
12	27	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
13	28	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	6	0.59	0.59	N/A	N/A	N/A	2.66	206.50	0.08	0 00:06	0.00	0.00
2	9	0.53	0.53	N/A	N/A	N/A	2.54	202.24	0.07	0 00:06	0.00	0.00
3	10	1.38	1.38	N/A	N/A	N/A	7.90	202.50	0.26	0 00:06	0.00	0.00
4	13	0.78	0.78	N/A	N/A	N/A	2.99	202.35	0.17	0 00:06	0.00	0.00
5	14	0.59	0.59	N/A	N/A	N/A	2.66	202.19	0.08	0 00:06	0.00	0.00
6	16	0.76	0.76	N/A	N/A	N/A	2.96	205.94	0.08	0 00:06	0.00	0.00
7	17	1.23	1.23	N/A	N/A	N/A	7.24	207.24	0.17	0 00:06	0.00	0.00
8	20	0.82	0.82	N/A	N/A	N/A	5.26	215.85	0.13	0 00:06	0.00	0.00
9	21	1.05	1.05	N/A	N/A	N/A	6.40	215.75	0.15	0 00:06	0.00	0.00
10	24	1.23	1.23	N/A	N/A	N/A	7.24	223.96	0.17	0 00:06	0.00	0.00
11	25	1.10	1.10	N/A	N/A	N/A	6.64	524.00	0.15	0 00:06	0.00	0.00
12	27	1.22	1.22	N/A	N/A	N/A	7.21	236.93	0.17	0 00:06	0.00	0.00
13	28	0.88	0.88	N/A	N/A	N/A	5.56	237.35	0.13	0 00:06	0.00	0.00

Project Description

File Name	9720.16_SSA-rev.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	00:00:00	0:00:00
End Analysis On	00:00:00	1:00:00
Start Reporting On	00:00:00	0:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	13
Nodes	26
Junctions	9
Outfalls	4
Flow Diversions	0
Inlets	13
Storage Nodes	0
Links	20
Channels	0
Pipes	20
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	25 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-06	0.12	0.7500	0.81	0.61	0.07	0.73	0 00:06:00
2	Sub-09	0.09	0.9000	0.81	0.73	0.07	0.66	0 00:06:00
3	Sub-10	0.26	0.8100	0.81	0.66	0.17	1.69	0 00:06:00
4	Sub-13	0.13	0.9000	0.81	0.73	0.10	0.96	0 00:06:00
5	Sub-14	0.10	0.9000	0.81	0.73	0.07	0.73	0 00:06:00
6	Sub-16	0.13	0.9000	0.81	0.73	0.09	0.94	0 00:06:00
7	Sub-17	0.34	0.5500	0.81	0.45	0.15	1.51	0 00:06:00
8	Sub-20	0.14	0.9000	0.81	0.73	0.10	1.01	0 00:06:00
9	Sub-21	0.28	0.5700	0.81	0.46	0.13	1.29	0 00:06:00
10	Sub-24	0.21	0.9000	0.81	0.73	0.15	1.51	0 00:06:00
11	Sub-25	0.24	0.7100	0.81	0.58	0.14	1.35	0 00:06:00
12	Sub-27	0.21	0.9000	0.81	0.73	0.15	1.50	0 00:06:00
13	Sub-28	0.18	0.7400	0.81	0.60	0.11	1.08	0 00:06:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	7	Junction	197.61	206.04	197.61	206.04	0.00	3.25	198.64	0.00	7.40	0 00:00	0.00	0.00
2	11	Junction	198.36	202.30	197.50	202.30	10.00	2.59	199.02	0.00	3.28	0 00:00	0.00	0.00
3	12	Junction	197.08	202.18	197.08	202.18	0.00	1.37	197.39	0.00	4.79	0 00:00	0.00	0.00
4	18	Junction	201.18	207.06	201.18	207.06	0.00	2.40	201.46	0.00	5.60	0 00:00	0.00	0.00
5	22	Junction	210.82	216.07	210.82	216.07	0.00	7.28	211.54	0.00	4.54	0 00:00	0.00	0.00
6	26	Junction	219.00	233.90	219.00	233.90	0.00	5.21	219.70	0.00	14.20	0 00:00	0.00	0.00
7	29	Junction	231.85	237.32	231.85	237.32	0.00	2.54	232.28	0.00	5.05	0 00:00	0.00	0.00
8	Out-1D-7	Junction	197.18	203.18	197.18	203.18	0.00	0.00	197.18	0.00	6.00	0 00:00	0.00	0.00
9	Out-1D-9	Junction	197.67	203.67	197.67	203.67	0.00	0.00	197.67	0.00	6.00	0 00:00	0.00	0.00
10	Out-1D-15	Outfall	193.00					1.37	193.00					
11	Out-1D-19	Outfall	194.20					2.40	194.43					
12	Out-1D-23	Outfall	204.00					7.26	204.00					
13	Out-1D-8	Outfall	197.50					3.25	198.23					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	D-10	Pipe	7	Out-1D-8	33.23	197.61	197.50	0.3300	15.000	0.0150	3.25	3.96	0.82	3.52	0.88	0.70	0.00	Calculated
2	D-11	Pipe	22	Out-1D-23	106.95	210.82	204.38	6.0200	15.000	0.0150	7.26	13.74	0.53	10.61	0.68	0.55	0.00	Calculated
3	D-12	Pipe	18	Out-1D-19	16.00	201.18	194.20	43.6200	12.000	0.0150	2.40	20.39	0.12	15.18	0.26	0.26	0.00	Calculated
4	D-13	Pipe	12	Out-1D-15	13.65	197.08	195.58	10.9900	12.000	0.0150	1.37	10.23	0.13	7.73	0.28	0.28	0.00	Calculated
5	D-14	Pipe	21	22	24.97	211.27	211.02	1.0000	12.000	0.0150	1.27	3.09	0.41	3.17	0.52	0.52	0.00	Calculated
6	D-16	Pipe	20	22	30.06	211.22	210.92	1.0000	12.000	0.0150	0.99	3.09	0.32	2.46	0.53	0.53	0.00	Calculated
7	D-17	Pipe	28	29	13.28	232.72	232.59	1.0000	12.000	0.0150	1.07	3.09	0.35	3.11	0.45	0.45	0.00	Calculated
8	D-18	Pipe	27	29	32.10	232.27	231.95	1.0000	12.000	0.0150	1.48	3.09	0.48	3.53	0.53	0.53	0.00	Calculated
9	D-19	Pipe	25	26	21.15	219.51	219.30	1.0000	12.000	0.0150	1.33	3.09	0.43	3.36	0.50	0.50	0.00	Calculated
10	D-2	Pipe	6	7	32.13	202.11	201.79	1.0000	12.000	0.0150	0.72	3.09	0.23	2.97	0.35	0.35	0.00	Calculated
11	D-20	Pipe	24	26	32.45	219.46	219.14	1.0000	12.000	0.0150	1.49	3.09	0.48	3.33	0.56	0.57	0.00	Calculated
12	D-21	Pipe	29	26	260.65	231.85	219.50	4.7400	12.000	0.0150	2.45	6.72	0.36	7.75	0.42	0.42	0.00	Calculated
13	D-22	Pipe	26	22	163.67	219.00	211.00	4.8900	12.000	0.0150	5.13	6.83	0.75	9.15	0.67	0.67	0.00	Calculated
14	D-3	Pipe	17	18	49.15	202.74	202.25	1.0000	12.000	0.0150	1.48	3.09	0.48	3.61	0.52	0.52	0.00	Calculated
15	D-4	Pipe	16	18	25.27	201.53	201.28	1.0000	12.000	0.0150	0.93	3.09	0.30	3.13	0.40	0.40	0.00	Calculated
16	D-5	Pipe	10	11	13.24	198.50	138.36	454.3400	12.000	0.0150	1.67	3.18	0.53	2.97	0.68	0.68	0.00	Calculated
17	D-6	Pipe	13	11	14.17	198.50	198.36	0.9900	12.000	0.0150	0.93	3.07	0.30	1.95	0.62	0.62	0.00	Calculated
18	D-7	Pipe	11	7	32.29	198.36	197.61	2.3200	12.000	0.0150	2.54	4.71	0.54	3.65	0.83	0.83	0.00	Calculated
19	D-8	Pipe	9	12	14.54	197.83	197.68	1.0000	12.000	0.0150	0.65	7.31	0.09	5.12	0.22	0.22	0.00	Calculated
20	D-9	Pipe	14	12	10.52	197.78	197.08	6.6600	12.000	0.0150	0.72	7.97	0.09	4.16	0.27	0.27	0.00	Calculated

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft^2)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	6	FHWA HEC-22 GENERIC	N/A	On Sag	1	202.11	206.43	202.11	10.00	0.73	N/A	N/A	N/A	7.00	2.90	206.51
2	9	FHWA HEC-22 GENERIC	N/A	On Sag	1	198.50	202.16	197.83	10.00	0.66	N/A	N/A	N/A	7.00	2.77	202.24
3	10	FHWA HEC-22 GENERIC	N/A	On Sag	1	198.50	202.24	197.86	0.00	1.69	N/A	N/A	N/A	7.00	9.22	202.53
4	13	FHWA HEC-22 GENERIC	N/A	On Sag	1	197.86	202.19	197.86	0.00	0.96	N/A	N/A	N/A	7.00	5.98	202.41
5	14	FHWA HEC-22 GENERIC	N/A	On Sag	1	197.78	202.11	197.78	10.00	0.73	N/A	N/A	N/A	7.00	2.90	202.19
6	16	FHWA HEC-22 GENERIC	N/A	On Sag	1	201.53	205.86	201.53	10.00	0.94	N/A	N/A	N/A	7.00	5.88	206.00
7	17	FHWA HEC-22 GENERIC	N/A	On Sag	1	202.74	207.07	202.74	10.00	1.51	N/A	N/A	N/A	7.00	8.47	207.27
8	20	FHWA HEC-22 GENERIC	N/A	On Sag	1	211.22	215.72	211.22	10.00	1.01	N/A	N/A	N/A	7.00	6.20	215.87
9	21	FHWA HEC-22 GENERIC	N/A	On Sag	1	211.27	215.60	211.27	10.00	1.29	N/A	N/A	N/A	7.00	7.51	215.78
10	24	FHWA HEC-22 GENERIC	N/A	On Sag	1	219.46	223.79	219.46	10.00	1.51	N/A	N/A	N/A	7.00	8.46	223.98
11	25	FHWA HEC-22 GENERIC	N/A	On Sag	1	219.51	523.84	219.51	10.00	1.35	N/A	N/A	N/A	7.00	7.79	524.02
12	27	FHWA HEC-22 GENERIC	N/A	On Sag	1	232.27	236.76	232.27	10.00	1.50	N/A	N/A	N/A	7.00	8.43	236.95
13	28	FHWA HEC-22 GENERIC	N/A	On Sag	1	232.72	237.22	232.72	10.00	1.08	N/A	N/A	N/A	7.00	6.55	237.37

Subbasin Hydrology

Subbasin : Sub-06

Input Data

Area (ac) 0.12
Weighted Runoff Coefficient 0.75

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.12	-	0.75
Composite Area & Weighted Runoff Coeff.	0.12		0.75

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

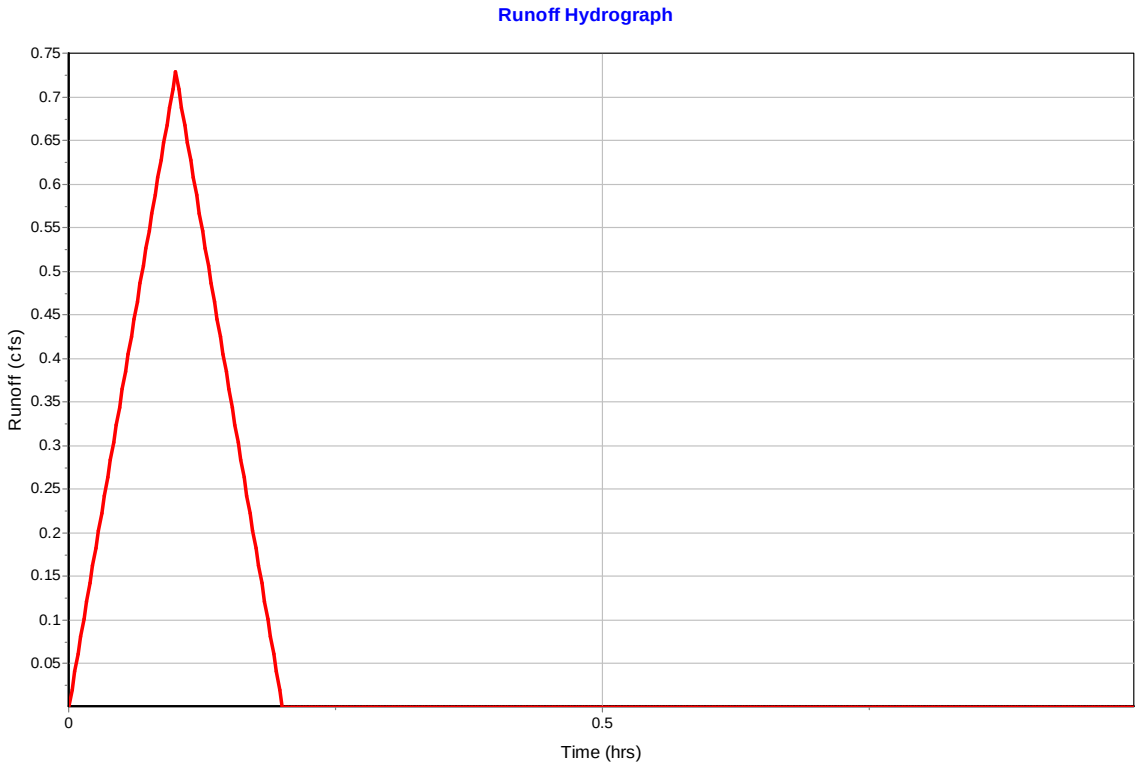
Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.81
Total Runoff (in) 0.61
Peak Runoff (cfs) 0.73
Rainfall Intensity 8.093
Weighted Runoff Coefficient 0.75
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-06



Subbasin : Sub-09

Input Data

Area (ac) 0.09
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.09	-	0.9
Composite Area & Weighted Runoff Coeff.	0.09		0.9

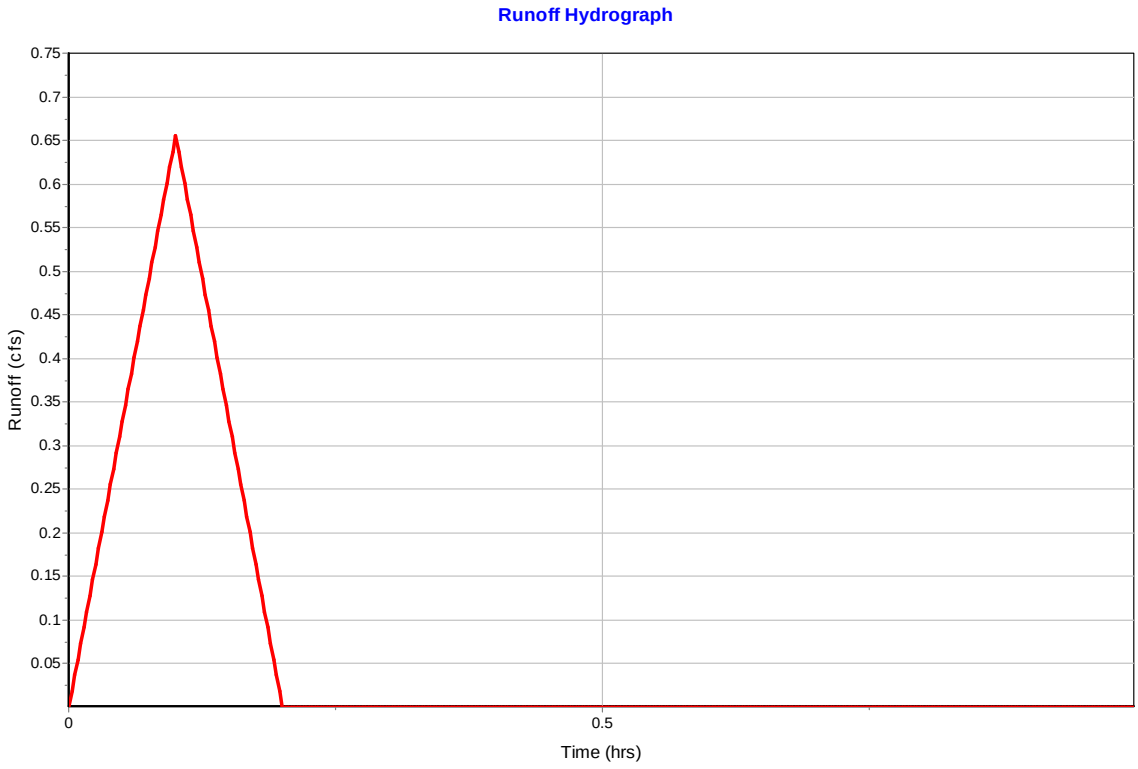
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.81
Total Runoff (in) 0.73
Peak Runoff (cfs) 0.66
Rainfall Intensity 8.093
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-09



Subbasin : Sub-10

Input Data

Area (ac) 0.26
Weighted Runoff Coefficient 0.81

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.26	-	0.81
Composite Area & Weighted Runoff Coeff.	0.26		0.81

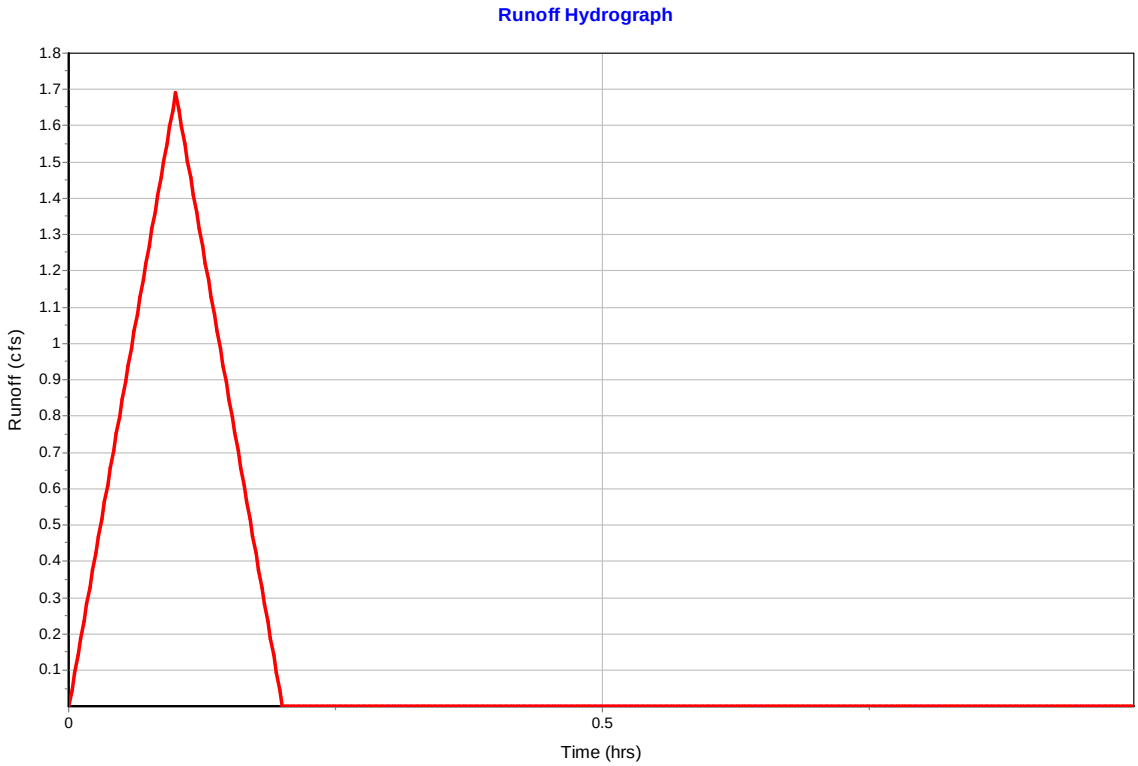
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.81
Total Runoff (in) 0.66
Peak Runoff (cfs) 1.69
Rainfall Intensity 8.093
Weighted Runoff Coefficient 0.81
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-10



Subbasin : Sub-13

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.13	-	0.9
Composite Area & Weighted Runoff Coeff.	0.13		0.9

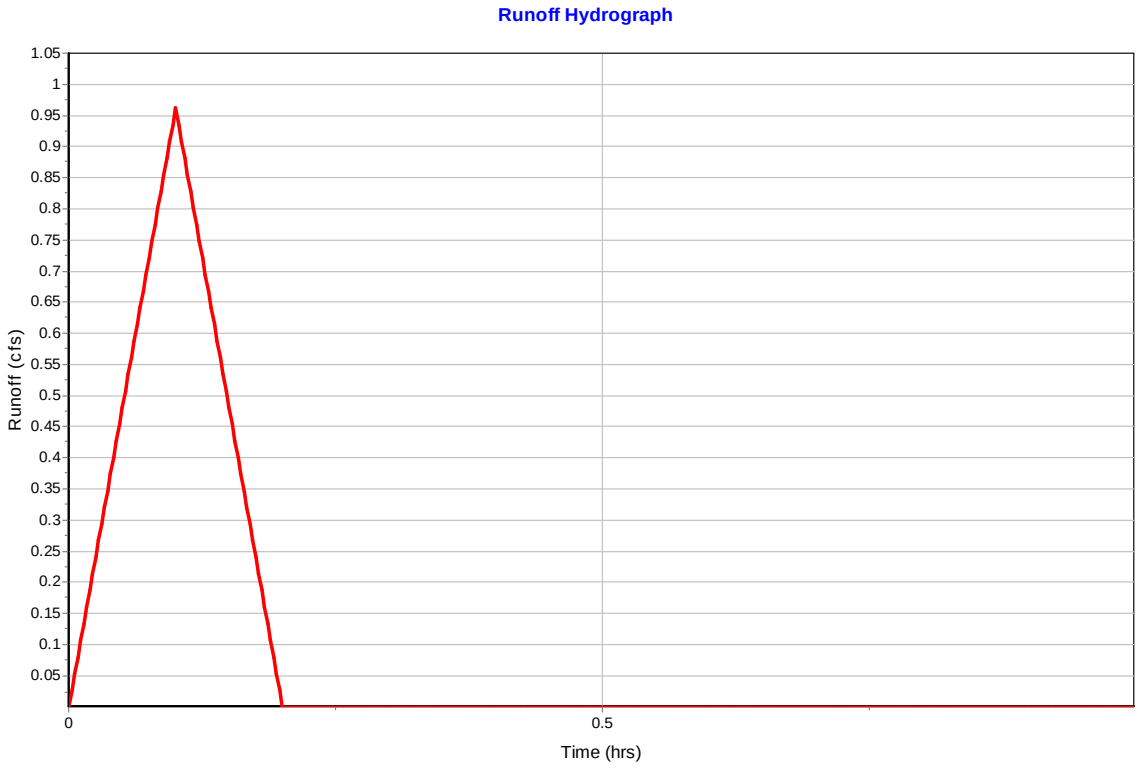
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.81
Total Runoff (in) 0.73
Peak Runoff (cfs) 0.96
Rainfall Intensity 8.093
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-13



Subbasin : Sub-14

Input Data

Area (ac) 0.1
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.1	-	0.9
Composite Area & Weighted Runoff Coeff.	0.1		0.9

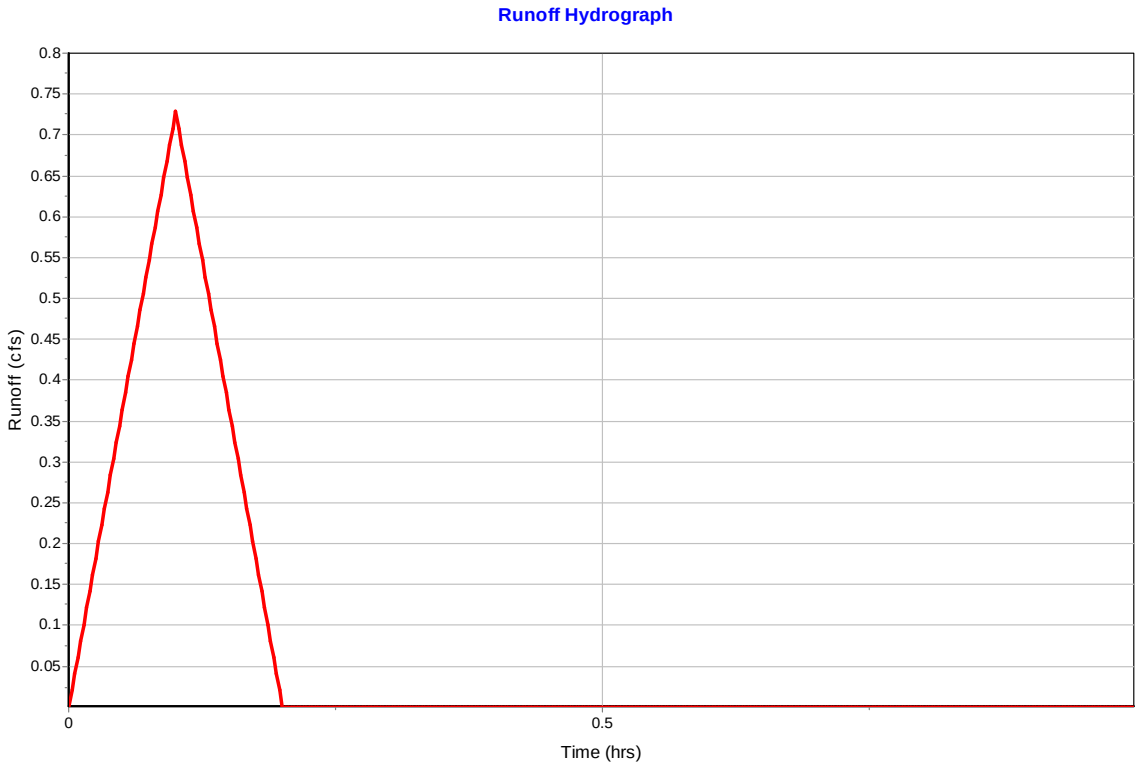
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.81
Total Runoff (in) 0.73
Peak Runoff (cfs) 0.73
Rainfall Intensity 8.093
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-14



Subbasin : Sub-16

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.13	-	0.9
Composite Area & Weighted Runoff Coeff.	0.13		0.9

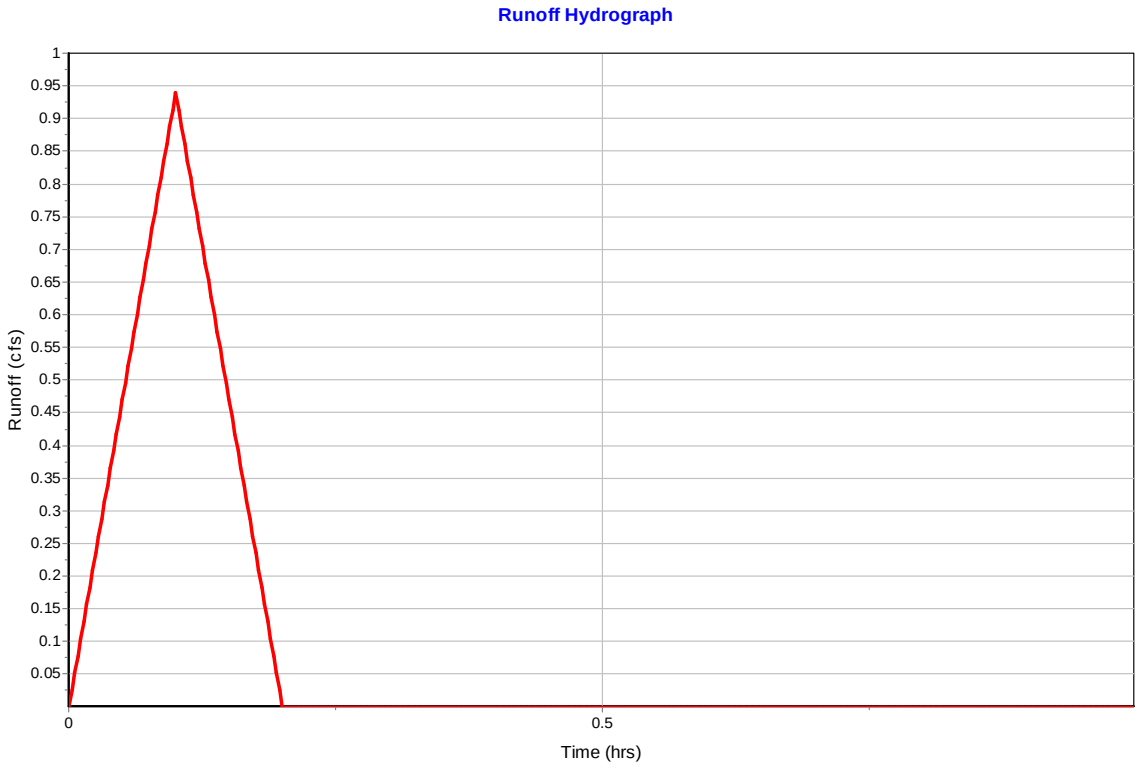
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.81
Total Runoff (in) 0.73
Peak Runoff (cfs) 0.94
Rainfall Intensity 8.093
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-16



Subbasin : Sub-17

Input Data

Area (ac)	0.34
Weighted Runoff Coefficient	0.55

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.34	-	0.55
Composite Area & Weighted Runoff Coeff.	0.34		0.55

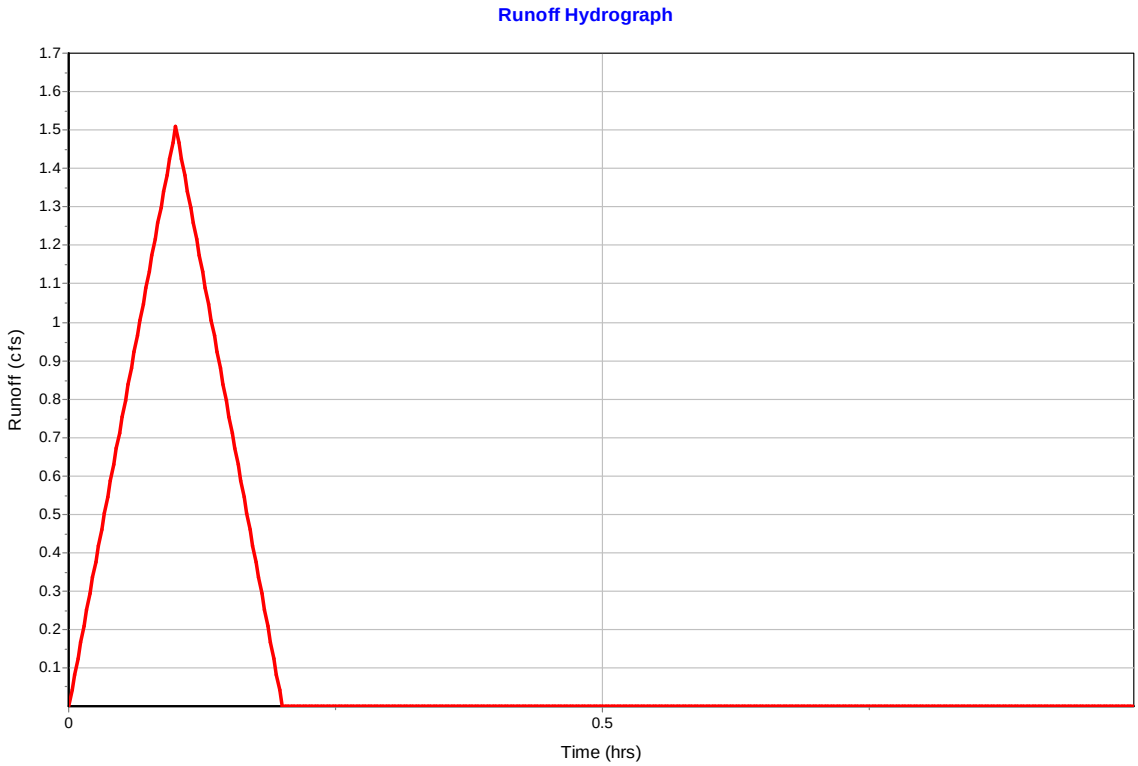
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in)	0.81
Total Runoff (in)	0.45
Peak Runoff (cfs)	1.51
Rainfall Intensity	8.093
Weighted Runoff Coefficient	0.55
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : Sub-17



Subbasin : Sub-20

Input Data

Area (ac) 0.14
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.14	-	0.9
Composite Area & Weighted Runoff Coeff.	0.14		0.9

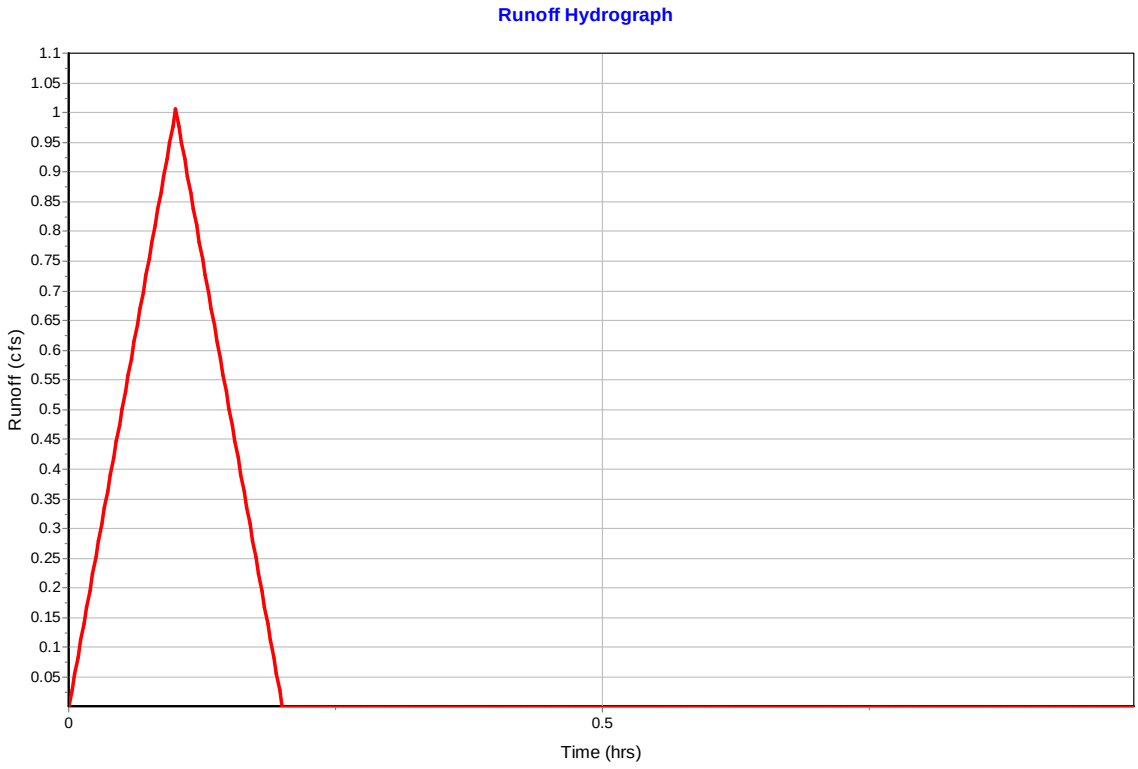
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.81
Total Runoff (in) 0.73
Peak Runoff (cfs) 1.01
Rainfall Intensity 8.093
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-20



Subbasin : Sub-21

Input Data

Area (ac) 0.28
Weighted Runoff Coefficient 0.57

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.28	-	0.57
Composite Area & Weighted Runoff Coeff.	0.28		0.57

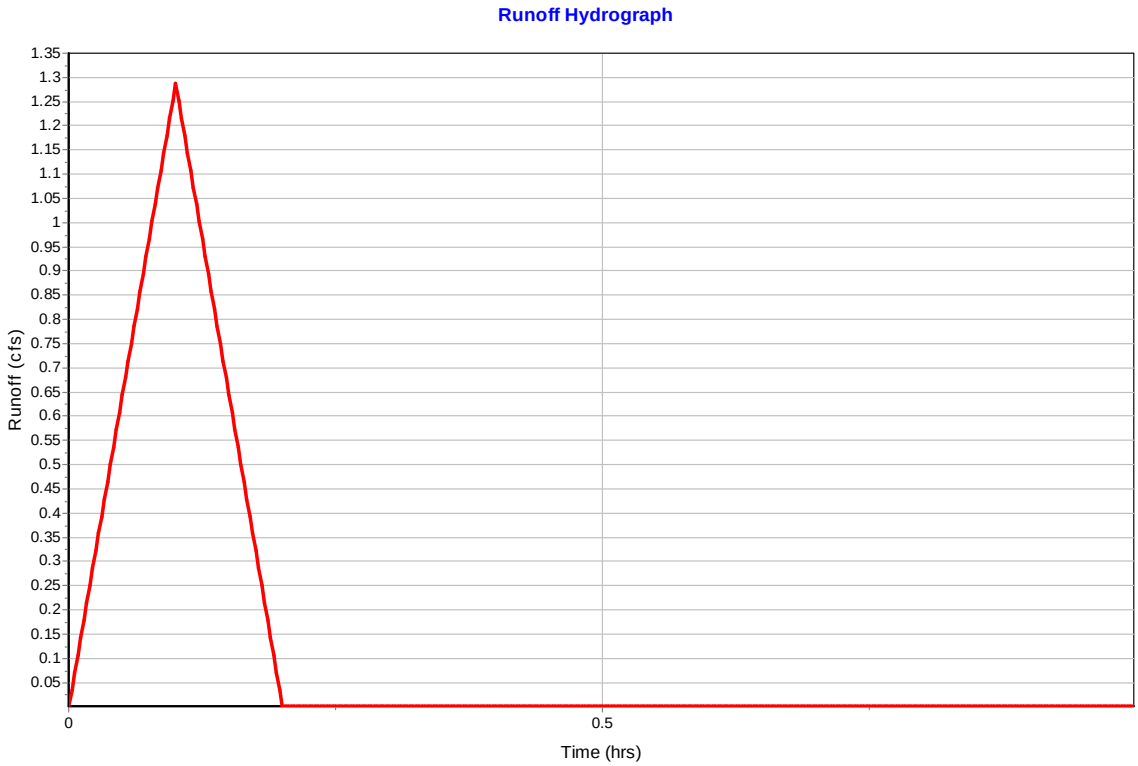
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.81
Total Runoff (in) 0.46
Peak Runoff (cfs) 1.29
Rainfall Intensity 8.093
Weighted Runoff Coefficient 0.57
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-21



Subbasin : Sub-24

Input Data

Area (ac) 0.21
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.21	-	0.9
Composite Area & Weighted Runoff Coeff.	0.21		0.9

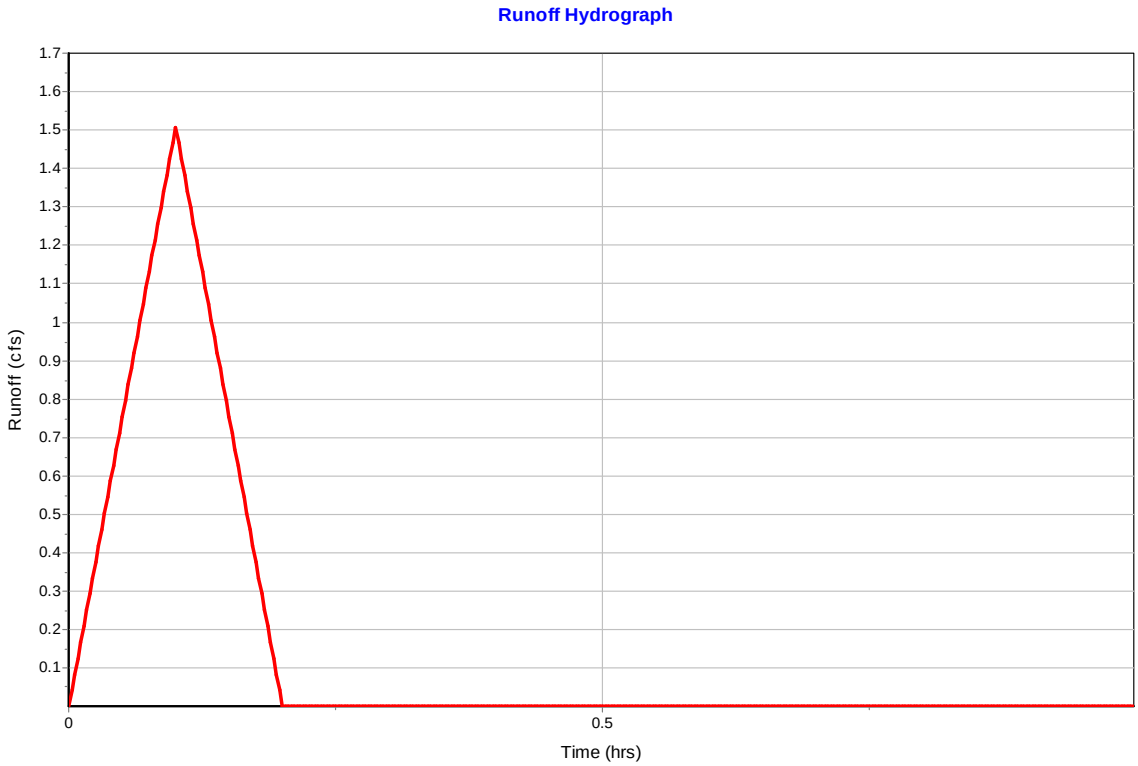
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.81
Total Runoff (in) 0.73
Peak Runoff (cfs) 1.51
Rainfall Intensity 8.093
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-24



Subbasin : Sub-25

Input Data

Area (ac) 0.24
Weighted Runoff Coefficient 0.71

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.24	-	0.71
Composite Area & Weighted Runoff Coeff.	0.24		0.71

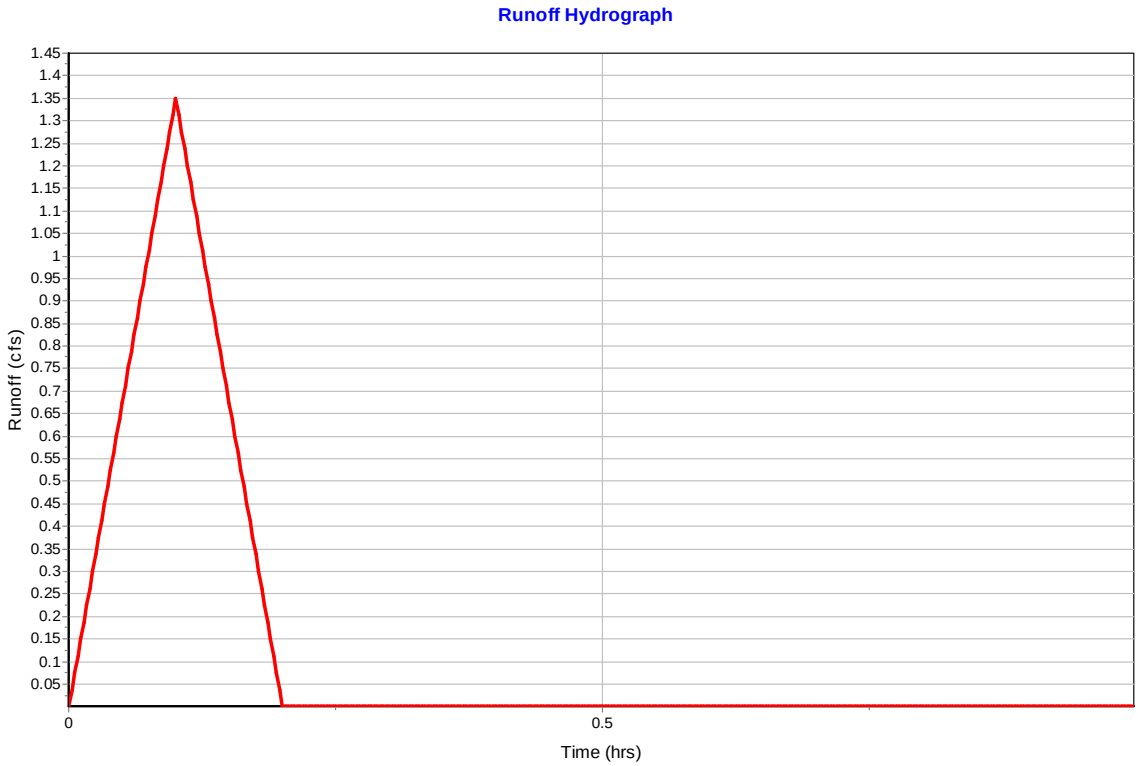
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.81
Total Runoff (in) 0.58
Peak Runoff (cfs) 1.35
Rainfall Intensity 8.093
Weighted Runoff Coefficient 0.71
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-25



Subbasin : Sub-27

Input Data

Area (ac) 0.21
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.21	-	0.9
Composite Area & Weighted Runoff Coeff.	0.21		0.9

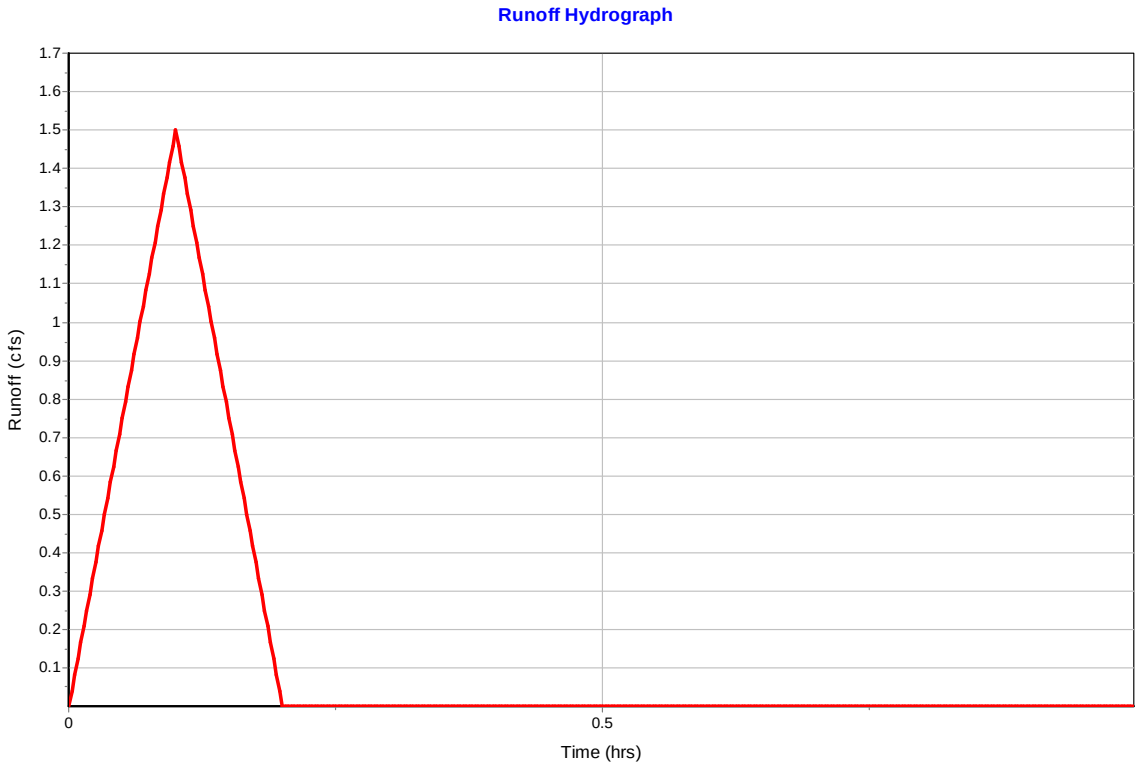
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 0.81
Total Runoff (in) 0.73
Peak Runoff (cfs) 1.5
Rainfall Intensity 8.093
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-27



Subbasin : Sub-28

Input Data

Area (ac)	0.18
Weighted Runoff Coefficient	0.74

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.18	-	0.74
Composite Area & Weighted Runoff Coeff.	0.18		0.74

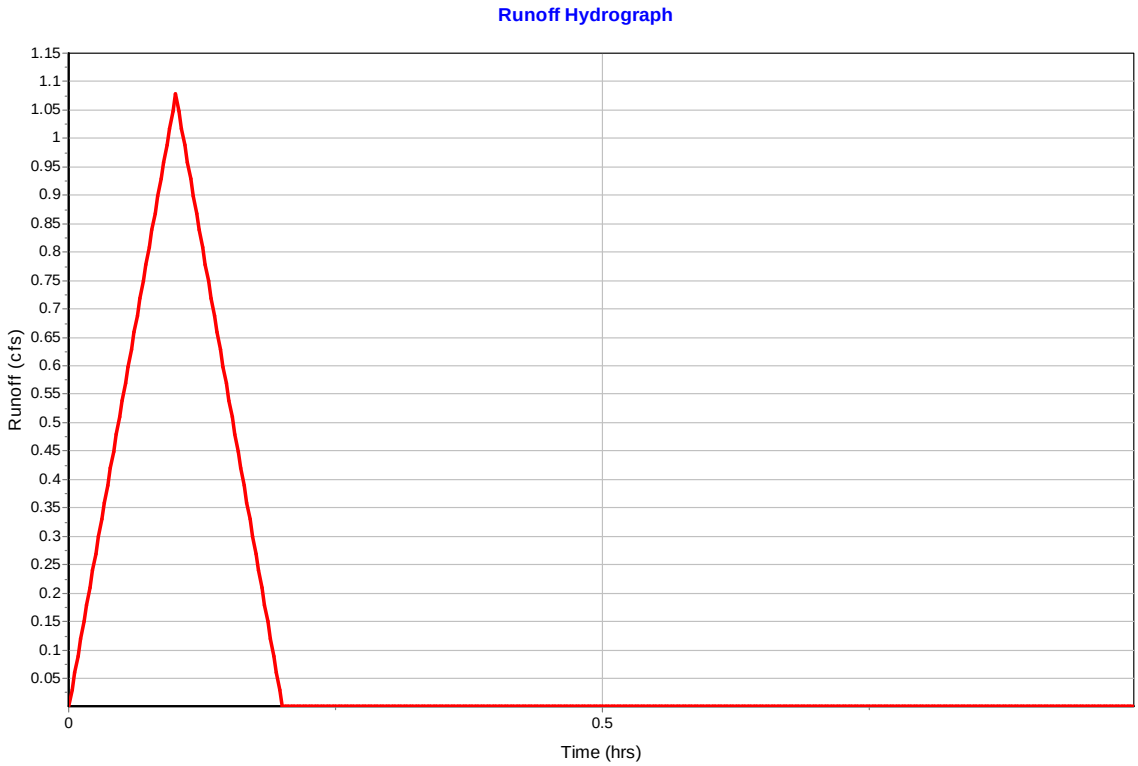
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in)	0.81
Total Runoff (in)	0.6
Peak Runoff (cfs)	1.08
Rainfall Intensity	8.093
Weighted Runoff Coefficient	0.74
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : Sub-28



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	7	197.61	206.04	8.43	197.61	0.00	206.04	0.00	0.00	0.00
2	11	198.36	202.30	3.94	197.50	-0.86	202.30	0.00	10.00	0.00
3	12	197.08	202.18	5.10	197.08	0.00	202.18	0.00	0.00	0.00
4	18	201.18	207.06	5.88	201.18	0.00	207.06	0.00	0.00	0.00
5	22	210.82	216.07	5.25	210.82	0.00	216.07	0.00	0.00	0.00
6	26	219.00	233.90	14.90	219.00	0.00	233.90	0.00	0.00	0.00
7	29	231.85	237.32	5.47	231.85	0.00	237.32	0.00	0.00	0.00
8	Out-1D-7	197.18	203.18	6.00	197.18	0.00	203.18	0.00	0.00	0.00
9	Out-1D-9	197.67	203.67	6.00	197.67	0.00	203.67	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	7	3.25	0.00	198.64	1.03	0.00	7.40	197.79	0.18	0 00:06	0 00:00	0.00	0.00
2	11	2.59	0.00	199.02	0.66	0.00	3.28	198.46	0.10	0 00:06	0 00:00	0.00	0.00
3	12	1.37	0.00	197.39	0.31	0.00	4.79	197.13	0.05	0 00:06	0 00:00	0.00	0.00
4	18	2.40	0.00	201.46	0.28	0.00	5.60	201.23	0.05	0 00:06	0 00:00	0.00	0.00
5	22	7.28	0.00	211.54	0.72	0.00	4.54	210.95	0.13	0 00:06	0 00:00	0.00	0.00
6	26	5.21	0.00	219.70	0.70	0.00	14.20	219.12	0.12	0 00:06	0 00:00	0.00	0.00
7	29	2.54	0.00	232.28	0.43	0.00	5.05	231.93	0.08	0 00:06	0 00:00	0.00	0.00
8	Out-1D-7	0.00	0.00	197.18	0.00	0.00	6.00	197.18	0.00	0 00:00	0 00:00	0.00	0.00
9	Out-1D-9	0.00	0.00	197.67	0.00	0.00	6.00	197.67	0.00	0 00:00	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	D-10	33.23	197.61	0.00	197.50	0.00	0.11	0.3300	CIRCULAR	15.000	15.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
2	D-11	106.95	210.82	0.00	204.38	0.38	6.44	6.0200	CIRCULAR	15.000	15.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
3	D-12	16.00	201.18	0.00	194.20	0.00	6.98	43.6200	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
4	D-13	13.65	197.08	0.00	195.58	2.58	1.50	10.9900	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
5	D-14	24.97	211.27	0.00	211.02	0.20	0.25	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
6	D-16	30.06	211.22	0.00	210.92	0.10	0.30	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
7	D-17	13.28	232.72	0.00	232.59	0.74	0.13	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
8	D-18	32.10	232.27	0.00	231.95	0.10	0.32	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
9	D-19	21.15	219.51	0.00	219.30	0.30	0.21	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
10	D-2	32.13	202.11	0.00	201.79	4.18	0.32	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
11	D-20	32.45	219.46	0.00	219.14	0.14	0.32	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
12	D-21	260.65	231.85	0.00	219.50	0.50	12.35	4.7400	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
13	D-22	163.67	219.00	0.00	211.00	0.18	8.00	4.8900	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
14	D-3	49.15	202.74	0.00	202.25	1.07	0.49	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
15	D-4	25.27	201.53	0.00	201.28	0.10	0.25	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
16	D-5	13.24	198.50	0.00	138.36	-60.00	60.14	454.3400	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
17	D-6	14.17	198.50	0.64	198.36	0.00	0.14	0.9900	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
18	D-7	32.29	198.36	0.00	197.61	0.00	0.75	2.3200	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
19	D-8	14.54	197.83	-0.67	197.68	0.60	0.15	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
20	D-9	10.52	197.78	0.00	197.08	0.00	0.70	6.6600	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	D-10	3.25	0 00:06	3.96	0.82	3.52	0.16	0.88	0.70	0.00		Calculated
2	D-11	7.26	0 00:06	13.74	0.53	10.61	0.17	0.68	0.55	0.00		Calculated
3	D-12	2.40	0 00:06	20.39	0.12	15.18	0.02	0.26	0.26	0.00		Calculated
4	D-13	1.37	0 00:06	10.23	0.13	7.73	0.03	0.28	0.28	0.00		Calculated
5	D-14	1.27	0 00:06	3.09	0.41	3.17	0.13	0.52	0.52	0.00		Calculated
6	D-16	0.99	0 00:06	3.09	0.32	2.46	0.20	0.53	0.53	0.00		Calculated
7	D-17	1.07	0 00:06	3.09	0.35	3.11	0.07	0.45	0.45	0.00		Calculated
8	D-18	1.48	0 00:06	3.09	0.48	3.53	0.15	0.53	0.53	0.00		Calculated
9	D-19	1.33	0 00:06	3.09	0.43	3.36	0.10	0.50	0.50	0.00		Calculated
10	D-2	0.72	0 00:06	3.09	0.23	2.97	0.18	0.35	0.35	0.00		Calculated
11	D-20	1.49	0 00:06	3.09	0.48	3.33	0.16	0.56	0.57	0.00		Calculated
12	D-21	2.45	0 00:06	6.72	0.36	7.75	0.56	0.42	0.42	0.00		Calculated
13	D-22	5.13	0 00:06	6.83	0.75	9.15	0.30	0.67	0.67	0.00		Calculated
14	D-3	1.48	0 00:06	3.09	0.48	3.61	0.23	0.52	0.52	0.00		Calculated
15	D-4	0.93	0 00:06	3.09	0.30	3.13	0.13	0.40	0.40	0.00		Calculated
16	D-5	1.67	0 00:06	3.18	0.53	2.97	0.07	0.68	0.68	0.00		Calculated
17	D-6	0.93	0 00:06	3.07	0.30	1.95	0.12	0.62	0.62	0.00		Calculated
18	D-7	2.54	0 00:06	4.71	0.54	3.65	0.15	0.83	0.83	0.00		Calculated
19	D-8	0.65	0 00:06	7.31	0.09	5.12	0.05	0.22	0.22	0.00		Calculated
20	D-9	0.72	0 00:06	7.97	0.09	4.16	0.04	0.27	0.27	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	6	FHWA HEC-22 GENERIC	N/A	On Sag	1	202.11	206.43	4.32	202.11	0.00	10.00	0.00
2	9	FHWA HEC-22 GENERIC	N/A	On Sag	1	198.50	202.16	3.66	197.83	-0.67	10.00	0.00
3	10	FHWA HEC-22 GENERIC	N/A	On Sag	1	198.50	202.24	3.74	197.86	-0.64	0.00	0.00
4	13	FHWA HEC-22 GENERIC	N/A	On Sag	1	197.86	202.19	4.33	197.86	0.00	0.00	0.00
5	14	FHWA HEC-22 GENERIC	N/A	On Sag	1	197.78	202.11	4.33	197.78	0.00	10.00	0.00
6	16	FHWA HEC-22 GENERIC	N/A	On Sag	1	201.53	205.86	4.33	201.53	0.00	10.00	0.00
7	17	FHWA HEC-22 GENERIC	N/A	On Sag	1	202.74	207.07	4.33	202.74	0.00	10.00	0.00
8	20	FHWA HEC-22 GENERIC	N/A	On Sag	1	211.22	215.72	4.50	211.22	0.00	10.00	0.00
9	21	FHWA HEC-22 GENERIC	N/A	On Sag	1	211.27	215.60	4.33	211.27	0.00	10.00	0.00
10	24	FHWA HEC-22 GENERIC	N/A	On Sag	1	219.46	223.79	4.33	219.46	0.00	10.00	0.00
11	25	FHWA HEC-22 GENERIC	N/A	On Sag	1	219.51	523.84	304.33	219.51	0.00	10.00	0.00
12	27	FHWA HEC-22 GENERIC	N/A	On Sag	1	232.27	236.76	4.49	232.27	0.00	10.00	0.00
13	28	FHWA HEC-22 GENERIC	N/A	On Sag	1	232.72	237.22	4.50	232.72	0.00	10.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	6	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
2	9	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
3	10	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
4	13	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
5	14	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
6	16	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
7	17	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
8	20	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
9	21	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
10	24	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
11	25	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
12	27	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
13	28	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	6	0.73	0.73	N/A	N/A	N/A	2.90	206.51	0.08	0 00:06	0.00	0.00
2	9	0.66	0.66	N/A	N/A	N/A	2.77	202.24	0.08	0 00:06	0.00	0.00
3	10	1.69	1.69	N/A	N/A	N/A	9.22	202.53	0.29	0 00:06	0.00	0.00
4	13	0.96	0.96	N/A	N/A	N/A	5.98	202.41	0.23	0 00:06	0.00	0.00
5	14	0.73	0.73	N/A	N/A	N/A	2.90	202.19	0.08	0 00:06	0.00	0.00
6	16	0.94	0.94	N/A	N/A	N/A	5.88	206.00	0.14	0 00:06	0.00	0.00
7	17	1.51	1.51	N/A	N/A	N/A	8.47	207.27	0.19	0 00:06	0.00	0.00
8	20	1.01	1.01	N/A	N/A	N/A	6.20	215.87	0.15	0 00:06	0.00	0.00
9	21	1.29	1.29	N/A	N/A	N/A	7.51	215.78	0.17	0 00:06	0.00	0.00
10	24	1.51	1.51	N/A	N/A	N/A	8.46	223.98	0.19	0 00:06	0.00	0.00
11	25	1.35	1.35	N/A	N/A	N/A	7.79	524.02	0.18	0 00:06	0.00	0.00
12	27	1.50	1.50	N/A	N/A	N/A	8.43	236.95	0.19	0 00:06	0.00	0.00
13	28	1.08	1.08	N/A	N/A	N/A	6.55	237.37	0.15	0 00:06	0.00	0.00

Project Description

File Name	9720.16_SSA-rev.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	00:00:00	0:00:00
End Analysis On	00:00:00	1:00:00
Start Reporting On	00:00:00	0:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	13
Nodes	26
Junctions	9
Outfalls	4
Flow Diversions	0
Inlets	13
Storage Nodes	0
Links	20
Channels	0
Pipes	20
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	100 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-06	0.12	0.7500	1.04	0.78	0.09	0.94	0 00:06:00
2	Sub-09	0.09	0.9000	1.04	0.94	0.08	0.84	0 00:06:00
3	Sub-10	0.26	0.8100	1.04	0.84	0.22	2.18	0 00:06:00
4	Sub-13	0.13	0.9000	1.04	0.94	0.12	1.24	0 00:06:00
5	Sub-14	0.10	0.9000	1.04	0.94	0.09	0.94	0 00:06:00
6	Sub-16	0.13	0.9000	1.04	0.94	0.12	1.21	0 00:06:00
7	Sub-17	0.34	0.5500	1.04	0.57	0.19	1.94	0 00:06:00
8	Sub-20	0.14	0.9000	1.04	0.94	0.13	1.29	0 00:06:00
9	Sub-21	0.28	0.5700	1.04	0.59	0.17	1.66	0 00:06:00
10	Sub-24	0.21	0.9000	1.04	0.94	0.19	1.94	0 00:06:00
11	Sub-25	0.24	0.7100	1.04	0.74	0.17	1.74	0 00:06:00
12	Sub-27	0.21	0.9000	1.04	0.94	0.19	1.93	0 00:06:00
13	Sub-28	0.18	0.7400	1.04	0.77	0.14	1.39	0 00:06:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	7	Junction	197.61	206.04	197.61	206.04	0.00	4.07	198.83	0.00	7.21	0 00:00	0.00	0.00
2	11	Junction	198.36	202.30	197.50	202.30	10.00	3.22	199.42	0.00	2.87	0 00:00	0.00	0.00
3	12	Junction	197.08	202.18	197.08	202.18	0.00	1.77	197.44	0.00	4.74	0 00:00	0.00	0.00
4	18	Junction	201.18	207.06	201.18	207.06	0.00	3.09	201.51	0.00	5.55	0 00:00	0.00	0.00
5	22	Junction	210.82	216.07	210.82	216.07	0.00	9.24	211.67	0.00	4.40	0 00:00	0.00	0.00
6	26	Junction	219.00	233.90	219.00	233.90	0.00	6.68	219.89	0.00	14.01	0 00:00	0.00	0.00
7	29	Junction	231.85	237.32	231.85	237.32	0.00	3.27	232.35	0.00	4.98	0 00:00	0.00	0.00
8	Out-1D-7	Junction	197.18	203.18	197.18	203.18	0.00	0.00	197.18	0.00	6.00	0 00:00	0.00	0.00
9	Out-1D-9	Junction	197.67	203.67	197.67	203.67	0.00	0.00	197.67	0.00	6.00	0 00:00	0.00	0.00
10	Out-1D-15	Outfall	193.00					1.77	193.00					
11	Out-1D-19	Outfall	194.20					3.09	194.46					
12	Out-1D-23	Outfall	204.00					9.22	204.00					
13	Out-1D-8	Outfall	197.50					4.06	198.32					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	D-10	Pipe	7	Out-1D-8	33.23	197.61	197.50	0.3300	15.000	0.0150	4.06	3.96	1.03	3.79	1.02	0.81	0.00	> CAPACITY
2	D-11	Pipe	22	Out-1D-23	106.95	210.82	204.38	6.0200	15.000	0.0150	9.22	13.74	0.67	11.10	0.80	0.64	0.00	Calculated
3	D-12	Pipe	18	Out-1D-19	16.00	201.18	194.20	43.6200	12.000	0.0150	3.09	20.39	0.15	16.01	0.29	0.29	0.00	Calculated
4	D-13	Pipe	12	Out-1D-15	13.65	197.08	195.58	10.9900	12.000	0.0150	1.77	10.23	0.17	8.13	0.32	0.32	0.00	Calculated
5	D-14	Pipe	21	22	24.97	211.27	211.02	1.0000	12.000	0.0150	1.64	3.09	0.53	3.22	0.65	0.65	0.00	Calculated
6	D-16	Pipe	20	22	30.06	211.22	210.92	1.0000	12.000	0.0150	1.27	3.09	0.41	2.55	0.66	0.66	0.00	Calculated
7	D-17	Pipe	28	29	13.28	232.72	232.59	1.0000	12.000	0.0150	1.37	3.09	0.44	3.29	0.52	0.52	0.00	Calculated
8	D-18	Pipe	27	29	32.10	232.27	231.95	1.0000	12.000	0.0150	1.90	3.09	0.62	3.70	0.62	0.62	0.00	Calculated
9	D-19	Pipe	25	26	21.15	219.51	219.30	1.0000	12.000	0.0150	1.71	3.09	0.55	3.51	0.62	0.62	0.00	Calculated
10	D-2	Pipe	6	7	32.13	202.11	201.79	1.0000	12.000	0.0150	0.92	3.09	0.30	3.16	0.40	0.40	0.00	Calculated
11	D-20	Pipe	24	26	32.45	219.46	219.14	1.0000	12.000	0.0150	1.91	3.09	0.62	3.37	0.72	0.72	0.00	Calculated
12	D-21	Pipe	29	26	260.65	231.85	219.50	4.7400	12.000	0.0150	3.16	6.72	0.47	8.26	0.49	0.49	0.00	Calculated
13	D-22	Pipe	26	22	163.67	219.00	211.00	4.8900	12.000	0.0150	6.50	6.83	0.95	9.38	0.83	0.83	0.00	Calculated
14	D-3	Pipe	17	18	49.15	202.74	202.25	1.0000	12.000	0.0150	1.90	3.09	0.62	3.80	0.61	0.61	0.00	Calculated
15	D-4	Pipe	16	18	25.27	201.53	201.28	1.0000	12.000	0.0150	1.19	3.09	0.39	3.32	0.47	0.47	0.00	Calculated
16	D-5	Pipe	10	11	13.24	198.50	138.36	454.3400	12.000	0.0150	2.09	3.18	0.66	2.98	1.00	1.00	1.00	SURCHARGED
17	D-6	Pipe	13	11	14.17	198.50	198.36	0.9900	12.000	0.0150	1.16	3.07	0.38	1.95	0.99	0.99	0.00	Calculated
18	D-7	Pipe	11	7	32.29	198.36	197.61	2.3200	12.000	0.0150	3.17	4.71	0.67	4.03	1.00	1.00	1.00	SURCHARGED
19	D-8	Pipe	9	12	14.54	197.83	197.68	1.0000	12.000	0.0150	0.84	7.31	0.11	5.42	0.25	0.25	0.00	Calculated
20	D-9	Pipe	14	12	10.52	197.78	197.08	6.6600	12.000	0.0150	0.93	7.97	0.12	4.30	0.32	0.32	0.00	Calculated

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft^2)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	6	FHWA HEC-22 GENERIC	N/A	On Sag	1	202.11	206.43	202.11	10.00	0.94	N/A	N/A	N/A	7.00	5.86	206.57
2	9	FHWA HEC-22 GENERIC	N/A	On Sag	1	198.50	202.16	197.83	10.00	0.84	N/A	N/A	N/A	7.00	5.39	202.29
3	10	FHWA HEC-22 GENERIC	N/A	On Sag	1	198.50	202.24	197.86	0.00	2.17	N/A	N/A	N/A	7.00	11.11	202.57
4	13	FHWA HEC-22 GENERIC	N/A	On Sag	1	197.86	202.19	197.86	0.00	1.24	N/A	N/A	N/A	7.00	7.28	202.44
5	14	FHWA HEC-22 GENERIC	N/A	On Sag	1	197.78	202.11	197.78	10.00	0.94	N/A	N/A	N/A	7.00	5.86	202.25
6	16	FHWA HEC-22 GENERIC	N/A	On Sag	1	201.53	205.86	201.53	10.00	1.21	N/A	N/A	N/A	7.00	7.15	206.03
7	17	FHWA HEC-22 GENERIC	N/A	On Sag	1	202.74	207.07	202.74	10.00	1.94	N/A	N/A	N/A	7.00	10.22	207.30
8	20	FHWA HEC-22 GENERIC	N/A	On Sag	1	211.22	215.72	211.22	10.00	1.29	N/A	N/A	N/A	7.00	7.53	215.89
9	21	FHWA HEC-22 GENERIC	N/A	On Sag	1	211.27	215.60	211.27	10.00	1.65	N/A	N/A	N/A	7.00	9.08	215.81
10	24	FHWA HEC-22 GENERIC	N/A	On Sag	1	219.46	223.79	219.46	10.00	1.94	N/A	N/A	N/A	7.00	10.21	224.02
11	25	FHWA HEC-22 GENERIC	N/A	On Sag	1	219.51	523.84	219.51	10.00	1.74	N/A	N/A	N/A	7.00	9.41	524.05
12	27	FHWA HEC-22 GENERIC	N/A	On Sag	1	232.27	236.76	232.27	10.00	1.93	N/A	N/A	N/A	7.00	10.17	236.99
13	28	FHWA HEC-22 GENERIC	N/A	On Sag	1	232.72	237.22	232.72	10.00	1.39	N/A	N/A	N/A	7.00	7.94	237.40

Subbasin Hydrology

Subbasin : Sub-06

Input Data

Area (ac) 0.12
Weighted Runoff Coefficient 0.75

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.12	-	0.75
Composite Area & Weighted Runoff Coeff.	0.12		0.75

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

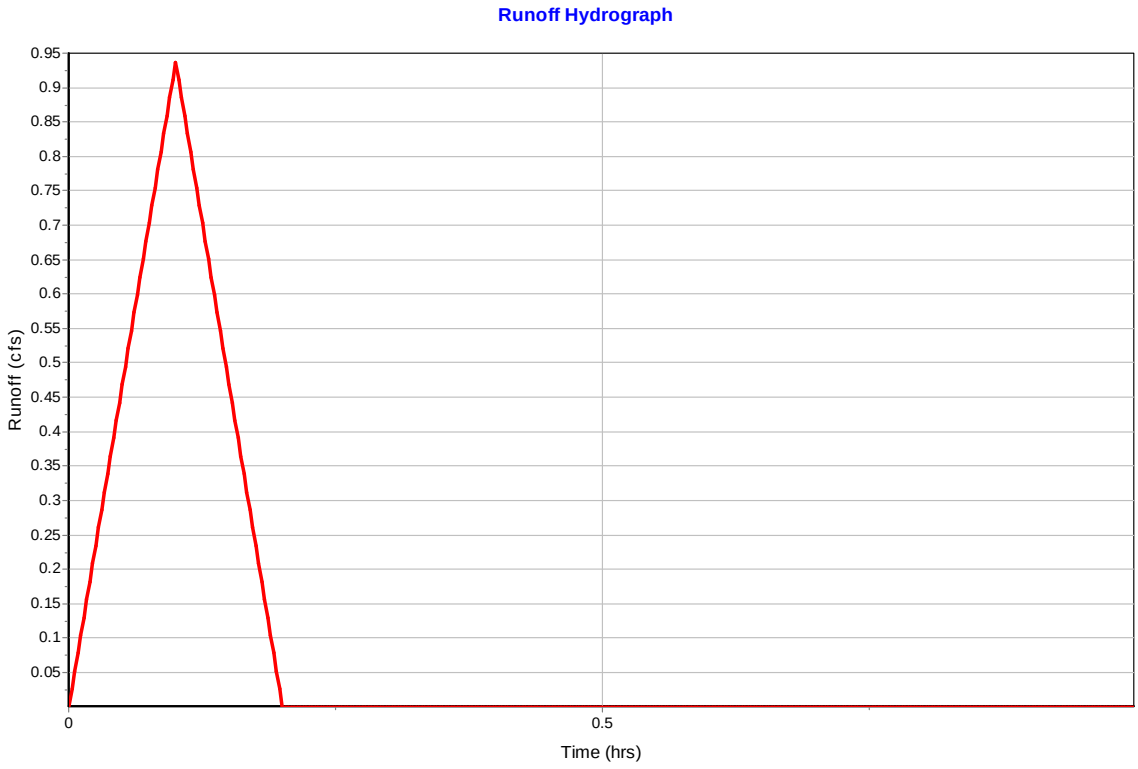
Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 1.04
Total Runoff (in) 0.78
Peak Runoff (cfs) 0.94
Rainfall Intensity 10.413
Weighted Runoff Coefficient 0.75
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-06



Subbasin : Sub-09

Input Data

Area (ac) 0.09
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.09	-	0.9
Composite Area & Weighted Runoff Coeff.	0.09		0.9

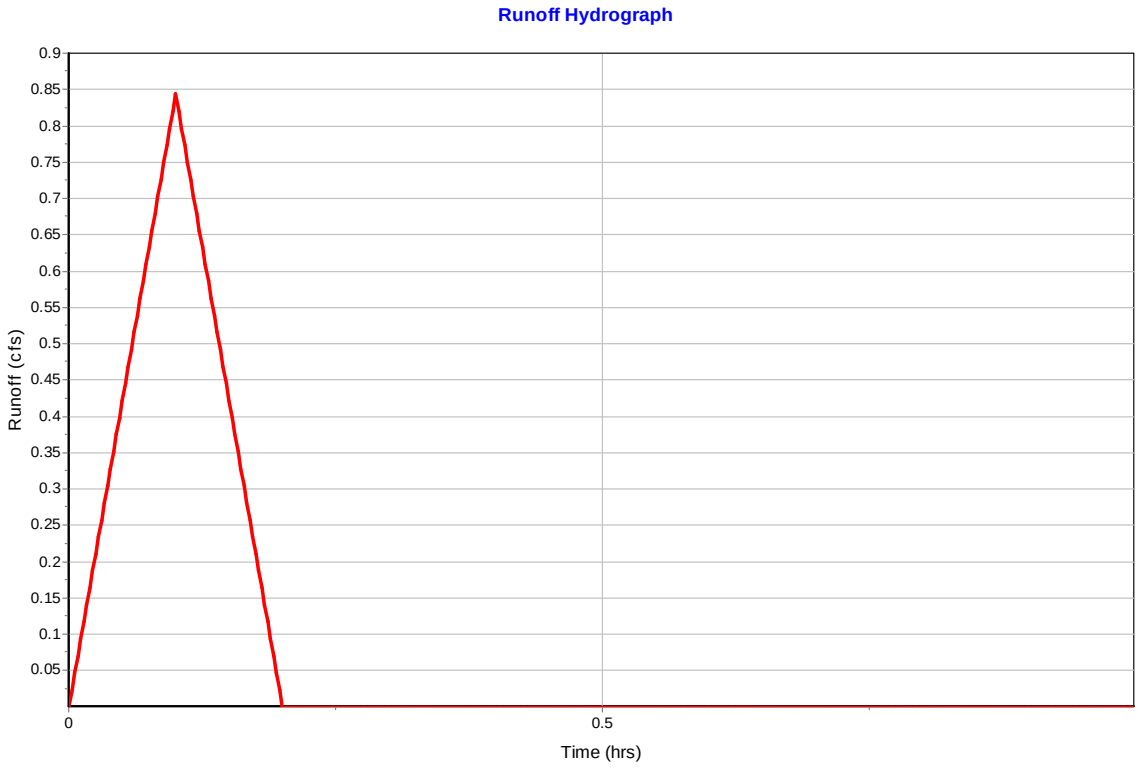
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 1.04
Total Runoff (in) 0.94
Peak Runoff (cfs) 0.84
Rainfall Intensity 10.413
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-09



Subbasin : Sub-10

Input Data

Area (ac) 0.26
Weighted Runoff Coefficient 0.81

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.26	-	0.81
Composite Area & Weighted Runoff Coeff.	0.26		0.81

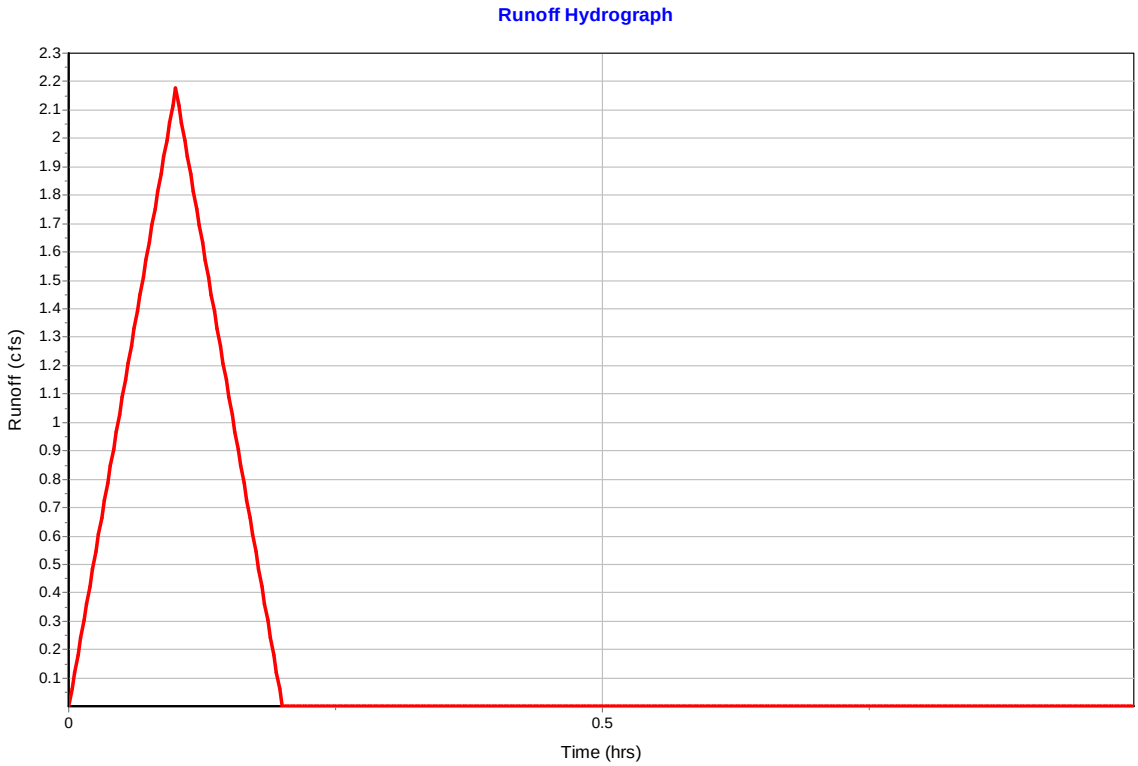
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 1.04
Total Runoff (in) 0.84
Peak Runoff (cfs) 2.18
Rainfall Intensity 10.413
Weighted Runoff Coefficient 0.81
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-10



Subbasin : Sub-13

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.13	-	0.9
Composite Area & Weighted Runoff Coeff.	0.13		0.9

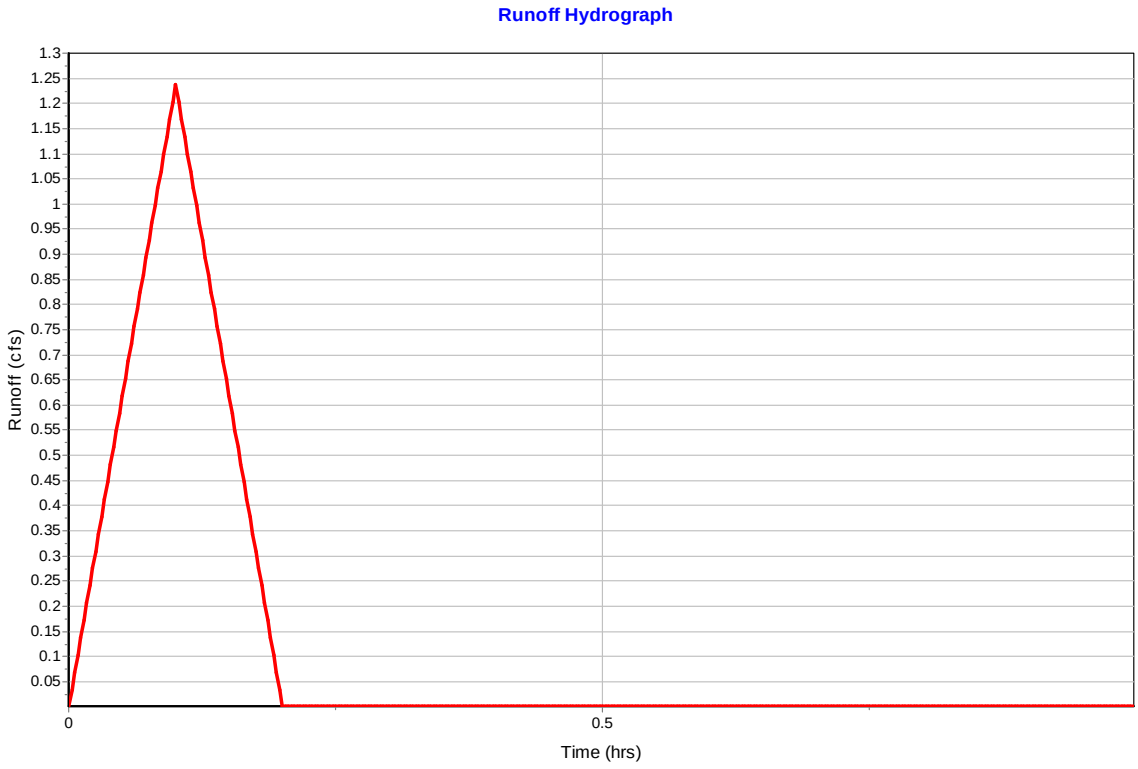
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 1.04
Total Runoff (in) 0.94
Peak Runoff (cfs) 1.24
Rainfall Intensity 10.413
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-13



Subbasin : Sub-14

Input Data

Area (ac) 0.1
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.1	-	0.9
Composite Area & Weighted Runoff Coeff.	0.1		0.9

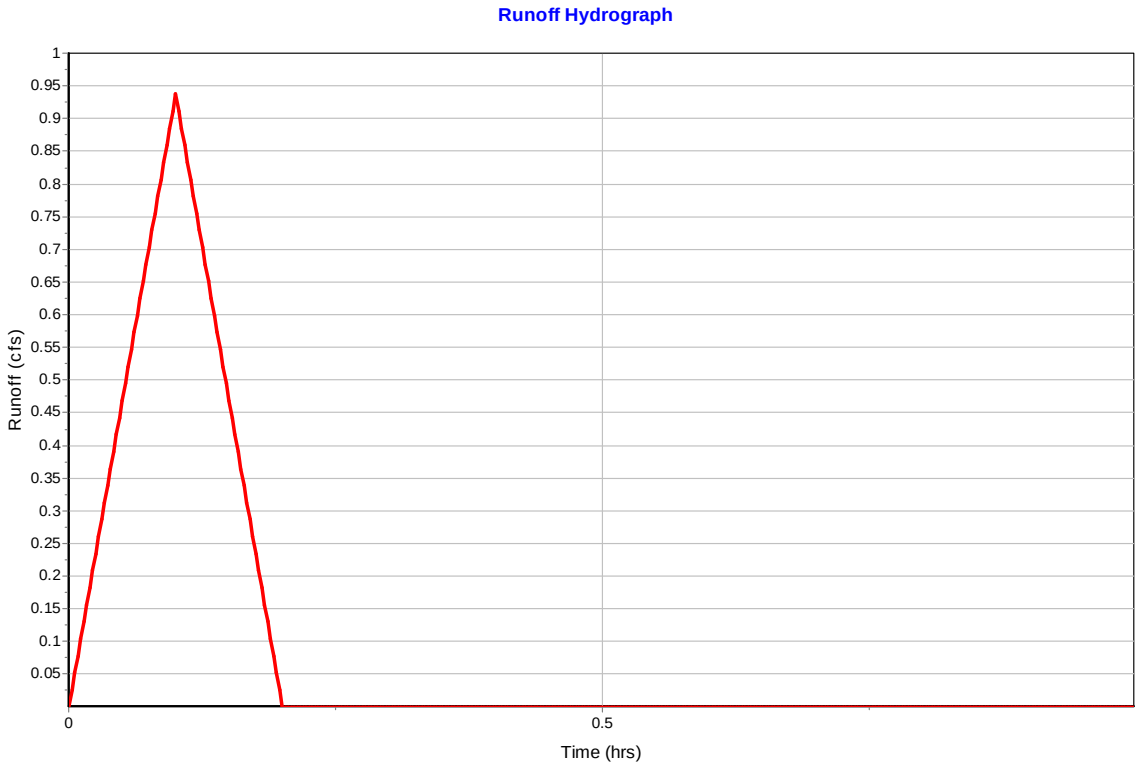
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 1.04
Total Runoff (in) 0.94
Peak Runoff (cfs) 0.94
Rainfall Intensity 10.413
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-14



Subbasin : Sub-16

Input Data

Area (ac) 0.13
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.13	-	0.9
Composite Area & Weighted Runoff Coeff.	0.13		0.9

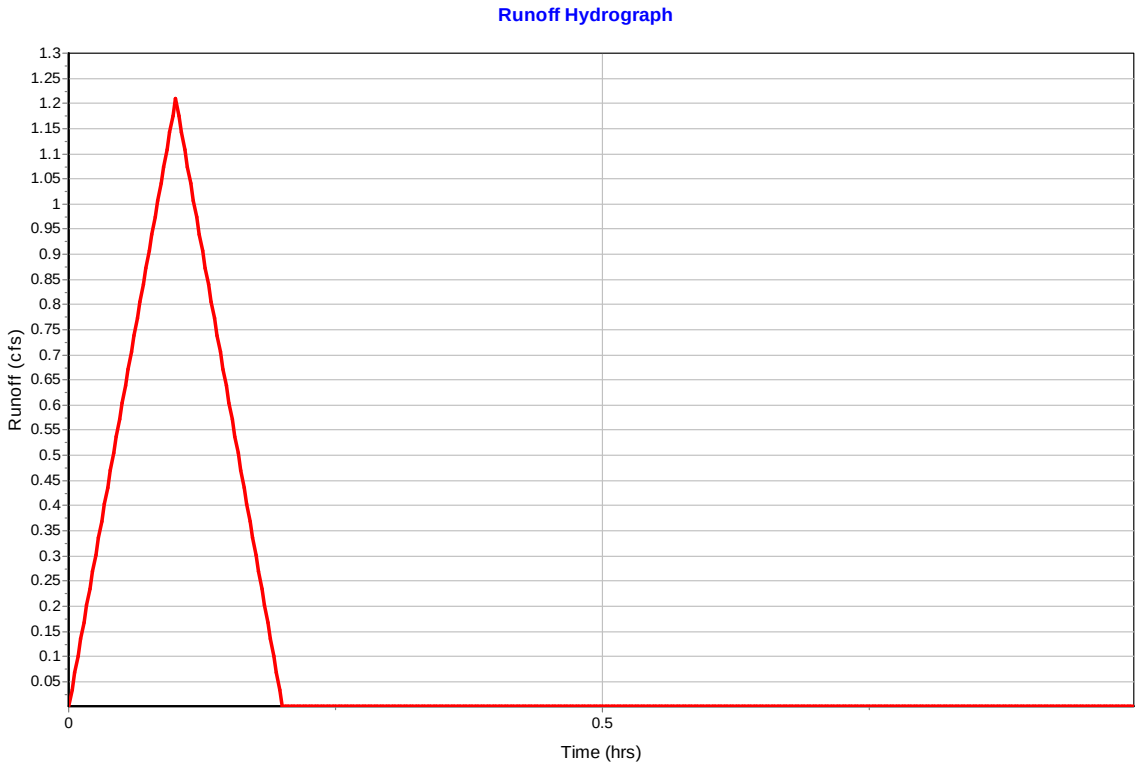
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 1.04
Total Runoff (in) 0.94
Peak Runoff (cfs) 1.21
Rainfall Intensity 10.413
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-16



Subbasin : Sub-17

Input Data

Area (ac) 0.34
Weighted Runoff Coefficient 0.55

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.34	-	0.55
Composite Area & Weighted Runoff Coeff.	0.34		0.55

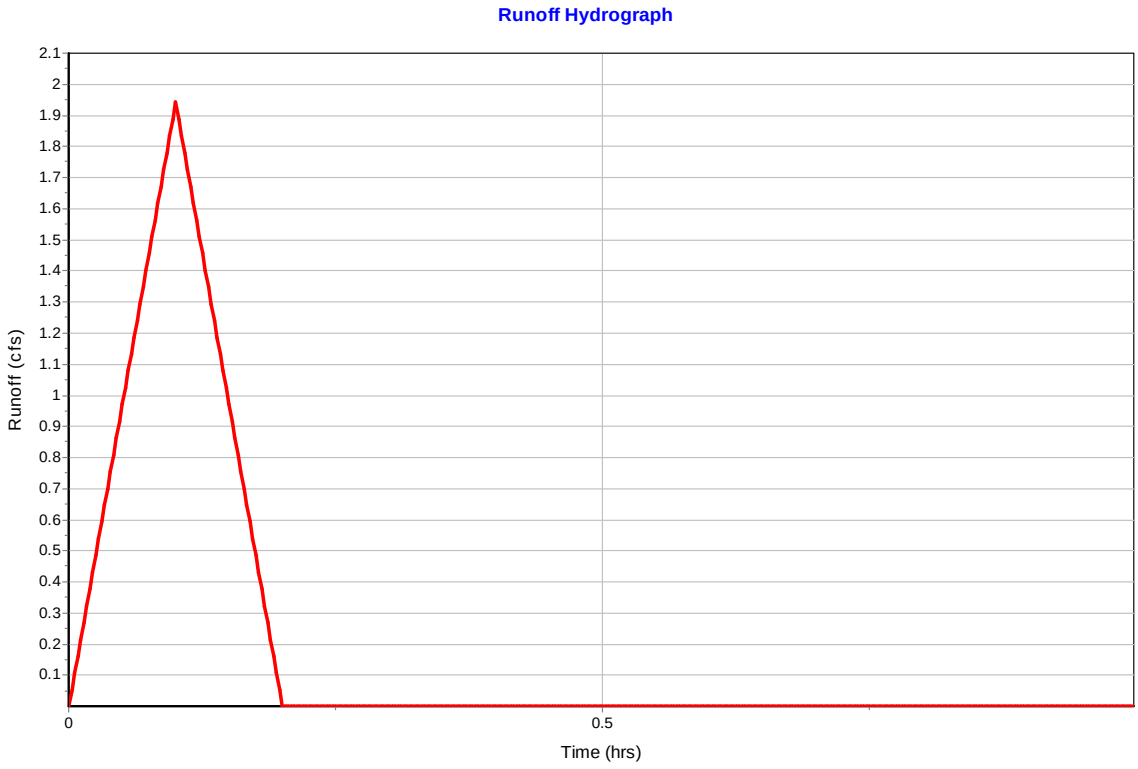
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 1.04
Total Runoff (in) 0.57
Peak Runoff (cfs) 1.94
Rainfall Intensity 10.413
Weighted Runoff Coefficient 0.55
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-17



Subbasin : Sub-20

Input Data

Area (ac) 0.14
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.14	-	0.9
Composite Area & Weighted Runoff Coeff.	0.14		0.9

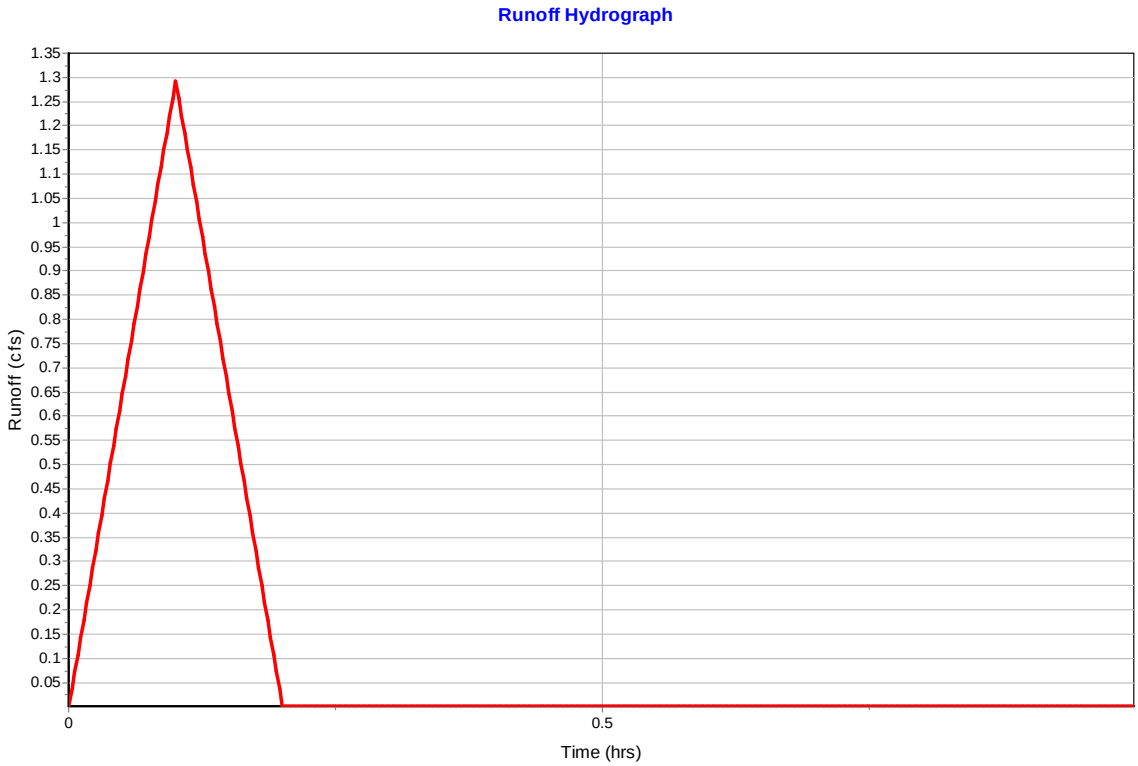
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 1.04
Total Runoff (in) 0.94
Peak Runoff (cfs) 1.29
Rainfall Intensity 10.413
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-20



Subbasin : Sub-21

Input Data

Area (ac) 0.28
Weighted Runoff Coefficient 0.57

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.28	-	0.57
Composite Area & Weighted Runoff Coeff.	0.28		0.57

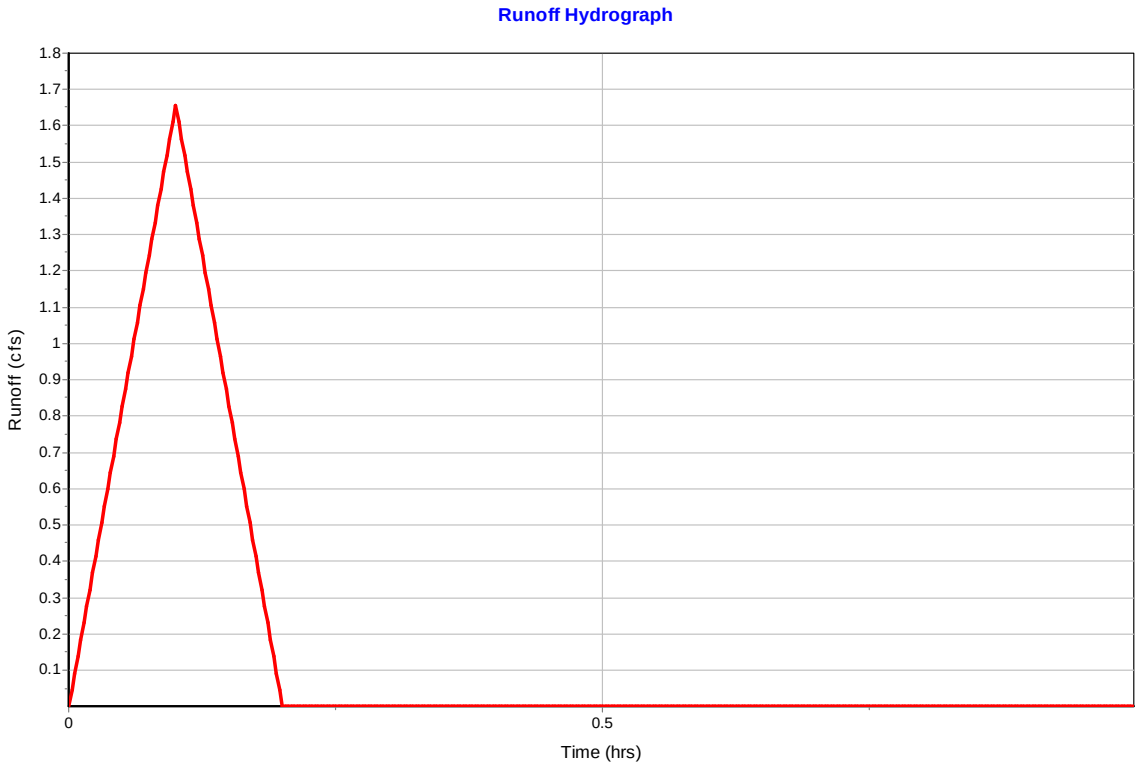
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 1.04
Total Runoff (in) 0.59
Peak Runoff (cfs) 1.66
Rainfall Intensity 10.413
Weighted Runoff Coefficient 0.57
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-21



Subbasin : Sub-24

Input Data

Area (ac) 0.21
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.21	-	0.9
Composite Area & Weighted Runoff Coeff.	0.21		0.9

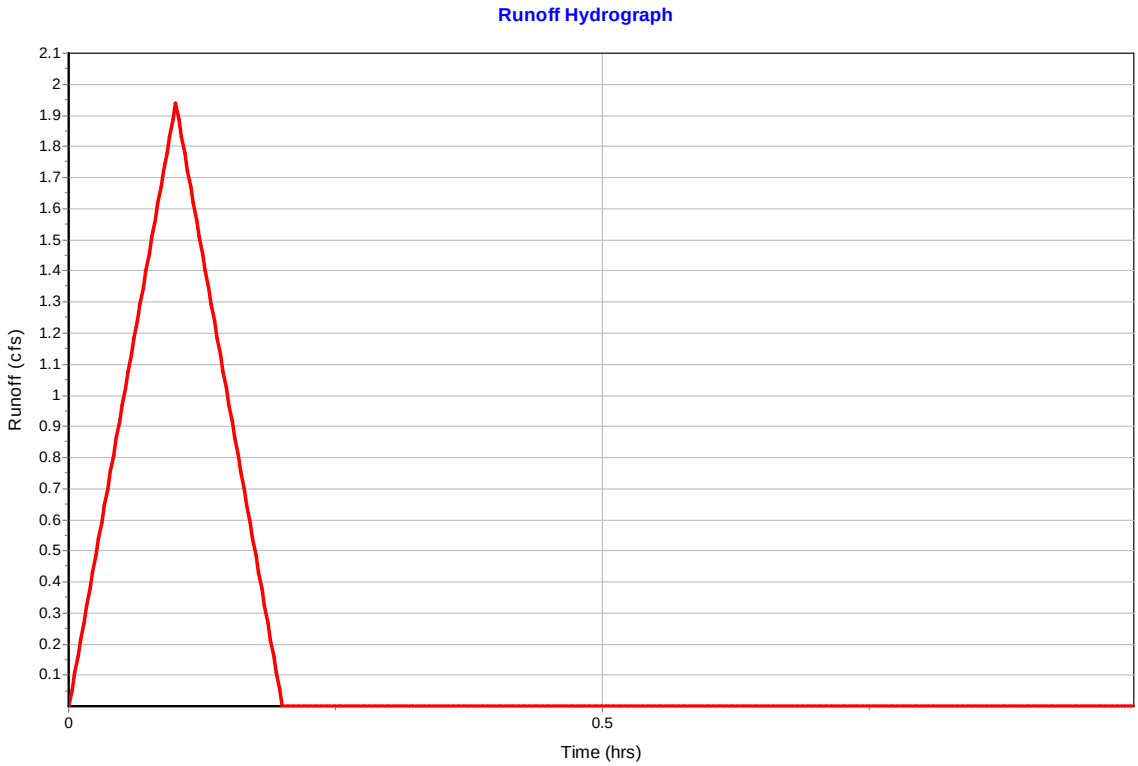
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 1.04
Total Runoff (in) 0.94
Peak Runoff (cfs) 1.94
Rainfall Intensity 10.413
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-24



Subbasin : Sub-25

Input Data

Area (ac) 0.24
Weighted Runoff Coefficient 0.71

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.24	-	0.71
Composite Area & Weighted Runoff Coeff.	0.24		0.71

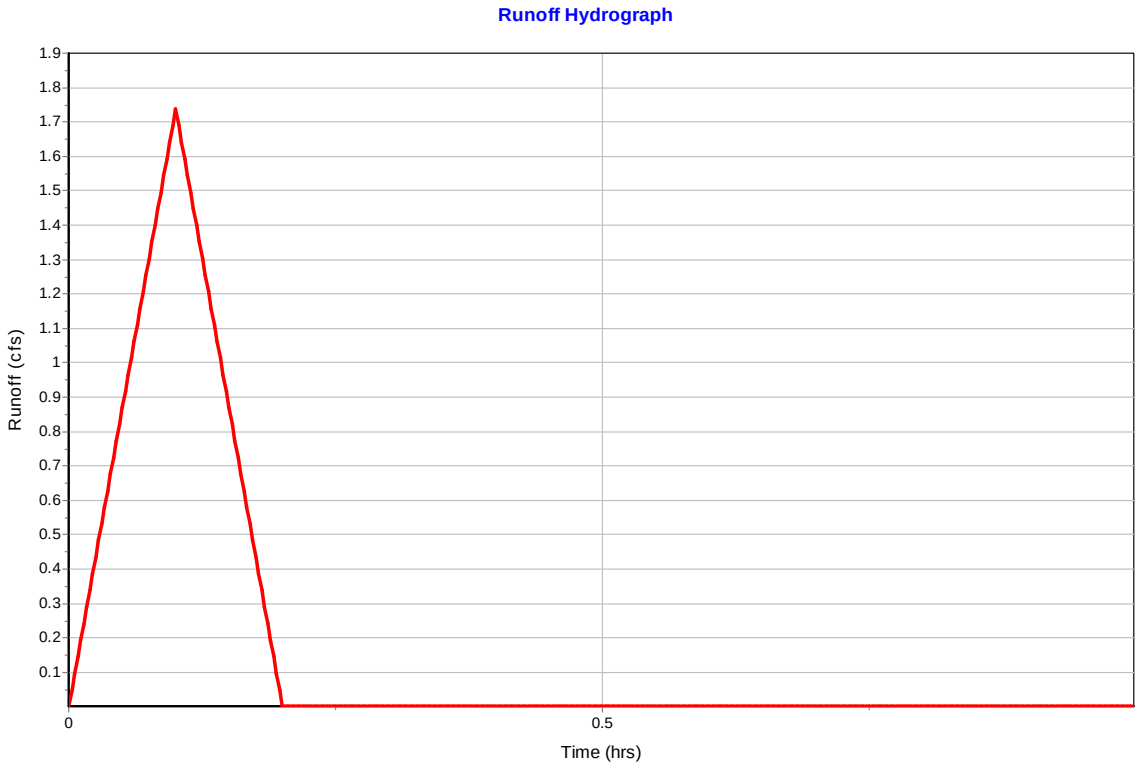
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 1.04
Total Runoff (in) 0.74
Peak Runoff (cfs) 1.74
Rainfall Intensity 10.413
Weighted Runoff Coefficient 0.71
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-25



Subbasin : Sub-27

Input Data

Area (ac) 0.21
Weighted Runoff Coefficient 0.9

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.21	-	0.9
Composite Area & Weighted Runoff Coeff.	0.21		0.9

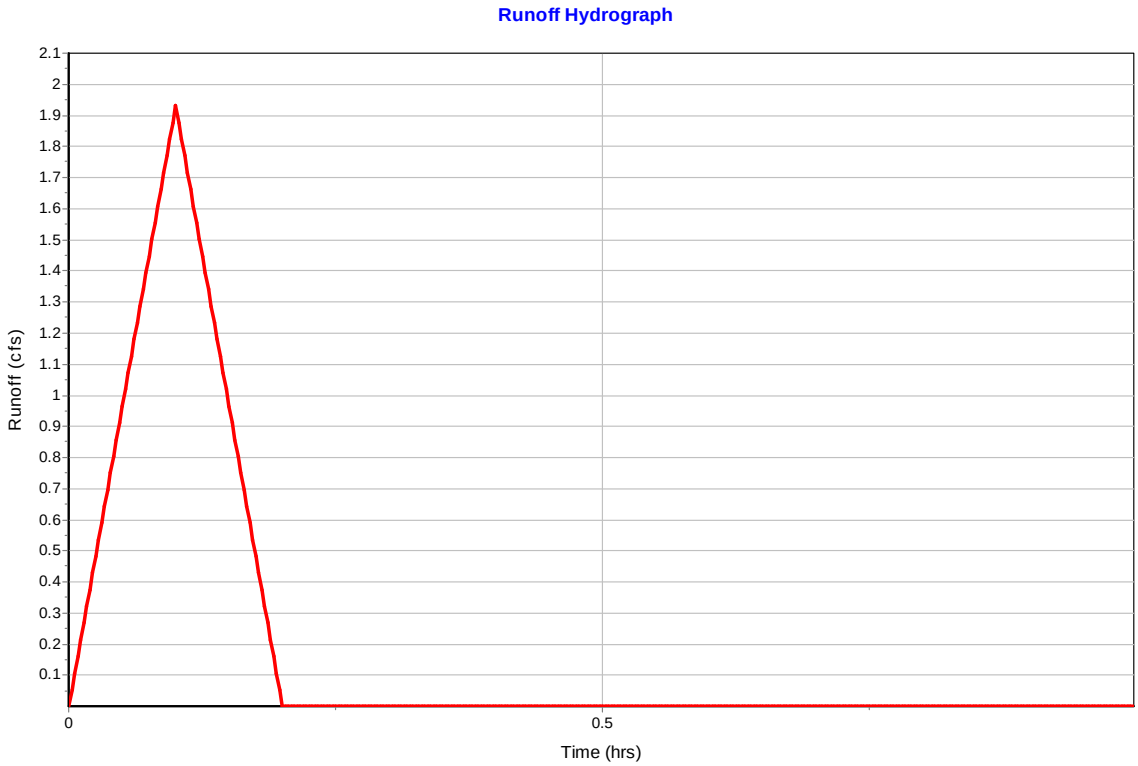
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in) 1.04
Total Runoff (in) 0.94
Peak Runoff (cfs) 1.93
Rainfall Intensity 10.413
Weighted Runoff Coefficient 0.9
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : Sub-27



Subbasin : Sub-28

Input Data

Area (ac)	0.18
Weighted Runoff Coefficient	0.74

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.18	-	0.74
Composite Area & Weighted Runoff Coeff.	0.18		0.74

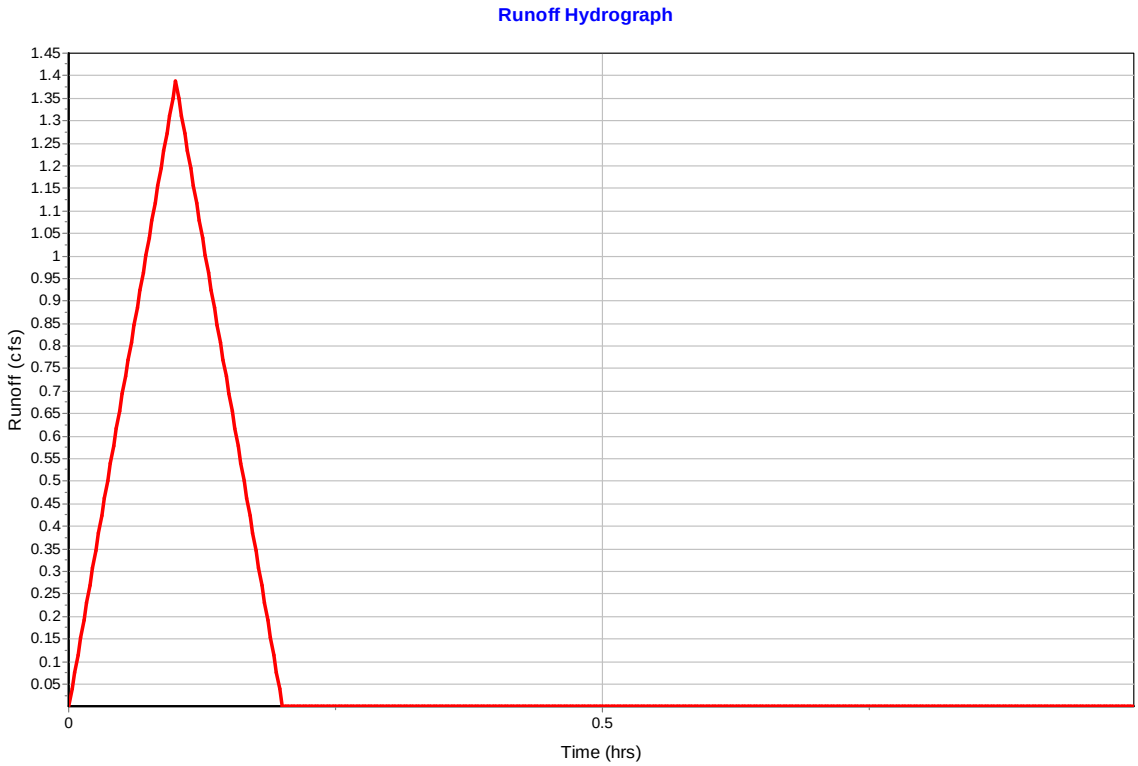
Time of Concentration

User-Defined TOC override (minutes): 6

Subbasin Runoff Results

Total Rainfall (in)	1.04
Total Runoff (in)	0.77
Peak Runoff (cfs)	1.39
Rainfall Intensity	10.413
Weighted Runoff Coefficient	0.74
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : Sub-28



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	7	197.61	206.04	8.43	197.61	0.00	206.04	0.00	0.00	0.00
2	11	198.36	202.30	3.94	197.50	-0.86	202.30	0.00	10.00	0.00
3	12	197.08	202.18	5.10	197.08	0.00	202.18	0.00	0.00	0.00
4	18	201.18	207.06	5.88	201.18	0.00	207.06	0.00	0.00	0.00
5	22	210.82	216.07	5.25	210.82	0.00	216.07	0.00	0.00	0.00
6	26	219.00	233.90	14.90	219.00	0.00	233.90	0.00	0.00	0.00
7	29	231.85	237.32	5.47	231.85	0.00	237.32	0.00	0.00	0.00
8	Out-1D-7	197.18	203.18	6.00	197.18	0.00	203.18	0.00	0.00	0.00
9	Out-1D-9	197.67	203.67	6.00	197.67	0.00	203.67	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	7	4.07	0.00	198.83	1.22	0.00	7.21	197.83	0.22	0 00:06	0 00:00	0.00	0.00
2	11	3.22	0.00	199.42	1.06	0.00	2.87	198.49	0.13	0 00:06	0 00:00	0.00	0.00
3	12	1.77	0.00	197.44	0.36	0.00	4.74	197.14	0.06	0 00:06	0 00:00	0.00	0.00
4	18	3.09	0.00	201.51	0.33	0.00	5.55	201.24	0.06	0 00:06	0 00:00	0.00	0.00
5	22	9.24	0.00	211.67	0.85	0.00	4.40	210.97	0.15	0 00:06	0 00:00	0.00	0.00
6	26	6.68	0.00	219.89	0.89	0.00	14.01	219.15	0.15	0 00:06	0 00:00	0.00	0.00
7	29	3.27	0.00	232.35	0.50	0.00	4.98	231.94	0.09	0 00:06	0 00:00	0.00	0.00
8	Out-1D-7	0.00	0.00	197.18	0.00	0.00	6.00	197.18	0.00	0 00:00	0 00:00	0.00	0.00
9	Out-1D-9	0.00	0.00	197.67	0.00	0.00	6.00	197.67	0.00	0 00:00	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	D-10	33.23	197.61	0.00	197.50	0.00	0.11	0.3300	CIRCULAR	15.000	15.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
2	D-11	106.95	210.82	0.00	204.38	0.38	6.44	6.0200	CIRCULAR	15.000	15.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
3	D-12	16.00	201.18	0.00	194.20	0.00	6.98	43.6200	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
4	D-13	13.65	197.08	0.00	195.58	2.58	1.50	10.9900	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
5	D-14	24.97	211.27	0.00	211.02	0.20	0.25	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
6	D-16	30.06	211.22	0.00	210.92	0.10	0.30	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
7	D-17	13.28	232.72	0.00	232.59	0.74	0.13	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
8	D-18	32.10	232.27	0.00	231.95	0.10	0.32	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
9	D-19	21.15	219.51	0.00	219.30	0.30	0.21	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
10	D-2	32.13	202.11	0.00	201.79	4.18	0.32	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
11	D-20	32.45	219.46	0.00	219.14	0.14	0.32	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
12	D-21	260.65	231.85	0.00	219.50	0.50	12.35	4.7400	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
13	D-22	163.67	219.00	0.00	211.00	0.18	8.00	4.8900	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
14	D-3	49.15	202.74	0.00	202.25	1.07	0.49	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
15	D-4	25.27	201.53	0.00	201.28	0.10	0.25	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
16	D-5	13.24	198.50	0.00	138.36	-60.00	60.14	454.3400	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
17	D-6	14.17	198.50	0.64	198.36	0.00	0.14	0.9900	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
18	D-7	32.29	198.36	0.00	197.61	0.00	0.75	2.3200	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
19	D-8	14.54	197.83	-0.67	197.68	0.60	0.15	1.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
20	D-9	10.52	197.78	0.00	197.08	0.00	0.70	6.6600	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	D-10	4.06	0 00:06	3.96	1.03	3.79	0.15	1.02	0.81	0.00		> CAPACITY
2	D-11	9.22	0 00:06	13.74	0.67	11.10	0.16	0.80	0.64	0.00		Calculated
3	D-12	3.09	0 00:06	20.39	0.15	16.01	0.02	0.29	0.29	0.00		Calculated
4	D-13	1.77	0 00:06	10.23	0.17	8.13	0.03	0.32	0.32	0.00		Calculated
5	D-14	1.64	0 00:06	3.09	0.53	3.22	0.13	0.65	0.65	0.00		Calculated
6	D-16	1.27	0 00:06	3.09	0.41	2.55	0.20	0.66	0.66	0.00		Calculated
7	D-17	1.37	0 00:06	3.09	0.44	3.29	0.07	0.52	0.52	0.00		Calculated
8	D-18	1.90	0 00:06	3.09	0.62	3.70	0.14	0.62	0.62	0.00		Calculated
9	D-19	1.71	0 00:06	3.09	0.55	3.51	0.10	0.62	0.62	0.00		Calculated
10	D-2	0.92	0 00:06	3.09	0.30	3.16	0.17	0.40	0.40	0.00		Calculated
11	D-20	1.91	0 00:06	3.09	0.62	3.37	0.16	0.72	0.72	0.00		Calculated
12	D-21	3.16	0 00:06	6.72	0.47	8.26	0.53	0.49	0.49	0.00		Calculated
13	D-22	6.50	0 00:06	6.83	0.95	9.38	0.29	0.83	0.83	0.00		Calculated
14	D-3	1.90	0 00:06	3.09	0.62	3.80	0.22	0.61	0.61	0.00		Calculated
15	D-4	1.19	0 00:06	3.09	0.39	3.32	0.13	0.47	0.47	0.00		Calculated
16	D-5	2.09	0 00:06	3.18	0.66	2.98	0.07	1.00	1.00	1.00		SURCHARGED
17	D-6	1.16	0 00:06	3.07	0.38	1.95	0.12	0.99	0.99	0.00		Calculated
18	D-7	3.17	0 00:06	4.71	0.67	4.03	0.13	1.00	1.00	1.00		SURCHARGED
19	D-8	0.84	0 00:06	7.31	0.11	5.42	0.04	0.25	0.25	0.00		Calculated
20	D-9	0.93	0 00:06	7.97	0.12	4.30	0.04	0.32	0.32	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	6	FHWA HEC-22 GENERIC	N/A	On Sag	1	202.11	206.43	4.32	202.11	0.00	10.00	0.00
2	9	FHWA HEC-22 GENERIC	N/A	On Sag	1	198.50	202.16	3.66	197.83	-0.67	10.00	0.00
3	10	FHWA HEC-22 GENERIC	N/A	On Sag	1	198.50	202.24	3.74	197.86	-0.64	0.00	0.00
4	13	FHWA HEC-22 GENERIC	N/A	On Sag	1	197.86	202.19	4.33	197.86	0.00	0.00	0.00
5	14	FHWA HEC-22 GENERIC	N/A	On Sag	1	197.78	202.11	4.33	197.78	0.00	10.00	0.00
6	16	FHWA HEC-22 GENERIC	N/A	On Sag	1	201.53	205.86	4.33	201.53	0.00	10.00	0.00
7	17	FHWA HEC-22 GENERIC	N/A	On Sag	1	202.74	207.07	4.33	202.74	0.00	10.00	0.00
8	20	FHWA HEC-22 GENERIC	N/A	On Sag	1	211.22	215.72	4.50	211.22	0.00	10.00	0.00
9	21	FHWA HEC-22 GENERIC	N/A	On Sag	1	211.27	215.60	4.33	211.27	0.00	10.00	0.00
10	24	FHWA HEC-22 GENERIC	N/A	On Sag	1	219.46	223.79	4.33	219.46	0.00	10.00	0.00
11	25	FHWA HEC-22 GENERIC	N/A	On Sag	1	219.51	523.84	304.33	219.51	0.00	10.00	0.00
12	27	FHWA HEC-22 GENERIC	N/A	On Sag	1	232.27	236.76	4.49	232.27	0.00	10.00	0.00
13	28	FHWA HEC-22 GENERIC	N/A	On Sag	1	232.72	237.22	4.50	232.72	0.00	10.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	6	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
2	9	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
3	10	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
4	13	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
5	14	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
6	16	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
7	17	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
8	20	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
9	21	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
10	24	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
11	25	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
12	27	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00
13	28	N/A	0.0200	0.0130	0.0620	2.00	0.0000	7.00

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	6	0.94	0.94	N/A	N/A	N/A	5.86	206.57	0.14	0 00:06	0.00	0.00
2	9	0.84	0.84	N/A	N/A	N/A	5.39	202.29	0.13	0 00:06	0.00	0.00
3	10	2.17	2.17	N/A	N/A	N/A	11.11	202.57	0.33	0 00:06	0.00	0.00
4	13	1.24	1.24	N/A	N/A	N/A	7.28	202.44	0.25	0 00:06	0.00	0.00
5	14	0.94	0.94	N/A	N/A	N/A	5.86	202.25	0.14	0 00:06	0.00	0.00
6	16	1.21	1.21	N/A	N/A	N/A	7.15	206.03	0.16	0 00:06	0.00	0.00
7	17	1.94	1.94	N/A	N/A	N/A	10.22	207.30	0.23	0 00:06	0.00	0.00
8	20	1.29	1.29	N/A	N/A	N/A	7.53	215.89	0.17	0 00:06	0.00	0.00
9	21	1.65	1.65	N/A	N/A	N/A	9.08	215.81	0.20	0 00:06	0.00	0.00
10	24	1.94	1.94	N/A	N/A	N/A	10.21	224.02	0.23	0 00:06	0.00	0.00
11	25	1.74	1.74	N/A	N/A	N/A	9.41	524.05	0.21	0 00:06	0.00	0.00
12	27	1.93	1.93	N/A	N/A	N/A	10.17	236.99	0.23	0 00:06	0.00	0.00
13	28	1.39	1.39	N/A	N/A	N/A	7.94	237.40	0.18	0 00:06	0.00	0.00

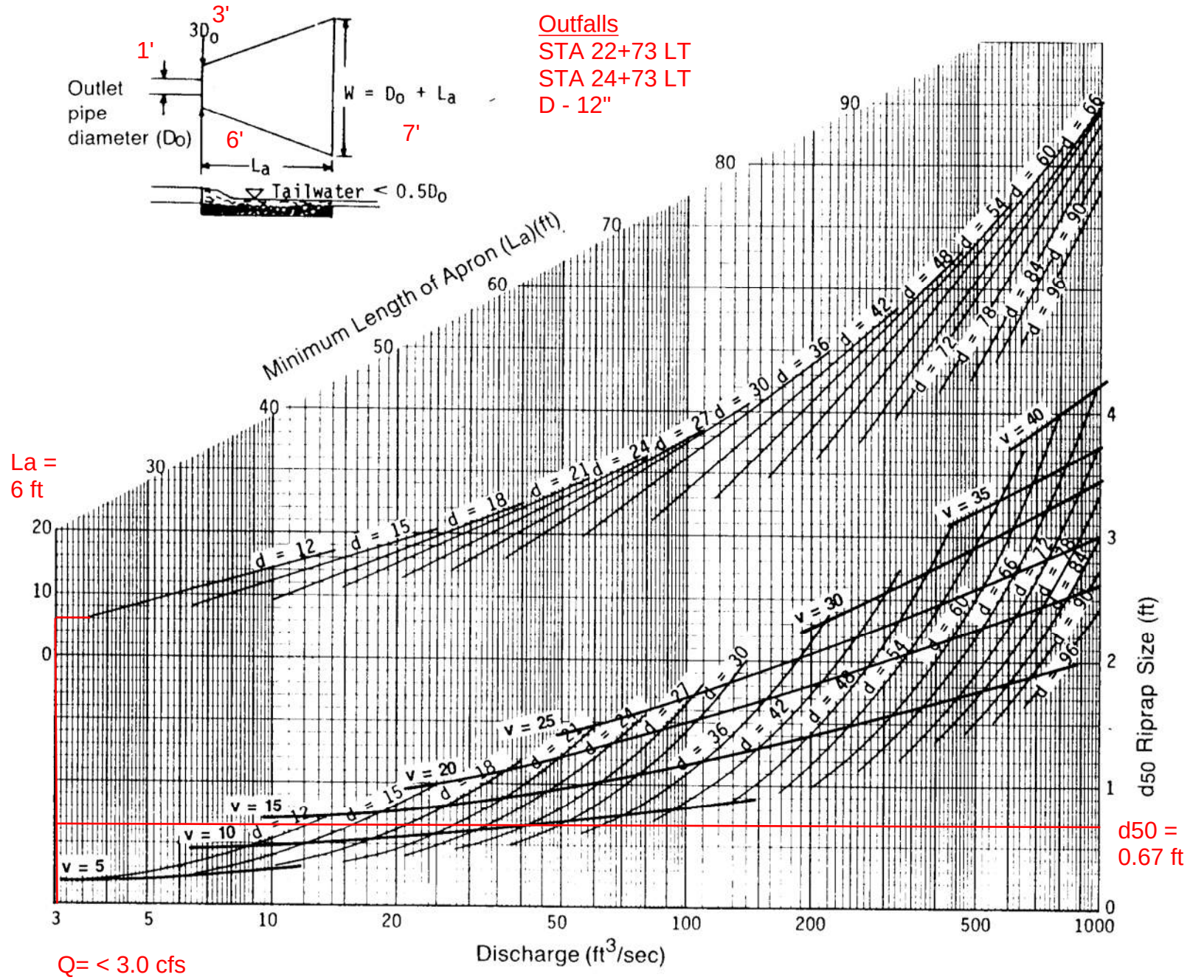


Figure 4.5-2 Design of Riprap Apron under Minimum Tailwater Conditions
(Source: USDA, SCS, 1975)

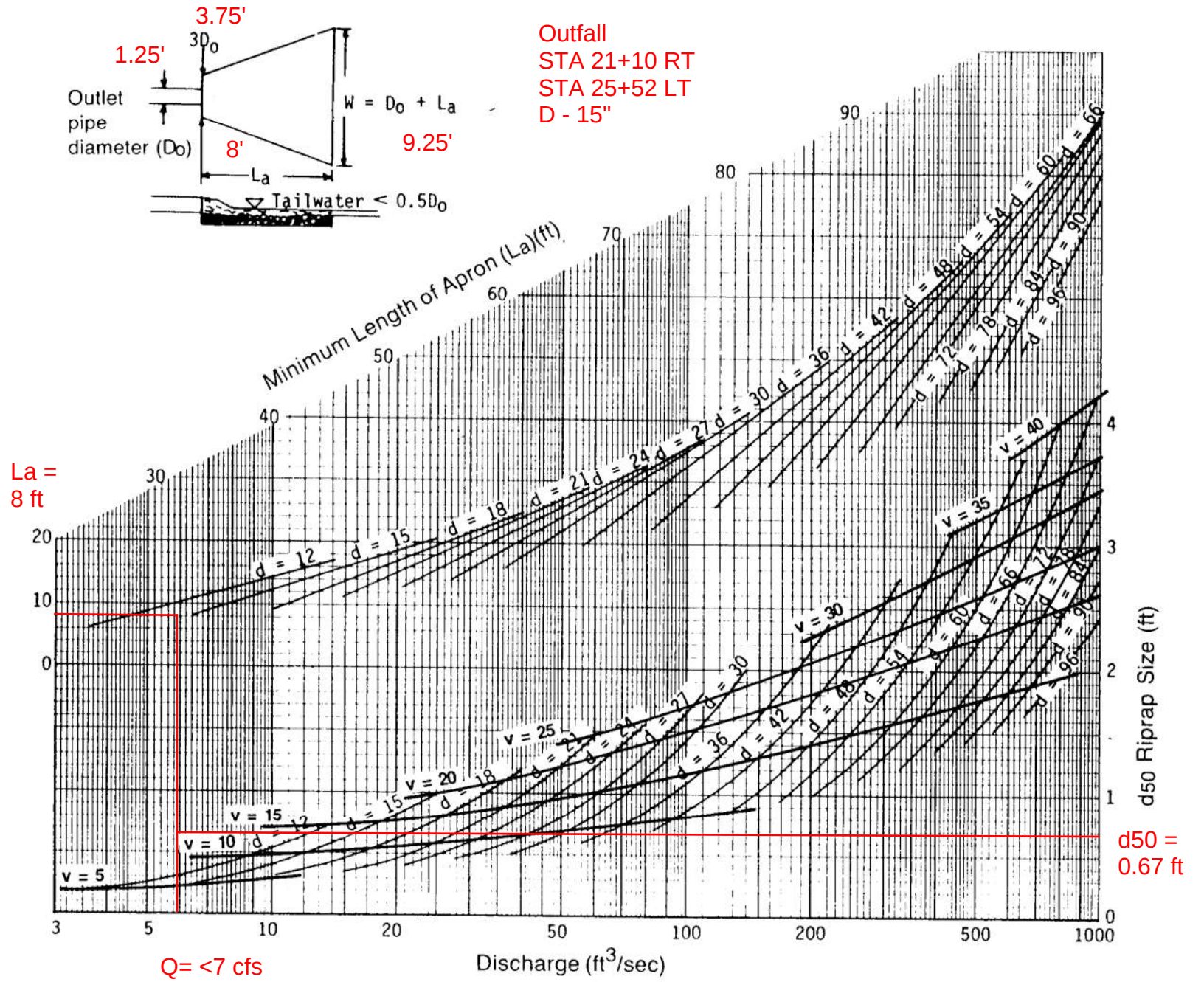


Figure 4.5-2 Design of Riprap Apron under Minimum Tailwater Conditions
(Source: USDA, SCS, 1975)

Nitsch Engineering

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Form S4-C: Standard 4 – Water Quality
TSS Worksheet

Project Name: Corridor Improvements along Route 138 (Washington Street)	Nitsch Project #: 9720.16 MassDOT Project Number: 607403
Location: Stoughton, MA	Checked by: MC
Prepared by: MJS	Sheet No. 1 of 1
Date: 4/1/22	

Closed Drainage System

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F 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:
Prepared By:
Date:

*Equals remaining load from previous BMP (E) which enters the BMP

BMP List	Design Rate
Bioretention Area	90%

TSS WORKSHEET *from Volume 2, Chapter 3, Table 4, TSS Removal*

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Form S4-C: Standard 4 – Water Quality
TSS Worksheet

Project Name: Corridor Improvements along Route 138 (Washington Street)	Nitsch Project #: 9720.16 MassDOT Project Number: 607403
Location: Stoughton, MA	Checked by: MC
Prepared by: MJS	Sheet No. 1 of 1
Date: 12/12/22	

Closed Drainage System

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
Sediment Forebay	0.25	0.75	0.19	0.56
	0.00	0.56	0.00	0.56
	0.00	0.56	0.00	0.56
	0.00	0.56	0.00	0.56

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 607403
Prepared By: mjs
Date: 12/12/2022

*Equals remaining load from previous BMP (E) which enters the BMP

BMP List	Design Rate
Bioretention Area	90%
Cistern	0%
Constructed Stormwater Wetland	80%

TSS WORKSHEET *from Volume 2, Chapter 3, Table 4, TSS Removal*

I:\Stormwater\Templates\Form S4-C

ATTACHMENT C

Long-Term Pollution Prevention-Stormwater Operation and Maintenance Plan

Route 138 Corridor Improvements

Stormwater Management System Operation and Maintenance Plan and Long-Term Pollution Prevention Plan

Stoughton

PREPARED FOR

massDOT

10 Park Plaza
Boston, MA 02116

PREPARED BY

Nitsch Engineering

Nitsch Engineering
2 Center Plaza, Suite 430
Boston, MA 02108

12/07/2022

Table of Contents

1

Stormwater Management System Operation and Maintenance (O&M) Plan

This Stormwater Management System Operation and Maintenance (O&M) Plan describes the approach for inspection and maintenance of drainage infrastructure and structural stormwater control measures (SCMs) to minimize contaminant loading for Route 138 Corridor Improvements in Stoughton. In general, inspection and maintenance activities will be conducted consistent with the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4) and MassDOT's anticipated NPDES Transportation Separate Storm Sewer System (TS4) Permit.

This document has been prepared per the requirements of Massachusetts Department of Environmental Protection (MassDEP) Regulations 310 CMR 10.05 (6)(k)(9) and satisfies the requirements of Massachusetts Stormwater Standard 9.

1.1 Responsible Party

In accordance with MassDOT procedures, the MassDOT District *5* office located in *Taunton* MA, is responsible for the maintenance of all stormwater management systems on MassDOT roads within the project area.

Questions or concerns regarding activities associated with this O&M Plan should be addressed to MassDOT's District 5 office located at 1000 County Street, Taunton, MA 02780 phone (857) 368-5000, during regular weekday hours, or to MassDOT's Highway Operations Center located in South Boston, MA at (800) 227-0608 during all other times and days, including weekends and holidays.

1.2 Inspection and Maintenance Measures and Record-Keeping

See Attachment B of the Stormwater Management Report for the proposed stormwater system within the project limits. The stormwater management system covered by this O&M Plan consists of the following measures:

- Deep Sump Catch Basins
- Pipe Outlets/Energy Dissipation Pads

MassDOT uses a performance-based inspection and maintenance program for SCMs and catch basins. For SCMs, MassDOT's overall approach is to inspect SCMs, and based on the results of the inspections, perform maintenance to preserve functionality. For catch basins, MassDOT's overall approach is to perform maintenance at an interval that maintains the functionality of the catch basin (e.g., sump is less than 50% full of sediment). Catch basin inspections, including documentation of sediment accumulation, and maintenance will generally occur simultaneously.

MassDOT's O&M program is data driven. Inspections and maintenance are recorded by personnel using hand-held tablets in the field to document sediment accumulation, maintenance action performed, and follow-up actions needed. Data are recorded in MassDOT's asset management system which is accessible in the field (mobile) or the office (desktop).

The table below summarizes data that is generally collected for each asset type. For all assets, the inspector and inspection date are recorded. Photo documentation of structure condition is taken and attached to the inspection record.

Inspection Form	Applicable Stormwater Assets	Information Collected
Inlets	› Catch basins	› Sediment accumulation › Trash/Debris accumulation › Signs of contamination › Frame and grate condition › Overall structure condition
SCMs	Consistent with the MassDOT Stormwater Design Guide (SDG), SCM categories include: › Sediment Forebay	› SCM accessibility › Presence of standing water › Level of erosion › Sediment accumulation › Trash/Debris accumulation › Vegetation condition › Overall SCM condition
Storm Discharge Points	› Outlets	› Presence of flow › Signs of contaminated flow › Sediment accumulation › Level of erosion › Pipe condition › Scour protection condition › Overall structure condition

Inspection and maintenance records can be made available using the asset management system through request with the MassDOT District 5 Environmental Engineer. Records will be kept for at least three years. Representatives of the Stoughton Conservation Commission, MassDEP, and US EPA may obtain access to these records, upon request. Additionally, MassDOT will allow members and agents of MassDEP and the Conservation Commission(s)

to enter and inspect the premises, upon request, to evaluate and ensure that the Operation and Maintenance Plan requirements for each SCM are being followed.

Maintenance actions will not occur at any set frequency, but rather will be based on condition and impact to functionality. Maintenance to be performed on the stormwater system includes:

Stormwater Feature	Potential Maintenance Actions	
Inlets and Outlets to SCMs	• Clear inlet and remove and properly dispose of sediment, trash, leaf litter, debris, and vegetation • Repair or replace structural components • Repair damaged or eroded areas	• Provide or rehabilitate erosion control at the outlet • Remove woody growth • Stabilize or reconstruct eroded areas • Treat invasive plants according to MassDOT Vegetation Management Plan
Surface SCMs	• Remove and properly dispose of accumulated material (e.g., sediment, trash, leaf litter, debris) • Mow vegetated areas and remove and dispose of grass clippings • Regrade areas that show signs of unwanted ponding and channelization • Stabilize or reconstruct eroded areas and reseed • Replace stones/soil and/or replant vegetation	• Remove woody growth • Treat invasive plants according to MassDOT Landscape Design Section •

Based on the results of the inspection, repairs will be made in accordance with MassDOT standard practices. Maintenance will be prioritized given the urgency of the required maintenance and availability of staff, contracts, etc. Maintenance may require contracting if existing contracts are unavailable to perform the work. More intensive remedial activities may require permitting and/or an engineering solution.

1.3 Erosion and Sediment Control Measures during Maintenance Activities

For maintenance activities that could result in discharges of sediments or other contaminants into wetlands, waterways, or other resource areas regulated under 310 CMR 10.00, the responsible maintenance personnel will employ measures to prevent migration of these sediments/contaminants. Such temporary measures may include, but are not necessarily limited to, the use of siltation barriers, catch basin silt sacks/filter bags, pipe

plugs, cofferdams deployed within the stormwater structure, turbidity curtains, or other practices designed to prevent such discharges.

Where maintenance occurs in areas that are confined, with no risk of discharge to adjacent water bodies, no special measures may be needed. Examples include, but are not limited to: exposed surfaces stabilized prior to placing it back into service; and (2) catch basin cleaning where the activity is limited to removing material from a sump below the elevation of the outlet pipe.

1.4 O&M Budget

MassDOT performs maintenance for stormwater management systems as part of their routine operation and maintenance budget for roadways and bridges. Budgets are managed at the district level and vary by fiscal year, depending on funding sources.

2

Long-Term Pollution Prevention Plan

This Long-Term Pollution Prevention Plan (LTPPP) describes the approach for pollution prevention and related maintenance activities for Corridor Improvements on Route 138 in Stoughton. In general, long-term pollution prevention and related maintenance activities will be conducted consistent with:

- The National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4),
- MassDOT's anticipated NPDES Transportation Separate Storm Sewer System (TS4) Permit, and
- Measures outlined in MassDOT's Stormwater Management Plan (SWMP).

This LTPPP satisfies the requirements related to pollution prevention under Massachusetts Stormwater Standards 4, 5, 6, and 10.

2.1 Practices for Long-Term Pollution Prevention

For the facilities covered, long-term pollution prevention includes the following measures.

2.1.1 Litter Pick-up

MassDOT will conduct litter pick-up from the stormwater management facilities in conjunction with routine road maintenance activities.

2.1.2 Inspection and Maintenance of Stormwater Assets

MassDOT will conduct inspection and maintenance of drainage infrastructure and the stormwater control measures (SCMs) in accordance with the O&M Plan, as described in Section 1.

2.1.3 Maintenance of Landscaped Areas

Routine mowing will be conducted according to standard MassDOT practices. SCM basin bottoms and embankments designed to impound water should be mowed as required to prevent establishment of woody vegetation.

Except in rare circumstances, MassDOT does not use fertilizers, herbicides, and pesticides for the maintenance of facilities. Exceptions include using fertilizer to ensure the survival of new

plantings and herbicides to control invasive plants. Use of fertilizers and herbicides is reviewed and approved by the MassDOT Landscape Design Section and District 5 Environmental Engineer prior to application. Local Conservation Commission review may also be required.

2.1.4 Snow and Ice Management

Snow and Ice Management will be conducted consistent with the practices outlined in the MassDOT Snow and Ice Control Program Environmental Status and Planning Report (ESPR), formerly known as the Snow and Ice Control Generic Environmental Impact Report (GEIR).

In accordance with the Snow and Ice Control ESPR, no sand is used on MassDOT properties for snow and ice control. The exception to this rule is within reduced salt areas where high sodium levels have been found in drinking water sources.

2.1.5 Street Sweeping

Routine highway cleaning, with a brush-type street sweeper, will be conducted in accordance with standard MassDOT practices. Sweeping will occur annually in the Spring.

2.1.6 Prohibition of Illicit Discharges

The MassDEP Stormwater Management Standard 10 prohibits illicit discharges to the stormwater management system. Illicit discharges are discharges that do not consist entirely of stormwater, except for certain specified non-stormwater discharges.

In accordance with the existing MS4 permit and anticipated TS4 permit requirements, examples of discharges from the following sources are not considered illicit discharges:

- Firefighting activities*
- Foundation drains
- Water line flushing
- Footing drains
- Landscape irrigation
- Individual residential car washing
- Uncontaminated groundwater
- Rising groundwater
- Diverted stream flows
- Flows from riparian habitats/wetlands
- Potable water sources
- Dechlorinated swimming pool water
- Street wash waters
- Wash water from residential buildings (no detergents)
- Condensation from air conditioning units
- Run-on from private driveways caused by precipitation
- Lawn watering
- Water from crawl space pumps

*Water from firefighting activities is allowed and need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

Based on plan review and confirmation in the field, there are no known or proposed illicit connections associated with the Route 138 Corridor Improvements. Should an interconnection to the stormwater management system be identified, the MassDOT PM will

coordinate with the District Permits Engineer to confirm if the connections are authorized. For unauthorized connections, the MassDOT PM and/or MassDOT Environmental Services Section will investigate the connections and if they are determined to be illicit, the connections will be managed through MassDOT's Illicit Discharge Detection and Elimination (IDDE) program and/or through other agencies.

ATTACHMENT D

Soil Investigations – NRCS Soil Maps and Descriptions

Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts

Map Scale: 1:11,400 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 17, Sep 3, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 25, 2020—Oct 4, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103D	Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes		0.0	0.2%
253D	Hinckley loamy sand, 15 to 35 percent slopes	A	4.3	15.2%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	2.6	9.1%
600	Pits, sand and gravel		1.3	4.5%
602	Urban land, 0 to 15 percent slopes		17.6	61.7%
653	Udorthents, sandy	A	2.6	9.3%
Totals for Area of Interest			**28.5**	**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

LGCI
Lahlaf Geotechnical Consulting, Inc.

October 25, 2022

Mr. Matthew J. Soltys, P.E.
Nitsch Engineering, Inc.
2 Center Plaza, Suite 430
Boston, Massachusetts 02108
Phone: (617) 338-0063
Fax: (508) 365-3355
E-mail: msoltys@nitscheng.com

Re: **Geotechnical Report**
Proposed Mast Arms, Reinforced Slope, and Retaining Wall
Stoughton, Massachusetts
LGCI Project No. 2139

Dear Mr. Soltys:

Lahlaf Geotechnical Consulting, Inc. (LGCI) has completed a geotechnical study for the proposed mast arms, reinforced slope, and retaining wall in Stoughton, Massachusetts. We are submitting this report containing the results of our study and our foundation design and construction recommendations.

The soil samples from our explorations are currently stored at LGCI for further analysis, if requested. Unless notified otherwise, we will dispose of the soil samples after three months.

Thank you for choosing LGCI as your geotechnical engineer.

Very truly yours,

Lahlaf Geotechnical Consulting, Inc.

Abdelmadjid M. Lahlaf, Ph.D., P.E.
Principal Engineer

LGCI
Lahlaf Geotechnical Consulting, Inc.

GEOTECHNICAL REPORT
PROPOSED MAST ARMS, REINFORCED SLOPE, AND RETAINING WALL
STOUGHTON, MASSACHUSETTS

LGCI Project No. 2139
October 25, 2022

Prepared for:

NITSCH ENGINEERING, INC.
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GEOTECHNICAL REPORT
PROPOSED MAST ARMS, REINFORCED SLOPE, AND RETAINING WALL
STOUGHTON, MASSACHUSETTS
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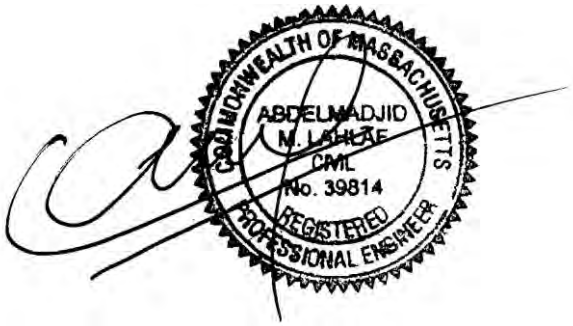

Abdelmadjid M. Lahlaf, Ph.D., P.E.
Principal Engineer

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Geotechnical Report
Proposed Mast Arms, Reinforced Slope, and Retaining Wall
Stoughton, Massachusetts
LGCI Project No. 2139

1. PROJECT INFORMATION

1.1 Project Authorization

This geotechnical report presents the results of the subsurface explorations and a geotechnical evaluation performed by Lahlaf Geotechnical Consulting, Inc. (LGCI) for the proposed mast arms, reinforced slope, and retaining wall in Stoughton, Massachusetts. To date, we have performed services in two (2) phases as follows:

- We performed our initial services in general accordance with our proposal No. 21099-Rev. 2 dated October 20, 2021, revised on November 16, 2021, and in general accordance with the terms and conditions of the Subconsultant Authorization by Nitsch Engineering, Inc. (Nitsch), dated December 2, 2021, and signed by Mr. Joshua J. Alston of Nitsch.

- We performed additional explorations in general accordance with the scope of services described in our proposal No. 22065-Rev. 1, dated May 9, 2022.

1.2 Purpose and Scope of Services

The purpose of our geotechnical services was to perform subsurface explorations at the site and to provide foundation design and construction recommendations for mast arms and a retaining wall, and to perform slope stability analyses. LGCI performed the following services:

- Coordinated the boring, test pit, and hand probe locations with Nitsch and provided an LGCI geotechnical engineer to mark the exploration locations in the field.

- Engaged a drilling subcontractor to advance fourteen (14) soil borings: eight (8) soil borings for the proposed mast arms, four (4) soil borings for slope stability analyses, and two (2) soil borings for the proposed retaining wall. Our drilling subcontractor contacted the utility clearance agency (Dig Safe Systems, Inc.) and the Town of Stoughton for utility clearance, and applied for and obtained a MassDOT permit for the borings and test pits.

- Engaged an excavation subcontractor to perform two (2) test pits near the existing retaining wall along the southbound lane on Washington Street. The purpose of the test pits was to expose the wall foundation and confirm the bearing stratum.

- Provided a field engineer to perform five (5) hand probes at the bottom of the existing slope to explore for the presence of organic soil for slope stability analyses.

- Provided an LGCI geotechnical engineer, full time, at the site to observe the soil borings, test pits, and hand probes; describe the soil samples, and prepare the field logs.

- Prepared this geotechnical report containing the results of our subsurface explorations and our recommendations for foundation design and construction recommendations for the proposed retaining wall, our geotechnical recommendations for mast arm foundation design in

accordance with standard drawings: "Overhead Signal Structure & Foundation, Sheets 1 through 7," by the Massachusetts Department of Transportation (MassDOT), Highway Division and dated December 2015, and the results of our slope stability analyses.

Following our initial explorations, LGCI submitted a preliminary geotechnical letter report dated April 14, 2022. The present report includes the results of our explorations and supersedes the April 14, 2022 report.

LGCI did not perform environmental services for this project. LGCI's scope of services did not include an environmental assessment for the presence or absence of wetlands or analytical testing for hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site, or mold in the soil or in any structure at the site. Any statements regarding odors, colors, or unusual or suspicious items or conditions are for information only and to support our geotechnical services.

Our scope does not include attending meetings, preparing specifications, performing contract document review, or providing construction services. LGCI would be pleased to perform these services when needed under a separate agreement. Recommendations for stormwater management, erosion control, pavement design, site specific liquefaction analysis, pile analysis and design, and detailed cost or quantity estimates are not included in our scope of work.

1.3 Site Description

Our understanding of the existing conditions is based on our field observations at the site, readily available aerial photographs of the site, our conversations with Nitsch, and on the following drawings:

- Drawing titled: "Stoughton, Washington Street (Route 138), Soil Boring & Test Pit Location Plan, Sheets No. 1 to 5," (Boring and Test Pit Location Plan) prepared by Nitsch, plotted on February 22, 2022, and provided to LGCI by Nitsch via e-mail on February 23, 2022.

- Drawing titled: "Stoughton, Washington Street (Route 138), Soil Boring & Test Pit Location Plan, Sheet No. 3 of 5," (Updated WB-1 and WB-2 Boring Location Plan), prepared by Nitsch, plotted on September 12, 2022, and provided to LGCI by Nitsch via e-mail on September 14, 2022.

The site consists of several sections of Route 138 (Washington Street) in Stoughton, Massachusetts as shown in Figure 1, including:

- The intersection of Washington Street and York Street, and a stretch of roadway along Washington Street extending about 525 feet north of the same intersection. The roadway grade ranges between about El. 202 feet on the northern end of the stretch and about El. 220 feet on the southern side of the stretch near the intersection. The grades drop on either side of the roadway along this stretch. Along the embankment on the eastern side of Washington Street which is the focus of the stability analyses in this report, the grades drop steeply about 6 feet

on the northern side of the stretch and about 23 feet on the southern side of the stretch towards wetland areas.

- The intersection of Washington Street with the driveway to Stop & Shop (across from O'Reilly's Auto Parts). The grade at the intersection is about El. 235 feet.

- The intersection of Washington Street and Central Washington Street in Stoughton. The grades at the intersection range between El. 240 feet and El. 242 feet.

- The portion of Washington Street in front of the AA Will Corp. property located at 198 Washington Street in Stoughton, Massachusetts as shown in Figure 1. The grades in Washington Street in front of the AA Will Corp. property range between about El. 240 feet and El. 244 feet, and between El. 232 feet and El. 237 feet near the existing retaining wall on the southbound side of Washington Street north of (across from) the AA Will Corp. property.

1.4 Project Description

Our understanding of the proposed improvements is based on our discussions with Nitsch and the following drawings:

- Drawing titled: "Stoughton, Washington Street (Route 138), Traffic Signal Plan, Sheets No. 104 to 108 out of 226," (Traffic Signal Plan) prepared by Nitsch, plotted on April 1, 2022, and provided to LGCI by Nitsch via e-mail on April 4, 2022.

- Drawing titled: "Stoughton, Washington Street (Route 138), Typical Sections & Pavement Notes," (Reinforced Slope Drawing) prepared by Nitsch, plotted on September 21, 2022, and provided to LGCI by Nitsch via e-mail on September 22, 2022.

- Drawing titled: "Stoughton, Washington Street (Route 138), Wall Plan & Profile," (Retaining Wall Drawing) prepared by Nitsch, plotted on October 4, 2022, and provided to LGCI by Nitsch via e-mail on October 4, 2022.

- Untitled retaining wall detail prepared by Nitsch, plotted on October 4, 2022, and provided to LGCI by Nitsch via e-mail on October 4, 2022.

We understand that Nitsch was engaged by MassDOT to design improvements along Washington Street in Stoughton, Massachusetts. The improvements will include installing mast arms at the intersections of Washington Street and York Street, Washington Street and the Stop and Shop Driveway, and Washington Street and Central Street in Stoughton. Based on the Traffic Signal Plan, the proposed mast arm sizes are as follows:

- Intersection of Washington Street and York Street: one (1) 30-foot mast arm at the northeast corner of the intersection and one (1) 25-foot mast arm at the western side of the intersection.

- Intersection of Washington Street and the Stop and Shop Driveway: one (1) 35-foot mast arm at the northeast corner of the intersection and one (1) 30-foot mast arm at the western side of the intersection.

- Intersection of Washington Street and Central Street: one (1) 45-foot mast arm at the northeast corner of the intersection, one (1) 25-foot mast arm at the northwest corner of the intersection, one (1) 35-foot mast arm at the southeast corner of the intersection, and one (1) 45-foot mast arm at the southwest corner of the intersection.

The improvements will include widening the roadway which will require extending the embankment on the eastern side of Washington Street along the 525-foot stretch north of the intersection with York Street between STA 21+75 and STA 27+00. Based on information provided to us by Nitsch and on the Reinforced Slope Drawing, the bottom 10 feet of the proposed fill embankment located between STA 21+75 and STA 25+00 will be reinforced with a rock-armored slope inclined at about 2H:1V. The thickness of the rock-armored slope will be about 24 inches. The remainder of the proposed embankment located between STA 21+75 and STA 27+00 will not be reinforced with a rock-armored slope and will be inclined at about 2H:1V. The proposed cut embankment located between STA 25+00 and STA 27+00 will be reinforced with a rock-armored slope inclined at about 1.5H:1V. The thickness of the armored slope will be about 24 inches.

The improvements will also include the construction of a retaining wall in front of the AA Will Corp. property. We understand that the proposed retaining wall will consist of a concrete gravity retaining wall. Based on the Retaining Wall Drawing, we understand that the proposed retaining wall will consist of three (3) sections separated by driveways as described below. We understand that the existing retaining wall across from the AA Will Corp. property will remain.

- Section 1, i.e., the northernmost portion of the proposed retaining wall, will be located between about Sta. 31+63.26 and Sta. 32+52.69. Section 1 of the proposed retaining wall will be about 89 feet in length and will have total wall heights ranging between about 7.8 feet and 12 feet, with exposed heights ranging between about 5 feet and 7.5 feet. The bottom of footing elevation of Section 1 of the proposed retaining wall will range between about El. 235.85 feet and El. 238.85 feet, requiring cuts up to about 7.0 to 10.0 feet to achieve the proposed grade of the bottom of footing.

- Section 2, i.e., the middle portion of the proposed retaining wall, will be located between about Sta. 32+78.50 and Sta. 33+77.21. Section 2 of the proposed retaining wall will be about 99 feet in length and will have a total height of about 7. 1feet, with exposed heights ranging between about 3 feet and 4 feet. The bottom of footing elevation of Section 2 of the proposed retaining wall will be about El. 239.35 feet, requiring cuts up to 8.0 feet to achieve the proposed grade of the bottom of footing.

- Section 3, i.e., the southernmost portion of the proposed retaining wall, will be located between about Sta 34+01.27 and Sta. 34+58.25. Section 3 of the proposed retaining wall will be about 57 feet in length and will have a total height of about 7.8 feet, with exposed heights ranging between about 3.5 feet and 5.0 feet. The bottom of footing elevation of

Section 3 of the proposed retaining wall will be about El. 237.99 feet, requiring cuts up to 7 feet to achieve the proposed grade of the bottom of footing.

Based on the retaining wall detail, we understand that the proposed retaining wall footings will be 6 feet wide and will have a thickness of 2 feet.

1.5 Elevation Data

We understand that the elevations provided in the Boring and Test Pit Location Plan and the Retaining Wall Drawing are referenced with respect to the North American Vertical Datum of 1988 (NAVD 88). Elevations are in feet.

2. SITE AND SUBSURFACE CONDITIONS

2.1 Surficial Geology

LGCI reviewed the following surficial geologic map titled: "Surficial Materials Map of the Blue Hills Quadrangle, Massachusetts," prepared by Stone, B.D., and DiGiacomo-Cohen, M.L. Scientific Investigation Map 3402, Quadrangle 127 – Blue Hills, 2018.

The Surficial Geologic Map indicates that the natural soils in the general vicinity of the site consist of coarse deposits, including gravel deposits, sand and gravel deposits, and sand deposits. The gravel deposits are composed mainly of gravel, cobbles, and boulders. The sand and gravel layers generally range from 25 to 50 percent gravel particles and from 50 to 75 percent sand particles. The sand deposits are composed mainly of very coarse to fine sand. Coarser layers may contain up to 25 percent gravel, and finer layers may contain fine sand, silt, and clay.

The Surficial Geological Map of the site is shown in Figure 2.

2.2 LGCI's Explorations

2.2.1 General

LGCI coordinated our exploration locations with Nitsch and marked the exploration locations in the field by taping distances from the existing landmarks. Our borings were marked in the field in accordance with the Boring and Test Pit Location Plan and the Updated WB-1 and WB-2 Boring Location Plan listed in Section 1.3. A few borings had to be slightly relocated to avoid existing utilities.

Our drilling subcontractor contacted the utility clearance agency (Dig Safe Systems, Inc.) for utility clearance. Our drilling subcontractor coordinated the clearance of water, sewer, and drains with the Town of Stoughton. Our drilling subcontractor also obtained a MassDOT permit, implemented a traffic management plan, and coordinated with and engaged police details.

Unless notified otherwise, we will dispose of the soil samples obtained during our explorations after three (3) months.

2.2.2 Soil Borings

LGCI engaged Northern Drill Service, Inc. (NDS) of Northborough, Massachusetts to advance twelve (12) soil borings (MA-1 to MA-8 and SB-1 to SB-4) for the slope near York Street and for the proposed mast arms between the dates of March 3 and 28, 2022. The borings were advanced with a track-mounted Diedrich D-25 drill rig or truck mounted Mobile Drill B-53 using drive and wash technique with a 4-inch casing. The borings extended to depths ranging between 12.5 feet and 31 feet beneath the ground surface. Upon completion, the boreholes were backfilled with the soil cuttings and gravel. In paved areas, the ground surface was

restored with asphalt cold patch. In concrete areas, the ground surface was restored with concrete.

LGCI engaged NDS to advance an additional two (2) soil borings (WB-1 and WB-2) along the proposed retaining wall near the AA Will Corp. property on September 22 and 23, 2022. The borings were advanced with a track mounted Diedrich D-25 drill rig using drive and wash technique with a 4-inch casing. NDS performed vacuum explorations down to a depth of 6 feet beneath the ground surface in the borings to clear the boreholes for utilities. The borings extended to a depth of 36 feet beneath the ground surface. Upon completion, the boreholes were backfilled with the soil cuttings and gravel.

NDS performed Standard Penetration Tests (SPT) during drilling and obtained split spoon samples in the borings with an automatic hammer at typical depth intervals of 2 feet or 5 feet as noted on the boring logs in general accordance with ASTM D-1586.

An LGCI geotechnical engineer observed and logged the borings in the field.

2.2.3 Test Pits

NDS performed two (2) test pits in front of the existing retaining wall across from the AA Will Corp. property on March 25, 2022. The purpose of the test pits was to expose the existing wall foundation and to explore the bearing material. The test pits extended to depths ranging between 5.5 and 6 feet beneath the ground surface and were performed using a Kubota KX 080-4 excavator. Upon completion, the test pits were backfilled with the excavated material which was placed in 18- to 24-inch lifts and tamped with the excavator bucket.

The results of the test pits are summarized in Section 2.4.

2.2.4 Hand Probes

An LGCI representative advanced five (5) hand auger probes near the bottom of the embankment on the eastern side of Washington Street just north of York Street on March 31, 2022. The purpose of the probes was to explore for the possible presence of organic soil at the bottom of the embankment. Due to obstructions, the probes terminated at depths ranging between 2.5 and 3.5 beneath the ground surface.

2.2.5 Boring, Probe, and Test Pits Logs and Locations

The boring, probe, and test pit locations are shown in Figures 3A to 3E. Appendix A contains LGCI's boring logs, Appendix B contain LGCI's probe logs, and Appendix C contains the test pit logs and retaining wall foundation sketches. Tables 1 to 3 include summaries of LGCI's borings, test pits, and probes, respectively.

The ground surface elevations included in this report were interpolated to the nearest foot from the drawings referenced in section 1.3 of the report.

2.3 Subsurface Conditions

2.3.1 General

The subsurface description in this report is based on a limited number of explorations and is intended to highlight the major soil strata encountered during our explorations. The subsurface conditions are known only at the actual exploration locations. Variations may occur and should be expected between exploration locations. The boring, probe, and test pit logs represent conditions that we observed at the time of our explorations and were edited, as appropriate, based on the results of the laboratory test data and inspection of the soil samples in the laboratory. The strata boundaries shown in our boring, probe, and test pit logs are based on our interpretations and the actual transitions may be gradual. Graphic soil symbols are for illustration only.

Below are individual descriptions of the subsurface conditions encountered for each proposed improvement. The soil strata encountered in the borings, probes, and test pits were as follows, starting at the ground surface.

2.3.2 Slope Borings near York Street (Borings SB-1 to SB-4)

Asphalt/Concrete/Topsoil – Asphalt was encountered at the ground surface in borings SB-1 to SB-3. The thickness of the asphalt ranged between 7 and 8 inches. A layer of concrete was encountered beneath the asphalt in borings SB-1 to SB-3. The thickness of the concrete was about 7 inches. Topsoil was encountered at the ground surface in boring SB-4. The thickness of the topsoil was about 3 inches. We understand that Nitsch will reduce impacts to the existing slab as part of the design of the project.

Fill – A layer of fill was encountered beneath the asphalt/concrete or topsoil in SB-1, SB-2 and SB-4. The fill extended to depths of 19 feet, 14 feet, and 4 feet beneath the ground surface, respectively. The samples in this layer were mostly described as well graded gravel or silty sand. The fines content in the fill ranged between 0 to 25 percent and the gravel content ranged up to 30 percent. When described as gravel the sand content ranged between 0 and 40 percent. The fill also contained traces of organic soil and asphalt.

The SPT N-values in the fill layer ranged between 7 blows per foot (bpf) and 28 bpf, with most values below 17 bpf, indicating medium dense soil.

Peat/Buried Topsoil – A layer of peat or buried topsoil was encountered in boring SB-1 and SB-2 and extended to depths of 23.6 feet and 14.1 feet, respectively. Three (3) samples were described as peat and two (2) samples were described as silty sand. When described as silty sand, the fines content ranged between 15 and 20 percent, and the gravel content ranged between 20 and 30 percent.

The SPT N-values in the peat layer ranged between 6 bpf and 10 bpf, indicating loose soil.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill or peat/ buried topsoil in all borings and extended to depths ranging between 9.2 feet and 31 feet beneath the ground surface. Six (6) soil samples were described as sand and five (5) soil samples were described as gravel. The fines content ranged between 0 and 20 percent, and the gravel content ranged between 10 and 35 percent. When described as gravel, the sand content ranged between 10 and 30 percent.

The SPT N-values in the sand layer ranged between 4 bpf and refusal, with most values ranging between 16 and 28 bpf, indicating loose to medium dense sand.

Weathered Rock or Rock – Weathered rock was encountered in boring SB-2 at a depth of 19 feet below the ground surface. Split spoon refusal was encountered in borings SB-3 and SB-4. Possible rock or boulders were encountered in SB-3 and SB-4 at depths of 26 feet and 9.2 feet below ground surface respectively. The button bit was advanced in borings SB-3 and SB-4 to the termination depths of 28.6 feet and 12.5 feet, respectively.

2.3.3 Retaining Wall near Southbound Side of Washington Street (Across from the AA Will Corp. Property) (Test Pits TP-1 to TP-2)

Topsoil –Topsoil was encountered at the ground surface in test pit TP-2. The thickness of the topsoil was about 12 inches.

Fill – A layer of fill was encountered at the ground surface or beneath the topsoil in both the test pits. The fill extended to depths of 4.3 feet and 2.5 feet beneath the ground surface in TP-1 and TP-2, respectively. The samples in this layer were described as well graded sand. The fines content in the fill ranged between 5 to 10 percent and the gravel content ranged up to 20 percent. The fill contained traces of organic soil and roots.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill in both test pits. The sand layer extended to depths of 5.5 feet and 2.5 feet below ground surface in test pits TP-1 and TP-2, respectively. The samples in this layer were described as poorly graded sand or well graded sand. The fines content was about 5 percent, and the gravel content ranged between 25 and 35 percent. This layer contained 5 to 15 percent cobbles up to 8 inches in diameter. The excavation effort was described as easy to moderate.

2.3.4 Intersection of Washington Street and York Street (Borings MA-1 and MA-2)

Topsoil –Topsoil was encountered at the ground surface in borings MA-1 and MA-2. The thickness of the topsoil was 7 inches and 4 inches, respectively.

Fill – A layer of fill was encountered beneath the topsoil in borings MA-1 and MA-2. The fill extended to depths of 2.0 feet and 4.0 feet beneath the ground surface, respectively. The samples in this layer were described as silty sand or buried topsoil. The fines content in the fill ranged between 15 to 20 percent and the gravel content ranged up to 40 percent. The fill contained traces of organic soil and roots.

The SPT N-values in the fill layer ranged between 7 bpf and 28 bpf, indicating loose to medium dense soil.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill in borings MA-1 and MA-2 and extended to the termination depth of 21 feet at boring MA-1 and to 16 feet below ground surface in boring MA-2. The samples in this layer were mostly described as well graded sand. One (1) sample was described as well graded gravel and one (1) sample was described as poorly graded sand. The fines content ranged between 5 and 10 percent and the gravel content ranged up to 40 percent. When described as gravel, the sand content ranged up to 10 percent. This layer contained boulders between the depths of 9.6 feet and 17.5 feet beneath the ground surface in boring MA-1.

The SPT N-values in the sand layer ranged between 6 bpf and refusal, with most values ranging between 11 bpf and 29 bpf, indicating loose to medium dense sand.

Boulder/Rock– Apparent rock was encountered in boring MA-2 at a depth of 16 feet beneath the ground surface. The drilling subcontractor advanced a button bit 2.2 feet between the depths of 16.0 feet to 18.2 feet below ground surface.

2.3.5 Intersection of Washington Street at Stop and Shop Driveway (Borings MA-3 and MA-4)

Topsoil/Bark Mulch –Topsoil was encountered at the ground surface in boring MA-3. Boring MA-4 had a layer of bark mulch over the topsoil. The thickness of the topsoil and bark mulch, where encountered, was about 2 feet in both borings.

Fill – A layer of fill was encountered beneath the topsoil in the borings MA-3 and MA-4 and extended to depths of 9.0 feet and 4.0 feet beneath the ground surface, respectively. The samples in this layer were described as sand with silt, one (1) sample was described as silty sand. The fines content in the fill ranged between 10 to 20 percent and the gravel content ranged up to 35 percent. The fill contained traces of organic soil, coal, ash, and asphalt.

The SPT N-values in the fill layer ranged between 3 bpf and 31 bpf, indicating loose to dense fill. The high SPT N-value recorded in the fill in boring MA-4 may be caused by obstructions in the fill and may not represent the true density of the fill.

Buried Organic Soil – A layer of buried organic soil was encountered in boring MA-3 and extended to a depth of 11.5 feet below the ground surface. The samples in this layer were described as silty sand. The fines content ranged between 20 to 30 percent. The gravel content ranged between 10 and 30 percent.

The SPT N-value in this layer was 10 bpf, indicating loose material.

Sand and Gravel – A layer of sand and gravel was encountered beneath the organic soil in MA-3 and beneath the fill in MA-4 and extended to the termination depths of 21 feet in both borings.

The samples in this layer were mostly described as well graded sand. One (1) sample was described as well graded gravel and one (1) sample was described as poorly graded sand. The fines content ranged between 0 and 15 percent and the gravel content ranged up to 35 percent. When described as gravel, the sand content ranged between 20 to 25 percent.

The SPT N-values in the sand layer ranged between 6 bpf and 76 bpf, with most values ranging between 18 bpf and 24 bpf, indicating mostly medium dense sand.

2.3.6 Intersection of Washington Street and Central Street (Borings MA-5 to MA-8)

Asphalt/Concrete/Topsoil – Asphalt was encountered at the ground surface in boring MA-7. The thickness of the asphalt was about 5 inches. A layer of concrete was encountered at the ground surface in boring MA-5. The thickness of the concrete was about 2.5 inches. Topsoil was encountered at the ground surface in borings MA-6 and MA-8. The thickness of the topsoil was about 3 inches and 24 inches, respectively. Boring MA-6 had a layer of bark mulch over the topsoil.

Fill – A layer of fill was encountered beneath the asphalt, concrete, or topsoil in borings MA-5 to MA-8 and extended to depths of 4.0 feet beneath the ground surface in borings MA-5 to MA-7 and to a depth of 8.0 feet the beneath the ground surface in boring MA-8. The samples in this layer were mostly described as silty sand. Three (3) samples were described as sand with silt, and one (1) sample was described as gravel. The fines content in the fill ranged between 0 to 20 percent and the gravel content ranged up to 25 percent. When described as gravel, the fill contained about 25 percent gravel. The fill also contained traces of organic soil, roots, coal, and asphalt.

The SPT N-values in the sand layer ranged between 16 bpf and refusal, with most values falling lower than 47 bpf, indicating medium dense to dense soil.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill in all borings. The sand layer extended to the termination depths in MA-5 to MA-8. The samples in this layer were mostly described as well graded or poorly graded sand with silt. The fines content in the sand layer ranged between 0 and 15 percent, and the gravel content ranged up to 35 percent.

The SPT N-values in the sand layer ranged between 16 bpf and refusal, with most values ranging between 24 bpf and 73 bpf, indicating dense to very dense sand.

Boulder/Rock – Split spoon refusal was encountered in MA-6 at a depth of 20.2 feet on possible boulder or bedrock.

2.3.7 Retaining Wall in Front of AA Will Corp. Property (Borings WB-1 and WB-2)

Topsoil – A layer of surficial organic topsoil was encountered at the ground surface in boring WB-2. The thickness of the topsoil was about 1.2 feet.

Fill – A layer of fill was encountered at the ground surface in boring WB-1 and beneath the layer of topsoil in boring WB-2. The fill extended to depths of 1.2 and 6 feet beneath the ground surface in borings WB-1 and WB-2, respectively. The samples in this layer were mostly described as well graded gravel. One (1) sample was described as well graded sand. The fines content in the fill ranged between 0 to 15 percent and the sand content ranged between 5 to 30 percent. When described as sand, the gravel content in the fill ranged between 20 to 25 percent. The fill contained between 10 to 15 percent cobbles up to about 6 inches in size. The fill also contained traces of roots.

SPT N-values were not recorded within the fill layer.

Sand and Gravel – A layer of sand and gravel was encountered beneath the fill in borings WB-1 and WB-2. The sand and gravel layer extended to the termination depths of 36 feet beneath the ground surface in borings WB-1 and WB-2. The samples in this layer were mostly described as well graded sand or poorly graded sand. Three (3) samples were described as well graded gravel. The fines content in the sand and gravel layer ranged between 0 and 15 percent, and the gravel content ranged between 5 to 45 percent. When described as gravel, the sand content in this layer ranged between 15 to 25 percent.

The SPT N-values in the sand and gravel layer ranged between 5 bpf and refusal, with most values ranging between 13 bpf and 33 bpf, indicating medium dense to dense sand and gravel. Please note that the high SPT N-values recorded in the sand and gravel layer may be due to obstructions such as cobbles and boulders present within the sand and gravel layer and may not represent the true density of the sand and gravel.

2.4 Test Pit Results

Test pit TP-1 and TP-2 indicated that the existing concrete block wall is founded on natural sand and gravel at depths of 3 feet to 2.5 feet, i.e., 2 to 1.5 courses of blocks beneath the ground, respectively. The bottom course of blocks rests on a 2- to 4-inch-thick leveling pad of concrete.

2.5 Groundwater

Groundwater was measured at the end or shortly after the end of drilling in all borings at depths ranging between 6.0 feet and 19.0 feet beneath the ground surface as shown in Table 1 and in the boring logs. Groundwater was not encountered in the test pits or probes as shown in Tables 2 and 3, and in the test pit and probe logs.

The groundwater information reported herein is based on observations made during or shortly after the completion of drilling or excavation, and may not represent the actual groundwater conditions, as additional time may be required for the groundwater levels to stabilize. The groundwater information presented in this report only represents the conditions encountered at the time and location of the explorations. Seasonal fluctuation should be anticipated.

3. EVALUATION AND RECOMMENDATIONS

3.1 Mast Arm Foundation Recommendations

Based on the results of the borings, the subsurface conditions at the site are suitable to support the proposed mast arm foundations. Each mast arm should be supported on a cored pier (drilled shaft) designed in accordance with the standard drawings: "Overhead Signal Structure & Foundation, Sheets 1 through 7," by the MassDOT, Highway Division and dated December 2015 (Standard Drawing).

Using the average SPT N-value (with hammer energy correction), we assessed the soil designation in accordance with the Standard Drawing. The table below shows the average SPT N-values (corrected and uncorrected for hammer energy), the mast arm length, the depth to groundwater, and the recommended soil designation for design of the drilled shafts.

Intersection	Boring	Groundwater Level (ft.)	Mast Arm Length (ft.)	Average SPT N-Value	Corrected Average SPT N-Value*	Designation
Washington St. & York St.	MA-1 **	6	30	20.3	27.0	WET SAND (DENSE)
	MA-2 **	9.2	25	12.4	16.5	WET SAND (LOOSE)
Washington St. & Stop and Shop Driveway	MA-3	9	35	7.5	9.9	WET SAND (LOOSE)
	MA-4	6	30	22.6	30.2	WET SAND (DENSE)
Washington St. & Central St.	MA-5	11.7	45	32.8	43.7	DRY SAND (DENSE)
	MA-6	10.1	25	27.3	36.4	DRY SAND (DENSE)
	MA-7	10.5	35	36.5	48.6	DRY SAND (DENSE)
	MA-8	9	45	26.3	35.1	WET SAND (DENSE)

*Correction for 80% automatic hammer efficiency.

** Based on the boring logs, drilling near the bottom of the shaft will likely extend through boulders or into rock.

3.2 Bearing Resistance and Settlement of Proposed Retaining Wall

3.2.1 General

The subsurface conditions encountered in the borings advanced along the proposed retaining wall alignment are suitable for shallow foundations after the surficial organic soil and existing

fill are removed and replaced with Gravel Borrow. We anticipate that the removal will extend to depths of up to 6 feet beneath the existing grade. The removal may extend deeper at locations not explored by LGCI.

Our recommendations for footings design are presented in Section 3.2.2 and our settlement estimate is presented in Section 3.2.3.

3.2.2 Footing Design

- We recommended placing a minimum of 12 inches of compacted Gravel Borrow or crushed stone below all footings to provide a uniform working surface.

- Footings should be placed at a minimum depth of 4 feet below the final grade to provide adequate frost protection.

- Wall footings should be designed and constructed with continuous, longitudinal steel reinforcement for greater bending strength to span across small areas of loose or soft soils that may go undetected during construction.

- A representative of LGCI should be engaged to observe that the foundation subgrades have been prepared in accordance with our recommendations.

- We estimated the nominal bearing resistance, q_n, for the proposed shallow foundations for footing widths ranging between 5 and 8 feet, a bearing depth of 4 feet below the ground surface, and a footing length ranging between 57 and 99 feet. We have assumed that the footings will bear on 12 inches of Gravel Borrow placed directly on top of the natural sand and gravel layer. Using a conservatively low friction angle of 31 degrees for the natural sand and gravel, we estimated a nominal resistance as follows:

  $q_n = 0.8*B + 10$ where B is the footing width in feet and q_n is in kips per square foot (ksf)

- The factored bearing resistance, q_R, should be calculated by multiplying the nominal resistance, q_n, by the appropriate resistance factor φ_b. The resistance factors should be as follows:

Service Limit State	1.0 (AASHTO-9, Section 10.5.5.1)
Extreme Limit State	1.0 (AASHTO-9, Section 10.5.5.3)
Strength Limit State	0.55 for wall footings, if any (AASHTO-9, Section 11.5.7)

3.2.3 Settlement Estimates

- LGCI estimated the service limit state bearing resistance of the retaining wall using the boring data for widths of abutment footings ranging between 5 and 8 feet. We used Hough's Method described in AASHTO-9 for well graded silty sand and gravel. We

assumed that the settlement occurs in the top 25 feet, i.e., in the 21-foot layer beneath the proposed footing embedded at a depth of 4 feet beneath the ground surface. Our calculations are included in Appendix D. To keep the total settlement of the wall footings within one (1) inch, the service limit state bearing resistance should be as follows:

$q = (41.9/B) + 2$ where B is in feet and q is in ksf.

- For the resistance above, we anticipate that the total settlement of the proposed footings will be less than 1 inch and that the differential settlement will be less than ½ to ¾ of an inch over a distance of 25 feet.

- The bearing resistance should be limited to the lower of q_n in Section 3.2.2 and q in this section.

3.3 Seismic Recommendations

Seismic design criteria for the retaining wall are provided in the sections below for a 1,000-year return period in accordance with the AASHTO Guide Specifications for LRFD Seismic Bridge Design (2011 with latest revisions).

- Site Class: D
- Peak Ground Acceleration (PGA): 0.067g
- Spectral Response Acceleration at short period (S_s): 0.140g
- Spectral Response Acceleration at 1 sec. (S_1): 0.037g
- Site Factor F_{pga} (Table 3.10.3.2-1): 1.6
- Site Coefficient F_a (Table 3.10.3.2-2): 1.6
- Site Coefficient F_v (Table 3.10.3.2-3): 2.4
- Adjusted Peak Ground Acceleration, A_s: 0.108g
- Adjusted Spectral Response S_{DS}: 0.224g
- Adjusted Spectral Responses S_{D1}: 0.089g

Based on the boring information, we believe the site soils at this location are in general not susceptible to liquefaction.

3.4 Lateral Pressures for Wall Design

Lateral earth pressures recommended for design of the retaining wall are provided below.

Coefficient of Active Earth Pressure, K_A:	0.31
Coefficient of At-Rest Earth Pressure, K_o:	0.50
Friction Angle between Backfill and Back of Wall, δ:	10 degrees
Total Unit Weight, γ:	120 pcf
Buoyant Unit Weight γ':	57.4 pcf

Note: The coefficient of active pressure value is based on Coulomb's equation using an internal friction angle for the backfill, ϕ, of 30 degrees and a friction angle between the backfill and the structure, δ, of 10 degrees. The coefficients of active and at-rest earth pressure are provided for wall backfill with a horizontal surface (non-sloping backfill) on the active side for the retaining wall.

- In accordance with MassDOT's LRFD Bridge Manual (2013) Section 3.1.6, for cantilever walls not founded on rock with a total height less than or equal to 5 feet, the coefficient of lateral earth pressure should be calculated using the following equation: $0.5*(K_A + K_o)$. For cantilever walls not founded on rock with a total height greater than 5 feet or any spread-footing supported gravity wall, the coefficient of lateral earth pressure should be calculated using K_A.

- In accordance with Section 3.3.1 of the 2013 MassDOT LRFD Bridge Design Manual, the passive earth pressures should be neglected in front of the walls in determining local wall stability (overturning, sliding, and bearing pressures).

- In accordance with AASHTO-9, Section 3.4.1, for the Strength Limit State, a load factor of 1.5 should be applied to the lateral earth pressure.

- We recommend placing free-draining material (Gravel Borrow, MassDOT M1.03.0, Type b) within the 3 feet immediately behind the wall. We recommend providing weep holes in the wall to promote drainage.

- Assuming that the footings are cast in place, we recommend an angle of friction ϕ_f of 34 degrees between the Gravel Borrow beneath the bottom of the footing and the compacted natural soil. In accordance with AASHTO-9, a resistance factor should be used for the shear resistance between the bottom of the proposed foundations and the Gravel Borrow as follows:

  0.8 for cast-in-place concrete foundation (Table 10.5.5.2.2-1)
  0.9 for precast concrete foundation (Table 10.5.5.2.2-1)
  1.0 for wing wall foundations (Table 11.5.7-1)

3.5 Seismic Pressure

In accordance with AASHTO Guide Specifications for LRFD Seismic Bridge Design (2011 with latest revisions), the site described in this report is classified as Seismic Design Category (SDC) A. According to the MassDOT Bridge Manual, Sections 3.4.4 and 3.4.6, a seismic analysis is not required SDC A walls.

3.6 Slope Stability Analyses

3.6.1 General

LGCI performed limit equilibrium analyses to evaluate the global stability of the proposed riprap slope embankment on the eastern side of Washington Street just north of York Street.

LGCI performed stability analyses using the slope stability program PCSTABL5M to calculate the factor of safety, FS, for a sliding failure using the Simplified Bishop Method of slices for circular failure surfaces. For this project, we defined critical failure surfaces as those surfaces that start on the upper side of the proposed riprap slope on Washington Street and extend to the lower side of the proposed slope in the wet areas, i.e., surfaces that entirely encompass the existing slope (global failure surfaces).

We performed slope stability analyses on cross sections between approximate station Sta. 10+00 and Sta. 12+00 (corresponding to proposed Sta. 23+00 and Sta. 25+00, respectively).

3.6.2 Slope Geometry

Our understanding of the proposed armored/riprap slope is based on our discussions with Nitsch and on the following documents:

- Drawing titled "Stoughton, Washington Street (Route138), Cross Sections Plan, Sheet No. 149 to 157 out of 226," prepared by Nitsch Engineering, Inc., plotted on April 1, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on April 4, 2022.

- Detailed cross section of the Riprap Slope provided to LGCI by Nitsch via e-mail on April 4, 2022.

We performed slope stability analyses for three (3) representative sections, i.e., sections at proposed Sta. 23+00, Sta. 24+00, and Sta. 25+00.

3.6.3 Soil Parameters

LGCI estimated the friction angles of the onsite soils, including the existing fill, natural sand and gravel layer, and organic soil (peat or buried organic soil) based on SPT data from borings SB-1, SB-2, and SB-3.

The table below shows the soil parameters we used in our slope stability analyses.

Soil Layer	Total Unit Weight (pcf)	Saturated Unit Weight (pcf)	Friction Angle (degrees)
Topsoil	115	120	28
Crushed Stone	135	140	42
Gravel Borrow	135	140	36
Existing Fill	120	125	33
Peat/Buried Organic Soil	110	115	29
Natural Sand & Gravel	125	130	36
Weathered Rock	135	140	42

For the rock, we assigned high strength values to force the failure surfaces into the overlying sand.

3.6.4 Results of Slope Stability Analyses

Our analyses indicated FS values of 1.55, 1.52, and 1.44 at Sta. 23+00, Sta. 24+00, and Sta. 25+00, respectively. The results of our slope stability analysis are included in Appendix D.

4. CONSTRUCTION CONSIDERATIONS

4.1 Site Preparation and Earthwork

4.1.1 General

Loose, soft, or organic materials as well as abandoned structures, if any, and utilities and deleterious matter encountered during initial stripping operations should be removed within the proposed foundation areas. Material placed around the mast arms near the surface should be compacted.

4.1.2 Drilled Shaft for Mast Arms

- During construction of the cored pier foundation (drilled shaft), a temporary casing that will be removed when concrete is placed will be required to prevent collapse of the fill and sand.

- We did not encounter boulders in our borings. However, the fill could contain cobbles and boulders. The contractor should be prepared to remove such boulders, if encountered, during the installation of the drilled shaft.

- When the drilling operations are complete, concrete should be placed inside the casing as soon as possible.

- The concrete should be placed using a tremie pipe. We recommend pouring the pier foundation concrete on the same day that the pier is drilled.

- A representative of LGCI should assess that the pier foundation is founded on competent bearing materials and that the pier foundation installation procedures comply with our recommendations.

4.1.3 Footing Subgrade Preparation

- Existing fill, organic soil, abandoned utilities, and other below-ground structures should be entirely removed from within and 1 foot outside the proposed foundation footprints.

- Due to the variability of the site soils and potential for differing bearing materials, we recommend placing a minimum of 12 inches of Gravel Borrow under footings to provide a firm working surface during placement of formwork and rebar.

- The subgrade of the footings in the natural sand and gravel should be compacted with a dynamic vibratory compactor imparting a minimum of 10 kips of force to the subgrade.

- Should boulders be encountered at the footing subgrade, the boulders should be removed, and the resulting excavation should be backfilled with compacted Gravel Borrow.

- Loose or soft soils identified during the compaction of the footing subgrades that cannot be compacted in place should be excavated to a suitable bearing stratum as determined by the representative of LGCI. Grades should be restored by backfilling with Gravel Borrow (MHD M1.03.0, Type a) or crushed stone.

- When crushed stone is required in the drawings or it is used for the convenience of the contractor, it should be wrapped in a geotextile fabric for separation except where introduction of the geotextile fabric promotes sliding.

- An LGCI representative should observe the exposed foundation subgrades prior to fill and concrete placement to verify that the exposed bearing materials are suitable for the design soil bearing pressure. If soft or loose pockets are encountered in the footing excavations, the soft or loose materials that cannot be compacted in place should be removed, and the bottom of the footing should be placed at a lower elevation on firm soil, or the resulting excavation should be backfilled with Gravel Borrow, or crushed stone wrapped in a geotextile fabric.

4.2 Fill Materials

Fill placed beneath the foundations and to backfill the walls should meet the gradation and compaction requirements of Gravel Borrow (MassDOT M1.03.0, Type a).

Materials to be used as fill should first be tested for compliance with the applicable gradation specifications.

4.3 Reuse of Onsite Materials

Based on our field observations, we do not anticipate that the site soils will meet the gradation requirements of Gravel Borrow. Should the contractor encounter materials potentially suitable for reuse during earthwork operations, the contractor should avoid mixing the reusable soils with unsuitable soils. The soils to be reused should be excavated and stockpiled separately for compliance testing.

Soils with 20 percent or greater fines content are generally very sensitive to moisture content variations and are susceptible to frost. Such soils are very difficult to compact at moisture contents that are much higher or much lower than the optimum moisture content determined from the laboratory compaction test. Therefore, strict moisture control should be implemented during compaction of onsite soils with fines contents of 20 percent or greater. The contractor should be prepared to remove and replace such soils if pumping occurs.

4.4 Temporary Excavations

Where temporary support of excavation (SOE) systems are needed, such as for the proposed retaining wall, the design of the SOE system should be performed by a professional engineer registered in the Commonwealth of Massachusetts and engaged by the contractor. The existing sand and gravel may contain cobbles and boulders that may preclude the use of sheet piles. The

contractor should review the subsurface information and select the appropriates SOE system. The design should be submitted to Nitsch for review at least two weeks before the start of construction. The design should include details about the size of the components of the system, and the construction and removal sequence.

All excavations to receive human traffic should be constructed in accordance with OSHA guidelines.

The site soils should generally be considered Type "C" and should have a maximum allowable slope of 1.5 Horizontal to 1 Vertical (1.5H:1V) for excavations less than 20 feet deep. Deeper excavations, if needed, should have shoring designed by a professional engineer.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of the excavation sides and bottom.

4.5 Groundwater Control Procedures

We do not anticipate that major groundwater control procedures will be needed during the excavation for the proposed retaining wall foundation. However, due to the sloping ground in the general vicinity of the site, surface runoff should be managed to maintain dry excavations. We recommend that the contractor design and submit a plan to collect and remove groundwater prior to the start of the excavations. Such a plan should include at a minimum, multiple sump pump pits extending at least 3 feet beneath the bottom of the excavation.

Groundwater levels should be maintained at a minimum of 1-foot below the bottom of excavations during construction. In addition to local sump pumps, the contractor should be prepared to use well points to maintain a dry excavation. The contractor should be permitted to employ whatever commonly accepted means and practices are available to dewater.

To reduce the potential for sinkholes developing over sump pump pits after the sump pumps are removed, the crushed stone placed in the sump pump pits should be wrapped in a geotextile fabric. Alternatively, the crushed stone should be entirely removed after the sump pump is no longer in use and the sump pump pit should be restored with suitable backfill.
Groundwater collected from excavations should be filtered for fines in sedimentation basins before being discharged. At a minimum, the sedimentation basins should be constructed of hay bales wrapped in a geotextile fabric.

The contractor should discharge groundwater from the dewatering system in accordance with permits and local and state regulations.

4.6 Slope Subgrade Preparation

- We recommend removing the topsoil and organic matter from the surface of the existing slope before placing fill for the slope extension.

- At the bottom of the proposed slope, the surficial organic soil and swamp deposits material should be removed before placing fill for the new slope.

4.7 Contractor Submittals

The contractor should submit details about the construction procedures, including:

- The proposed construction sequence;
- Groundwater control system.

Contractor submittals should be prepared and sealed by a professional engineer registered in the Commonwealth of Massachusetts and should be submitted for review at least two weeks before the start of the work.

5. REPORT LIMITATIONS

Our analysis and recommendations are based on project information provided to us at the time of this report. If changes to the type, size, and location of the proposed structures or to the site grading are made, the recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions and recommendations modified in writing by LGCI. LGCI cannot accept responsibility for designs based on our recommendations unless we are engaged to review the final plans and specifications to determine whether any changes in the project affect the validity of our recommendations and whether our recommendations have been properly implemented in the design.

It is not part of our scope to perform a more detailed site history; therefore, we have not explored for or researched the locations of buried utilities or other structures in the area of the proposed construction. Our scope did not include environmental services or services related to moisture, mold, or other biological contaminates in or around the site.

We cannot accept responsibility for designs based on recommendations in this report unless we are engaged to 1) make site visits during construction to check that the subsurface conditions exposed during construction are in general conformance with our design assumptions and 2) ascertain that, in general, the work is being performed in compliance with the contract documents.

Our report has been prepared in accordance with generally accepted engineering practices and in accordance with the terms and conditions set forth in our agreement. No other warranty, expressed or implied, is made. This report has been prepared for the exclusive use of Nitsch Engineering, Inc. for the specific application to the Proposed Mast Arms, Reinforced Slope, and Retaining Wall in Stoughton, Massachusetts as conceived at this time.

6. REFERENCES

In addition to the references included in the text of the report, we used the following references:

American Association of State Highway and Transportation Officials (2020), "AASHTO LRFD Bridge Design Specifications," 9th Edition, Washington, D.C.

American Association of State Highway and Transportation Officials (2011), "AASHTO Guide Specifications for LRFD Seismic Bridge Design," 2nd Edition, with 2012 and 2014 Interim Revisions.

Massachusetts Highway Department (2022), "Standard Specifications for Highways and Bridges."

MassDOT (2013), "LRFD Bridge Manual," revised 2020.

United States Department of Labor, Occupational Safety and Health Administration [OSHA] (October 1989) "Federal Register, Volume 54, No. 209: Construction Standards for Excavations, 29 CFR, part 1926, Subpart P.".

US Geological Survey, Stoughton, MA Topo Map from http://mapserver.mytopo.com.

Table 1 - Summary of LGCI's Borings
Proposed Mast Arms, Reinforced Slope and Retaining Wall
Stoughton, Massachusetts
LGCI Project No. 2139

Boring No.	Ground Surface Elevation (ft.)[1]	Groundwater[2] Depth / El. (ft.)	Bottom of Topsoil/**Asphalt** Depth / El. (ft.)	Bottom of Concrete Depth / El. (ft.)	Bottom of Fill Depth / El. (ft.)	Bottom of Organic Soil/**Peat** Depth / El. (ft.)	Bottom of Sand and Gravel Depth / El. (ft.)	Top of Rock Depth / El. (ft.)	Bottom of Boring Depth / El. (ft.)
MA-1	216.0	6.0 / **210.0**	0.6 / **215.4**	- / -	2.0 / **214.0**	- / -	21.0 [3]/ **195.0**	- / -	21.0 / **195.0**
MA-2	219.0	9.2 / **209.8**	0.4 / **218.6**	- / -	4.0 / **215.0**	- / -	16.0 / **203.0**	16.0 [4]/ **203.0**	18.2 / **200.8**
MA-3	235.0	9.0 / **226.0**	2.0 / **233.0**	- / -	9.0 / **226.0**	11.5 / **223.5**	21.0 [3]/ **214.0**	- / -	21.0 / **214.0**
MA-4	235.0	6.0 / **229.0**	2.0 / **233.0**	- / -	4.0 / **231.0**	- / -	21.0 [3]/ **214.0**	- / -	21.0 / **214.0**
MA-5	242.0	11.7 / **230.3**	- / -	0.2 / **241.8**	4.0 / **238.0**	- / -	21.0 [3]/ **221.0**	- / -	21.0 / **221.0**
MA-6	240.0	10.1 / **229.9**	0.3 / **239.7**	- / -	4.0 / **236.0**	- / -	20.2 [3]/ **219.8**	- / -	20.2 / **219.8**
MA-7	241.0	10.5 / **230.5**	**0.5** / **240.5**	- / -	4.0 / **237.0**	- / -	21.0 [3]/ **220.0**	- / -	21.0 / **220.0**
MA-8	241.0	9.0 / **232.0**	2.0 / **239.0**	- / -	8.0 / **233.0**	- / -	21.0 [3]/ **220.0**	- / -	21.0 / **220.0**
SB-1	202.0	6.0 / **196.0**	**0.6** / **201.4**	1.2 / **200.8**	19.0 / **183.0**	**23.6** / **178.4**	31.0 [3]/ **171.0**	- / -	31.0 / **171.0**
SB-2	204.0	8.0 / **196.0**	**0.7** / **203.3**	- / -	14.0 / **190.0**	14.1 / **189.9**	19.0 / **185.0**	19.0 [4]/ **185.0**	26.0 / **178.0**
SB-3	211.0	19.0 / **192.0**	**0.7** / **210.3**	- / -	- / -	- / -	26.0 / **185.0**	26.0 [4]/ **185.0**	28.6 / **182.4**
SB-4	215.0	8.5 / **206.5**	0.3 / **214.7**	- / -	4.0 / **211.0**	- / -	9.2 / **205.8**	9.2 [4]/ **205.8**	12.5 / **202.5**
WB-1	241.0	6.0 / **235.0**	- / -	- / -	1.2 / **239.8**	- / -	36.0 [3]/ **205.0**	- / -	36.0 / **205.0**
WB-2	245.0	14.0 / **231.0**	1.2 / **243.8**	- / -	6.0 / **239.0**	- / -	36.0 [3]/ **209.0**	- / -	36.0 / **209.0**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.
2. Groundwater depths based on level at the end of drilling, level after drilling, or based on sample moisture, whichever is shallower.
3. Boring terminated in the sand and gravel layer.
4. Boring terminated in rock or on a boulder .
5. "-" means layer was not encountered.

Table 2 - Summary of LGCI's Test Pits
Proposed Mast Arms and Reinforced Slope
Stoughton, Massachusetts
LGCI Project No. 2139

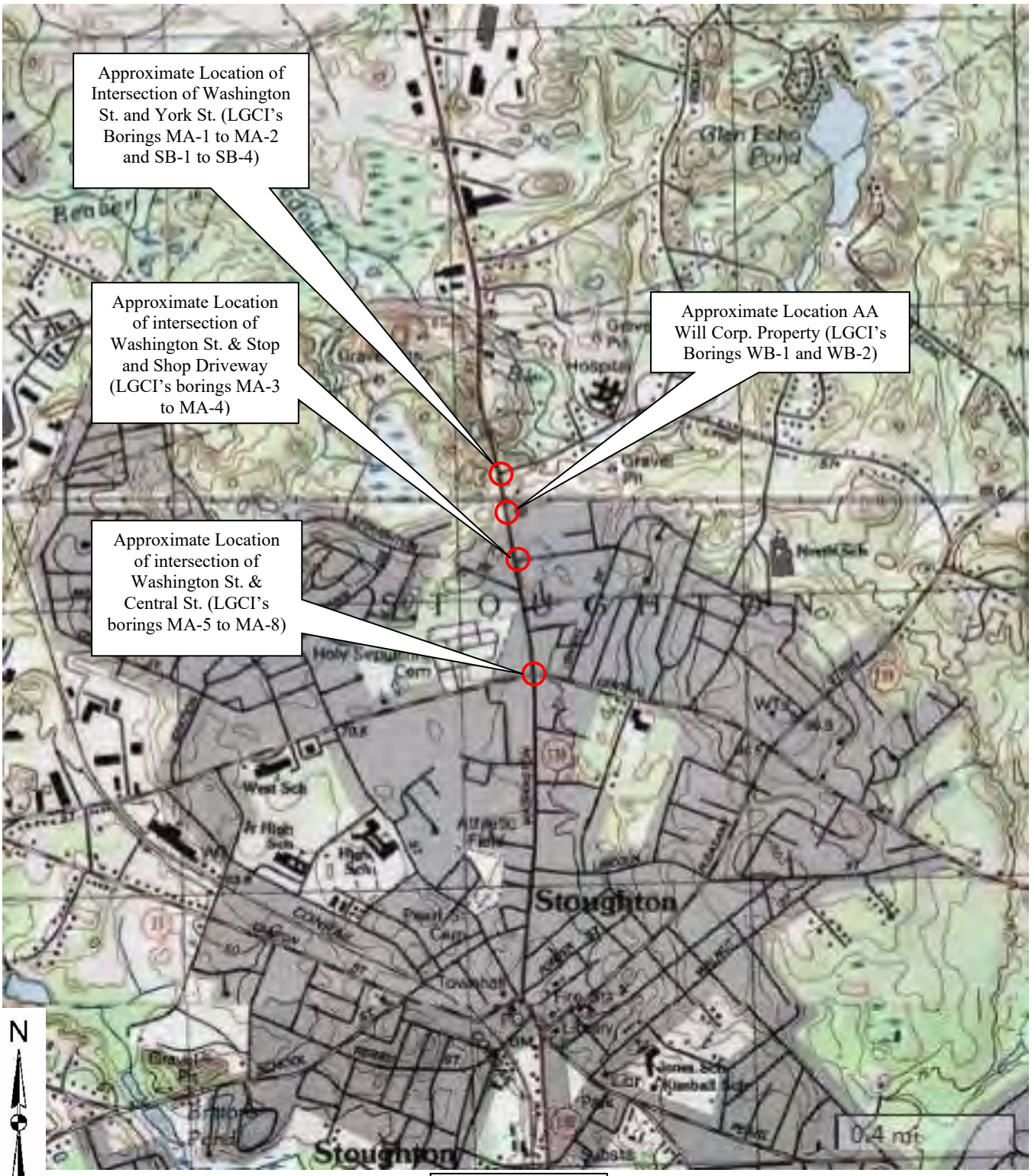
Test Pit No.	Ground Surface Elevation (ft.)[1]	Groundwater[2] Depth / El. (ft.)	Bottom of Topsoil Depth / El. (ft.)	Bottom of Fill Depth / El. (ft.)	Bottom of Sand and Gravel Depth / El. (ft.)	Bottom of Test Pit Depth / El. (ft.)
TP-1	232.0	- / **-**	- / **-**	4.3 / **227.7**	6.0 [3]/ **226.0**	6.0 / **226.0**
TP-2	237.0	- / **-**	1.0 / **236.0**	2.5 / **234.5**	5.5 [3]/ **231.5**	5.5 / **231.5**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.
2. Groundwater not encountered.
3. Test pit terminated in the sand and gravel layer.
4. "-" means layer or groundwater was not encountered.

Table 3 - Summary of LGCI's Probes
Proposed Mast Arms and Reinforced Slope
Stoughton, Massachusetts
LGCI Project No. 2139

Probe No.	Ground Surface Elevation (ft.)[1]	Groundwater[2] Depth / El. (ft.)	Bottom of Forest Mat Depth / El. (ft.)	Bottom of Fill Depth / El. (ft.)	Bottom of Buried Organic Soil Depth / El. (ft.)	Bottom of Probe Depth / El. (ft.)
HP-1	195.0	- / **-**	0.5 / **194.5**	2.7 [3]/ **192.3**	- / **-**	2.7 / **192.3**
HP-2	188.0	0.0 / **188.0**	1.5 / **186.5**	3.5 [3]/ **184.5**	- / **-**	3.5 / **184.5**
HP-3	187.0	1.5 / **185.5**	1.0 / **186.0**	2.0 / **185.0**	3.0 [4]/ **184.0**	3.0 / **184.0**
HP-4	189.0	0.5 / **188.5**	0.5 / **188.5**	2.5 [3]/ **186.5**	- / **-**	2.5 / **186.5**
HP-5	205.0	- / **-**	***1.0*** / **204.0**	3.0 [3]/ **202.0**	- / **-**	3.0 / **202.0**

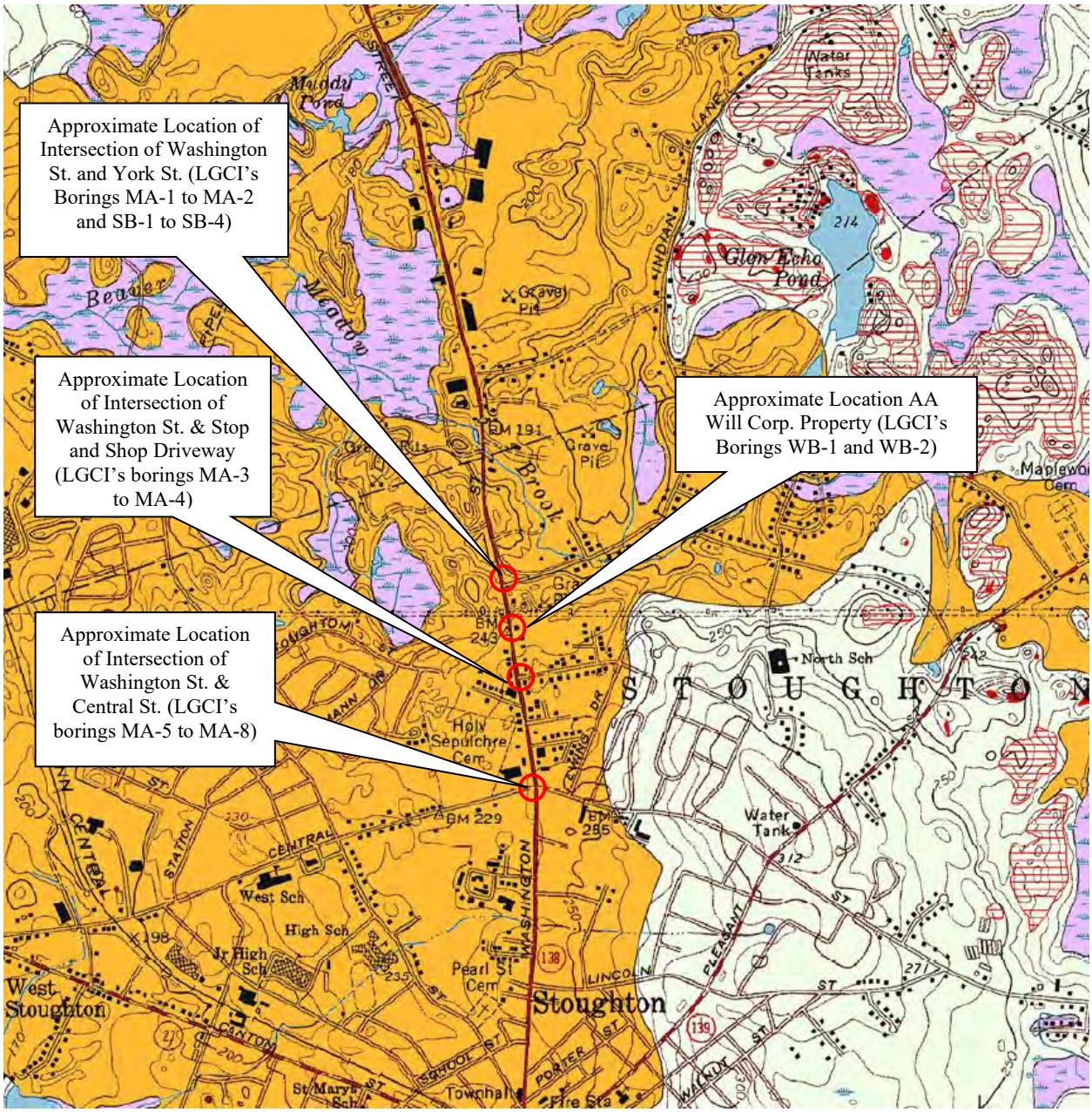
1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2023.
2. Groundwater depths based on level at the end of drilling, level after drilling, or based on sample moisture, whichever is shallower.
3. Probe terminated in the Fill layer.
4. Probe terminated in the buried organic soil layer.
5. "-" means layer was not encountered.



Contour Interval: 3 meters

Note: Figure based on USA Topo Maps of Stoughton, MA obtained from https://viewer.nationalmap.gov/

Client:	Project:	
Nitsch Engineering, Inc.	Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 1 – Site Location Map
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139 / Date: Oct. 2022



N

Coarse deposits consist of *gravel deposits*, *sand and gravel deposits*, and *sand deposits*, not differentiated in this report. *Gravel deposits* are composed of at least 50 percent gravel-size clasts; cobbles and boulders predominate; minor amounts of sand occur within gravel beds, and sand comprises a few separate layers. Gravel layers generally are poorly sorted, and bedding commonly is distorted and faulted due to postdepositional collapse related to melting of ice. *Sand and gravel deposits* occur as mixtures of gravel and sand within individual layers and as layers of sand alternating with layers of gravel. Sand and gravel layers generally range between 25 and 50 percent gravel particles and between 50 and 75 percent sand particles. Layers are well sorted to poorly sorted; bedding may be distorted and faulted due to postdepositional collapse. *Sand deposits* are composed mainly of very coarse to fine sand, commonly in well-sorted layers. Coarser layers may contain up to 25 percent gravel particles, generally granules and pebbles; finer layers may contain some very fine sand, silt, and clay

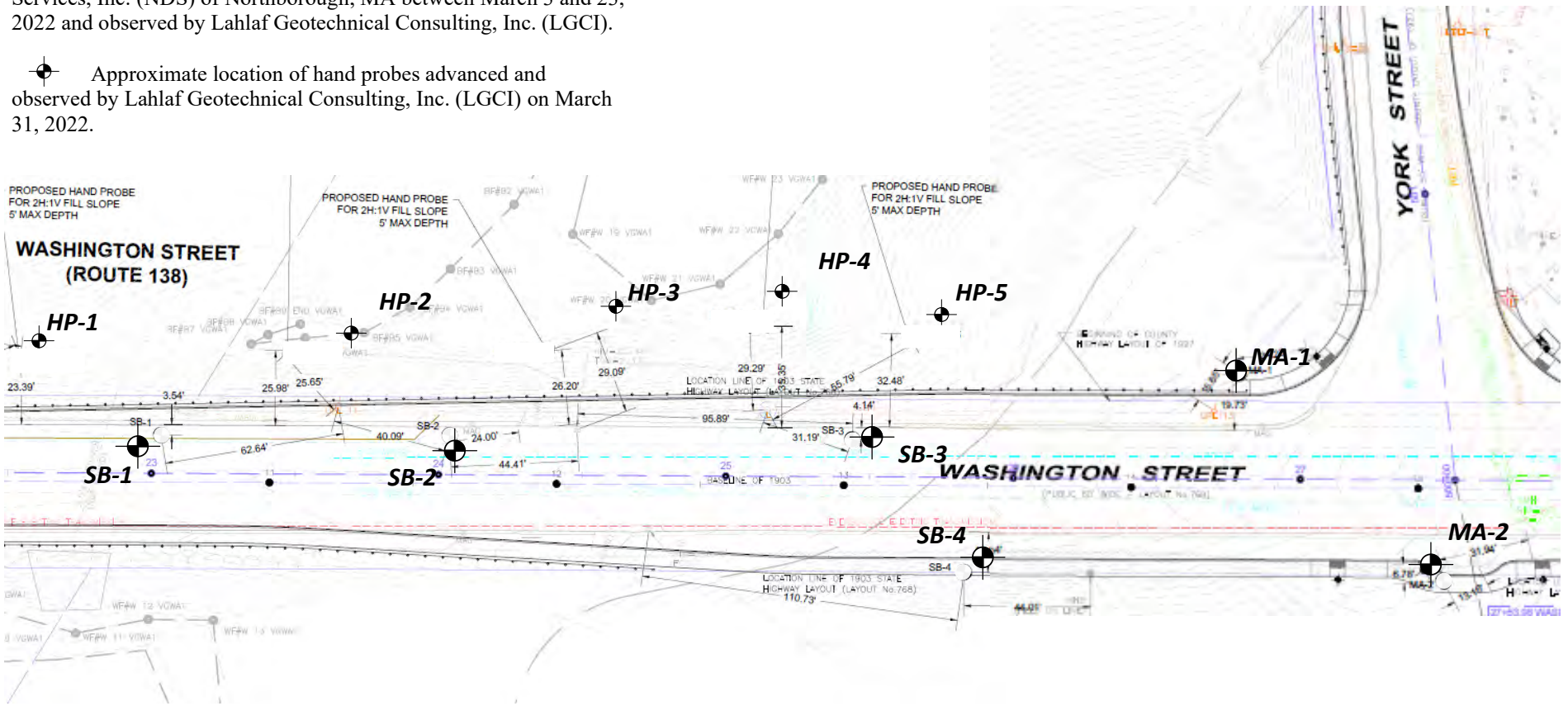
Note: Figure based on map titled: "Surficial Materials Map of the Blue Hills Quadrangle, Massachusetts," prepared by Stone, B.D., and DiGiacomo-Cohen, M.L. Scientific Investigation Map 3402, Quadrangle 127 – Blue Hills, 2018.

Client:	Project:	Figure 2 – Surficial Geologic Map	
Nitsch Engineering, Inc.	Proposed Mast Arms, Reinforced Slope, and Retaining Wall		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: Oct. 2022

Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA between March 3 and 23, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).

Approximate location of hand probes advanced and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI) on March 31, 2022.

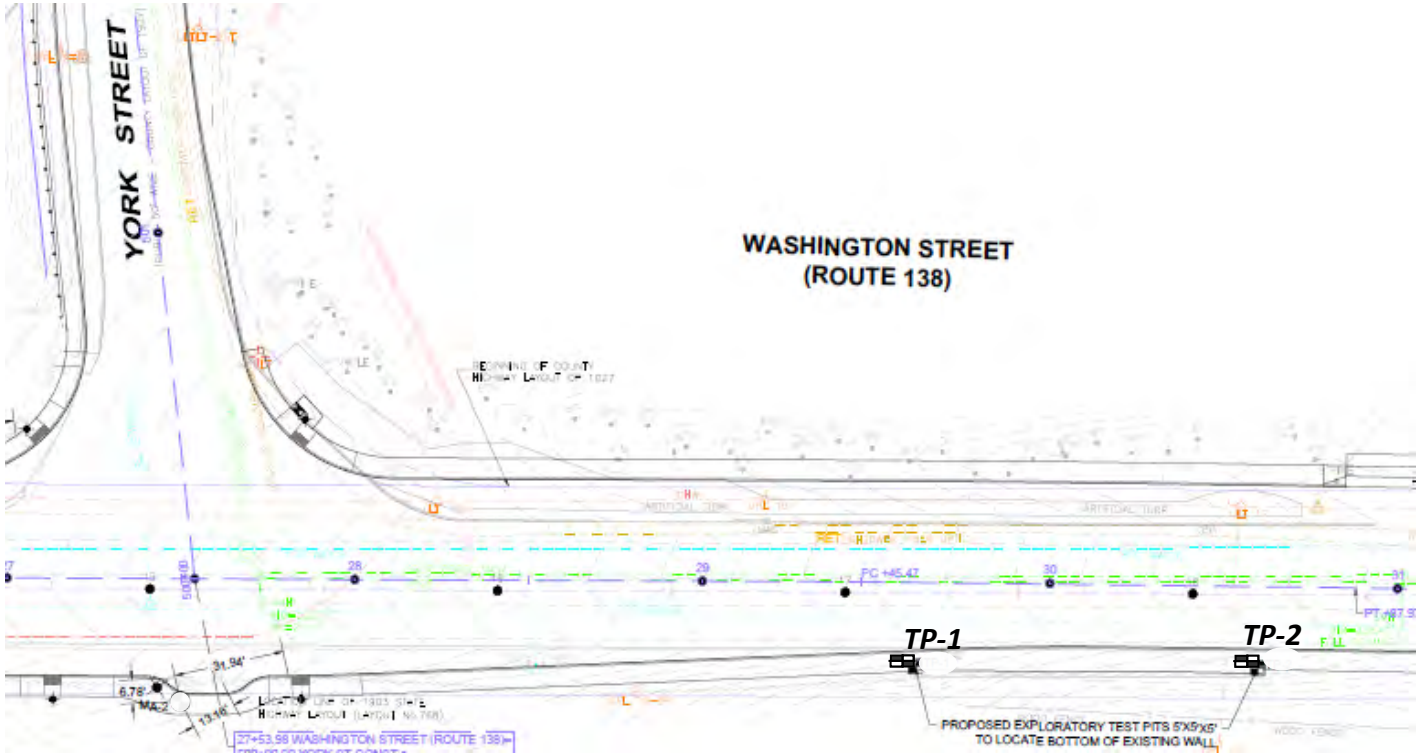


Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 and 2 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3A – Boring Location Plan - MA-1 & MA-2 and SB-1 to SB-4	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: Oct. 2022

Legend

Approximate location of test pit advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA on March 25, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



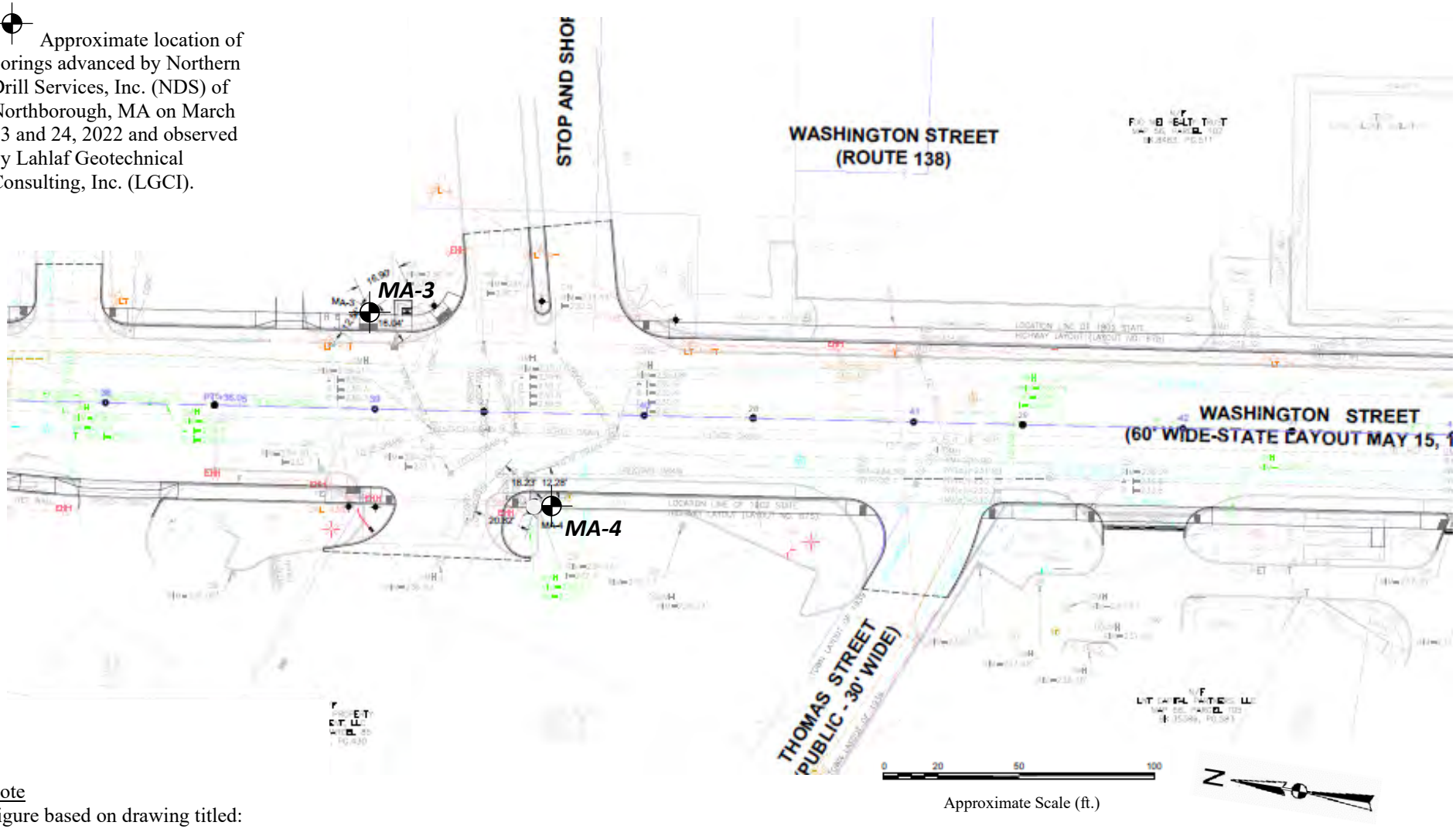
Approximate Scale (ft.)

Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 2 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022 and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3B – Test Pit Location Plan - TP-1 and TP-2	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: Oct. 2022

Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA on March 23 and 24, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



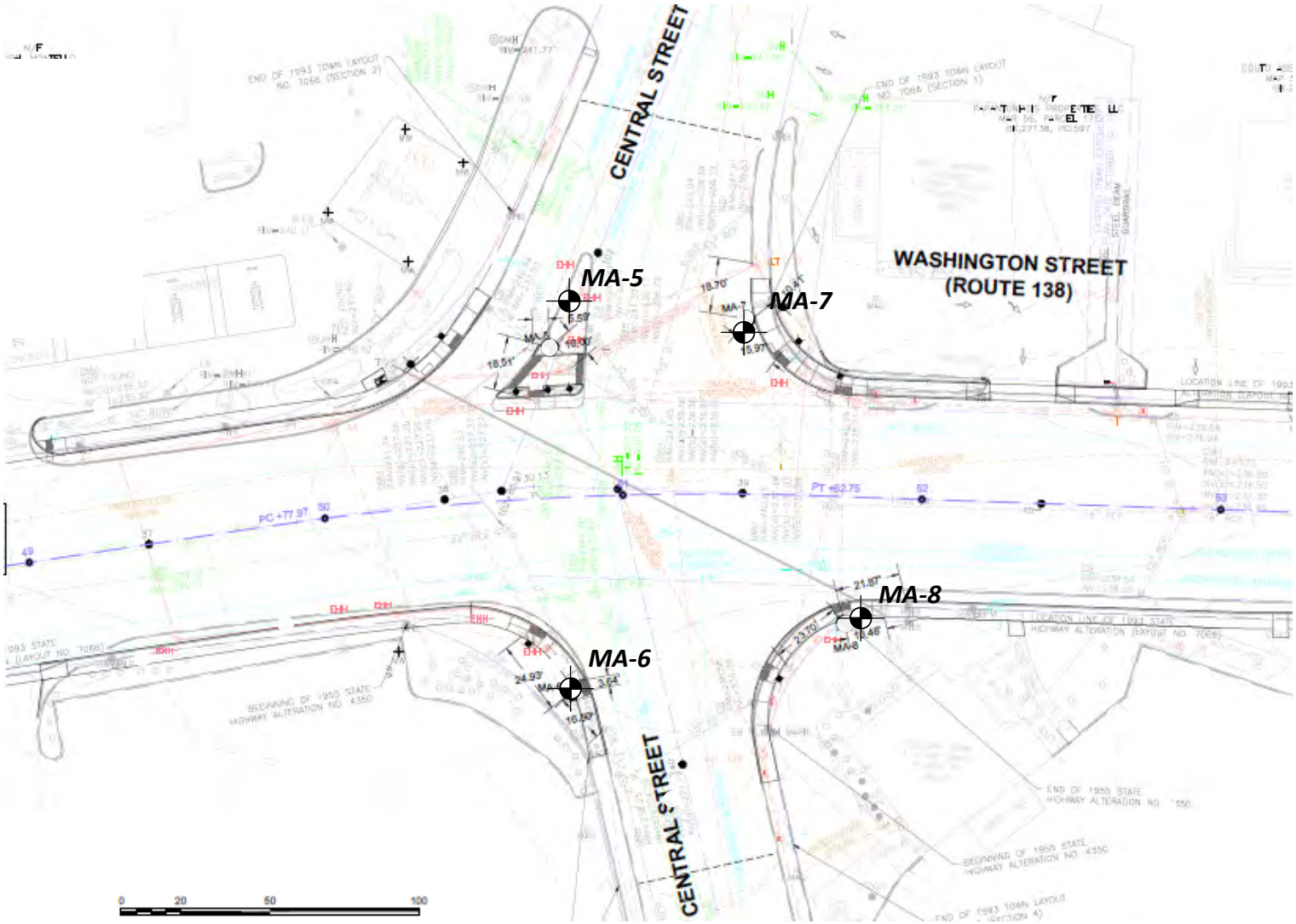
Approximate Scale (ft.)

Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 4 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022 and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3C – Boring Location Plan - MA-3 to MA-4	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: Oct. 2022

Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA between March 24 and 28, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



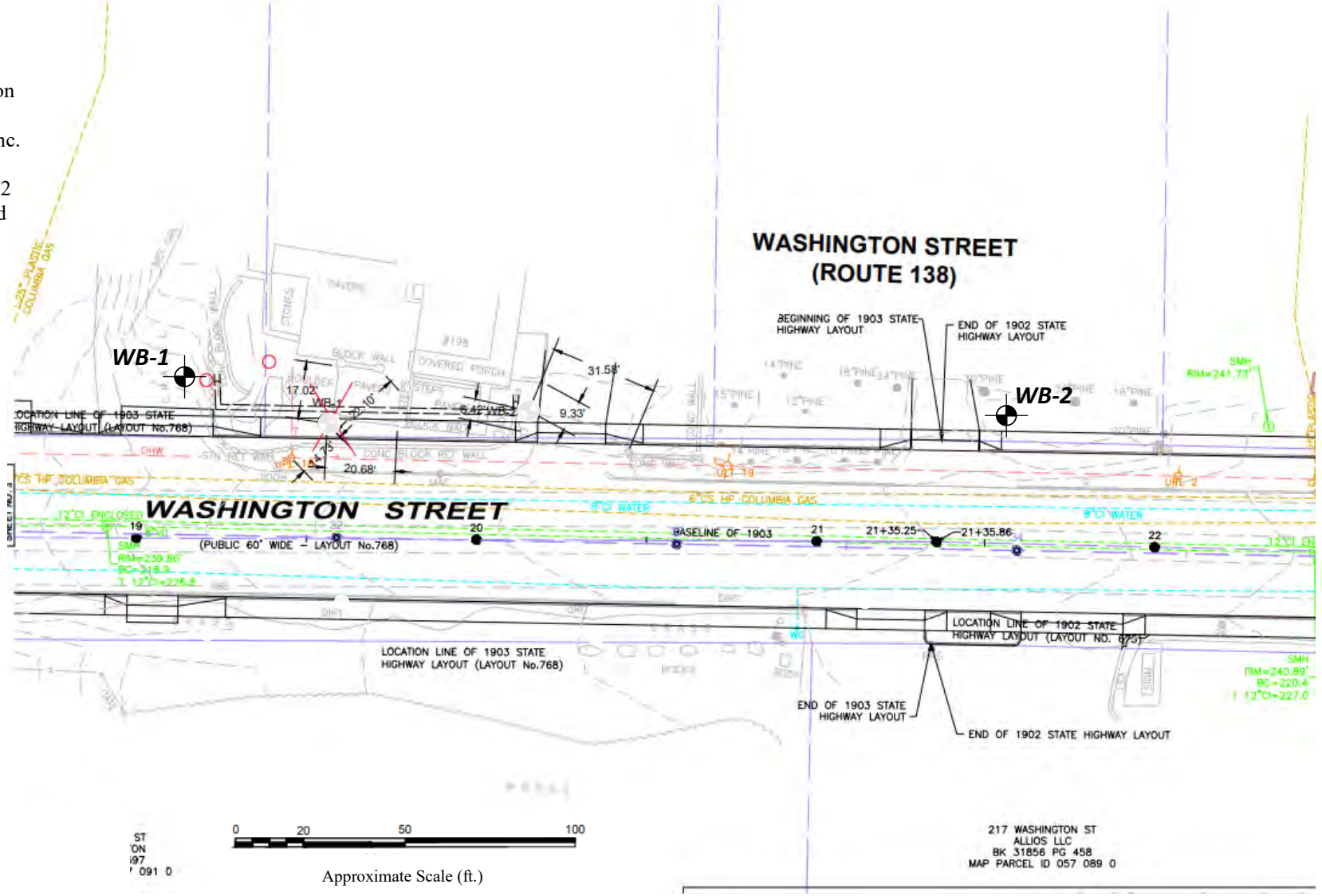
Approximate Scale (ft.)

Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 5 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022 and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client:	Project:	Figure 3D – Boring Location Plan - MA-5 to MA-8	
Nitsch Engineering, Inc.	Proposed Mast Arms, Reinforced Slope, and Retaining Wall		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: Oct. 2022

Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA between September 22 and 23, 2022 and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



Note
Figure based on drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 3 of 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022 and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

Client: Nitsch Engineering, Inc.	Project: Proposed Mast Arms, Reinforced Slope, and Retaining Wall	Figure 3E – Boring Location Plan – WB-1 to WB-2	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Stoughton, MA	LGCI Project No.: 2139	Date: Oct. 2022

APPENDIX A – Boring Logs

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

WB-1
PAGE 1 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 9/22/22 **DATE COMPLETED:** 9/23/22
BORING LOCATION: Near northern side of prop. retaining wall
COORDINATES: NA
SURFACE El.: 241 ft. (see note 1) **TOTAL DEPTH:** 36 ft.
WEATHER: 50's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 6.0 ft. / El. 235.0 ft. Based on sample moisture
AT END OF DRILLING: 12.4 ft. / El. 228.6 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Vacuum then drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HO **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
0	240.0	0.5	G1 G2			1	Fill	1.2 239.8	REMARK 1: Performed vacuum explorations for the top 6 feet to clear borehole for utilities. G1 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 20-25% fine to coarse subrounded gravel, gray, moist G2 - Well Graded GRAVEL (GW), fine to coarse, subrounded, 0-5% fines, 5-10% fine to medium sand, brown, moist
		1.2	G3						G3 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, ~25% fine to coarse subrounded gravel, 10-15% cobbles up to 8" in size, brown, moist
5	235.0	6	S1	6-7-8-6 (15)	24/4				S1 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, ~25% fine to coarse subrounded gravel, brown, wet
		8	S2	6-7-6-8 (13)	24/5	1			S2 - Similar to S1 REMARK 1: Drill rig chattering between depths of 9 feet and 10 feet on possible cobbles or boulder.
10	230.0	10	S3	36-55-55/2"	14/6				S3 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 40-45% fine to coarse subrounded to subangular gravel, brown, wet
		11.2				2	Sand and Gravel		REMARK 2: Drill rig chattering between depths of 11.5 feet and 13 feet on possible cobbles or boulder.
		14	S4	12-11-14-14 (25)	24/8				S4 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, trace coarse, ~10% fines, 30-35% fine to coarse subrounded to subangular gravel, brown, wet
15	225.0	16							
		19	S5	11-15-17-18 (32)	24/10				S5 - Poorly Graded SAND with Silt (SP-SM), fine, 5-10% fines, trace of fine subangular gravel, brown, wet
20	220.0	21							
		24							S6 - No reovery, drove 3" spoon and obtained sample:
25				29-17-16-17					Well Graded SAND with Silt (SW-SM), fine to coarse, 5-10% fines, 10-15% fine

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

WB-1
PAGE 2 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	215.0	24 26	S6	(33)	24/0		Sand and Gravel	239.8	subangular gravel, brown, wet
30		29	S7	19-18-20-22 (38)	24/7				S7 - Similar to S6
	210.0	31							
35		34	S8	18-12-12-12 (24)	24/9				S8 - Poorly Graded SAND with Gravel (SP), coarse, 0-5% fines, 20-25% fine subangular gravel, brown, wet
	205.0	36						36.0	Bottom of borehole at 36.0 feet. Backfilled borehole with drill cutting and 2 bags of gravel.
40									
	200.0								
45									
	195.0								
50									
	190.0								
55									
	185.0								
60									

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

WB-2
PAGE 1 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 9/22/22 **DATE COMPLETED:** 9/22/22
BORING LOCATION: Near southern side of prop. retaining wall
COORDINATES: NA
SURFACE El.: 245 ft. (see note 1) **TOTAL DEPTH:** 36 ft.
WEATHER: 60's / Rain
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 231.0 ft. Based on sample moisture
AT END OF DRILLING: 19.0 ft. / El. 226.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Zac Nader
DRILLING METHOD: Vacuum then drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HO **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1			1	Topsoil		REMARK 1: Performed vacuum explorations for the top 6 feet to clear borehole for utilities.
		1.2	G2					1.2	G1 - Topsoil
									G2 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subrounded, 10-15% fines, 20-25% fine to medium sand, 10-15% cobbles up to 6" in size, trace of roots, dark brown, moist
		3	G3				Fill		G3 - Similar to G2, 25-30% fine to coarse sand
5	240.0								
		6	S1	3-2-3-3 (5)	24/5			6.0	S1 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 25-30% fine subrounded gravel, brown, moist
		8	S2	6-4-5-4 (9)	24/0				S2 - No recovery, drove 3" spoon and obtained sample: Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subrounded, 10-15% fines, 20-25% fine to coarse sand, brown, moist
10	235.0	10	S3	3-3-3-7 (6)	24/0				S3 - No recovery, drove 3" spoon and obtained sample: Similar to S2
		12	S4	11-12-13-13 (25)	24/7				S4 - Well Graded GRAVEL with Sand (GW), fine to coarse, subrounded, 0-5% fines, ~15% medium to coarse sand, brown, moist
		14	S5	4-8-10-13 (18)	24/9		Sand and Gravel		S5 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 25-30% fine subrounded gravel, brown, wet
15	230.0	16	S6	25-50-50/3"	15/8				S6 - Similar to S5
		17.3							
		19	S7	22-29-25-19 (54)	24/0				S7 - No recovery, drove 3" spoon and obtained sample: Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, trace coarse, 5-10% fines, 25-30% fine to coarse subrounded gravel, brown, wet
20	225.0	21							
		24							
25	220.0		S8	14-12-13-18					S8 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 5-10% fines, light brown, wet

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

WB-2
PAGE 2 OF 2

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		24	S8	(25)	24/7				
		26							
		29							
30	215.0		S9	8-10-12-12 (22)	24/12		Sand and Gravel		S9 - Poorly Graded SAND with Silt (SP-SM), fine to medium, trace coarse, 5-10% fines, 5-10% fine subrounded gravel, light brown, wet
		31							
		34							
35	210.0		S10	17-31-51-67 (82)	24/24				S10 - Similar to S9, no gravel
		36						36.0	
40	205.0								Bottom of borehole at 36.0 feet. Backfilled borehole with drill cutting and 2 bags of gravel.
45	200.0								
50	195.0								
55	190.0								
60	185.0								

APPENDIX B – Probe Logs

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Road, Suite 2
Billerica, MA 01862
Telephone: (978) 330-5912
Fax: (978) 330-5056

PROBE LOG

HP-1
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 195 ft. (see note 1) **TOTAL DEPTH:** 2.7 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1			Forest Mat	0.5	G1 - Forest Mat
		0.5	G2			Swamp Deposits	194.5	G2 - Silty SAND (SM), fine, ~35% fines, trace of roots, trace of organic soil, brown, moist (Swamp Deposit)
		1.5	G3					G3 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines, 0-5% fine subrounded gravel, trace of roots, trace of organic soil, brown, moist
					1		2.7	REMARK 1: Refusal at depth 2.7' on possible cobbles or boulder.
								Bottom of borehole at 2.7 feet.
5	190.0							
10	185.0							
15	180.0							
20	175.0							
25	170.0							

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Road, Suite 2
Billerica, MA 01862
Telephone: (978) 330-5912
Fax: (978) 330-5056

PROBE LOG

HP-2
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 188 ft. (see note 1) **TOTAL DEPTH:** 3.5 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 0.0 ft. / El. 188.0 ft.
AT END OF DRILLING: -
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1			Forest Mat	1.5	G1 - Forest Mat
		1.5	G2			Swamp Deposits	186.5	G2 - Poorly Graded GRAVEL (GP), coarse, subrounded, 0-5% fines, 0-5% fine sand, gray, wet
		2	G3					G3 - Well Graded GRAVEL with Silt and Sand GW-GM), 10-15% fines, 20-25% fine to coarse sand, brown to gray, wet
	185.0	3	G4		1			G4 - Poorly Graded SAND with Gravel (SP), medium to coarse, 5-10% fines, 30-35% coarse subrounded gravel, gray, wet
5					2		3.5	REMARK 1: Refusal at depth 3.5' on possible cobbles or boulder.
								REMARK 2: Performed two additional hand probes: HP-2A and HP-2B. Both encountered refusal at depths 2.0' and 2.5', respectively.
	180.0							Bottom of borehole at 3.5 feet.
10								
	175.0							
15								
	170.0							
20								
	165.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Road, Suite 2
Billerica, MA 01862
Telephone: (978) 330-5912
Fax: (978) 330-5056

PROBE LOG

HP-3
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 187 ft. (see note 1) **TOTAL DEPTH:** 3 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 1.5 ft. / El. 185.5 ft.
AT END OF DRILLING: -
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1			Forest Mat	1.0	G1 - Forest Mat
		1	G2			Swamp Deposits	2.0	G2 - Silty SAND (SM), fine to medium, ~30% fines, 0-5% fine rounded gravel, trace of organic soil, trace of roots, black, wet
	185.0	2	G3			Buried Organic Soil	3.0	G3 - Silty SAND with Gravel (SM), mostly fine, 30-35% fines, ~15% coarse subrounded gravel, trace of organic soil, organic odor, brown to black, wet
					1			REMARK 1: Refusal at depth 3.0' on possible cobbles or boulder.
					2			REMARK 2: Performed two additional hand probes: HP-3A and HP-3B. Both encountered refusal at depths 1.0' and 2.5', respectively.
5								Bottom of borehole at 3.0 feet.
	180.0							
10								
	175.0							
15								
	170.0							
20								
	165.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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PROBE LOG

HP-4
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 189 ft. (see note 1) **TOTAL DEPTH:** 2.5 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 0.5 ft. / El. 188.5 ft.
AT END OF DRILLING: -
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
0		0	G1		1	Forest Mat	0.5 ▽ 188.5	G1 - Forest Mat
		0.5	G2		2	Swamp Deposits		G2 - Silty SAND with GRAVEL (SM), fine to medium, 25-30% fines, 25-30% fine to coarse rounded to subrounded gravel, brown to black, wet
		1.5	G3		3		2.5	G3 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, rounded to subrounded, 5-10% fines, 30-35% medium to coarse sand, light brown, wet
								REMARK 1: Refusal at depth 2.5' on possible cobbles or boulder.
								REMARK 2: Cobbles and boulders are observable at ground surface elevation.
								REMARK 3: Performed an additional hand probe: HP-4A. Encountered refusal at depth 1.0' on possible cobbles or boulder.
	185.0							Bottom of borehole at 2.5 feet.
5								
	180.0							
10								
	175.0							
15								
	170.0							
20								
	165.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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PROBE LOG

HP-5
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/31/22 **DATE COMPLETED:** 3/31/22
BORING LOCATION: Eastern of Washington st at the bottom of the slope
COORDINATES: NA
SURFACE El.: 206 ft. (see note 1) **TOTAL DEPTH:** 3 ft.
WEATHER: 40's / Partly cloudy
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: NA
DRILLING FOREMAN:
DRILLING METHOD:
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.:
GEOPROBE LINER DIA.: NA
LOGGED BY: LB / HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	205.0	0	G1			Forest Mat	1.0	G1 - Forest Mat
		1	G2			Swamp Deposits	205.0	G2 - Silty SAND (SM), fine to medium, ~15% fines, 10-15% fine to coarse subrounded gravel, trace of roots, brown, moist
		2	G3		1			G3 - Silty SAND Gravel (SM), fine to coarse, 15-20% fines, ~30% fine to coarse subrounded gravel, ~10% cobbles about 4" in diameter, trace of roots, brown, moist
					2		3.0	REMARK 1: Refusal at depth 3.0' on possible cobbles or boulder.
								REMARK 2: Performed an additional hand probe: HP-5A. Encountered refusal at depth 1.0' on possible cobbles or boulder.
5	200.0							Bottom of borehole at 3.0 feet.
10	195.0							
15	190.0							
20	185.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

APPENDIX C – Test Pit Logs and Foundation Sketches

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TEST PIT LOG

TP-1
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/25/22 **DATE COMPLETED:** 3/25/22
TEST PIT LOCATION: Near retaining wall on SB side of Washington St
COORDINATES: NA
SURFACE EL.: 232 ft. (see note 1) **TOTAL DEPTH:** 6 ft.
GROUNDWATER LEVELS:
▽ **DURING EXCAVATION:** Not encountered
▼ **AT END OF EXCAVATION:** Not encountered

EXCAVATION SUBCONTRACTOR: Northern Drill Service, Inc.
EXCAVATION FOREMAN: Justin Steven
EXCAVATOR TYPE/MODEL: Kubota KX 080-4
WEATHER: 40's / Cloudy
TEST PIT DIMENSIONS: 9.0' x 5.0'
LOGGED BY: OL **CHECKED BY:** HO

Depth (ft)	El. (ft)	Excavation Effort	Remark	Strata	Depth El.(ft.)	Material Description
0	230.0	E		Fill	4.3 / 227.7	0 ft. - 4.3 ft.: Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 15-20% coarse subangular gravel, trace of roots, trace of organic soil, brown, moist
2.5						
	227.5	M	1 2	Sand and Gravel	6.0	4.3 ft. - 6 ft.: Well Graded SAND with Gravel (SW), fine to coarse, ~5% fines, 30-35% fine to coarse subrounded gravel, up to 15% cobbles up to 8", trace of roots, light brown, moist REMARK 1: Excavator scraping on potential boulder. LGCI representative confirmed the presence of a boulder in the test pit. REMARK 2: Test pit terminated due to side wall collapse.
5.0						Bottom of test pit at 6.0 feet. Test pit backfilled with excavated material and tamped in 18-inch lifts with excavator bucket.

GENERAL COMMENTS: **E = Easy, M - Moderate, D = Difficult, V = Very Difficult**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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TEST PIT LOG

TP-2
PAGE 1 OF 1

CLIENT: Nitsch Engineering, Inc.
PROJECT NAME: Prop. Mast Arms, Reinforced Slope, and Retaining Wall
LGCI PROJECT NUMBER: 2139
PROJECT LOCATION: Stoughton, MA

DATE STARTED: 3/25/22 **DATE COMPLETED:** 3/25/22
TEST PIT LOCATION: Near retaining wall on SB side of Washington St
COORDINATES: NA
SURFACE EL.: 237 ft. (see note 1) **TOTAL DEPTH:** 5.5 ft.
GROUNDWATER LEVELS:
DURING EXCAVATION: Not encountered
AT END OF EXCAVATION: Not encountered

EXCAVATION SUBCONTRACTOR: Northern Drill Service, Inc.
EXCAVATION FOREMAN: Justin Steven
EXCAVATOR TYPE/MODEL: Kubota KX 080-4
WEATHER: 40's / Cloudy
TEST PIT DIMENSIONS: 10.0' x 4.0'
LOGGED BY: OL **CHECKED BY:** HO

Depth (ft)	El. (ft)	Excavation Effort	Remark	Strata	Depth El.(ft.)	Material Description
		E		Topsoil	1.0	0 ft. - 1 ft.: Topsoil
	235.0	E		Fill	236.0 2.5	1 ft. - 2.5 ft.: Well Graded SAND (SW), fine to coarse, ~5% fines, 5-10% coarse subrounded gravel, brown, moist
2.5	232.5	E		Sand and Gravel	234.5 5.5	2.5 ft. - 5.5 ft.: Poorly Graded SAND with Gravel (SP), medium to coarse, ~5% fines, 25-30% fine to coarse subrounded gravel, trace of cobbles up to 8", brown, moist
5.0						Bottom of test pit at 5.5 feet. Test pit backfilled with excavated material and tamped in 18-inch lifts with excavator bucket.

GENERAL COMMENTS: **E = Easy, M - Moderate, D = Difficult, V = Very Difficult**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Stoughton, Washington Street (Route138), Soil Boring & Test Pit location Plan, Sheet No. 1 to 5," prepared by Nitsch Engineering, Inc., plotted on February 22, 2022, and provided to LGCI by Nitsch Engineering, Inc. via e-mail on February 23, 2022.

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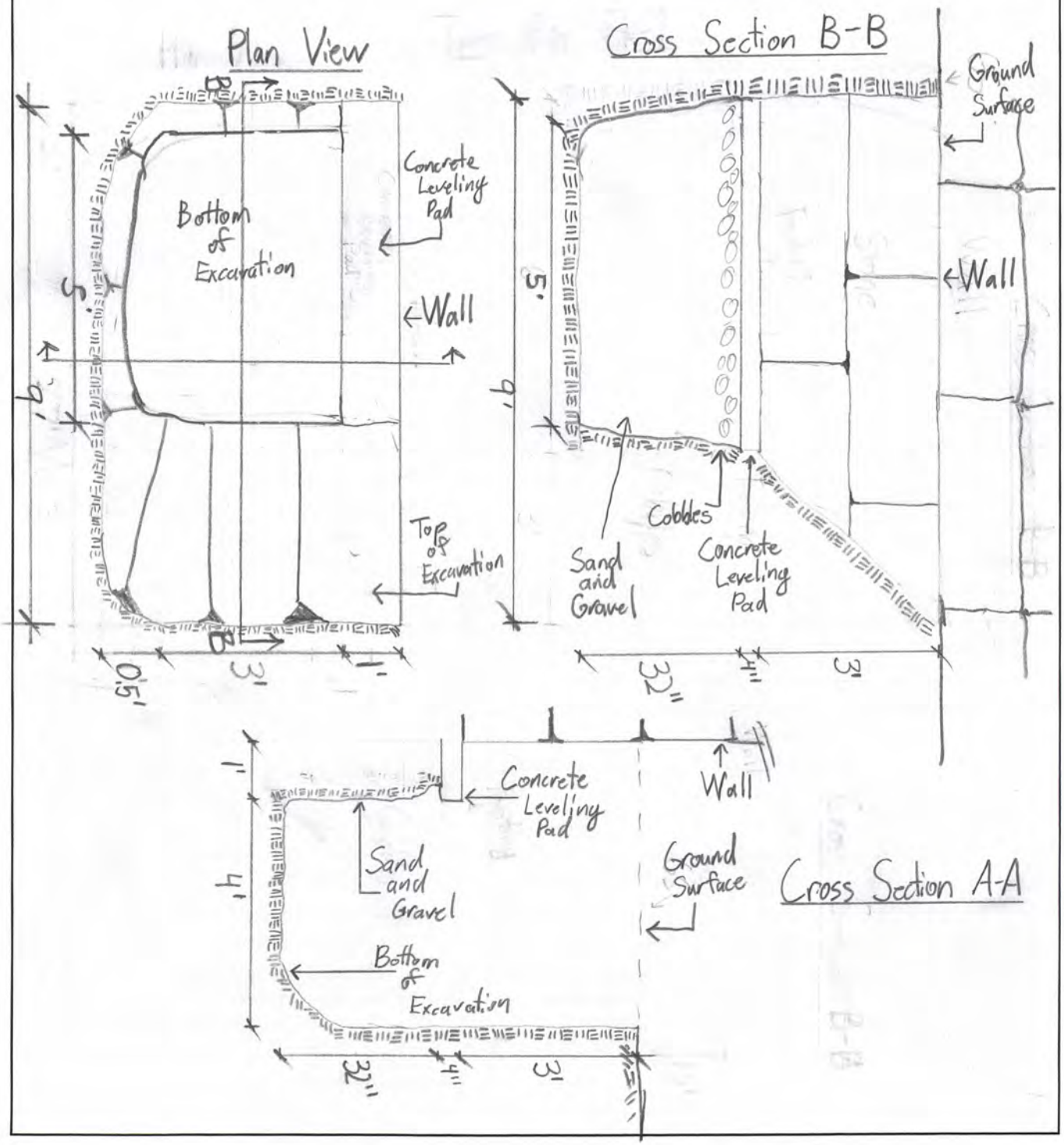
Phone: (978) 330-5912
Fax: (978) 330-5056
E-mail: LGCI@lgcinc.net

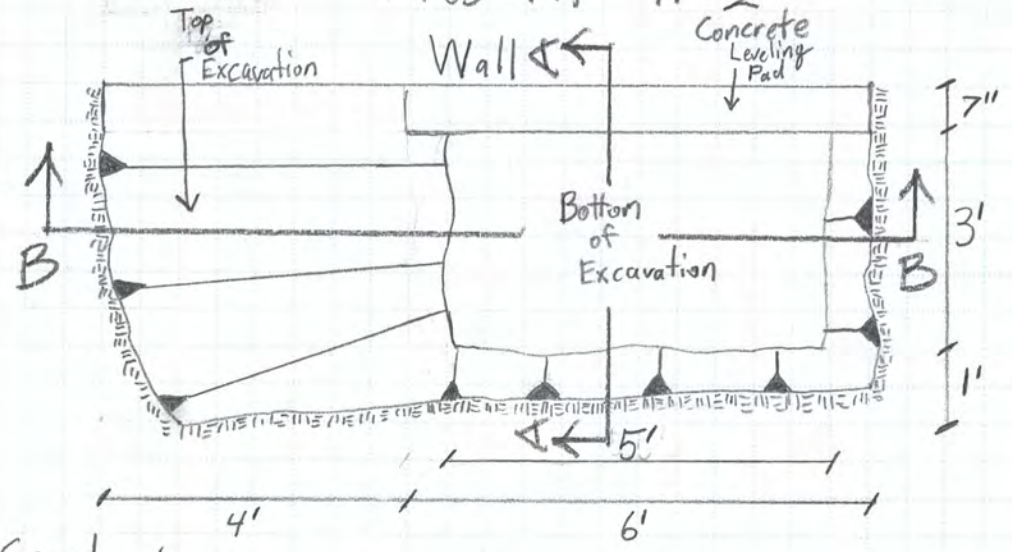
Project Name: Prop. Mast Arms, Reinforced Slope, Retaining Wall Stoughton, MA
LGCI Project No.: 2139
Prepared by: OIL
Date: 3/31/22
Checked by: OML
Date: 4/13/22
Purpose: Test Pit TP-1



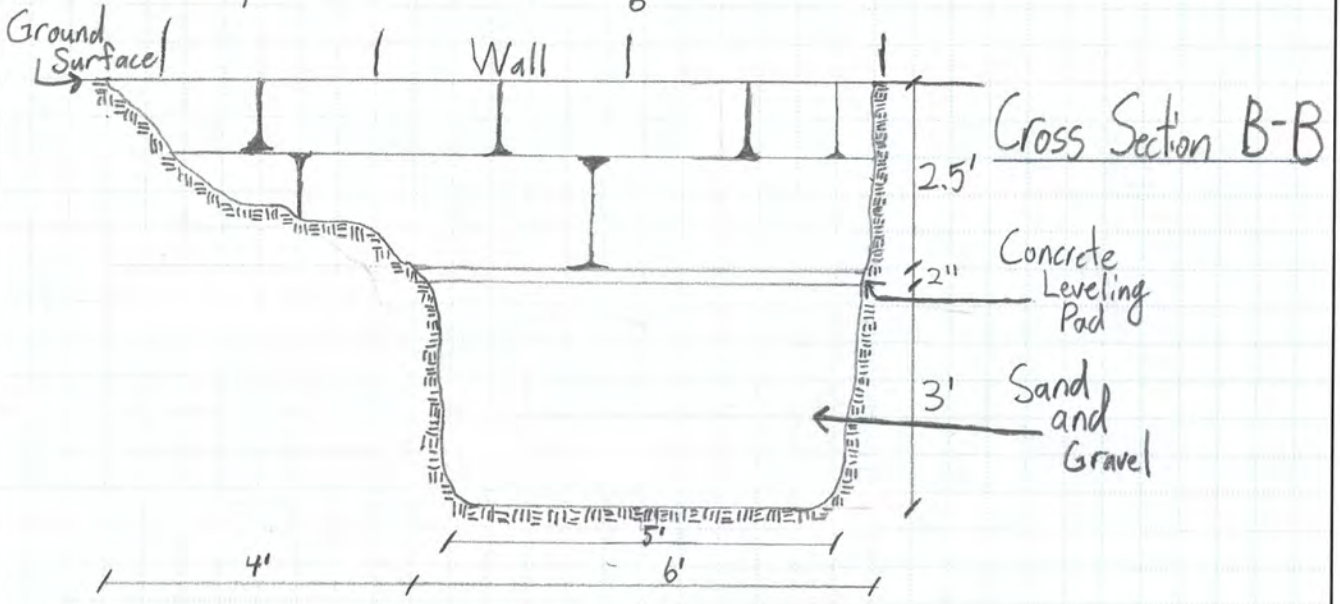
LGCI Proposal No.: 2139
Prepared by: OIL
Date: 4/1/22

Project Name: Prop. Mast Arms, Reinforced Slope, Retaining Wall
Project Location: Stoughton, MA

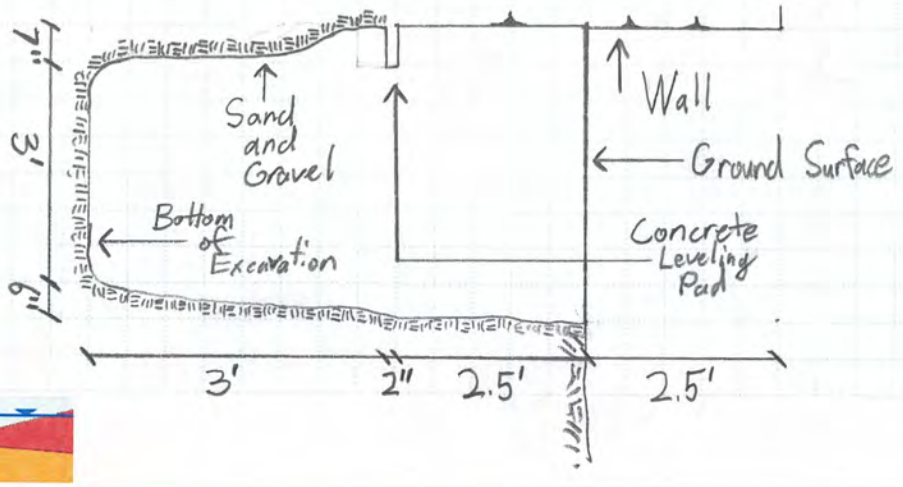
Test Pit TP-2



Plan View



Cross Section B-B



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DOCUMENT A00893

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
NO EFFECT

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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: December 29, 2023
Project code: 2024-0031072
Project Name: 613358 STOUGHTON- CORRIDOR IMPROVEMENTS ON ROUTE 138, FROM CANTON T.L. TO CHARLES AVENUE (PHASE 2)

Subject: Consistency letter for the '613358 STOUGHTON- CORRIDOR IMPROVEMENTS ON ROUTE 138, FROM CANTON T.L. TO CHARLES AVENUE (PHASE 2)' 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 December 29, 2023 to verify that the **613358 STOUGHTON- CORRIDOR IMPROVEMENTS ON ROUTE 138, FROM CANTON T.L. TO CHARLES AVENUE (PHASE 2)** (Proposed Action) may rely on the amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion Opinion (dated March 23, 2023) for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (PBO) to satisfy requirements under section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 *et seq.*).

Based on the information you provided (Project Description shown below), you have determined that the Proposed Action will have no effect on the endangered Indiana bat (*Myotis sodalis*) or the endangered northern long-eared bat (*Myotis septentrionalis*). If the Proposed Action is not modified, **no consultation is required for these two species.** If the Proposed Action is modified, or new information reveals that it may affect the Indiana bat and/or northern long-eared bat in a manner or to an extent not considered in the PBO, further review to conclude the requirements of ESA section 7(a)(2) may be required.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities:
If your initial bridge/culvert or structure assessment failed to detect Indiana bats and/or NLEBs use or occupancy, yet later detected prior to, or during construction, please submit the Post Assessment Discovery of Bats at Bridge/Culvert or Structure Form (User Guide Appendix E) to this Service Office within 2 working days of the incident. In these instances, potential incidental

take of Indiana bats and/or NLEBs may be exempted provided that the take is reported to the Service.

If the Proposed Action may affect any other federally-listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Office is required. If the proposed action has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency accordingly.

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Candidate

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

613358 STOUGHTON- CORRIDOR IMPROVEMENTS ON ROUTE 138, FROM CANTON T.L. TO CHARLES AVENUE (PHASE 2)

DESCRIPTION

613358 STOUGHTON- CORRIDOR IMPROVEMENTS ON ROUTE 138, FROM CANTON T.L. TO CHARLES AVENUE (PHASE 2)

The project will include mill and overlay, new and reconstructed sidewalks on one side between Canton TL and York Street; south of York Street sidewalks on both sides, buffered bike lanes, ADA compliant curb ramps, and signs and pavement markings.

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/@42.1434728,-71.10367713532736,14z

DETERMINATION KEY RESULT

Based on the information you provided, you have determined that the Proposed Action will have no effect on the endangered Indiana bat and/or the endangered northern long-eared bat. Therefore, no consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required for these two species.

QUALIFICATION INTERVIEW

1. Is the project within the range of the Indiana bat[1]?

   [1] See Indiana bat species profile

   Automatically answered
   No

2. Is the project within the range of the northern long-eared bat[1]?

   [1] See northern long-eared bat species profile

   Automatically answered
   Yes

3. [Semantic] Does your proposed action intersect an area where Indiana bats and northern long-eared bats are not likely to occur?

   Automatically answered
   Yes

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING NLEB OR INDIANA BAT

This key was last updated in IPaC on October 30, 2023. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) for the endangered **Indiana bat** (*Myotis sodalis*) and the endangered **northern long-eared bat** (NLEB) (*Myotis septentrionalis*).

This decision key should only be used to verify project applicability with the Service's amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion (dated March 23, 2023) for Transportation Projects. The programmatic biological opinion covers limited transportation activities that may affect either bat species, and addresses situations that are both likely and not likely to adversely affect either bat species. This decision key will assist in identifying the effect of a specific project/activity and applicability of the programmatic consultation. The programmatic biological opinion is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic biological opinion, or that may affect ESA-listed species other than the Indiana bat or NLEB, or any designated critical habitat, may require additional ESA Section 7 consultation.

IPAC USER CONTACT INFORMATION

Agency: Massachusetts Department of Transportation
Name: Trevor Burns
Address: 10 Park Plaza
City: Boston
State: MA
Zip: 02116
Email trevor.b.burns@dot.state.ma.us
Phone: 8573010759

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

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DOCUMENT B00420

PROPOSAL

STOUGHTON

For: **Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)**

COMMONWEALTH OF MASSACHUSETTS

LOCATION

The work referred to herein is in the Town of STOUGHTON in Norfolk 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 138 (Washington Street)

Beginning – Station 11+45.00 +/-
Ending –Station 38+10.00 +/-

York Street

Beginning – Station 502+65.00 +/-

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 **1179 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 # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
101.	2	CLEARING AND GRUBBING AT _____ PER ACRE		
102.2	1	TREE TRIMMING AT _____ LUMP SUM		
102.3	40	HERBICIDE TREATMENT OF INVASIVE PLANTS AT _____ PER HOUR		
102.33	16	INVASIVE PLANT MANAGEMENT STRATEGY AT _____ PER HOUR		
102.511	6	TREE PROTECTION - ARMORING AND PRUNING AT _____ EACH		
102.521	340	TREE AND PLANT PROTECTION FENCE AT _____ PER FOOT		
102.55	40	ARBORIST AT _____ PER HOUR		
103.	10	TREE REMOVED - DIAMETER UNDER 24 INCHES AT _____ EACH		
104.	3	TREE REMOVED - DIAMETER 24 INCHES AND OVER AT _____ EACH		

Project # 613358 Contract # 129897				
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
107.48	60	PREFORMED JOINT FILLER AT _____ PER FOOT		
120.	6,900	EARTH EXCAVATION AT _____ PER CUBIC YARD		
121.	750	CLASS A ROCK EXCAVATION AT _____ PER CUBIC YARD		
127.1	475	REINFORCED CONCRETE EXCAVATION AT _____ PER CUBIC YARD		
141.	580	CLASS A TRENCH EXCAVATION AT _____ PER CUBIC YARD		
141.1	200	TEST PIT FOR EXPLORATION AT _____ PER CUBIC YARD		
142.	620	CLASS B TRENCH EXCAVATION AT _____ PER CUBIC YARD		
144.	90	CLASS B ROCK EXCAVATION AT _____ PER CUBIC YARD		
146.	6	DRAINAGE STRUCTURE REMOVED AT _____ EACH		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
150.	400	ORDINARY BORROW AT _____ PER CUBIC YARD		
151.	3,200	GRAVEL BORROW AT _____ PER CUBIC YARD		
151.2	1,200	GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AT _____ PER CUBIC YARD		
153.	20	CONTROLLED DENSITY FILL - EXCAVATABLE AT _____ PER CUBIC YARD		
153.5	100	FLUIDIZED THERMAL BACKFILL AT _____ PER CUBIC YARD		
156.	1,200	CRUSHED STONE AT _____ PER TON		
170.	8,700	FINE GRADING AND COMPACTING - SUBGRADE AREA AT _____ PER SQUARE YARD		
180.01	1	ENVIRONMENTAL HEALTH AND SAFETY PROGRAM AT _____ LUMP SUM		
180.02	40	PERSONAL PROTECTION LEVEL C UPGRADE AT _____ PER HOUR		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
180.03	40	LICENSED SITE PROFESSIONAL SERVICES AT _____ PER HOUR		
181.11	6,750	DISPOSAL OF UNREGULATED SOIL AT _____ PER TON		
181.12	900	DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY AT _____ PER TON		
181.13	900	DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY AT _____ PER TON		
181.14	450	DISPOSAL OF HAZARDOUS WASTE AT _____ PER TON		
182.1	1	INSPECTION AND TESTING FOR ASBESTOS AT _____ LUMP SUM		
182.2	100	REMOVAL OF ASBESTOS AT _____ PER FOOT		
195.	1	GROUND MONITORING SURVEY AT _____ LUMP SUM		
201.	17	CATCH BASIN AT _____ EACH		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
202.	11	MANHOLE AT _____ EACH		
204.11	2	GUTTER INLET - SPECIAL AT _____ EACH		
220.	100	DRAINAGE STRUCTURE ADJUSTED AT _____ EACH		
220.2	10	DRAINAGE STRUCTURE REBUILT AT _____ PER FOOT		
220.5	5	DRAINAGE STRUCTURE REMODELED AT _____ EACH		
220.7	16	SANITARY STRUCTURE ADJUSTED AT _____ EACH		
221.1	27	FRAME AND COVER - SECURED AT _____ EACH		
222.1	26	FRAME AND GRATE - MASSDOT CASCADE TYPE AT _____ EACH		
223.2	24	FRAME AND GRATE (OR COVER) REMOVED AND DISCARDED AT _____ EACH		

Project # 613358 Contract # 129897				
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
224.12	3	12 INCH HOOD AT _____ EACH		
227.3	20	REMOVAL OF DRAINAGE STRUCTURE SEDIMENT AT _____ PER CUBIC YARD		
227.31	250	REMOVAL OF DRAINAGE PIPE SEDIMENT AT _____ PER FOOT		
227.4	10	MASONRY PLUG AT _____ PER SQUARE FOOT		
238.12	150	12 INCH DUCTILE IRON PIPE AT _____ PER FOOT		
241.12	1,330	12 INCH REINFORCED CONCRETE PIPE CLASS III AT _____ PER FOOT		
241.15	30	15 INCH REINFORCED CONCRETE PIPE CLASS III AT _____ PER FOOT		
242.12	3	12 INCH REINFORCED CONCRETE PIPE FLARED END AT _____ EACH		
242.15	1	15 INCH REINFORCED CONCRETE PIPE FLARED END AT _____ EACH		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
258.	70	STONE FOR PIPE ENDS AT _____ PER SQUARE YARD		
281.6	10	CEMENT CONCRETE PAVERS (WATERWAY) AT _____ PER SQUARE YARD		
303.06	50	6 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT) AT _____ PER FOOT		
303.12	20	12 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT) AT _____ PER FOOT		
309.	1,000	DUCTILE IRON FITTINGS FOR WATER PIPE AT _____ PER POUND		
357.06	4	6 INCH GATE BOX AT _____ EACH		
357.12	2	12 INCH GATE BOX AT _____ EACH		
358.	26	GATE BOX ADJUSTED AT _____ EACH		
358.1	3	GATE BOX REMOVED AND STACKED AT _____ EACH		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
376.1	1	HYDRANT - EXCLUDING COST OF HYDRANT AT _____ EACH		
376.3	1	HYDRANT - REMOVED AND STACKED AT _____ EACH		
381.	5	SERVICE BOX AT _____ EACH		
381.3	5	SERVICE BOX ADJUSTED AT _____ EACH		
384.	5	CURB STOP AT _____ EACH		
402.	580	DENSE GRADED CRUSHED STONE FOR SUB-BASE AT _____ PER CUBIC YARD		
415.1	8,600	PAVEMENT STANDARD MILLING AT _____ PER SQUARE YARD		
431.	320	HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE AT _____ PER SQUARE YARD		
440.	11,000	CALCIUM CHLORIDE FOR ROADWAY DUST CONTROL AT _____ PER POUND		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
443.	11	WATER FOR ROADWAY DUST CONTROL AT _____ PER 1000 GALLONS		
450.42	1,300	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5) AT _____ PER TON		
450.52	200	SUPERPAVE LEVELING COURSE - 9.5 (SLC - 9.5) AT _____ PER TON		
450.80	2,450	ASPHALT RUBBER GAP GRADED - 12.5 (ARGG - 12.5) AT _____ PER TON		
451.	350	HMA FOR PATCHING AT _____ PER TON		
452.	2,300	ASPHALT EMULSION FOR TACK COAT AT _____ PER GALLON		
453.	8,300	HMA JOINT ADHESIVE AT _____ PER FOOT		
472.	200	TEMPORARY ASPHALT PATCHING AT _____ PER TON		
477.2	3,000	MILLED RUMBLE STRIP (TYPE C) AT _____ PER FOOT		

Project # 613358 Contract # 129897				
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
482.4	30	SAWCUTTING PORTLAND CEMENT CONCRETE AT _____ PER FOOT		
482.5	2,600	SAWCUTTING ASPHALT PAVEMENT FOR BOX WIDENING AT _____ PER FOOT		
506.	3,700	GRANITE CURB TYPE VB - STRAIGHT AT _____ PER FOOT		
506.1	360	GRANITE CURB TYPE VB - CURVED AT _____ PER FOOT		
509.	220	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - STRAIGHT AT _____ PER FOOT		
509.1	100	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - CURVED AT _____ PER FOOT		
514.	24	GRANITE CURB INLET - STRAIGHT AT _____ EACH		
580.	800	CURB REMOVED AND RESET AT _____ PER FOOT		
594.	800	CURB REMOVED AND DISCARDED AT _____ PER FOOT		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
595.	6	CURB INLET REMOVED AND DISCARDED AT _____ EACH		
620.12	200	GUARDRAIL, TL-2 (SINGLE FACED) AT _____ PER FOOT		
620.13	900	GUARDRAIL, TL-3 (SINGLE FACED) AT _____ PER FOOT		
627.1	3	TRAILING ANCHORAGE AT _____ EACH		
627.82	1	GUARDRAIL TANGENT END TREATMENT, TL-2 AT _____ EACH		
627.83	3	GUARDRAIL TANGENT END TREATMENT, TL-3 AT _____ EACH		
628.22	1	TRANSITION TO RIGID BARRIER (SINGLE FACED) AT _____ EACH		
628.304	1	TEMPORARY IMPACT ATTENUATOR, NON-REDIRECTIVE, TL-2 AT _____ EACH		
628.305	2	TEMPORARY IMPACT ATTENUATOR, NON-REDIRECTIVE, TL-3 AT _____ EACH		

Project # 613358 Contract # 129897				
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
628.313	1	PERMANENT IMPACT ATTENUATOR, REDIRECTIVE, TL-3 AT _____ EACH		
629.1	130	PRECAST CONCRETE BARRIER - SINGLE FACED AT _____ PER FOOT		
630.2	900	HIGHWAY GUARD REMOVED AND DISCARDED AT _____ PER FOOT		
632.3	2	INDIVIDUAL POST REMOVED AND STACKED AT _____ EACH		
645.148	500	48 INCH CHAIN LINK FENCE (PIPE TOP RAIL) VINYL COATED (LINE POST OPTION) AT _____ PER FOOT		
652.048	6	48 INCH CHAIN LINK FENCE END POST AT _____ EACH		
660.	100	METAL PIPE RAIL AT _____ PER FOOT		
672.	2	FENCE GATE AND GATE POSTS REMOVED AND RESET AT _____ EACH		
693.	300	STONE WALL REMOVED AND STACKED AT _____ PER FOOT		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
697.1	40	SILT SACK AT _____ EACH		
698.3	1,800	GEOTEXTILE FABRIC FOR SEPARATION AT _____ PER SQUARE YARD		
701.	50	CEMENT CONCRETE SIDEWALK AT _____ PER SQUARE YARD		
701.2	110	CEMENT CONCRETE PEDESTRIAN CURB RAMP AT _____ PER SQUARE YARD		
702.	620	HOT MIX ASPHALT SIDEWALK OR DRIVEWAY AT _____ PER TON		
705.2	20	PAVERS REMOVED AND STACKED AT _____ PER SQUARE YARD		
710.3	17	BOUND - LETTERED GRANITE AT _____ EACH		
710.4	4	BOUND - PLAIN GRANITE AT _____ EACH		
711.	5	BOUND REMOVED AND RESET AT _____ EACH		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
715.	5	RURAL MAIL BOX REMOVED AND RESET AT _____ EACH		
722.3	1	SCHEDULE OF OPERATIONS (TYPE C) - FIXED PRICE $60000 AT Sixty Thousand Dollars LUMP SUM	$60,000.00	$60,000.00
740.	40	ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) AT _____ PER MONTH		
748.	1	MOBILIZATION AT _____ LUMP SUM		
751.1	550	LOAM FOR LAWNS AT _____ PER CUBIC YARD		
751.7	240	COMPOST BLANKET AT _____ PER CUBIC YARD		
755.35	1	INLAND WETLAND REPLICATION AREA AT _____ LUMP SUM		
755.45	40	WETLAND RESTORATION AT _____ PER SQUARE YARD		
755.75	160	WETLAND SPECIALIST AT _____ PER HOUR		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
755.76	1	WETLANDS MONITORING REPORTS AT _____ LUMP SUM		
756.	1	NPDES STORMWATER POLLUTION PREVENTION PLAN AT _____ LUMP SUM		
765.	3,800	SEEDING AT _____ PER SQUARE YARD		
767.121	2,041	SEDIMENT CONTROL BARRIER AT _____ PER FOOT		
767.6	110	AGED PINE BARK MULCH AT _____ PER CUBIC YARD		
767.9	1,500	JUTE MESH AT _____ PER SQUARE YARD		
769.	1,400	PAVEMENT MILLING MULCH UNDER GUARD RAIL AT _____ PER FOOT		
784.101	5	TREE - CONTINGENCY AT _____ EACH		
801.32	430	3 INCH ELECTRICAL CONDUIT - TYPE NM (DOUBLE) AT _____ PER FOOT		

Project # 613358 Contract # 129897				
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
804.3	1,850	3 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC -(UL) AT _____ PER FOOT		
811.22	8	ELECTRIC HANDHOLE - SD2.022 AT _____ EACH		
811.31	6	PULL BOX 12 X 12 INCHES - SD2.031 AT _____ EACH		
815.1	1	TRAFFIC CONTROL SIGNAL LOCATION NO. 1 AT _____ LUMP SUM		
832.	170	WARNING-REGULATORY AND ROUTE MARKER - ALUMINUM PANEL (TYPE A) AT _____ PER SQUARE FOOT		
847.1	30	SIGN SUP (N/GUIDE)+RTE MKR W/1 BRKWAY POST ASSEMBLY - STEEL AT _____ EACH		
850.41	960	ROADWAY FLAGGER AT _____ PER HOUR		
851.1	120	TRAFFIC CONES FOR TRAFFIC MANAGEMENT AT _____ PER DAY		
852.	800	SAFETY SIGNING FOR TRAFFIC MANAGEMENT AT _____ PER SQUARE FOOT		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
852.11	1,000	TEMPORARY PEDESTRIAN BARRIER AT _____ PER FOOT		
852.12	10	TEMPORARY PEDESTRIAN CURB RAMP AT _____ EACH		
853.1	10	PORTABLE BREAKAWAY BARRICADE TYPE III AT _____ EACH		
853.2	190	TEMPORARY BARRIER (TL-2) AT _____ PER FOOT		
853.23	1,000	TEMPORARY BARRIER (TL-3) AT _____ PER FOOT		
853.403	1,600	TRUCK MOUNTED ATTENUATOR AT _____ PER DAY		
853.8	100	TEMPORARY ILLUMINATION FOR WORK ZONE AT _____ PER DAY		
854.016	6,500	TEMPORARY PAVING MARKINGS - 6 INCH (PAINTED) AT _____ PER FOOT		
854.036	700	TEMPORARY PAVING MARKINGS - 6 INCH (TAPE) AT _____ PER FOOT		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
854.1	1,000	PAVEMENT MARKING REMOVAL AT _____ PER SQUARE FOOT		
856.	3,200	ARROW BOARD AT _____ PER DAY		
856.12	2,500	PORTABLE CHANGEABLE MESSAGE SIGN AT _____ PER DAY		
859.	240,000	REFLECTORIZED DRUM AT _____ PER DAY		
859.1	3,200	REFLECTORIZED DRUMS WITH SEQUENTIAL FLASHING WARNING LIGHTS AT _____ PER DAY		
864.02	20	PAVEMENT ARROW AND LEGENDS - TAPE AT _____ PER SQUARE FOOT		
864.04	480	PAVEMENT ARROWS AND LEGENDS REFLECTORIZED WHITE (THERMOPLASTIC) AT _____ PER SQUARE FOOT		
864.1	2,700	GREEN FRICTION SURFACE FOR BIKE LANES AT _____ PER SQUARE FOOT		
864.31	14	SLOTTED PAVEMENT MARKER ONE-WAY WHITE AT _____ EACH		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
864.35	130	SLOTTED PAVEMENT MARKER TWO-WAY YELLOW/YELLOW AT _____ EACH		
866.106	11,500	6 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) AT _____ PER FOOT		
866.112	4,200	12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) AT _____ PER FOOT		
867.106	6,300	6 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC) AT _____ PER FOOT		
867.112	200	12 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC) AT _____ PER FOOT		
874.	4	STREET NAME SIGN AT _____ EACH		
874.2	10	TRAFFIC SIGN REMOVED AND RESET AT _____ EACH		
874.7	20	MISCELLANEOUS SIGNS REMOVED AND STACKED AT _____ EACH		
874.8	5	MICELLANEOUS SIGNS REMOVED AND RESET AT _____ EACH		

Project # 613358	Contract # 129897			
Location : STOUGHTON				
Description : Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
901.	320	4000 PSI, 1.5 INCH, 565 CEMENT CONCRETE AT _____ PER CUBIC YARD		
903.	10	3000 PSI, 1.5 INCH, 470 CEMENT CONCRETE AT _____ PER CUBIC YARD		
910.1	1,315	STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED AT _____ PER POUND		
950.5	1	TEMPORARY SUPPORT OF EXCAVATION AT _____ LUMP SUM		
970.	1,850	DAMP-PROOFING AT _____ PER SQUARE FOOT		
983.31	2,850	COMPOST AND SEED OVER MODIFIED ROCKFILL SLOPE AT _____ PER SQUARE YARD		
Total Qty:	397,558			

DOCUMENT B00853

SCHEDULE OF PARTICIPATION BY DISADVANTAGED BUSINESS ENTERPRISES (DBES)

PRIME BIDDER: _____

DATE OF BID OPENING: _____ PROJECT NO.: 613358

FEDERAL AID PROJECT NO. NHP(NHS)-003S(829)

PROJECT LOCATION: STOUGHTON

Name, Address, and Phone Number(s) of DBE	Name of Activity	(a)† DBE Contractor Activity Amount *Construction Work*	(b) DBE Other Business Amount *Services, Supplies, Material*	(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.: 613358 FEDERAL AID PROJECT NO.: NHP(NHS)-003S(829)

PROJECT LOCATION: STOUGHTON

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.

_____ Date_____
DBE Company Authorized Signature

DISADVANTAGED BUSINESS ENTERPRISES (DBE) PARTICIPATION
LETTER OF INTENT
(To be completed by the DBE – Page 2 of 2)

DATE OF BID OPENING: _____

PROJECT NUMBER: 613358

FEDERAL AID PROJECT NUMBER: NHP(NHS)-003S(829)

PROJECT LOCATION: STOUGHTON

PRIME BIDDER: _____

DBE COMPANY NAME: _____

Item number if applicable	NAICS Code	Description of Activity with notations such as Services, or Brokerage, Installation Only, Material Only, or Complete	Quantity	Unit Price	Amount
			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: _____

Rev'd 9/20/19

*** END OF DOCUMENT ***

DOCUMENT B00855

DBE JOINT CHECK ARRANGEMENT APPROVAL FORM

(to be submitted by Prime Contractor)

Contract No: 129897 **Project No.** 613358 **Federal Aid No.:** NHP(NHS)-003S(829)

Location: STOUGHTON **Bid Opening Date:** _____

Project Description: Corridor Improvements on Route 138, from Canton T.L. to Charles Avenue (PHASE 2)

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 ***