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COMMONWEALTH OF MASSACHUSETTS

massDOT
Massachusetts Department of Transportation
Highway Division

CONTRACT DOCUMENTS AND SPECIAL PROVISIONS

PROPOSAL NO.	612190-134594
P.V. =	$7,378,000.00
PLANS	YES

FOR

Federal Aid Project No. HIP(NGB)-003S(963)X
Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad

in the Town of

HOLDEN

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

This Proposal to be opened and read: **TUESDAY, JUNE 30, 2026 at 2:00 P.M.**

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NOTICE TO CONTRACTORS

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

TUESDAY, JUNE 30, 2026 at 2:00 P.M. **
HOLDEN
Federal Aid Project No. HIP(NGB)-003S(963)X
Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad
****Date Subject to Change**

PROJECT VALUE = $7,378,000.00

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

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

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

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

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

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

NOTICE TO CONTRACTORS (Continued)

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

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

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

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

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

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

NOTICE TO CONTRACTORS (Continued)

PRICE ADJUSTMENTS

This Contract contains price adjustments for hot mix asphalt and Portland cement mixtures, diesel fuel, and gasoline. For reference the base prices are as follows: liquid asphalt $670.00 per ton, Portland cement $452.13 per ton, diesel fuel $4.497 per gallon, and gasoline $3.752 per gallon, and Steel Base Price Index 357.7. MassDOT posts the **Price Adjustments** on their Highway Division's website at
https://www.mass.gov/massdot-contract-price-adjustments

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

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

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

BY: Phillip Eng, Interim MassDOT Secretary
Jonathan L. Gulliver, Undersecretary and Highway Administrator
SATURDAY, MAY 30, 2026

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DOCUMENT 00210

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

July 1, 1981, updated October 2016

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(2) transactions are recorded as necessary

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

ii. to maintain accountability for assets;

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

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

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

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

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

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

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

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

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

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

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

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

<<<<<<<<<<>>>>>>>>>>

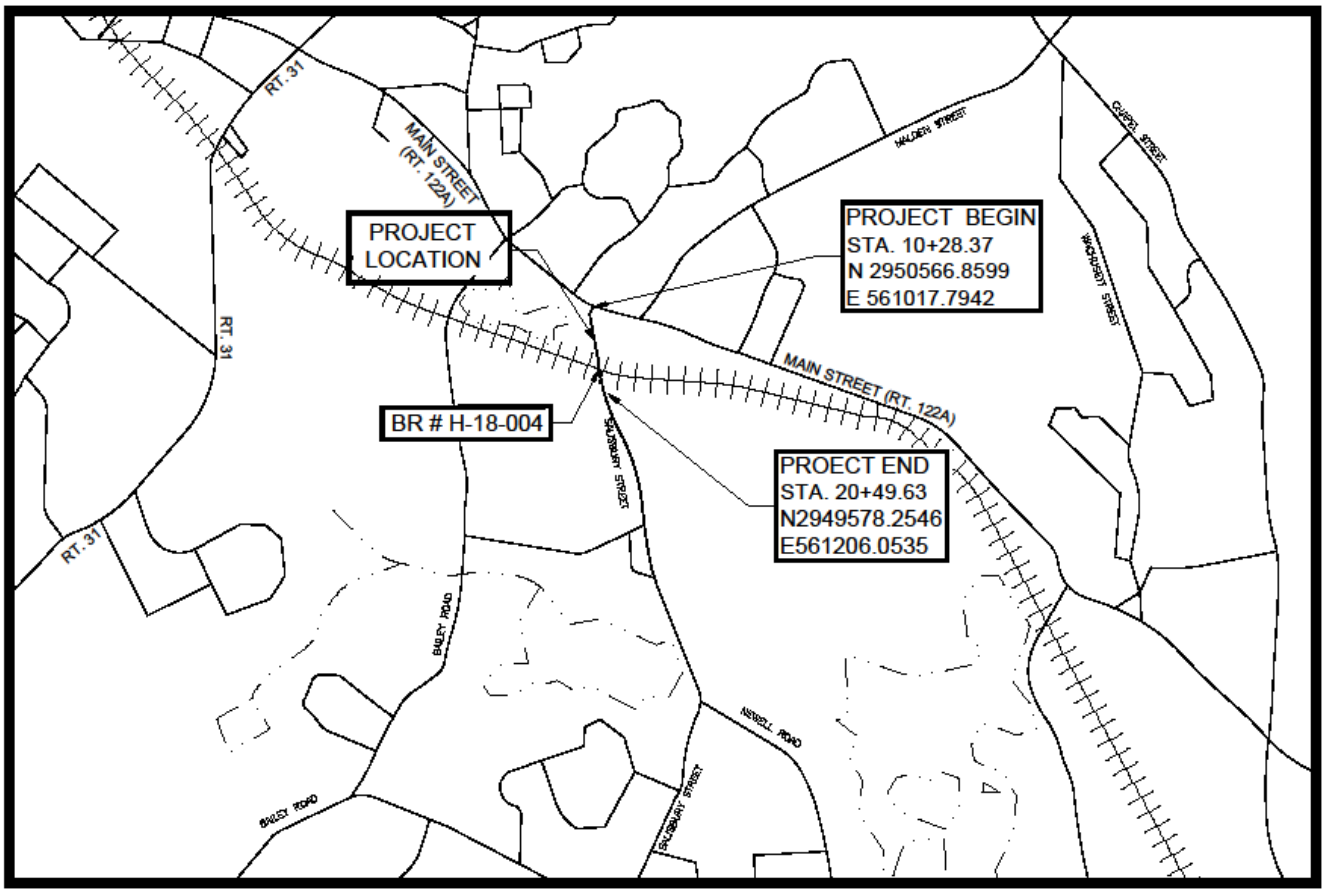
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DOCUMENT 00331

LOCUS MAP

HOLDEN
Federal Aid Project No. HIP(NGB)-003S(963)X
Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad



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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

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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: _____

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WORK NOT COMPLETED WITHIN SPECIFIED TIME: _____

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Revised: 04/28/17

*** END OF DOCUMENT ***

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

NOTICE OF AVAILABILITY

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

SPECIAL PROVISIONS FOR RIGHT-TO-KNOW ACT REQUIREMENTS

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

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

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

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

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

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

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

ALTERNATIVE DISPUTE RESOLUTION
Forum, Choice of Law and Mediations:

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

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DOCUMENT 00715

SUPPLEMENTAL SPECIFICATIONS

MARCH 31, 2026

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

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

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

DIVISION I

GENERAL REQUIREMENTS AND COVENANTS

SECTION 5.00: CONTROL OF WORK

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

DIVISION II

CONSTRUCTION DETAILS

SECTION 600: HIGHWAY GUARD, FENCES AND WALLS

SUBSECTION 628: IMPACT ATTENUATORS

Subsection 628.82: General
Replace this subsection with the following:

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

SECTION 800: TRAFFIC CONTROL DEVICES

SUBSECTION 813: WIRING, GROUNDING AND SERVICE CONNECTIONS

Subsection 813.20: Payment Items
Replace this subsection with the following:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The cement concrete foundation shall conform to the Plans and M4.02.0: Concrete Produced by Stationary and Truck Mixers, M4.03.0: Concrete Produced by Volumetric Mixers, M4.06.1: Conventional Concrete, M4.09.0:

Precast, Prestressed, and Prefabricated Concrete Products, M4.11.0: Evaporation Reducing Materials, and M4.12.0: Curing Materials, as applicable.

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

No work shall commence until Shop Drawings have been approved.

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

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

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

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

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

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

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

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

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

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

813.90	Power Pedestal	Each

DIVISION III

MATERIALS SPECIFICATIONS

SECTION M10: TRAFFIC CONTROL DEVICES

Subsection M10.03.1: Field Monitoring Unit
Add this new subsection:

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

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

M10.03.1.A: Hardware

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

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

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

M10.03.1.B: Software

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

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

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

M10.03.1.C: Wireless Connectivity

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

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

M10.03.1.D: Remote Access

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

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END OF SUPPLEMENTAL SPECIFICATIONS

DOCUMENT 00760

FHWA-1273 – Revised October 23, 2023

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

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

ATTACHMENTS

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

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under title 23, United States Code, as required in 23 CFR 633.102(b) (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services). 23 CFR 633.102(e).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider. 23 CFR 633.102(e).

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services) in accordance with 23 CFR 633.102. The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in solicitation-for-bids or request-for-proposals documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract). 23 CFR 633.102(b).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract. 23 CFR 633.102(d).

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

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

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

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

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

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

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

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

1. Equal Employment Opportunity: Equal Employment Opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (*see* 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140, shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR Part 35 and 29 CFR Part 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6. Training and Promotion:

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

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

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

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

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

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

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

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

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

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

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

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

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

10. Assurances Required:

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

b. The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:
(1) Withholding monthly progress payments;
(2) Assessing sanctions;
(3) Liquidated damages; and/or
(4) Disqualifying the contractor from future bidding as non-responsible.

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

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

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

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

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

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

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

III. NONSEGREGATED FACILITIES

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

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

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

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

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

1. Minimum wages (29 CFR 5.5)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2. Withholding (29 CFR 5.5)

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

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with paragraph

2.a. of this section or Section V, paragraph 3.a., or both, over claims to those funds by:

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

(2) A contracting agency for its 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

May 13, 2026

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

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

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

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

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

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

Base Prices and Period Prices are defined as follows:

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

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

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

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

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

Period Prices are determined as follows:

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

Example of a Period Price Calculation:

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

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

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

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

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

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

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

End of example.

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

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

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

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

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

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

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

TABLE

Steel Type		Price per Pound
1	ASTM A615/A615M Grade 60 (AASHTO M31 Grade 60 or 420) Reinforcing Steel	$0.55
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	$4.45
19	ASTM A240 Type 316 Stainless Steel	$4.45
20	ASTM A148 Grade 80/50 Steel Castings (See Note below.)	$1.53
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: 134594 **Project No.** 612190 **Federal Aid No.:** HIP(NGB)-003S(963)X

Location: HOLDEN

Project Description: Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad

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

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

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

Document #

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

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

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

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

Document #

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

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

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

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

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

PART 2

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

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

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

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

_____
(Print Name and Title)

_____
(Authorized Signature)

_____
(Date)

Rev'd 09/02/22

*** END OF DOCUMENT ***

DOCUMENT 00860

COMMONWEALTH OF MASSACHUSETTS PUBLIC EMPLOYMENT LAWS

Revised February 20, 2019

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

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

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

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

The Prevailing Wage Rate generally includes the following:

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

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

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

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

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

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

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

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

STATEMENT OF COMPLIANCE

Date: _____

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

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

_____
(Contractor or Subcontractor)

on the _____
(MassDOT Project Location and Contract Number)

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

Signature _____

Title _____

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

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

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

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

*** END OF DOCUMENT ***

DOCUMENT 00861

STATE PREVAILING WAGE RATES

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

MAURA HEALEY
Governor
KIM DRISCOLL
Lt. Governor

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

LAUREN JONES
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority:	Massachusetts Highway	**City/Town:**	HOLDEN
Contract Number:	134594		
Description of Work:	HOLDEN - Federal Aid Project No. HIP(NGB)-003S(963)X Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad		
Job Location:	Salisbury Street over G&W Railroad		

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 within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or a sub-contractor.
- Apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentices must keep their apprentice identification card on their persons during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DAS regardless of whether they are registered with another federal, state, local, or private agency must be paid the journeyworker's rate.**
- Every contractor or subcontractor working on the construction project must submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee’s name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. For a sample payroll reporting form go to http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Contractors must obtain the wage schedules from awarding authorities. Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may file a complaint with the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
(2 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	1/1/2026	$40.95	$16.17	$21.78	$0.00	$0.00	$78.90
	6/1/2026	$41.95	$16.17	$21.78	$0.00	$0.00	$79.90
	12/1/2026	$41.95	$16.17	$23.52	$0.00	$0.00	$81.64
	1/1/2027	$41.95	$16.77	$23.52	$0.00	$0.00	$82.24
(3 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	1/1/2026	$41.02	$16.17	$21.78	$0.00	$0.00	$78.97
	6/1/2026	$42.02	$16.17	$21.78	$0.00	$0.00	$79.97
	12/1/2026	$42.02	$16.17	$23.52	$0.00	$0.00	$81.71
	1/1/2027	$42.02	$16.77	$23.52	$0.00	$0.00	$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	1/1/2026	$41.14	$16.17	$21.78	$0.00	$0.00	$79.09
	6/1/2026	$42.14	$16.17	$21.78	$0.00	$0.00	$80.09
	12/1/2026	$42.14	$16.17	$23.52	$0.00	$0.00	$81.83
	1/1/2027	$42.14	$16.77	$23.52	$0.00	$0.00	$82.43
ADS/SUBMERSIBLE PILOT PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2) For apprentice rates see "Apprentice- PILE DRIVER"	8/1/2024	$117.16	$10.08	$11.62	$12.67	$0.00	$151.53
AIR TRACK OPERATOR LABORERS LABORERS - ZONE 2 For apprentice rates see "Apprentice- LABORER"	12/1/2025	$41.22	$10.65	$9.75	$9.11	$0.00	$70.73
	6/1/2026	$42.66	$10.65	$9.75	$9.11	$0.00	$72.17
	12/1/2026	$44.10	$10.65	$9.75	$9.11	$0.00	$73.61
	6/1/2027	$45.55	$10.65	$9.75	$9.11	$0.00	$75.06
	12/1/2027	$47.00	$10.65	$9.75	$9.11	$0.00	$76.51
	6/1/2028	$48.50	$10.65	$9.75	$9.11	$0.00	$78.01
	12/1/2028	$50.00	$10.65	$9.75	$9.11	$0.00	$79.51
AIR TRACK OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY) For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	12/1/2025	$41.22	$10.65	$9.75	$9.21	$0.00	$70.83
	6/1/2026	$42.66	$10.65	$9.75	$9.21	$0.00	$72.27
	12/1/2026	$44.10	$10.65	$9.75	$9.21	$0.00	$73.71
ASBESTOS WORKER (PIPES & TANKS) HEAT & FROST INSULATORS LOCAL 6 HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)	12/1/2025	$44.80	$14.50	$4.30	$6.75	$0.00	$70.35
ASPHALT RAKER LABORERS LABORERS - ZONE 2 For apprentice rates see "Apprentice- LABORER"	12/1/2025	$40.72	$10.65	$9.75	$9.11	$0.00	$70.23
	6/1/2026	$42.16	$10.65	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.60	$10.65	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$45.05	$10.65	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.50	$10.65	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$48.00	$10.65	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.50	$10.65	$9.75	$9.11	$0.00	$79.01
ASPHALT RAKER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2025	$40.72	$10.65	$9.75	$9.21	$0.00	$70.33
	6/1/2026	$42.16	$10.65	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.60	$10.65	$9.75	$9.21	$0.00	$73.21

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE	12/1/2025	$58.68	$16.55	$13.35	$3.25	$0.00	$91.83
OPERATING ENGINEERS LOCAL 4	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
BACKHOE/FRONT-END LOADER	12/1/2025	$58.68	$16.55	$13.35	$3.25	$0.00	$91.83
OPERATING ENGINEERS LOCAL 4	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
BARCO-TYPE JUMPING TAMPER	12/1/2025	$40.72	$10.65	$9.75	$9.11	$0.00	$70.23
LABORERS	6/1/2026	$42.16	$10.65	$9.75	$9.11	$0.00	$71.67
LABORERS - ZONE 2	12/1/2026	$43.60	$10.65	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$45.05	$10.65	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.50	$10.65	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$48.00	$10.65	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.50	$10.65	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
BLOCK PAVER, RAMMER / CURB SETTER	12/1/2025	$41.22	$10.65	$9.75	$9.11	$0.00	$70.73
LABORERS	6/1/2026	$42.66	$10.65	$9.75	$9.11	$0.00	$72.17
LABORERS - ZONE 2	12/1/2026	$44.10	$10.65	$9.75	$9.11	$0.00	$73.61
	6/1/2027	$45.55	$10.65	$9.75	$9.11	$0.00	$75.06
	12/1/2027	$47.00	$10.65	$9.75	$9.11	$0.00	$76.51
	6/1/2028	$48.50	$10.65	$9.75	$9.11	$0.00	$78.01
	12/1/2028	$50.00	$10.65	$9.75	$9.11	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"							
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY)	12/1/2025	$41.22	$10.65	$9.75	$9.21	$0.00	$70.83
LABORERS	6/1/2026	$42.66	$10.65	$9.75	$9.21	$0.00	$72.27
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$44.10	$10.65	$9.75	$9.21	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
BOILER MAKER	1/1/2024	$48.12	$7.07	$14.60	$6.00	$0.00	$75.79
BOILERMAKERS LOCAL 29							
BOILERMAKERS LOCAL 29							

Apprentice: BOILER MAKER

Effective Date: 1/1/2024

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	65.00	$31.28	$7.07	$9.32	$3.90	$0.00	$51.57
2	65.00	$31.28	$7.07	$9.32	$3.90	$0.00	$51.57
3	70.00	$33.68	$7.07	$10.03	$4.20	$0.00	$54.98
4	75.00	$36.09	$7.07	$10.74	$4.50	$0.00	$58.40
5	80.00	$38.50	$7.07	$11.45	$4.80	$0.00	$61.82
6	85.00	$40.90	$7.07	$12.18	$5.10	$0.00	$65.25

Construction

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

Apprentice: BOILER MAKER

Effective Date: 1/1/2024

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
7	90.00	$43.31	$7.07	$12.88	$5.40	$0.00	$68.66
8	95.00	$45.71	$7.07	$13.62	$5.70	$0.00	$72.10

Apprentice to Journeyworker Ratio: 1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 (WORCESTER)	2/1/2026	$65.81	$12.84	$15.57	$7.33	$0.00	$101.55
	8/1/2026	$68.01	$12.84	$15.57	$7.33	$0.00	$103.75
	2/1/2027	$69.41	$12.84	$15.57	$7.33	$0.00	$105.15

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

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$32.91	$12.84	$15.57	$7.33	$0.00	$68.65
2	60.00	$39.49	$12.84	$15.57	$7.33	$0.00	$75.23
3	70.00	$46.07	$12.84	$15.57	$7.33	$0.00	$81.81
4	80.00	$52.65	$12.84	$15.57	$7.33	$0.00	$88.39
5	90.00	$59.23	$12.84	$15.57	$7.33	$0.00	$94.97

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

Effective Date: 8/1/2026

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

Apprentice to Journeyworker Ratio: 1:5

BULLDOZER/GRADER/SCRAPER OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$58.02	$16.55	$13.35	$3.25	$0.00	$91.17
	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
CAISSON & UNDERPINNING BOTTOM MAN LABORERS LABORERS - FOUNDATION AND MARINE	12/1/2025	$49.10	$10.65	$9.75	$9.80	$0.00	$79.30
	6/1/2026	$50.65	$10.65	$9.75	$9.80	$0.00	$80.85
	12/1/2026	$52.15	$10.65	$9.75	$9.80	$0.00	$82.35
For apprentice rates see "Apprentice- LABORER"							
CAISSON & UNDERPINNING LABORER LABORERS	12/1/2025	$47.95	$10.65	$9.75	$9.80	$0.00	$78.15
	6/1/2026	$49.50	$10.65	$9.75	$9.80	$0.00	$79.70

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORERS - FOUNDATION AND MARINE	12/1/2026	$51.00	$10.65	$9.75	$9.80	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"							
CAISSON & UNDERPINNING TOP MAN	12/1/2025	$48.28	$10.65	$9.75	$9.80	$0.00	$78.48
LABORERS	6/1/2026	$49.83	$10.65	$9.75	$9.80	$0.00	$80.03
LABORERS - FOUNDATION AND MARINE	12/1/2026	$51.33	$10.65	$9.75	$9.80	$0.00	$81.53
For apprentice rates see "Apprentice- LABORER"							
CARBIDE CORE DRILL OPERATOR	12/1/2025	$40.72	$10.65	$9.75	$9.11	$0.00	$70.23
LABORERS	6/1/2026	$42.16	$10.65	$9.75	$9.11	$0.00	$71.67
LABORERS - ZONE 2	12/1/2026	$43.60	$10.65	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$45.05	$10.65	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.50	$10.65	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$48.00	$10.65	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.50	$10.65	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
CARPENTER	3/1/2026	$50.85	$11.08	$11.47	$8.50	$0.00	$81.90
CARPENTERS	9/1/2026	$52.10	$11.08	$11.47	$8.50	$0.00	$83.15
CARPENTERS -ZONE 2 (Eastern Massachusetts)	3/1/2027	$53.35	$11.08	$11.47	$8.50	$0.00	$84.40

Apprentice: CARPENTER

Effective Date: 3/1/2026

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

Apprentice: CARPENTER

Effective Date: 9/1/2026

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

Apprentice to Journeyworker Ratio: 1:5

Construction

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

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$16.42	$7.38	$0.00	$0.00	$0.00	$23.80
2	60.00	$16.42	$7.38	$0.00	$0.00	$0.00	$23.80
3	65.00	$17.79	$7.38	$0.00	$1.00	$0.00	$26.17
4	70.00	$19.16	$7.38	$0.00	$1.00	$0.00	$27.54
5	75.00	$20.53	$7.38	$3.80	$1.00	$0.00	$32.71
6	80.00	$21.90	$7.38	$3.80	$1.00	$0.00	$34.08
7	85.00	$23.26	$7.38	$3.80	$1.00	$0.00	$35.44
8	90.00	$24.63	$7.38	$3.80	$1.00	$0.00	$36.81

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2026

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

Apprentice to Journeyworker Ratio: 1:5

CEMENT MASONRY/PLASTERING	1/1/2026	$53.24	$13.35	$16.43	$7.78	$1.80	$92.60
PLASTERERS AND CEMENT MASONS LOCAL 534	7/1/2026	$54.49	$13.35	$16.43	$7.78	$1.80	$93.85
Plasterers and Cement Masons - Zone 1	1/1/2027	$55.94	$13.35	$16.43	$7.78	$1.80	$95.30
	7/1/2027	$57.29	$13.35	$16.43	$7.78	$1.80	$96.65
	1/1/2028	$58.64	$13.35	$16.43	$7.78	$1.80	$98.00

Apprentice: CEMENT MASONRY/PLASTERING

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$26.62	$13.35	$16.43	$0.00	$0.00	$56.40
2	60.00	$31.94	$13.35	$16.43	$7.78	$1.80	$71.30
3	65.00	$34.61	$13.35	$16.43	$7.78	$1.80	$73.97
4	70.00	$37.27	$13.35	$16.43	$7.78	$1.80	$76.63

Construction

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

Apprentice: CEMENT MASONRY/PLASTERING

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
5	75.00	$39.93	$13.35	$16.43	$7.78	$1.80	$79.29
6	80.00	$42.59	$13.35	$16.43	$7.78	$1.80	$81.95
7	90.00	$47.92	$13.35	$16.43	$0.00	$0.00	$77.70

Apprentice: CEMENT MASONRY/PLASTERING

Effective Date: 7/1/2026

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

Apprentice to Journeyworker Ratio: 1:5

CHAIN SAW OPERATOR LABORERS LABORERS - ZONE 2	12/1/2025	$40.72	$10.65	$9.75	$9.11	$0.00	$70.23
	6/1/2026	$42.16	$10.65	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.60	$10.65	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$45.05	$10.65	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.50	$10.65	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$48.00	$10.65	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.50	$10.65	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$59.88	$16.55	$13.35	$3.25	$0.00	$93.03
	6/1/2026	$60.61	$17.05	$13.35	$3.25	$0.00	$94.26
	12/1/2026	$62.09	$17.05	$13.35	$3.25	$0.00	$95.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
COMPRESSOR OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$37.37	$16.55	$13.35	$3.25	$0.00	$70.52
	6/1/2026	$37.63	$17.05	$13.35	$3.25	$0.00	$71.28
	12/1/2026	$38.58	$17.05	$13.35	$3.25	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
DELEADER (BRIDGE) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$59.56	$10.35	$12.00	$12.60	$0.00	$94.51

Construction

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

Apprentice: DELEADER (BRIDGE)

Effective Date: 1/1/2026

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

Apprentice to Journeyworker Ratio: 1:1

DEMO: ADZEMAN LABORERS LABORERS - ZONE 2	12/1/2025	$48.00	$10.65	$9.75	$9.65	$0.00	$78.05
	6/1/2026	$49.55	$10.65	$9.75	$9.65	$0.00	$79.60
	12/7/2026	$51.05	$10.65	$9.75	$9.65	$0.00	$81.10
	6/7/2027	$52.65	$10.65	$9.75	$9.65	$0.00	$82.70
	12/6/2027	$54.25	$10.65	$9.75	$9.65	$0.00	$84.30
	6/5/2028	$55.93	$10.65	$9.75	$9.65	$0.00	$85.98
	12/4/2028	$57.60	$10.65	$9.75	$9.65	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS LABORERS - ZONE 2	12/1/2025	$49.00	$10.65	$9.75	$9.65	$0.00	$79.05
	6/1/2026	$50.55	$10.65	$9.75	$9.65	$0.00	$80.60
	12/7/2026	$52.05	$10.65	$9.75	$9.65	$0.00	$82.10
	6/7/2027	$53.65	$10.65	$9.75	$9.65	$0.00	$83.70
	12/6/2027	$55.25	$10.65	$9.75	$9.65	$0.00	$85.30
	6/5/2028	$56.93	$10.65	$9.75	$9.65	$0.00	$86.98
	12/4/2028	$58.60	$10.65	$9.75	$9.65	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BURNERS LABORERS LABORERS - ZONE 2	12/1/2025	$48.75	$10.65	$9.75	$9.65	$0.00	$78.80
	6/1/2026	$50.30	$10.65	$9.75	$9.65	$0.00	$80.35
	12/7/2026	$51.80	$10.65	$9.75	$9.65	$0.00	$81.85
	6/7/2027	$53.40	$10.65	$9.75	$9.65	$0.00	$83.45
	12/6/2027	$55.00	$10.65	$9.75	$9.65	$0.00	$85.05
	6/5/2028	$56.68	$10.65	$9.75	$9.65	$0.00	$86.73
	12/4/2028	$58.35	$10.65	$9.75	$9.65	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: CONCRETE CUTTER/SAWYER LABORERS LABORERS - ZONE 2	12/1/2025	$49.00	$10.65	$9.75	$9.65	$0.00	$79.05
	6/1/2026	$50.55	$10.65	$9.75	$9.65	$0.00	$80.60
	12/7/2026	$52.05	$10.65	$9.75	$9.65	$0.00	$82.10
	6/7/2027	$53.65	$10.65	$9.75	$9.65	$0.00	$83.70
	12/6/2027	$55.25	$10.65	$9.75	$9.65	$0.00	$85.30
	6/5/2028	$56.93	$10.65	$9.75	$9.65	$0.00	$86.98
	12/4/2028	$58.60	$10.65	$9.75	$9.65	$0.00	$88.65

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"							
DEMO: JACKHAMMER OPERATOR LABORERS LABORERS - ZONE 2	12/1/2025	$48.75	$10.65	$9.75	$9.65	$0.00	$78.80
	6/1/2026	$50.30	$10.65	$9.75	$9.65	$0.00	$80.35
	12/7/2026	$51.80	$10.65	$9.75	$9.65	$0.00	$81.85
	6/7/2027	$53.40	$10.65	$9.75	$9.65	$0.00	$83.45
	12/6/2027	$55.00	$10.65	$9.75	$9.65	$0.00	$85.05
	6/5/2028	$56.68	$10.65	$9.75	$9.65	$0.00	$86.73
	12/4/2028	$58.35	$10.65	$9.75	$9.65	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: WRECKING LABORER LABORERS LABORERS - ZONE 2	12/1/2025	$48.00	$10.65	$9.75	$9.65	$0.00	$78.05
	6/1/2026	$49.55	$10.65	$9.75	$9.65	$0.00	$79.60
	12/7/2026	$51.05	$10.65	$9.75	$9.65	$0.00	$81.10
	6/7/2027	$52.65	$10.65	$9.75	$9.65	$0.00	$82.70
	12/6/2027	$54.25	$10.65	$9.75	$9.65	$0.00	$84.30
	6/5/2028	$55.93	$10.65	$9.75	$9.65	$0.00	$85.98
	12/4/2028	$57.60	$10.65	$9.75	$9.65	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"							
DIRECTIONAL DRILL MACHINE OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$58.02	$16.55	$13.35	$3.25	$0.00	$91.17
	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
DIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2)	8/1/2024	$78.11	$10.08	$11.62	$12.67	$0.00	$112.48
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Diver wage 70/80/90 2A $69.83, 3A $91.79,4A $102.14 Total Rate							
DIVER TENDER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2)	8/1/2024	$51.97	$10.08	$11.62	$12.67	$0.00	$86.34
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Piledriver wage 70/80/90 2A $54.20, 3A $73.93,4A $82.05 Total Rate							
DIVER TENDER (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2)	8/1/2024	$83.69	$10.08	$11.62	$12.67	$0.00	$118.06
For apprentice rates see "Apprentice- PILE DRIVER"							
DIVER/SLURRY (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2)	8/1/2024	$117.16	$10.08	$11.62	$12.67	$0.00	$151.53
For apprentice rates see "Apprentice- PILE DRIVER"							
DRAWBRIDGE OPERATOR (Construction) DRAWBRIDGE - SEIU LOCAL 888 DRAWBRIDGE - SEIU LOCAL 888	7/1/2020	$26.77	$6.67	$3.93	$0.00	$0.16	$37.53
ELECTRICIAN ELECTRICIANS LOCAL 96 ELECTRICIANS LOCAL 96	9/7/2025	$48.16	$14.98	$14.30	$5.30	$0.00	$82.74
	9/6/2026	$49.38	$15.96	$14.57	$5.43	$0.00	$85.34

Construction

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

Apprentice: ELECTRICIAN

Effective Date: 9/7/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$19.26	$14.98	$0.58	$0.00	$0.00	$34.82
2	45.00	$21.67	$14.98	$0.65	$0.00	$0.00	$37.30
3	48.00	$23.12	$14.98	$13.55	$2.54	$0.00	$54.19
4	55.00	$26.49	$14.98	$13.65	$2.92	$0.00	$58.04
5	65.00	$31.30	$14.98	$13.80	$3.45	$0.00	$63.53
6	80.00	$38.53	$14.98	$14.02	$4.24	$0.00	$71.77

Apprentice: ELECTRICIAN

Effective Date: 9/6/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$19.75	$15.96	$0.59	$0.00	$0.00	$36.30
2	45.00	$22.22	$15.96	$0.67	$0.00	$0.00	$38.85
3	48.00	$23.70	$15.96	$13.80	$2.61	$0.00	$56.07
4	55.00	$27.16	$15.96	$13.90	$2.99	$0.00	$60.01
5	65.00	$32.10	$15.96	$14.05	$3.53	$0.00	$65.64
6	80.00	$39.50	$15.96	$14.28	$4.35	$0.00	$74.09

Apprentice to Journeyworker Ratio: 2:3

Apprentice: ELEVATOR CONSTRUCTOR

Effective Date: 1/1/2026

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

Apprentice: ELEVATOR CONSTRUCTOR

Effective Date: 1/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$36.12	$16.48	$0.00	$0.00	$0.00	$52.60
2	55.00	$39.73	$16.48	$11.16	$11.00	$0.00	$78.37
3	65.00	$46.95	$16.48	$11.16	$11.00	$0.00	$85.59

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: ELEVATOR CONSTRUCTOR							
Effective Date: 1/1/2027							
Step / Percent		**Apprentice Base Wage**					
4 / 70.00		$50.56	$16.48	$11.16	$11.00	$0.00	$89.20
5 / 80.00		$57.78	$16.48	$11.16	$11.00	$0.00	$96.42
Apprentice to Journeyworker Ratio: 1:1							
ELEVATOR CONSTRUCTOR HELPER	1/1/2026	$48.46	$16.38	$11.06	$10.70	$0.00	$86.60
ELEVATOR CONSTRUCTORS LOCAL 41	1/1/2027	$50.56	$16.48	$11.16	$11.00	$0.00	$89.20
ELEVATOR CONSTRUCTORS LOCAL 41							
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"							
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY)	12/1/2025	$40.72	$10.65	$9.75	$9.21	$0.00	$70.33
LABORERS	6/1/2026	$42.16	$10.65	$9.75	$9.21	$0.00	$71.77
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$43.60	$10.65	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY	5/1/2026	$54.40	$16.55	$13.35	$3.25	$0.00	$87.55
OPERATING ENGINEERS LOCAL 4	11/1/2026	$55.69	$16.55	$13.35	$3.25	$0.00	$88.84
OPERATING ENGINEERS LOCAL 4	5/1/2027	$57.12	$16.55	$13.35	$3.25	$0.00	$90.27
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY	5/1/2026	$56.02	$16.55	$13.35	$3.25	$0.00	$89.17
OPERATING ENGINEERS LOCAL 4	11/1/2026	$57.32	$16.55	$13.35	$3.25	$0.00	$90.47
OPERATING ENGINEERS LOCAL 4	5/1/2027	$58.77	$16.55	$13.35	$3.25	$0.00	$91.92
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY	5/1/2026	$26.28	$16.55	$13.35	$3.25	$0.00	$59.43
OPERATING ENGINEERS LOCAL 4	11/1/2026	$27.04	$16.55	$13.35	$3.25	$0.00	$60.19
OPERATING ENGINEERS LOCAL 4	5/1/2027	$27.89	$16.55	$13.35	$3.25	$0.00	$61.04
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIRE ALARM INSTALLER	9/7/2025	$48.16	$14.98	$14.30	$5.30	$0.00	$82.74
ELECTRICIANS LOCAL 96	9/6/2026	$49.38	$15.96	$14.57	$5.43	$0.00	$85.34
ELECTRICIANS LOCAL 96							
For apprentice rates see "Apprentice- ELECTRICIAN"							
FIRE ALARM REPAIR / MAINT/COMMISSIONING	9/7/2025	$48.16	$14.98	$14.30	$5.30	$0.00	$82.74
ELECTRICIANS LOCAL 96	9/6/2026	$49.38	$15.96	$14.57	$5.43	$0.00	$85.34
ELECTRICIANS LOCAL 96							
For apprentice rates see "Apprentice- ELECTRICIAN"							
FIREMAN (ASST. ENGINEER)	12/1/2025	$47.09	$16.55	$13.35	$3.25	$0.00	$80.24
OPERATING ENGINEERS LOCAL 4	6/1/2026	$47.55	$17.05	$13.35	$3.25	$0.00	$81.20
OPERATING ENGINEERS LOCAL 4	12/1/2026	$48.73	$17.05	$13.35	$3.25	$0.00	$82.38
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FLAGGER & SIGNALER (HEAVY & HIGHWAY)	12/1/2025	$28.09	$10.65	$9.75	$9.21	$0.00	$57.70
LABORERS	6/1/2026	$29.21	$10.65	$9.75	$9.21	$0.00	$58.82

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$29.21	$10.65	$9.75	$9.21	$0.00	$58.82
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
FLOORCOVERER FLOORCOVERERS LOCAL 2168 FLOORCOVERERS LOCAL 2168 ZONE II	3/1/2024	$48.93	$10.33	$11.47	$8.80	$0.00	$79.53

Apprentice: FLOORCOVERER

Effective Date: 3/1/2024

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

Apprentice Notes

Steps are 750 hrs.

Apprentice to Journeyworker Ratio: 1:1

FORK LIFT/CHERRY PICKER OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$58.68	$16.55	$13.35	$3.25	$0.00	$91.83
	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
GENERATOR/LIGHTING PLANT/HEATERS OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$37.37	$16.55	$13.35	$3.25	$0.00	$70.52
	6/1/2026	$37.63	$17.05	$13.35	$3.25	$0.00	$71.28
	12/1/2026	$38.58	$17.05	$13.35	$3.25	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) GLAZIERS LOCAL 35 GLAZIERS LOCAL 35 (ZONE 2)	1/1/2026	$49.06	$10.35	$12.00	$12.60	$0.00	$84.01

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

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.53	$10.35	$0.00	$0.00	$0.00	$34.88
2	55.00	$26.98	$10.35	$0.00	$6.88	$0.00	$44.21
3	60.00	$29.44	$10.35	$0.00	$7.50	$0.00	$47.29
4	65.00	$31.89	$10.35	$0.00	$8.13	$0.00	$50.37
5	70.00	$34.34	$10.35	$12.00	$8.75	$0.00	$65.44

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
HOISTING ENGINEER/CRANES/GRADALLS OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$58.68	$16.55	$13.35	$3.25	$0.00	$91.83
	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48

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

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
6	75.00	$36.80	$10.35	$12.00	$9.38	$0.00	$68.53
7	80.00	$39.25	$10.35	$12.00	$10.00	$0.00	$71.60
8	90.00	$44.15	$10.35	$12.00	$11.25	$0.00	$77.75

Apprentice to Journeyworker Ratio: 1:1

Apprentice: HOISTING ENGINEER/CRANES/GRADALLS

Effective Date: 12/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	$32.88	$0.00	$0.00	$0.00	$0.00	$32.88
2	60.00	$35.87	$16.55	$13.35	$3.25	$0.00	$69.02
3	65.00	$38.86	$16.55	$13.35	$3.25	$0.00	$72.01
4	70.00	$41.85	$16.55	$13.35	$3.25	$0.00	$75.00
5	75.00	$44.84	$16.55	$13.35	$3.25	$0.00	$77.99
6	80.00	$47.82	$16.55	$13.35	$3.25	$0.00	$80.97
7	85.00	$50.81	$16.55	$13.35	$3.25	$0.00	$83.96
8	90.00	$53.80	$16.55	$13.35	$3.25	$0.00	$86.95

Apprentice: HOISTING ENGINEER/CRANES/GRADALLS

Effective Date: 6/1/2026

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

Apprentice to Journeyworker Ratio: 1:6

HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 63 SHEETMETAL WORKERS LOCAL 63	7/1/2025	$43.48	$12.94	$11.01	$8.72	$2.13	$78.28
	7/1/2026	$43.48	$13.24	$11.01	$9.92	$2.13	$79.78
	1/1/2027	$43.48	$13.54	$11.01	$11.12	$2.13	$81.28
	7/1/2027	$44.98	$13.54	$11.01	$11.12	$2.13	$82.78
	1/1/2028	$46.48	$13.54	$11.01	$11.12	$2.13	$84.28

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (ELECTRICAL CONTROLS)	9/7/2025	$48.16	$14.98	$14.30	$5.30	$0.00	$82.74
ELECTRICIANS LOCAL 96	9/6/2026	$49.38	$15.96	$14.57	$5.43	$0.00	$85.34
ELECTRICIANS LOCAL 96							
For apprentice rates see "Apprentice- ELECTRICIAN"							
HVAC (TESTING AND BALANCING - AIR)	7/1/2025	$43.48	$12.94	$11.01	$8.72	$2.13	$78.28
SHEETMETAL WORKERS LOCAL 63	7/1/2026	$43.48	$13.24	$11.01	$9.92	$2.13	$79.78
SHEETMETAL WORKERS LOCAL 63	1/1/2027	$43.48	$13.54	$11.01	$11.12	$2.13	$81.28
	7/1/2027	$44.98	$13.54	$11.01	$11.12	$2.13	$82.78
	1/1/2028	$46.48	$13.54	$11.01	$11.12	$2.13	$84.28
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (TESTING AND BALANCING -WATER)	3/1/2026	$55.90	$13.10	$9.71	$8.06	$0.00	$86.77
PLUMBERS LOCAL 4							
PLUMBERS LOCAL 4							
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HVAC MECHANIC	3/1/2026	$55.90	$13.10	$9.71	$8.06	$0.00	$86.77
PLUMBERS LOCAL 4							
PLUMBERS LOCAL 4							
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HYDRAULIC DRILLS	12/1/2025	$41.22	$10.65	$9.75	$9.11	$0.00	$70.73
LABORERS	6/1/2026	$42.66	$10.65	$9.75	$9.11	$0.00	$72.17
LABORERS - ZONE 2	12/1/2026	$44.10	$10.65	$9.75	$9.11	$0.00	$73.61
	6/1/2027	$45.55	$10.65	$9.75	$9.11	$0.00	$75.06
	12/1/2027	$47.00	$10.65	$9.75	$9.11	$0.00	$76.51
	6/1/2028	$48.50	$10.65	$9.75	$9.11	$0.00	$78.01
	12/1/2028	$50.00	$10.65	$9.75	$9.11	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"							
HYDRAULIC DRILLS (HEAVY & HIGHWAY)	12/1/2025	$41.22	$10.65	$9.75	$9.21	$0.00	$70.83
LABORERS	6/1/2026	$42.66	$10.65	$9.75	$9.21	$0.00	$72.27
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$44.10	$10.65	$9.75	$9.21	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
INSULATOR (PIPES & TANKS)	9/1/2025	$54.31	$14.75	$9.52	$10.09	$0.00	$88.67
HEAT & FROST INSULATORS LOCAL 6	9/1/2026	$57.38	$14.75	$9.52	$10.09	$0.00	$91.74
HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)							

Apprentice: INSULATOR (PIPES & TANKS)

Effective Date: 9/1/2025

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

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER	9/16/2025	$57.57	$9.05	$12.75	$14.50	$0.00	$93.87
IRONWORKERS LOCAL 7							
IRONWORKERS LOCAL 7 (WORCESTER AREA)							

Apprentice: INSULATOR (PIPES & TANKS)

Effective Date: 9/1/2026

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

Apprentice to Journeyworker Ratio: 1:4

Apprentice: IRONWORKER/WELDER

Effective Date: 9/16/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$34.54	$9.05	$12.75	$4.50	$0.00	$60.84
2	75.00	$43.18	$9.05	$12.75	$4.50	$0.00	$69.48
3	85.00	$48.93	$9.05	$12.75	$4.50	$0.00	$75.23

Apprentice to Journeyworker Ratio: 1:4

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
JACKHAMMER & PAVING BREAKER OPERATOR	12/1/2025	$40.72	$10.65	$9.75	$9.11	$0.00	$70.23
LABORERS	6/1/2026	$42.16	$10.65	$9.75	$9.11	$0.00	$71.67
LABORERS - ZONE 2	12/1/2026	$43.60	$10.65	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$45.05	$10.65	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.50	$10.65	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$48.00	$10.65	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.50	$10.65	$9.75	$9.11	$0.00	$79.01

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORER	12/1/2025	$40.47	$10.65	$9.75	$9.11	$0.00	$69.98
LABORERS	6/1/2026	$41.91	$10.65	$9.75	$9.11	$0.00	$71.42
LABORERS - ZONE 2	12/1/2026	$43.35	$10.65	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.80	$10.65	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.25	$10.65	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.75	$10.65	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.25	$10.65	$9.75	$9.11	$0.00	$78.76

Apprentice: LABORER

Effective Date: 12/1/2025

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

Construction

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

Apprentice: LABORER

Effective Date: 12/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.03	$10.15	$9.50	$9.11	$0.00	$53.79
2	70.00	$29.20	$10.15	$9.50	$9.11	$0.00	$57.96
3	80.00	$33.38	$10.15	$9.50	$9.11	$0.00	$62.14
4	90.00	$37.55	$10.15	$9.50	$9.11	$0.00	$66.31

Apprentice: LABORER

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.15	$10.65	$9.75	$9.11	$0.00	$54.66
2	70.00	$29.34	$10.65	$9.75	$9.11	$0.00	$58.85
3	80.00	$33.53	$10.65	$9.75	$9.11	$0.00	$63.04
4	90.00	$37.72	$10.65	$9.75	$9.11	$0.00	$67.23

Apprentice to Journeyworker Ratio: 1:5

LABORER (HEAVY & HIGHWAY)	12/1/2025	$40.47	$10.65	$9.75	$9.21	$0.00	$70.08
LABORERS	6/1/2026	$41.91	$10.65	$9.75	$9.21	$0.00	$71.52
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$43.35	$10.65	$9.75	$9.21	$0.00	$72.96

Apprentice: LABORER (HEAVY & HIGHWAY)

Effective Date: 12/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.03	$10.15	$9.50	$9.21	$0.00	$53.89
2	70.00	$29.20	$10.15	$9.50	$9.21	$0.00	$58.06
3	80.00	$33.38	$10.15	$9.50	$9.21	$0.00	$62.24
4	90.00	$37.55	$10.15	$9.50	$9.21	$0.00	$66.41

Apprentice: LABORER (HEAVY & HIGHWAY)

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.15	$10.65	$9.75	$9.21	$0.00	$54.76
2	70.00	$29.34	$10.65	$9.75	$9.21	$0.00	$58.95
3	80.00	$33.53	$10.65	$9.75	$9.21	$0.00	$63.14
4	90.00	$37.72	$10.65	$9.75	$9.10	$0.00	$67.22

Apprentice to Journeyworker Ratio: 1:5

LABORER: CARPENTER TENDER	12/1/2025	$40.47	$10.65	$9.75	$9.11	$0.00	$69.98
LABORERS	6/1/2026	$41.91	$10.65	$9.75	$9.11	$0.00	$71.42

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORERS - ZONE 2	12/1/2026	$43.35	$10.65	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.80	$10.65	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.25	$10.65	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.75	$10.65	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.25	$10.65	$9.75	$9.11	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"							
LABORER: CEMENT FINISHER TENDER	12/1/2025	$40.47	$10.65	$9.75	$9.11	$0.00	$69.98
LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.65	$9.75	$9.11	$0.00	$71.42
	12/1/2026	$43.35	$10.65	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.80	$10.65	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.25	$10.65	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.75	$10.65	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.25	$10.65	$9.75	$9.11	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"							
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER	12/1/2025	$40.56	$10.65	$9.75	$9.65	$0.00	$70.61
LABORERS LABORERS - ZONE 2	6/1/2026	$42.00	$10.65	$9.75	$9.65	$0.00	$72.05
	12/7/2026	$43.44	$10.65	$9.75	$9.65	$0.00	$73.49
	6/7/2027	$44.89	$10.65	$9.75	$9.65	$0.00	$74.94
	12/6/2027	$46.34	$10.65	$9.75	$9.65	$0.00	$76.39
	6/5/2028	$47.84	$10.65	$9.75	$9.65	$0.00	$77.89
	12/4/2028	$49.34	$10.65	$9.75	$9.65	$0.00	$79.39
For apprentice rates see "Apprentice- LABORER"							
LABORER: MASON TENDER	12/1/2025	$40.72	$10.65	$9.75	$9.11	$0.00	$70.23
LABORERS LABORERS - ZONE 2	6/1/2026	$42.16	$10.65	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.60	$10.65	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$45.05	$10.65	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.50	$10.65	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$48.00	$10.65	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.50	$10.65	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
LABORER: MASON TENDER (HEAVY & HIGHWAY)	12/1/2025	$40.72	$10.65	$9.75	$9.21	$0.00	$70.33
LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$42.16	$10.65	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.60	$10.65	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
LABORER: MULTI-TRADE TENDER	12/1/2025	$40.47	$10.65	$9.75	$9.11	$0.00	$69.98
LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.65	$9.75	$9.11	$0.00	$71.42
	12/1/2026	$43.35	$10.65	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.80	$10.65	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.25	$10.65	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.75	$10.65	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.25	$10.65	$9.75	$9.11	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"							
LABORER: TREE REMOVER	12/1/2025	$40.47	$10.65	$9.75	$9.11	$0.00	$69.98
LABORERS	6/1/2026	$41.91	$10.65	$9.75	$9.11	$0.00	$71.42

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORERS - ZONE 2	12/1/2026	$43.35	$10.65	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.80	$10.65	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.25	$10.65	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.75	$10.65	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.25	$10.65	$9.75	$9.11	$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 LABORERS - ZONE 2	12/1/2025	$40.72	$10.65	$9.75	$9.11	$0.00	$70.23
	6/1/2026	$42.16	$10.65	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.60	$10.65	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$45.05	$10.65	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.50	$10.65	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$48.00	$10.65	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.50	$10.65	$9.75	$9.11	$0.00	$79.01

For apprentice rates see "Apprentice- LABORER"

LASER BEAM OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2025	$40.72	$10.65	$9.75	$9.21	$0.00	$70.33
	6/1/2026	$42.16	$10.65	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.60	$10.65	$9.75	$9.21	$0.00	$73.21

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

MARBLE & TILE FINISHERS BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 - MARBLE & TILE	2/1/2026	$52.08	$12.84	$15.57	$5.78	$0.00	$86.27
	8/1/2026	$53.84	$12.84	$15.57	$5.78	$0.00	$88.03
	2/1/2027	$54.96	$12.84	$15.57	$5.78	$0.00	$89.15

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$26.04	$12.84	$15.57	$5.78	$0.00	$60.23
2	60.00	$31.25	$12.84	$15.57	$5.78	$0.00	$65.44
3	70.00	$36.46	$12.84	$15.57	$5.78	$0.00	$70.65
4	80.00	$41.66	$12.84	$15.57	$5.78	$0.00	$75.85
5	90.00	$46.87	$12.84	$15.57	$5.78	$0.00	$81.06

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 8/1/2026

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

Apprentice to Journeyworker Ratio: 1:5

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
MARBLE MASONS,TILELAYERS & TERRAZZO MECH	2/1/2026	$67.97	$12.84	$15.57	$7.99	$0.00	$104.37
BRICKLAYERS LOCAL 3	8/1/2026	$70.17	$12.84	$15.57	$7.99	$0.00	$106.57
BRICKLAYERS LOCAL 3 - MARBLE & TILE	2/1/2027	$71.57	$12.84	$15.57	$7.99	$0.00	$107.97

Apprentice: MARBLE MASONS,TILELAYERS & TERRAZZO MECH

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$33.99	$12.84	$15.57	$7.99	$0.00	$70.39
2	60.00	$40.78	$12.84	$15.57	$7.99	$0.00	$77.18
3	70.00	$47.58	$12.84	$15.57	$7.99	$0.00	$83.98
4	80.00	$54.38	$12.84	$15.57	$7.99	$0.00	$90.78
5	90.00	$61.17	$12.84	$15.57	$7.99	$0.00	$97.57

Apprentice: MARBLE MASONS,TILELAYERS & TERRAZZO MECH

Effective Date: 8/1/2026

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

Apprentice to Journeyworker Ratio: 1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES)	12/1/2025	$58.02	$16.55	$13.35	$3.25	$0.00	$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE	12/1/2025	$58.02	$16.55	$13.35	$3.25	$0.00	$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 3)	1/5/2026	$45.20	$10.58	$11.47	$9.75	$0.00	$77.00
MILLWRIGHTS LOCAL 1121							
MILLWRIGHTS LOCAL 1121 - Zone 3							

Apprentice: MILLWRIGHT (Zone 3)

Effective Date: 1/5/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	$24.86	$10.58	$0.00	$5.36	$0.00	$40.80
2	65.00	$29.38	$10.58	$0.00	$6.34	$0.00	$46.30
3	75.00	$33.90	$10.58	$11.47	$7.31	$0.00	$63.26

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: MILLWRIGHT (Zone 3)							
Effective Date: 1/5/2026							
Step / Percent		**Apprentice Base Wage**					
4 / 85.00		$38.42	$10.58	$11.47	$8.29	$0.00	$68.76
Apprentice Notes							
Step 1&2 Appr. indentured after 1/6/2020 receive no pension,							
Apprentice to Journeyworker Ratio: 1:4							
MORTAR MIXER	12/1/2025	$40.72	$10.65	$9.75	$9.11	$0.00	$70.23
LABORERS	6/1/2026	$42.16	$10.65	$9.75	$9.11	$0.00	$71.67
LABORERS - ZONE 2	12/1/2026	$43.60	$10.65	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$45.05	$10.65	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.50	$10.65	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$48.00	$10.65	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.50	$10.65	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
OILER (OTHER THAN TRUCK CRANES,GRADALLS)	12/1/2025	$25.08	$16.55	$13.35	$3.25	$0.00	$58.23
OPERATING ENGINEERS LOCAL 4	6/1/2026	$25.07	$17.05	$13.35	$3.25	$0.00	$58.72
OPERATING ENGINEERS LOCAL 4	12/1/2026	$25.74	$17.05	$13.35	$3.25	$0.00	$59.39
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
OILER (TRUCK CRANES, GRADALLS)	12/1/2025	$31.05	$16.55	$13.35	$3.25	$0.00	$64.20
OPERATING ENGINEERS LOCAL 4	6/1/2026	$31.17	$17.05	$13.35	$3.25	$0.00	$64.82
OPERATING ENGINEERS LOCAL 4	12/1/2026	$31.97	$17.05	$13.35	$3.25	$0.00	$65.62
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
OTHER POWER DRIVEN EQUIPMENT - CLASS II	12/1/2025	$58.02	$16.55	$13.35	$3.25	$0.00	$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PAINTER (BRIDGES/TANKS)	1/1/2026	$59.56	$10.35	$12.00	$12.50	$0.00	$94.41
PAINTERS LOCAL 35							
PAINTERS LOCAL 35 - ZONE 2							
Apprentice: PAINTER (BRIDGES/TANKS)							
Effective Date: 1/1/2026							
Step / Percent		**Apprentice Base Wage**					
1 / 50.00		$29.78	$10.35	$0.00	$0.00	$0.00	$40.13
2 / 55.00		$32.76	$10.35	$0.00	$6.93	$0.00	$50.04
3 / 60.00		$35.74	$10.35	$0.00	$7.56	$0.00	$53.65
4 / 65.00		$38.71	$10.35	$0.00	$8.19	$0.00	$57.25

Construction

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

Apprentice: PAINTER (BRIDGES/TANKS)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
5	70.00	$41.69	$10.35	$12.00	$8.82	$0.00	$72.86
6	75.00	$44.67	$10.35	$12.00	$9.45	$0.00	$76.47
7	80.00	$47.65	$10.35	$12.00	$10.08	$0.00	$80.08
8	90.00	$53.60	$10.35	$12.00	$11.34	$0.00	$87.29

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	1/1/2026	$50.46	$10.35	$12.00	$12.60	$0.00	$85.41

* If 30% or more of surfaces to be painted are new construction,
NEW paint rate shall be used.
PAINTERS LOCAL 35
PAINTERS LOCAL 35 - ZONE 2

Apprentice: PAINTER (SPRAY OR SANDBLAST, NEW) *

Effective Date: 1/1/2026

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

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	1/1/2026	$48.52	$10.35	$12.00	$12.60	$0.00	$83.47

PAINTERS LOCAL 35
PAINTERS LOCAL 35 - ZONE 2

Apprentice: PAINTER (SPRAY OR SANDBLAST, REPAINT)

Effective Date: 1/1/2026

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

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice to Journeyworker Ratio: 1:1							
PAINTER / TAPER (BRUSH, NEW) *	1/1/2026	$49.06	$10.35	$12.00	$12.60	$0.00	$84.01
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.							
PAINTERS LOCAL 35							
PAINTERS LOCAL 35 - ZONE 2							

Apprentice: PAINTER / TAPER (BRUSH, NEW) *

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.53	$10.35	$0.00	$0.00	$0.00	$34.88
2	55.00	$26.98	$10.35	$0.00	$6.93	$0.00	$44.26
3	60.00	$29.44	$10.35	$0.00	$7.56	$0.00	$47.35
4	65.00	$31.89	$10.35	$0.00	$8.19	$0.00	$50.43
5	70.00	$34.34	$10.35	$12.00	$8.82	$0.00	$65.51
6	75.00	$36.80	$10.35	$12.00	$9.45	$0.00	$68.60
7	80.00	$39.25	$10.35	$12.00	$10.08	$0.00	$71.68
8	90.00	$44.15	$10.35	$12.00	$11.34	$0.00	$77.84

Apprentice to Journeyworker Ratio: 1:1							
PAINTER / TAPER (BRUSH, REPAINT)	1/1/2026	$47.12	$10.35	$12.00	$12.60	$0.00	$82.07
PAINTERS LOCAL 35							
PAINTERS LOCAL 35 - ZONE 2							

Apprentice: PAINTER / TAPER (BRUSH, REPAINT)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$23.56	$10.35	$0.00	$0.00	$0.00	$33.91
2	55.00	$25.92	$10.35	$0.00	$6.93	$0.00	$43.20
3	60.00	$28.27	$10.35	$0.00	$7.56	$0.00	$46.18
4	65.00	$30.63	$10.35	$0.00	$8.19	$0.00	$49.17
5	70.00	$32.98	$10.35	$12.00	$8.82	$0.00	$64.15
6	75.00	$35.34	$10.35	$12.00	$9.45	$0.00	$67.14
7	80.00	$37.70	$10.35	$12.00	$10.08	$0.00	$70.13
8	90.00	$42.41	$10.35	$12.00	$11.34	$0.00	$76.10

Apprentice to Journeyworker Ratio: 1:1							
PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY)	12/1/2025	$40.47	$10.65	$9.75	$9.21	$0.00	$70.08
LABORERS	6/1/2026	$41.91	$10.65	$9.75	$9.21	$0.00	$71.52
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$43.35	$10.65	$9.75	$9.21	$0.00	$72.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
PANEL & PICKUP TRUCKS DRIVER	1/1/2026	$40.78	$16.17	$21.78	$0.00	$0.00	$78.73
TEAMSTERS JOINT COUNCIL NO. 10	6/1/2026	$41.78	$16.17	$21.78	$0.00	$0.00	$79.73
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/1/2026	$41.78	$16.17	$23.52	$0.00	$0.00	$81.47

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	1/1/2027	$41.78	$16.77	$23.52	$0.00	$0.00	$82.07
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2)	8/1/2024	$51.97	$10.08	$11.62	$12.67	$0.00	$86.34
For apprentice rates see "Apprentice- PILE DRIVER"							
PILE DRIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2)	8/1/2024	$51.97	$10.08	$11.62	$12.67	$0.00	$86.34

Apprentice: PILE DRIVER

Effective Date: 8/1/2024

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$23.39	$10.08	$0.00	$2.53	$0.00	$36.00
2	55.00	$28.58	$10.08	$0.00	$5.07	$0.00	$43.73
3	70.00	$36.38	$10.08	$11.62	$7.60	$0.00	$65.68
4	80.00	$41.58	$10.08	$11.62	$10.14	$0.00	$73.42

Apprentice to Journeyworker Ratio: 1:5

PIPELAYER LABORERS LABORERS - ZONE 2	12/1/2025	$40.72	$10.65	$9.75	$9.11	$0.00	$70.23
	6/1/2026	$42.16	$10.65	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.60	$10.65	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$45.05	$10.65	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.50	$10.65	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$48.00	$10.65	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.50	$10.65	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
PIPELAYER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2025	$40.72	$10.65	$9.75	$9.21	$0.00	$70.33
	6/1/2026	$42.16	$10.65	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.60	$10.65	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
PLUMBER & PIPEFITTER PLUMBERS LOCAL 4 PLUMBERS LOCAL 4	3/1/2026	$55.90	$13.10	$9.71	$8.06	$0.00	$86.77

Apprentice: PLUMBER & PIPEFITTER

Effective Date: 3/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$22.36	$13.10	$0.00	$0.00	$0.00	$35.46
2	50.00	$27.95	$13.10	$0.00	$0.00	$0.00	$41.05
3	60.00	$33.54	$13.10	$0.00	$0.00	$0.00	$46.64
4	70.00	$39.13	$13.10	$0.00	$8.06	$0.00	$60.29

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: PLUMBER & PIPEFITTER							
Effective Date: 3/1/2026							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
5 / 80.00		$44.72	$13.10	$0.00	$8.06	$0.00	$65.88
Apprentice to Journeyworker Ratio: 1:3							
PNEUMATIC CONTROLS (TEMP.) PLUMBERS LOCAL 4 PLUMBERS LOCAL 4	3/1/2026	$55.90	$13.10	$9.71	$8.06	$0.00	$86.77
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
PNEUMATIC DRILL/TOOL OPERATOR LABORERS LABORERS - ZONE 2	12/1/2025	$40.72	$10.65	$9.75	$9.11	$0.00	$70.23
	6/1/2026	$42.16	$10.65	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.60	$10.65	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$45.05	$10.65	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.50	$10.65	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$48.00	$10.65	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.50	$10.65	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2025	$40.72	$10.65	$9.75	$9.21	$0.00	$70.33
	6/1/2026	$42.16	$10.65	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.60	$10.65	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
POWDERMAN & BLASTER LABORERS LABORERS - ZONE 2	12/1/2025	$41.47	$10.65	$9.75	$9.11	$0.00	$70.98
	6/1/2026	$42.91	$10.65	$9.75	$9.11	$0.00	$72.42
	12/1/2026	$44.35	$10.65	$9.75	$9.11	$0.00	$73.86
	6/1/2027	$45.80	$10.65	$9.75	$9.11	$0.00	$75.31
	12/1/2027	$47.25	$10.65	$9.75	$9.11	$0.00	$76.76
	6/1/2028	$48.75	$10.65	$9.75	$9.11	$0.00	$78.26
	12/1/2028	$50.25	$10.65	$9.75	$9.11	$0.00	$79.76
For apprentice rates see "Apprentice- LABORER"							
POWDERMAN & BLASTER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2025	$41.47	$10.65	$9.75	$9.21	$0.00	$71.08
	6/1/2026	$42.91	$10.65	$9.75	$9.21	$0.00	$72.52
	12/1/2026	$44.35	$10.65	$9.75	$9.21	$0.00	$73.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
POWER SHOVEL/DERRICK/TRENCHING MACHINE OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$58.68	$16.55	$13.35	$3.25	$0.00	$91.83
	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PUMP OPERATOR (CONCRETE) OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$58.02	$16.55	$13.35	$3.25	$0.00	$91.17
	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
PUMP OPERATOR (DEWATERING, OTHER) OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$37.37	$16.55	$13.35	$3.25	$0.00	$70.52
	6/1/2026	$37.63	$17.05	$13.35	$3.25	$0.00	$71.28
	12/1/2026	$38.58	$17.05	$13.35	$3.25	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
READY-MIX CONCRETE DRIVER TEAMSTERS 170 TEAMSTERS 170 - Dauphinais (Bellingham)	1/1/2025	$27.60	$11.26	$6.15	$0.00	$0.00	$45.01
RECLAIMERS OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$58.02	$16.55	$13.35	$3.25	$0.00	$91.17
	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
RIDE-ON MOTORIZED BUGGY OPERATOR LABORERS LABORERS - ZONE 2	12/1/2025	$40.72	$10.65	$9.75	$9.11	$0.00	$70.23
	6/1/2026	$42.16	$10.65	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.60	$10.65	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$45.05	$10.65	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.50	$10.65	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$48.00	$10.65	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.50	$10.65	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
ROLLER/SPREADER/MULCHING MACHINE OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$58.02	$16.55	$13.35	$3.25	$0.00	$91.17
	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) ROOFERS LOCAL 33 ROOFERS LOCAL 33	2/1/2026	$53.53	$14.53	$12.67	$9.03	$0.00	$89.76

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

Effective Date: 2/1/2026

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

Apprentice Notes

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

Apprentice to Journeyworker Ratio: 1:5

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

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- ROOFER"							
SHEETMETAL WORKER SHEETMETAL WORKERS LOCAL 63 SHEETMETAL WORKERS LOCAL 63	7/1/2025	$43.48	$12.94	$11.01	$8.72	$2.13	$78.28
	7/1/2026	$43.48	$13.24	$11.01	$9.92	$2.13	$79.78
	1/1/2027	$43.48	$13.54	$11.01	$11.12	$2.13	$81.28
	7/1/2027	$44.98	$13.54	$11.01	$11.12	$2.13	$82.78
	1/1/2028	$46.48	$13.54	$11.01	$11.12	$2.13	$84.28

Apprentice: SHEETMETAL WORKER

Effective Date: 7/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$19.57	$5.82	$4.95	$0.00	$0.85	$31.19
2	50.00	$21.74	$6.47	$5.51	$0.00	$0.94	$34.66
3	55.00	$23.91	$7.12	$9.91	$0.00	$1.15	$42.09
4	60.00	$26.09	$7.76	$9.91	$0.00	$1.23	$44.99
5	65.00	$28.26	$8.41	$9.91	$0.00	$1.31	$47.89
6	70.00	$30.44	$9.06	$9.91	$0.00	$1.39	$50.80
7	75.00	$32.61	$9.71	$9.91	$0.00	$1.47	$53.70
8	80.00	$34.78	$10.35	$9.91	$8.72	$1.78	$65.54
9	85.00	$36.96	$11.00	$9.91	$8.72	$1.86	$68.45
10	90.00	$39.13	$11.65	$9.91	$8.72	$1.94	$71.35

Apprentice: SHEETMETAL WORKER

Effective Date: 7/1/2026

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

Apprentice to Journeyworker Ratio: 1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	1/1/2026	$41.24	$16.17	$21.78	$0.00	$0.00	$79.19
	6/1/2026	$42.24	$16.17	$21.78	$0.00	$0.00	$80.19
	12/1/2026	$42.24	$16.17	$23.52	$0.00	$0.00	$81.93
	1/1/2027	$42.24	$16.77	$23.52	$0.00	$0.00	$82.53
SPECIALIZED EARTH MOVING EQUIP > 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	1/1/2026	$41.53	$16.17	$21.78	$0.00	$0.00	$79.48
	6/1/2026	$42.53	$16.17	$21.78	$0.00	$0.00	$80.48
	12/1/2026	$42.53	$16.17	$23.52	$0.00	$0.00	$82.22

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	1/1/2027	$42.53	$16.77	$23.52	$0.00	$0.00	$82.82
SPRINKLER FITTER SPRINKLER FITTERS LOCAL 669 SPRINKLER FITTERS LOCAL 669	4/1/2026	$56.54	$13.60	$7.45	$9.41	$0.00	$87.00
	7/1/2026	$56.54	$13.60	$7.45	$9.41	$0.00	$87.00
	10/1/2026	$56.54	$13.60	$7.45	$9.41	$0.00	$87.00
	1/1/2027	$56.54	$14.55	$7.50	$9.41	$0.00	$88.00
	4/1/2027	$59.83	$14.55	$7.50	$9.41	$0.00	$91.29
	7/1/2027	$59.83	$14.55	$7.50	$9.41	$0.00	$91.29
	10/1/2027	$59.83	$14.55	$7.50	$9.41	$0.00	$91.29
	1/1/2028	$59.83	$15.50	$7.55	$9.41	$0.00	$92.29

Apprentice: SPRINKLER FITTER

Effective Date: 4/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	43.00	$28.36	$9.64	$0.00	$0.00	$0.00	$38.00
2	48.00	$31.66	$9.64	$0.00	$0.00	$0.00	$41.30
3	52.00	$34.29	$13.60	$7.45	$1.15	$0.00	$56.49
4	56.00	$36.93	$13.60	$7.45	$1.15	$0.00	$59.13
5	59.00	$38.91	$13.60	$7.45	$1.40	$0.00	$61.36
6	64.00	$42.21	$13.60	$7.45	$1.40	$0.00	$64.66
7	68.00	$44.85	$13.60	$7.45	$1.40	$0.00	$67.30
8	72.00	$47.48	$13.60	$7.45	$1.40	$0.00	$69.93
9	76.00	$50.12	$13.60	$7.45	$1.40	$0.00	$72.57
10	80.00	$52.76	$13.60	$7.45	$1.40	$0.00	$75.21

Apprentice: SPRINKLER FITTER

Effective Date: 7/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	43.00	$28.36	$9.64	$0.00	$0.00	$0.00	$38.00
2	48.00	$31.66	$9.64	$0.00	$0.00	$0.00	$41.30
3	52.00	$34.29	$13.60	$7.45	$1.15	$0.00	$56.49
4	56.00	$36.93	$13.60	$7.45	$1.15	$0.00	$59.13
5	59.00	$38.91	$13.60	$7.45	$1.40	$0.00	$61.36
6	64.00	$42.21	$13.60	$7.45	$1.40	$0.00	$64.66
7	68.00	$44.85	$13.60	$7.45	$1.40	$0.00	$67.30
8	72.00	$47.48	$13.60	$7.45	$1.40	$0.00	$69.93
9	76.00	$50.12	$13.60	$7.45	$1.40	$0.00	$72.57
10	80.00	$52.76	$13.60	$7.45	$1.40	$0.00	$75.21

Apprentice to Journeyworker Ratio: 1:1

STEAM BOILER OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2025	$58.02	$16.55	$13.35	$3.25	$0.00	$91.17
	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN	12/1/2025	$58.02	$16.55	$13.35	$3.25	$0.00	$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TERRAZZO FINISHERS	2/1/2026	$66.89	$12.84	$15.57	$8.02	$0.00	$103.32
BRICKLAYERS LOCAL 3	8/1/2026	$69.09	$12.84	$15.57	$8.02	$0.00	$105.52
BRICKLAYERS LOCAL 3 - MARBLE & TILE	2/1/2027	$70.49	$12.84	$15.57	$8.02	$0.00	$106.92

Apprentice: TERRAZZO FINISHERS

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$33.45	$12.84	$15.57	$8.02	$0.00	$69.88
2	60.00	$40.13	$12.84	$15.57	$8.02	$0.00	$76.56
3	70.00	$46.82	$12.84	$15.57	$8.02	$0.00	$83.25
4	80.00	$53.51	$12.84	$15.57	$8.02	$0.00	$89.94
5	90.00	$60.20	$12.84	$15.57	$8.02	$0.00	$96.63

Apprentice: TERRAZZO FINISHERS

Effective Date: 8/1/2026

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

Apprentice to Journeyworker Ratio: 1:5

TEST BORING DRILLER	12/1/2025	$51.95	$10.65	$9.75	$9.80	$0.00	$82.15
LABORERS	6/1/2026	$53.50	$10.65	$9.75	$9.80	$0.00	$83.70
LABORERS - FOUNDATION AND MARINE	12/1/2026	$55.00	$10.65	$9.75	$9.80	$0.00	$85.20
For apprentice rates see "Apprentice- LABORER"							
TEST BORING DRILLER HELPER	12/1/2025	$48.07	$10.65	$9.75	$9.80	$0.00	$78.27
LABORERS	6/1/2026	$49.62	$10.65	$9.75	$9.80	$0.00	$79.82
LABORERS - FOUNDATION AND MARINE	12/1/2026	$51.12	$10.65	$9.75	$9.80	$0.00	$81.32
For apprentice rates see "Apprentice- LABORER"							
TEST BORING LABORER	12/1/2025	$47.95	$10.65	$9.75	$9.80	$0.00	$78.15
LABORERS	6/1/2026	$49.50	$10.65	$9.75	$9.80	$0.00	$79.70
LABORERS - FOUNDATION AND MARINE	12/1/2026	$51.00	$10.65	$9.75	$9.80	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"							
TRACTORS/PORTABLE STEAM GENERATORS	12/1/2025	$58.02	$16.55	$13.35	$3.25	$0.00	$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TRAILERS FOR EARTH MOVING EQUIPMENT	1/1/2026	$41.82	$16.17	$21.78	$0.00	$0.00	$79.77
TEAMSTERS JOINT COUNCIL NO. 10	6/1/2026	$42.82	$16.17	$21.78	$0.00	$0.00	$80.77
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/1/2026	$42.82	$16.17	$23.52	$0.00	$0.00	$82.51
	1/1/2027	$42.82	$16.77	$23.52	$0.00	$0.00	$83.11
TUNNEL WORK - COMPRESSED AIR	12/1/2025	$60.18	$10.65	$9.75	$10.25	$0.00	$90.83
LABORERS	6/1/2026	$61.73	$10.65	$9.75	$10.25	$0.00	$92.38
LABORERS (COMPRESSED AIR)	12/1/2026	$63.23	$10.65	$9.75	$10.25	$0.00	$93.88
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE)	12/1/2025	$62.18	$10.65	$9.75	$10.25	$0.00	$92.83
LABORERS	6/1/2026	$63.73	$10.65	$9.75	$10.25	$0.00	$94.38
LABORERS (COMPRESSED AIR)	12/1/2026	$65.23	$10.65	$9.75	$10.25	$0.00	$95.88
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - FREE AIR	12/1/2025	$52.25	$10.65	$9.75	$10.25	$0.00	$82.90
LABORERS	6/1/2026	$53.80	$10.65	$9.75	$10.25	$0.00	$84.45
LABORERS (FREE AIR TUNNEL)	12/1/2026	$55.30	$10.65	$9.75	$10.25	$0.00	$85.95
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - FREE AIR (HAZ. WASTE)	12/1/2025	$54.25	$10.65	$9.75	$10.25	$0.00	$84.90
LABORERS	6/1/2026	$55.80	$10.65	$9.75	$10.25	$0.00	$86.45
LABORERS (FREE AIR TUNNEL)	12/1/2026	$57.30	$10.65	$9.75	$10.25	$0.00	$87.95
For apprentice rates see "Apprentice- LABORER"							
VAC-HAUL	1/1/2026	$41.24	$16.17	$21.78	$0.00	$0.00	$79.19
TEAMSTERS JOINT COUNCIL NO. 10	6/1/2026	$42.24	$16.17	$21.78	$0.00	$0.00	$80.19
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/1/2026	$42.24	$16.17	$23.52	$0.00	$0.00	$81.93
	1/1/2027	$42.24	$16.77	$23.52	$0.00	$0.00	$82.53
VOICE-DATA-VIDEO TECHNICIAN	9/7/2025	$36.12	$14.98	$13.94	$3.97	$0.00	$69.01
ELECTRICIANS LOCAL 96	9/6/2026	$37.04	$15.96	$14.20	$4.07	$0.00	$71.27
ELECTRICIANS LOCAL 96							

Apprentice: VOICE-DATA-VIDEO TECHNICIAN

Effective Date: 9/7/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$18.06	$14.98	$0.54	$3.97	$0.00	$37.55
2	55.00	$19.87	$14.98	$0.60	$3.97	$0.00	$39.42
3	60.00	$21.67	$14.98	$13.51	$3.97	$0.00	$54.13
4	65.00	$23.48	$14.98	$13.56	$3.97	$0.00	$55.99
5	70.00	$25.28	$14.98	$13.62	$3.97	$0.00	$57.85
6	75.00	$27.09	$14.98	$13.67	$3.97	$0.00	$59.71
7	80.00	$28.90	$14.98	$13.73	$3.97	$0.00	$61.58
8	85.00	$30.70	$14.98	$13.78	$3.97	$0.00	$63.43

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: VOICE-DATA-VIDEO TECHNICIAN							
Effective Date: 9/6/2026							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
1 / 50.00		$18.52	$15.96	$0.56	$4.07	$0.00	$39.11
2 / 55.00		$20.37	$15.96	$0.61	$4.07	$0.00	$41.01
3 / 60.00		$22.22	$15.96	$13.76	$4.07	$0.00	$56.01
4 / 65.00		$24.08	$15.96	$13.81	$4.07	$0.00	$57.92
5 / 70.00		$25.93	$15.96	$13.87	$4.07	$0.00	$59.83
6 / 75.00		$27.78	$15.96	$13.92	$4.07	$0.00	$61.73
7 / 80.00		$29.63	$15.96	$13.98	$4.07	$0.00	$63.64
8 / 85.00		$31.48	$15.96	$14.03	$4.07	$0.00	$65.54
Apprentice to Journeyworker Ratio: 1:1							
WAGON DRILL OPERATOR	12/1/2025	$40.72	$10.65	$9.75	$9.11	$0.00	$70.23
LABORERS	6/1/2026	$42.16	$10.65	$9.75	$9.11	$0.00	$71.67
LABORERS - ZONE 2	12/1/2026	$43.60	$10.65	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$45.05	$10.65	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.50	$10.65	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$48.00	$10.65	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.50	$10.65	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
WAGON DRILL OPERATOR (HEAVY & HIGHWAY)	12/1/2025	$40.72	$10.65	$9.75	$9.21	$0.00	$70.33
LABORERS	6/1/2026	$42.16	$10.65	$9.75	$9.21	$0.00	$71.77
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$43.60	$10.65	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
WASTE WATER PUMP OPERATOR	12/1/2025	$58.68	$16.55	$13.35	$3.25	$0.00	$91.83
OPERATING ENGINEERS LOCAL 4	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
WATER METER INSTALLER	3/1/2026	$55.90	$13.10	$9.71	$8.06	$0.00	$86.77
PLUMBERS LOCAL 4							
PLUMBERS LOCAL 4							
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"							

Outside Electrical

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

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 8/31/2025

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

Outside Electrical

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

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 8/31/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
2	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
3	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
4	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
5	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
6	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
7	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 8/30/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
2	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
3	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
4	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
5	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
6	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
7	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Apprentice to Journeyworker Ratio: 1:2

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

Additional Apprentice Information

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

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

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

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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 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: MA20260025 05/18/2026

State: Massachusetts

Construction Types: Highway

Counties: Massachusetts Counties of
Worcester

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

CARP0336-004 09/01/2025

	Rates	Fringes
CARPENTER (INCLUDES FORM WORK)	$ 50.10	31.45

ELEC0103-007 09/01/2025

	Rates	Fringes
ELECTRICIAN	$ 66.17	37.08

ENGI0004-030 06/01/2025

	Rates	Fringes
POWER EQUIPMENT OPERATOR GROUP 2 BULLDOZER; GRADER/BLADE; ROLLER 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	$ 57.18	33.70

POWER EQUIPMENT OPERATOR GROUP 1
BACKHOE/EXCAVATOR/TRACKHOE; BOBCAT/SKID STEER/SKID
LOADER; BROOM/SWEEPER; GRADALL; LOADER; PAVER
(ASPHALT, AGGREGATE, AND CONCRETE); POST DRIVER
(GUARDRAIL/FENCES) 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.....$ 57.83
33.70

ENGI0004-031 06/01/2025

Rates
Fringes
POWER EQUIPMENT OPERATOR: MILLING MACHINE
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.....$ 57.83
33.70

IRON0007-028 09/16/2025

Rates
Fringes
IRONWORKER, STRUCTURAL.....$ 57.57
37.67

IRON0007-029 09/16/2025

Rates
Fringes
IRONWORKER: ORNAMENTAL.....$ 57.57
37.67

LABO0039-003 06/01/2018

Rates
Fringes
LABORER: COMMON OR GENERAL.....$ 33.25
22.92
LABORER: ASPHALT, INCLUDES RAKER, SHOVELER,
SPREADER AND DISTRIBUTOR.....$ 33.50
22.92
LABORER (GUARDRAIL INSTALLATION).....$ 33.50
22.92

PAIN0035-023 07/01/2024

	Rates	Fringes
PAINTER: STEEL	$ 56.76	36.00

SUMA2014-015 01/11/2017

	Rates	Fringes
TRUCK DRIVER: FLATBED TRUCK	$ 48.53	0.00
TRUCK DRIVER: DUMP TRUCK	$ 30.38	7.20
TRUCK DRIVER: CONCRETE TRUCK	$ 33.69	15.79
TRAFFIC CONTROL: LABORER-CONES/ BARRICADES/BARRELS - SETTER/MOVER/SWEEPER	$ 44.49	12.41
TRAFFIC CONTROL: FLAGGER	$ 23.00	20.44
PILEDRIVERMAN	$ 45.65	23.33
PAINTER: SPRAY (LINESTRIPING)	$ 48.00	0.00
OPERATOR: PILEDRIVER	$ 44.46	16.94
OPERATOR: MECHANIC	$ 48.14	17.02
OPERATOR: FORKLIFT	$ 64.67	0.00
OPERATOR: CRANE	$ 52.14	21.08
LABORER: LANDSCAPE	$ 40.39	17.68
LABORER: CONCRETE SAW (HAND HELD/WALK BEHIND)	$ 41.78	18.37
IRONWORKER, REINFORCING	$ 56.48	20.62
CEMENT MASON/CONCRETE FINISHER	$ 56.70	21.08

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.
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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

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

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

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

Union Rate Identifiers

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

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

Union Average Rate Identifiers

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

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

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

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

State Adopted Rate Identifiers

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

WAGE DETERMINATION APPEALS PROCESS

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

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

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

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

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

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

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

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

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

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

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION

"

DOCUMENT A00801

SPECIAL PROVISIONS

HOLDEN
Federal Aid Project No. HIP(NGB)-003S(963)X
Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad

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

SCOPE OF WORK

All work under this Contract shall be done in conformance with the 2026 Standard Specifications for Highways and Bridges, the Supplemental Specifications contained in this book, the Construction Standard Details in effect as of January 2026, the 1990 Standard Drawings for Signs and Supports, the 2015 Overhead Signal Structure and Foundation Standard Drawings, the 11th Edition of the Manual on Uniform Traffic Control Devices (MUTCD) and the January 2026 Massachusetts Amendments to the MUTCD, the 1968 Standard Drawings for Traffic Signals and Highway Lighting, the latest edition of The American Standard for Nursery Stock, the Plans and these Special Provisions.

The limits of this project are to begin at the intersection of Salisbury Street at Main Street (Route 122A), and end just south of Pine Tree Road. The purpose of this project is to replace this structurally deficient bridge carrying Salisbury Street over the G&W Railroad. The inspection reports from January of 2026 and April of 2026 (Document A00818) have identified severe deficiencies with the deck, railing and girders which warrant repair as soon as possible. The bridge is currently on a quarterly inspection cycle and could potentially be closed to the public following the next inspection scheduled in July 2026. The Bridge cannot be closed and the detour put in place during the academic calendar for the Wachusett Regional Public schools, unless deemed necessary by MassDOT Bridge Inspection. The bridge was originally constructed in 1907 and reconstructed in 1958. In 1958, two new abutments and a new superstructure were constructed. The existing superstructure and abutments will be demolished as part of this project, as well as a partial demolition of the existing piers.

The proposed bridge will have a single span of approximately 65'-0" and the superstructure will consist of five (5) NEXT D beams. The bridge will be founded on precast concrete stub abutments supported on drilled micropiles. The bridge will accommodate two 11-foot travel lanes, two 4-foot shoulders and one 10'-5" sidewalk on the west side.

SCOPE OF WORK (Continued)

In addition to a full bridge replacement, the project also proposes roadway reconstruction on the bridge approaches. Full depth construction is being proposed where the roadway profile is being modified, and a mill and overlay is being proposed where the roadway profile is being matched. The roadway will accommodate two 11'-0" travel lanes and two 2' minimum shoulders. A minimum 5.5-foot sidewalk is also being proposed on the west side of Salisbury Street, as well as ADA compliant pedestrian curb ramps. Two retaining walls are also proposed as part of this project, a proposed prefabricated modular gravity retaining wall on the northwest side of the project, adjacent to the bridge and a permanent soldier pile and lagging retaining wall adjacent to the railroad tracks. Other aspects of the project include guardrail installation on both sides of the roadway, utility relocations and installations.

As the project will result in the closure of Salisbury Street, a detour is being put in place. Vehicles and trucks will be using separate detours as shown on the Highway Plans. The Contractor is responsible for notifying the DPW, emergency services, and the school departments two weeks ahead of the bridge closure.

SUBSECTION 8.03 PROSECUTION OF THE WORK
Add/amend the following at the end of the Section

Contractual Milestones:

This Contract contains the following Contractual Milestones and Durations that are to be included in the Contractor's Baseline Contract Progress Schedule submission. The Contractor shall identify the completion of the work pertaining to each Contractual Milestone and Duration through the inclusion of a Finish Milestone in the accepted baseline Contract Progress Schedule using the stated description.

MS#01 Contractor Field Completion: The Contractor shall achieve Contractor Field Completion within **480 calendar days from Notice to Proceed.**

Contractor Field Completion is defined as: All physical contract Work is complete including punchlist. The Contractor has fully de-mobilized from field operations.

MS#02 Substantial Completion: The Contractor shall achieve Substantial Completion within **456 calendar days from Notice to Proceed**.

Substantial Completion is defined as: A walkthrough of the entire contract Work has been performed by the Resident Engineer, a Punch List has been generated and the Work required by the Contract, including paper work, has been completed, except for work having a Contract price of less than one percent of the adjusted total Contract price, including overruns, underruns and all contract amendments. All material submittals have been received by the District Materials Lab.

SUBSECTION 8.03 (Continued)

MS#03 Full Beneficial Use:

Full Beneficial Use is defined as: 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. Work must be completed and accepted by MassDOT including but not limited to two lanes of vehicular travel, the completion of bridge parapets, protective screening, sidewalk, placement of protective course pavement on the bridge and temporary pavement markings as needed to allow safe passage of traffic and compliant accessible pedestrian use to achieve Full Beneficial Use.

The Contractor shall achieve Milestone MS#03 **by Tuesday August 24, 2027, at 5:00 PM**

INCENTIVE/DISINCENTIVE REQUIREMENTS

MassDOT is instituting an Incentive/Disincentive specification for this contract. The purpose of incentive payments is to encourage the Contractor to employ innovative methods and techniques to reduce the duration of bridge closures to traffic, ensure timely completion of the project, and meet specified interim milestones. Conversely, if the Contractor fails to achieve certain milestones, MassDOT shall assess Disincentive Deductions based on calculated Roadway User Delay costs to a maximum amount equal to the total amount of the incentive(s). These disincentive(s) are in addition to any liquidated damages that may apply if the contract completion date is not achieved.

For purposes of determining whether the Contractor shall receive an Incentive Payment, the dates and times set forth in Milestone MS#03 will not be adjusted under any circumstances for any reason, cause, or circumstance whatsoever, regardless of fault, and excepts in the instance of an "Act of God" and/or declared state of emergency.

The goal of Incentive/Disincentive monetary adjustments are to minimize the impacts to the users of the Bridge and to support a reduced overall schedule duration, to assure that the Contractor complies with MassDOT commitments and to limit the detour and closure to the maximum days as defined by the duration between Work Restriction WS#01 and Milestone MS#03.

Payment: The Incentive Payment or Disincentive Deduction shall be made in accordance with the payout schedule specified in this Contract. For Disincentive Deductions, any partial day will be rounded up to the nearest whole day.

Liquidated Damages: Nothing in this section shall alter or otherwise affect the assessment of liquidated damages under Subsection 8.11 of the MassDOT Standard Specifications for Highways and Bridges – Failure to Complete Work on Time.

INCENTIVE / DISINCENTIVE REQUIREMENTS (Continued)

Incentive Milestone Payments
Incentive Payment #1: Full Beneficial Use Incentive.
If the Contractor achieves Milestone MS#03: Full Beneficial Use prior to 3:30 PM, Tuesday August 24, 2027, and in accordance with the work restrictions described, the Contractor shall receive a performance Incentive Payment of Four Hundred One Thousand and One Hundred Dollars ($401,100).

MassDOT will only make payment under Incentive Payment #1 if the Contractor achieves Milestone MS#03.

Disincentive Deduction #1: If the Contractor fails to achieve Milestone MS#03, MassDOT will assess a disincentive deduction of Nineteen Thousand One Hundred Dollars ($19,100) per calendar day, based on calculated roadway user delays, for each day from September 1, 2027, through September 21, 2027, inclusive. The maximum total disincentive shall not exceed Four Hundred One Thousand and One Hundred Dollars ($401,100).

The Contractor shall only receive Incentive Payment #1 after Milestone MS#02 – Substantial Completion.

SUBSECTION 8.06 LIMITATIONS OF OPERATIONS
Add/amend the following at the end of the Section:

Access Restraints:

This Contract will contain an Access Restraint to provide an anticipated start dates of certain portions of the Work that are restrained by a Utility Party or limitations associated with work over an active railroad line. An Access Restraint is a restriction of physical work, of a specific area or operation in the Contract, to allow all bidders to evaluate anticipated work restrictions, equally, during the pre-bid planning stages.

The Contract Time (duration) has been established with consideration of anticipated utility work and work hours restrictions likely to be imposed by the railroad, based on initial information provided by these Parties and accepted by MassDOT. The Contractor shall coordinate and communicate with all affected utilities and is responsible for obtaining required right-of-entry agreements and railroad flagging services necessary to perform the Work. The Contractor may also be required to complete certain support activities for utility relocations, as identified in the Contract Documents, in advance of the commencement of the respective utility work.

The Contractor must clearly identify all aspects of this work in the preparation of the Construction Schedule and throughout the Contract duration.

The Contract contains the following utility Access Restraint that is to be included in the Contractor's Baseline Schedule submission:

SUBSECTION 8.06 (Continued)

AR#1 – Access Restraint #01 – The contractor shall coordinate with Railroad on right of entry to railroad right of way that is necessary to perform the work on this project.

This work shall be completed prior to the commencement of bridge demolition operations.

Work Restrictions:

Additionally, this Contract contains the following work restriction:

WR#1 – Work Restriction #01 – The bridge and associated limits of work shall not be closed before Friday June 11, 2027, after the daily scheduled train passes train passes at or around 7:00 PM. All signs for the detour shall be in place before closing the bridge. Also, message boards shall be alerting the public of the impending detour for two weeks leading up to the closure.

FORCED CLOSURE DUE TO BRIDGE CONDITION

The bridge is presently subject to inspection by MassDOT on a three-month inspection cycle. The structure shall continue to be monitored for deterioration, structural deficiencies, or other changes in condition that, in the judgment of the Engineer, may warrant immediate closure of the bridge to traffic prior to the closure date established under WR#1.

If the Engineer determines that immediate closure is required for public safety prior to WR#1, WR#1 shall be modified accordingly, and the restriction prohibiting closure prior to June 11, 2027, shall be removed and replaced with an allowable closure date of no later than Friday, April 15, 2027.

Should such forced closure occur, Milestone MS#03 (Full Beneficial Use) shall be revised by the Engineer to establish a bridge closure duration not to exceed seventy-four (74) calendar days from the modified closure commencement date. The seventy-four (74) calendar-day duration shall commence on the date the roadway detour is fully implemented, and traffic is officially diverted from the bridge.

Failure of the Contractor to achieve Milestone MS#03 (Full Beneficial Use) within the seventy-four (74) calendar-day period shall result in forfeiture of any Incentive Payment otherwise available under the Contract and the assessment of Disincentive Damages in accordance with the Contract Documents. Disincentive Damages shall commence seven (7) calendar days following the revised MS#03 completion date, as determined under the Contract, and shall continue for a period not to exceed twenty-one (21) calendar days. Disincentive Damages shall be assessed at a rate of Nineteen Thousand One Hundred Dollars ($19,100) per calendar day, for a maximum aggregate amount not to exceed Four Hundred One Thousand One Hundred Dollars ($401,100).

All other terms, conditions, stipulations, and payment provisions associated with the Contract incentive/disincentive requirements shall remain in full force and effect as otherwise specified in the Contract Documents.

SUBSECTION 7.05 INSURANCE REQUIREMENTS

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

7.05.B: Public Liability Insurance 3.

Railroad Protective Liability Insurance shall be obtained in the amount of $2,000,000 per occurrence and $6,000,000 aggregate on behalf of P&W Railroad.

CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

Prospective bidders are required to submit all questions to the Construction Contracts Engineer by 3:00 P.M. on the Tuesday of the previous week before the scheduled bid opening date. Any questions received after this time will not be considered for review by the Department.

Contractors should email questions and addendum acknowledgements to the following email address massdotspecifications@dot.state.ma.us The MassDOT proposal number and municipality is to be placed in the subject line.

NOTICE TO CONTRACTOR

The Contractor shall be aware that time is of the essence in the execution of work under this contract. Upon receipt of a notice of award, the Contractor shall immediately begin with the preparation of submittals on the critical path to completion of the work. This includes but is not limited to the following:

1. Railroad License to access and work on Railroad property
2. Health and Safety Plan
3. Stormwater Pollution Prevention Plan
4. Noise and Dust Control Submittals
5. Railroad ballast and erosion control protection measures
6. Invasive species management plan site walk and submittals
7. Soil sampling and testing for hazardous materials (Refer to Items 180.01 through 181.14)
8. Perform and submit results for proposed Boring BB-4 at the location shown on the plans

The Contractor is also responsible for coordinating with the following stakeholders. The Contractor shall coordinate closely with railroad personnel.

NOTICE TO CONTRACTOR (Continued)

The Contractor shall contact the Dawson Elementary School and the Wachusett Regional School District Superintendent.

Joe Wilde, Principal
155 Salisbury Street, Holden MA 01520
Phone: 508-829-6828
Email: joy_wilde@wrsd.net

James Reilly, MSW, Ed. D, Superintendent
1745 Main Street, Jefferson MA 01522
Phone: 508-829-1670
Email: james_reilly@wrsd.net

The Contractor shall also contract the emergency services departments, bus route coordinator and the DPW.

Fire Department: Russell Hall, Fire Chief
1370 Main Street, Holden MA 01520
Phone: 508-210-5650

Police Department: Timothy Sherblom, Police Chief
1370 Main Street, Holden MA 01520
Phone: 508-210-5600

Bus Route Coordinator: Carolyn Holden, Division Manager
175 East County Road, Rutland MA 01543
Phone: 508-829-1670 x272
Email: carolyn_holden@wrsd.net

During the closure of Salisbury Street, the Contractor and the Engineer are required to meet with the school Superintendent, Dawson Elementary School Principal, Emergency Services and the DPW once a month to provide status updates on the project.

HOLIDAY WORK RESTRICTIONS

(Supplementing Subsection 7.09)

The District Highway Director (DHD) may authorize work to continue during these specified time periods if it is determined by the District that the work will not negatively impact the traveling public. DHD may allow work in those areas on a case by case basis and where work is behind barrier and will not impact traffic

Below are the holiday work restrictions:

New Years Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the DHD and the local police chief.

Martin Luther King's Birthday (Federal Holiday)
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

President's Day (Federal Holiday)
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

Evacuation Day (Suffolk County State Holiday)
No work restrictions due to traffic concerns.

Patriot's Day (State Holiday)
Work restrictions will be in place for Districts 3 and 6 along the entire Boston Marathon route and any other locations that the DHD in those districts determine are warranted so as to not to impact the marathon. All other districts work restrictions will be as per DHD.

Mother’s Day
No work on Western Turnpike and Metropolitan Highway System from 5:00 AM on the Friday before, until the normal start of business on the following day.

Memorial Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

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.

HOLIDAY WORK RESTRICTIONS (Continued)

Independence Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the DHD and the local police chief.

Labor Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Columbus Day (Federal Holiday)
No work on major arterials from 5:00 AM on the Friday before, until the normal start of business on the following day

Veterans' Day (Federal Holiday)
No work restrictions due to traffic concerns.

Thanksgiving Day (Federal Holiday)
No work on major arterials from 5:00 AM two days before until the normal start of business on the following Monday.

Christmas Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day.

WORK SCHEDULE

Prior to and after the bridge closure, all work shall be performed during normal work hours. The work shall be done on an 8-hour, 5-day week (Monday through Friday) between the hours of 7:00 AM and 3:30 PM with the prime Contractor and all Subcontractors working on the same shift. All Construction equipment shall be off the portion of the road open to the public by 3:30 PM, including the removal of temporary traffic control setups if required. All pre and post closure work involving single-lane closures will be limited to the hours between 9:30 AM to 2:30 PM to accommodate school bus route schedule.

The Bridge cannot be closed and the detour put in place during the academic calendar for the Wachusett Regional Public schools, unless deemed necessary by MassDOT Bridge Inspection.

During the bridge closure, all work shall be done on a 10-hour, 6-day week between the hours of 7:00 AM and 5:00 PM. The Contractor must maintain traffic closure of the bridge until construction of the bridge has been completed.

SUBSECTION 8.02 SCHEDULE OF OPERATIONS

Replace this subsection with the following:

An integrated cost and schedule controls program shall be implemented by the Contractor to track and document the progress of the Work from Notice to Proceed (NTP) through the Contractor Field Completion (CFC) Milestone. The Contractor's schedules will be used by the Engineer to monitor project progress, plan the level-of-effort required by the Department's work force and consultants and as a critical decision-making tool. Accordingly, the Contractor shall ensure that it complies fully with the requirements specified herein and that its schedules are both accurate and updated as required by the specification throughout the life of the project. Detailed requirements are provided in Division II, Section 722 Construction Scheduling.

TRUCK SAFETY DEVICES

(Supplementing Subsection 7.04: Motor Vehicles)

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

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.

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

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

SUBSECTION 8.14 UTILITY COORDINATION, DOCUMENTATION, AND MONITORING RESPONSIBILITIES

A. GENERAL

In accordance with the provisions of Section 8.00 Prosecution and Progress, utility coordination is a critical aspect to this Contract. This section defines the responsibility of the Contractor and MassDOT, with regard to the initial utility relocation plan and changes that occur as the prosecution of the Work progresses. The Engineer, with assistance from the Contractor shall coordinate with Utility companies that are impacted by the Contractor's operations. To support this effort, the Contractor shall provide routine and accurate schedule updates, provide notification of delays, and provide documentation of the steps taken to resolve any conflicts for the temporary and/or permanent relocations of the impacted utilities. The Contractor shall provide copies to the Engineer of the Contractor communication with the Utility companies, including but not limited to:

- Providing advanced notice, for all utility-related meetings initiated by the Contractor.
- Providing meeting minutes for all utility-related meetings that the Contractor attends.
- Providing all test pit records.
- Request for Early Utility work requirements of this section (see below).
- Notification letters for any proposed changes to Utility start dates and/or sequencing.
- Written notification to the Engineer of all apparent utility delays within seven (7) Calendar Days after a recognized delay to actual work in the field – either caused by a Utility or the Contractor.
- Any communication, initiated by the Contractor, associated with additional Right-of-Way needs in support of utility work.
- Submission of completed Utility Completion Forms.

B. PROJECT UTILITY COORDINATION (PUC) FORM

The utility schedule and sequence information provided in the Project Utility Coordination Form (if applicable) is the best available information at the time of the bid and has been considered in setting the contract duration. The Contractor shall use all of this information in developing the bid price and the Baseline Schedule Submission, inclusive of the individual utility durations sequencing requirements, and any work that has been noted as potentially concurrent utility installations.

C. INITIATION OF UTILITY WORK

The Engineer will issue all initial notice-to-proceed dates to each Utility company based on either the:

1) Contractor's accepted Baseline Schedule
2) An approved Early Utility Request in the form of an Early Utility sub-net schedule (in accordance with the requirements of this Subsection)
3) An approved Proposal Schedule

SUBSECTION 8.14 (Continued)

C.1 - BASELINE SCHEDULE – UTILITY BASIS
The Contractor shall provide a Baseline Schedule submission in accordance with the requirements of Subsection 8.02 and inclusive of all of the information provided in the PUC Form that has been issued in the Contract documents. This is to include the utility durations, sequencing of work, allowable concurrent work, and all applicable considerations that have been depicted on the PUC Form.

C.2 – EARLY UTILITY REQUEST – (aka SUBNET SCHEDULE) PRIOR TO THE BASELINE
All early utility work is defined as any anticipated/required utility relocations that need to occur prior to the Baseline Schedule acceptance. In all cases of proposed early utility relocation, the Contractor shall present all known information at the pre-construction conference in the form of a 'sub-net' schedule showing when each early utility activity needs to be issued a notice-to-proceed. The Contractor shall provide advance notification of this intent to request early utility work in writing at or prior to the Pre-Construction meeting. Prior to officially requesting approval for early utility work, the Contractor shall also coordinate with MassDOT and all utility companies (private, state or municipal) which may be impacted by the Contract. If this request is acceptable to the Utilities and to MassDOT, the Engineer will issue a notice-to-proceed to the affected Utilities, based on these accepted dates.

C.3 – PROPOSAL SCHEDULE - CHANGES TO THE PUC FORM
If the Contractor intends to submit a schedule (in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02) that contains durations or sequencing that vary from those provided in the Project Utility Coordination (PUC) Form, the Contactor must submit this as an intended change, in the form of a Proposal Schedule and in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02. These proposed changes are subject to the approval of the Engineer and the impacted utilities, in the form of this Proposal Schedule and a proposed revision to the PUC form. The Contractor shall not proceed with any changes of this type without written authorization from the Engineer, that references the approved Proposal Schedule and PUC form changes. The submission of the Baseline Schedule should not include any of these types of proposed utility changes and should not delay the submission of the Baseline Schedule. As a prerequisite to the Proposal Schedule submission, and in advance of the utility notification(s) period, the Contractor shall coordinate the proposed utility changes with the Engineer and the utility companies, to develop a mutually agreed upon schedule, prior to the start of construction.

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

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

SUBSECTION 8.14 (Continued)

All documentation provided in this section is subject to the review and verification of the Engineer and, if required, the Utility Owner. In accordance with MassDOT Specifications, Division I, Subsection 8.10, a Time Extension will be granted for a delay caused by a Utility, only if the actual duration of the utility work is in excess of that shown on the Project Utility Coordination Form, and only if;

1) proper Notification of Delay was provided to MassDOT in accordance with the time requirements that are specified in this Section
2) the utility delay is a critical path impact to the Baseline Schedule (or most recently approved Progress Schedule)

E. LOCATION OF UTILITIES

The locations of existing utilities are shown on the Contract drawings as an approximation only. The Contractor shall perform a pre-construction utility survey, including any required test pits, to determine the location of all known utilities no later than thirty (30) calendar days before commencing physical site work in the affected area.

F. POST UTILITY SURVEY – NOTIFICATION

Following completion of a utility survey of existing locations, the Contractor will be responsible to notify the Engineer of any known conflicts associated with the actual location of utilities prior to the start of the work. The Engineer and the Contractor will coordinate with any utility whose assets are to be affected by the Work of this Contract. A partial list of utility contact information is provided in the Project Utility Coordination Form.

G. MEETINGS AND COOPERATION WITH UTILITY OWNERS

The Contractor shall notify the Engineer in advance of any meeting they initiate with a Utility Owner's representative to allow MassDOT to participate in the meeting if needed.

Prior to the Pre-Construction Meeting, the Contractor should meet with all Utility Owners who will be required to perform utility relocations within the first 6 months of the project, to update the affected utilities of the Project Utility Coordination Form and all other applicable Contract requirements that impact the Utilities. The Contractor shall copy the Engineer on any correspondence between the Utility Owner and the Contractor.

H. FORCE ACCOUNT / UTILITY MONITORING REQUIREMENTS

The Engineer will be responsible for recording daily Utility work force reports. The start, suspension, re-start, and completion dates of each of the Utilities, within each phase of the utility relocation work, will be monitored and agreed to by the Engineer and the Contractor as the work progresses.

I. ACCESS AND INSPECTION

The Contractor shall be responsible for allowing Utility owners access to their own utilities to perform the relocations and/or inspections. The Contractor shall schedule their work accordingly so as not to delay or prevent each utility from maintaining their relocation schedule.

COMPLIANCE WITH THE NATIONAL DEFENSE AUTHORIZATION ACT

(Supplementing Subsection 7.01)

On all projects, the "Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment" Regulation (2 CFR 200.216) prohibits the Contractor from using or furnishing the following telecommunications equipment or services:

- Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
- For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
- Telecommunications or video surveillance services provided by such entities or using such equipment.
- Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

This prohibition applies to all products manufactured by the aforementioned companies, including any individual components or parts.

By submitting a bid on a project, the Contractor certifies that all work will be in compliance with the terms of 2 CFR 200.216. The Contractor shall submit a COC indicating compliance with the above provisions for all telecommunications equipment or services included in the Contract.

Payment for the item in which the materials are incorporated may be withheld until these COCs are received. Any cost involved in furnishing the certificate(s) shall be borne by the Contractor.

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. requires the following,

(1) all iron and steel used in the project are produced in the United States--this means all manufacturing processes, from the initial melting stage through the application of coatings, must occur in the United States. Foreign steel and iron can be used if the cost of the materials does not exceed 0.1% of the total Contract cost or $2,500, whichever is greater. The action of applying a coating to a covered material (i.e., steel and iron) is deemed a manufacturing process subject to Buy America. Coating includes epoxy coating, galvanizing, painting and any other coating that protects or enhances the value of a material subject to requirements of Build America, Buy America. Steel used for temporary support of excavation, including H piles, soldier piles, and sheeting when the steel is required to be left in place is subject to requirements of Build America, Buy America. Temporary steel, shall remain in place when it falls within the influence zone of the soil supporting any structure or railroad tracks.

(2) all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States and

(3) all construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States. "Construction materials" includes an article, material, or supply—other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives—that is or consists primarily of:

- non-ferrous metals,
- plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables),
- glass (including optic glass),
- lumber; or
- drywall.

The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.

All articles, materials, and supplies should be classified as an iron or steel product, a manufactured product, or another product as specified by law or in 2 CFR part 184 (such other products specified by law or in 2 CFR part 184 include "excluded materials" and "construction materials"); an article, material, or supply must not be considered to fall into multiple categories.

GENERAL REQUIREMENTS FOR DEMOLITION AND WORK INVOLVING PAINTED STEEL

(02/06/2020)

Demolition and work involving painted steel shall conform to the requirements of Subsection 961 of the Standard Specifications.

Work Involving Painted Steel

Hazardous materials shall be removed in the immediate area of any intended welding, heating, saw cutting or burning of steel. Hazardous material removal is required to allow the demolition of structural steel, railings, drainage systems, utility supports, steel lamp posts, etc.

The contractor shall assume that the coatings on the steel contain lead (Pb), unless otherwise determined by testing. The contractor shall certify in writing to the Engineer the results of all testing, and shall also certify that any lead (Pb) coated steel removed from the project was not reused or buried, but was sent to a scrap metal recycling facility.

Implement and maintain programs and procedures, which comply with the requirements of this specification and all applicable standards and regulations. Comply with all applicable regulations even if the regulation is not specifically referenced herein. If a state or local regulation is more restrictive than the regulation of this specification, follow the more restrictive requirements.

This requirement is intended only for the demolition and preparation prior to repair and does not include provisions for recoating of steel.

Environmental

All applicable portions of Subsections 961.65 “Worker Protection” and 961.66 “Environmental Protection and Monitoring” shall be followed when performing this work.

During chemical stripping a hand washing facility may be used in lieu of a decontamination/changing facility.

Hazardous material shall be collected during the disassembly and disposed of as outlined in Subsection 961.68 “Handling of Hazardous Waste and Reporting Release Programs”.

The applicable submittals shall be according to Subsection 961.69 “Submittals”.

GENERAL REQUIREMENTS FOR DEMOLITION AND WORK INVOLVING PAINTED STEEL (Continued)

Cleaning/Removal

Cutting Or Burning Of Steel

All surfaces to be welded, heated, saw cut or burned shall be cleaned so as to remove all contaminants and/or hazardous materials, which could be discharged to the environment as a function of the subsequent operations.

Lead paint shall be removed in its entirety in an area prescribed by a 6 inch (15 cm) minimum offset from the required work. The paint removal operation may be dry abrasive blasting, wet abrasive blasting or chemical stripping.

Proper level of containment shall be used when performing this work in accordance with Subsection 961.67 "Containment". Full containment is not required during chemical stripping operation however; the Contractor shall install proper shielding and/or tarpaulins under the chemical stripping operations in order to catch all debris generated during this procedure. A cleaned area must be inspected and approved before the demolition operations are started.

During cleaning operations the Contractor shall be required to furnish and erect temporary floodlights illuminating the steel surface at a minimum of 30-foot candles. This lighting shall be used in areas where there is insufficient lighting for proper cleaning operations and inspection. The Contractor shall supply electrical power.

The Contractor shall provide support for interim and final inspection of the bridge during cleaning operations. This support shall include the necessary traffic controls and safe access to the work.

Mechanical Disassembly Of Steel

All surfaces to be mechanically disassembled by shear cutting or removing bolts or rivets shall not require deleading. When shear cutting or removing bolts or rivets, the Contractor shall not use any method that will cause dust and/or particles to be emitted and/or dispersed into the environment to an extent that would expose the workers above the Action Levels of 30µg/m3.

For purposes of limiting the lead (Pb) dust, the Contractor will be required to dampen the lead paint work areas.

The contractor shall install a proper shielding and/or tarpaulins under all lead-paint-coated surfaces to be shear cut or bolts or rivets ordered removed in order to catch any loose lead paint chips, dust or particles.

PIGEON WASTE

The Contractor shall remove and dispose of the pigeon waste and any other debris accumulated on the steel members and bridge seats in areas where work is being performed. Pigeon waste and debris material contaminants will require special handling and disposal in accordance with all Federal, state, and local requirements. No separate payment will be made for removal and disposal of pigeon waste. Cost shall be incidental to the contract pay items.

PROTECTION OF UNDERGROUND FACILITIES

The Contractor's attention is directed to the necessity of making his own investigation in order to assure that no damage to existing structures, drainage lines, traffic signal conduits, etcetera, will occur. No cranes or other construction equipment will be allowed to park above the Metropolitan District Commission (MDC) pipes.

The Contractor may use Test Pits or other means to verify locations and adequate cover of underground utilities, as required by the Engineer.

The Contractor shall immediately notify the Engineer where utility conflicts are observed or where the location of existing utilities differ from those shown on the Drawings. The Contractor shall also notify the Engineer where utilities have inadequate cover.

NOTICE TO OWNERS OF UTILITIES

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

Before the Contractor begins any work or operations that might damage any subsurface structures, he shall carefully locate all such structures and conduct his operations so as to avoid any damage to them.

It shall be the responsibility of the Contractor to coordinate the removal of abandoned utilities to be removed by others when conducting operations which may require utility removal in a timely fashion.

Gas:
Eversource Gas
157 Cordaville Road, 3113
Southborough, MA 01772
Contact: Jeffrey Evans-Mongeon
Tel: 508-305-6970
Email: jeffrey.evans-mongeon@eversource.com

NOTICE TO OWNERS OF UTILITIES (Continued)

DPW:
Holden DPW (Highway)
18 Industrial Drive
Holden, MA 01520
Contact: Nicholas Schwartz
Tel: 508-210-5550

Pole Set Responsibility:
Holden Municipal Light Department
1 Holden Street
Holden, MA 01520
Contact: Barry Tupper
Tel: 508-210-5400
Email: btupper@holdenma.gov

National Grid Electric
Contact: Manuel Munoz
Tel: 401-895-9726
Email: manuel.munoz@nationalgrid.com

District Utility/Constructability Engineer:
MassDOT District 3 Utility/Constructability Engineer
499 Plantation Street
Worcester, MA 01605
Contact: Ross Goodale
Tel: 508-479-9024
Email: ross.a.goodale@state.ma.us

Electric:
Holden Municipal Light Department
1 Holden Street
Holden, MA 01520
Contact: Barry Tupper
Tel: 508-210-5400
Email: btupper@holdenma.gov

Water & Sewer:
Holden DPW
18 Industrial Drive
Holden, MA 01520
Contact: Nicholas Schwartz
Tel: 508-210-5550

NOTICE TO OWNERS OF UTILITIES (Continued)

Railroad:
Providence & Worcester R.R
75 Hammond Street
Worcester, MA 01610
Contact: Greg Breaston
Email: greg.breaston@gwrr.com

Railroad:
Contact: Paul Koppana
Email: pkoppana@benesch.com

Cable:
Charter Communications
301 Barber Avenue
Worcester MA 01606
Contact: John Yurkevicius
Tel: 774-243-9786
Email: john.yurkevicius@charter.com

Crown Castle
80 Central Street
Boxborough, MA 01719
Contact: Mark Bonanno
Tel: 508-616-7818
Email: mark.bonanno@crowncastle.com

Telephone:
Verizon
385 Myles Standish Blvd.
Taunton, MA 02780
Contact: Paul Styspeck
Tel: 413-787-1845
Email: paul.m.styspeck@verizon.com

A list of public and private utilities can be found on the MassDOT website at:

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

Select District 3
Select the Town of Holden, and then locate the utility
The utility contact list is for guidance only and is not guaranteed to be complete or up to date.

NOTICE TO OWNERS OF UTILITIES (Continued)

EVERSOURCE EMERGENCY TELEPHONE NUMBERS

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

HOLDEN MUNICIPAL LIGHT DEPARTMENT

ELECTRIC
Emergency: 508-210-5600
Customer Support: 508-210-5400

TOWN OF HOLDEN SPECIFICATIONS FOR WATER, SEWER, DRAINAGE

The Town of Holden Specifications for Water, Sewer, Drainage may be found at the following links:

https://www.holdenma.gov/town-clerk/pages/chapter-95-sewer-rules-and-regulations

https://www.holdenma.gov/sites/g/files/vyhlif4526/f/uploads/chapter_9.2_water_div_rr_-_revised_5.3.21_1.pdf

https://www.holdenma.gov/sites/g/files/vyhlif4526/f/uploads/holden_stormwater_rules_and_regulations_06.21.21.pdf

TRAFFIC OFFICERS AND RAILROAD FLAGGING SERVICE
(Supplementing Subsection 7.11)

Under the provisions of Chapter 634 of the Acts of 1971, the railroad shall furnish, without cost, the necessary flag protection on the railroad right-of-way which may be required for bridge inspection, maintenance and repair, reconstruction or replacement.

The Contractor, however, is responsible for all costs incurred in restoring tracks that have been disturbed by the Contractor's operations. Reference is made to the Railroad Special Provisions hereinafter included.

2026 FIFA WORLD CUP – BOSTON, MASSACHUSETTS

The 2026 FIFA World Cup will be held at Gillette Stadium in Foxborough, related events, and significant tourist events such as Sail Boston and the 250th Anniversary of the United States will be held throughout the region. Matches and Fan Fest and other possible 250th Celebration activities are scheduled through June, July and August 2026. The District will be imposing work and/or traffic restrictions as necessary to minimize impacts during these periods when, as determined by MassDOT, the Contractor's operations could impact vehicular traffic, particularly on interstate highways and major arterials throughout the region and local roads near event sites. No additional compensation will be allowed for work restrictions except as determined under Subsection 8.10. nor will the Contractor have any claim for related costs, direct or indirect. The Contract time determinations have accounted for potential work restriction during this period and Contractor's should plan accordingly. Any necessary or emergency work required during this time will require District approval.

ENVIRONMENTAL PERMITTING

The proposed work does not occur in jurisdictional wetland resources subject to section 401 or section 404 of the Clean Water Act; therefore, the project does not require a Water Quality Certification from the Massachusetts Department of Environmental Protection or authorization from the US Army Corps of Engineers. The proposed work qualifies for the bridge exemption authorized in the Transportation Bond Bill and is therefore not subject to the Massachusetts Wetlands Protection Act, the Massachusetts Public Waterfront Act (Chapter 91), or the Massachusetts Environmental Policy Act. The Department of Conservation and Recreation has issued a Decision under the Watershed Protection Act. If field conditions and/or Contractor-proposed erection, demolition, staging, or other procedures require work to occur in or otherwise impact water or wetland resource areas, the Contractor is advised that no associated work can occur until all required environmental permits have been obtained allowing such work. The Contractor must notify the District Highway Director and Resident Engineer in writing at least 60 days prior to desire commencement of the proposed activity. All environmental submittals, including any Contract with Local, State, or Federal environmental agencies, must be coordinated with the District 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 obtain the environmental permits.

CONTROL OF WATER

The Contractor is notified that s/he will be responsible and held accountable for performing any/all work necessary to control water encountered in any and all excavations necessary for the project.

Such work shall include but not be limited to excavation for all utility structures and pipe trenches constructed. Under this contract, payment for control of water for drainage and pipe will be considered incidental to the excavation and utility construction items on the project.

LIGHTING

The Contractor shall direct lighting away from suitable habitat (e.g. forested habitat). Use downward-facing, full cut-off lens lights, and direct lighting away from suitable habitat when installing new or replacing existing permanent lights.

FENCE PROTECTION

The Contractor shall take great care to maintain existing fences which are denoted with a disposition to be retained. Damaged fencing shall be repaired in kind to a condition equal to or better than that of the original. The cost of fencing repair or replacement for any fence designated to be retained shall be borne by the Contractor and shall be performed at no cost to the Owner.

NORTHERN LONG-EARED BAT AND TRICOLORED BAT PROTECTION

The northern long-eared bat (*Myotis septentrionalis*; NLEB) and tricolored bat (*Perimyotis subflavus*; TCB) are listed as federally endangered or proposed endangered, respectfully, under the Endangered Species Act (ESA). The U.S. Fish and Wildlife Service (USFWS) developed this guidance to address ESA compliance and promote conservation of NLEB and TCB. This project has been consulted with the USFWS through the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and Federal Transit Administration (FTA) Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024. and generated a May Affect, Not Likely to Adversely Affect (NLAA) determination (see Document A00844). Subsequently, the project has completed Section 7 consultation under the ESA.

In advance of the uplisting of the TCB to endangered under the ESA, the following Avoidance and Minimization Measures (AMMs) must be strictly adhered to in order to protect NLEB and TCB and to be in compliance with the ESA. Contact MassDOT Environmental Services - Wildlife Unit Supervisor for questions about project limits, restrictions, or conservation measures.

General AMM

- The Contractor shall ensure all personnel working in on the project site are aware of all environmental commitments related to NLEB and TCB, including all applicable AMMs. NLEB and TCB information (https://www.fws.gov/midwest/endangered/mammals/nleb/ and https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus) shall be made available to all personnel.
- On 6/20/2023, MassDOT Highway Division Environmental Services conducted a northern long-eared bat summer presence/absence survey, in accordance with the 2023 survey guidelines. The survey did not confirm the presence of NLEB and/or TCB. If work is proposed by the Contractor past 6/20/2028, additional review is required by the MassDOT Highway Division's Environmental Services Section, and additional review and restrictions may be required by the USFWS.

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.*

Bridge AMM

- On 10/9/2024, MassDOT Highway Division Environmental Services, conducted a northern long-eared bat bridge/structure bat assessment, in accordance with the USFWS guidelines. The assessment did not find presence of, or evidence of use by bats, and as stated within the guidelines, the assessment is valid for two years. If bridge work is not complete before 10/9/2026, assessment of the bridge for the presence of, or evidence of use by, bats shall be completed by the MassDOT Wildlife Unit prior to continuing bridge work. The Contractor shall notify the MassDOT Wildlife Unit no later than fourteen (14) days prior to 10/9/2026 to provide adequate time for inspection. If bats are found to be present, or, if there is evidence of bat usage, work at the bridge shall not commence until after the MassDOT Wildlife Unit has completed coordination with the US Fish and Wildlife Service to determine the appropriate follow up or mitigation actions.

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.

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.

ABUTTER ACCESS

The Contractor shall maintain access to all private property throughout and at the completion of construction. A paved driveway apron shall be constructed to private residences as shown on the plans or otherwise matching existing locations and widths. If conditions warrant that the driveway construction extend beyond the limits shown on the plans, the Contractor shall notify the Engineer immediately and the limit of driveway construction will be approved by the Engineer prior to proceeding with the work.

PROVISIONS FOR PROSECUTION OF THE WORK

(Supplementing Subsection 8.03)

Before starting any work under this Contract, the Contractor shall prepare, and submit to the Engineer for approval, a plan (based on the Contract traffic management plans) that indicates the traffic routing proposed by the Contractor during the various stages and time periods of the work and the temporary barricades, signs, drums and other traffic control devices to be employed during each stage and time period. Particular care should be taken to establish and maintain methods and procedures that will not create unnecessary or unusual hazards to public safety.

Additionally, The Contractor is hereby notified that winter work is expected for this project and has been taken into account in setting the completion date for the contract. Items of work that are expected to continue into the winter months include, but are not limited to, demolition of existing structures and construction of soldier pile and lagging retaining walls. The relevant provisions of Section 901.33 shall be followed. Any costs, either direct costs or resulting from inefficiencies, related to continuing work in the winter shall be included in the Contractor's bid and shall not be cause for a claim for a time extension or additional compensation.

EQUIVALENT SINGLE AXLE LOADS (ESALS)

The estimated traffic level to be used for SUPERPAVE HMA mixture designs for this contract, expressed in Equivalent Single Axle Loads (ESALs) for the design travel lane over a 20-year period, is **1.1 Million** 18-kip (80-kn) ESALs.

ASIAN LONGHORNED BEETLE ADVISORY

This project falls within the Asian Longhorned Beetle (ALB) Eradication Program Regulated Boundary. Bidders should familiarize themselves with the ALB Factsheet, Federal Regulations, and the Animal and Plant Health Inspection Service (APHIS)/USDA website www.aphis.usda.gov. The following contract bid items may be affected by this condition: Items 101, 101.2, 103. and 104. It is possible that certain additional training & certification requirements and special disposal requirements will be required at a minimum. Bidders shall include any additional costs of compliance with city, state and federal regulations within the above bid items at this time.

Working in Massachusetts' ALB Regulated Areas APHIS has partnered with the U.S. Forest Service, the Massachusetts Department of Conservation and Recreation, the Massachusetts Department of Agricultural Resources, and the City of Worcester. Together, these organizations form the ALB Cooperative Eradication Program in Massachusetts. Both Federal and State law establish regulated areas around ALB infestations. The regulated areas assist in beetle eradication by curtailing the movement of materials that could host populations of the ALB. This keeps infestations from spreading. Federal and State laws outline the conditions and requirements for moving regulated articles out of or within the infested area. The Federal regulation can be found at 7 CFR 301.51. Training sessions, workshops, and other outreach tools designed to assist businesses with compliance are offered in the Worcester area to explain the ALB and laws enacted to eradicate it.

VALUE ENGINEERING CHANGE PROPOSAL

This Subsection defines the conditions and requirements which apply to Value Engineering Change Proposals ("VECPs"). The purpose of this provision is to encourage the Contractor to propose changes in certain project requirements that will maintain the project's functional requirements at a savings in contract time, contract price, or both. The net savings obtained by using a VECP that meets the conditions and requirements set forth here will be shared by the Contractor and MassDOT.

VECP's under this provison are to be initiated, developed and submitted to MassDOT by the Contractor. The VECP must show the contemplated changes to the Drawings, Specifications and other requirements in the Contract. When a VECP submitted pursuant to this section is fully accepted by MassDOT, the VECP will be implemented by the Contractor and paid using the current cost and resource loaded schedule. Contractor shall demonstrate that the VECP is equal to, or better than, the original design or material; that there is an interest in public safety within the VECP; that there is a life-cycle cost benefit; and/or that end users will benefit from the shortened schedule. VECPs shall be consistent with the MassHighway/MassDOT Standard Specifications for Highways and Bridges and other applicable reference documents and directives. Any proposed deviation from these documents will need to be clearly identified in the VECP Proposal Documents, and must be approved by MassDOT's Chief Engineer before accepting this VECP.

A. In order to be considered for MassDOT review each VECP shall:
   1. Be clearly labeled pursuant to this Subsection;

   2. Yield a net savings at least two hundred and fifty thousand (250,000.00) Dollars and/or a net saving of contract completion duration of at least three (3) months;

   3. The proposed changes to contract items must:

      a. maintain the specified items' required functions (service life, reliability);

      b. meet applicable safety regulations and codes;

      c. material substitutions must be in accordance with DOT prequalified/preapproved products and must be tested in accordance with standard material specs/testing methods (and considering all relevant environmental, load, and other relevant factors);

      d. show economy of operation, ease of maintenance, ease of construction, and necessary standardized features and appearance; and

   4. Shall not require an extension of Contract Time or Contract Milestones, with the exception of cases when there are anticipated significant cost saving.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

The thresholds above are considered to be a general guideline. MassDOT will consider VECPs outside of these thresholds if a significant benefit is demonstrated. Additionally, notwithstanding this VECP process, MassDOT will consider minor revisions in the form of a Contract Modification.

Further, any VECP submitted shall be in sufficient detail to clearly define the proposed change. The Contractor's failure to provide information of the type, detail and in a format to facilitate the MassDOT's review, may be grounds for rejection of the VECP. Additionally, the Contractor will not be entitled to any equitable adjustment or increased Time, due to any aspect of any of the proposed VECP including permitting, right of way, utility coordination or delayed responses by MassDOT. If, after the progression of the work associated with the executed Contract Modification for the VECP, any additional costs are realized by the Contractor or any of the sub- consultants, sub-contractors, or suppliers, the Contractor shall be obligated to pay for any and all costs.

B. The following initial items shall be provided by the Contractor for MassDOT's review. *Items 1-6 need to be submitted prior to the start of MassDOT's review of the VECP and item 7 is an important consideration for the pricing of the VECP and the timeline of the proposed VECP schedule.*

1. ***VECP Description***: A description of the difference between the existing and the proposed Contract requirements, and the comparative advantages and disadvantages of each;

2. ***VECP Change Listing***: A listing of the Contract requirements that will need to be changed, modified, or reviewed as well as the proposed Contract document changes in the Instructions to Bidders, Contract, Standard Specifications, General Requirements and Special Provisions required by the VECP.

3. ***Construction Schedule Update*****:** Any changes in the Contract Time(s) or Contract Milestone(s), that will result from acceptance of the VECP, shall be accompanied by a contemporaneous schedule analysis *(i.e, the Contractor's baseline schedule submission, all past/required monthly schedule updates, a detailed assessment of all past delays, and a resource loaded Crticial Path Method schedule as specified in Section 8.0 / Subsection 8.02 of this Contract)* of the projected Work that remains including the proposed VECP related schedule changes *(inclusive of the timeline to review accept the VECP and the timeline for implementing the design changes)* in the remaining work. This shall be submitted in the form of a Proposal Schedule until the VECP has been formally accepted. Note: All of this information is to be updated, recertified, and formally accepted by MassDOT before final acceptance of this this VECP is issued.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

4. ***Date for MassDOT's Acceptance***: A statement that clearly justifies the date by which the VECP must be accepted to obtain the maximum price reduction, noting any effect upon the Contract Time(s) and/or Contract Milestone(s). This statement must include a narrative that demonstrates the most recent construction schedule has been utilized to justify that proposed acceptance date *(e.g. "in order to start to fabricate critical materials, authorization must be provided to work on the shop drawings by no later than [date]").* The Contractor should allow for at least sixty (60) to ninety (90) days for acceptance by MassDOT once all of the VECP documentation has been provided. Acceptance shall mean that MassDOT has received a finalized and executed contract modification. However, this is a proposed Contract change.

   The Contractor is fully obligated to progress the Work of the original Contract and MassDOT is not liable for any delays or costs that may occur in the review phase of any VECP proposal.

5. ***Cost and Savings Estimates***: A detailed estimate of the anticipated net savings, calculated as follows:

   a. ***Original Scope:*** Isolate the cost of performing the original contract construction activities, in accordance with the original Contract Documents, as originally bid by the Contractor, that are anticipated to be superseded by the VECP. *This cost is to include any original contract scope that is anticipated to be altered or eliminated by the VECP such as, shop drawing preparation, inspection work, testing, maintenance of traffic, or any other original contract costs, that have yet to have been performed at the time of this VECP submission.*

   b. ***New VECP Scope:*** Calculate the cost of performing the comparable construction activities associated with the VECP.

   c. ***Contractor's Engineer & Inspection***: Calculate the cost of engineering, inspection, and design work by the Contractor's Engineer/Designer. This should be a realistic estimate of the costs of any required engineering, design and review work by the Contractor's Engineer.

   d. ***MassDOT's Costs:*** MassDOT's estimate of costs to perform engineering/design reviews, cost estimate reviews, schedule reviews, and any other administrative costs to review and recommend implementation of the proposed VECP. *(including all anticipated increased costs to MassDOT on other Contracts and all anticipated follow-on increased costs to MassDOT, if any)* as provided by MassDOT. MassDOT's estimated costs must be included the VECP calculation and will be provided by MassDOT in support of the VECP evaluation process.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

e. ***Other Costs:*** Estimated costs associated with any revisions to other project related costs, such as Environmental Permits or Right of Way acquisitions, including other agency or municipality costs, as provided by MassDOT.

Net Savings:
The net savings to be split between MassDOT and the Contractor shall be calculated using the items above as follows: a - (b+c+d+e) = net savings

6. *The Contractor shall also provide:*

a. A proposed Change Order, which explains and justifies any required Equitable Adjustment in the Contract Price.

b. The Contractor's actual costs expended for developing the VECP as of the date of the VECP submission;

***7. Design Changes and Drawings*:** The costs that are outlined above should be inclusive of the following design and engineering responsibilities.

a. Design changes shall be prepared and stamped by the Contractor's professional designer and/or engineer. In addition, in the development of the VECP; the Contractor is responsible for anticipating and managing all aspects associated with any VECP design work that must be performed by a licensed Engineer.

b. The Contractor's engineer must analyze and stamp all components of any aspect of the project that has been redesigned, changed, or altered as a result of this VECP.

c. The Contractor's engineer shall provide all calculations and supporting design/engineering documentation that was utilized to develop the changes and stamped drawings. These will be used by MassDOT's Designer-of-Record to review the VECP changes. The Contractor is limited to selecting only those engineer's that have been pre-qualified by MassDOT's A&E Board.

d. MassDOT's Designer-of-Record will review and respond to all completed design submissions related to this VECP within thirty (30) calendar days, unless determined to be a non-critical path item.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

e. MassDOT will be responsible for estimating and managing MassDOT's Designer-of-Record during the VECP review and implementation. Should any significant conflicts arise, between the Contractor's Engineer and MassDOT's Designer-of-Record, the DOT and the Contractor will work expeditiously to resolve the conflict. Should this type of conflict continue for greater than five (5) days, the Contractor is to bear all financial and time related impacts of such delay and must seek to resolve the design conflict, in an acceptable manner to MassDOT. The resolution of this conflict will be funded at the Contractor's expense – exclusive of the net saving that was agreed to at the execution of the contract modification for this VECP.

f. The Contractor's Engineer may also be required to inspect the construction work. The Contractor is to include such anticipated inspection costs in the initial VECP.

g. MassDOT's Designer of Record will remain the Designer-of-Record for the entire Project. Any costs incurred in the use of MassDOT's Designer-of-Record by MassDOT or Contractor associated with the review of a VECP are to be included in the calculated net savings.

C. Approval of the VECP shall not occur until a Contract Modification, incorporating the VECP, is issued by MassDOT and properly executed by the Contractor. MassDOT may accept or reject part or all of any VECP at any time prior to an executed Contract Modification for the applicable VECP. The decision of MassDOT, concerning acceptance or rejection of any VECP, shall be final and shall not be subject to dispute resolution.

It is expected that several weeks may go by before the final VECP documentation has been executed with a Contract Modification. Therefore, MassDOT intends to make certain that the initial cost estimate information has not changed before entering into a Contract Modification. As the VECP evaluation process is finalized, and prior to the signed Contract Modification for the VECP, the Contractor and MassDOT must re-certify the current status of the originally proposed cost and/or schedule savings.

Until a contract modification is issued and schedule and cost/savings re-certification is complete and accepted by MassDOT, the Contractor shall remain obligated to perform the Work in accordance with the terms and conditions of the original Contract Documents.

Upon completion of the work associated with the VECP, MassDOT may require verification that the VECP savings has been achieved.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

D. VECPs will be processed (distributed, reviewed, commented upon, accepted or rejected) expeditiously (pursuant to M.G.L. c. 30, § 39R); however, as this is an elective modification to the contract, MassDOT shall not be liable for any delay or cost in the review and acceptance of the VECP. During the review of the VECP, the Contractor remains obligated to progress the original Contract scope, and schedule, as planned; until a Contract Modification, accepting the Contractor re-certified VECP, has been executed by MassDOT.

The Contractor has the right to withdraw part, or all of any VECP, prior to acceptance by MassDOT. Such withdrawal shall be made in writing to the Engineer. The Contractor shall state the period of time, from the date of the initial VECP submittal, that the VECP shall remain valid and feasible. Revision of this validity and feasibility period shall be allowed only by mutual agreement of the Contractor and the Engineer in writing.

If the Contractor desires to withdraw the proposal prior to the expiration of this period for non-technical reason, MassDOT reserves the right to recover all actual costs that have been incurred to MassDOT.

If the Contractor withdraws the VEC Proposal, MassDOT reserves the right to proceed with the VECP or any portion of the VECP as a normal change and the Contractor waives any right it may have had to share in net savings thereunder.

For purposes of this provision, expiration of the time established by the Contractor for approval shall be considered as withdrawal by the Contractor if MassDOT requests an extension of that time and the Contractor does not provide a written extension.

E. With regard to unknown conditions or sub-surface work, in general, the expectation is that the Contractor and MassDOT will strive to gain enough knowledge about the risks in order to provide a forward-priced Change Proposal. Therefore, any costs to fully evaluate the proposal, such as additional borings and/or test pits, must be considered in the cost evaluation of whether the VECP is worth pursuing. However, if it is impractical to gather conclusive exploratory information, before the VECP is executed, MassDOT may consider provisions in the VECP that clearly identifies the risk sharing (cost and time) related specifically to the unknown/sub-surface conditions. If these VECP provisions are acceptable to MassDOT they are to include supplemental language to provide a determination of the final savings/cost, and time impacts, no later than 45 days after the sub-surface work is completed. All other aspects of the VECP, unrelated to these Provisions, will be binding upon execution of the VECP.

NONCONFORMING COMPRESSIVE STRENGTH OF CEMENT CONCRETE

Concrete with compressive strength test results failing to attain the limits specified in Table 901.64-3 of 901.64.B: Acceptance Testing shall be evaluated for structural adequacy and serviceability at the Contractors' expense. The Department will review all production records, the concrete test records, petrographic analysis report, field notes, and the placement records for the concrete in question. If the Engineer determines the material is found to be adequate to remain in place, payment shall be adjusted in accordance with the following formula:

$$P = \frac{2(fc - f'c)(UP)(Q)}{f'c}$$

Where:

P = pay adjustment for substandard concrete
$f'c$ = specified minimum compressive strength at 28 days
fc = substandard concrete cylinder compressive strength at 56 days
Q = quantity of concrete represented by the acceptance cylinders tested
UP = unit contract price or the lump sum breakdown price per cubic yard for the class of concrete involved complete in place

ITEM 102.3 HERBICIDE TREATMENT OF INVASIVE PLANTS HOUR

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

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

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

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

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

This item is not intended for manual removal of plants.

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

Herbicide shall be applied during daytime hours only.

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

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

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

ITEM 102.3 (Continued)

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)

4. Crew leader must have expertise with invasive plant control and provide the following:
   a. Have held Core license for at least five (5) years.
   b. Resume listing five (5) or more years of experience applying pesticides with the company or with another company specializing in vegetation management.

SUBMITTALS

No work shall begin without approval of the submittals.

Submittals include the following items:

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.

ITEM 102.3 (Continued)

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

Herbicide Applications

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

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

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

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

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

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

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

Disposal Of Invasive Plant Material

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

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

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

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

ITEM 102.3 (Continued)

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

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

Follow-Up Treatment

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

MEASURE OF SUCCESS

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

METHOD OF MEASUREMENT

Item 102.3 will be measured for payment by the Hour of 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.

ITEM 102.3 (Continued)

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.

ITEM 102.33 (Continued)

V. Invasive Plant Treatment & Management

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

VI. Monitoring Schedule if requested by MassDOT.

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

Photo Documentation

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

METHODS

Initial Site Walk

Prior to any construction activities and soil disturbance, the Contractor shall walk the site with the Engineer and the MassDOT Landscape Architect to determine the IPMS. During the site walk the Contractor shall identify limits of work and, as necessary, mark locations of areas designated for treatment and individual plants targeted for treatment or removal. The Contractor shall be responsible for marking delineated areas and plants to be preserved, removed, or otherwise treated. Fencing or other materials needed for marking and delineating protected areas shall be incidental to this item.

IPMS Follow-up Amendment

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

ITEM 102.33 (Continued)

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.

ITEM 102.511 (Continued)

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).

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.

ITEM 102.511 (Continued)

- 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.

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

ITEM 102.521 (Continued)

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

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

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

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

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

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

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

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

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

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

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

ITEM 102.521 (Continued)

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

- Forty (40) percent of the value payment will be made upon installation of 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.

ITEM 102.55 (Continued)

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:

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;

ITEM 102.55 (Continued)

- 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

- Special Care
  - oversee tree pruning for health and aesthetics
  - recommend fertilization and amendments
  - recommend and oversee pest control

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.

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 114.1 DEMOLITION OF SUPERSTRUCTURE OF BRIDGE NO. H-18-004 LUMP SUM

The work under this item shall conform to the relevant provisions of Subsection 112 of the Standard Specifications and the following:

The Contactor will make his own investigation of the structure to be demolished including the materials that are part of, or may be stored in the structure. No increase will be made to the bid price due to the nature of the materials involved in the demolition or to the depth of the existing structure. All costs for permits, dump fees, special handling of hazardous materials, etcetera, shall be included in the bid price of the demolition item.

The work done under this Item includes the demolition of the existing superstructure of Bridge No. H-18-004 (225). The work shall include (but is not limited to) removal and satisfactory disposal of the existing concrete deck beam bridge superstructure, approach slabs, etc. The existing bridge superstructure is in poor condition and is transversely post-tensioned and extra care will be required during demolition.

SUBMITTALS

The Contractor shall prepare and submit a plan indicating the proposed demolition procedures including dust control, and methods to be used including equipment, tools, devices, crane capacity and location, schedule of operations, methods of utility protection, and disposal location to the Engineer for approval. The demolition procedures and any necessary calculations and drawings shall be stamped by a Professional Structural Engineer registered in Massachusetts, certifying that all existing structural members are suitably braced and supported throughout the demolition process. The Contractor shall be aware and make adequate provision for the protection and/or relocations of overhead utilities located near the existing structures. The Contactor's plans for demolition shall be approved by the Engineer and PWRR prior to commencement of the work. This submittal will need to be submitted shortly after receiving notice to proceed in order to prevent delay in approval from the railroad.

Except as specified, all materials and debris removed under Item 114.1 shall become the property of the Contractor, and shall be recycled, reused or disposed of in accordance with all applicable local, state and federal requirements. Demolition and work involving painted steel shall conform to the requirements of Section 961 of the 2026 Standard Specifications for Highways and Bridges and the special provisions described above. All hazardous materials shall be contained and disposed of in accordance with state and federal environmental regulations.

ITEM 114.1 (Continued)

Debris from demolition must be carefully contained within the work zones and prevented from falling/infiltrating onto the railroad below. Shielding shall be in place to protect the railroad and utilities prior to any demolition work (see Item 994.01). Any material that accidentally falls outside of the shielding limits shall be immediately removed. Contractor shall control dust resulting from demolition operations. Contractor shall provide noise pollution and dust monitoring throughout construction. Demolition near the railroad shall meet all requirements of the railroad owner, including but not limited to, maintaining horizontal offsets to the tracks, requesting foul time if needed to encroach the foul zone to complete the work, protecting the railroad tracks from disturbances and unsettling, etc. No reduction in horizontal or vertical clearances shall be permitted at any time during construction. The Contractor shall coordinate with the railroad owner prior to demolition.

All submittals shall be in accordance with Subsections 112, 960.61, and 961.66.

CONSTRUCTION DUST CONTROL AND MONITORING

1.1 General

The Contractor is responsible for controlling construction related dust emissions at all times during the work of this Contract, 24 hours per day, 7 days per week, including nonworking hours, weekends and holidays.

1.2 Regulatory Requirements

The Contractor shall perform all Work specified under this Section in compliance with the provisions of the Massachusetts Department of Environmental Protection Code of Massachusetts Regulations (CMR) 310 CMR 7.09 “Dust, Odor, Construction and Demolition”.

Work of this Contract shall be conducted in a manner that will not result in excessive particulate matter emissions, nuisance dust conditions, or PM10 (particulate matter with an aerodynamic diameter less than or equal to 10 microns) concentrations exceeding the Massachusetts and National Ambient Air Quality Standard of 150 micrograms per cubic meter (µg/m3) on a 24-hour average basis measured at offsite receptor locations.

1.3 Submittals

Specific to the work to be performed for this contract, develop and submit for approval a Dust Control Plan (DCP) that outlines in detail the measures to be implemented to comply with this Section. For work activities to be performed, the plan should include details as to how dust emissions will be controlled and/or minimized for demolition activities, earthwork activities including excavation activities, stockpile material, and on public roadways. Any modifications to the approved DCP must be submitted to MassDOT for review and approval prior to implementation. Product literature and material Safety Data Sheets for dust suppression wetting agents and stabilizers must be submitted.

ITEM 114.1 (Continued)

1.4 Materials

1. Dust Suppression Agents
   a. Dust suppression wetting agents shall be water soluble, non-toxic, non-reactive, non-volatile, and non-foaming.
   b. Soil stabilizer shall be a sprayable organic or inorganic tackifier.
2. Barriers, Screens, and Covers
   a. Wind screens shall be a durable fabric mesh of 50 percent porosity, attached to a construction fence.
   b. Wind barriers shall be solid wood fences, solid durable fabric attached to construction fence, or other solid barriers intended to block the passage of wind.
   c. The construction fence itself (chain link or solid) is not part of this Section.
   d. Covers for stockpiles shall be plastic tarps.
3. Seeding
   a. Seeding for dust control shall conform to Subsection 765. The Contractor shall determine, through testing if necessary, the materisl and methods necessary for the Contractor to satisfacctirly produce a stand of grass that will effectively control dust.

1.5 Construction Methods

1. Construction Site Dust Control – General
   a. Wet suppression shall be used to provide temporary control of dust. Several applications per day may be necessary to control dust depending upon meteorological conditions and work activity. The Contractor shall apply wet suppression on a routine basis as necessary or as directed by MassDOT to control dust.
   b. Calcium chloride shall be used to control dust instead of wet suppression when freezing conditions exist. Calcium chloride shall be uniformly applied at one and on-half (1.5) pounds per square yard, unless otherwise directed by MassDOT. Ensure vegetation, or soil to be used for vegetation, is not treated.
   c. The use of petroleum products for dust suppression is prohibited in this Contract.
   d. Provide wind screens and wind barriers in locations where they would be effective in minimizing wind erosion and spread of dust within areas disturbed by the Contractor. Locations shall be submitted as part of the Contractor's DCP. The Contractor shall keep wind screens and barriers in good repair for the life of the Contract.
   e. Seeding used to prevent wind erosion shall be in accordance with Subsection 765. During seeding, furnish to MassDOT all container labels or empty containers from all materisl used. Do not seed without the direction of MassDOT.
   f. Compressed air will be permitted only for cleaning of non-particle debris, such as that from reinforcing bars. Cleaning debris from any surface or structure using copmpressed air is no permitted
   g. Only wet cutting of concrete block, concrete, and/or asphalt surfaces is allowed.

ITEM 114.1 (Continued)

2. Public Roadway Dust Control
   a. Vehicles leaving the construction site shall have no mud and dirt on the vehicle's body or wheels.
   b. Haul truck cargo areas shall be securely covered during material transport on public roadways.
   c. Material with high water content shall not be allowed to leak from truck cargo areas during transport over public roadway.
   d. Vehicle mud and dirt carryout, material spills and soil wash-out onto public roadways and walkways and other paved areas shall be immediately cleaned up.
   e. The Contractor is responsible for daily clean-up of public roadways and walkways affected by Work of this Contract. The Contractor shall use vacuuming, wet mopping, wet power sweeping, regenerative power air sweeping, or wet power broom sweeping on paved roadways. Dry power sweeping is prohibited.
3. Control of Earthwork Dust
   a. During batch drop operations (i.e., earthwork with front-end loader, clamshell bucket, or backhoe) the free drop height of excavated or aggregate material shall be reduced as practical to minimize the generation of dust.
   b. To prevent spills during transport, freeboard space shall be maintained between the material load and the top of the truck cargo bed rail.
4. Control of Stockpile Dust
   a. Wet suppression without wetting agent during active stockpile load-in, load-out and maintenance activities. Salty or brackish water shall not be used.
   b. Plastic tarps on stockpiles, secured with sandbags or an equivalent method to prevent the covers from being dislodged by the wind. The Contractor shall repair or replace covers whenever damaged or dislodged, without additional compensation.
   c. Soil stabilizers applied to the surface of inactive stockpiles.
   d. Seeding of inactive stockpiles.
   e. The method to be used shall be submitted for review and approval as part of the dust control plan specified under Submittals.
5. Demolition Dust Control Measures
   a. Wet suppression without wetting agent during demolition work shall be used.
   b. Demolition debris shall be removed promptly from the site.
   c. During transport of demolition debris, the truck cargo area shall be securely covered.

CONSTRUCTION NOISE CONTROL

1.1 General

This work shall conform to the relevant provisions of Subsection 850 of the Standard Specifications. The contractor shall coordinate with MassDOT Environmental Section prior to beginning construction of this Contract.

ITEM 114.1 (Continued)

The intent of noise control is to minimize construction noise within construction areas, lay-down areas, and residences/businesses adjacent to the construction site. The contractor will be required to comply with all applicable local noise regulations, specification requirements, and noise level limits specified herein.

The Contractor shall use equipment with efficient noise-suppression devices and employ other noise abatement measures such as enclosures and barriers such as enclosures and barriers necessary for the protection of the public. In addition, the Contractor shall schedule and conduct operations in a manner that will minimize to the greatest extent feasible, the disturbance to the public in areas adjacent to the work and to occupants of building in the vicinity of the Work.

In no case shall the restrictions identified in the item limit the Contractor's responsibility for compliance with all Federal, state and local safety ordinances and regulations.

1.2 Terms used:

Noise is any audible sound which has the potential to annoy or disturb humans or to cause an adverse psychological or physiological effect on humans.

Daytime refers to the period from 7AM to 6PM local time daily, except Sundays and Federal holidays

Evening refers to the period from 6 PM to 10 PM local time daily, except Sundays and Federal holidays

Nighttime refers to the period from 10 PM to 7 AM local time daily, as well as Sundays and Federal holidays

Noise-Sensitive Locations shall mean locations where particular sensitivities to noise exist, such as residential areas, institutions, hospitals and parks

Nuisance Noise refers to sound levels that annoy or disturb a reasonable person of normal sensitivities, but do not exceed the noise limits specified herein

Lot-Line refers to the line separating a parcel of land from another parcel or from the street

Background Noise shall be defined as the measured ambient noise level associated with all existing environmental, transportation, and community noise sources in the absence of any audible construction activity *dBa* shall be defined as the sound level (in decibels referenced to 20 micro-pascals) as measured using the A-weighting network on a sound level meter, in accordance with ANSI S1.5 Standards

Lmax shall be defined as the maximum measured sound level at any instant in time

ITEM 114.1 (Continued)

Leq shall be defined as the equivalent sound level, or the continuous sound level that represents the same sound energy as the varying sound levels, over a specified monitoring period

L10 shall be defined as the sound level exceeded 10 percent of the time for a specified monitoring period

Slow specifies a time constant or 1 second for the root-mean-square (RMS) detector used by a sound level meter, in accordance with ANSI S1.4 Standards.

Impact Noise is noise produced from impact or devices with discernible separation in sound pressure maxima. Examples for impact equipment include but are not limited to blasting, clam shovel or chisel drops, pavement breakers, jackhammers, hoe rams, mounted impact hammers, and impact pile drivers (but not vibratory pile drivers). Table 2 specifies types of equipment which are considered to emit impact or continuous noise.

1.3 Submittals:
Submit (as needed) the name, address, and qualifications of the Acoustical Engineer, as specified in this section for review and acceptance. Develop and submit for approval, a Noise Control Plan (NCP) that outlines in detail, the measures to be implemented by the Contractor to comply with this Section. Any modifications to the approved NCP must be submitted for review and approval prior to implementation. Submit (as needed) shop and working drawings, computations, material data, and other descriptions for abatement measures used as Temporary Noise Barriers, Acoustical Barrier Enclosures, or Noise Control Curtains as specified in this Section. Drawings and computations shall be stamped by a Registered Professional Engineer in the Commonwealth of Massachusetts.

1.4 Construction Limitations:
Noise Levels
Daytime, evening, and nighttime construction noise levels at noise-sensitive locations and other noise monitoring locations shall not exceed the limits specified in Table 1, unless the noise exceedances occur when mitigation consistent with this specification is utilized, as determined by MassDOT . The lot-line criteria shall apply to all points on a given lot-line of an affected receptor.

In addition, equipment operating under full load shall not exceed the Lmax noise limits specified in Table 2, unless noise exceedances occur when mitigation consistent with this specification is utilized, as determined by MassDOT. The 50-feet noise emission limits specified in Table 2 shall apply to the entire operation in which the equipment is engaged. Table 2 also provides distinction as to which equipment is considered to emit impact or continuous noise.

ITEM 114.1 (Continued)

Work shall be performed in a manner to prevent nuisance conditions such as noise which exhibits a specific audible frequency or tone (e.g., backup alarms, unmaintained equipment, brake squeal) or impact noise (e.g., jackhammers, joe rams). MassDOT will make any final interpretation concerning whether or not nuisance noise conditions exist. MassDOT has the authority to stop the Work until nuisance noise conditions are resolved, without additional time or compensation for the Contractor.

Equipment Operations
If night work is allowed by MassDOT then the use of all impact devices, including hoe rams, jackhammers, chiseling devices, and pavement breakers shall be prohibited during the nighttime hours (i.e. 10 PM to 7 AM). Any necessary use of impact devices between 10 PM and 7 AM shall be reviewed by the Engineer in advance and allowed as an exception only upon sufficient justification.

The Contractor shall use approve haul routes to minimize noise at residential and other sensitive noise receptor sites.

If night work is allowed by MassDOT then all equipment with backup alarms operated during the hours of 6 PM to 10 PM by the Contractor. Vendors, suppliers, and subcontractors on the construction site shall be equipped with either audible self-adjusting ambient-sensitive backup alarms or manually adjustable alarms. The ambient-sensitive alarms shall automatically adjust to a maximum of 5 dBA over the surrounding background noise levels. The manually adjustable alarms shall be set at the lowest setting required to be audible above the surrounding noise. Installation and use of the alarms shall be consistent with the performance requirement of the current revisions of Society of Automotive Engineering (SAE) J994, J1446, and OSHA regulations.

If night work is allowed by MassDOT for work between the hours of 10 PM to 7 AM then the Contractor shall use in lieu of audible backup alarms an appropriate alternative safety method in accordance with OSHA regulations (29 CFR Part 1926, Subpart "O", 1926.6O1.b.4 and 1926 6O2.a.9) and accepted Health and Safety Plan that is to be submitted by the Contractor. This applies to all vehicles and equipment operated by the Contractor, vendors, suppliers, and subcontractors on the construction site.

Per State regulations, engine idling for trucks is limited to 5 minutes maximum.

ITEM 114.1 (Continued)

1.5 Acoustical Engineer

The Acoustical Engineer identified in the heading shall oversee all requirements of this subsection.

The Acoustical Engineer shall have the following minimal qualifications:

2. Bachelor of Science of higher degree from a qualified program in engineering, physics, or architecture offered by an accredited university of college, and five years' experience in noise control engineering and construction noise analysis; or current enrollment as a full Member of Board-certified Member in the Institute or Noise Control Engineering (INCE).

3. Demonstrated substantial and responsible experience in preparing and implementing construction noise controls and monitoring plans on construction projects conducted in an urban setting, calculating construction noise levels, and designing and overseeing the implementation of construction noise abatement measures.

If at any point, in the judgment of the Engineer, the quality of the Acoustical Engineer's submittals proves to be repeatedly unacceptable, then the Engineer can require the submittal and selection of an alternative Acoustical Engineer meeting the requirements in this heading.

2.1 Materials – General

All equipment and materials specified in the part will remain the property of the Contractor or contractor's subcontractors, vendors and suppliers, as applicable.

2.2 Noise Reduction Materials and Equipment

Noise reduction materials may be new or used. Used materials shall be of a quality and condition to perform their designed function.

Noise reduction equipment and materials may include, but are not limited to:

1. Shields, shrouds, or intake and exhaust mufflers.
2. Noise-deadening material to line hoppers, conveyor transfer points, storage bins, or chutes.
3. Noise barriers using materials consistent with the Temporary Noise Barrier materials specified in this Section.
4. Noise curtains using materials consistent with the heading Noise Control Curtains materials specified under this subsection.

All equipment used on the construction site, including jackhammers and pavement breakers, shall have exhaust systems and mufflers that have been recommended by the manufacturer as having the lowest associated noise.

ITEM 114.1 (Continued)

The local power grid shall be used wherever feasible to limit generator noise. Where a generator is necessary, it shall have the maximum noise muffling capability recommended by the manufacturer to meet the noise emission limits specified in Table 2.

2.3 Temporary Noise Barriers

Materials

Temporary barriers shall be constructed of ¾-inch Medium Density Overlay (MDO) plywood sheeting, or other material of equivalent utility and appearance having a surface weight of two pounds per square foot (2lbs/sq.ft.) or greater. The temporary noise barriers shall have a Sound Transmission Class of STC-30 or greater, based on certified sound transmission loss data taken according to ATM Test Method E90.

The temporary barriers shall be lined on one side with glass fiber, mineral wool, or other similar noise curtain type noise-absorbing material at least 2-inches thick and have a Noise Reduction Coefficient rating of NRC-0.85 or greater based on certified sound absorption coefficient data taken according to ASTM Test Metod C423.

The materials used for temporary barriers shall be sufficient to last through the duration of construction for this Contract and shall be maintained in good repair.

Construction Details

4. Barrier panels shall be attached to support frames constructed in sections to provide a moveable barrier utilizing the standard "Temporary Precast Concrete Median Barrier" for the Project, or other supports designed to withstand 80 mph wind loads plus a 30 percent gust factor.
5. When barrier units are joined together, the matin surfaces of the barrier sides shall be flush with each other. Gaps between barrier units, and between the bottom edge of the barrier panels and the ground, shall be closed with material that will completely fill the gaps, and be dense enough to attenuate noise.

6. The barrier height shall be designed to break the line-of-sight and provide at least a 5dBA insertion loss between the noise producing equipment and the upper-most story of the receptor(s) requiring noise mitigation. If for practicality or feasibility reasons, which are subject to the review and approval of MassDOT, a barrier cannot be build to provide noise relief to all stories, then it must be built to the tallest achievable height.

Prefabricated acoustic barriers are available from various vendors. An equivalent barrier design can be submitted as specified under Submittals in lieu of the plywood barrier described above.

ITEM 114.1 (Continued)

2.4 Acoustical Barrier Enclosures

Materials
The acoustical barrier enclosure shall consist of durable, flexible composite material featuring a noise barrier layer bonded to sound-absorptive material on one side.

The noise barrier layer shall consist of rugged, impervious material with a surface weight of at least on pound per square foot (1lbs/sq.ft.). The sound absorptive material shall include a protective face and be securely attached to one side of the flexible barrier over the entire face.

The acoustical material used shall be weather and abuse resistant and exhibit superior hanging and tear strength during construction. The material shall have a minimum breaking strength of 120 lb/in. per FTMS 191 A-M5102 and minimum tear strength of 30 lb/in. per ASTM D117.

Based on the same test procedures, the absorptive material facing shall have a minimum breaking strength of 100 lb/in. and a minimum tear strength of 7 lb/in.

The acoustical material shall be corrosion resistant to most acids, mild alkalis, road salts, oils, and grease.

The acoustical material shall be fire retardant and be approved by the local fire department with jurisdiction over the proposed location for installation prior to procurement. It shall also be mildew resistant, vermin proof and non-hygroscopic.

The acoustical material shall have a Sound Transmission Class of STC-25 or greater, base on certified sound transmission loss data taken according to ASTM Test Method E90. It shall also have a Noise Reduction Coefficient rating of NRC-0.70 or greater, based on certified sound absorption coefficient data taken according to ASTM Test Method C423

The Contractor shall submit the name of the manufacturer, properties of the material to be furnished, and two one-foot square sample to MassDOT for review prior to submittal of design and detailed engineering as specified under Submittals.

Construction Details

6. The acoustical barrier enclosure shall be designed to effectively cover a noise producing source to reduce noise affecting nearby noise-sensitive receptors.

7. The acoustical material shall be installed in vertical and horizontal segments with the vertical segments extending the full enclosure height. All seams and joints shall have a minimum overlap of 2 inches (2”) and be sealed using double grommets. Construction details shall be performed according to the manufacturer’s recommendations.

ITEM 114.1 (Continued)

The contractor shall be responsible for the design, detailing, and adequacy of the framework and supports, ties, attachment methods, and other appurtenances required for the proper construction of the acoustical barrier enclosure.

The design and details for the acoustical noise barrier enclosure framework and supports shall be prepared and stamped by a Professional Engineer licensed in the Commonwealth of Massachusetts. The Contractor shall submit the design and detailed engineering drawings to MassDOT as specified in the Submittals.

2.5 Noise Control Curtain

Materials

The noise control curtain shall consist of durable, flexible composite material featuring a noise barrier layer bonded to sound-absorptive material on one side. The noise barrier layer shall consist of a rugged, impervious material with a surface weight of at least one pound per square foot (1lb/sq.ft). The sound absorptive material shall include a protective face and be securely attached to one side of the flexible barrier over the entire face.

The noise curtain materials used shall be weather and abuse resistant and exhibit superior hanging and tear strength during construction. The curtain's noise barrier layer material shall have a minimum breaking strength of 120 lb/in. per FTMS191 A-M5102 and minimum tear strength of 30 lb/in. per ASTM

D117. Based on the same test procedures, the noise curtain absorptive material facing shall have a minimum breaking strength of 100lb/in. and a minimum tear strength of 7 lb/in.

The noise curtain material shall be mildew resistant, vermin proof, non-hygroscopic corrosion, resistant to most acids, mild alkalies, road salts, oils and grease.

The noise curtain material shall be fire retardant and be approved by the local fire department with jurisdiction over the proposed location for installation prior to procurement.

Noise control curtain shall have a Sound Transmission Class of STC-30 or greater, based on certified sound transmission loss data taken according to ASTM Test Method E90. It shall also have a Noise Reduction Coefficient rating of NRC-0.85 or greater, based on certified sound absorption coefficient data taken according to ASTM Test Method C423.

The Contractor shall submit the name of the manufacturer, properties of the material to be furnished, and two one-foot square samples to MassDOT for review prior to submittal of the design and detailed engineering drawings as specified under Submittals.

ITEM 114.1 (Continued)

Construction Details

The noise control curtains shall be designed to effectively reduce noise affecting nearby noise-sensitive receptors. The curtains shall be secured above, at the ground and at intermediate points by framework and supports designed withstand 80 mph wind loads plus a 30 percent gust factor.

The curtains shall be installed in vertical and horizontal segments with the vertical segments extending the full curtain height to the ground. All seams and joints shall have a minimum overlap of 2 inches and be sealed using Velcro or double grommets spaced 12 inches on center. Curtains shall be fastened to framework and guardrails with wire cable 12 inches on center Construction details shall be performed according to the manufacturer's recommendations.

The curtain height shall be designed to break the line-of-sight and provide at least a 5 dBA insertion loss between the noise producing equipment and the upper-most story of the receptor(s) requiring noise mitigation. If for practicality or feasibility reasons, which are subject to the review and approval of MassDOT, a curtain system cannot be built to provide noise relief to all stories, then it must be built to the tallest achievable height.

The Contractor shall be responsible of the design, detailing and adequacy of the framework and supports, ties, attachment methods, and other appurtenances required for the proper installation of the noise control curtains.

The design and details for the noise control curtains framework and supports shall be prepared and stamped by a Professional Engineer licensed in the Commonwealth of Massachusetts. The Contractor shall submit the design and detailed engineering drawings to MassDOT as specified under Submittals.

Construction Methods

3.1 Noise Reduction Methods

The Contractor shall use all reasonable efforts to implement the noise reduction methods listed below to minimize construction noise emission levels.

Noise reduction methods shall include, but no limited to:

1. Use of: 1) concrete crushers or pavement saws for concrete deck removal, demolitions, or similar construction activity; 2) pre-augering equipment to reduce the duration of impact or vibratory pile driving; 3) local power grid to reduce the use of generators.
2. Attaching: 1) intake and exhaust mufflers, shields, or shrouds; 2) noise-deadening material to inside of hoppers, conveyor transfer points, or chutes.
3. Maintaining: 1) equipment mufflers and lubrication; 2) precast decking or plates; 3) on-site roadways to minimize surface irregularities to prevent unnecessary noise.
4. Limiting: 1) the number and duration of equipment idling on the site; 2) the use of annunciators or public address systems; 3) the use of air- or gasoline-driven hand tools.

ITEM 114.1 (Continued)

5. Configuring, to the extent feasible the construction site in a manner that keeps loud equipment and activities as far as possible from noise-sensitive locations.
6. Scheduling of construction events and limiting usage times to minimize noise, especially during nighttime hours and near sensitive abutters.
7. Constructing noise barriers and/or noise curtain systems.
8. Minimizing noise from the use of backup alarms using measures that meet OSHA regulations. This includes use of self-adjusting ambient-sensitive backup alarms, manually-adjustable alarms on low setting, use of observers, and scheduling of activities so that alarm noise is minimized.
9. Where practical and feasible, configuring construction sites to minimize backup alarm noise. For example, construction site access should be designed such that delivery and dump trucks move through the site in a forward manner without the need to back up.
10. Preventing nuisance noise conditions such as from squealing equipment, backup alarms, radios and public address systems, etc.
11. Using variable message and sign boards that are solar powered or connected to the local power grid.

3.2 Complaint Procedure

The objective of the complaint procedure is to ensure that public and agency complaints are addressed and resolved consistently and expeditiously.

If the Contractor receives a complaint regarding construction noise, the Contractor shall immediately notify the Acoustical Engineer and contact MassDOT.

If noise levels measured by the Contractor's Acoustical Engineer exceed allowable limits as specified under CONSTRUCTION LIMITATIONS of this Subsection, or work being performed under this Contract is resulting in nuisance conditions as determined by MassDOT, then the Contractor shall immediately use noise reduction materials and methods as described under NOISE REDUCTION METHODS to reduced noise levels or to alleviate the nuisance conditions.

3.3 Temporary Noise Barriers

General

The Contractor shall erect temporary noise barriers to mitigate construction noise at locations per the NCP and/or as directed by the Engineer.

The temporary noise barriers shall be readily moveable so that they may be re-positioned, as necessary, to provide noise abatement for non-stationary, as well as stationary, processes.

Installation, Maintenance, and Removal

The barriers shall be installed such that the noise-absorptive surfaces face the construction noise source.

ITEM 114.1 (Continued)

The Contractor shall maintain the temporary noise barriers and repair all damage that occurs, including, but not limited to, keeping barriers clean and free from graffiti and maintain structural integrity. Gaps, holes, and weaknesses in the barriers, and openings between or under the units, shall be repaired promptly or replaced by the Contractor with new material.

The Contractor shall remove and dispose of the temporary noise barriers at the end of the Contract, or sooner, at the direction of MassDOT.

3.4 Acoustical Barrier Enclosures

General

The Contractor shall erect acoustical barrier enclosures to mitigate construction noise at all locations per the NCP, as required in the construction drawings and/or as directed by MassDOT.

The acoustical barrier enclosures shall be readily moveable so that they may be repositioned, as necessary, to provide noise abatement for non-stationary equipment (e.g., jackhammers, chainsaws, compressors).

Installation, maintenance and Removal

The acoustical enclosure shall be installed such that the noise-absorptive surfaces face the construction noise source.

The Contractor shall maintain the acoustical barrier enclosures and repair all damage that occurs, including, but not limited to, keeping barriers clean and free from graffiti and maintaining structural integrity. Gaps, holes, and weaknesses in the acoustical enclosure and openings between or under the panels, shall be repaired promptly or replaced by the Contractor with new material. Construction work shall not proceed until repairs are made.

The Contractor shall remove and dispose of the acoustical enclosure at the end of the Contract, or sooner, at the direction of MassDOT.

3.5 Noise Control Curtains

General

The Contractor shall erect noise control curtains to mitigate construction noise at locations specified in construction drawings, per the NCP, and/or as required by MassDOT.

Noise control curtains shall particularly be used for short-term operations (e.g., less than 3 months), or where vehicular or pedestrian access is required during the day, or as required by MassDOT.

Installation, Maintenance, and Removal

The noise control curtains shall be installed without any gaps such that the sound-absorptive side faces the construction activity to be shielded. The curtains shall be supported by the existing roadway, bridge spans, or other methods identified by the Contractor.

ITEM 114.1 (Continued)

The Contractor shall maintain the noise control curtains and repair all damage the occurs including, but not limited to, keeping noise control curtains clean and free from graffiti and maintaining structural integrity. Gaps, holes, and weaknesses in the noise control curtains, and openings between or under the panels, shall be repaired promptly or replaced by the Contractor with new material. Construction work that will produce noise exceeding the established thresholds without the noise control curtains in place shall not proceed until such repairs are made.

The Contractor shall remove and dispose of the noise control curtains at the end of the Contract, or sooner at the direction of MassDOT.

TABLE 1. CONSTRUCTION NOISE LOT-LINE LIMITS IN dBA

Period of the Day	Hours	Land-Use	Non-Impact Equipment		Impact Equipment	
			L_{eq}	L_{max}	L_{eq}[a]	L_{max}
Daytime	7:00 am to 6:00 pm	Noise-sensitive	70	85	n/a	90
		Commercial	77	--	n/a	--
		Industrial	82	--	n/a	--
Evening	6:00 pm to 10:00 pm	Noise-sensitive	62	80	n/a	80
Nighttime	10:00 pm to 7:00 am	Noise-sensitive (Bl[e]<70dBA)	60	75	n/a	80

NOTES:

(a) Noise from impact equipment is exempt from the L_{eq} requirement, however, is still subject to a lot-line L_{max} limit.
(b) All measurements shall be taken at the affected lot-line. In situations where the work site is within 50 feet of a lot-line, the measurement shall be taken from a point along the lot-line such that a distance of 50 feet is maintained between the sound level meter and the construction activity being monitored.
(c) Lot-line noise limits shall apply to all points along the receptor's lot-line.
(d) L_{eq} noise readings are averaged over 20-minute intervals. L_{max} noise readings occur instantaneously.
(e) BL is the average baseline or background measure in L_{eq}.

ITEM 114.1 (Continued)

TABLE 2 CONSTRUCTION EQUIPMENT 50-FEET NOISE EMISSION LIMITS (a), (b)

Equipment Category	L_{max} Noise Limit at 50 feet, dBA, slow	Is Equipment and Impact Device? (c)	Acoustic Usage Factor (d)
All other equipment > 5HP	85	No	50%
Auger Drill Rig	84	No	20%
Backhoe	78	No	40%
Bar Bender	80	No	20%
Blasting	94	Yes	1%
Boring Jack Power Unit	80	No	50%
Chain Saw	84	No	20%
Clam Shovel	87	Yes	20%
Compactor (ground)	80	No	20%
Compressor (air)	78	No	40%
Concrete Batch Plant	83	No	15%
Concrete Mixer Truck	79	No	40%
Concrete Pump Truck	81	No	20%
Concrete Saw	90	No	20%
Crane (mobile or stationary)	81	No	20%
Dozer	82	No	40%
Drill Rig Truck	79	No	20%
Drum Mixer	80	No	50%
Dump Truck	76	No	40%
Excavator	81	No	40%
Flat Bed Truck	74	No	40%
Front End Loader	79	No	40%
Generator (25 KVA or less)	73	No	50%
Generator (more than 25)	81	No	50%
Gradall	83	No	40%
Grader	85	No	40%
Grapple (on backhoe)	85	No	40%
Horizontal Boring Hydraulic Jack	80	No	25%
Hydra Break Ram	90	Yes	20%
Impact Pile Driver (diesel or drop)	95	Yes	20%
Insitu Soil Sampling Rig	84	No	20%

ITEM 114.1 (Continued)

Equipment Category	L_{max} Noise Limit at 50 feet, dBA, slow	Is Equipment and Impact Device? (c)	Acoustic Usage Factor (d)
Jackhammer	85	Yes	20%
Man Lift	75	No	20%
Mounted Impact Hammer (hoe ram)	90	Yes	20%
Paver	77	No	50%
Pavement Scarifier	85	No	20%
Pickup Truck	75	No	40%
Pneumatic Tools	85	No	50%
Pumps	77	No	50%
Refrigerator Unit	73	No	100%
Rivet Buster / Chipping Gun	79	Yes	20%
Rock Drill	81	No	20%
Roller	80	No	20%
Sand Blasting	90	No	20%
Scraper	84	No	40%
Shears (on backhoe)	90	No	40%
Slurry Plant	78	No	100%
Slurry Trenching Machine	80	No	50%
Soil Mix Drill Rig	80	No	50%
Tractor	84	No	40%
Vacuum Excavator (vac-truck)	85	No	40%
Vacuum Street Sweeper	80	No	10%
Ventilation Fan	79	No	100%
Vibrating Hopper	85	No	50%
Vibratory Concrete Mixer	80	No	20%
Vibratory Pile Driver	95	No	20%
Warning Horn	83	No	5%
Welder / Torch	73	No	40%

NOTES:

(a) Measured at 50 feet from the construction equipment, with a “slow” (1 sec) time constant.

(b) Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.

(c) “Impact” equipment is assumed to produced separate discernable sound pressure maxima.

(d) “Acoustic Usage Factor” represents the percent of time that equipment is assumed to be running at full power while working on site.

ITEM 114.1 (Continued)

BASIS OF PAYMENT

Item 114.1 will be paid for at the Contract Lump Sum price, which price shall include all materials, equipment, tools, submittals and labor for the demolition of the superstructure. All costs for permits, dump fees, taxes, Noise Control, and Dust Control, and special handling of hazardous materials shall be included in the bid price of the demolition item.

Temporary Protective Shielding will be required during the demolition of the existing superstructure and will be paid for under Item No. 994.01.

ITEM 120.1 UNCLASSIFIED EXCAVATION CUBIC YARD

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

Included in Item 120.1 Unclassified Excavation is the excavation, removal, and proper disposal of existing sidewalks, walkways, existing approach slabs, pavement, pedestrian curb ramps; underground pipes and structures not provided for elsewhere; curbs, curbing, curb corners, curb inlets, berms, posts, and bollards; fences, fence posts, fence gates, plantings, and flowers where called out for removal, removal of existing sign panels, posts, poles, and span poles where shown or indicated.

Included in Item 120.1 Unclassified Excavation is the removal and proper disposal of any item not suitable for resetting or stacking; any item which the Engineer deems not suitable for re-use or has designated for disposal; or any work for which removal and disposal is not expressly provided for anywhere.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 120.1 will be measured and paid in accordance with the requirements of Subsections 120.80 and 120.81 of the Standard Specifications, respectively.

ITEM 127.1 REINFORCED CONCRETE EXCAVATION CUBIC YARD

The work under this Item shall conform to the applicable provisions of Subsections 120 and 140 of the Standard Specifications and the following:

The work under this item shall include the removal and satisfactory disposal of reinforced cement concrete of existing abutments, and wingwalls, and partial demolition of pier caps, which are not included under Item 114.1 Demolition of Bridge No. H-18-004.

The contractor will make his own investigation of the structure to be demolished including the materials that are part of or may be stored in the structure. No increase will be made to the bid price due to the nature of the materials involved in the demolition or to the depth of the existing structure. All costs for permits, dump fees, special handling of hazardous materials, etcetera, shall be included in the bid price of the demolition item.

Care shall be taken to ensure that the remaining portion of the existing piers will not be undermined during excavation.

The Contractor shall take care not to damage any portion of the existing structure to remain. Any damage caused by the Contractor's operations shall be repaired as directed by the Engineer at the Contractor's expense.

PROJECT CONDITIONS

During demolition, no heavy equipment shall be allowed within the foul zone of the railroad or the wetlands. All heavy equipment shall be located at the road surface or from the embankment. Concrete formwork may be constructed from the top or sides. Any additional work and equipment required within the wetlands shall only consist of workers and hand tools.

CONSTRUCTION METHODS

Any and all temporary work platforms required for the safe performance of this work and protection of utilities shall be considered incidental to this item.

METHOD OF MEASUREMENT

Item 127.1 will be measured for payment by the CUBIC YARD.

BASIS OF PAYMENT

Item 127.1 will be paid at the Contract unit price per CUBIC YARD, which price shall constitute full compensation for all labor, tools, materials, and equipment necessary to complete the work to the satisfaction of the Engineer. Considered incidental to this item are: cutting the concrete prior to demolition; removal of loose material, dust, and debris; and proper disposal of waste, including any additional requirements of the railroad companies.

ITEM 127.1 (Continued)

Removal and proper disposal of any existing fittings, existing appurtenances, or existing elements attached to, embedded in, or abutting the concrete indicated for removal will be considered as incidental to the work of this Item.

No foreign material or debris resulting from the Contractor's operations shall be permitted to remain. The Contractor shall be required to remove any debris generated from construction from the site immediately and to restore portions of the site affected by the operation to their original undisturbed condition or better. Removal of debris generated by demolition and construction will be performed at the Contractor's own expense. Demolition near the railroad tracks shall meet all requirements of the railroad owner, including but not limited to protecting the tracks. Contractor shall prevent demolition material and debris from falling on the tracks. Contractor shall be responsible for dust control as the result of the demolition operations.

ITEM 129.2 OLD PAVEMENT EXCAVATION SQUARE YARD

The work under this item shall conform to the relevant provisions of Subsection 120 of the Standard Specifications and the following:

The work under this item shall consist of the removal and disposal of all hot mix asphalt pavement at locations shown on the plans and as required by the Engineer.

The Contractor shall excavate the existing pavement in this area down to the top of the existing sub-base material. Unless otherwise directed by the Engineer, the area of removed pavement shall be covered with special borrow as directed in the Typical Sections. The excavated pavement material will be removed, discarded, and transported by the Contractor to an environmentally approved site without any additional compensation.

METHOD OF MEASUREMENT

Item 129.2 will be measured for payment by the SQUARE YARD, regardless of depth.

BASIS OF PAYMENT

Item 129.2 will be paid at the Contract unit price per SQUARE YARD, which price shall include all labor, equipment, tools, and materials, and all incidental costs required to complete the work.

ITEM 140. BRIDGE EXCAVATION CUBIC YARD

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

The Contactor will make his own investigation of the structure to be demolished including the materials that are part of, or may be stored in the structure. No increase will be made to the bid price due to the nature of the materials involved in the demolition or to the depth of the existing structure. All costs for permits, dump fees, special handling of hazardous materials, etcetera, shall be included in the bid price of the demolition item.

The work under this item shall include the excavation for the proposed abutments and removal and satisfactory disposal of any parts of the existing substructure which is not included under Item 127.1 Reinforced Concrete Excavation. Additional locations for work under Bridge Excavation may also be specified by the Engineer. The work shall also include pre-demolition testing of the soil, in conformance with the relevant provisions of Subsection 961.66 of the 2026 Standard Specifications for Highways and Bridges and the following:

METHODS

Prior to the start of any work, the Contactor shall perform testing of the soil for lead. This work shall be completed within 30 days of Notice to Proceed. All soil samples shall be completed in compliance with Subsection 961.66, and taken to a depth of 6 inches. The cost of this work shall be incidental to Item 140.

PROJECT CONDITIONS

The Contractor will be required to provide Temporary Protective Shielding (Item 994.01) during bridge excavation. During demolition, debris from demolition must be carefully contained within the work zones and prevented from falling/infiltrating onto the railroad below. Shielding shall be in place to protect the railroad and utilities prior to any demolition work. Any material that accidentally falls outside of the shielding limits shall be immediately removed. Contractor shall control dust resulting from demolition operations.

CONSTRUCTION METHODS

Any and all temporary work platforms required for the safe performance of this work and protection of utilities shall be considered incidental to this item. Temporary Protective Shielding will be required during the excavation of the existing substructure (abutments and wingwalls) and will be paid for under Item No. 994.01.

ITEM 140. (Continued)

METHOD OF MEASUREMENT

Item 140 will be measured for payment by the CUBIC YARD.

This item does not include the stockpiling of excavated material.

BASIS OF PAYMENT

Item 140 will be paid at the Contract unit price per CUBIC YARD, which price shall constitute full compensation for all labor, tools, materials, and equipment necessary to complete the work to the satisfaction of the Engineer. Considered incidental to this item are: the removal of the concrete abutment seats, removal of fieldstone masonry and associated mortar, loose material, dust, and debris; and proper disposal of waste.

Removal and proper disposal of any existing fittings, existing appurtenances, or existing elements attached to, embedded in, or abutting the abutments indicated for removal will be considered as incidental to the work of this Item.

Debris from construction must be carefully contained within the work zones and prevented from falling onto the railroad below. No foreign material or debris resulting from the Contractor's operations shall be permitted to enter or remain on the railroad. The Contractor shall be required to remove any debris generated from construction from the site immediately and to restore portions of the site affected by the operation to their original undisturbed condition or better. Removal of debris generated by demolition and construction will be performed at the Contractor's own expense. Contractor shall be responsible for dust control as the result of the demolition operations.

Temporary Protective Shielding will be paid under Item 994.1.

ITEM 180.01 ENVIRONMENTAL HEALTH AND SAFETY PROGRAM LUMP SUM

The work shall consist of ensuring the health and safety of the Contractor's employees and subcontracting personnel, the Engineer, their representatives, the environment, and public welfare from any on-site chemical contamination present in air, soil, water and sediment.

The Contractor shall prepare and implement a site-specific Environmental Health and Safety Plan (EHASP) which has been approved and stamped by a Certified Industrial Hygienist (CIH) and includes the preparer's name and work experience. The EHASP shall include appropriate components required by OSHA Standard 29 CFR 1910.120(b) and the Massachusetts Contingency plan (MCP) 310 CMR 40.0018 and must comply with all applicable state and federal laws, regulations, standards and guidelines, and provide a degree of protection and training appropriate for implementation on the project. The EHASP shall be a dynamic document with provision for change to reflect new information, new practices or procedures, changing site environmental conditions or other situations which may affect site workers and the public. The EHASP shall be developed and implemented independently from the standard construction HASP required to work on all MassDOT construction projects.

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

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

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

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

ITEM 180.01 (Continued)

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

Method of Measurement and Basis of Payment

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

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

ITEM 180.02 PERSONAL PROTECTION LEVEL C UPGRADE HOUR

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

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

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

ITEM 180.03 LICENSED SITE PROFESSIONAL SERVICES HOUR

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

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

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

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

ITEM 180.03 (Continued)

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.

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).

ITEM 180.03 (Continued)

LABORATORY TESTING IN SUPPORT OF LSP SERVICES

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

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.

ITEM 180.03 (Continued)

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

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

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

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)

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. Preliminary soil characterization for the site has been performed and the laboratory analyses are presented in GZA's Geotechnical Report dated April 24, 2026 (available upon request). The Classes of Contaminated Soils are defined as follows:

UNREGULATED SOIL consists of soil, fill and dredged material with measured levels of oil and hazardous material (OHM) contamination at concentrations below the applicable Reportable Concentrations (RCs) presented in the MCP. Unregulated soil consists of material which may be reused (or otherwise disposed) as fill within the Commonwealth of Massachusetts subject to the non-degradation criteria of the MCP (310 CMR 40.0032(3), in a restricted manner, such that they are sent to a location with equal or higher concentrations of similar contaminants. Disposal areas include licensed disposal facilities, approved industrial settings in areas which will be capped or covered with pavement or loamed and seeded, and for purposes of this project should be reused as fill within the project site construction corridor whenever possible. The material cannot be placed in residential and/or environmentally sensitive (e.g. wetlands) areas. Under no circumstances shall contaminated soils be placed in an uncontaminated or less contaminated area (including the area above the groundwater table if this area shows no sign of contamination).

The Contractor shall submit to MassDOT the proposed disposal location for unregulated soils for approval. If such a disposal location is not a licensed disposal facility, the Contractor shall submit to the Engineer analytical data to characterize the disposal area sufficiently to verify that the unregulated material generated within the MassDOT construction project limits is equal to or less than the contaminant levels at the disposal site and meets the non-degradation requirements of the MCP. In addition, the Contractor shall provide written confirmation from the owner of the proposed disposal location that they have been provided with the analytical data for both the materials to be disposed as well as the disposal site characterization and that s/he agrees to accept this material. A Material Shipping Record or Bill of Lading, as appropriate, shall be used to track the off-site disposal of unregulated soil and a copy, signed by the disposal facility or property owner, shall be provided to the Engineer in order to document legal disposal of the unregulated material.

The cost of on-site disposal of unregulated soil within the project area will be considered incidental to the item of work to which it pertains.

ITEMS 181.11 through 181.14 (Continued)

REGULATED SOIL consists of materials containing measurable levels of OHM that are equal to or exceed the applicable Reportable Concentrations for the site as defined by the MCP, 310 CMR 40.0000. Regulated soil which meets the MCP reuse criteria of the applicable soil/groundwater category for this project area may be reused on site provided that it meets the appropriate geotechnical criteria established by the Engineer. Regulated Soil may be reused (as daily or intermediate cover or pre-cap contouring material) or disposed (as buried waste) at lined landfills within the Commonwealth of Massachusetts or at an unlined landfill that is approved by the Massachusetts Department of Environmental Protection (DEP) for accepting such material, in accordance with DEP Policy #COMM-97-001, or at a similar out-of-state facility. It should be noted that soils which exceed the levels and criteria for disposal at in-state landfills, as outlined in COMM-97-001, may be shipped to an in-state landfill, but require approval from the DEP Division of Solid Waste Management and receiving facility. An additional management alternative for this material is recycling into asphalt. Regulated Soils may also be recycled at a DEP approved recycling facility possessing a Class A recycling permit subject to acceptance by the facility and compliance with DEP Policy #BWSC-94-400. Regulated Soil removed from the site for disposal or treatment must be removed via an LSP approved Bill of Lading, Manifest or applicable material tracking form. This type of facility shall be approved/permitted by the State in which it operates to accept the class of contaminated soil in accordance with all applicable local, state and federal regulations.

HAZARDOUS WASTE consists of materials which must be disposed of at a facility permitted and operated in full compliance with Federal Regulation 40 CFR 260-265, Massachusetts Regulation 310 CMR 30.000, Toxic Substances Control Act (TSCA) regulations, or the equivalent regulations of other states, and all other applicable local, state, and federal regulations. All excavated materials classified as hazardous waste shall be disposed of at an out-of-state permitted facility. This facility shall be a RCRA hazardous waste or TSCA facility, or RCRA hazardous waste incinerator. This type of facility shall be approved/permitted by the State in which it operates to accept hazardous waste in accordance with all applicable local, state and federal regulations and shall be permitted to accept all contamination which may be present in the soil excavate. The Contractor shall ensure that, when needed, the facility can accept TSCA waste materials i.e. polychlorinated biphenyls (PCBs). Hazardous waste must be removed from the site for disposal or treatment via an LSP approved Manifest.

MONITORING/SAMPLING/TESTING REQUIREMENTS

The Contractor shall be responsible for monitoring, sampling and testing during and following excavation of contaminated soils to determine the specific class of contaminated material. Monitoring, sampling and testing frequency and techniques should be performed in accordance with Item 180.03 – LSP Services. Additional sampling and analysis may be necessary to meet the requirements of the disposal facility license. The cost of such additional sampling and analysis shall be included in the bid cost for the applicable disposal items. The Contractor shall obtain sufficient information to demonstrate that the contaminated soil meets the disposal criteria set by the receiving facility that will accept the material.

ITEMS 181.11 through 181.14 (Continued)

No excavated material will be permanently placed on-site or removed for off-site disposal until the results of chemical analyses have been received and the materials have been properly classified. The Contractor shall submit to the Engineer results of field and laboratory chemical analyses tests within seven days after their completion, accompanied by the classification of the material determined by the Contractor, and the intended disposition of the material. The Contractor shall submit to the Engineer for review all plans and documents relevant to LSP services, including but not limited to, all documents that must be submitted to the DEP.

WASTE TRACKING:

Copies of the fully executed Weight Slips/Bills of Lading/ Manifests/Material Shipping Records or other material tracking form received by the Contractor from each disposal facility and for each load disposed of at that facility, shall be submitted to Engineer and the Contractor's LSP within three days of receipt by the Contractor. The Contractor is responsible for preparing and submitting such documents for review and signature by the LSP or other appropriate person with signatory authority, three days in advance of transporting soil off-site. The Contractor shall furnish a form attached to each manifest or other material tracking form for all material removed off-site, certifying that the material was delivered to the site approved for the class of material. If the proposed disposition of the material is for reuse within the project construction corridor, the Contractor shall cooperate with MassDOT to obtain a suitable representative sample(s) of the material to establish its structural characteristics in order to meet the applicable structural requirements as fill for the project.

All material transported off-site shall be loaded by the Contractor into properly licensed and permitted vehicles and transported directly to the selected disposal or recycling facility and be accompanied by the applicable shipping paper. At a minimum, truck bodies must be structurally sound with sealed tail gates, and trucks shall be lined and loads covered with a liner, which shall be placed to form a continuous waterproof tarpaulin to protect the load from wind and rain.

DECONTAMINATION OF EQUIPMENT

Tools and equipment which are to be taken from and reused off site shall be decontaminated in accordance with applicable local, state and federal regulations. This requirement shall include, but not be limited to, all tools, heavy machinery and excavating and hauling equipment used during excavation, stockpiling and handling of contaminated material. Decontamination of equipment is considered incidental to the applicable excavation item.

ITEMS 181.11 through 181.14 (Continued)

REGULATORY REQUIREMENTS

The Contractor shall be responsible for adhering to regulations, specifications and recognized standard practices related to contaminated material handling during excavation and disposal activities. MassDOT shall not be responsible at any time for the Contractor's violation of pertinent State or Federal regulations or endangerment of laborers and others. The Contractor shall comply with all rules, regulations, laws, permits and ordinances of all authorities having jurisdiction including, but not limited to, Massachusetts DEP, the U.S. Environmental Protection Agency (EPA), Federal Department of Transportation (DOT), Massachusetts Water Resources Authority (MWRA), the Commonwealth of Massachusetts and other applicable local, state and federal agencies governing the disposal of contaminated soils.

All labor, materials, equipment and services necessary to make the work comply with such regulations shall be provided by the Contractor without additional cost to MassDOT. Whenever there is a conflict or overlap within the regulations, the most stringent provisions shall apply. The Contractor shall reimburse MassDOT for all costs it incurs, including damages and/or fines, as a result of the Contractor's failure to adhere to the regulations, specifications, recognized standard practices, etc., that relate to contaminated material handling, transportation and disposal.

SUBMITTALS

I. Summary of Sampling Results, Classification of Material and Proposed Disposal Option.

The following information, presented in tabular format, must be submitted to the Engineer for review and approval prior to any reuse on-site or disposal off-site. This requirement is on-going throughout the project duration. At least two weeks prior to the start of any excavation activity, the Contractor shall submit a tracking template to be used to present the information as stipulated below. Excavation will not begin until the format is acceptable to MassDOT.

Characterization Reports will be submitted for all soil, sediment, debris and groundwater characterized through the sampling and analysis program. Each report will include a site plan which identifies the sampling locations represented in the Report. The Construction Plan sheets may be used as a baseplan to record this information.

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

ITEMS 181.11 through 181.14 (Continued)

Each Characterization Report will include the laboratory analytical report and Chain of Custody Record for the samples included in the Report.

II. Stockpiling, Transport, and Disposal.

At least two weeks prior to the start of any excavation activity, the Contractor shall submit, in writing, the following for review and shall not begin excavation activity until the entire submittal is acceptable to MassDOT.

Excavation and Stockpiling Protocol:
Provide a written description of the management protocols for performing excavation and stockpiling and/or direct loading for transport, referencing the locations and methods of excavating and stockpiling excavated material.

Disposal and Recycling Facilities:

1. Provide the name, address, applicable licenses and approved waste profile for disposal and/or recycling location(s) where contaminated soil will be disposed. Present information substantiating the suitability of proposed sites to receive classifications of materials intended to be disposed there, including the ability of the facility to accept anticipated volumes of material.

2. Provide a summary of the history of compliance actions for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. Material should not be sent to facilities which are actively considered by the DEP, USEPA or other responsible agency to be in violation of federal, state or local hazardous waste or hazardous material regulations. MassDOT reserves the right to reject any facility on the basis of poor compliance history.

Transportation:
The name, address, applicable license and insurance certificates of the licensed hauler(s) and equipment and handling methods to be used in excavation, segregation, transport, disposal or recycling.

III. Material Tracking and Analytical Documentation for Reuse/Disposal.

The following documents are required for all excavation, reuse and disposal operations and shall be in the format described. At least two weeks prior to the start of any excavation or demolition activity, the Contractor shall submit the tracking templates required to present the information as stipulated below. Excavation or demolition will not begin until the format is acceptable to MassDOT.

ITEMS 181.11 through 181.14 (Continued)

All soils, sediments and demolition debris must be tracked from the point of excavation to stockpiling to onsite treatment/processing operations to off-site disposal or onsite reuse as applicable.

Demolition Debris:
Demolition debris must be tracked if the debris is stockpiled at a location other than the point of origin or if treatment or material processing is conducted. Identification of locations will be based on the station-offset of the location. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations/comments, quantity, and stockpile ID/processing operation location. For each unit of material tracked, the table will also track reuse of the material on-site, providing reuse date, location of reuse as defined by start and end station, width of reuse location by offset, the fill elevation range, quantity, and finish grade for said location. For demolition debris which is not reused on site, the table will also track disposal of the material as defined by disposal date, quantity and disposal facility. The table must provide a reference to any analytical data generated for the material.

Soil/Sediment:
Soil excavation will be identified based on the station-offset of the excavation location limits. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations, quantity, and stockpile number/location. For each unit of material tracked, the table will also track reuse of the material on-site and disposal of the material off-site using the same categories identified for demolition debris above.

Method Of Measurement And Basis Of Payment

Disposal of contaminated soil shall be measured for payment by the Ton of actual and verified weight of contaminated materials removed and disposed of. The quantities will be determined only by weight slips issued by and signed by the disposal facility. The most cost-effective, legal disposal method shall be used. The work of the LSP for disposal under all of these items shall be incidental to the work with no additional compensation.

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

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

ITEMS 181.11 through 181.14 (Continued)

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

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

ITEM 184.1 DISPOSAL OF TREATED WOOD PRODUCTS TON

Work under this item shall include the transportation and disposal of all treated existing wood product as directed by the Engineer.

The timber components of the existing structure are suspected to be treated with creosote, pentachlorophenol and/or CCA. This item shall include all costs for sampling, laboratory testing, loading, transportation and disposal of the treated wood. The Contractor is required to submit disposal manifests to the Engineer prior to the completion of the project. All aspects of this Item are to be completed in accordance with state and federal regulations.

Compensation

Measurement and payment will be by the weight, in tons, of treated timber transported and accepted at a licensed facility. The work shall be considered full compensation for all labor, tools, equipment, materials, testing, loading, transportation, approvals, and permits necessary for the completion of the work.

ITEM 201. CATCH BASIN EACH

The work under this item shall conform to the relevant provisions of Subsection 201 of the Standard Specifications and the following:

SUBMITTALS

Submit shop drawings, sketches and plan markups for all new structures.

MATERIALS

Use MassDOT Approved Producers for Precast Products.

Sump depth shall be 4ft.

Where noted on the Plans, install tops with an eccentric hole; the eccentric hole can be rotated to position the grate against the curb or to provide a clear path in the crosswalks and sidewalks.

CONSTRUCTION

Where new drainage structures are shown on the drawings to be constructed over existing pipes, the work to install the structures 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 (basin) shaped invert.

Where new pipe is shown on the drawings to be connected into an existing drainage structure to remain, the existing structure 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 the insertion of the new pipe. The proposed pipe end shall be set and cut off flush with the inside face of the existing structure wall and the remaining space around the pipe completely filled with cement mortar for the full thickness of the structure wall.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 201 will be measured and paid in accordance with the requirements of Subsections 201.80 and 201.81 of the Standard Specifications.

ITEM 222.3 FRAME AND GRATE (OR COVER) MUNICIPAL STANDARD EACH

The work under this item shall conform to the relevant provisions of Subsections 201 and 220 of the Standard Specifications and the following:

Municipal frames and grates (or covers) shall be installed on drainage structures, unless otherwise shown on the Drawings or as directed by the Engineer.

The Contractor shall submit the Manufacturer's shop drawings for frames, grates, and covers.

MATERIALS

Grates shall be bicycle-friendly. **DO NOT USE BAR GRATES**.

Frames, grates, and covers shall come from stock listed on the MassDOT Qualified Construction Materials List (QCML) for Cast Iron Frame and Grate or Cover (M8.03.0); and 2) a minimum of 10 days prior to beginning the work of this Subsection, have written approval from the Public Works Director.

All manhole lids installed on manholes in public drainage and storm water systems shall have the word "DRAIN" stamped on the top surface.

Any frames and grates or covers from existing structures which are deemed unsuitable for reuse shall not be reset nor stacked, but shall be removed and discarded at the expense of the contractor and shall become the property of the contractor and shall be legally disposed of off the site.

All castings located within the pavement area shall not be set to finished grade until after the binder course has been placed.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 222.3 will be measured and paid in accordance with the requirements of Subsections 201.80 and 201.81 of the Standard Specifications.

The Contract price shall include all incidentals materials, labor and equipment required for the installation of each frame and grate or frame and cover.

ITEM 376.5 HYDRANT – ADJUSTED EACH

The work under this item shall conform to the relevant provisions Subsection 301 of the Standard Specifications, and the following:

SUBMITTALS

Written Acceptance of the Work, signed and dated by the Town of Holden.

MATERIALS AND CONSTRUCTION

The Contractor shall comply with the Town of Holden Specifications for Water-Sewer-Drainage.

The Contactor shall give the Town 48-hour notice before beginning the hydrant work.

The Contract shall adjust the elevation of existing hydrants with respect to the finished grade, using risers or barrel extenders as needed. The Contractor shall expose existing pipe and existing joints as needed to attach risers or to cut existing pipe. The Contractor shall backfill and compact the excavation as needed after adjusting the hydrant.

After adjustment, the hydrant shall be inspected, disinfected, and tested in accordance with Town Specifications. The Engineer and Town must accept the adjusted hydrant.

METHOD OF MEASUREMENT

Item 376.5 will be measured for payment per EACH hydrant adjusted, complete in place.

BASIS OF PAYMENT

Item 376.5 will be paid at the Contract unit price per EACH hydrant adjusted, with written Acceptance, regardless of the amount raised or lowered.

The price shall be considered as full compensation for all means and methods to complete the work, including but not limited to: excavation to expose joints; preparation of joints; risers and extenders; cutting; testing and disinfecting.

ITEM 458.71 EXPANDED SHALE LIGHTWEIGHT AGGREGATE CUBIC YARD

Work under this item shall consist of the furnishing and placement of expanded shale lightweight aggregate fill behind the abutments and splayed wingwalls. This work shall be performed as hereinafter specified, to the dimensions indicated on the plans, or as directed by the Engineer.

MATERIALS

Lightweight Aggregate Fill

Lightweight aggregate for geotechnical fill shall be an approved rotary kiln expanded shale lightweight aggregate or approved equal meeting ASTM C 330. No by-product slags, cinders or by-products of coal combustion shall be permitted. Grading shall conform to ASTM C 330 as specified below. Lightweight aggregate shall have proven record of durability as determined by ASTM C 88 and ASTM C 131, and be non-corrosive, as determined by CAL DOT 422. The Lightweight aggregate shall have the following properties:

Gradation	
Sieve	ASTM C 330 Requirement
1-inch	100
3/4 in	90-100
3/8 in	10-50
No. 4	0-15

Physical Properties			
Property		Test Method	Requirement
Density	Minimum	ASTM D 4254	40 lb/ft^3
	Maximum[1]	ASTM D 4253	65 lb/ft^3
Soundness ($MgSO_4$- 5 cycles)		ASTM C 88	< 10%
Abrasive Resistance		ASTM C 131	40%
In-situ Phi (φ) Angle		ASTM D 4030	34^o

Electrochemical Properties		
Property	AASHTO Test Method	Requirement
Resistivity	T 288 I	>3000 ohm-cm
pH	T 289 I	5-10
Chloride Content	T 291 I	<100 mg/kg
Sulfate Content	T 290 I	<200 mg/kg

[1] Saturated-surface-dry particles.

ITEM 458.71 (Continued)

Density
The dry loose density shall be less than 50 pcf.

The maximum in-place compacted density (moist, surface dry) shall not exceed 60 pcf

The lightweight aggregate producer shall submit verification of a compacted moist density of less than 60 pcf when measured by a one point proctor test conducted in accordance with a modified version of ASTM D698 "The Standard Test Methods of Moisture-Density Relations of Soil- Aggregate Mixtures Using a 5.5-pound Hammer and 12 inch Drop" (AASHTO T 99). Because of the cohesionless nature of coarse lightweight aggregate, the standard shall be modified as follows: The aggregate sample shall be placed in a 0.5 cubic foot bucket at the moisture content that the aggregate will be delivered to the jobsite. The sample shall be placed in three equal layers and compacted by dropping a 5.5 pound hammer from a distance of 12 inches 25 times on each layer. The wet procedure shall be performed with the lightweight aggregate tested in saturated surface dry (SSD) condition after a minimum water immersion period of 72 hours.

The minimum compacted dry density shall be equal to 65% relative density as determined by AASHTO D4253 and D4254.

Strength
The minimum strength of loosely placed material, as determined from drained triaxial test, shall equal that of a cohesionless soil with an angle of internal friction of 36°. The minimum strength to material compacted to 65% of relative density shall equal that of a cohesionless soil with an angle of internal friction of 40°.

QUALIFICATIONS

The certified supplier/producer of the lightweight aggregate backfill shall beregularly engaged in the production of lightweight aggregate backfill. This shall include the production of lightweight aggregate, with a minimum production of 10,000 total cubic yards in the previous two (2) years.

The lightweight aggregate backfill material shall have been successful applied on at least three Engineered Fill projects which have performed satisfactorily for at least three (3) years.

SUBMITTALS

Prior to the start of construction, submit product data sheet and certification from the Manufacturer that the lightweight fill product supplied meets the requirements of this Section.

At least 30 days prior to the planned start of work, product data, consistent with the above-mentioned requirements, shall be submitted for review and approval by the Engineer and shall include manufacturer's specifications, catalog cuts and other engineering data needed to demonstrate compliance with the specified requirements.

ITEM 458.71 (Continued)

At least four weeks prior to placing, a 50-pound representative sample of the Lightweight Aggregate Backfill material shall be submitted. The approved sample shall become the standard of the material furnished under this contract.

At least 30 days prior to the planned start of work, submit proposed compaction equipment and procedures including documentation that the equipment and procedures have been agreed upon by the lightweight aggregate producer as appropriate toward meeting the specified minimum compacted dry density of 65% of the relative dry density as determined by ASTM D4253 and D4254 (without crushing).

DELIVERY, STORAGE & HANDLING

As per below section Observation and Testing, upon receipt of lightweight aggregate material to the site, the dry, loose density shall be checked to ensure it meets specifications. Once unloaded on site all lightweight aggregate material shall be protected from contamination or mixing with other materials during storage, transport on site, and final placement. During months of potential freezing temperatures or snowfall the lightweight aggregate material shall be covered and kept above and standing water. No lightweight aggregate material shall be used that has not been properly stored or handled to the satisfaction of the Engineer.

CONSTRUCTION

Construct the lightweight fill in accordance with the following, unless otherwise approved by the lightweight fill manufacturer:

General
In all fill areas, compact the foundation subgrade with at least 10 passes of a smooth wheel vibratory compactor weighing at least 10,000 lbs. In confined areas, proof compact with a vibratory plate compactor weighing at least 200 lbs and imparting an impact load of at least 2.5 tons. Where exposed footing subgrades are at or near the groundwater level, static proof compaction methods may be recommended by the geotechnical engineer in lieu of vibratory methods. Remove unsuitable soils and soils that do not become firm under proof compaction and replace with compacted Gravel Borrow to create a competent bearing surface.

1. When applicable, except as noted below, lightweight fill placement shall conform to the requirements of Sections 120, 140 and 150 of the MassDOT Standard Specifications.

ITEM 458.71 (Continued)

2. Place lightweight aggregate in areas free from standing water or frozen ground. Compact lightweight aggregate in place during construction using a smooth drum roller between 8 and 12 tons (static weight), sized to compact adequately without causing significant particle breakage. Place and compact the aggregate in 12-inch maximum loose lifts (or as required to achieve compaction) with a minimum of 2, maximum of 4 orthogonal passes of compaction equipment, unless otherwise directed by the Engineer. Perform additional passes of compaction, if required, until all measurable compaction has been achieved. In confined areas, vibratory plate compaction equipment shall be used (5 hp to 20 hp) with a minimum of two (2) passes in 6 inch lifts for a 5 hp plate and a minimum of two (2) passes in 12 inch lifts for a 20 hp plate. Do not over-compact the lightweight aggregate. Construction equipment, other than for compaction shall not operate on the exposed fill. Each lift shall be compacted to at least 95% of maximum laboratory dry density in accordance with ASTM D-698.

3. The subgrade condition in areas where lightweight aggregate backfill is to be placed shall be examined prior to placement and any conditions found unsatisfactory shall be corrected to be the satisfaction of the Engineer prior to proceeding. Unsatisfactory subgrade conditions shall include, but not be limited to frozen ground, standing water/ice, loose material, deleterious materials, ruts, organics and muck.

4. The final finish surface of the lightweight aggregate fill shall be within ±0.1 feet of the elevations shown on the plans.

5. Any lightweight aggregate material that does not comply with the specified criteria shall be removed and replaced at no additional cost.

Conduct sampling and testing at a minimum frequency listed below:

1. Compaction Test: Each course of units at 100 ft intervals.
2. Gradation Test: Weekly unless material comes from a pre-approved stockpile.
3. Density Test: Weekly unless material comes from a pre-approved stockpile.

OBSERVATION AND TESTING

All Work performed under this Contract shall be subject to observation and tests by the Engineer. The Contractor shall cooperate with the Engineer and shall furnish all materials and facilities as may be required, and shall provide convenient access to all parts of the Work for the purpose of observations to check compliance with the plans and specifications.

The Contractor will test the Lightweight Aggregate Fill for dry loose, delivered bulk density and in-place compacted density.

ITEM 458.71 (Continued)

1. Delivered Bulk Density

   Upon receipt of material to the site, check the dry, loose density to ensure it meets specifications. Check density of every truckload delivered (perform two tests per truckload).

2. In-Place Compacted Density

   Prior to start of production placement and compaction of the lightweight aggregate:

   a. A representative of the lightweight aggregate supplier/producer shall be on site to provide expert oversite of a test compaction effort in the presence of the Engineer. The lightweight aggregate representative shall evaluate the proposed compaction equipment and number of passes relative to achieving the desired compaction without excessive crushing of the material. If alternate proposed compaction equipment results from the evaluation a second test compaction effort shall be similarly performed.

   b. At a minimum, the test section shall comprise at least three (3) lists of lightweight aggregate material placed and compacted with the same means, methods and equipment proposed for the production work.

   c. In each lift of the test section, at least one (1) in-place density test shall be performed using the sand replacement method in a test pit, per ASTM D4914. Each test pit shall be excavated into each lift to fully penetrate the lift thickness. Per ASTM D4914, a liner such as flexible plastic sheeting shall be used to line the test pit to prevent loss of calibrated test sand into voids withing the lift being tested.

   d. If the in-place density is found to be satisfactory in the test section, the means and methods of compaction shall be modified, and the test section and in-place testing in each lift repeated, until an appropriate method has been determined (Equipment type, size, number of passes) to achieve the required compaction.

   e. The results of the test sections(s) in-place density testing shall be provided in a memorandum for review by the Engineer within three (3) days of completion of the test section.

During production placement of Lightweight Aggregate Fill, check density of in-place Lightweight Aggregate Fill for every 65.4 cubic meter of material installed. The minimum compacted dry density shall be equal to 65 percent of the relative dry density as determined by ASTM D-4253 & D-4254.

METHOD OF MEASUREMENT

Item 458.71 will be measured for payment by the CUBIC YARD.

ITEM 458.71 (Continued)

BASIS OF PAYMENT

Item 458.71 will be paid at the Contract unit price per CUBIC YARD, complete in place, which price shall include all labor, equipment, materials, and incidental costs required to complete the work.

ITEM 504.2 GRANITE CURB TYPE VA-4 – SPLAYED END EACH

The work under this item shall conform to the relevant provisions of Section 500 of the Standard Specifications and the following:

A splayed end curb shall be provided to transition from the vertical curb to the sloped face of the bridge curb as shown on the plans and as required by the Engineer. The splayed end curb shall be 6 feet in length with a sawn face that shall match the slope of the bridge curb.

METHOD OF MEASUREMENT

Item 504.2 will be measured for payment per EACH.

BASIS OF PAYMENT

Item 504.2 will be paid at the Contract unit price per EACH, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 634.11 THRIE BEAM GUARDRAIL SYSTEM FOOT

The work under this Item shall conform to the relevant provisions of Section 600 of the Standard Specifications and includes installation of thrie beam guardrail as shown on the plans and the following:

The thrie beam guardrail system assembly includes the installation of transition to bridge rail, transition to thrie beam, and Test Level 3 deep post thrie beam guardrail at the locations shown on the plans.

METHOD OF MEASUREMENT

Item 634.11, Thrie Beam Guardrail System, will be measured for payment by the FOOT of guardrail installed, complete in place.

BASIS OF PAYMENT

Item 634.11, Thrie Beam Guardrail System, will be paid at the Contract Unit Price per FOOT, which price shall include all labor, materials, equipment, and incidental costs required to complete the work including guardrail panels, offset blocks, posts, transitions and other appurtenances to install the system.

Trailing anchorages and tangent end treatments shall be paid for under their respective items.

ITEM 657. TEMPORARY FENCE FOOT
ITEM 657.5 TEMPORARY FENCE REMOVED AND RESET FOOT

The work under these Items shall conform to the relevant provisions of Section 600 of the Standard Specifications and includes installation of temporary chain link fencing as shown on the plans and the following:

Temporary chain link fence shall be placed around the work area to protect areas with excavation as required by the Engineer and shall meet the requirements of the Standard Specifications and the Construction Standards, except the material need not be in new condition.

Gates shall be used at all locations that are to be opened on a regular basis.

Temporary fence shall be reset as often as required by Contractor activities to meet the project schedule and to stage the construction, subject to approval by the Engineer. The Contractor shall submit a plan to the Engineer indicating the locations and the amount of Temporary Fence and Temporary Fence, Removed and Reset that he anticipates he will install for the project. The methods of installation(s) and fence detail(s) shall also be submitted for approval by the Engineer.

The Contractor shall inspect the condition of temporary fence on a daily basis. Temporary fence that is damaged shall be promptly replaced.

METHOD OF MEASUREMENT

Item 657 will be measured for payment by the FOOT of temporary fence installed, complete in place.

Item 657.5 will be measured for payment by the FOOT of temporary fence removed and reset, complete in place.

BASIS OF PAYMENT

Item 657. will be paid at the Contract unit price per FOOT, which price shall include all labor, materials, equipment, and incidental costs required to complete the work including posts, fence fabric, gates, bracing, mounting.

Item 657.5 will be paid at the Contract unit price per FOOT, to remove and reset temporary fence, as many times as needed or as directed by the Engineer. Such price shall be considered as full compensation for all labor, materials, equipment, and incidental costs required to complete the work including posts, fence fabric, gates, bracing, mounting, and other appurtenances to supplement the original installation of Temporary Fence.

No payment will be made for the final removal of temporary fence. No payment will be made for any component needed to replace defective components.

ITEM 697.1 SILT SACK EACH

Work under this item shall conform to the relevant provisions of Subsections 227 and 670 of the Standard Specifications and the following:

The work under this item includes the furnishing, installation, maintenance and removal of a reusable fabric sack to be installed in drainage structures for the protection of wetlands and other resource areas and the prevention of silt and sediment from the construction site from entering the storm water collection system. Devices shall be ACF Environmental (800)-448-3636; Reed & Graham, Inc. Geosynthetics (888)-381-0800; The BMP Store (800)-644-9223; or approved equal.

CONSTRUCTION

Silt sacks shall be installed in retained existing and proposed catch basins and drop inlets within the project limits and as required by the Resident Engineer.

The silt sack shall be as manufactured to fit the opening of the drainage structure under regular flow conditions, and shall be mounted under the grate. The insert shall be secured from the surface such that the grate can be removed without the insert discharging into the structure. The filter material shall be installed and maintained in accordance with the manufacturer's written literature and as directed by the Engineer.

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

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

When emptying the silt sack, the contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed at the Contractors expense. The silt and sediment from the silt sack shall be legally disposed of offsite. Under no condition shall silt and sediment from the insert be deposited on site and used in construction.

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

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

ITEM 697.1 (Continued)

COMPENSATION

Silt sacks will be measured and paid at the Contract unit price per each, complete in place, which price shall include all labor, materials, equipment and incidental costs required to complete the work. No separate payment will be made for removal and disposal of the sediment from the insert, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 698.3 GEOTEXTILE FABRIC FOR SEPARATION SQUARE YARD

The work under this item shall conform to the requirements of Section M9.50.0 of the Standard Specifications and the following:

The work shall include furnishing and installing geotextile fabric for separation, as required by the Engineer.

The Geotextile Fabric shall conform to the requirements of AASHTO M 288 Class 2 and shall be manufactured with material meeting M9.50.0 for Separation or a fabric approved by the Engineer. Geotextile fabric used for this Item must be one listed on the MassDOT Qualified Construction Materials List (QCML) for the approved application of separation.

Geotextile Fabric shall be used to separate the in-situ slope surface in Modified Rockfill Slope and the Crushed Stone. Geotextile Fabric shall also be installed as shown on the plans or in other locations designated by the Engineer.

Install geotextile fabric per manufacturer's recommendations.

METHOD OF MEASUREMENT

Item 698.3 will be measured for payment by the Square Yard of geotextile fabric for separation installed, complete in place; any overlaps shall be measured as a single layer of cloth.

BASIS OF PAYMENT

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

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:

A four-foot smart level shall be provided to the Engineer at the Resident Engineer's Office.

Two computer systems, printer system and a digital camera 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 Systems shall meet the following minimum criteria or better:

Processor:	Intel, 3.5 GHz
System Memory (RAM):	12 GB
Hard Drive:	500 GB
Optical Drive:	DVD-RW/DVD+RW/CD-RW/CD+RW
Graphics Card:	8 GB
Network Adapter:	10/100 Mbit/s
USB Ports:	6 USB 3.0 ports
Keyboard:	Generic
Mouse:	Optical mouse with scroll, MS-Mouse compliant
Video/Audio	the computer system shall be capable of allow video calling and recording:
Video camera	shall be High Definition 1080p widescreen capable video calling and recording with built in microphone. The microphone system shall capture natural audio while filtering out background noise.
Audio	shall be stereo multimedia speaker system delivering premium sound.
OS:	Latest Windows Professional with all security updates
Web Browser:	Latest Internet Explorer with all security updates
Applications:	Latest MS Office Professional with all security updates Latest Adobe Acrobat Professional with all security updates Latest Autodesk AutoCAD LT Antivirus software with all current security updates maintained through the life of the contract.
Monitors:	Two 27" LED with Full HD resolution. Max. resolution 1920 x 1080
Flash drives:	2 (two) - 128GB USB 3.0
Internet access:	High Speed (min. 24 mbps) internet access with wireless router.

ITEM 740. (Continued)

The Multifunction Printer System shall meet the following minimum criteria or better:

Color laser printer, fax, scanner, email and copier all in one with the following minimum capabilities:

- Estimated volume 8,000 pages per month
- LCD touch panel display
- 50 page reversing automatic document feeder (RADF)
- Reduction/enlargement capability
- Ability to copy and print 11" x 17" paper size
- email and network pc connectivity
- Microsoft and Apple compatibility
- ability to overwrite latent images on hard drive
- 600 x 600 dpi capability
- 30 pages per minute print speed (color),
- 4 Paper Trays Standard (not including the bypass tray)
- Automatic duplexing
- Finisher with staple functions
- Standard Ethernet. Print Controller
- Scan documents to PDF, PC and USB
- ability to print with authenticated access protection

The Contractor shall supply a maintenance contract for next day service, and all supplies (toner, staples, paper) necessary to meet estimated monthly usage.

A Digital Camera shall meet the following minimum criteria or better:

Resolution:	14 Megapixel
Optical Zoom:	5x
Waterproof:	to a depth of 33ft (10m)
Shockproof:	up to 6.6ft (2m)
Freezeproof:	14°F (-10°C)
Memory:	8 GB SD Card
USB Port:	USB 2.0 with PC cable
Screen:	2.7+ inch LCD with scratch-resistance and anti-reflectance
Battery Power:	2 rechargeable batteries and a battery charger
Carrying Case:	Rain-proof with shoulder strap

The Engineer's Field Office and the equipment included herein including the computer system, printer, and camera 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 751.765 COMPOST AND SEED OVER MODIFIED ROCK CUBIC YARD

GENERAL

The work under this Item shall conform to the relevant provisions of Subsection 751, 767, and 765 of the Standard Specifications and the following.

Work shall consist of furnishing and pneumatically applying compost in conjunction with the specified native seed on designated areas of modified rock and achieving satisfactory establishment of seeded species as specified herein.

QUALIFICATIONS

Compost application and seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

MATERIAL AND SUBMITTALS

Compost

Compost shall meet the relevant provisions for Type 2 Compost, found in Section M1.06 of the Supplemental Standard Specifications.

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

Seed Mix

Seed Mixes and Submittals shall be per the item(s) for the permanent seed mix. Mix shall be:

765. - Seeding for Slopes and Shoulders and shall be applied per Section M6 of the Standard Specifications.

SEEDING SEASON

The season for seeding native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%.

CONSTRUCTION METHODS

Method of application and equipment to be used shall be reviewed and approved by the Engineer prior to placement of material.

ITEM 751.765 (Continued)

Placement of Compost

Compost shall be placed as shown on the Plans and in the Detail and as required by the Engineer. Material shall be placed so that settled material is at or slightly below the surface plane of the stone. The Contractor shall ensure that there will be adequate quantity, including adjustment for settlement.

For purposes of estimation, required compost quantities should be 300 cubic yards per acre to achieve the target depth.

Seeding

For areas smaller than half an acre, unless otherwise approved by the Engineer, seeding shall be done by broadcast method. Seeding shall be done in conjunction with or immediately following Compost application. Alternative seeding methods must be submitted and approved by the Engineer 14 days in advance of compost and seed application.

Hydroseeding

Hydroseeding may be used for sites over half an acre in size or when the rock slope does not permit safe application via a broadcasting method. Hydroseed shall be per the manufacturer's directions and as follows.

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

When Seeding Occurs after Application of Compost or after December 1

When seeding is done more than 3 days after Compost application or when Compost is applied after December 1, seeding rate shall be increased by 50%.

Over-Seeding

Large extents of bare area (greater than 5-6 feet and depending on modified rock slope conditions) shall be over-seeded with the specified mix during the appropriate season for seeding. Rates, methods, and submittals shall be as specified under the relevant Seed Mix Item and Materials above.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

ITEM 751.765 (Continued)

Determining Satisfactory Establishment

A reasonably well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect or designated Specialist will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species will be visible. For seeding with compost over modified rock this shall generally be:

- A minimum of 50% coverage by the specified permanent seeded species after one growing season (considered June-September 15). Of that percentage, generally, depending on the mix species:
    - At least 2 types of permanent seeded grass species shall be visible.
    - At least 2 species of wildflowers shall be visible.
- There will be no more than 25% coverage by weed species.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (ex., clover) due to using an incorrect or modified mix or due to failure to clean the hydroseeding tank if a hydroseeder is used.

Invasive and aggressive weeds (such as mugwort, vetch, knapweed, and chicory) must be cut, pulled with roots removed, or treated with herbicide by a licensed and approved applicator prior to going to seed for Interim Acceptance. Weed removal shall be coordinated with MassDOT Landscape Architect. No herbicides shall be used without approval and coordination with MassDOT Landscape Design Section.

Acceptance of Seeding and Establishment Work

Conditional Acceptance shall be based on approval of seed mix submittals and proper application of seed as specified herein.

Final Acceptance of Seed Establishment shall be given upon satisfactory Establishment as described above. If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. Otherwise, Contractor shall forego the payment for Final Acceptance. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Compost and Seed for Modified Rock will be measured and paid for at the Contract unit price per Cubic Yard which price shall include all labor, materials, equipment, site preparation, and all incidental costs required to complete the work.

Native Seed Mix shall be compensated at the bid price per the specified seed mix item by pound.

ITEM 751.765 (Continued)

Schedule of payment shall be as follows:

60% upon approval of Compost application and Conditional Acceptance of seeding as specified above

40% upon Final Acceptance of Seed Establishment

765.21 ANNUAL COVER CROP FOR NATIVE SEEDING POUND

Work under this item shall conform to the relevant provisions of Subsection 765 of the Standard Specifications and the following.

DESCRIPTION

Work consists of furnishing and applying the appropriate annual grass to be seeded as a cover crop in conjunction with upland native seeding and at the rate specified herein.

A cover crop shall be used for following conditions:

- when specified under Application Rate for the permanent native upland seed mix
- for slopes 2:1 or steeper and an annual is not already specified as part of the permanent mix
- when seeding out of season and the native seed mix does not already specify an annual
- as required to prevent erosion until the permanent seed establishes.

A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

Annual rye (*Lolium multiflorum*) will not be accepted as an annual cover crop.

Using annual rye or exceeding the application rate such that a dense stand of annual grasses prevents germination of the native grasses will require mowing of annual grasses. In this instance, mowing of cover crop will be incidental to this item.

Seed and Application Rate

Add 30 pounds/acre of the following seed based on seeding season:

Avena sativa (Grain Oats):	1 January to 31 July
Cecale cereale (Grain Rye):	1 August to 31 December

METHOD OF MEASUREMENT

Item 765.21 will be measured for payment per POUND of seed, complete in place.

BASIS OF PAYMENT

Item 765.21 will be paid at the Contract unit price per POUND upon approval of seed bag tags or other documentation of correct application rate and species, and upon acceptance of a satisfactory stand of annual grasses three weeks following seeding.

Application and care of cover crop will be paid for separately under Item 765.635 Native Seeding and Establishment.

ITEM 765.411 SHORT GRASSLAND SEED MIX POUND

Work under this item shall consist of furnishing the mix(es) specified below in the required quantity. Work under this Item shall conform to the relevant provisions of Section 765 of the Standard Specifications, with the following adjustments:

SUBMITTALS

1) Pre-Verification of Seed Availability. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species in the required quantities and for the anticipated date of seeding. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Species not expected to be available should be noted and substitutions recommended.

2) Final Verification of Seed Availability. No earlier than 21 days prior to ordering, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species and in the required quantities. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section. Substitutions or changes in the mix at this time must be approved by MassDOT Landscape Design Section.

3) Seed Worksheet provided herein shall be submitted to the Engineer prior to ordering seed to determine the number of pounds of Pure Live Seed required.

4) Seed Tags. The contractor shall submit original seed tags from each bag of seed used on the project or ensure that each tag is photo documented by the Engineer while on the unopened bag.

   Number of tags submitted must correspond to number of bags delivered.

   Species listed on the seed tag shall match the Final Verification of Seed Availability (Submittal #2) unless approved otherwise. Tag must include: variety and species name; lot number; purity; percentage of inert matter; percentage of weeds, noxious seeds, and other crop seeds; germination, dormant or hard seed; total viability; origin of seed; germination test date, net weight, and name and address of seller. The origin of seed must be listed on the seed tag for all species in the mix to provide verification of original (generation 0) seed source. The smallest known geographic area (township, county, ecotype region, etc.) shall be listed. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

   A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

ITEM 765.411 (Continued)

1) Verification of Seed Delivery. Prior to payment, contractor shall submit the Seed Delivery Verification form contained within the contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this contract. The bill of lading must include variety and species name, lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section

2) Seed Sample. If requested or if seed is from a previously opened bag, the contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

The appropriate seeding seasons are:

Spring: April 1 - May 15
Fall: October 1 - December 1 for dormant seeding

Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%.

PERMANENT SEED MIX(ES)

Calculating Pure Live Seed (PLS)

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed). For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy, it is calculated to be 90% x [78 + 10 + 2]% = 81% PLS.

Therefore, each pound of PLS would need 1 pound / 0.81 = 1.2 pounds of seed with a 90% purity and 90% total germination

Seed Mix(es) shall be as specified below. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

ITEM 765.411 (Continued)

Short Grassland Seed Mix

	Botanical Name	Common Name	% PLS by Weight
Grass			
	Schizachyrium scoparium 'Albany Pine'	Little Bluestem 'Albany Pine'	57.00%
	Elymus virginicus	Virginia Wild Rye	27.00%
	Festuca rubra	Creeping Red Fescue	9.00%
	Agrostis perennans	Upland Bentgrass	1.20%
	Dichanthelium clandestinum 'Tioga'	Deertongue grass 'Tioga'	1.00%
	Eragrostis spectabilis 'RI Ecotype'	Purple Lovegrass 'RI Ecotype'	1.00%
			96.20%
Herb/Forb			
	Chamaecrista fasciculata	Partridge Pea	2.30%
	Penstemon digitalis	Beard-tongue	0.50%
	Solidago nemoralis	Grey Goldenrod	0.30%
	Aster pilosus	Heath Aster	0.10%
	Pycnanthemum tenuifolium	Slender Mountain Mint	0.10%
	Oenothera fruticosa var. fruticosa	Sundrops	0.10%
	Achillea millefolium	Common Yarrow	0.10%
	Aster lateriflorus	Calico Aster	0.10%
	Solidago bicolor	White Goldenrod	0.10%
	Aster laevis NY Ecotype	Smooth Aster NY Ecotype	0.10%
			3.80%
			100.00%

Application Rate: 15 pounds PLS/ Acre. No cover crop shall be applied.

Any species substitutions shall be with a species having similar characteristics and function. Substitutions must be approved by MassDOT Landscape Design Section per the documentation submittal process.

Any species substitutions shall be with a species having similar characteristics and function. Substitutions must be approved by MassDOT Landscape Design Section per the documentation submittal process.

50% Increase Adjustment for Field Conditions:

Seeding under the following conditions requires a 50% increase in the permanent mix at the time of construction:

- Seeding out of season
  OR
- Seeding after Compost Blanket has been applied (unless already increased for out of season).

ITEM 765.411 (Continued)

METHOD OF MEASUREMENT

Item 765.411 Short Grassland Seed Mix will be measured for payment by the POUND of Pure Live Seed delivered and complete in place.

BASIS OF PAYMENT

Item 765.411 Short Grassland Seed Mix will be paid for at the respective Contract unit prices per pound of Pure Live Seed delivered upon approval of all Seed Submittal Documentation. Overseeding required to correct poor germination or establishment shall be incidental to the item.

Application and care of native seed mix will be paid for separately under Item 765.635 Native Seeding and Establishment.

Site preparation, including raking, tilling, removal of debris and stones, and other work to the prepare site for seeding shall be compensated under Item 751. Loam For Roadsides as relevant to the project.

Application and care of native seed mix will be paid for separately under Item 765.635 Native Seeding and Establishment.

Site preparation, including raking, tilling, removal of debris and stones, and other work to the prepare site for seeding shall be compensated under Item 751. Loam For Roadsides as relevant to the project.

ITEM 765.411 (Continued)

NATIVE SEED WORKSHEET

Project Description: _____ Project No: _____

Contractor: _____Contract No: _____

Seed Mix Number & Description: _____

Contractor: Complete Prior To Ordering

Pounds of Seed Required Per Contract:

_____lbs./acre for _____Acre(s) OR _____ SY

Additional 50% increase if required (out of season or seeding over compost blanket):

_____**lbs. Total Seed Required**

Calculated Quantity for **P**ure **L**ive **S**eed (PLS[1]):

_____ **Total Pounds PLS**

Engineer: Verification at Time of Application

Number pounds delivered to site[2]: _____ Date(s): _____

Actual Seed Bag Tag/s Received or photo documented by Engineer: _____

[1] PLS=% pure seed x % viable seed (total germination, hard seed, and dormant seed).
*[2]Quantity delivered should match pounds **Total Pounds PLS** and **Verification of Seed Delivery**. Pounds should be shown on each Seed Tag.*

ITEM 765.411 (Continued)

SUPPLIER VERIFICATION OF SEED DELIVERY FOR MASSDOT PROJECTS

Date_____

We hereby certify that (*Seed Supplier*):_____

Furnished to (*Contractor*): _____

For use on: (*Project Description*) _____

Project #: _____ Contract #: _____

Pounds of Pure Live Seed: _____

Of Mix (*Description*): _____

Lot Number _____

The material was delivered on (*Date*)_____.

The labels and contents meet all State and Federal regulations. The mixture consists of the following species, including cultivars (as applicable) and ecotype region, and at the following percentages (may be attached separately):

Name (print): _____ Title: _____

Supplier: _____

Signature and Seal: _____

ITEM 765.635 NATIVE SEEDING AND ESTABLISHMENT SQUARE YARD

Work shall conform to the relevant provisions of Subsections 765 and 767 of the Standard Specifications and the following:

The work under this item shall consist of seeding, mowing, and other care to establish a stand of grass in the areas shown on the plans or as required by the Engineer. For the purposes of these specifications, the term "grass" shall apply to all the forbs, grasses, sedges, and rushes included in the materials.

QUALIFICATIONS

Seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

SEEDING SEASON

Seeding seasons for native mixes shall be as noted in Special Provision Item 765.411. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%.

MATERIAL AND SUBMITTALS

Seed Mixes and Submittals shall be per the item(s) for permanent and annual (cover crop) seed mixes.

Compost Blanket, if used, shall meet the material and submittal requirements for that item.

Hydromulch shall be wood fiber or straw applied per the Standard Specifications and at the rates specified below and per the manufacturer.

A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of hydromulch, tackifier, and seed, per 100 gallons of water and as applicable to products used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above.

Fertilizer

No fertilizers shall be applied.

ITEM 765.635 (Continued)

Water

Water, including hose and all other watering equipment required for the work, shall be furnished by the Contractor to the site at no additional cost. Water shall be suitable for irrigation and free from ingredients harmful to plant life. All plants injured or work damaged due to the lack of water or the use of too much water shall be the Contractor's responsibility to correct.

SEEDING

Hand broadcast method shall be used for all areas smaller than half an acre and when specified on the plans for areas over half an acre.

Seeding shall occur within 72 hours of placement of loam and final grading or the Contractor shall propose a reasonable, alternative schedule that shall be approved by the Engineer.

Surface Preparation

No seeding or soil preparation shall be done if soils are muddy or dry and compacted. Bare soils shall be raked to remove large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Ruts and depressions shall be filled with additional loam or compost and the soil shall be re-graded to a relatively smooth finish corresponding to the required grades.

When seeding over existing or compacted soil or soil that has sat bare for more than 30 days, surface will be prepared by tilling or raking to a minimum depth of 2 inches prior to seeding and prior to Compost Blanket application (when applied).

Surface preparation shall be compensated for under for loam placement or topsoil rehandled and spread as appropriate to the project.

Jute or coir mesh, when specified in the contract, shall be placed after seeding and per the Standard Specifications and the manufacturer’s instruction.

Surface preparation shall be approved by the Engineer prior to seeding.

Seeding over Various Substrates

Loam: Seeding shall occur within 72 hours of loam placement to prevent loss of topsoil. Seed shall be manually broadcast for areas less than half an acre (each area, not cumulative area) and when specified on the plans. Broadcasting shall be immediately followed by hydromulching as specified below. When not specified on the plans, larger areas may be hydroseeded as specified below.

ITEM 765.635 (Continued)

Seed Application

All seed shall be mulched as specified herein.

Seed application shall be by broadcast seeding or by hydroseeding as described below.

Broadcast Seeding

Seed shall be broadcast spread using a cyclone or whirlwind seeder or hand broadcast. Small or light-seeded species such as bluestem may be mixed with approved filler to achieve an even distribution. Seed shall not be broadcast when wind velocities are greater than 15 mph.

Broadcast seeding shall be undertaken in two separate passes at ninety degrees to each other. One-half the seeding rate shall be applied in each direction (horizontally and vertically). To ensure seed to soil contact with broadcasting of seed, seeding shall be followed by rolling or tracking with equipment approved by the Engineer.

Broadcast seed shall be mulched with weed-free straw mulch. Hydromulching shall be as specified under Hydromulching.

Hydroseeding and Hydromulching

Hydroseed and mulching shall be per the manufacturer's directions and as follows.

Hydroseeding shall only be used for sites over half an acre in size or with permission of the Engineer.

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

A 2-step process shall be used for seeding in conjunction with hydromulch. Seed shall be applied with 500 lbs/acre of hydromulch in the first pass. A second pass with 1,000 lbs/ acre of hydromulch shall be applied in a second pass. Each pass shall be applied in a different direction.

Once the seed has been added to the tank mixture a one-hour time limit is set for spreading the mixture on the soil. Once the one hour has passed the excess mixture must be discarded.

For broadcast seeding, hydromulch shall be applied immediately following seeding at a rate of 1,000 lbs/acre. Tank shall be cleaned from any previous hydroseeding.

ITEM 765.635 (Continued)

CARE DURING GERMINATION AND ESTABLISHMENT

Contractor shall care for seeded areas as necessary for successful germination. Care will include watering and weed control as necessary to achieve establishment of the specified seeded species after one growing season as specified below.

The contractor shall maintain the stand of grasses to ensure healthy growth of the seeded species. Work shall include mowing or weed-whacking for weed control, watering if necessary, and removal of invasive plants.

Watering shall be sufficient to achieve soil moisture to a depth of 2 inches or more and such moisture is uniform. Method of watering shall not erode or damage soil or grassed surfaces.

General Weed Control: Unless otherwise directed, mowing shall be as specified under Mowing for Weed Control for seed establishment. Weeds shall be mowed prior to weeds setting seed (by the end of July unless otherwise approved).

Control of Invasive and Aggressive Weeds: Invasive and aggressive weeds, including but not limited to mugwort, ragweed, knapweed, foxtail, crabgrass, and chicory must be cut or treated prior to going to seed. Herbicide treatment must be coordinated with MassDOT. Undesired species (such as chicory) introduced due to use of incorrect seed mix shall be removed at the Contractor's expense.

MOWING FOR WEED CONTROL

Mowing for weed control shall be completed after weeds have sprouted and show leaf and bud growth, but prior to setting seed, generally between July 7th and August 1st, unless directed otherwise by the MassDOT Landscape Architect and the Engineer.

Mowing height shall be as needed for weed control, generally to a height of 8 inches and not below 4 inches, unless directed otherwise. Mowing shall be with a brush hog mower or string trimmer other approved equipment. Conventional lawn mowers which cannot achieve the appropriate cut shall not be used.

Contractor shall give 48-hour notice prior to mowing work. Mowing shall only occur in dry sunny weather. Litter pickup should occur prior to mowing in all areas. If required by the Engineer, cut grass shall be raked and removed. Litter pickup and raking and removal of grass shall be incidental to the work.

Mowing equipment shall be approved by the Engineer prior to work.

ITEM 765.635 (Continued)

OVER-SEEDING

Areas of bare ground greater than 2-3 feet in diameter shall be over-seeded with the specified mix during the appropriate season for seeding. Where required for overseeding mowing shall be as close to the soil as possible. Soil that is compacted shall be raked or otherwise roughened prior to over-seeding.
Over-seeding rates and methods shall be those specified above under Materials and Methods. Following over-seeding, soil shall be lightly tamped to ensure seed to soil contact and areas shall be mulched with straw mulch and watered with a fine mist to moisten soil to a depth of at least 2 inches.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

DETERMINING SATISFACTORY GRASS ESTABLISHMENT

A well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species (not the cover crop) will be visible. Generally:

- A minimum of 75% coverage by the specified permanent seeded species after one growing season. Of that percentage, generally, depending on the mix species:
    - At least 3 types of the permanent seeded grass species shall be visible.
    - At least 3 species of wildflowers shall be visible.
- There will be no significant gaps or bare soil (generally 2-3 feet in diameter or greater).
- There will be no more than 25% coverage by weed species.
- All soil shall be stabilized and there shall be no channeling or erosion.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (i.e., clover) due to failure to clean the hydroseeding tank or using incorrect mix.

Invasive and aggressive weeds (such as mugwort, ragweed, knapweed, and chicory) must be cut or treated prior to going to seed for Interim Acceptance. Herbicide treatment must be coordinated with MassDOT.

A warm-season grass mix with perennials will not have uniform growth. A uniform stand of grass may indicate use of an incorrect mix.

ITEM 765.635 (Continued)

ACCEPTANCE OF SEEDING AND ESTABLISHMENT WORK

Conditional Acceptance shall be based on proper application of seed as specified herein.

Interim Acceptance of Care. Seeding will be inspected by mid-July to assess germination and Establishment conditions as described above. When necessary for Interim Acceptance, areas shall be mowed prior to weed species producing seed and as specified above under Weed Control. ***Areas requiring weed control that are not mowed prior to weed seed dispersal will not be approved for Interim Acceptance.*** Seeding that shows good germination and is determined by the Engineer and Landscape Architect to not require weed control at the time of inspection shall be accepted for Interim Acceptance payment.

Final Acceptance of Establishment shall be given upon satisfactory Establishment as described above.

If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT

Native Seeding and Establishment will be measured for payment by the square yard, complete in place.

BASIS OF PAYMENT

Native Seeding and Establishment will be paid at the Contract unit price by the square yard (SY) upon Conditional, Interim, and Final Acceptances as described above. This price shall include all submittals, seeding, rolling to ensure seed-to-soil contact, weed control other than mowing, water, over-seeding, labor, materials, equipment, and all incidental costs required to complete the work of establishing a satisfactory stand of grass.

Native seed mixes shall be compensated under the respective items.

Site preparation, including raking, tilling, removal of debris and stones, and other work to the prepare site for seeding shall be compensated under Item 751. Loam For Roadsides as relevant to the project.

Mowing for weed control will be incidental to this item.

Schedule of payment shall be as follows:

30% upon Conditional Acceptance
20% upon Interim Acceptance of Care, except this amount will be reduced to zero and final payment will be reduced accordingly when areas requiring weed control are not mowed as specified in the Interim Acceptance criteria.
50% upon Final Acceptance of Establishment

ITEM 767.121 SEDIMENT CONTROL BARRIER FOOT

The work under this item shall conform to the relevant provisions of Subsections 670, 751 and 767 of the Standard Specifications and shall include the furnishing and placement of a sediment control barrier. Sediment control barrier shall be installed prior to disturbing upslope soil.

The purpose of the sediment control barrier is to slow runoff velocity and filter suspended sediments from storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent upgradient water or water off road surfaces from flowing into a work zone. Contractor shall be responsible for ensuring that barriers fulfill the intent of adequately controlling siltation and runoff.

Twelve-inch diameter (after installation) compost filter tubes with biodegradable natural fabric (i.e., cotton, jute, burlap) are intended to be the primary sedimentation control barrier. Photo-biodegradable fabric shall not be used.

For small areas of disturbance with minimal slope and slope length, the Engineer may approve the following sediment control methods:

- 9-inch compost filter tubes
- Straw bales which shall be trenched

No straw wattles may be used. Additional compost filter tubes (adding depth or height) shall be used at specific locations of concentrated flow such as at gully points, steep slopes, or identified failure points in the sediment capture line.

When required by permits, additional sediment barrier shall be stored on-site for emergency use and replacement for the duration of the contract.

Where shown on the plans or when required by permits, sedimentation fence shall be used in addition to compost filter tubes and straw bales and shall be compensated under that item.

Sediment control barriers shall be installed in the approximate location as shown on the plans and as required so that no excavated or disturbed soil can enter mitigation areas or adjacent wetlands or waterways. If necessary to accommodate field conditions and to maximize effectiveness, barrier locations may be shifted with approval from the Engineer. Barriers shall be in place prior to excavation work. No work shall take place outside the barriers.

MATERIALS AND CONSTRUCTION

Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans and adjust placement to ensure that the placement will provide maximum effectiveness.

Barriers shall be staked, trenched, and/or wedged as specified herein and according to the Manufacturer's instructions. Barriers shall be securely in contact with existing soil such that there is no flow beneath the barrier.

ITEM 767.121 (Continued)

Compost Filter Tube

Compost material inside the filter tube shall meet M1.06.0, except for the following: no peat, manure or bio-solids shall be used; no kiln-dried wood or construction debris shall be allowed; material shall pass through a 2-inch sieve; and the C:N ratio shall be disregarded.

Outer tube fabric shall be made of 100% biodegradable materials (i.e., cotton, hemp or jute) and shall have a knitted mesh with openings that allow for sufficient water flow and effective sediment capture.

Tubes shall be tamped, but not trenched, to ensure good contact with soil. When reinforcement is necessary, tubes shall be stacked as shown on the detail plans.

Straw Bales

Straw bales shall be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

Bales should be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. All bales should be either wire-bound or string-tied. Straw bales should be installed so that bindings are oriented around the sides (rather than along the tops and bottoms) of the bales in order to prevent deterioration of the bindings.

The barrier should be entrenched and backfilled. A trench should be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. The trench must be deep enough to remove all grass and other material which might allow underflow. After the bales are staked and chinked (filled by wedging), the excavated soil should be backfilled against the barrier. Backfill soil should conform to the ground level on the downhill side and should be built up to 4 inches against the uphill side of the barrier.

Each bale should be securely anchored by at least 2 stakes or re-bars driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together. Stakes or re-bars should be driven deep enough into the ground to securely anchor the bales. For safety reasons, stakes should not extend above the bales but should be driven in flush with the top of the bale.

The gaps between the bales should be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency. Wedging must be done carefully in order not to separate the bales.

When used in a swale, the barrier should be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the barrier but not around it.

ITEM 767.121 (Continued)

Sedimentation Fence

Materials and Installation shall be per Section 670.40 and 670.60 of the Standard Specifications and the following:

Sedimentation fence shall only be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

When used with compost filter tubes, the tube shall be placed on a minimum of 8 inches of folded fabric on the upslope side of the fence. Fabric does not need to be trenched.

When used with straw bales, an 8-inch deep and 4-inch wide trench or V-trench shall be dug on the upslope side of the fence line. One foot of fabric shall be placed in the bottom of the trench followed by backfilling with compacted earth or gravel. Stakes shall be on the down slope side of the trench and shall be spaced such that the fence remains vertical and effective.

Width of fabric shall be sufficient to provide a 36-inch high barrier after fabric is folded or trenched. Sagging fabric will require additional staking or other anchoring.

MAINTENANCE

Maintenance of the sediment control barrier shall be per Section 670.60 of the Standard Specifications or per the Stormwater Pollution Prevention Plan (SWPPP), whichever is more restrictive.

The contractor shall inspect the sediment barrier in accordance with relevant permits. At a minimum, barriers shall be inspected at least once every 7 calendar days and after a rain event resulting in 0.25 inches or more of rainfall. Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively for all phases of the Contract.

Barriers that decompose such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost within the fabric tube is sufficiently intact (despite fabric decay) and continues to provide effective water and sediment control, barrier does not necessarily require replacement.

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed, as required, when construction work is complete and upslope areas have been permanently stabilized and after receiving permission to do so from the Engineer.

Regardless of site context, nonbiodegradable material and components of the sediment barriers, including photo-biodegradable fabric, plastic netting, nylon twine, and sedimentation fence, shall be removed and disposed off-site by the Contractor.

ITEM 767.121 (Continued)

For naturalized areas, biodegradable, natural fabric and material may be left in place to decompose on-site. In urban, residential, or other locations where aesthetics is a concern, the following shall apply:

- Compost filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (as would be done with a soil amendment or mulch). No more than a 2-inch depth shall be left on soil substrate.
- Straw bales shall be removed and disposed off-site by the Contractor. Areas of trenching shall be raked smooth and disturbed soils stabilized with a seed mix matching adjacent seeding or existing grasses (i.e., lawn or native grass mix).
- Sedimentation fence, stakes, and other debris shall be removed and disposed off-site. Site shall be restored to a neat and clean condition.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.121 will be measured and paid for at the contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

Additional barrier, such as double or triple stacking of compost filter tubes, will be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damage by construction activities shall be repaired or replaced as directed by the Engineer at the Contractors expense.

ITEM 769.1 PAVEMENT MILLING MULCH UNDER GUARDRAIL SQUARE YARD

All work under this item shall conform to the relevant provisions of Subsection 769 of the Standard Specifications and the following:

The mulched area shall be placed in locations as shown in the plans or as approved by the Engineer.

Milling mulch shall be spread to a depth of 4-inches.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 769.1 shall be measured and paid for at the contract unit price per SQUARE YARD which price shall include all labor, equipment, materials, maintenance and all incidental costs required to complete the work.

ITEM 772.161	**TREE EVERGREEN – NIGRA AMERICAN ARBORVITAE - 5-6 FEET**	**EACH**
ITEM 772.335	**TREE EVERGREEN - EASTERN RED CEDAR - 4-5 FEET**	**EACH**
ITEM 774.638	**TREE EVERGREEN WHITE SPRUCE - 5-6 FEET**	**EACH**

The work under these items shall conform to the applicable requirements of Subsection 771, of the Standard Specifications. As indicated on the plans, plantings are schematic and shall be staked out in the field and confirmed with MassDOT Landscape Design Section prior to installation.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Items 772.161, 772.335, and 774.638 will be measured and paid in accordance with the requirements of Subsections 771.80 and 771.81 of the Standard Specifications.

ITEM 816.81 TEMPORARY TRAFFIC CONTROL SIGNAL LOCATION NO. 1 LUMP SUM

Location No. 1 is the temporary signalized intersection of Main St (Route 122) at Bailey Rd.

The work under this item shall conform to the relevant provisions of Section 800 of the Standard Specifications, the 2023 Manual on Uniform Traffic Control Devices (MUTCD), and the following.

Location No. 1 is the temporary signalized intersection of Main St (Route 122) at Bailey Rd.

These provisions are presented under major subheadings as follows: 1) General Requirements for Local Intersection Control Equipment, 2) Local Intersection Controllers with Peer-to-Peer capability, 3) Video Detection System, 4) Broadband Ethernet Radio, 5) Environmentally Hardened Ethernet Switch, and 6) GPS Receiver.

The work includes furnishing all labor and materials to install temporary wood pole span poles and span wires with tether; signal heads with backplates; video detection system; emergency vehicle preemption; wireless broadband radio and Ethernet communication equipment; all cable and wiring; equipment grounding and bonding; and all other equipment, materials and program signal timing data to the local traffic signal controllers and incidental costs necessary to provide a complete, fully operational peer-to-peer temporary traffic control signal system as specified herein and as shown on the plans.

GENERAL REQUIREMENTS FOR LOCAL INTERSECTION CONTROL EQUIPMENT

Before beginning ANY traffic signal work, the individual or contracting organization responsible for any portion of the traffic signal construction shall demonstrate to the Engineer personal possession in the field of all of the following documents:

- 2026 “Massachusetts Highway Department Standard Specifications for Highways and Bridges”
- 2023 Manual on Uniform Traffic Control Devices with all Amendments
- January 2026 Construction Standard Details
- MassDOT 2015 Overhead Signal Structure and Foundation Standard Drawings
- 1968 Standard Drawings for Traffic Signals and Highway Lighting
- 1990 Standard Drawings for Signs and Supports
- All contract drawings showing traffic signal details or traffic signal design
- All contract special provisions

A list of the major traffic signal items required is included on the Plans. All traffic signal equipment installed on this project shall be included on the MassDOT Highway Division Qualified Traffic Control Equipment List.

Within thirty days following the Notice to Proceed, the Contractor shall submit shop drawings for signal supports, a list of equipment, and manufacturer’s equipment specifications to the Engineer in accordance with the relevant provisions of Section 815.20.

ITEM 816.81 (Continued)

No work shall be commenced by the Contractor until approval of the shop drawings and the manufacturer's data has been received in writing from the Engineer. Approval of these drawings will be general in character and shall not relieve the Contractor from the responsibility of, or the necessity of, furnishing materials and workmanship conforming to the plans and specifications.

The existing traffic signal at the intersection of Main Street and Salisbury Street shall remain operational throughout construction and signal timings shall be adjusted by the Contractor in coordination with MassDOT.

Service Connection

A service connection in conformance Section 813 of the Standard Specifications shall be made at the traffic signal controller cabinet. The Contractor shall install overhead wire from the nearest utility pole to the temporary wooden span pole with the controller cabinet mounted to it. The serving utility shall connect the source of supply to the wires installed by the Contractor. No work shall be done on power poles without a representative of the serving utility company being present. The Contractor will be responsible for coordinating the serving utility company work.

The Contractor shall notify the serving utility that construction has begun immediately after receiving notice to proceed with construction. The Contractor shall schedule with the serving utility the installation of service connection and main power shut-off, if required.

The Contractor shall submit the required work order request to the serving utility and pay of all charges for the service connection including modifications required for the connection.

Traffic Signal Equipment

The traffic signal controller unit (CU), malfunction management unit (MMU) and all other ancillary traffic signal control components included in the traffic signal control cabinet shall comply with the National Electrical Manufacturers Association (NEMA) Standard No. TS 2-2016, Traffic Controller Assemblies with National Transportation Communications for ITS Protocol (NTCIP) Requirements.

Flashing Operation

Changes from flashing to stop-and-go operation and from stop-and-go to flashing operation shall occur as set forth in the MUTCD.

Malfunction Management Unit (MMU)

The MMU shall meet Section 4 requirements set forth in NEMA TS-2 specifications, 2016. The MMU shall be compatible with a NEMA TS-2 Type 1 traffic signal controller. The MMU shall provide a means of displaying the real time status of operating parameters such as the time and date, compatibility card programming, functional inputs, and the status of MMU switch settings.

ITEM 816.81 (Continued)

The MMU shall provide a settable internal ninety-nine-year clock. This clock shall automatically adjust for daylight savings time. This requirement shall be accomplished by a user programmable function.

The MMU shall store events in a nonvolatile memory and these events shall be retained through indefinite power interruption on event log. A minimum of 100 events shall be logged by time and date of event occurrence. The memory storage algorithm shall be a first-in/first-out system (this type of rolling memory assures that the most recent events are retained). As a minimum, the event log shall contain the following information:

- Failure type (date/time stamp)
- Display indications at time of failure
- Manual reset (date/time stamp)
- Manual switch changes (date/time stamp)
- Last time/date stamp
- Last print out

The MMU shall be furnished and wired such that data is transmitted directly to the controller for remote system access. The data exchange shall provide the ability to, via the controller unit, remotely upload the MMU event log, MMU switch settings, and compatibility card programming information.

Bus Interface Unit (BIU)

The Bus Interface Unit (BIU) shall comply with Section 8 of the NEMA TS 2 Standard. The BIU shall be fully interchangeable with any other manufacturer's unit and interchangeable in a NEMA TS 2 Type 1 cabinet assembly.

The BIU shall perform the interface function between Port 1 at the controller unit, the malfunction management unit, loop detector rack assembly, and the back panel terminal and facilities.

As a minimum, two (2) 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.

Load Switches

Load switches shall comply with Subsection 6.2 of the NEMA TS 2 Standard. All load switches shall utilize optically isolated encapsulated modular solid-state relays. Discrete components on circuit boards are not acceptable.

Load switch indicator lights shall be LED-type and wired on the input side of the device.

ITEM 816.81 (Continued)

Flasher

Flashers shall comply with Subsection 6.3 of the NEMA TS 2 Standard and be equipped with two output indicator lights which will show flashing power out to the cabinet assembly.

Flash Transfer Relay

Flash transfer relays shall comply with Subsection 6.4 of the NEMA TS 2 Standard.

The field electrical loading for flash operation shall be wired through the transfer relays such that the load on the 2-circuit flasher is as balanced as possible within the limitations of the signal phasing.

Signal Heads.

Signal heads shall have yellow housings with black doors. All signal head indications shall be state approved LED. All signal heads shall have 5" flat back plates with 3" yellow retroreflective boards as indicated on the plans.

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.

ITEM 816.81 (Continued)

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

Temporary Wooden Pole Span Wire System

Under this item the Contractor shall furnish and install wood poles, anchors, guy wires, and incidentals as described herein and as shown on the plans. The cost of the wood poles, anchors and guy wires is included to be included in the contract unit price for Item 816.81.

The height of the wood poles shall be determined by the Contractor and shall be such a height that allows all traffic signal equipment/signs/tether wire to be at a minimum vertical clearance of no less than 17'-6" or greater than 19' above the pavement grade at the center of the roadway. Class 1 poles or better shall be used for traffic signal support poles.

Poles shall not have more than 180 degrees twist in grain over the full length. Tops of the poles shall be beveled.

Poles shall be smoothly trimmed wither by hand or by machine. Any surface preparation of the poles shall be considered incidental work to these items. The depth of cut shall be kept to a practical minimum on the surface and in no case be more than 1/4 in. except at wood characteristics. The circumference at any point between wood characteristics shall not be reduced by more than 1 in.

Excessive splitting shall not be acceptable and shall be defined as: A check or split that will permit a number 10 B & S wire to be extended 3 in. into the body of the pole. Checking and splitting of such size that at any point along the pole, two checks or splits occur into which a number 10 wire may be inserted for a depth of more than 3/4 in. Any pole found to have excessive splitting shall be replaced by the Contractor at no additional cost.

Tops and butts of poles shall be free of pith holes.

The depth of a trimmed scar shall not be greater than 1 in. or 1/10" of the pole diameter at that location.

Any deviation from straightness shall not exceed 2 in., within a 5 foot section. A pole may sweep in one plane and in one direction provided a straight line joining the midpoint of the pole at the butt and midpoint of the pole at the top does not at any intermediate point pass through the external surface of the pole. No poles with sweeps in two planes will be accepted and shall be replaced by the Contractor at no additional cost.

ITEM 816.81 (Continued)

Before treatment, poles shall be sufficiently air-seasoned or kiln dried to reduce cracking after treatment to a minimum and to permit maximum penetration and retention of the preservative. Prior to treatment, the moisture content of the sapwood, based on the oven-dried weight, shall not exceed 25%. An electrical resistance type moisture meter having insulated needles shall determine the moisture content. The needles shall be driven 2 1/4 in. deep into the wood. The Contractor shall conduct the moisture content test in the presence of the Engineer.

The preservative shall be pentachlorophenal meeting the requirements of the American Wood Preservative Association (AWPA) Standards P8. The carrier shall be a volatile petroleum solvent meeting the requirements of AWPA Standard P9. Retention shall not be less than 1/2 pound of pentachlorophenol per 1 cubic foot of wood. The treating process shall produce complete sapwood penetration with the preservative of 1/2 lb. of pentachlorophenol per 1 cubic foot of wood in the 1/2 to 2 in. zone.

Strain poles shall be in placed in the ground a minimum of 12 feet. After each pole is set in the ground, the pole shall be backfilled with select backfill. Backfill shall be free of rocks and debris, and shall be placed in layers of no more than 6 in. before compaction. Each layer shall be moistened and thoroughly compacted.

Strain poles shall be raked sufficiently to be plumb after all loads have been placed. The wood pole shall not display a void area between the pole and the backfill when placed under load.

All electrical cables and conductors installed above ground, except where attached to overhead span wire, must be installed in conduit attached to the wood poles. Conduit must be securely fastened to wood poles with straps. The cost of furnishing the conduit and necessary fittings and attachments shall be considered incidental to work under these items.

Traffic Control Cabinet

The controller cabinets shall be pole-mounted and conform to the NEMA TS 2 Type 1 Standards, Section 7. The control cabinet shall be made of aluminum with painted aluminum interior and exterior.

The firmware and software version shall be the latest version available on the market. In addition, the contractor shall promptly furnish to the owner and install all upgraded versions of both firmware and software through the last day of the inspection period, guarantee period or warranty period, whichever day is later.

The contractor shall furnish one cable to connect a controller to a laptop computer. This cable shall have a termination at one end to match the controller. It shall have a termination on the other end to match the type of communication interface found on laptop computers. This cable shall be wired to provide communication between the controller and the computer.

Payment for the work described above shall be deemed to be incidental to and included in the prices bid for various items of traffic signal work, and no additional payment shall be made for the work described above.

ITEM 816.81 (Continued)

LOCAL INTERSECTION CONTROLLER

The local intersection controllers shall be NEMA TS2 Type 1 controller with Peer-to-Peer capability.

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 standards for fully actuated traffic control units. The local controller shall have internal communication capability with direct access to the data memory. The local system controller shall be capable of processing controller, intersection and system detection data and provide all required intersection control functions. The required local controller time-based coordination and preemption functions shall be internal in the timing unit.

The local intersection controller shall provide multiple communication interfaces including Ethernet, USB and other industry-specific interfaces, facilitating both backward and forward compatibility.

To minimize training and simplify local programming, all local parameter access shall utilize prompting and English language displays, and all codes needed by the user, if any, shall be on the front panel or on the display screen to avoid the need for memorization or the presence of a manual.

The local intersection controller shall utilize a backlit LCD display screen and simultaneously provide real-time active status as well as programming view. The real-time status shall be dynamically updated as the controller program is updated.

The local intersection controller's Central Processor Unit (CPU) shall be based on an open architecture platform with standard Linux operating system. The controller shall have the capability to operate in various modes including as a standalone unit with Time-of-Day (TOD) programming as well as part of an Adaptive Signal Control Technology (ASCT) system using Peer-to-Peer communication technology.

The local controller shall monitor communication links to all adjacent intersections in real-time. Loss of communication link shall be configured as a critical failure and the local controller shall log it as a critical failure alarm. If communication to the Critical intersection is lost, the local controller shall transition flash mode. Upon restoration of the communication link, the local controller shall revert back to Peer-Peer operation.

The local controller shall monitor all detection inputs in real-time. Loss of any detection inputs shall be logged as a failure alarm. Loss of detection inputs at the Critical intersection used to determine optimal cycle length shall be logged as a critical failure alarm.

The local controller shall provide the capability to send automatic notification of all critical failure alarms to authorized maintenance personnel.

ITEM 816.81 (Continued)

In addition to standard measures of effectiveness (MOEs) produced by the local controller, the controller shall store cycle length, phase splits and offsets on a cycle-by-cycle basis locally on non-volatile memory. The local controller shall also store all failure alarms. The local controller shall have sufficient memory to retain all locally stored information for no less than thirty (30) days. Local storage shall be configured as a circular memory wherein once the storage capacity is exceeded, the local controller shall overwrite the oldest data.

The local controller shall allow for local and remote download of all locally stored information.

Testing of Grounding System

The Contractor shall perform testing of the equipment grounding system in the presence of the Engineer in accordance with the Standard Specifications.

VIDEO DETECTION SYSTEM

360-Degree Video Detection Camera and System

The work shall consist of furnishing, installation, configuration, integration and testing of a Video-based Detection and Analytics System (VDAS) to provide a remotely accessible system for traffic detection and analytics, and all other material, labor and equipment necessary to provide a complete and operating system as specified herein. This work must be performed in accordance with the standard specifications as specified herein.

Communication Interface

The VDAS hall support 4G LTE cellular connectivity with MIMO and diversity (Bands 2, 4, 5, 13, 17, 25), HSPA+, GSM/GPRS/EDGE, EV-DO Rev A, 1XRTT with peak downlink of 100Mbps and peak uplink of 50Mbps. The VDAS shall support 802.11 a/b/g/n with MIMO and Diversity antennas with security of at least 64/128 bits WEP, WPA, WPA2. It shall also support location services using GPS or GLONASS. The communication interface shall support communication of detection data, video imagery, and traffic analytics to the Central Analytics Server (CAS). The communication interface shall support remote configuration of vehicle detection zones. The interface shall provide galvanic isolation between earth ground and logic ground.

The communication interface shall include a communication antenna that is externally mounted and contain the following fully-enclosed antenna elements and quantities in a single enclosure:

1. 2G/3G/LTE MIMO (quantity: 2)
2. 2.4GHz/5GHz WIFI MIMO (quantity: 2)
3. GPS/GLONASS/BEIDOU (quantity: 1)

ITEM 816.81 (Continued)

The communication antenna shall have labeled antenna terminations for easy installation. It shall not exceed 35mm in height. The antenna shall be colored Pantone 427 U for blend with traffic cabinet construction. It shall be IP67 rated and mounted on the cabinet with a water-tight seal made of a closed cell rubber type foam and medium-firm acrylic adhesive with bonding features including a high initial adhesion and excellent high/low temperature holding power with excellent peel strength. The antenna shall capture Vehicle Identification Data via a wireless traffic probe utilizing Wi-Fi MAC address identification technology.

Camera

The VDAS shall include a camera that provides 360 degrees of visibility from the point of installation. It shall be powered via Power over Ethernet (PoE) and be IEEE802.3af compliant. It shall support configuration in both spherical "fisheye" configuration, and rectangular "quad view". The camera shall support at least 9 megapixel (MP) capture, and have the ability to capture 4K video. The camera shall provide H.264 and MJPEG image compression and support RTSP streaming. The camera shall have a maximum aperture ratio of 1:1.9 with a focal length of 1.38mm. The camera shall include a clear polycarbonate resin-based dome rated to IP66 (NEMA 4X compliant). The camera shall include a de-humidification device for use in various weather conditions.

The camera shall l include all mounting hardware that is constructed of weatherproof painted aluminum. The mounting hardware shall be fully assembled to the camera and ready to attach to a pole or extension arm. The mounting hardware shall support vertical pole installation, horizontal pole installation, or attachment via a 1 ¼" threaded fitting. The mounting hardware shall include 40 feet of shielded Ethernet cable for connection to a Power over Ethernet (PoE) power source and internet access. The cable shall include two-way Ethernet coupler rated to IP68 for connection to cabinet Ethernet cable.

NTCIP Controller Interface

The VDAS hardware shall include a NTCIP controller interface with communication capability over Ethernet providing auto-negotiation to 10/100 Mbps, half or full duplex. The interface shall include an ethernet cable for interfacing with NEMA TS2 type A1N, A2N, P1N, or P2N controllers. It shall support communication to the controller over TCP/IP, SNMP v1, v2c, and v3, and STMP NTCIP protocols reading all objects defined in NTCIP 1201 and 1202 supported by the controller.

The interface shall support acquisition and recording of phase, channel, detector, pedestrian detector, pre-emption, alarm and overlap statuses at a frequency of 10 times per second including whether a phase is next or has a call for service on it. It shall read and distinguish between detection, pedestrian detection, and pre-emption device information from all detectors, pedestrian detectors, and pre-emption devices wired into the cabinet. It shall detect all controller-defined failures of a detector defined in NTCIP 1202: - ASC.vehicleDetectorAlarms. It shall also detect all detector defined failures of a detector defined in NTCIP 1202 – ASC.vehicleDetectorReportedAlarms.

ITEM 816.81 (Continued)

The interface shall detect the free mode status of the controller, read coordination information including cycle and sync status, as well as current and future coordination plan parameters, flash status, stop time, external start, power restart, low battery, a serviceable call exists and has not been serviced for two cycles, or SDLC response fault. It shall support measurement of the existing sequence selected, support reading of the phase table, sequence table, channel table and overlap table. It shall support running the traffic controller in free mode through force, hold and omit directions, support capturing and reporting Controller Faults based on controller-reported flash status reasons of 'other', 'automatic', 'localManual', 'faultMonitor', 'mmu', 'startup', and 'preempt'.

SDLC Controller Interface

The VDAS shall include a SDLC controller interface with all necessary cabling to connect to a cabinet's existing Port 1/SDLC bus. The interface shall support reading terminal and facility input & outputs, and channel state at a frequency of at least 10 times per second. The interface shall support acquisition of Malfunction Management Unit (MMU) fault status including conflict, red failure, and clearance failure. It shall support reading information from all detectors wired into the cabinet supporting up to 1 ms resolution between detection events, detect failure of a detector in either always high, or always low, mode, and support capturing and reporting Controller Faults based on MMU status bits of 'in conflict', 'red failure', 'diagnostic failure', 'in failure state', and 'local flash'.

Peripheral Interface

The VDAS shall support 2 x USB 2.0 device ports, 4 x 10/100/1000 Ethernet ports, PoE on 2 of the above ports, with at least one of which capable of supporting PoE+. The VDAS shall support industrial temperature-rated storage comprising a solid state drive of at least 64 GB.

The VDAS hardware shall provide light-emitting diode (LED) indicators for Server connectivity, Ethernet link/activity, power, cellular link/activity, and signal strength. It shall support 4 x RS232 serial connections (one port configurable to RS485) with RJ45 connectors. It shall provide Digital IO pins 4 x I/O pins (200mA sinking each), digital input, 0~30V, 1 x 24VDC supply pin (200mA max sourcing), 5 x ground. The interface shall provide galvanic isolation between earth ground and logic ground.

The interface shall provide data buffering of all Telemetry Data (controller state, detector actuations, pre-emption events) during periods of loss of cellular connection for at least 12 minutes, and data buffering of all Telemetry Data during periods of loss of power for at least 10 seconds.

Video Processing Unit

The VDAS shall have a video processing unit (VPU) that support processing of a minimum of two simultaneous feeds from Camera units. It shall display status of detection channels. The VPU shall include a USB 2.0 device port, 4 x 10/100/1000 Ethernet ports, and support PoE on two of the above ports.

ITEM 816.81 (Continued)

The VPU shall include onboard processing capabilities to perform video- based vehicle detection and generation of traffic analytics. It shall provide 24 NEMA-rated GPIO ports that can be configured for actuation and support all requirements found in 2.2.1.6 SDLC Controller Interface. The VPU shall provide the capability to act as one or more SDLC detector racks and support generating detection outputs on up to 64 channels.

Video Detection

The VDAS shall support remote configuration of detection zones and system settings via Communications Service and Software. It shall also allow for configuration at the roadside, by a laptop computer connected via Ethernet to the Video Processing Unit and Software. The VDAS shall support the configuration of entries, exits, and turning movements for additional traffic analytics

The VDAS shall support maintaining multiple detection zone configurations that can be remotely selected and enabled at any time using Software. It shall store historical versions of detection zone configurations that can be restored at any time using Software.

The VDAS shall support a minimum of 100 unique video detection zones that are both rectangular and irregular polygon shaped zones. It shall support real-time detection of vehicles, cyclists, and pedestrians in configurable detection zones per camera. The VDAS shall ensure that the detection system meets or exceeds 98% detection accuracy requirement in good weather conditions.

The VDAS shall support identification of unacceptable video feed, including interrupted video signal. It shall support directional detection zones to reduce false detections from objects traveling in other directions and support the tracking of vehicles and pedestrians for video analytics applications.

The VDAS shall support a minimum of 16 detection channels. It shall support the option of actuation via SDLC, direct wiring into cabinet backplane, or through NEMA A/B/C interface. It shall also support actuation of both pulse and presence detection signals over any of the above interfaces, and support output of a constant call on any detection channel if a loss of video signal occurs.

Video Analytics

The VDAS shall have video analytics capability including Continuous Traffic Data Collection, and On-Demand Video Analysis. It shall support the processing of turning movement count data for all visible movements at the intersection at all times. The count shall include classification of all vehicles passing through an intersection including Light Vehicles, Single-Unit Trucks, Articulated Trucks, and Buses. It shall also support the processing of crosswalk movement data for Pedestrians.

The VDAS has have the ability to record and recall MP4 video for offline or third-party on-demand traffic studies. It shall support offline safety analysis and turning movement studies.

ITEM 816.81 (Continued)

The VDAS video analytics capabilities shall also include the ability to access the data 30 minutes of capture under normal operating circumstances. It shall support the graphical visualization of turning movement count data by vehicle class or by intersection movement. The system shall support the export of turning movement count data to XML, CSV formats, and in 1, 5, 10, 15, 30 minute and 1 hour bins. It shall automatically identify peak-hours and calculate peak-hour factor (PHF), and automatically generate and display truck percentage.

Software

The VDAS shall be supplied with a software system to provide a single user interface containing all Software functionality described herein. It shall provide a secure web-based Graphical User Interface (GUI) using SSL, allowing for an unlimited number of concurrent logins by authenticated users. It shall be fully accessible via desktop, tablet, and mobile products on modern browsers, and support user login via OAuth Login. It shall provide a secure means of verifying account registration via email and a secure means of password reset. The software shall support the addition and management of user accounts for users that are both inside and outside of the organization at no additional cost. It shall support access to all detection data, traffic analytics data, and Vehicle Identification Data stored on the Server.

The VDAS shall support live video streaming to modern desktop browsers without any third party plugins and live video streaming on tablet browsers using the HLS protocol. The live video streaming shall be with a latency of no more than 10 seconds at a frame rate of at least 15 fps, with an initial load time of no more than 10 seconds, at least 20 concurrent video streams from a single camera to be viewed in multiple browsers, and at least 40 concurrent video streams from all cameras active in the system, to be viewed in multiple browsers. The system shall support remotely enabling and disabling video recording on the Peripheral Interface Hardware. It shall support the remote upload (ie. recall) of recorded video from the Peripheral Interface Hardware, and recall of recorded video from the Peripheral Interface Hardware for at least the past 7 days. The system shall provide secure storage and access to any recalled video within the Software, and playback of recalled video in the browser.

The VDAS software system shall provide a user interface for remote configuration of detection zones. The user interface shall allow for monitoring of detection activity, wherein a detection zone is highlighted on the video overlay display to confirm vehicle detection when a vehicle is detected crossing a detection zone, and caching and remote recall of video for up to 7 days to help diagnose detection problems.

The VDAS software system shall support live display of all Telemetry Data, including detector actuations and signal phasing, with latency not to exceed 1 second when LTE connection is active. It shall support historical display of all Telemetry Data on demand with load latency not to exceed 1 second. The software shall support a viewing mode in which all Telemetry Data is displayed overlaid onto a diagram of the intersection. It shall support a viewing mode in which all Telemetry Data is displayed in a timing diagram format in which interval length is displayed in seconds for each signal phase. It shall also display weather conditions for the location, including precipitation and temperature, as part of live and historical viewing of Telemetry Data, and provide reporting on signal telemetry and detector data.

ITEM 816.81 (Continued)

The VDAS software system shall support open data to API via REST interface including JSON to all Telemetry Data, Alert Data, Vehicle Count Data, and Video Analytics data. It shall include administrator control of level of data API access, including what function calls can be made publicly and what function calls are accessible only through authentication. It shall support Swagger.io documentation of API.

The VDAS hardware system in cabinet shall be capable of receiving remote updates including the ability to extend the functionality, and to remotely update configuration.

Signal Performance Measures

The VDAS software system shall support Signal Performance Measures including generation of any of the below listed Signal Performance Measures, or Preemption Analysis for any 24hr period in under 5 seconds, for all captured data up to 3 years in the past

The VDAS system shall support the generation of performance metrics including generation of approach volume charts when the intersection includes upstream detector data, generation of arrivals-on-red / arrivals-on-green charts when the intersection includes upstream detector data, Purdue Split Failure chart when the intersection includes stop-bar detector data, split trends when the intersection includes stop-bar detector data, detector occupancy ratio charts (Red, Green, and ROR5) for all intersection movements that include stop-bar detector data, phase interval charts over any 24 hour period, phase green allocation over any 24 hour period, and Purdue Coordination Diagram when the intersection includes upstream detector data. The system shall support generation of simple delay charts for all intersection movements that include stop-bar detector data, delay charts for all pedestrian movements that include pedestrian detection.

The system shall support download of all above mentioned signal performance charts as flat image files, PDF files, CSV, or XLS files.

The system shall support generation and overlay of historical trends of approach volumes, arrivals-on-red, split trends, green allocation, and simple delay over any period (minimum of up to three months) throughout the three year data set. It shall support generation of historical variability statistics of approach volumes, arrival-on-red, and simple delay over any period (minimum of up to three months) throughout the three year data set, and ability to statistically compare differences between data series, including single-day metrics and historical trends

The VDAS software system shall support generation and recall of logs of preemption events, including their time of occurrence and duration, and have the ability to query historical occurrences of pre-empt events into tabular format for export, in perpetuity.

ITEM 816.81 (Continued)

The system shall allow aggregation of performance reports over a corridor including generation of corridor average arrivals on green per corridor for all corridors in the network, historical trend data for all corridors in a network for trends up to one year, comparison of historical trends to a baseline data set, and comparison of historical trends to a baseline data set for any period throughout the 3 year data. It shall support sorting of all corridors in a network by any aggregated metric listed above. It shall support the subscription and delivery of daily, weekly, or monthly aggregated corridor performance reports via email.

The system also allow aggregation of signal performance reports including generation of major street aggregation of intersection arrivals on green per intersection for all supported intersections in the network, minor street simple delay per intersection for all supported intersections in the network, major street aggregation of approach volumes per intersection for all supported intersections in the network, split failure count per intersection for all supported intersections in the network, and historical trend data for all intersections in a network for trends up to one year. The system shall support the subscription and delivery of daily, weekly, or monthly aggregated intersection performance reports via email.

The VDAS software system shall include a signal performance analysis tool for generation and visualization of a selected metric for all movements within an intersection, including phase data, stop-bar occupancy ratios, Purdue Split Failures, and split trend data. It shall support the generation and visualization of metrics for all intersections within a corridor, including arrivals on red and coordinated phase data (ie. time-space visualization), zooming and filtering of data by time of day, and historical trend data for split trend and arrivals on red metrics

Central Server

The VDAS Central Server shall be hosted professional cloud-based facility with redundancy of at least two instances, with automatic load balancing, support any simultaneous number of connections, and have storage of all detection data and traffic analytics in perpetuity.

Communications Services

The VDAS system shall be provided with a 4G LTE cellular data service between the Communications Interface and the Central Server via a national commercial carrier using Bands 2, 4, 5, 13, 17, and 25 with failover support from 4G to 3G to 2G with incremental fallback on appropriate bands.

The VDAS communication service shall be a Virtual Private Network (VPN) for secure data transmission between the Communications Interface and Central Server. It shall create a private network where IP traffic can be transmitted from a traffic cabinet directly into the traffic management center and any central software systems. It shall use authentication based on public key infrastructure (PKI) and encryption using PKI and the TLS/DTLS1.0+ protocol and support HTTPS/SSL communication to the Central Server from the public internet.

ITEM 816.81 (Continued)

The system shall support revoking of all authenticated user names, passwords, or keys at any time. The communication service shall be a simultaneous integration across a heterogeneous mix of different technologies and providers, including different cellular providers, fiber connected networks, and point-to-point radio solutions.

The communication service shall support integrating an unlimited number of intersections with the customers Central Management System and be capable of supporting both IP and serial-over-IP connections to all controller models in the field. It shall meet all bandwidth and latency requirements of the Customer's Central Management System.

Testing and Certification

All VDAS hardware shall be tested and certified. The Communications Interface shall be PTCRB and Verizon Safe-For-Network Certified. All hardware shall meet the following requirements: NEMA TS-2, Section 2 tested and compliant, including shock, vibration, voltage, and thermal articles 2.2.7-2.2.11, NEMA operating temperature specification -34 °C to 74 °C (-29 °F to 165 °F), NEMA storage temperature specification -34 °C to 74 °C (-29 °F to 165 °F), humidity operating requirements of 5% - 95% RH non-condensing, FCC tested and compliant, and RoHS compliant.

Installation

The VDAS system shall be furnished with all mounting hardware with device(s). The hardware components including the Peripheral Interface, NTCIP Controller Interface, and Communications Interface shall be provided in a single self-contained device. All functionality of SDLC Controller Interface and Video Processing Unit shall be provided in a single self-contained device. All hardware functionality of Peripheral Interface, NTCIP Controller Interface, and Communications Interface shall operate off a single UL, CSA-certificated LPS NEMA-rated power supply. All hardware functionality of SDLC Controller Interface and Video Processing Unit shall operate off a single UL, CSA-certificated NEMA-rated power supply.

The VDAS system shall be installed as per the contract documents. The system shall be configured with settings that were approved at equipment mock up (if required per the Special Provision for Testing and Integration) or as approved by the Engineer to ensure interoperability and security, including VPN settings, local IP address, port forwarding and Network Address Translation (NAT), and IP-based filtering. All system integration and testing shall be to meet the functionality and requirements specifications described herein as well as in the contract plans.

Support

The VDAS system provider shall provide technical support via email and toll-free telephone for all included hardware and software between the hours of 7:00 and 19:00 EST/EDT, Monday to Friday.

ITEM 816.81 (Continued)

Warranty

The VDAS system shall be furnished with a standard manufacturer's warranty, transferable to MassDOT. All of the hardware system components shall carry a warranty including parts and labor for 3 years from the date of shipment. Firmware and Software shall be updated for the life of the product. Firmware updates, web application updates, and security patches, shall be provided by the Contractor through the VDAS provider over the term of the contract.

BROADBAND ETHERNET RADIO COMMUNICATION

The Broadband Ethernet radio shall utilize point-to-point industrially hardened wireless Ethernet Transmission which allows a single Ethernet data stream to be transmitted between a Client remote location and the Access Point or head end. A simple, easy to read LED array shall display the unit's operational status along with received signal strength, ensuring optimal installation and operation. The radio shall support up to 95Mbps throughput due to MIMO technology. The units shall be passively powered by PoE (Power over Ethernet) through a PoE injection module. The radio shall be FCC certified. The radio shall be supplied with all necessary power injectors, power supplies and mounting hardware.

The locations and mounting heights of the proposed antennae shown on the plans are approximate. It shall be the responsibility of the Contractor to verify the operational feasibility of reliable wireless communication between the locations through Path Analysis and Spectrum Analysis and make necessary modifications to the antenna location and mounting height before installing the antenna. The cost to conduct the wireless communication feasibility assessment and the installation of mounting hardware shall be considered incidental to the installation of the wireless communication system.

ENVIRONMENTALLY HARDENED ETHERNET SWITCH

The Peer-to-Peer communication between the local traffic signal controllers shall be through Ethernet communication. The Ethernet communication network shall utilize an Environmentally-Hardened Ethernet Switch.

The Environmentally-Hardened Ethernet switch with uplink management functionality shall have a minimum of 8 ports operating at 10/100 Mbps and designed to combine Ethernet data from the seven electrical ports into an 8^{th} electrical port and forward that data to the next network device. No programming shall be required to use this switch. The Ethernet switch shall be factory pre-programmed to prevent network video flooding. The Ethernet switch shall be either wall-mounted, shelf-mounted or DIN –rail mounted with the appropriate attachments. The Ethernet switch shall be designed to meet full compliance with the environmental requirements (ambient operating temperature, mechanical shock, vibration, humidity with condensation, high-line/low-line voltage conditions and transient voltage protection) of NEMA TS-1/TS-2 and the Caltrans Specification for Traffic Signal Control Equipment. All power and signal input/output lines shall have power surge and transient voltage protection. The Ethernet switch shall have LED indicators to provide power and activity status. The Ethernet switch shall be compliant with the IEEE 802.3 standards and come with a minimum 2-year warranty.

ITEM 816.81 (Continued)

GPS RECEIVER

All traffic signal cabinets shall be furnished and installed with a GPS Receiver/Antenna module. The GPS receiver shall be rugged with the Wide Area Augmentation System (WAAS) enabled. The module shall be capable of simultaneously tracking up to twelve (12) satellites.

The module shall have a minimum receiver sensitivity of -165 dbW. The module shall have RS-232 serial port interface with selectable baud rate between 300 bits per second (bps) to 38,400 bps. The serial port shall support NMEA 0183 v2.00, NMEA 0183 V3.0 and NMEA 0183 V2.0 (ASCII). The module shall support approved output sentences that is compatible with the specified controller firmware as described above.

The Contractor shall ensure that the module is provided with sufficient length of cable; the cable as per manufacturer specification. It shall be the responsibility of the Contractor to furnish a GPS Receiver/Antenna module with a connector that can be physically interfaced with the controller as specified above.

FINE TUNING, ADJUSTMENT, AND TESTING PERIOD

After the Contractor has finished installing the controller 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, adjustment 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. Final acceptance will not be made until the system has operated satisfactorily, as designed, for a period of *not less than* 30 days from a date designated by the Engineer.

GUARANTEE AFTER FINAL ACCEPTANCE

The Contractor shall troubleshoot, repair, and/or replace any equipment installed in conjunction with this contract at his own expense if found to be defective in workmanship, material, or manner of functioning within a period of six months from the date of final acceptance of this contract by MassDOT

BASIS OF PAYMENT

Item 816.81 will be paid at the Contract LUMP SUM price, which price shall include all labor, material, equipment and incidental costs required to complete the work. The Contractor shall be responsible for maintaining and paying for all associated fees and cost to run the temporary traffic signals. Once the work is completed, the Contractor is also responsible for the removal of the temporary traffic signal systems without any additional compensation and restoring the existing property to its original condition.

ITEM 862.506	**6-IN. RECESSED WHITE LINE (MC, FD, WR)**	**FOOT**
ITEM 862.512	**12-IN. RECESSED WHITE LINE (MC, FD, WR)**	**FOOT**
ITEM 863.506	**6-IN. RECESSED YELLOW LINE (MC, FD, WR)**	**FOOT**

Work to be completed under these items shall conform to the relevant provisions of Subsection 860 of the Standard Specifications and shall consist of furnishing and installing Recessed Multi-Component (MC), Wet Reflective (WR) Pavement Markings at the locations shown on the plans or as directed by the Engineer.

If the Multi-Component Pavement Marking material is applied over a different pavement marking material, the Contractor shall provide documentation that the Multi-Component Pavement Marking Material being used will adhere to the existing marking material.

Materials

MC pavement markings shall consist of a two-component, 100% solids liquid binder, first drop beads or elements to provide wet and dry retroreflectivity, and second drop glass beads to improve the durability of the pavement marking, reduce track-free times, and provide supplementary retro-reflectivity. MC Pavement Marking binders are typically composed of, but not limited to, Epoxies, Polyureas, or Urethanes.

Classification of dry time is based upon the results of the test procedures found in ASTM D711 (73.5 ± 3.5°F at 50 ± 5% relative humidity) when applied with glass beads. MC Ultra-Fast Dry (MC, UFD) pavement markings shall have a no track time of 3 minutes or less. MC Fast Dry (MC, FD) pavement markings shall have a no track time of 10 minutes or less. MC Standard Dry (MC, SD) pavement markings shall have a no track time of 45 minutes or less. The Contractor shall provide a Certificate of Compliance verifying the product supplied meets the specified dry time requirements per ASTM D711 prior to installation.

The Contractor shall select a liquid binder and bead/element combination that meets these performance specifications.

Second drop beads shall be manufactured from glass of a composition that is highly resistant to traffic wear and to the effects of weathering. If coating is required to meet the performance requirements, the second drop beads shall be coated to ensure satisfactory embedment and adhesion. Second drop beads retained on a No. 40 U.S. Standard Mesh Sieve shall have a minimum crush strength of 30 lbs. when tested in accordance with ASTM D1213.

Second drop beads passing the No. 30 sieve shall have a minimum of 75 percent true spheres when tested in accordance with ASTM D1155. All second drop beads retained on the No. 20 and No. 30 sieves shall have a minimum of 80 percent true spheres as determined by ASTM D1155.

ITEMS 862.506, 862.512, & 863.506 (Continued)

Second drop beads shall meet the following gradation requirements when tested in accordance with ASTM D1214:

U.S. Standard Sieve No.	Percent Retained
20	3-10
30	15-35
50	45-75
70	0-10
Pan	0-5

Construction Methods

The Contractor shall follow all installation instructions from the manufacturer, including allowable ranges of temperature and humidity for installation, unless otherwise approved by the Engineer.

The pavement surface shall be clean, dry and free of laitance, oil, dirt, grease, paint or other foreign contaminants prior to the installation of any new pavement markings. If an air lance is used to clean the surface, air compressors shall initially be blown out away from the application area to prevent compressor condensation build-up. A minimum of 24 hours of dry time following any rainfall is required prior to the placement of pavement markings.

Recessing of markings shall be per 860.65: Recessed Markings.

Application rate for binder and all glass beads shall consider final pavement surface composition and smoothness in advance of application to ensure proper wet film thickness and embedment of all beads. The Contractor shall provide the Engineer with documentation from the manufacturer with all recommended application rates in advance of any pavement marking installation.

The minimum uniform wet thickness for the MC binder shall be 20 mils but should be increased if recommended by the manufacturer. The line thickness shall be met across at least the middle ⅔ of the pavement marking width. Wet mil thickness gauges shall be provided by the Contractor to the Engineer to assure that desired thickness is achieved.

The finished white color shall be free from tint, with good opacity and visibility under both daylight and artificial light. The finished yellow color shall be defined by Federal Test Standard 595 - Color Chip Number 13538, using Federal Test Standard 141 (Method 4252). The finished lines shall be uniform in color and have clean, well-defined edges.

Glass beads shall be applied in a manner that does not induce rolling or bouncing, to ensure that exposed portions of beads are free of binder material. Beads should be embedded in the binder to a depth of approximately 50% of their diameter.

Glass beads shall be applied as a reflective medium, using the double drop method, at a rate in accordance with the manufacturer’s specification in order to meet the minimum retro-reflectivity levels.

ITEMS 862.506, 862.512, & 863.506 (Continued)

Newly installed pavement markings shall be protected from tracking during the curing period per Subsection 860.63.

Once the installed pavement markings have been open for traffic for a minimum of 7 days, the Contractor shall perform retro-reflectance readings per the measurement and sampling procedures contained in ASTM D7585 (Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments) using the Referee Evaluation Protocol found in section 6.4, and the testing procedures shall follow ASTM E1710 (*Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retro-reflectometer*) and ASTM E2177 (*Standard Test Method for Measuring the Coefficient of Retroreflected Luminance (R_L) of Pavement Markings in a Standard Condition of Wetness*).

The average initial retro-reflectance readings shall exceed the following minimum values:

Test Method	*White Markings	*Yellow Markings
ASTM E1710 (Dry)	475 mcd/lux/m²	375 mcd/lux/m²
ASTM E2177 (Wet Recovery)	375 mcd/lux/m²	300 mcd/lux/m²

*Observation Angle = 1.05°, Entrance Angle = 88.8°

Pavement markings with measured average initial retro-reflectance readings that do not meet the specified minimum values using the procedures outlined in subsection 6.4.5 of ASTM D7585 shall be removed by a method approved by the Engineer and reapplied at no additional cost, unless otherwise approved by the Engineer.

METHOD OF MEASUREMENT

Items 862.506, 862.512, and 863.506 will be measured for payment by the FOOT of Multi-Component Marking material installed, complete in place.

BASIS OF PAYMENT

Items 862.506, 862.512, and 863.506 will be paid at the respective Contract unit prices per FOOT, which prices shall include all material, labor, and equipment required or incidental to the satisfactory completion of the work.

ITEM 874.2 TRAFFIC SIGN REMOVED AND RESET EACH

The work to be done under Item 874.2 Traffic Sign Removed and Reset shall conform to the relevant provisions of Subsections 828 and 840 of the Standard Specifications and the following:

The work shall include the removal of existing signs for reuse; and the removal and proper disposal of existing hardware, supports, and cement concrete foundation, from existing locations shown on the plans or as directed by the Engineer. The work includes the resetting of the existing signs with new hardware, new supports, and new cement concrete foundations in their final locations as shown on the plans or as directed by the Engineer. The work shall also include backfilling and overlay of the existing locations as described herein.

Signs shall include signs, traffic signs, street name signs, other panels, or other placards as indicated on the Drawings or as directed by the Engineer. New hardware shall include hardware, fittings, and attachments which will affix the existing sign properly to the new post.

The Contractor shall submit Manufacturer's cut sheets for the proposed sign posts for Approval by the Engineer.

Signs and panels shall be satisfactorily stored and protected until reset in the proposed work. Any signs damaged or lost directly or indirectly as a result of the Contractor's operations shall be replaced by the Contractor at his own expense.

The Contractor shall coordinate the removal of the signs and posts with the Engineer by notifying the Engineer prior to beginning the work. If practicable, existing signs shall remain in place until new sign posts are stable in their final location and the signs can be reset. During the execution of the work, if the absence of existing signs may cause hazardous conditions or excessive disruption to traffic, the Engineer may direct the Contractor to erect temporary signage until the signs are reset in their final locations. Temporary signage will be considered as incidental to this Item.

If signs are reset to another location, post holes shall be backfilled, tamped and graded level to present an undisturbed appearance. Any surface material necessary to overlay the backfill is included in the cost of these Items.

METHOD OF MEASUREMENT

Item 874.2 will be measured for payment by the EACH sign assembly.

BASIS OF PAYMENT

Item 874.2 will be paid at the Contract unit price by the EACH sign assembly, regardless of the number of panels or posts, reset in the designated location, which price shall include all tools, material, equipment and labor to complete the work. Incidentals to the measurement and payment for this Item are: removal, new hardware, cement concrete for foundations, any borrow materials, loam and seed, or other surface finishes needed to restore ground from where existing posts have been removed and not reset. New posts will be paid under item 847.1.

ITEM 874.4 TRAFFIC SIGN REMOVED AND STACKED EACH

The work under Item 874.4 Traffic Sign Removed and Stacked shall conform to the relevant provisions of Subsections 828 and 840 of the Standard Specifications and the following:

The work shall include the removal of signs, traffic signs, street name signs, other panels, or other placards, attached hardware, and supports from locations shown on the plans or as directed by the Engineer.

Any signs or posts damaged or lost directly or indirectly as a result of the Contractor's operations shall be replaced by the Contractor at his own expense. The Contractor shall coordinate the removal of the signs and posts with the Engineer by notifying the Engineer prior to and at the completion of the work.

Signs removed, will be properly stacked at the Holden Department of Public Works, located at 18 Industrial Drive Holden, MA 01520. Privately owned signs and their supports shall be properly stacked adjacent to the layout at the bottom of the roadway slope but within the temporary easement.

Post holes shall be backfilled, tamped and graded level to present an undisturbed appearance. Any surface material necessary to finish the posthole backfill is included in the cost of this item.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 874.4 will be measured for payment by the EACH sign assembly, regardless of the number of panels or posts, properly stacked.

BASIS OF PAYMENT

Item 874.4 will be paid at the Contract unit price per EACH, which price shall include all labor, power disconnection, materials, equipment, transportation and incidental cost required to complete the work.

Incidental to this item are any tools, labor, materials, and equipment needed to restore disturbance of the ground due to removal of the designated signs.

ITEM 876.5 SOLAR PANELS AND POST REMOVED AND STACKED EACH

The work under this item shall conform to the relevant provisions of Subsections 828 and 840 of the Standard Specifications and the following:

The work shall include the removal of solar panel assemblies, other panels, or other placards, attached hardware, supports, wiring, and foundations from locations shown on the plans or as directed by the Engineer.

Any solar panels or posts damaged or lost directly or indirectly as a result of the Contractor's operations shall be replaced by the Contractor at his own expense. The Contractor shall coordinate the removal of the solar panels and posts with the Engineer by notifying the Engineer prior to and at the completion of the work.

Solar panels and posts removed will be properly stacked at the MassDOT District 3 Maintenance Depot, located at 500 Main Street, Rutland, MA 01543. Privately owned solar panels and their support shall be properly stacked adjacent to the layout at the bottom of the roadway slope but within the temporary easement.

Post holes or foundation holes shall be backfilled, tamped and graded level to present an undisturbed appearance. Any surface material necessary to finish the posthole backfill is included in the cost of this item.

METHOD OF MEASUREMENT

Item 876.5 will be measured for payment by the EACH post assembly, regardless of the number of panels, properly stacked.

BASIS OF PAYMENT

Item 876.5 will be paid at the Contract unit price per each, which price shall include all labor, power disconnection, materials, equipment, transportation and incidental cost required to complete the work.

Incidental to this item are any tools, labor, materials, and equipment needed to restore disturbance of the ground due to removal of the designated signs.

ITEM 945.10	**DRILLED MICROPILES**	**FOOT**
ITEM 948.60	**MICROPILE VERIFICATION LOAD TEST**	**EACH**
ITEM 948.61	**MICROPILE PROOF LOAD TEST**	**EACH**

The work under these items shall conform to the relevant provisions of Subsection 940 of the Standard Specifications and the following:

This work shall consist of constructing micropiles as shown on the plans, approved working drawings, and as specified herein. The Contractor is responsible for furnishing all materials, equipment, labor, services, and supervision; and for selecting means and methods for the installation and testing of micropiles for this project.

Micropiles shall consist of permanent casing sections and fully reinforced grout sections bonded with bedrock. Permanent casings shall be included as part of the micropiles and shall remain in place after grouting is complete. Temporary casings shall be installed if necessary to facilitate micropile construction and shall be removed during or after grouting. The Contractor is responsible for drilling through obstructions encountered during pile installation.

The micropiles load capacities shall be confirmed by verification and proof load testing. Testing must meet the test acceptance criteria specified herein. The bond length of the micropile may be modified by the Engineer, pending results of load testing performed as an initial part of the work.

MATERIALS

The materials for micropiles shall meet the following requirements:

Permanent/Drill Steel Casing used as Reinforcement: Permanent steel casing/pipe used as reinforcement shall be new "Prime" steel meeting the requirements of any API 5L PSL1 pipe with a yield strength of 52 ksi with SR15 supplemental requirements. The grade of the prime steel casing shall conform to the properties shown on the Plans. For steel pipe that is to be welded, the Carbon Equivalency, as defined in AWS D1.1 Section XI.1, shall be less than or equal to 0.45, as demonstrated by mill certificates. The sulfur content shall not exceed 0.05%, as demonstrated by mill certificates.

Permanent steel casing shall consist of ERW (Electric Resistance Welded) and/or seamless steel casing and shall be designed to withstand the design loadings determined by the Engineer or shown on the Plans and the verification/proof test loading described in this specification. Joints shall develop the full vertical capacity, and at least 60% of the moment capacity of the casing. As installed, there shall be no joints within three feet or as shown on the plans from the bottom of the pile cap.

The steel casing shall have certified mill test reports and shall be submitted for record purposes as the materials are delivered. The steel shall be traceable back to the mill certifications, and be free from defects (dents, cracks, tears, etc.).

ITEMS 945.10, 948.60, & 948.61 (Continued)

New "mill secondary" steel pipe/casing will not be accepted regardless if they are accompanied by coupon test results.

Permanent steel casing shall be installed a minimum of 12 inches into intact bedrock.

Reinforcing Bars: Central reinforcing steel shall be full-length, continuously threaded bars. The bars shall conform to AASHTO M 31 Grade 60 or Grade 75, or AASHTO M 275 Grade 150 as shown on the Contract Documents. The grade and size of the central reinforcement shall conform to any minimum and/or maximum properties shown on the Plans.

Reinforcing Bar Couplings: Reinforcing bar couplers shall be in accordance with Subsection M8.01.9 but are not required to be listed on the Qualified Construction Materials List (QCML). Where reinforcing bars are not specified with corrosion protection, bar couplers shall not be required to be epoxy coated or galvanized.

Independent testing shall be performed by a nationally recognized testing laboratory, approved by the Engineer, which shall provide certified test results showing that the reinforcing bar coupler meets the requirements of Subsection M8.01.9. Acceptance of the couplers shall be approved by the Engineer.

Centralizers and Spacers: Centralizers and spacers shall be fabricated from schedule 40 PVC pipe or tube, or material non-detrimental to the reinforcing steel. Wood shall not be used.

They shall be securely attached to the reinforcement; sized to position the reinforcement to provide the grout cover specified in the table below; sized to allow grout tremie pipe insertion to the bottom of the drill hole; and sized to allow grout to freely flow up the drill hole and casing.

Table 1 - Minimum Grout Cover for Steel Reinforcement

Condition	Minimum Cover on Bar (in.)	Minimum Cover on Coupler (in.)
Micropiles in Soil	1	¼
Micropiles in Rock	½	¼
Coated or Encapsulated Bars	½	¼

Admixtures for Grout: Admixtures shall conform to the requirements of AASHTO M 194 and shall be selected from the QCML where applicable. Expansive admixtures shall only be added to the grout used for filling sealed encapsulations or micropile top connections. Accelerators are not permitted. Admixtures containing intentionally added chlorides are not permitted. Admixtures shall be from the same Manufacturer and shall be compatible with the grout and mixed in accordance with the Manufacturer's recommendations.

ITEMS 945.10, 948.60, & 948.61 (Continued)

Admixtures that control bleed, improve flowability, reduce water content, and retard set may be used in the grout subject to review and acceptance by the Engineer.

Cement: All cement shall conform to AASHTO M 85 Type I, Type II, Type III, or Type V and shall be the product of one Manufacturer.

Grout: Neat cement mixture with a minimum 3-day compressive strength of 50 percent of the 28-day unconfined compressive strength (4000 psi 28-day compressive strength, minimum,). The grout shall be proportioned and mixed as to provide a fluid grout capable of maintaining the solids in suspension without appreciable bleed. Preparation and placement of grout shall be in accordance with the recommendations of "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," ACI 304.

A minimum of 60 calendar days prior to the start of micropile construction the grout mix design shall be submitted to the Engineer and a trial batch shall be performed. The trial batch shall take place at a location approved by the Engineer and be performed in the presence of Department personnel. It shall be representative of the production grout placement and shall consist of the same materials, equipment, methods of mixing, and sample preparation and curing methods.

Trial batch samples will be tested to verify that the material meets all grout criteria specified in Table 2. The quantity of material batched shall be sufficient to perform all required tests specified.

Table 2 – Grout Material Acceptance Criteria for Trial Batch Testing

Quality Characteristic	Test Method	Engineering Limit
Minimum Compressive Strength:	AASHTO T 106 Or AASHTO T 22	
3 days		≥ 2000 psi
7 days		For information only
28 days		≥ 4000 psi
Consistency	API RP-13B-1	± 10% of the density specified in the mix design

Plates and Shapes: Structural steel plates and shapes for pile top attachments shall conform to M8.05.0, AASHTO M 270, and have minimum yield strength of 50 ksi.

Water: Water for mixing grout shall be potable, clean, and free from substances that may be injurious to cement and steel.

Fillers: Inert fillers such as sand (conforming to AASHTO M 45) may be used in the grout in special situations, such as presence of large voids in the ground or when grout take and travel are to be limited, with prior written approval by the Engineer.

ITEMS 945.10, 948.60, & 948.61 (Continued)

CONSTRUCTION METHODS

QUALIFICATIONS

The Micropile Contractor must be experienced in the construction and load testing of micropiles and have successfully constructed at least 5 projects in the last 5 years involving construction totaling at least 100 micropiles with similar capacity and requirements specified in these plans and specifications. The Micropile Contractor shall have previous micropile drilling and grouting experience in soil/rock similar to project conditions and shall have available and be thoroughly familiar with the specialized type of equipment needed to perform work of this type.

The on-site foremen and drill rig operators shall also have experience on at least 3 projects over the past 5 years installing micropiles of equal or greater capacity than required in these plans and specifications.

Prior to the Pre-construction Meeting, the Micropile Contractor shall submit the following information to verify the firm's experience and the qualifications of personnel scheduled to perform the micropile design (load test frame) and construction:

1. Submit a list of at least five micropile projects successfully completed in the last five years. Include construction details, structural details, load test reports, and client contact for each project listed.
2. Submit a list of the equipment and resources the Micropile Contractor plans to mobilize and utilize for the performance of the project.
3. Provide the names and detail the experience of the micropile designer, on-site supervisor, foremen, and drill rig operators for this project.
4. A signed statement that the Micropile Contractor has inspected both the project site and all the subsurface information including any soil or rock samples made available in the Contract Documents.

Work on any micropiles shall not be started, nor materials ordered until the qualifications and submittals have been accepted by the Engineer. The Engineer may suspend the micropile construction if the Micropile Contractor substitutes unapproved personnel during construction. Requests for substitution of field personnel shall be submitted to the Engineer for acceptance. Additional costs resulting from the suspension of work will be the Micropile Contractor's responsibility, and no extension in contract completion date resulting from the suspension of work will be allowed.

The Micropile Contractor shall have, on site during all micropile construction activity, a minimum of one Quality Control (QC) inspector. This person shall be responsible for quality control of the micropiles during all phases of construction and will monitor and document all QC inspection and testing activities required by the specifications and outlined in the accepted procedures and Working Drawings. The QC person shall be a certified NETTCP Concrete Technician.

ITEMS 945.10, 948.60, & 948.61 (Continued)

MICROPILE PRE-CONSTRUCTION SUBMITTALS

The Contractor shall prepare and submit to the Engineer: shop drawings, a micropile installation plan, construction procedures, load testing procedures, and equipment calibrations for review and acceptance. The Contractor shall verify the limits of the micropile structure before preparing the detailed working drawings and allow the Engineer four (4) weeks to review the submittal after a complete set has been received. Work shall not begin, nor materials ordered until all submittals have been received, reviewed, and accepted in writing by the Engineer.

The micropile submittals shall include:

A. Plans

1. A plan view of the micropile layout identifying the locations of micropiles, numbering system for records, and verification test and proof test micropile locations.

2. An elevation view of the test micropile(s) showing:
    i. A typical detail of test micropiles defining the micropile length, reinforcement, inclination, and load test bonded and unbonded test lengths.
    ii. Permanent casing length and diameter, casing plunge length, and grout bond zone length.
    iii. Estimated soil/bedrock strata.
    iv. Instrumentation to be installed.
    v. Minimum drill hole diameter.
    vi. Splice type and locations.
    vii. Centralizers and spacers.
    viii. Corrosion protection details.
    ix. Grout design strength.

3. Details for constructing micropile structures around utilities, as applicable.

B. Construction Procedures

1. Detailed step-by-step description of the proposed micropile construction procedure, including personnel, testing, and equipment to assure quality control. This step-by-step procedure shall be shown in sufficient detail to allow the Engineer to monitor the construction and quality of the micropiles. Include methods of drilling the holes, advancing the casing, drilling through or removing obstructions, flushing drilled holes, installing reinforcement, and grout pressures.

2. If welding of casing is proposed, submit the welding procedure. All welding shall be done in accordance with the current AWS Structural Welding Code.

ITEMS 945.10, 948.60, & 948.61 (Continued)

3. Information on space requirements for installation equipment that verify the proposed equipment can perform at the site.

4. Plan describing how surface water, drill flush, and excess waste grout will be controlled and disposed.

5. Certified mill test reports for the central reinforcing steel. The ultimate strength, yield strength, elongation, and material properties composition shall be included.

6. Certified mill test reports for the permanent casing. Certification that the permanent casing meets the supplemental requirements of SR15 shall be included.

7. Quality Control Plan. The QC Plan should sufficiently document the QC processes of all Contractor parties (i.e. Prime Contractor and Subcontractors) performing work required under this specification. The QC Plan shall be structured to follow the format and section headings outlined in the MassDOT Model QC Plan. It shall be submitted to the Engineer for review and approval a minimum of 30 days prior to the start of work.

   The QC Plan shall include complete descriptions, and details for the following:

   i. Micropile installation including drilling method and grouting procedure.
   ii. Grout mix design and type of materials to be used in the grout including certified test data and trial batch reports. The Micropile Contractor shall also provide specific gravity and density of the wet mix design.
   iii. Methods and equipment for accurately monitoring and recording the grout depth and grout volume as the grout is being placed.
   iv. Estimated curing time for grout to achieve specified strength. Previous test results for the proposed grout mix completed within one year of the start of grouting may be submitted for initial verification and acceptance, and start of production work. During production, grout shall be tested in accordance with the Grout Testing Requirement specified herein.
   v. Procedure and equipment for Micropile Contractor monitoring of grout quality. At a minimum, the Micropile Contractor shall verify the specific gravity of the mixed grout prior to placement of the grout into each drilled micropile.

C. Load Testing Procedures

Detailed plans and procedures for the proposed micropile load testing method. This shall include all drawings, details, and structural design calculations necessary to clearly describe the proposed test method, reaction load system capacity and equipment setup, types and accuracy of apparatus to be used for applying and measuring the test loads and pile top movements in accordance with the Micropile Load Testing section of this specification.

ITEMS 945.10, 948.60, & 948.61 (Continued)

D. Equipment Calibration

Calibration reports and data for each test jack, pressure gauge, master pressure gauge, and electronic load cell to be used. The calibration tests shall have been performed by a certified testing laboratory, and tests shall have been performed within 90 calendar days of the date submitted. Testing shall not commence until the Engineer has reviewed and accepted the jack, pressure gauge, master pressure gauge, and electronic load cell calibration data.

PRE-CONSTRUCTION MEETING

A mandatory pre-construction meeting will be scheduled by the Engineer and held prior to the start of micropile construction. The Design Consultant, MassDOT Resident Engineer, MassDOT District Materials Engineer, Prime Contractor, and Micropile Contractor, including QC personnel, shall attend the meeting. The preconstruction meeting will be conducted to clarify the construction and QC requirements for the work, to coordinate the construction schedule and activities, specifically those pertaining to excavation for micropile structures, installation of temporary sheeting, anticipated subsurface conditions, micropile installation and testing, micropile structure survey control, and site drainage control.

SITE DRAINAGE CONTROL

The Contractor shall control and properly dispose of drill flush and construction related waste, including excess grout, in accordance with related specifications within the Contract Documents, and all applicable local codes and regulations. Provide positive control and discharge of all surface water that will affect construction of the micropile installation. Maintain all pipes or conduits used to control surface water during construction. Repair damage caused by surface water at no additional cost. Upon substantial completion of the work, remove surface water control pipes or conduits from the site.

EXCAVATION

Coordinate the work and the excavation so the micropile structures are safely constructed and remain stable at all times. Perform the micropile construction and related excavation in accordance with the plans and accepted submittals. No excavation deeper than those specified herein or shown on the plans will be made above or below the micropile structure locations without written acceptance of the Engineer.

MICROPILE INSTALLATION

A. General

The Micropile Contractor shall select the drilling method, the grouting procedure, and the grout pressure used for installation of the micropiles. The construction method shall incorporate any special construction requirements specified on the plans. The production micropiles and its construction method shall be identical to the accepted verification test piles.

ITEMS 945.10, 948.60, & 948.61 (Continued)

When the plans require uncased drilling of the micropile into bedrock, the permanent and/or temporary casing shall be drilled a minimum 12 inches into intact bedrock or to a depth within the bedrock so as to prevent subsidence of over burden into the uncased and/or bond zone portion of the drill hole (i.e. the rock socket).

Piles shall be installed only in the presence of the Engineer's or MassDOT's Representative.

B. Location and Survey

Micropiles shall be located and marked using survey and a template by the Contractor who shall maintain and be responsible for all location and elevation stakes.

C. Drilling

The drilling equipment and methods shall be suitable for drilling through the conditions to be encountered, without causing damage to overlying or adjacent structures, buried structures, or utilities.

Temporary casing or other accepted method of pile drill hole support is required, when drilling within 10 feet of an existing foundation, or utility, and/or in caving or unstable ground, to permit the pile shaft to be formed to the minimum design drill hole diameter. The casing shall be of the type and thickness that can be installed without distortion. Casings that fail, fracture, or otherwise distort during drilling or after drilling shall, unless otherwise directed, be withdrawn or replaced at the Contractor's expense. The drill hole must be open along its full length to at least the design minimum drill hole diameter prior to placing grout and reinforcement. The Contractor's proposed method(s) to provide drill hole support and to prevent detrimental ground movements shall be reviewed by the Engineer. Detrimental ground movement is defined as movement which requires remedial repair measures, in order to maintain site conditions as determined by the Engineer. Do not progress a new hole, pressure-grout, or post-grout, within a radius of 5 pile diameters or 5 feet, whichever is greater, of a micropile until the grout for that micropile has set 24 hours or longer. Do not allow vibration or excessive wheel loads to influence piles during installation and construction.

Use of drilling fluid containing bentonite or any other non-reverting drilling fluid is not permitted. Use of polymer slurry to remove cuttings from the cased hole shall be approved by the Engineer.

Piles shall be installed using equipment capable of penetrating boulders, cobbles, bedrock, dense till material, granite blocks, timber, concrete, or other man-placed materials that hinder the advance of the pile.

Use of drop-type impact hammers and blasting are not permitted. Prior to the use of down the hole air drilling methods the Contractor shall provide temporary fencing or barriers as necessary to prevent cuttings from leaving the work area and entering the adjacent traffic lanes.

Micropiles shall not be installed using auger cast methods.

ITEMS 945.10, 948.60, & 948.61 (Continued)

Permanent casing must be installed in a manner which will not loosen the adjacent soils and will result in intimate contact between the casing and the soil. Driving of casing will not be allowed. Drilling shall be performed such that cuttings and/or wash fluid return through the inside of the casing. External flush will not be allowed. The method of drilling used shall prevent the loss of ground due to erosion, jetting, or blow-in at the bottom of the casing. No open-hole drilling will be allowed unless accepted by the Engineer.

D. Ground Heave or Subsidence

During construction, the Contractor shall observe the ground conditions in the vicinity of the micropile construction site on a daily basis for signs of ground heave or subsidence. Immediately notify the Engineer if signs of movements are observed. The Contractor shall immediately suspend or modify drilling or grouting operations if ground heave or subsidence is observed, if the micropile structure is adversely affected, or if adjacent structures are damaged from the drilling or grouting. If the Engineer determines that the movements require corrective action, the Contractor shall take corrective actions necessary to stop the movement or perform repairs. When due to the Contractor's methods or operations or failure to follow the specified/accepted construction sequence, as determined by the Engineer, the costs of providing corrective actions will be borne by the Contractor.

E. Pipe Casing and Reinforcing Bars Placement and Splicing

Reinforcement shall be placed prior to grouting the drill hole. Reinforcement surface shall be free of deleterious substances such as soil, mud, grease, or oil that might contaminate the grout or coat the reinforcement and impair bond. Reinforcement in the bond zone [i.e. rock socket] shall extend the minimum required length.

The Contractor shall install all micropiles to the planned elevations.

Centralizers and spacers shall be provided at a maximum spacing of 10 feet on center. The upper- and lower-most centralizers shall be located a maximum of 5 feet from the top and bottom of the micropile, respectively. Centralizers and spacers shall permit the free flow of grout without misalignment of the reinforcing bar(s) and permanent casing. The reinforcing steel shall be inserted into the drill hole to the desired depth without difficulty. Partially inserted reinforcing bars shall not be driven or forced into the hole. The Contractor shall re-drill and reinsert reinforcing steel when necessary to facilitate insertion.

Lengths of casing and reinforcing bars to be spliced shall be secured in proper alignment and in a manner to avoid eccentricity or angle between the axes of the two lengths to be spliced. Splices and threaded joints shall meet the requirements of the Material section. Threaded pipe casing joints shall be located at least two casing outside diameters (O.D.) from a splice in any reinforcing bar. When multiple bars are used, bar splices shall be staggered at least 1 foot.

ITEMS 945.10, 948.60, & 948.61 (Continued)

F. Grouting

Micropiles shall be grouted the same day the load transfer bond length is drilled, or the bond length shall be flushed prior to grouting procedures commence. The grouting equipment shall produce a grout free of lumps and undispersed cement. Admixtures, if used, shall be mixed in accordance with Manufacturer's recommendations. The Contractor shall have means and methods of measuring the grout quantity and pumping pressures during the grouting operations. The grout pump shall be a positive displacement pump equipped with a pressure gauge to monitor grout pressure. A second pressure gauge shall be placed at the point of injection into the pile top. The pressure gauge shall be capable of measuring pressures of at least 145 psi or twice the actual grout pressure used, whichever is greater. The grout shall be kept in agitation prior to pumping. Grout shall be placed within one hour of mixing. The grouting equipment shall be sized to enable each pile to be grouted in one continuous operation. The grout volume being pumped shall be measured to an accuracy of 10 percent.

The hole shall be flushed with clean water immediately prior to grouting, to remove all contaminated water and cuttings. The hole shall be flushed through the grout pipe fully extended to the bottom of the hole with the temporary casing (if any) in place. The water shall be pumped at a high velocity until the wash water at the top of the casing is clear. After flushing, the depth of the hole shall be measured to confirm that the hole is clean and no sediment exists at the bottom of the drilled rock-socket/bond length. Installation of the steel reinforcing and grouting shall be done immediately after flushing. In case of delay, the hole shall be re-flushed and rechecked prior to grouting as directed by the Engineer.

The grout shall be injected from the lowest point of the drill hole, and injection shall continue until uncontaminated grout flows from the top of the pile. Temporary casing, if used, shall be extracted in stages ensuring that, after each length of casing is removed, the grout level is brought back up to the proposed level before the next length is removed. The use of compressed air to directly pressurize the fluid grout takes is not permissible. The tremie pipe or casing shall always extend below the level of the existing grout in the drill hole during grouting procedures. The grout takes shall be controlled to prevent excessive heave or fracturing of rock or soil formations. The entire micropile shall be grouted to the design cut-off level. Upon completion of grouting, the grout tube may remain in the hole, but must be filled with grout.

If the Contractor elects to use a post-grouting system, Working Drawings and relevant details including grouting pressure, volume, location and mix design, shall be submitted to the Engineer for review.

ITEMS 945.10, 948.60, & 948.61 (Continued)

G. Construction Tolerance

Unless otherwise stated on the Plans, the following shall be the maximum construction tolerances for micropiles:

1. Centerline of piling shall not be more than 3 inches from indicated plan location.
2. Pile shall be plumb within 2 percent of total-length design plan alignment.
3. Battered piles inclined up to 1:6 shall be within 4 percent of design plan alignment.
4. Battered piles inclined greater than 1:6 shall be within 7 percent of design plan alignment.
5. Top elevation of pile shall be plus 1 inch or minus 2 inch maximum from vertical design elevation indicated.
6. Centerline of reinforcing steel shall not be more than 3/4 inches from indicated center of pile.
7. Minimum volume of grout placed shall be the 110% of the theoretical volume of the whole micropile length from bottom to top at time of grouting.

H. Micropile Installation Records

The Contractor shall prepare and submit to the Engineer full-length installation records for each micropile installed. The records shall be submitted within one work shift after that pile installation is completed. The data shall be recorded on a micropile installation log. A separate log shall be provided for each micropile. The log for each micropile shall contain the following minimum information:

1. Project name, structure name, micropile number, and contract number.
2. Date and time of drilling, grouting, and completion.
3. Bottom elevation of the proposed footing and final top elevation of the micropile, to the nearest 0.1 feet.
4. Plumbness and deviation from design location and batter.
5. Micropile as-built information such as pile inclination, casing diameter and wall thickness, reinforcement size and length, casing length below bottom of footing, taped measurement inside casing to check cleanout, plunge length (cased bond length), bond length below casing, total pile length below and above bottom of footing, All dimensions shall be provided to the nearest 0.1 feet.
6. Drilling method, drill bit type and size, and drill operator's name.
7. Table showing the descriptions and approximate top and bottom elevation of each soil or rock layer encountered during pile drilling.
8. Grout mix, density, and quantity used, for initial grout and post-grout (if any) including cement type and admixtures.
9. Maximum and average grout pressure used during installation.
10. Damage (if any) to pile, description of any deviations from the design location and batter or from the approved pile design and installation procedures, and description of any unusual occurrences during drilling (including obstructions), installation, and grouting.

ITEMS 945.10, 948.60, & 948.61 (Continued)

The example micropile installation log in the "Micropile Design and Construction Guidelines Manual," Report No. FHWA-NHI-05-039 or FHWA-SA-97-070 can be used as a reference in developing the micropile installation log.

The Contractor shall also submit within 2 weeks after installation of all piles, an as-built plan, certified by a surveyor, showing the as-installed location of all piles to the nearest ½ inch.

CONSTRUCTION QUALITY ASSURANCE

Contractor Quality Control

The Contractor's QC personnel will perform Quality Control inspection, sampling, and testing to ensure that the processes are providing work conforming to the contract requirements. Inspection, sampling, and testing shall be documented on appropriate forms and provided to the Engineer. The Engineer will not sample or test for Quality Control or assist in controlling the Contractor's operations.

A. Testing

1. Grout consistency: As measured by grout density shall be determined by the Contractor per API RP-13B-1 at a frequency of at least one test per pile, conducted just prior to start of pile grouting. The Baroid Mud Balance used in accordance with API RP-13B-1 is an approved device for determining the grout density of neat cement grout. The measured grout density shall be within ±10% of the density specified in the grout mix design submittal.

2. Compressive Strength: Grout within the micropiles shall be tested by the Contractor's Quality Control Inspector to ensure that it attains the minimum required compressive strength.

   Micropile grout shall be sampled and cured in accordance with AASHTO R 64 (for 2 inch by 2 inch cubes) or T 23 (for 3 inch by 6 inch cylinders) and tested for compressive strength in accordance with AASHTO T 106 (for cubes) or T 22 (for cylinders). Grout samples shall be taken directly from the grout plant (on-site mixer and pump).

   The QC Technician will take the following sets of grout samples for QC testing:

   i. Verification Test Piles – three (3) sets of three (3) cubes or cylinders for 3-, 7-, and 28-day strength testing.
   ii. Proof Test Piles – three (3) sets of three (3) cubes or cylinders for 3-, 7-, and 28-day strength testing.
   iii. Production Piles – one (1) set of three (3) cubes or cylinders for 28-day strength testing for every two (2) micropiles or one set from each grout plant on each day of operation; whichever occurs more frequently.

ITEMS 945.10, 948.60, & 948.61 (Continued)

The Contractor shall provide grout cube compressive strength, grout density, can grout volume results to the Engineer within 24 hours of testing.

Table 3 – Grout Material Acceptance Criteria

Quality Characteristic	Test Method	Engineering Limit
Minimum Compressive Strength:	AASHTO T 106 or AASHTO T 22	
3 days		≥ 2000 psi
7 days		For information only
28 days		≥ 4000 psi
Consistency	API RP-13B-1	± 10% of the density specified in the mix design
Volume		≥ Theoretical volume of hole

MassDOT Acceptance

The Engineer is responsible for performing all Acceptance activities and making the final Acceptance determination. The Engineer's Acceptance system will include monitoring the Contractor's QC activity, performing Acceptance inspection, and utilizing available sampling and testing data.

A. Inspection

The Engineer will perform Acceptance inspection of all work items to ensure that all materials and completed work are in conformance with the contract requirements.

B. Testing

MassDOT will determine whether it will test 2-inch cubes or 3-inch by 6-inch cylinders for its Acceptance testing. The Contractor will be required to provide to MassDOT a sufficient amount of approved 2-inch cube molds or 3-inch cylinders. If it is determined that MassDOT will test 3-inch cylinders then a correlation between the 2-inch cube results and the 3-inch cylinders shall be determined by MassDOT.

MassDOT will take the following sets of grout samples for Acceptance testing:

i. Verification Test Piles – 3 sets of cubes or cylinders for 3-, 7-, and 28-day strength testing.
ii. Proof Test Piles – three (3) sets of three (3) cubes or cylinders for 3-, 7-, and 28-day strength testing.
iii. Production Piles – one (1) set of three (3) cubes or cylinders for 28-day strength testing for every two (2) micropiles or one set from each grout plant on each day of operation; whichever occurs more frequently.

ITEMS 945.10, 948.60, & 948.61 (Continued)

Pile verification or proof load testing shall not be performed until MassDOT has confirmed the grout has reached the minimum 3-day design strength specified in Table 4.

Table 4 – Grout Material Acceptance Criteria

Quality Characteristic	Test Method	Engineering Limit
Minimum Compressive Strength:	AASHTO T 106 or AASHTO T 22	
3 days		≥ 2000 psi
7 days		For information only
28 days		≥ 4000 psi

MICROPILE LOAD TESTING

A. General

The Contractor shall perform pre-production verification pile load testing on one sacrificial pile per bond zone bearing stratum. The number and location of the verification test(s) shall be as specified on the Plans. In general, the location of the verification test(s) shall be within 10 feet of the footprint of a substructure unit, but at least 5 feet from any production pile as selected by the Contractor and accepted by the Engineer.

Pile proof load testing shall be performed on actual production micropiles and shall be performed on one pile per substructure unit or five percent of the total number of piles, whichever is greater, in conformance with the approved working drawings and testing procedures. The production proof test pile(s) shall be at a location selected by the Contractor and accepted by the Engineer.

The load tests shall conform to the requirements of ASTM D1143 (vertical compression load testing) or ASTM D3689 (vertical tension load testing) except as modified herein. The maximum test loads shall be 150% of the Factored Design Load (FDL) for the micropile verification test and 100% of the FDL for Micropile Proof Test. The Factored Design Load is defined as the Factored Axial Design Load (compression and/or tension) as shown on the Plans. The maximum test loads shall be as specified above but not more than 80% of the structural capacity of the micropile elements, to include steel yield in tension, steel yield or buckling in compression, or grout crushing in compression. The structural elements of the verification test micropile may be modified for testing the FDL of the micropile as accepted by the Engineer. The Alignment Load (AL) should not be more than 0.04 FDL.

Before starting the work, the Contractor shall submit to the Engineer for acceptance, a pile load test plan including a written description of the equipment and methods which are intended to be used. The methods must be of an accepted type and shall be altered as necessary to meet the acceptance of the Engineer. The pile load test plan and description shall be prepared and stamped by a professional engineer registered in the Commonwealth of Massachusetts.

ITEMS 945.10, 948.60, & 948.61 (Continued)

Grout within the micropile verification test pile shall attain the minimum required 3-day compressive strength prior to load testing. The top elevation of the test pile shall be determined immediately before the load testing. The head of each micropile shall be cut-off level or capped to produce a level horizontal bearing surface.

The Contractor shall provide all personnel and equipment needed to perform the test, measure loads and movements, and record test data. A representative of the Department or the Engineer may observe and witness the test and record data independently. No testing is to be performed unless all the agreed representatives are present.

Testing equipment shall include dial gauges, dial gauge support, jack and pressure gauge, electronic load cell, and a reaction frame. The Contractor shall provide a description of test setup and jack, pressure gauge and load cell calibration curves in accordance with the submittals Section.

Design the testing reaction frame to be sufficiently rigid and of adequate dimensions such that excessive deformation of the testing equipment does not occur. Provide a reaction frame capable of safely supporting 125 percent of the maximum test load. Align the jack, bearing plates and stressing anchorage such that unloading and repositioning of the equipment will not be required during the test.

Apply and measure the test load with a hydraulic jack and pressure gauge. The pressure gauge shall be graduated in 100 psi increments or less. The jack pressure gauge shall have a pressure range not exceeding twice the anticipated maximum test pressure. The jack shall be positioned at the beginning of the test such that unloading and repositioning during the test will not be required.

Calibrate the test load jacking system including the hydraulic jack couplings, gas pump, pressure gauge, and hydraulic load cell prior to the test so that the load applied is controlled to within 3 percent of the total applied load. Submit calibration reports prior to the start of the pile load test. Monitor the creep test load hold during verification tests with both the pressure gauge and the electronic load cell. Use the load cell to accurately maintain a constant load hold during the creep test load hold increment of the verification test.

Readings of settlement and rebound shall be referred to a fixed benchmark and shall be made using at least three dial gauges (micrometer dial extensometers) graduated to 0.001 inches and located 120 degree intervals around the micropile. The gauges shall be mounted on a reference beam supported at each end by reliable supports located at least 10 feet from the center of the test pile and independent from the jack, pile, or reaction frame.

The dial gauges shall have a travel sufficient to allow the test to be done without having to reset the gauges. Visually align the gauges to be parallel with the axis of the micropile. Readings shall be taken at intervals specified in the Verification Test and Proof Test section.

The Contractor shall establish a survey reference point on the test pile and another reference point at the center of the reference beam. The reference points shall consist of graduated scales machine-divided into 0.02 inch and attached securely to the pile and reference beam. The reference points shall be monitored using survey equipment during the pile load test.

ITEMS 945.10, 948.60, & 948.61 (Continued)

Protect the settlement measuring system against rain, wind, frost, and any other disturbances that could affect the reliability of the settlement observations. Provide sun shading for the measuring system for the duration of the test and for a minimum of 1 hour prior to the start of the test.

B. Micropile Verification Test

The Contractor shall perform pre-production verification pile load testing on sacrificial piles at a location selected by the Contractor and accepted by the Engineer. The location of the verification tests shall be within 10 feet of footprint of a substructure unit but at least 5 feet away from any production pile. Testing shall be performed in compression or tension in accordance with ASTM D1143 or ASTM D3689, respectively, except as modified herein.

Verification load tests shall be performed to verify that the Contractor installed micropiles will meet the required FDL and load test acceptance criteria and to verify that the length of the micropile bond zone is adequate. The drilling-and-grouting method and casing outside diameter shall be identical to those specified for the production piles as indicated on the Plans.

Verification test piles shall be installed at the location accepted by the Engineer. The steel core may need to have a higher strength or a larger diameter than for the production piles to accommodate the test load.

Verification test piles shall include at least two, ¾-inch diameter PVC Schedule 40 pipes cast into the test pile to allow telltales to be installed for load testing. The pipes shall be securely fastened in straight alignment to prevent displacement during grouting. The pipes shall be sealed at the bottom with threaded steel caps and at the top with threaded PVC plugs. The pipes shall extend within one foot of the top and bottom of the bearing stratum (i.e. unbonded zone of the pile) at the test pile location. Strain gages may be substituted for telltales.

The micropile verification load test results must verify the micropile design and installation methods, and be reviewed and accepted by the Engineer prior to beginning installation of production micropiles. The verification test pile and reaction piles shall not be used as production piles.

ITEMS 945.10, 948.60, & 948.61 (Continued)

Test verification pile to a maximum Test Load of 150% of the Factored Design Load (FDL) defined above, as indicated on the Plans. The verification pile load test shall be made by incrementally loading the micropile in accordance with the following cyclic load schedule:

Step	Loading	Applied Load	Hold Time (min.)
1	Cycle 1	AL	-
		0.075 FDL	4
		0.15 FDL	4
		0.225 FDL	4
		0.30 FDL	4
		0.375 FDL	4
2	Cycle 2	AL	1
		0.15 FDL	1
		0.30 FDL	1
		0.375 FDL	1
		0.45 FDL	4
		0.525 FDL	4
		0.60 FDL	4
		0.675 FDL	4
		0.75 FDL	4
3	Cycle 3	AL	1
		0.30 FDL	1
		0.60 FDL	1
		0.675 FDL	1
		0.75 FDL	1
		0.875 FDL	4
		0.90 FDL	4
		0.975 FDL	10 or 60 (Creep Test)
4	Cycle 4	AL	1
		0.30 FDL	1
		0.60 FDL	1
		0.90 FDL	1
		0.975 FDL	1
		1.05 FDL	4
		1.125 FDL	4
		1.20 FDL	4
		1.275 FDL	4
		1.35 FDL	4
		1.425 FDL	4
		1.50 FDL	4
		1.20 FDL	4
		0.90 FDL	4
		0.60 FDL	4
		0.30 FDL	4
		AL	15

ITEMS 945.10, 948.60, & 948.61 (Continued)

Creep Test: Pile top movement shall be measured at each load increment. The load-hold period shall start as soon as each test load increment is applied. The verification test pile shall be monitored for creep at the 0.975 FDL. Depending on performance, either a 10 minute or 60 minute creep test shall be performed at the 0.975 FDL test load where movements shall be recorded at 1, 2, 3, 5, 6, and 10 minutes. When the pile top movement between 1 and 10 minutes exceeds 0.04 inches, the 0.975 FDL test load shall be maintained an additional 50 minutes. Movements shall be recorded at 20, 30, 50, and 60 minutes. Dial gauges shall be reset to zero after the initial AL is applied.

The Acceptance criteria for micropile verification load tests are:

1. If the pile is tested in compression, acceptance will be based on the Davisson criteria. For this criterion, the ultimate load is defined as the load at which settlement measured relative to the top of the pile prior to the start of testing exceeds the sum of:
    I. The theoretical elastic compression of the pile assuming the load applied at the top of the pile act over the full length of the pile, and
    II. 0.15 inches plus 1 percent of the pile tip diameter.
2. If the pile is tested in tension, the ultimate load is defined as the load that produces an upward movement under load of 0.5 inch at the pile tip. The movement at the pile tip is:
    I. Measured directly by tell-tale, or
    II. Computed by deducting the theoretical elastic elongation of the pile from the upward movement measured relative to the top of the pile prior to the start of testing.
3. At the end of the 0.975 FDL increment, the test pile shall have a creep rate not exceeding 0.04 inch/log cycle time (1 to 10 minutes) or 0.08 inch/log cycle time (6 to 60 minutes or the last log cycle if held longer). The creep rate shall be linear or decreasing throughout the creep load hold period.
4. Failure does not occur at any load increment up to and including the maximum test load, 1.50 FDL. Failure is defined as load where the slope of the load versus head settlement curve first exceeds 0.025 in/kip.

At the completion of verification testing, test piles shall be removed down to the elevation specified on the plans or by the Engineer.

For the verification load tests, reports must be written and submitted to the Engineer within 3 working days of the load test completion. This report will either confirm the micropiles' resistance and bond lengths specified on the plans or reject the piles based upon the test results. This report shall be reviewed and acceptance by the Engineer prior to beginning installation of production micropiles. The contents of the verification load test report shall include:

ITEMS 945.10, 948.60, & 948.61 (Continued)

1. Brief project description.
2. Description of site and subsurface conditions including information on the ground conditions at the location of the load test and a comparison to actual conditions encountered.
3. Key personnel including the drill rig operator, the superintendent, the grout plant operator, and any other personnel involved in the installation and testing of the micropile.
4. Micropile installation data including information such as length of the micropile (cased and uncased), number of bags of cement used to construct the micropile, size and type of casing and reinforcement, geology encountered (e.g. soil material, rock material, and water levels) during drilling, grouting record and grout testing results.
5. Results of load test including load-movement curves/figures and filled-out data sheets.
6. Statement of load test requirements and acceptance criteria.
7. Comparison of load test requirements and acceptance criteria.
8. Summary statement on the load test results.

If a tested micropile fails to meet the Acceptance criteria, the Contractor shall modify the design, the construction procedure, or both. These modifications may include but not limited to modifying the installation methods, increasing the bond length, regrouting the pile via preplaced regrout tubes or changing the micropile type. Any modification that necessitates changes to the structure design shall be submitted as a revision to the Working Drawings and require the Engineer's review and acceptance. Additional load testing may be required until an acceptable pile load test meets the designated load test requirements.

C. Micropile Proof Test

Proof test piles to a maximum test load of 1.00 FDL as defined above. Proof tests shall be made by incrementally loading the micropile in accordance with the following cyclic load schedule:

Step	Loading	Applied Load	Hold Time (min.)
1	Cycle 1	AL	-
		0.10 FDL	4
		0.20 FDL	4
		0.30 FDL	4
		0.40 FDL	4
		0.50 FDL	4
		0.60 FDL	4
		0.70 FDL	4
		0.80FDL	4
		0.90 FDL	4
		1.00 FDL	10 or 60 (Creep Test)
		0.75 FDL	4
		0.50 FDL	4
		0.25 FDL	4
		AL	4

ITEMS 945.10, 948.60, & 948.61 (Continued)

Creep Test: Pile top movement shall be measured at each load increment. The load-hold period shall start as soon as each test load increment is applied. The proof test pile shall be monitored for creep at the 1.00 FDL. Depending on performance, either a 10 minute or 60 minute creep test shall be performed at the 1.00 FDL test load where movements shall be recorded at 1, 2, 3, 5, 6, and 10 minutes. When the pile top movement between 1 and 10 minutes exceeds 0.04 inches, the 1.00 FDL test load shall be maintained an additional 50 minutes. Movements shall be recorded at 20, 30, 50, and 60 minutes. Dial gauges shall be reset to zero after the initial AL is applied.

The Acceptance criteria for Micropile Proof Load Test are the same as those for the Micropile Verification Load Test, except as modified below:

1. The creep test shall be held at the end of the 1.00 FDL increment.
2. Failure does not occur at any load increment up to and including the maximum test load, 1.00 FDL

Within 3 days of the completion of each proof load, the Contractor shall submit a report confirming the micropiles' capacities and bond lengths specified on the plans or reject the piles based upon the test results. The contents of the proof load test report shall be the same as those in the report for the Micropile Verification Load Test.

If a proof-tested micropile fails to meet the Acceptance criteria, the Contractor shall immediately proof test another micropile within that substructure. For failed piles and further construction of other piles, the Contractor shall modify the construction procedure. Failed micropiles shall be replaced at the Contractor's expense. Any modification that necessitates changes to the structure design shall require the Engineer's prior review and acceptance. Verification and proof tests will be re-performed if the micropile type is changed.

NON-CONFORMING PILES

Non-conforming piles include piles that are installed out of tolerance, are damaged, the volume of grout placed is less than the theoretical volume of the hole, or the grout tests do not indicate the specified strength has been achieved. The Contractor shall submit a written remedial action plan to the Engineer for approval. The remedial action plan shall indicate how to correct the problem and prevent its reoccurrence. To mitigate or remediate non-conforming piles, the Contractor may be required to provide additional piles or supplement piles to meet specified requirements at no additional cost to the Owner.

METHOD OF MEASUREMENT

Item 945.10 will be measured for payment by the FOOT of drilled micropile.

Item 948.60 will be measured for payment by the EACH micropile verification load test.

Item 948.61 will be measured for payment by the EACH micropile proof load test.

ITEMS 945.10, 948.60, & 948.61 (Continued)

BASIS OF PAYMENT

Item 945.10 will be paid at the Contract unit price per FOOT, complete in place and accepted, which price shall be considered complete compensation for providing all materials, labor, equipment, proper disposal of drilling spoil, and incidentals to complete the work. There will be no separate measurement for mobilization and demobilization associated with this item. Any difference in the required length of permanent casing and micropile installed and accepted by the Engineer from the estimated lengths shall be measured for payment and/or credit. There will be no payment for differences in required length of temporary casing. The Micropile Contractor is also responsible for estimating the grout take. There will be no extra payment for grout overruns. There will be no extra payment for grout and drill water handling. Drilling of micro-piles may encounter contaminated waste due to proximity to railroad. Disposal of contaminated spoils and treatment of potential contaminated groundwater is incidental to this Item.

The Contractor shall anticipate encountering obstructions as noted herein and shall utilize equipment and methods necessary to advance through or remove the obstructions. The presence of obstructions, any lost production, replacement piles, and the removal of obstructions, if necessary, shall not be measured or paid for separately. Any costs associated with the presence of obstructions shall be considered incidental to the Drilled Micropiles Item.

Drilling tools that are lost during the drilling shall not be considered obstructions and shall be promptly removed by the Contractor without compensation. If removal will degrade the hole, the hole shall be abandoned with a new hole located by the Engineer. All costs due to lost tool removal, drilling a new hole and filling the abandoned hole shall be borne by the Contractor.

Items 948.60 and 948.61 will be paid at the respective Contract unit prices per EACH completed and accepted test, which prices shall be considered complete compensation for providing all design, materials, labor, equipment, load test report, and incidentals to complete the work including the installation and materials of the test pile and reaction piles, if used. The respective prices shall also include full compensation for cutting the pile to the elevation necessary to properly incorporate the pile in the structure. If a pile is not to be incorporated in the structure, this payment item includes cutting the pile to the grade necessary to avoid its interference with the proposed construction. Payment for Micropile Verification Load Tests shall also include full compensation for installing the test pile. Micropiles installed as test piles for Proof Load Tests, if incorporated in the final structures, the length of pile installed in place shall be paid for at contract unit price of Drilled Micropiles.

Payment Items

945.10	Drilled Micropiles	Foot
948.60	Micropile Verification Load Test	Each
948.61	Micropile Proof Load Test	Each

ITEM 950.2 TEMPORARY EXCAVATON SUPPORT LUMP SUM

The work under this item shall conform to the relevant provisions of Subsections 140, 940, 950, 955 and the following:

Under this item, the Contractor shall design, furnish and install, maintain and remove temporary excavation support systems for retaining the embankments adjacent to excavations required for the construction of the replacement bridge and for wall construction. The design of the system(s) shall be submitted for review and acceptance by the Engineer. All portions of the temporary excavation support systems shall be designed to be removed in their entirety, except as noted herein.

The Contractor shall make every effort to protect existing trees adjacent to the excavation and notify the Engineer if roots are found to be within the limits of the excavation support system.

The excavation support systems for the proposed bridge structures are anticipated to consist of soldier pile and lagging, but alternate forms of temporary shoring may be submitted for review by the Engineer. Any necessary tieback anchors, deadman anchors, soil nails and/or temporary bracing are considered incidental to this item. Any part of a support of excavation system that is in the zone of influence of the bridge foundations or is in the soil below the bridge structure, shall be left in place. The excavation support systems provided shall be independent and not cause damage to the permanent structures following their removal.

The support of excavation system shall be designed and detailed by the Contractor to avoid impacting the existing buried utilities, including communication, water, and gas lines and the existing DCR sewer. Any modifications to the support of excavation system to accommodate the existing utilities shall be incidental to this item.

The excavation support system shall extend longitudinally such that the maximum slope of the excavated surface does not exceed 1 (vertical) to 2 (horizontal) unless the contractor's engineer provides calculations demonstrating that a steeper slope is stable. In no case shall the slope exceed 1 (vertical) to 1-1/2 (horizontal). The Contractor is responsible for protecting the slope's surface from erosion.

All support members shall be designed to be installed outside of the zone of influence of the railroad or new or existing structures or utilities, such as the existing DCR sewer, with the exception of steel soldier piles installed in predrilled holes, encased in concrete, which may be designed and installed to span the underground utility. All support members shall be installed within the construction easement limits shown on the plans.

Should a variance from railroad specifications be granted and portions of excavation support elements be installed within the railroad's zone of influence, do not remove portions of excavation support members installed within the zone of influence of the tracks or utilities.

The zone of influence is defined per Drawing 2.3.4 in Part II of the MassDOT LRFD Bridge Manual and Section 1 of the Genesee and Wyoming of the Genesee and Wyoming Public Project Manual.

ITEM 950.2 (Continued)

The Contractor is responsible for control of groundwater and surface runoff drainage to allow excavation work to be performed in the dry. This may involve temporary sump pumps and temporary cofferdams (such as a temporary portable dams to mitigate water from entering the excavation). All work required to maintain a dry excavation is incidental to the items and will not be considered for additional compensation.

The Contractor shall be responsible for the preconstruction and post-construction surveys of existing buildings and structures adjacent to the construction site.

The Contractor is responsible for installation of surveyed deformation monitoring points (DMPs) to monitor movements that may be detrimental to performance of roadway and/or structures. This work shall be performed by a Registered Land Surveyor and a Geotechnical Monitoring Consultant and shall be considered incidental to the items and will not be considered for additional compensation.

GEOTECHNICAL INSTRUMENTATION AND MONITORING

Geotechnical instrumentation and monitoring is required at the below-referenced locations at Bridge No. H-18-004 and the railroad tracks.

Qualifications of Contractor's Instrumentation Personnel

A. The Contractor's instrumentation personnel shall include a qualified Geotechnical Monitoring Consultant who is a registered Professional Engineer in the Commonwealth of Massachusetts, who has a minimum of a Bachelor of Science degree in civil engineering, and who has at least 2 years of experience in installation and monitoring of the types of instruments specified herein and in interpreting instrumentation data and performing pre-construction surveys of existing structures. A suitably qualified engineering geologist with equivalent or better experience is also acceptable as the Geotechnical Monitoring Consultant. The Geotechnical Monitoring Consultant shall:

1. Prepare detailed step-by-step installation procedures for all instruments specified herein.
2. Be on site and supervise at least the first installation of each type of instrument.
3. Conduct the pre-installation acceptance tests for at least the first of each type of instrument specified herein.
4. Be on site until the completion and acceptance by the Engineer of the tasks identified herein, and subsequently be available for consultation at all times for the duration of the Contract.
5. Supervise interpretations of geotechnical instrumentation data.

ITEM 950.2 (Continued)

B. For the collection of instrumentation data, the Contractor's personnel shall be as follows:

1. The person in responsible charge of the surveyors shall be a Registered Land Surveyor or Professional Engineer licensed in the Commonwealth of Massachusetts with a minimum of 3 years of experience in deformation measurements of the types and accuracies specified herein. The field survey party chief shall have a minimum of one year of experience in deformation survey measurements of the types and accuracies specified herein.
2. Interpretations of data shall be made by the Contractor's Geotechnical Monitoring Consultant.

Deformation Monitoring
The Contractor shall furnish, install, protect, replace, monitor and report on survey deformation monitoring points (DMPs) during the Work at the following locations as a minimum:

1. All excavation support systems shall be monitored using DMPs spaced a minimum of one every 25 linear feet along the top of the excavation support wall, to measure horizontal displacements.
2. The portions of the granite block abutments to remain shall be monitored using DMPs spaced a minimum of one every 25 linear feet along the top of the wall.
3. The rails shall be monitored using DMPs spaced a minimum of one every 25 linear feet along each rail, to measure horizontal displacements.

The Contractor's registered Surveyor and Geotechnical Monitoring Consultant shall monitor and maintain the instrumentation until after excavation is complete, and shall continue monitoring weekly thereafter for 4 weeks. The Contractor shall perform a baseline survey of each DMP consisting of two sets of independent readings prior to the beginning of excavation and demolition. During excavation, DMPs shall be monitored at least one time daily until excavation is complete. The Contractor shall provide survey data to the Engineer for review within 24 hours of collection of data. The number of points to be monitored on a daily basis and the frequency of monitoring may be increased or decreased in agreement with the Engineer based on the results of the monitoring. Survey data shall be reported to an accuracy of 0.01 feet.

The following Threshold and Limiting Values for monitoring points shall be used:

Monitoring Target	Threshold Value	Limiting Value
Structure DMP (hor. and vert.)	0.25 inch	0.5 inch
Track DMP (hor. and vert.)	0.25 inch	0.5 inch
Utility DMP (vertical)	0.25 inch	0.5 inch
Excavation Support DMP		
horizontal	1.0 inch	2.0 inch
vertical	0.5 inch	1.0 inch

If a Threshold Value is reached the Contractor shall increase the instrument monitoring frequency as directed by the Owner, install and monitor additional instruments as directed by the Engineer and implement remedial measured so the Limiting Value is not reached.

ITEM 950.2 (Continued)

Stop work, immediately notify the Engineer, and take immediate remedial action if movement (horizontal or vertical) of the existing structure or excavation support system exceeds a Limiting Value during progress of this work. These movement criteria are intended only to establish a guideline, and in no way relieve the Contractor of its responsibility for preventing detrimental movements or damage causing structural distress in the various structures, roadways, or embankment. The Contractor shall provide all measures necessary to control movements to within the established performance criteria, or to lesser amounts as required to prevent damage. The Engineer may require the Contractor to take steps to control movements to levels which are lower, at no additional cost to the Owner, if in the Engineer's opinion the measured or observed movements are detrimental or damaging.

The work shall be executed in such a manner as to prevent damage to existing structures and other public and private property and existing improvements. The Contractor shall protect existing improvements from damage caused by settlement, lateral movement, loss of ground, undermining, washout, and other potential hazards which may be initiated by the Contractor's operations. Damage to existing facilities shall be repaired by the Contractor at its own expense.

Vibration Monitoring

Where vibratory construction methods (e.g. demolition or installation of excavation support members) are used within a distance of 100 feet of existing structures or within 200 feet of sensitive abutters, the Contractor shall provide all labor and equipment to monitor and report vibrations during the Work.

Contractor shall conduct vibration monitoring using a portable seismograph to measure vibration levels resulting from construction activities. Provide at least two seismographs which have been calibrated within the previous six months to a standard that is traceable to the National Bureau of Standards. Seismograph monitoring locations shall be mutually agreed upon by the Engineer and Contractor. Vibrations shall be monitored on a continuous basis during demolition, excavation, or pile installation that use vibration or impact methods.

If vibration levels are found to exceed the maximum limits shown below, Contractor shall revise its construction operations as necessary to reduce vibration levels, at no additional cost to the Owner. The Engineer may require the Contractor to perform additional vibration monitoring if, in the opinion of the Engineer, conditions warrant such action.

Vibration monitoring shall be conducted by persons trained in the use of a seismograph and records shall be analyzed and results reported by persons familiar with analyzing and reporting the frequency content of a seismograph record. Limit construction vibrations to prevent damage to any adjacent building, structure, utilities, pipes or other features near the site. The Contractor is solely responsible to determine the maximum vibration tolerable at each location. However, in no case shall the following peak particle velocity criteria be exceeded.

ITEM 950.2 (Continued)

Frequency (Hz)	Maximum Peak Particle Velocity (in. per. sec.)
Over 40	1.0
30 to 40	0.75
20 to 30	0.75
Less than 20	0.5

Contractor shall provide written reports of monitoring results to the Engineer within 24 hours of each day's monitoring.

EARTH AND/OR EXCAVATION SUPPORT SYSTEM REQUIREMENTS

The Contractor shall submit to the Engineer for approval an excavation support system design that is designed to carry all of the applicable AASHTO and American Railway Engineering and Maintenance-of-Way (AREMA) loads and meet the deflection and vibration criteria specified herein and on the drawings. Plans, shop drawings, and calculations of the earth and/or excavation support systems shall be prepared and submitted to the Engineer for review and acceptance prior to excavation. The Contractor designed excavation support systems shall meet the minimum following requirements:

1. The Contractor is responsible for selecting, designing, furnishing, installing, maintaining, monitoring, and removing the excavation support systems.

2. The Contractor shall submit plans and calculations of the proposed systems. All plans and calculations submitted shall be prepared and stamped by a Professional Engineer registered in Massachusetts.

3. The earth and/or excavation support systems shall be designed to safely resist all anticipated loads they may be subjected to while in place, including live load surcharge and any expected surcharge from construction vehicles (e.g. cranes, concrete trucks, and compaction equipment). The design shall be in accordance with the AASHTO LRFD Bridge Construction Specifications, Section 3 – Temporary Works and AREMA.

The Contractor shall submit shop drawings indicating the instrumentation and monitoring point locations, sizes, material types, and installation procedures. Contractor submittals shall be acceptable to the Engineer prior to undertaking the work.

ITEM 950.2 (Continued)

Soldier piles, if utilized, shall be installed in pre-augered holes or drilled shafts, advanced into the glacial till and weathered bedrock strata to the required depth and/or socketed into rock as necessary. Soldier piles shall be placed in pre-drilled holes or drilled shafts and backfilled with concrete below proposed bottom of excavation elevation and within rock sockets and with sand, crushed stone or other excavatable material above proposed bottom of footing elevation. The drilling equipment and methods used for pre-augering/drilled shaft installation at the soldier pile locations shall be suitable for drilling through the conditions to be encountered, without causing damage to overlying or adjacent structures, buried structures, utilities, or services. The drill hole must be open along its full length to at least the design minimum drill hole/shaft diameter prior to installing soldier piles and backfilling the pre-augered hole/drilled shaft after pile installation. The diameter and depth of the pre-auger shall be specified on the Contractor's shop drawings. All soldier piles within the temporary construction easement shall be cut off to 4 feet below grade and left in place by the Contractor, unless otherwise noted on the plans.

Temporary casing or other approved method of drill hole support will be required in caving or unstable ground to permit the shaft to be formed to the minimum design drill hole diameter. The casing shall be steel, clean, watertight, and of ample strength to withstand handling and installation induced stresses and the pressure from both fluids and surrounding earth materials without distortion.

The Contractor's proposed method(s) to provide drill hole support and to prevent detrimental ground movements shall be reviewed by the Engineer. Detrimental ground movement is defined as movement which requires remedial repair measures, in order to maintain site conditions and stability of adjacent structures and utilities as determined by the Engineer.

Methods of installation or extraction of vertical temporary excavation support members which cause vibrations in excess of the maximum values specified herein will not be permitted. The Contractor shall be advised that obstructions such as existing foundations, weathered bedrock, cobbles and boulders are likely to be encountered and will need to be penetrated during pre-augering/drilled shaft installation for the soldier piles.

All materials used for the support system, whether new or used, shall be sound and free from strength-impairing defects. New steel piles shall conform to the applicable provisions of Section 940. Submit laboratory coupon strength testing certificates for any used steel elements, demonstrating the required minimum yield strength. Treated timber if used shall conform to the applicable provisions of Section 955.

The Contractor shall submit to the Engineer for review a temporary excavation support system design that is designed to carry all of the applicable AASHTO and AREMA loads, including, but not limited to: earth pressure and all temporary and permanent surcharges. It shall be designed in accordance with the AASHTO Guide Design Specifications for Bridge Temporary Works, 2017, and all later interim/versions published as of the bid opening date. The temporary excavation support system must be designed and stamped by a qualified Professional Engineer registered in the Commonwealth of Massachusetts experienced in the type and complexity of excavation support required for this project. Complete detailed drawings and calculations shall be submitted to the Engineer for review and acceptance. Qualifications of the Contractor's Engineer shall be submitted with the shop drawings and design calculations.

ITEM 950.2 (Continued)

The Contractor shall make its own evaluation of existing conditions and facilities, and of the effects of the proposed temporary excavation support system and construction methods, and shall provide in its design for all loads and methods necessary to permit construction of the specified stages of the work while maintaining public safety and protecting completed work (and all third party property) from damage caused by its operations.

Contractor shall produce drawings and design calculations prepared and stamped by a professional engineer licensed in the state of Massachusetts and submitted to the Engineer for review and acceptance. Drawings shall show all materials, member sizes, connections, methods and sequence of installation, location, and depths of system components; and the complete description of equipment and instrumentation to be used with installation, operation, and maintenance procedures. Acceptance of the working drawing does not relieve the Contractor of the sole responsibility of providing for the safety of the public, personnel, equipment, and structures, as well as successful project completion and the successful completion of the work.

The Contractor shall take into account subsurface conditions such as soil types, bedrock elevations, water surface elevations, existing foundations to be demolished and proposed new foundations. The Contractor shall accurately locate all utility lines and structures to ensure that the proposed temporary excavation support system will not interfere with any existing or proposed utilities and structures.

The plan submitted shall be sufficiently detailed so that the Contractor's method of dealing with operations shall be clearly stated. Prior to any excavation, the Engineer must review and accept complete detailed drawings and complete calculations for the temporary excavation support system in writing.

During the prosecution of this work, the Engineer may reject use of any method or equipment which causes vibrations that exceed threshold or limiting values or levels which may cause damage to portions of the adjacent structures. Any damage done to portions of the adjacent structures and/or utilities identified on the Plans to remain shall be replaced or repaired by the Contractor at its expense to the satisfaction of the Engineer. The provisions and requirements for vibration monitoring shall be followed during the temporary support of excavation work.

Excavation and/or earth support systems are required as generally described below:

Bridge No. H-18-004

The Contractor may, at no additional cost to the Owner, install additional excavation support systems as required to facilitate construction. The temporary excavation support system(s) is (are) required to support the embankments during excavation and removal of the existing bridge, and during construction of the replacement bridge.

ITEM 950.2 (Continued)

During partial removal of the existing granite block abutment, stability of the remaining portion of the wall and adjacent excavation slopes shall be maintained according to the AASHTO Guide Design Specifications for Bridge Temporary Works. The Contractor shall include in the Temporary Excavation Support submittal the proposed procedures and sequence for the partial demolition of the granite block abutment to maintain the stability of the remaining portion of the granite block wall and surrounding excavation throughout the demolition and construction sequence.

In addition, support of excavation shall be provided whenever the 2:1 slope line from top of rail tie, as illustrated per Drawing 2.3.4 in Part II of the MassDOT LRFD Bridge Manual, and as required by Section 1 of the Genesee and Wyoming Public Project Manual, would be disturbed by an excavation or in the placement of an adjacent structure. It is the responsibility of the Contractor to determine the appropriate means and methods of shoring.

BASIS OF PAYMENT

Item 950.2, Temporary Excavation Support, will be paid at the Contract LUMP SUM price, which price shall include all labor, tools, equipment, material and all associated work necessary to design, provide and revise submittals, install, monitor, maintain and remove the excavation support system(s).

Payment for work under these items shall be made at the Contract unit bid price per Lump Sum of excavation support system installed, which shall include full compensation for all design, plans, labor, tools, materials, equipment for furnishing, installing, monitoring, preconstruction and post-construction surveys, maintenance, and subsequent removal and all other incidentals necessary to complete the work, including survey deformation monitoring.

Excavation for construction of proposed substructure elements and demolition of existing substructure units shall be paid for under Items 114.1, 127.1, and 140, as applicable. Obstruction removal shall be considered incidental to complete the work.

No separate payment for dewatering shall be made.

No separate payment for temporarily supporting or adjusting existing utilities for the installation, removal or maintenance of the excavation support system shall be made.

ITEM 994.01 TEMPORARY PROTECTIVE SHIELDING – BRIDGE NO. H-18-004 (CNU) LUMP SUM

The work under this Item includes the design, furnishing, installation, maintenance, as needed, and removal and disposal of a protective shielding system under the bridge and adjacent to existing/proposed abutments. The shielding shall protect the Providence and Worcester Railroad underneath from debris and dust during the following activities: 1) demolition of the existing superstructure; 2) demolition of the substructure; 3) construction of a new superstructure and substructure; 4) closure pours between NEXT-D beams and installation of bridge railings.

SUBMITTALS

The Contractor shall submit calculations and detailed drawings of the proposed shielding system to the Engineer for approval. These calculations and drawings shall be stamped by a Professional Engineer registered in Massachusetts. This submittal will need to be submitted shortly after receiving the Notice to Proceed in order to prevent delay in approval from the railroad.

The Design shall include a description of the equipment and construction methods proposed. Include means and methods for deck removal and the maximum size of deck area being removed each time by such methods.

The Design shall include a description of sequencing for the erection, removal and resetting, and final removal of the temporary protective shielding during the activities aforementioned.

CONSTRUCTION METHODS

The shielding shall conform to the following:

- Conform to all applicable local, state, and federal regulation, including Orders of Conditions, if any.
- Shielding shall be designed to safely withstand all loads that it will be subjected to. The allowable design stresses shall be in accordance with AASHTO Standard Specifications for Highway Bridges and GWRR requirements. Shielding shall also be designed to withstand the impact imparted by the maximum sized piece of the bridge superstructure or the maximum sized piece of the fieldstone abutments should they fall during excavation or removal.
- Shielding shall be installed or removed only upon inspection field approval of the Engineer.
- Superstructure shielding shall be in place prior to removal of the existing deck. Shielding shall not lessen the existing vertical clearance under the bridge. Superstructure shielding shall extend the full length and width of the bridge.
- Shielding suspended beneath the existing superstructure shall have all spaces along the perimeter and at the seams sealed to prevent dust and debris from escaping and falling onto the railroad below. If saws are used to sawcut the existing deck into pieces, provisions shall be made to contain the water runoff and prevent it from contaminating the area below.
- Substructure shielding shall extend as far as practicable beyond the existing substructure to protect the railroad. Substructure shielding will be required when demolishing the existing abutments and when constructing the new abutments and shall meet the horizontal clearance requirements of the railroad owner.

ITEM 994.01 (Continued)

- Superstructure shielding will be required after beam erection during the deck pour and safety curb pours and during bridge railing installation.

All materials used in the shielding system shall become the property of the Contractor and shall be removed from the site at the completion of the project.

BASIS OF PAYMENT

Item 994.01 will be paid at the Contract LUMP SUM price, which price shall include all materials, equipment, tools and labor, incidental to the design, construction, inspection, maintenance and removal of the temporary protective shielding in conformance with the approved plans, these specifications, and to the satisfaction of the Engineer.

Item 994.01 Temporary Protective Shielding will be paid in partial payments per the following schedule. The total of all partial payments to the Contractor shall equal the Contract Lump Sum price, regardless of the quantities of the individual components. The cost of equipment, tools, labor, and materials for any item not listed but required to complete the work shall be considered incidental to the Item and no further compensation will be allowed.

The payment schedule for Item 994.01 shall be made in four (4) equal partial payments upon successful completion of the following milestones:

1. Upon the Engineer-approved installation of superstructure shielding prior to the demolition of the existing superstructure;

2. Upon the Engineer-approved removal of the substructure shielding system upon completion of the abutment removal and construction for one abutment;

3. Upon the Engineer-approved removal of the substructure shielding system upon completion of the abutment removal and construction for the other abutment;

4. Upon the Engineer-approved final removal from under the new superstructure and satisfactory disposal of all temporary shielding materials from the project.

ITEM 995.01 BRIDGE STRUCTURE - BRIDGE NO. H-18-004 (CNU) LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsection 995 of the Standard Specifications and the specific requirements stipulated below for the component parts of this Item. For those component parts where no specific requirement is stipulated, the Standard Specifications shall apply except for payment.

The work under this Item shall include all materials, equipment, and labor needed to construct the following:

- Precast Concrete Bridge Elements: Abutment stems, abutment footings, wingwall stems, wingwall footings, approach slabs, highway guardrail transition and bases
- Cast-in-Place Concrete (5000 psi high performance cement concrete): CP-MTL3 bridge rail, reinforced cement concrete sidewalk, curtain walls, end diaphragms, backwalls, concrete cap in existing piers.
- Grout for precast substructure elements
- Prestressed concrete 32” NEXT-D beams (five), including inserts for utilities on beams 1 and 5
- UHPC Closure pours between prestressed concrete NEXT-D beams (Subsection 902 of 2026 MassDOT Standard Specifications). UHPC must reach 4000 psi min and 7 days curing prior to opening bridge to traffic). Contractor to allow 6 weeks lead time for approval for trial batches and use of UHPC.
- Elastomeric bridge bearing pads
- Reinforcing Steel
- Protective Screen Type II
- Aluminum Hand Rail
- Damp-Proofing
- Spray-applied membrane waterproofing
- Sawing and sealing joints in asphaltic pavement at bridges
- Steel utility supports between cross frames
- Anti-graffiti coating for the substructure elements
- All items not specifically provided for elsewhere in the contract

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of this bridge structure or which may be incidental to its construction and are not specifically included for payment under another Item shall be considered incidental to the work performed under this Item and shall be included in the unit price of the component of which they are a part.

PROJECT CONDITIONS

All heavy equipment shall be located at the road surface. Concrete formwork may be constructed from the top or sides.

ITEM 995.01 (Continued)

SAWING & SEALING JOINTS IN ASPHALT PAVEMENT AT BRIDGES

The work to be done under this heading consists of making a sealed kerf across the full width of the finished asphalt pavement at bridge abutments where called for on the Plans. The shape, width, and depth of the kerf shall be as shown on the Plans.

Prior to the start of the asphalt pavement operation, the Contractor shall place a mark on each curb or barrier on either side of the paved roadway. These marks shall be aligned with the actual end of the bridge deck and shall be placed so that they will not be covered or otherwise obscured by the asphalt pavement.

After the completion of the paving operation, the Contractor shall snap a straight chalk line on the pavement between these two marks. The Contractor shall then saw cut the pavement along this line to the depth, width and shape as shown on the Plans. The equipment shall be approved by the Engineer prior to commencing work.

After completing the saw cutting, the Contractor shall clean the saw groove of any dust and debris with an oil free air blast. If the groove was wet sawn, the groove shall be cleaned with a water blast to remove any remaining slurry and debris, vacuumed with a Wet-or-Dry vacuum to remove any standing water, and then dried with an air blast from a Hot-Air-Lance.

Once the groove is clean and dry, the Contractor shall fill it completely with a hot-applied bituminous crack sealer meeting the requirements of M3.05.4 in accordance with the manufacturer's application instructions and restrictions regarding ambient and material temperatures. The crack sealer shall be thoroughly cured prior to opening the road to traffic. To reduce tackiness, only boiler slag aggregate (black beauty) shall be scattered over the sealer when required by the Engineer. Conventional sand shall not be used for this purpose.

ULTRA-HIGH PERFORMANCE CONCRETE

The work to be done under this heading shall conform to the relevant provisions of Subsection 902 of the Standard Specifications and the following.

The work to be performed under this Item shall consist of the supply, mixing, placement, finishing, and curing of Ultra-High Performance Concrete. Ultra-High Performance Concrete shall be used for the Next-D closure pours and shall attain a minimum compressive strength of 4000 psi prior to introducing loads to the concrete with a minimum curing time of 7 days.

The Contractor shall submit a plan stipulating their intended prequalified concrete producer and the proposed testing plan to verify that the strength gain will be adequate for this project and meet their schedule of operations.

A placement and curing procedure shall be submitted to MassDOT for approval, a minimum of 30 Days in advance of the first placement for all applications. It is anticipated the placement and curing procedure will include continuous curing, using a liquid membrane forming compound, until such time as the concrete cylinder breaks demonstrate that the concrete has achieved required strength prior to introducing any loads and shall be the same procedure used in preparing the test samples for approval of the mix design for use on this project.

ITEM 995.01 (Continued)

RAPID HARDENING LOW PERMEABILITY CEMENT CONCRETE

The work to be done under this heading shall conform to the relevant provisions of Subsection 901 of the Standard Specifications and the following.

Prior to production, the Volumetric Concrete Mixer used for the production of the rapid hardening low permeability cement concrete and mix design formulation shall be listed on the MassDOT Qualified Construction Materials List (QCML).

The work to be performed under this Item shall consist of the supply, mixing, placement, finishing, and curing of rapid hardening low permeability cement concrete. Substructure closure pours shall attain a minimum compressive strength of 5000 psi prior to introducing loads to the concrete and/or opening the bridge to traffic with a minimum curing time of 4 hours.

The Contractor shall submit a plan stipulating their intended prequalified concrete producer and the proposed testing plan to verify that the strength gain will be adequate for this project and meet their schedule of operations.

A placement and curing procedure shall be submitted to MassDOT for approval, a minimum of 30 Days in advance of the first placement for all applications. It is anticipated the placement and curing procedure will include continuous curing, using a liquid membrane forming compound, until such time as the concrete cylinder breaks demonstrate that the concrete has achieved required strength prior to introducing any loads and shall be the same procedure used in preparing the test samples for approval of the mix design for use on this project.

MIX DESIGN AND TRIAL BATCH REQUIREMENTS

Research & Materials Section personnel will witness calibration or verification of equipment and prequalification sampling and testing of concrete ingredients performed for each Volumetric Concrete Mixer. Prequalification of each Volumetric Concrete Mixer will be issued on an annual basis by the Research & Materials Section. Concrete mix design and trial batches shall be preapproved by the Research & Materials Section annually.

The Contractor shall formulate a design mix on the RMS 043 Cement Concrete Mix Design Sheet, based upon performing trial mixes and testing witnessed by District and Research and Materials personnel, and submit it along with data sheets to the MassDOT Research and Materials Section for approval. The coarse and fine aggregate incorporated into the mix design formulation shall be non-reactive to alkali silica reaction (ASR).

Modifications to the cement concrete mix design provided above must be submitted to MassDOT for approval a minimum of 60 calendar days prior to the start of use on the project. The mix design shall be submitted to the Engineer and a trial batch shall be performed. The trial batch shall take place at a location approved by the Engineer and performed in the presence of MassDOT personnel.

ITEM 995.01 (Continued)

Testing for the performance criteria shown below, shall be performed by an AASHTO accredited laboratory. The Contractor shall furnish the services of an ACI certified Field Concrete Technician to perform slump, air, and temperature test, as well as cast Field cured and Standard cured cylinders to be tested at MassDOT's Testing Facilities as directed by MassDOT. MassDOT shall be notified at least 48 hours prior to the test batching and shall also be present to witness the testing. Trial batch testing shall be witnessed by MassDOT personnel.

Trial Batch Performance Criteria

Property	Method	Quality Characteristics		Criteria
Uniformity	T 119	Slump (in.)		8 ± 1
Workability	T 119	Segregation Resistance[1]		No Segregation
Thermal	T 309	Concrete Temperature (°F)		50 – 90
Strength	T 22	Compressive Strength (psi)	2 Hours[2]	≥ 2500[2]
			4 Hours	≥ 2500
		Three (3) 4 x 8 in. cylinders per duration	6 Hours	–
			24 Hours	–
			7 Days	≥ 5000
			28 Days	≥ 7000
	T 97	Flexural Strength (psi)[3]	2 Hours[4]	–
			4 Hours	–
		Two (2) beams per duration	6 Hours	–
			24 Hours	–
			7 Days	≥ 600
			28 Days	–
	C882	Bond Strength (psi)[5]	2 Hours[6]	–
			4 Hours	–
			6 Hours	–
			24 Hours	≥ 1200
			7 Days	≥ 1900
			28 Days	≥ 2200
Setting	T 197	Time of Initial Set (minutes)[7]		30
		Time of Final Set (minutes)[7]		40
Durability	T 121 T 152 T 196	Air Content (%)		5.0 ± 2.0
	T 358	Chloride Ion Penetration Resistance: Surface Resistivity (kΩ-cm)	28 Days	≥ 21
	T 161 (A)	Freezing and Thawing Resistance: Durability Factor[8]	300 Cycles	≥ 80

ITEM 995.01 (Continued)

Trial Batch Performance Criteria (Continued)

Property	Method	Quality Characteristics		Criteria
	W/CM	Water-Cementitious (W/CM) Ratio		≤ 0.40
Shrinkage	T 160	Unrestrained Volume Change (%)[9]	28 Days	≤ 0.04
	C1581	Restrained Shrinkage[10]	28 Days	No Cracking[11]
	T 363	Restrained Shrinkage Circumferential Residual Stress (psi)[12]	7 Days	σθ(RIC) < 0.6T[13]

[1] Testing for segregation resistance shall be performed while the concrete is being discharged and during AASHTO T 119 Standard Method of Test for Slump of Hydraulic Cement Concrete. Visual signs of segregation include coarse particles advancing in front of or behind the fine particles and mortar and a tendency for coarse aggregate to separate from the mortar, particularly when the mixture is being consolidated.
[2] Cement Concrete Producer may elect to test for compressive strength at 2 hour duration to determine if 2500 psi is attained earlier than the 4 hour criteria.
[3] If Cement Concrete Producer elects to test for compressive strength at 2 hour duration, flexural strength testing shall be conducted.
[4] If Cement Concrete Producer elects to test for compressive strength at 2 hour duration, bond strength testing shall be conducted.
[5] For applications where the concrete is subject to flexural stresses.
[6] For applications where bond strength is desired.
[7] Test result shall be within close conformity to the criteria identified.
[8] Freezing and thawing cycles shall be conducted per MassDOT cycling procedures and parameters.
[9] For applications where the concrete is not subject to restraining stresses.
[10] For mix designs with nominal maximum aggregate size less than or equal to 1/2 in and for applications where the concrete is subject to restraining stresses.
[11] Cracking is defined as the sudden decrease in compressive strain greater than 30 με.
[12] For any nominal maximum aggregate size and for applications where the concrete is subject to restraining stresses. The circumferential residual stress in the specimen at the inner face of the specimen (óè(RIC)) shall be calculated according to AASHTO T 363.
[13] The splitting tensile strength (T) at 28 days shall be determined by AASHTO T 198 Standard Method of Test for Splitting Tensile Strength of Cylindrical Concrete Specimens.

ITEM 995.01 (Continued)

MASSDOT ACCEPTANCE PRODUCTION SAMPLING, TESTING, AND INSPECTION

Acceptance tests will be performed by MassDOT on field cured cylinders. The timing of this acceptance testing will be in conformance with the approved QC Plan and Assembly Plan. The Contractor will be notified of any Acceptance tests that do not meet the requirements. The Contractor will be required to develop a contingency corrective action plan if the final compressive strength is not achieved. Acceptance of the concrete compressive strength will be based on the field cured cylinders achieving minimum criteria identified in the table below as cast and tested by MassDOT.

At least seven (7) days prior to the scheduled start of production, the Contractor shall contact the MassDOT Research and Materials Section (RMS) to provide notice of the scheduled production start date. The Producer shall grant access to all required areas of the Producers's facility to the MassDOT Inspector, during the hours of production. Production without MassDOT Inspector access to required areas is prohibited and will result in the rejection of the produced concrete.

No concrete shall be placed until MassDOT approves all aspects of the proposed placement. Modifications must be submitted in writing to MassDOT for approval.

MassDOT Acceptance Criteria

Property	Method	Quality Characteristics		Criteria
Uniformity	T 119	Slump (in.)		8 ± 1
Workability	T 119	Segregation Resistance		No Segregation
Thermal	T 309	Concrete Temperature (°F)		50 – 90
Strength	T 22	Compressive Strength (psi) Three (3) 4 x 8 in. cylinders per duration	4 Hours	≥ 2500
			7 Days	≥ 5000
			28 Days	≥ 7000
Durability	T 121 T 152 T 196	Air Content (%)		5.0 ± 2.0
	T 358	Chloride Ion Penetration Resistance: Surface Resistivity (kΩ-cm)	28 Days	≥ 21
	W/CM	Water-Cementitious (W/CM) Ratio		≤ 0.40

CONTRACTOR QUALITY CONTROL PRODUCTION SAMPLING, TESTING, AND INSPECTION

The Contractor shall engage an AASHTO Accredited Laboratory to provide testing of the field cured cylinders during construction. All personnel performing QC tests shall be qualified NETTCP Concrete Technicians and certified ACI Concrete Laboratory and Concrete Strength Technicians. The testing of the cylinders performed by the Contactor retained technician will be at an interval determined by the Contractor and in conformance with the approved Assembly Plan.

ITEM 995.01 (Continued)

At a minimum, the Contractor is required to perform testing for verification of design strength to permit loads to be applied according to the table below. Field cured cylinders (4" X 8" cylinders) will be made from concrete taken from each concrete truck. The Contractor shall fabricate the required cylinders from each truck used, to allow multiple tests to verify field concrete strength. MassDOT shall be allowed to witness the test and comment on all the tests performed by the Contractor. The Contractor shall not apply loads to the concrete without prior approval from MassDOT. Note the Contractor may choose to fabricate additional cylinders for their use.

All testing and equipment shall conform to AASHTO T22, and the making and curing of concrete cylinders shall conform to AASHTO T23. All costs associated with the testing, personnel, equipment calibration and verification to demonstrate the field concrete strength shall be incidental to the Work.

Air content results not meeting the criteria below will result in the rejection of the concrete and the volumetric mixer until the non-conforming air content is resolved.

Contractor Quality Control Criteria

Property	Method	Quality Characteristics		Criteria
Uniformity	T 119	Slump (in.)		8 ± 1
	T 121	Unit Weight (lbs / ft^3)		–
Workability	T 119	Segregation Resistance		No Segregation
Thermal	T 309	Concrete Temperature (°F)		50 – 90
Strength	T 22	Compressive Strength (psi) Three (3) 4 x 8 in. cylinders per duration	2 Hours	≥ 1500
			4 Hours	≥ 2500
			6 Hours *if necessary*	≥ 2500
Durability	T 121 T 152 T 196	Air Content (%)		5.0 ± 2.0
	W/CM	Water-Cementitious (W/CM) Ratio		≤ 0.40

CLOSURE POUR QC PLAN

A Closure Pour Quality Control Plan (QC Plan) shall be prepared and submitted to MassDOT for approval a minimum of (60) days prior to the planned start of precast element placement in the field. The plan submitted shall account for all the closure pours that will be cast during the specific phase of the construction.

The Closure Pour QC Plan shall use the MassDOT QC Plan format. Split sample correlation for strength will be required before any loads are applied.

The QC sampling and testing frequencies specified in the Closure Pour QC Plan shall be no less than the frequencies specified in the Department's material sampling ledger.

Inspection Attributes shall be identified and inspection Lot and Sublot sizes shall be established for each Inspection Attribute. The minimum Attributes to be inspected for QC shall be in accordance with the MassDOT Standard Specifications for Highways and Bridges, 2026 Edition and shall address the following four primary inspection components:

ITEM 995.01 (Continued)

- Equipment
- Materials
- Environmental Conditions
- Workmanship

Standard QC Report Forms and Record Books shall be established for inspection, sampling, and testing of all Work Items. NETTCP standard Test Report Forms (TRFs) and Inspection Report Forms (IRFs) shall be used to document all QC inspection, sampling, and testing results. Where NETTCP TRFs or IRFs do not currently exist, the Contractor shall develop and use their own forms to address such testing or inspection.

All laboratories performing QC testing of Project Produced Materials shall be qualified through either the AASHTO Accreditation Program (AAP) or NETTCP Laboratory Certification Program.

All QC personnel identified in the Closure Pour QC Plan shall have both the appropriate ACIand NETTCP certifications, which shall be described in the QC Plan and shall be subject to MassDOT approval. The QC Plan Manager shall be NETTCP certified as a QA Technologist.

SURFACE PREPARATION

The new precast concrete surfaces to be in contact with the proposed closure concrete must be free of materials such as paint, oil, curing compound, bond breaker, etc. that will inhibit bonding. Reinforcing steel shall be cleaned as directed, and any damaged epoxy coating of steel reinforcement shall be repaired as directed.

The new precast concrete surfaces must be saturated prior to concrete placement using potable water. Standing water shall be removed from surfaces to achieve a Saturated Surface Dry (SSD) condition.

MIXING

Cement concrete mixes shall be batched onsite using MassDOT approved, described hereinafter, Volumetric Concrete mixing equipment. As part of the Work Plan the Contractor shall submit for approval a contingency plan to address mixing equipment failure.

It is critical that the water-cementitious ratio is carefully monitored during production to ensure that is does not exceed the values from the approved mix design. Exceeding this value is ground for rejection.

Materials shall be delivered to jobsite, or the supplier’s facility, in original, unopened, undamaged containers that clearly show the manufacturer’s name, product name, and batch number and be subject to inspection by MassDOT. The supplier shall give sufficient notice to permit MassDOT to schedule an inspection if they so choose. Material shall be stored in a dry area off the ground protected from rain, snow, and other sources of moisture. Material shall be protected from temperature extremes. Bulk sand and coarse aggregate shall be stored in a well-drained area on a clean, solid surface and materials shall be covered to prevent contamination with foreign matter. Trucks shall be empty and only charged with materials after MassDOT verification.

ITEM 995.01 (Continued)

VOLUMETRIC CONCRETE MIXER

The MassDOT Highway Division will only permit the use of Volumetric Concrete Mixers when all of the following procedures are adhered to.

Upon written request by the Contractor, the Deputy Chief Engineer for Construction may approve the use of concrete proportioned by a Volumetric Concrete Mixer used for the purpose of mixing rapid hardening low permeability concrete.

All cement concrete materials, concrete handling, placement, protection, curing, and finishing requirements of the Standard Specifications for Highways and Bridges shall apply. MassDOT approved Volumetric Concrete Mixers will be listed on the Pre-Qualified Material Producers List (with serial number) and shall meet all the requirements of ASTM C685 and be currently registered with the Volumetric Mixer Manufacturers Bureau (VMMB).

Each Volumetric Concrete Mixer used on MassDOT Highway Division projects shall be pre-qualified as follows. All Volumetric Concrete Mixers are required to have a Quality System Manual (QSM) that conforms to the format outlined in AASHTO R-38 and that adequately addresses the information specified in AASHTO R-38. Volumetric Concrete Mixers must have their QSM approved by the Research & Materials Section prior to use and changes made to the QSM shall be approved annually. A copy of the approved QSM shall be kept with the Volumetric Concrete Mixer and made available to MassDOT upon request. The Quality Control procedures for concrete production contained in the approved QSM shall be adhered to for all placements.

The concrete mixing and delivery equipment shall be capable of mixing and delivering concrete to the placement location at rates that are sufficient to comply with the project's restrictive time constraints. Cement concrete shall be proportioned and mixed using self-contained, mobile, and continuously mixing equipment that meets the following requirements:

1. Use a self-propelled mixer that can carry sufficient unmixed dry, bulk cement, sand, coarse aggregate, and water to produce at least 6 cubic yards of concrete on site.
2. Use a mixer that is capable of positive measurement of cement introduced into the mix as well as fine and coarse aggregate. Use a recording meter that is visible at all times and equipped with a ticket printout to indicate the quantity of cement and aggregate materials.
3. Calibrate the mixers to accurately proportion the specified mix. Prior to placing concrete, perform calibration and yield tests under MassDOT's supervision in accordance with the Department's written instructions. Copies of these written instructions are available from the Research & Materials Unit. Perform the calibration and yield tests using the material to be used on the project. Recalibrate the mixer after any major maintenance operation, on the mixer, anytime the source of materials changes, or as directed. Furnish all materials and equipment necessary to perform the calibrations and yield tests.
4. Use a mixer that controls the flow of water into the mix. Measure the flow rate of water with a calibrated flowmeter coordinated with both the cement and aggregate feeding mechanisms and the mixer. Adjust the flow rate, as necessary, to control the slump and ensure that the water- cement ratios are met. In addition to flowmeters, use mixers with accumulative water meters capable of indicating the number of gallons, to the nearest 0.1 gallon, introduced into the mixer. Filter water with a suitable mesh filter before it flows through the accumulative water meters.

ITEM 995.01 (Continued)

5. Use a mixer that has a minimum of two liquid admixture dispensers and is capable of dispensing the admixtures through a controlled flow meter in accordance with ASTM C685.
6. Calibrate the mixer to automatically proportion and blend all components of the indicated composition on a continuous or intermittent basis as the finishing operation requires. Provide a mixer that discharges mixed material through a Volumetric mixer discharge chute and is capable of spraying water over the placement width as it moves ahead to ensure the concrete surfaces which will be cast against are wet prior to receiving the concrete.
7. Mount a tachometer on the unit to indicate the drive shaft speed.
8. For any project where a Volumetric Concrete Mixer is proposed to be used, the Contractor must prepare and submit a project-specific construction Quality Control Plan (QC Plan). The QC Plan shall conform to the format and content detailed in the Northeast Transportation Training and Certification Program (NETTCP) Model QC Plan (December 2009, or latest edition.

Information contained in relevant sections of the approved QSM for the proposed Volumetric Concrete Mixer may be referenced, rather than repeated, in applicable sections of the QC Plan (e.g. Materials Control, Production Facilities.) The QC Plan shall be submitted to MassDOT a minimum of 60 days prior to proposed placement of concrete by Volumetric Concrete Mixer. The District Construction Engineer and the Research & Materials Section will review the QC Plan. The Contractor shall not place any concrete by Volumetric Concrete Mixer prior to approval by the Research & Materials Section.

A signed batch ticket printout from the printer mounted on the Volumetric Concrete Mixer truck indicating that the mix batched is in conformance with the mix design previously approved shall also be provided to MassDOT prior to discharging concrete. The batch ticket shall record the actual water/cement ratio.

Quality Control inspection, sampling, and testing, including but not limited to air content, slump, temperature, and cylinders for compressive strength, shall be performed by the Contractor in accordance with the approved QC Plan. MassDOT will perform Acceptance sampling (every 50 cubic yards per day per approved truck) and testing for field cured cylinders as well as Acceptance inspection for materials and workmanship attributes.

The use of Volumetric Concrete Mixers cannot be used when the ambient temperature is expected to drop below 40° F within 7 days prior to the anticipated concrete placement. MassDOT may suspend or revoke approval of the Volumetric Concrete Mixer at any time the unit fails to produce uniformly mixed concrete within the quality limits specified.

Material to be mixed should have a temperature of about 70˚F. Warmer material will set faster than expected and cooler material will have slower strength gain. The temperature of the mixed concrete shall be controlled by protecting the cement, fine and coarse aggregate, and mixing water from temperature extremes and/or by heating the mixing water.

ITEM 995.01 (Continued)

The coarse aggregate shall be placed in the mixer followed by the mixing water, then the cement. The use of blended cements with fly ash content less than 15% shall not be permitted. The components shall then be mixed for 2 to 3 minutes to achieve a uniform lump-free consistency. Admixtures not included as part of the approved mix design shall not be added without the approval of MassDOT. The concrete shall not be re-tempered. The concrete mixing and delivery equipment shall be capable of mixing and delivering concrete to the placement location at rates that are sufficient to avoid horizontal cold joints between successive placements.

An approved retarding admixture may be used to extend the setting time of the concrete when so directed by MassDOT at dosage rates recommended by the cement concrete material manufacturer. Retarding admixture proposed for use must be approved by MassDOT. Only those products previously approved for the purpose intended herein and listed on the Qualified Construction Materials List maintained by the MassDOT Research and Materials Section may be used.

PLACEMENT AND FINISHING

The substructure closure pour concrete shall be placed immediately after mixing onto substrates that are Saturated Surface Dry (SSD) and shall be worked firmly into sides and bottom of the closure pour to achieve good bond. The manufacturer's limitations on minimum surface and ambient temperatures shall be complied with if different from above. The concrete placement shall start at one edge of the placement and shall continue full depth with temporary vertical bulkheads, if needed, to ensure that horizontal cold joints do not occur between successive concrete placements. It is critical that the concrete be placed and finished as rapidly as possible as the concrete will typically lose all slump within 10 minutes of mixing.

Surfaces that are adjacent to the placement shall be protected with drop cloths, waterproof paper, or other means to maintain them free of material splashes, water, and debris.

LIQUID MEMBRANE-FORMING COMPOUNDS FOR CURING

Liquid membrane-forming compounds for curing shall meet ASTM C309, Type 2 (white pigmented), Class B (ASTM D883 resin based non wax) and the Manufacturer's instructions and recommendations, and the requirements specified herein.

Compounds shall form a continuous, non-yellowing, and durable film with quality moisture-retention properties. Compounds shall maintain the relative humidity of the concrete surface above 80% for seven days to sustain cement hydration. Compounds shall not affect the original color of the concrete surface. Compounds shall not degrade due to exposure to ultraviolet light from direct sunlight. Compounds shall meet the local and federal allowable Volatile Organic Compound (VOC) content limits.

White-pigmented compounds shall be agitated in the container prior to application to prevent pigment from settling out resulting in non-uniform overage and ineffective curing.

ITEM 995.01 (Continued)

Careful considerations shall be made by the Contractor to determine if the evaporation rate is exceeding the rate of bleeding, thus causing the surface to appear dry even though bleeding is still occurring. To diagnose and prevent this condition, the Contractor may place a transparent plastic sheet over a test area of the uncured and unfinished concrete surface and shall determine if any bleed water accumulates under the plastic. Under such conditions, the application of liquid membrane-forming compounds to the concrete surface shall be delayed to prevent bleed water from being sealed below the concrete surface, map cracking of the membrane films, reduction in moisture-retention capability, and the need for reapplication of the compound.
Prior to use, compounds shall be thoroughly mixed, stirred, and agitated per the Manufacturer's instructions and recommendations.

Compounds shall be applied continuously and uniformly to the surface of the concrete per the Manufacturer's instructions and recommendations. Compounds shall be applied immediately after the disappearance of the surface water sheen following final finishing. Applicating of the compound immediately after final finishing and before all free water on the surface has evaporated will help prevent the formation of cracks. When using compounds to reduce moisture loss from formed surfaces, the exposed surface shall be wetted immediately after form removal and kept moist until the curing compound is applied. The concrete shall be allowed to reach a uniformly damp appearance with no free water on the surface, and then application of the compound shall begin at once. Delayed application will result in surface drying, absorption of the compound into the concrete, and no forming of a continuous membrane.

The concrete surface shall be damp when the compound is applied. Spray nozzles recommended by the compound Manufacturer and use of windshields shall be arranged by the Contractor to prevent wind- blown loss of compound and to ensure proper coverage application rates are achieved. The compound shall be applied by power sprayer, using appropriate wands and nozzles with pressures between 25 and 100 psi. The Contractor shall fill the power sprayer with curing compound from the Manufacturer's original container in the presence of the Engineer. Any dilution as recommended by the Manufacturer shall take place in the presence of the Engineer. For very small areas such as repairs, the compound shall be applied with a wide, soft-bristled brush or paint roller.

The Contractor shall verify the application rate and procedures are in accordance with the Manufacturer's instructions and recommendations. At least one uniform coat shall be applied at a rate of 150 to 200 ft2/gallon. If two coats are necessary to ensure complete coverage, for effective protection the second coat should be applied at right angles to the first. Complete coverage of the surface shall be attained due to the potential for formation of small pinholes in the membrane, which will result in loss of moisture from the concrete. Compounds shall not sag, run off peaks, or collect in grooves.

ITEM 995.01 (Continued)

Compounds and procedures shall be compatible with concrete surfaces receiving subsequent applications or placements of concrete, overlays, coatings, paints, sealers, finishes or other toppings to ensure acceptable bonding to the concrete. Testing to establish compatibility among the curing compound, subsequent surface treatments, concrete moisture content and the actual finished surface texture of the concrete shall be conducted when compatibility is not known. The compound Manufacturer shall be consulted by the Contractor to determine the compatibility of the application. Compounds shall not be applied to concrete surfaces where bonding of subsequent applications or placements is incompatible or is of concern. The use of wax-based curing compounds shall be prohibited.

CLEAN UP

The mixer shall be cleaned immediately after use or add mix water and begin mixing immediately for the next batch. Buildup of hardened concrete in the mixer shall not be allowed since this creates inefficient mixing and the heat generated accelerates later batches.

PRECAST CONCRETE ABUTMENT STEMS, ABUTMENT FOOTINGS, WINGWALL STEMS, WINGWALL FOOTINGS, APPROACH SLABS, HIGHWAY GUARDRAIL TRANSITION AND BASES

General.

The work under this Heading consists of fabricating, transporting and installing precast concrete abutment stems, abutment footings, wingwall stems, wingwall footings, approach slabs, and highway guardrail transitions and bases and includes all necessary labor, materials, and equipment to complete the work as shown on the Plans. The Precast Concrete Bridge Elements shall meet the requirements of Section M4: Cement Concrete and Related Materials. Precast concrete shall be 5000 psi HP concrete.

MATERIALS

Materials.

Materials shall conform to M4.09.1 and the following:

Non-Shrink Grout Products	M4.04.5
Controlled Low-Strength Material – Structural Non-Excavatable	M4.08.0
Welded Steel Wire Fabric	M8.01.2
Mechanical Reinforcing Bar Splicer	M8.01.9
Lifting Devices	PCI MNL-116
Corrugated Metal Pipe	AASHTO M 36

1. **Vertical Adjustment Assembly.**

Vertical Adjustment Assembly details and material requirements shall be as shown on the plans. Alternate devices may be used provided that they are adjustable and can support the anticipated loads. The design of the leveling devices, with necessary calculations, shall be submitted to the Engineer of Record for approval.

ITEM 995.01 (Continued)

1. **Threaded Inserts.**

Threaded inserts are permissible to facilitate forming the keyway pours. Threaded inserts shall be hot dip galvanized or made of stainless steel. The number of threaded inserts shall be minimized, and the inserts shall not come in contact with the reinforcing steel.

2. **Corrugated Metal Pipe.**

Corrugated Metal Pipe to be used for forming voids as specified on the plans shall be fabricated from steel and shall have a protective metallic coating of zinc (galvanizing).

CONSTRUCTION METHODS – PLANT FABRICATION

1. Pre-Production Meeting.

The Contractor shall notify the MassDOT Research and Materials Section to determine if a pre-production meeting will be required to review the specification, shop drawings, curing plan, schedule, and discuss any specific requirements. The meeting shall be held prior to scheduling a MassDOT Inspector (refer to M4.09.4 *Department Acceptance*), and at least seven (7) days prior to the scheduled casting of any Precast Concrete Bridge Element or control section. The Contractor shall schedule the meeting, which shall include representatives of the Fabricator and MassDOT.

Reinforcement.

The reinforcing bars shall be installed in accordance with Subsection 901.35, including tolerances for cover and horizontal spacing of bars. Components of mechanical reinforcing bar splicers shall be set with the tolerances shown on the plans. The reinforcing bars and mechanical reinforcing bar splicers shall be assembled into a rigid cage that will maintain its shape in the form and which will not allow individual reinforcing bars to move during the placement of concrete. This cage shall be secured in the form so that the clearances to all faces of the concrete, as shown on the plans, shall be maintained.

Where reinforcing bars are to protrude from one Precast Concrete Bridge Element in order to mate with reinforcing bar splicers in a second precast concrete element, the fabricator shall set the reinforcing bars and the reinforcing bar splicers with a template in order to ensure proper fit up within the tolerances specified on the plans.

Tolerances.

Fabrication shall comply with tolerances specified on the plans. Tolerances for steel reinforcement placement shall be in accordance with Subsection 901.35. In the absence of specifications on the plans, tolerances shall comply with the latest version of the PCI MNL 135, Precast Tolerance Manual.

ITEM 995.01 (Continued)

Forms.

Concrete shall be cast in rigidly constructed forms, which will maintain the Precast Concrete Bridge Elements within specified tolerances to the shapes, lines and dimensions shown on the approved fabrication drawings. Forms shall be constructed from flat, smooth, non-absorbent material and shall be sufficiently tight to prevent the leakage of the plastic concrete. When wood forms are used, all faces in contact with the concrete shall be laminated or coated with a non-absorbent material. All worn or damaged forms, which cause irregularities on the concrete surface or damage to the concrete during form removal, shall be repaired or replaced before being reused. If threaded inserts are cast into the elements for support of formwork, the inserts shall be recessed a minimum of 1 inch and shall be plugged after use with a grout of the same color as that of the precast cement concrete.

CONSTRUCTION METHODS – FIELD CONSTRUCTION

1. General.

All of the Contractor's field personnel involved in the erection and assembly of the Precast Concrete Bridge Elements shall have knowledge of and follow the approved Erection Procedure and Quality Control Plan for Precast Concrete Bridge Element Assembly. The Erection Procedure and Quality Control Plan for the Precast Concrete Bridge Element Assembly submittal will need to be submitted shortly after receiving notice to proceed in order to prevent delay in approval from the railroad.

Prior to installation, the following documentation shall be reviewed and confirmed by the MassDOT Resident Engineer or designee:

(a) QC Compressive Strength Test Report Forms attaining Design Strength, f'c for the Precast Concrete Bridge Element's representative sublot.
(b) Certificate of Compliance generated by the Fabricator as described under the Fabricator Quality Control section.
(c) QC Inspection Reports signed by the Quality Control Manager.

Field construction staff shall verify that the Resident Engineer has accepted all Precast Concrete Bridge Elements prior to installation.

2. Procedure and Quality Control Plan for Precast Concrete Bridge Element Assembly.

Prior to the erection, the Contractor shall submit an Erection Procedure and a Quality Control Plan for Precast Concrete Bridge Element Assembly for approval by the Engineer. This submittal shall include computations and drawings for the transport, hoisting, erection and handling of the Precast Concrete Bridge Elements. The Erection Procedure and Quality Control Plan for Precast Concrete Bridge Element Assembly shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts with working knowledge of the Contractor's equipment, approved shop drawings, and materials to build the bridge. The Erection Procedure and Quality Control Plan for Precast Concrete Bridge Element Assembly shall, at a minimum, include the following:

ITEM 995.01 (Continued)

1. **Erection Procedure**

The Erection Procedure shall be prepared to conform to the requirements of 960.61, Design, Fabrication and Erection and the applicable sections in Chapter 8 of the PCI Design Handbook (eighth edition) for handling, erection, and bracing requirements. At a minimum, the Erection Procedure shall provide:

(a) Minimum concrete compressive strength for handling the Precast Concrete Bridge Elements.
(b) Concrete stresses during handling, transport, and erection.
(c) Crane capacities, pick radii, sling geometry, and lifting hardware. Crane capacities will need to meet requirements P&W Railroad in addition to MassDOT Bridge Manual. Erection procedures must be approved by P&W Railroad.
(d) Verification that the equipment can handle all pick loads and weights with the required factor of safety.
(e) Evaluation of construction sequence and evaluation of any geometric conflicts in the lifting of the Precast Concrete Bridge Elements and setting them as shown on the plans.
(f) Design of crane supports including verification of subgrade for support.
(g) Location and design of all temporary bracing that will be required during erection.

Non-shrink grout and concrete materials, approved by the Engineer, shall be placed as shown on the plans. Fill joints, keyways, and voids, in strict accordance with the specifications and manufacturer's recommendations and instructions.

For footings, approach slabs and highway guardrail transitions, once these Precast Concrete Bridge Elements have been set to the correct horizontal and vertical alignment, the void between them and the supporting soil shall be filled with Controlled Low-Strength Material – Structural Non-Excavatable to the limits as shown on the plans. Add additional grout ports in the footings to facilitate the bedding process if required.

Except in approach slabs, joints shall be filled flush to the top with non-shrink grout, and any vertical misalignment between adjacent elements shall be feathered out on a slope of 1 to 12.

Curing of grout or concrete shall be performed in strict accordance with the specifications and manufacturer's recommendations. Filling shall not be completed in cold weather when either the ambient temperature or the precast member's temperature is below the manufacturer's recommendation. No localized heating of either the precast members or of the air surrounding the element will be permitted in an attempt to reach application temperatures.

If the joints or voids are not filled within five days after the Precast Bridge Elements are erected, the Contractor shall cover and protect the openings from weather and debris until they are filled.

ITEM 995.01 (Continued)

2. **Quality Control Plan for Precast Concrete Bridge Element Assembly**

The Quality Control Plan for Precast Concrete Bridge Element Assembly is a document prepared and submitted by the Contractor prior to the start of work which requires the Contractor to identify and detail the sequence of construction in accordance with the project schedule and which clearly identifies all stages of field construction. The assembly procedures for the Precast Concrete Bridge Elements shall be submitted in PDF format on 24"x36" sheets. This document will be treated as a Construction Procedure and will be reviewed by both the Designer and the District Construction Office. The approval of this document will serve as a guideline for setting interim concrete and grout strengths and curing procedures to allow construction to proceed without waiting for the final in-service strengths to be achieved.

The following list details the minimum criteria that should be included in the Quality Control Plan for Precast Concrete Bridge Element Assembly:

(a) A detailed schedule showing the sequence of operations that the Contractor will follow. The schedule shall include a timeline for installation of all major elements of the bridge accounting for the installation of temporary works and cure times of grouts or closure pour concrete and other selected materials.
(b) Calculations that support the schedule outlined above should be included verifying that the selected materials have adequate interim strength to proceed from one step to another. Final material strengths are not normally required until the bridge is opened to vehicular traffic. The minimum factor of safety of two (2) will be required for the interim strength of grouts and closure pour concrete before construction is allowed to proceed to subsequent steps. The factor of safety is applied to the service loads that are supported by the elements and materials during various stages of construction. For example, if the Contractor calculates that the grout between the precast pier cap and pier wall requires a strength of 100 psi to support the dead load of the beams in the next step, a cylinder break of 200 psi will be required prior to allowing the pier cap to be loaded with the beams. The required strength of materials for subsequent construction stages shall also be calculated and the material strength verified.
(c) The Contractor is responsible for determining the center of gravity for all elements. Special care shall be used for unusual elements that are not symmetric. These elements may require special lifting hardware to allow for installation in a plumb or flat position.
(d) Plan of the work area, depicting items such as temporary earth support, utilities within the immediate vicinity of the work, drainage structures, etc. The Contractor shall coordinate the various subcontractors that will need to occupy the same area and shall ensure that there are no conflicts. For example, if the Contractor is having different Subcontractors prepare and submit plans for temporary earth support and demolition, and the earth support is required to be installed prior to the demolition, it shall be the Contractor's responsibility to ensure that the Quality Control Plan for Precast Concrete Bridge Element Assembly submission allows both operations to be performed without field modification.
(e) Details of all equipment that shall be employed for the construction of the bridge.
(f) Methods of providing temporary support of the elements. Include methods of adjusting and securing the element after placement.
(g) Vertical Adjustment Assemblies to be used as a means of setting precast concrete footings to the correct elevations.

ITEM 995.01 (Continued)

(h) Procedures for controlling the overall horizontal dimensions and the vertical elevations as each precast concrete bridge element is erected by using the tolerance limits of the joints as detailed on the plans.
(i) Methods for curing grout.
(j) Proposed methods for installing non-shrink grout and the sequence and equipment for the grouting operation.
(k) Methods for sealing the keyways in preparation for filling with non-shrink grout, including the use of backer rods. The Contractor shall not assume that the backer rods will restrain the pressure from the grout in vertical grout joints. Provide additional forming to retain the backer rod.

3. Survey and Layout.

Working points, working lines, and benchmark elevations shall be established prior to placement of all elements. The Contractor is responsible for field survey as necessary to complete the work. MassDOT reserves the right to perform additional independent survey. If discrepancies are found, the Contractor may be required to verify previous survey data.

4. Preparation of Closure Pours and Grouted Keyways.

Immediately prior to erecting the Precast Concrete Bridge Elements, the closure pours and grouted keyways shall be cleaned at the job site of all dust, dirt, carbonation, laitance, and other potentially detrimental materials which may interfere with the bonding of the closure pour concrete or grout and precast concrete using a high-pressure water blast. Any exposed reinforcing steel in the precast concrete shall be protected from damage during the cleaning of the keyways. Damaged epoxy coating of steel reinforcement shall be repaired, and the reinforcing steel shall be cleaned as directed by the Engineer. The surfaces of the closure pours and grouted keyways shall be wetted so that the surfaces shall have a Saturated Surface Dry (SSD) condition for at least 24 hours prior to the placement of the closure pour concrete.

5. Erection.

The elements shall be placed in the sequence and according to the methods outlined in the Erection Procedure and Quality Control Plan for Precast Concrete Bridge Element Assembly. As the erection proceeds, the Contractor shall constantly monitor the assembly to ensure that the precast concrete bridge element is within proper horizontal and vertical location and tolerances prior to releasing it from the crane and setting the next unit. The Contractor may use shims to maintain proper setting tolerances.

The concrete elements shall be lifted only by the lifting devices, and the utmost care shall be taken to prevent distortion of the elements during handling, transportation or storage.

This approval will be contingent on the Contractor demonstrating by calculations, prepared by a Professional Engineer registered in Massachusetts, that the elements will not be damaged by the non-vertical lifting force and by documentation that the capacity of the lifting devices is adequate for the non-vertical lifting force.

After all Precast Concrete Bridge Elements have been placed, the actual overall dimensions of the structure both horizontal and vertical, as laid out shall not deviate from the nominal dimensions shown on the plans beyond a tolerance of +0 inches and -1 inches. Once the layout of Precast Concrete Bridge Elements has been accepted by the Engineer, the Contractor shall cut all lifting devices off below the surfaces of the elements.

ITEM 995.01 (Continued)

F. Filling of Blockouts for Lifting Devices and Threaded inserts.

If the blockouts in the Precast Concrete Bridge Elements where the lifting devices were located will be exposed and visible after assembly is complete, the Contractor shall fill these blockouts with Mortar (M4.04.5).

After the formwork has been removed, all threaded inserts that have been cast into the precast concrete bridge deck for support of the formwork shall be filled with a grout of the same color as that of the precast concrete.

PRESTRESSED 32 INCH NEXT D CONCRETE BEAMS

A. General.

The work under this Heading consists of fabricating, transporting and installing prestressed 32 inch NEXT D concrete beams, and includes all necessary labor, materials, and equipment to complete the work as shown on the Plans. The Precast, Prestressed, and Prefabricated Concrete Elements shall meet the requirements of Section M4: Cement Concrete and Related Materials.

MATERIALS

A. Materials.

Materials shall conform to M4.09.1 and the following:

Non-Shrink Grout Products	M4.04.5
Prestressing Strands	AASHTO M 203
Welded Steel Wire Fabric	M8.01.2
Mechanical Reinforcing Bar Splicer	M8.01.9
Strand Chuck	M8.15.0
Lifting Devices	PCI MNL-116

1. Reinforcement and Prestressing Strands.

The size and grade of steel reinforcement and prestressing strands shall be as indicated on the plans. All reinforcing steel shall be epoxy coated, Grade 60. All prestressing strands shall be uncoated.

2. Threaded Inserts

Threaded inserts are permissible in Prestressed Concrete Beams for installing formwork, utility supports, or deck drains. Threaded inserts shall be hot dip galvanized or made of stainless steel and shall not come in contact with the reinforcing steel. The number of threaded inserts installed for the Contractor's convenience shall be kept to a minimum.

ITEM 995.01 (Continued)

CONSTRUCTION METHODS – PLANT FABRICATION

A. Pre-Production Meeting.

The Contractor shall notify the MassDOT Research and Materials Section to determine if a pre-production meeting will be required to review the specification, shop drawings, curing plan, schedule, and discuss any specific requirements. The meeting shall be held prior to scheduling a MassDOT Inspector (refer to M4.09.4 *Department Acceptance*), and at least seven (7) days prior to the scheduled casting of any Prestressed Concrete Beam or control section. The Contractor shall schedule the meeting, which shall include representatives of the Fabricator and MassDOT.

B. Reinforcement.

The reinforcing bars shall be installed in accordance with Subsection 901.35 of the Standard Specifications, including tolerances for cover and horizontal spacing of bars. Components of mechanical reinforcing bar splicers shall be set with the tolerances shown on the plans. The reinforcing bars and mechanical reinforcing bar splicers shall be assembled into a rigid cage that will maintain its shape in the form and which will not allow individual reinforcing bars to move during the placement of concrete. This cage shall be secured in the form so that the clearances to all faces of the concrete, as shown on the plans, shall be maintained.

C. Placing and Tensioning Strands.

Placing and tensioning strands shall be in accordance with PCI MNL-116. The location of all prestressing strands shall be as indicated on the plans.

D. Tolerances.

Fabrication shall comply with tolerances specified on the plans. Tolerances for steel reinforcement placement shall be in accordance with Subsection 901.35. In the absence of specifications on the plans, tolerances shall comply with the latest version of the PCI MNL 135, Precast Tolerance Manual.

E. Forms.

Concrete shall be cast in rigidly constructed forms, which will maintain the Prestressed Concrete Beams within specified tolerances to the shapes, lines and dimensions shown on the approved fabrication drawings. Forms shall be constructed from flat, smooth, non-absorbent material and shall be sufficiently tight to prevent the leakage of the plastic concrete. When wood forms are used, all faces in contact with the concrete shall be laminated or coated with a non-absorbent material. All worn or damaged forms, which cause irregularities on the concrete surface or damage to the concrete during form removal, shall be repaired or replaced before being reused. If threaded inserts are cast into the elements for support of formwork, the inserts shall be recessed a minimum of 1 inch and shall be plugged after use with a grout of the same color as that of the precast cement concrete.

ITEM 995.01 (Continued)

CONSTRUCTION METHODS – FIELD CONSTRUCTION

A. General.

All of the Contractor's field personnel involved in the erection and assembly of the Prestressed Concrete Beams shall have knowledge of and follow the approved Erection Procedure and Quality Control Plan for Prestressed Concrete Beam Assembly.

Prior to installation, the following documentation shall be reviewed and confirmed by the MassDOT Resident Engineer or designee:

(a) QC Compressive Strength Test Report Forms attaining Design Strength, f'_c for the Prestressed Concrete Beam's representative sublot.
(b) Certificate of Compliance generated by the Fabricator as described under the Fabricator Quality Control section.
(c) QC Inspection Reports signed by the Quality Control Manager.

Field construction staff shall verify that the Resident Engineer has accepted all Prestressed Concrete Beams prior to installation.

B. Erection Procedure and Quality Control Plan for Prestressed Concrete Beam Assembly.

Prior to the erection, the Contractor shall submit an Erection Procedure and a Quality Control Plan for Prestressed Concrete Beam Assembly for approval by the Engineer. This submittal shall include computations and drawings for the transport, hoisting, erection and handling of the Prestressed Concrete Beams. The Erection Procedure and Quality Control Plan for Prestressed Concrete Beam Assembly shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts with working knowledge of the Contractor's equipment, approved shop drawings, and materials to build the bridge. The erection plan submittal will need to be submitted shortly after receiving notice to proceed in order to prevent delay in approval from the railroad. The Erection Procedure and Quality Control Plan for Prestressed Concrete Beam Assembly shall, at a minimum, include the following:

1. Erection Procedure

The Erection Procedure shall be prepared to conform to the requirements of 960.61, Design, Fabrication and Erection and the applicable sections in Chapter 8 of the PCI Design Handbook (eighth edition) for handling, erection, and bracing requirements. At a minimum, the Erection Procedure shall provide:

(a) Steel reinforcing details, and location and details of lifting devices
(b) Minimum concrete compressive strength for handling the Prestressed Concrete Beams.
(c) Concrete stresses during handling, transport, and erection.
(d) Crane capacities, pick radii, sling geometry, and lifting hardware.
(e) Verification that the equipment can handle all pick loads and weights with the required factor of safety.
(f) Evaluation of construction sequence and evaluation of any geometric conflicts in the lifting of the Prestressed Concrete Beams and setting them on the abutments and piers.
(g) Design of crane supports including verification of subgrade for support.
(h) Location and design of all temporary bracing that will be required during erection.

ITEM 995.01 (Continued)

2. Quality Control Plan for Prestressed Concrete Beam Assembly

The Quality Control Plan for Prestressed Concrete Beam Assembly is a document prepared and submitted by the Contractor prior to the start of work which requires the Contractor to identify and detail the sequence of construction in accordance with the project schedule and which clearly identifies all stages of field construction. The assembly procedures for the Prestressed Concrete Beams shall be submitted in PDF format on 24"x36" sheets. This document will be treated as a Construction Procedure and will be reviewed by both the Designer and the District Construction Office.

At a minimum, the Quality Control Plan for Prestressed Concrete Beam Assembly shall include the following:

(a) Listing of the equipment, materials, and personnel including their assigned responsibilities that will be used to erect and assemble the Prestressed Concrete Beams on site.
(b) Documentation of all preparatory work necessary for moving personnel, equipment, supplies, and incidentals to the project site before beginning work.

Detailed schedule showing the sequence of operations that the Contractor will follow to complete the field construction from setting working points and working lines to the casting of closure pours and the curing of the closure pour concrete, as described below and as called for on the plans.

(c) Contractor's means for ensuring that the Prestressed Concrete Beam shall align to the roadway profile and cross slope and means for adjusting the final deck slab elevation.
(d) Timeline and descriptions of Quality Control activities to be followed throughout the field construction operations including methods and procedures for controlling tolerance limits both horizontally and vertically.

C. Survey and Layout.

Working points, working lines, and benchmark elevations shall be established prior to placement of all elements. The Contractor is responsible for field survey as necessary to complete the work. MassDOT reserves the right to perform additional independent survey. If discrepancies are found, the Contractor may be required to verify previous survey data.

1. Backwalls, Curtain Walls and Keeper Blocks.

The backwalls, the curtain walls at the abutment bridge seats, and the keeper blocks shall be cast only after the beam layout has been accepted. Closed cell foam shall be attached to the bridge beams to the limits and thickness as shown on the plans and the backwall / curtain wall / keeper block concrete shall be placed directly against it. The sidewalk and safety curb may be cast after the curtain walls and exterior pier keeper blocks have been cast.

ITEM 995.01 (Continued)

A. Prestressed NEXT D beams.

1. Beam Layout and Erection.

Prestressed concrete beams shall be installed to the line and grade shown on the plans in accordance with the Contractor's approved Erection Procedure and Assembly Plan.

Immediately prior to erecting the beams, the surfaces of the closure pours shall be cleaned at the job site of all dust, dirt, and carbonation using a high-pressure water blast. In addition, the surfaces of closure pours shall be wetted so that the surfaces shall have a Saturated Surface Dry (SSD) condition for at least 24 hours prior to the placement of the closure pour concrete.

As the beams are being erected, the Contractor shall monitor the width of the closure pours and the out-to-out width of the beams top flanges so that, after all beams are erected, the actual overall width of the bridge deck shall not deviate from the dimension shown on the plans beyond a tolerance of +0 inches and -1 inches. In order to achieve this, the Contractor may vary the width of the closure pours within the tolerances specified on the plans.

2. Closure Pour Concrete Placement.

Prior to placing the closure pour concrete, the abutments shall be prepared for the placement of the closure pour concrete as called for on the plans.

The surfaces of the closure pours shall be free of materials such as paint, oil, curing compound, bond breaker, dirt etc. that will inhibit bonding. The surfaces of the closure pours shall be hydro-blasted with equipment that can remove asphaltic material, oils, dirt, rubber, curing compounds, paint carbonation, laitance, and other potentially detrimental materials, which may interfere with the bonding of the closure pour concrete and precast concrete.

The exposed reinforcing steel shall be protected from damage during the cleaning of the surfaces of the closure pours. Damaged epoxy coating of steel reinforcement shall be repaired, and the reinforcing steel shall be cleaned as directed by the Engineer.

Closure pour concrete for the Prestressed NEXT 32D beams shall be Ultra High Performance Concrete. Please reference 2026 MassDOT Standard Specifications. The closure pours shall cure a minimum of seven days before traffic is placed on the bridge.

The Contractor shall cut the lifting devices off below the top of the beam, and the recesses shall be filled with mortar (M4.04.5). The Contractor shall also remove projections and fill all depressions in the tops of the beams with mortar (M4.04.5).

After the formwork has been removed, all threaded inserts that have been cast into the beams for support of the formwork shall be plugged with a grout of the same color as that of the precast concrete.

SCHEDULE OF BASIS FOR PARTIAL PAYMENT

Within ten (10) days from the Notice to Proceed, the Contractor shall submit on his/her proposal form a schedule of unit prices for the major component Sub-Items that make up Item 995.01 as well as the total bridge structure Lump Sum cost for Bridge Structure No. H-18-004 (CNU). The bridge structure Lump Sum breakdown quantities provided in the proposal form are estimated and not guaranteed. The total of all partial payments to the Contractor shall equal the Lump Sum contract price regardless of the accuracy of the quantities furnished by the Engineer for the individual bridge components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 995.01 and no further compensation will be allowed.

ITEM 995.01 (Continued)

Sub-Item	Description	Quantity	Unit	Unit Price	Total
482.31	SAWING & SEALING JOINTS IN ASPHALT PAVEMENT AT BRIDGES	74	FT		
904.3	5000 PSI ¾ INCH, 685 HP CEMENT CONCRETE	90	CY		
904.33	RAPID HARDENING LOW PERMEABILITY CONCRETE	60	CY		
905.21	ULTRA HIGH PERFORMANCE CONCRETE	5	CY		
910.1	STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED	14431	LB		
922	LAMINATED ELASTOMERIC BEARING PAD WITHOUT ANCHOR BOLTS	20	EA		
930.21	PRESTRESSED CONCRETE NEXT 32D BEAMS (96" NOMINAL WIDTH)	340	FT		
930.63	PRECAST CONCRETE APPROACH SLAB	10	EA		
930.64	PRECAST CONCRETE HIGHWAY GUARDRAIL TRANSITION	4	EA		
930.65	PRECAST CONCRETE ABUTMENT STEM	10	EA		
930.66	PRECAST CONCRETE ABUTMENT FOOTING	12	EA		
930.67	PRECAST CONCRETE WINGWALL STEM	8	EA		
930.68	PRECAST CONCRETE WINGWALL FOOTING	5	EA		
960.	STRUCTURAL STEEL	450	LB		
965.	MEMBRANE WATERPROOFING FOR BRIDGE DECKS	2175	SF		
970.	DAMP-PROOFING	3420	SF		
975.4	PROTECTIVE SCREEN TYPE II	140	FT		
975.5	ALUMINUM HANDRAIL	100	FT		

Total Cost of Item 995.01 =

The schedule on the proposal form applies only to Bridge Structure No. H-18-004 (CNU). Payment for similar materials and construction at locations other than at this bridge structure shall not be included under this Item. Sub-Item numbering is presented for information only in accordance with MassDOT Standard Nomenclature.

ITEM 996.4 SOLDIER PILE AND LAGGING WALL LUMP SUM

Work under this item shall consist of the construction of steel "H-pile" and precast concrete panel "lagging" retaining wall adjacent to the southwest abutment as specified herein and as indicated on the Contract Drawings. The work shall conform to the relevant provisions of Section 900 of the Standard Specifications.

The retaining wall shall consist of Steel "H-Piles" with precast concrete panels topped with a cast-in-place cement concrete barrier cap. Safety railings or fencing shall be installed along the top of the retaining wall, as indicated on the plans. Soldier pile and lagging wall will be bonded for continuity by extending a continuous epoxy-coated bar to connect the tops of all soldier piles within the cap.

Soldier piles shall be installed in pre-drilled holes, advanced through all material encountered to the minimum tip embedment depth required by design, as shown on the Plans. Installation equipment shall be capable of drilling through boulders, and any other obstructions, encountered during installation.

The soldier pile and lagging wall is designed to be free draining and shall be constructed to conform to this intent. Anti-Graffiti protective coatings shall be applied to all exposed faces of concrete and steel under the permanent condition.

The supports for the soldier pile and lagging wall shall consist of vertical drilled shafts with an embedded galvanized steel soldier pile. Once the soldier pile is placed in the open drilled shaft excavation, concrete shall be placed around the soldier pile, up to bottom of proposed wall elevation.. Controlled low strength material shall be placed above the concrete to backfill the remainder of the pre-augered drilled shaft excavation. Drilled shaft installation equipment shall be capable of drilling through boulders, cobbles, or any other obstructions, encountered during installation. If bedrock is encountered above the proposed bottom of shaft, then a rock socket must be provided to achieve the minimum Pile Tip Elevation shown on the Contract Drawings, or a minimum rock socket depth of 5 feet, whichever is deeper.

Pressure-treated timber lagging will be placed starting from the top and progressing to the bottom of the wall. A filter fabric will be attached to the back of the lagging to prevent soil raveling between lagging boards. Permanent precast concrete panels will be installed in front of the lagging and crushed stone will be used to fill the void between the panels and the lagging. A cast-in-place concrete cap will be placed on top of the wall. The soldier pile and lagging wall will support a safety railing and fencing. The soldier pile and lagging wall shall be furnished complete in place in accordance with the lines, grades, dimensions and all appurtenances shown on the Contract Drawings.

ITEM 996.4 (Continued)

This Item includes all material and labor necessary to complete the work in accordance with the schedule of items included herein under Basis for Partial Payment and all other items that are part of the work for which payment is not provided for elsewhere.

The panels shall be underlain by an unreinforced grout leveling pad. The unreinforced leveling pad shall be set on firm and level surface. Any foundation soil found to be unsuitable should be removed and replaced as directed and compacted with a vibratory compactor to provide a firm in-place foundation. The cost shall be incidental to price per cubic yard of concrete. The work shall include but not be limited to:

1. Perform pre-construction surveys on designated abutting structures and facilities.
2. Install geotechnical instruments and preform baseline monitoring.
3. Verifying location of existing granite block foundations on south abutment by probes or test pits.
4. Disassembling the section(s) of the granite block wall that interferes with the construction of the south abutment while maintaining wall and excavation stability (refer to Item 950.2, Temporary Excavation Support).
5. Creating a smooth transition between the existing granite blocks and new soldier pile wall.
6. Installing soldier piles.
7. Installing lagging and precast panels between soldier piles.
8. Geotechnical instrumentation shall be monitored as the work progresses.
9. Perform post-construction surveys on designated abutting structures and facilities.

The pre- and post-construction surveys and all instrumentation and monitoring shall be paid under Item 950.2 Temporary Excavation Support.

SUBMITTALS

All submittals shall be submitted at least 2 weeks prior to planned start of work, and must be accepted by the Engineer before work may proceed.

A. Working Drawings

1. Submit working drawings at least two (2) weeks before beginning excavation, installation of temporary excavation support system, or installation of soldier pile and lagging wall.

ITEM 996.4 (Continued)

B. Additional Requirements for Working Drawings – Working drawings shall include the following:

1. Grades and strengths of all construction materials used.

2. Wall Elevation and Profile view drawings showing bottom of wall and top of wall elevations along entire wall alignment.

3. Method for installing wall.

4. Method for attaching timber lagging and precast panels.

5. Method for attaching concrete cap beam.

6. Architectural Form Liner

7. Loads on the excavation support system for various stages of excavation.

8. Anticipated equipment, traffic (and other surcharge) loads on adjacent ground during construction.

9. Existing utility facilities, including underground and overhead utilities. After checking locations of utilities by field investigations, determine which conflict with or potentially may impact the construction of the proposed new wall.

C. Submit the following:

1. Provide detailed sequence of granite block wall demolition work and soldier pile and lagging wall construction, with starting and ending dates for each activity.

2. Provide schedule of temporary interruption of utility services.

3. Provide details for shutoff and capping or re-routing of utility services.

4. Predemolition Photographs or Video: Show existing conditions of the granite block piers. Submit before the Work begins.

5. Hazardous material remediation plan. Included in the plan are landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

D. Proposed Protection Measures: Submit informational report in accordance with OSHA Part 1926 procedures, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control.

ITEM 996.4 (Continued)

E. Contractor Qualifications

1. The Contractor performing the construction of the work shall have a minimum of ten (10) years of experience in soldier pile wall design and construction and shall submit evidence of successful completion of at least five (5) similar projects.

2. The Contractor's staff shall include one registered Professional Engineer licensed to perform work in the Commonwealth of Massachusetts. The Contractor shall assign a superintendent or foreman with a minimum of five (5) years of experience in the supervision of permanent soldier pile and lagging construction.

3. The Contractor shall employ a Licensed Surveyor to set the positions of the piles shown on the pile layout plans. Contractor shall be responsible for the accuracy of the location and positioning of each pile.

F. Shop and Erection Drawings

Submit shop and erection drawings at least thirty (30) days before beginning excavation or installation of excavation support system. Shop drawings shall include the following:

1. Method for installing all of the wall elements (drilled shafts, piles, timber lagging, drainage mat, CIP concrete cap and facing).

2. Erection Procedure for soldier piles including plan view of anticipated crane picks, radii, pile laydown area, etc.

3. Field verification of existing utilities, underground and overhead. After checking location/owner of utilities, determine which may affect the work.

4. Anticipated equipment, traffic (and other surcharge) loads on adjacent ground during construction.

5. Wall's construction materials (type, grade, strength, etc.) that shall meet Materials requirements as stated below.

G. Submit design calculations prepared by a professional engineer registered in the Commonwealth of Massachusetts for the timber lagging.

H. Submit material information and specifications of form liner with an approved finish.

I. Submit Welder Qualifications and Welding Procedures in accordance with AWS D1.1.

J. Submit descriptive data and operating procedures for all equipment to be used. This shall include, at a minimum, machinery required to install wall, excavate soil, and remove obstructions. Submit all pertinent data including sizes, weights, capacities, torques and operating frequencies.

ITEM 996.4 (Continued)

K. During soldier pile wall construction, maintain and submit weekly to the Engineer, clearly written and illustrated reports documenting the Work as it was actually constructed. Each weekly report shall be approved and stamped by the Contractor's Professional Engineer and submitted within 24 hours of the last day of the week for which the report applies (reporting period). Each weekly report shall contain all of the daily reports for the reporting period and shall include the following information:

1. Pile identification.
2. Dimensions of the excavation and elevations of the top and bottom of piles.
3. Dates and times of soldier pile advancement.
4. Description of soils encountered, obstructions, and excavation problems, if any.
5. Reference to shop drawings, cut-outs, bearing plates, and other embedded items. Indicate variations from shop drawings, if any.
6. Plumbness and deviation from plan location.
7. Elevations of bottom of soldier pile wall showing deviations, if any, from Drawings.
8. Plumbness and location of individual structural sections, showing deviations, if any, from the Drawings.

L. The Contractor shall be responsible for the preconstruction and post-construction surveys survey of existing buildings and structures adjacent to the construction site.

M. The Contractor shall submit to the Engineer for approval a list of materials proposed for use of the Anti-Graffiti Coating, giving the manufacturer's name, product name and any necessary identification numbers for each item, and the manufacturer's data sheets and recommendations for installation including relevant limitations, safety factors, environmental precautions, and application rates.

SUBSURFACE DATA

Borings performed in June 2023 and June 2025 in the vicinity of the wall alignment and logs and locations are shown on the contract plans. The borings indicates that below ground obstructions may be encountered. Such obstructions may include but are not necessarily limited to boulders or bedrock (possible at eastern end of wall).

ITEM 996.4 (Continued)

The aforementioned data is for general information and is accurate only at the particular locations and times the subsurface explorations were made. It is the Contractor's responsibility to make interpretations and draw conclusions based on the character of materials to be encountered and the impact on his work based on his expert knowledge of the area and of earthwork techniques. The Contactor shall also perform an additional boring along the soldier pile and lagging wall alignment, shown on the plans (BB-4) as an early action item. The boring log shall be submitted to the Design Engineer and 30 days shall be allowed to verify the soldier pile and lagging wall design and make any necessary changes as a result of the subsurface information. The Contractor, at his/her own expense, may conduct additional subsurface explorations for his/her own information after obtaining MassDOT's approval.

MATERIALS

Casing, concrete, and appurtenances for the Drilled Shafts:

All materials shall conform to MassDOT Standard specification for Drilled Shafts (Section 945). Drilled Shafts shall be installed with a temporary casing and filled with 4000 PSI, 3/4 INCH, 610 Cement Concrete to the elevations shown on the Plans.

Controlled Low Strength Materials:

CLSM (or Flowable Fill) is a lean-mix concrete, used to fill the vertical hole above the concrete in the Drilled Shaft, that shall meet MassDOT Materials Specifications M4.08.0 CLSM (Mechanical Excavatable), with a compressive strength at 28 days of 150 psi.

Steel Piles

Steel piles shall be W12x72, W14x145, and W18x175 and conform to the requirements of AASHTO M183 Grade 50 or higher grade and conform to the relevant provisions of Section 940 and 960 of the Standard Specifications. The piles shall be hot dipped galvanized in accordance with AASHTO M111. The galvanizing bath shall contain nickel (0.05% to 0.09% by weight).

Precast Concrete Panels

The manufacturer of the panels should note the dimensions of soldier pile and lagging wall and understand that the design intent is that the entire wall will have the same appearance. This shall be achieved by use of architectural form liners with a "dry laid stone" finish similar to the adjacent section of existing granite block. The Contractor shall coordinate with the precast wall manufacturer and the Engineer to achieve this goal. The precast concrete panels shall be manufactured to the relevant provisions of Section 900 and Material Section M4 including but not limited to Subsection M4.02.14.

ITEM 996.4 (Continued)

The architectural form liners shall manufactured of thermoformed rigid polymer alloy sheets. The liners shall accommodate form pressures to a maximum 1000 psf.

The precast concrete panels shall be manufactured of air-entrained 4,000 psi, 3/4 inch cement concrete, true to line, plane and dimensions shown on the Plans.

Steel Reinforcement for Structures – Epoxy Coated

Steel reinforcement for concrete structures shall conform to the relevant provisions of Section 900 of the Standard Specifications. Reinforcing bars shall be deformed bars rolled from new billet steel conforming to the requirements of ASTM A615, Grade 60 and shall be epoxy coated. Epoxy coated reinforcing bars shall conform to ASTM A775 .

CIP Concrete for Wall Panel

The concrete for the CIP panel shall be 4000 PSI, 3/4 INCH 600 Cement Concrete.

Welded Shear Connectors

Headed Welded Connectors: ASTM A108, Grade 60, low carbon steel, galvanized. Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

Mechanical Compression Anchors
The contractor shall use a heavy duty compression anchor, made of stainless steel, suitable and rated for use outdoors, in uncracked concrete/rock, meeting the minimum size and grade shown on the Contract Drawings.

Architectural Form Liner

The Contractor shall use architectural form liners with an approved finish. The architectural form liners shall be manufactured of medium-density plastic overlaid plywood, 5/8” minimum thickness, or thermoformed rigid polymer alloy sheets. The liners shall accommodate form pressures up to 1000 psf.

Anti-Graffiti Compound

Two coats of anti-graffiti coating shall be applied by airless spray, brush, or roller to all exposed concrete surfaces of the prefabricated retaining walls. The Contractor may not proceed with any production coating operations until the samples and mock- ups are approved. All manufacturer's recommendations and procedures shall be strictly adhered to. Approved manufacturer’s authorized representatives shall provide additional job site training in the proper mixing and application procedures of the anti-graffiti coating. The cost for sufficient involvement of the authorized representatives shall be considered incidental to this Item. All State, Federal and local safety and environmental protection requirements shall be strictly adhered to.

ITEM 996.4 (Continued)

The anti-graffiti coating shall be a clear, non-yellowing, chemical and scratch resistant, fast curing, water-based, one-component silicone elastomer specifically formulated to protect surfaces subject to repeated graffiti attacks. It shall have no effect on the color of the concrete.

Damproofing and Drainage Board

Apply bituminous damproofing and install vertical strips of drainage board to the back side of the precast panels, as shown in the plans. The damproofing and drainage board shall conform to relevant provisions of the Standard Specifications.

Prefabricated Geocomposite Drain (PGD) shall consist of a drainage core with geotextile. Use drainage core material consisting of a preformed, stable, polymer plastic material with a cuspated or geonet structure. Use drainage core that supports the geotextile and provides a bonding surface for the geotextile at intervals not exceeding 1-1/8 inches in any direction. PGD shall have the geotextile fabric covering the full length of the drainage core with minimum 3-inch wide flaps/flanges of fabric extending beyond both longitudinal edges of the drainage core.

Geotextile fabric shall be composed of over 85% of polyester, polypropylene, polyolefin, or polyamide fibers by weight, that are formed into a stable network to ensure the performance during handling, installation, and service life. Use geotextile fabric that is resistant to chemical attack, rot, and mildew.

Submit Certified Test Data showing the product will meet or exceed the requirements listed in Table 1 and Table 2.

Table 1. Physical, mechanical and hydraulic requirements for the core of the PGD

Property	Test Method	Unit	Required Value
Thickness	ASTM D5199	in	0.4 to 1.0
Compressive Strength	ASTM D1621	psf	10,625
In-plane flow rate*	ASTM D4716	gal/min	15 to 25

* Tested under a confining pressure of 3,600 psf and a hydraulic gradient of 1.0.

Table 2. Strength and hydraulic requirements for the fabric of the PGD

Property	Test Method	Unit	Required Value
Permittivity	ASTM D4491	sec^{-1}	≥0.2
Grab Strength	ASTM D4632/D4632M	lb	157
Elongation	ASTM D4533/D4533M	%	≥50
Trapezoidal Tear Strength	ASTM D6241	lb	56
Puncture Strength	ASTM D6241 ASTM D4833	lb lb	309 58

ITEM 996.4 (Continued)

Drain-pipe

Weep hole fittings, as provided by the manufacturer, shall transition between the PGD and the outlet pipe. If manufacturer fittings are not available, provide smooth-lined outlet (4-inch diameter, Schedule 40 PVC pipe).

CONSTRUCTION METHODS

General Requirements

A. Disassemble the granite block wall at the limits shown on the Contract Drawings.

B. Cut granite blocks so that there is a level transition between granite blocks and CIPt panel of the soldier pile and lagging wall.

C. Install the wall in accordance with the accepted working drawings, and in such a manner as to prevent movement, settlement, loss of ground, removal of fines from the adjacent ground, and damage to or movement of adjacent structures and utilities. This could include the use of drilling slurry during installation of soldier piles in predrilled holes to maintain stable drill holes and limit the loss of ground outside the drill hole.

D. Perform work from track side of the proposed wall unless temporary easements have been granted to minimize adjacent property impacts. Heavy equipment shall be placed on the track side of the proposed wall.

E. Perform field welding by certified welders in accordance with American Welding Society Standards AWS D 1.1, "Structural Welding Code - Steel."

F. Implement the Plan of Actions as submitted under Paragraph 1.3D, if Response Values as specified in the Response Value Table are reached.

G. Borings indicate below ground obstructions may be encountered. Such obstructions may include, but are not necessarily limited to, boulders and various other demolition and construction debris.

H. Temporary casings used for pre-drilling holes for soldier piles shall be installed where specified on the Contract Drawings to top weathered bedrock, as a minimum, using rotary drilling techniques over their full depth to limit potential vibration damage to adjacent structures and facilities. Potential vibration damage could result if the piles or casing were installed using driving or vibratory methods.

I. Protection of Existing Adjacent Structures

1. The Contractor shall repair all damage to adjacent properties and restore the surfaces and finishes to the original state.

ITEM 996.4 (Continued)

2. If in the opinion of the Engineer the integrity of the adjacent railroad tracks, bridge, buildings, structures, or paved areas are jeopardized due to movement, the Contractor shall immediately discontinue further demolition or excavation in the affected area and implement accepted Plan of Action to mitigate further movement. Mitigating measures shall remain in effect until such time that the Engineer evaluates the impact on the structure and may direct the Contractor to perform any remedial work. The Contractor shall submit proposed remedial measures to the Geotechnical Engineer for review and acceptance. Submittals shall include methods and names of subcontractors. The Contractor shall proceed with remedial work upon acceptance by the Engineer. Mitigating measures shall be at no additional cost.

J. Monitoring Deflection of Wall

1. Once the soldier piles are installed to final elevation but before excavation begins, establish deformation-monitoring points on the top of the wall, spaced approximately every 20 feet along the wall (every other soldier pile). The monitoring points shall consist of painted marks on the steel member.

2. Perform a baseline survey of each deformation monitoring point before excavation begins. Survey both vertical and lateral position.

3. Perform daily survey of each top-of-wall deformation monitoring point from when excavation begins until full excavation depth is reached. Thereafter, perform weekly survey of each monitoring point until the concrete facing is constructed.

Drilled Shafts

Temporary casing shall be used to install the drilled shaft to the depth required, as shown on the Plans. Casing shall be removed from the portion above the bottom of wall elevation prior to concrete set. Excavated holes for the drilled shaft shall be within 3 inches of the plan location. All installation shall follow the relevant provisions of Section 945. If bedrock is encountered above the proposed bottom of shaft, then a rock socket must be provided to achieve the minimum Pile Tip Elevation or a minimum 6 feet rock-socket, whichever is shallower.

Following soldier pile placement, the excavated hole shall be backfilled with structural concrete from the bottom of the hole to the bottom of proposed retaining wall elevation . Tremie methods shall be used to place concrete if there is standing water in the drilled shaft excavation. From the bottom of proposed retaining wall to the ground surface, the hole should be backfilled with CLSM that is subsequently chipped/scraped off during lagging and facing installation.

ITEM 996.4 (Continued)

Steel Piles

The piles shall be set taking into account anticipated deflection at the top of wall, true to line and grade as shown on the Contract Drawings, and/or as directed. Pile shall be set by use of a temporary template or jig to ensure that pile spacing and plumbness remain true. The temporary jig will remain in place until concrete has set. The overall vertical tolerance of the wall (variation from plumbness from top to bottom) shall not exceed 2% of the height of the wall along its back slope and 1% of the height along its front slope. Temporary supports shall support "H-piles" for at least 5 days before concrete panel installation begins.

The "H-piles" shall be installed by placing them in predrilled or preaugered drilled shaft holes at the diameters and spacing shown on the Contract Drawings. Predrilled or pre-augered drilled shaft holes shall be protected as necessary against cave-ins, displacement of surrounding soil and for retention of ground water by means of temporary steel casing and/or use of slurry subject to approval by the Engineer. Predrilling/preaugering shall following the relevant provisions of Section 945.

The "H-piles" shall be installed in the drilled shaft holes and shall be encased in 4000 psi concrete below wall base, and controlled low strength material above bottom of wall. A portion of the controlled low strength material shall be excavated/removed to allow the installation of lagging and concrete panels.

Welded Shear Connectors

Weld headed steel connectors to the flanges of the soldier piles in order to connect the precast concrete wall facing panels to the soldier pile. Attach headed connectors according to the American Welding Society Standards AWS D1.1 and as shown on the plans. The contractor may attach the connectors either before placing the soldier pile in the drilled hole or after excavating in front of the wall. If connectors are attached after the soldier pile has been installed and excavation in front of the wall has been completed, the contractor shall clean and prepare the surface prior to attaching the connectors. Protect the headed connectors from damage until the concrete wall facing is placed. If connectors are damaged during construction, the Contractor shall repair or replace the damaged stud at their own expense.

Mechanical Drop-in Anchors

Drill holes to the required depth into the granite block at intervals shown on the Contract Drawings. The hole diameters shall be 1/16 to 1/8 -inch bigger than the anchor. Clean out the hole with air. Install the anchor to the back of the hole and install and tighten the bolt. The Contractor shall repair or replace the damaged anchors at their own expense.

ITEM 996.4 (Continued)

Architectural Form Liner

Construct formwork to shapes, lines, and dimensions required, plumb and straight, secured and braced sufficiently rigid to prevent deformation under load, and sufficiently tight to prevent leakage, all in conformance with ACI Standard 347, "Recommended Practice for Concrete Formwork". Before form materials can be re-used, surfaces that will be in contact with freshly cast concrete shall be thoroughly cleaned, damaged areas repaired, and projecting nails withdrawn. Re-use of form material shall be subject to approval by Engineer.

Drain Mat

Prior to facing installation, a Prefabricated Geocomposite Drain (PGD) mat or strip shall be attached to the face of the timber lagging, at the center of the lagging, from the top to the bottom of the wall. The PGD should be connected to the drainpipe, at the wall's bottom, using the fitting provided by the Drainage Mat's manufacturer and installed to the manufacturer's instructions.

Precast Concrete Panels

Precast concrete panels shall be placed so that their final position is as shown on the Plans. For erection, panels are handled by means of lifting devices connected to the upper edge of the panel. Panels should be placed in successive horizontal lifts in the sequence shown on the approved Shop Drawings as backfill placement proceeds. As backfill material is placed behind the panels, the panels shall be maintained in position by means of temporary wedges or bracing according to the wall supplier's recommendations. Concrete facing vertical tolerances and horizontal alignment tolerances shall not exceed ¾ inches when measured with a 10-foot long straight edge. During construction, the maximum allowable offset in any panel joint shall be 3/4 inch. The overall vertical tolerance of the wall (top to bottom) shall not exceed ½ inch per 10 feet of wall height.

The base of the precast wall panels shall be set on a base leveling pad comprised of unreinforced 3000 psi grout, set to the lines and grades shown on the drawings, to a minimum thickness of 2 inches and extend laterally a minimum of 6 inches in front and behind the wall panel. Base leveling pad shall be prepared to provide full contact to the base surface of the precast concrete wall units.

Anti-Graffiti Compound

The treatment may be applied using low-pressure spray, brush, or roller. The surface to be treated shall be prepared as recommended by the product manufacturer prior to the application of the treatment. All activities shall be in compliance with relevant local codes and governmental regulations. Coatings shall be in compliance with the latest Volatile Organic Compound (VOC) state requirements.

Manufacturer supplying the graffiti control treatment shall have been regularly engaged and specializing for the preceding ten (10) years in the formulation, manufacture and distribution of graffiti control products for masonry substrates. A representative of the manufacturer of the graffiti control treatment shall be present during preparation and application of all test areas.

ITEM 996.4 (Continued)

Testing shall be conducted on an unobtrusive location on representative conditions. Test will include cleaning and surface preparation proposed for the project, followed by the application of the treatment. The Engineer shall approve all test areas and application procedures prior to beginning full-scale treatment. Adjacent surfaces not to be treated shall be tested for possible detrimental effect or aesthetic alteration created by exposure to the treatment and shall be protected as determined necessary.

Materials shall be delivered to the site in the manufacturer's original, unopened containers bearing the manufacturer's label. The Contractor shall store and handle the materials in accordance with the manufacturer's recommendations.

CONTROL TESTS AND INSPECTIONS

A. Testing and inspection of concrete, reinforcing steel, and steel members shall conform to MassDOT requirements.

B. Dimensions shall be verified by field measurement and shall be within the following tolerances:

1. Soldier Piles

a. Plan location: Center of pile within 2 inches of the specified Plan location.

b. Should piles be installed outside allowable tolerances affecting the design and appearance of the permanent structure, Contractor shall propose and carry out immediate remedial measures at the acceptance of the Engineer.

c. Splicing of structural steel piles shall not be allowed.

2. Completed Wall

The overall vertical tolerance of the completed wall (plumbness from top to bottom) shall not exceed 1% of the height along its face.

3. Structural Steel/Reinforcing Steel Placement

a. Maximum tolerance for horizontal rotation at any elevation of the structural steel piles shall not exceed 5 degrees. Steel sections shall not be forcibly twisted after being seated to obtain rotational tolerance.

b. Lateral or longitudinal steel location at top of wall: Plus or minus 2 inches of specified Plan location.

ITEM 996.4 (Continued)

BASIS OF PAYMENT

Item 996.4, Soldier Pile and Lagging Wall, will be paid at the Contract LUMP SUM price, which price shall include all materials, labor, tools and equipment incidental and necessary for the installation, complete in place.

Removal of obstructions and bedrock excavation are incidental.

Additional boring labeled on the plans as BB-4 to be performed as an early action item will be considered incidental to Item 996.4.

Design, installation, and removal of temporary excavation support for Soldier Pile and Lagging Wall will be paid under Item 950.2.

If spoil and groundwater handling is required, it will be considered incidental including handling contaminants.

No separate payment for monitoring of the soldier pile and lagging wall will be made. The pre- and post-construction surveys and all instrumentation and monitoring and Geotechnical Monitoring shall be paid for under Item 950.2. Payment for similar materials and construction at locations other than at this structure shall not be included under this Item.

	Description	Quantity	Unit	Unit Price	Total
	Controlled Low Strength Materials – Mechanical Excavatable	5.5	cy		
	Drilled Shafts -24-inch Dia.	50	lf		
	Drilled Shafts -30-inch Dia.	129	lf		
	Precast Panels	482	sf		
	Structural Steel (coated)	33422	lb		
	Drainage Board	300	sf		
	Anti-Graffiti Coating	525	sf		
	Drain Pipe	52	lf		

Total Cost of Item 996.4 =

ITEM 996.5 PREFABRICATED MODULAR GRAVITY RETAINING WALL SQUARE FOOT

GENERAL

This item shall conform to the requirements of all relevant Sections of the Standard Specifications and Supplemental Specifications and the following.

The work under this Item shall consist of design, fabrication, furnishing, transportation, and erection of prefabricated modular (PM) retaining wall system of the required type, including foundation excavation, leveling pad, drainage, backfill, and miscellaneous items necessary for a complete installation.

The PM wall system shall be a gravity wall system consisting of architectural precast concrete monolithic face panel and stem units supported on cast-in place concrete leveling pads and select backfill. The wall structures shall be dimensioned to achieve the design criteria shown on the Plans and specified herein. The PM wall design shall follow the general dimensions of the wall envelope shown in the contract plans.

The PM gravity retaining wall system shall be designed and constructed as specified herein. The design shall be subject to review and acceptance of the Contractor's technical submittal by the Engineer. Acceptability of the PM gravity wall design shall be at the sole discretion of the Engineer. Any additional design, construction, or other costs arising as a result of rejection of a retaining wall design shall be borne by the Contractor.

Also included are the final detailing, fabrication, furnishing, transportation, and construction of precast or cast-in place concrete copings, precast highway guardrail transitions, including all associated components, as shown on the Plans.

Acceptable PM gravity retaining wall systems are:

1. T-Wall Retaining Wall System® by Fort Miller Company
2. T-Wall Retaining Wall System® by The Reinforced Earth Company
3. Doublewal II by United Concrete Products, Inc.
   or approved equal.

An anti-graffiti coating shall be applied to all exposed concrete surfaces of the retaining walls.

Value engineering is not applicable to the work of this Item.

QUALITY ASSURANCE

Quality Assurance shall conform to the requirements of all relevant Sections of the Standard Specifications and Supplemental Specifications and the following.

ITEM 996.5 (Continued)

Fabricator Quality Control

Precast concrete requirements regarding the precast concrete Fabricator's Quality Control (QC), the fabrication plant, personnel, laboratory, testing equipment, inspection, temperature monitoring of the concrete, sampling and testing of concrete, certificate of compliance, and QC documentation shall conform to Section M4.02.14, Precast Concrete Highway Units of the Standard Specifications.

Contractor Quality Control

The Contractor installing the PM retaining wall shall have a minimum of 5 years' experience constructing the chosen prefabricated wall system and shall use personnel having demonstrated experience in the installation procedures recommended by the manufacturer and the requirements specified herein.

A qualified representative (minimum 2 years demonstrated experience) from the selected wall design- supplier shall be present during construction of the PM walls. The services of the qualified representative shall be at no additional cost to the project. The Contractor shall make the necessary arrangements with the wall supplier to have the technical representative on the project. The qualified experienced technical representative will advise the Contractor and Engineer concerning proper installation procedures. The services of a qualified technical representative shall be incidental to this item.

Quality control and testing shall comply with Section M4.02.14. The sublot size for prefabricated modular wall units shall be a group of PM wall units represented by a single compressive strength sample and shall consist of the lesser of either 40 modular wall units or a single day's production.

Acceptance

Final Acceptance for the prefabricated modular wall system shall be determined by MassDOT.

MassDOT will perform Acceptance inspection and sampling and testing in accordance with Section M4.02.14.

Precast modular wall units for PM walls shall be manufactured in a concrete products plant with MassDOT-approved facilities.

MATERIALS

All materials used in the construction of the prefabricated retaining walls shall meet the relevant requirements as specified in Division III, Materials Specifications of the MassDOT Standard and Supplemental Specifications, and as specified herein.

Materials not conforming to requirements of the referenced specifications or from sources not listed in the Contract Documents shall not be used without written consent from the Engineer.

ITEM 996.5 (Continued)

The PM wall units shall be fabricated in accordance with Section M4.02.01 Precast Concrete Highway Units and Section 901. with the following exceptions and additions:

All PM wall units shall be wet-cast units conforming to ASTM C1776.

The PM wall units shall be manufactured of minimum ,5000 psi, ¾-inch, 5% air-entrained cement concrete from a MassDOT approved precaster, using a mix design in accordance with the Contractor's accepted PM gravity wall design.

Finishing, Protection, and Curing of Precast Concrete

Unless otherwise indicated on the Plans, the concrete surfaces shall be finished, protected, and cured in accordance to relevant requirements of M.4.02.01 Precast Concrete Highway Units and Section 901 of the Standard and Supplemental Specification and as modified herein.

The panels shall be cast on a flat area. The coil embeds, tie strip guide, and other galvanized devices shall not contact or be attached to the face panel reinforcement steel. Each panel shall be cast as a unit. No horizontal joints are permitted in a panel.

Steel Reinforcement

Steel Reinforcement for PM wall units shall be furnished in accordance with the relevant requirements of Section M8 of the Standard and Supplemental Specifications. All steel reinforcing shall be epoxy coated and shall conform to the requirements of AASHTO M31 Grade 60.

Joint Materials

Joint material shall be either preformed EPDM rubber pads conforming to ASTM D2000 for 4AA, 812 rubbers or neoprene elastomeric pads having a Durometer Hardness of 55 ±5.

Shear Keys

Precast shear keys shall be made of the same concrete mix as the prefabricated modular units and cured in the same manner. The shear keys are to be designed and detailed by the prefabricated wall manufacturer.

Backfill

All backfill materials used for PM walls shall be Gravel Borrow and shall conform to Section 150 of the Standard Specifications. Backfill material used in PM walls shall also meet the quality of material and gradation requirements of the PM manufacturer. Additional backfill requirements:

ITEM 996.5 (Continued)

A. Soundness: The material shall be substantially free of shale or other soft, poor durability particles. The materials shall have a magnesium sulfate soundness loss, as determined by AASHTO T104 (ASTM C88), of less than 30 percent after four cycles.

Limits of backfill included under this Item shall be from the back face of the blocks to a vertical plane 12 inches beyond the rear most edge of the PM walls, and including fill placed within a cut slope behind the wall no steeper than 1.5 horizontal to 1 vertical up to the existing ground surface. See Plans for diagrammatic details of the payment limits.

Anti-Graffiti Coating

Two coats of anti-graffiti coating shall be applied to all exposed faces of the wall by airless spray, brush, or roller to all exposed concrete surfaces of the prefabricated retaining walls. The Contractor may not proceed with any production coating operations until the samples and mock-ups are approved. All manufacturer's recommendations and procedures shall be strictly adhered to. Approved manufacturer's authorized representatives shall provide additional job site training in the proper mixing and application procedures of the anti-graffiti coating. The cost for sufficient involvement of the authorized representatives shall be considered incidental to this Item. All State, Federal and local safety and environmental protection requirements shall be strictly adhered to.

The anti-graffiti coating shall be a clear, non-yellowing, chemical and scratch resistant, fast curing, water-based, one-component silicone elastomer specifically formulated to protect surfaces subject to repeated graffiti attacks. It shall have no effect on the color of the concrete.

Leveling Pad

The leveling pad shall be constructed of minimum 4,000 psi, 3/4-inch, cement concrete approved mix as specified in Section M4, or other foundation material consistent with the Contractor's PM gravity wall design, as accepted by the Engineer. Leveling pad shall be 6 inches thick minimum and be placed at the design elevation shown on the Plans within a 1/8-inch tolerance. Bottom of leveling pad should be at least 4 feet below final ground surface at face of wall.

ACCEPTANCE OF MATERIALS

The Contractor shall furnish to the Engineer a Certificate of Compliance certifying that the above materials comply with the applicable contract specifications. A copy of all test results performed by the Contractor necessary to assure contract compliance shall also be furnished to the Engineer. Acceptance will be based on the Certificate of Compliance, accompanying test reports, and visual inspection by the Engineer.

ITEM 996.5 (Continued)

DESIGN REQUIREMENTS

The PM gravity wall system shall be designed to provide a prefabricated modular retaining wall system that acts as a gravity wall without the need for external bracing, reinforcing straps, grids, mesh, tiebacks, deadmen, etc. behind the wall system to provide external stability that would conflict with existing and proposed utilities and drainage structures, including future maintenance and repair of utilities. For this reason, mechanically stabilized earth (MSE) type wall systems will not be considered. Prefabricated modular gravity wall systems that provide stability within the wall envelope limits as shown on the Plans are permitted.

Design Specifications

The PM retaining walls shall be designed to provide the grade separation shown on the Plans with a service life of not less than 100 years.

All calculations and Shop Drawings shall be signed and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts and experienced in prefabricated modular retaining wall design and construction.

The PM gravity wall system shall be designed in accordance with:

1. The manufacturer's requirements.
2. The Contract Plans.
3. The requirements as specified herein.
4. AASHTO LRFD Bridge Design Specification, current edition. Herein referenced as AASHTO LRFD.
5. AASHTO LRFD Bridge Construction Specifications, current edition.

Where conflicting requirements occur, the more stringent shall govern. Design shall consider Service, Strength, and Extreme Limit- States, and external and internal stability.

If stated on the Contract Drawings, the wall shall be designed for seismic forces according to the AASHTO Guide Specifications for LRFD Seismic Bridge Design, 2nd Edition, 2022, interim updates.

The PM wall shall be dimensioned so that the maximum bearing pressure does not exceed the factored bearing resistance of the foundation soils, as noted on the Plans. The factored bearing pressure stated assumes a uniform pressure distribution.

The PM walls shall be designed to account for drainage required for walls to be free from hydrostatic pressure, including below established groundwater levels and seasonal levels.

ITEM 996.5 (Continued)

The prefabricated retaining wall design shall follow the general dimensions of the wall envelopes shown on the Plans. Top of leveling pad or footing elevations shall be as shown on the Plans, or may be lower. All wall elements shall be within the right-of-way limits shown on the Plans. The PM wall units shall be placed so as not to interfere with guardrail posts, drainage or other utilities, or other potential obstructions.

All appurtenances behind, in front of, over (such as coping), under, mounted upon or passing through the wall (such as drainage structures), or other appurtenances shown on the Plans shall be accounted for in the stability design of the prefabricated retaining wall system. PM wall units shall have tongue and groove, shiplap or similar approved interlocking connections along all joints, both vertical and horizontal.

The PM retaining wall system shall be supported on cast-in-place leveling pad, or other foundation materials as approved by the Engineer. The top of the leveling pad shall be located at or below the theoretical leveling pad elevation. The minimum wall embedment shall be 4 feet as measured to the bottom of the leveling pad, or as shown on the Plans, whichever is greater. The leveling pads are incidental to this item.

The top of the face panels shall be at or above the top of the panel elevation shown on the Plans. Where coping or barrier is used, the wall face shall extend up into the coping or barrier a minimum of 2-inches.

If additional soils information is required by the Contractor's wall designer, it must be obtained by the Contractor and will not be reimbursed by the Department.

Required geometry and utility poles and traffic barriers has been provided on the Plans. Final design of copings and detailing of all components shall be completed by the Manufacturer, in accordance with the following standards:

1. 2024 Massachusetts Department of Transportation Bridge Manual – Hundredth Anniversary Edition
2. NCHRP Report 663: Design of Roadside Barrier Systems Placed on MSE Retaining Walls
3. NCHRP Web Only Document 326: Design Guidelines for Test Level 3 through Test Level 5 Roadside Barrier Systems Placed on Mechanically Stabilized Earth Retaining Walls
4. American Association of State Highway and Transportation Officials LRFD Bridge Design Specifications, current edition.
5. American Association of State Highway and Transportation Officials Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, current edition.

ITEM 996.5 (Continued)

Unless otherwise noted on the Plans, the color and finish of the PM wall units shall consist of Gray and Ashlar, respectively, and must be accepted by the Engineer prior to proceeding with casting of the PM wall units.

PRE-CONSTRUCTION SUBMITTALS

Design computations demonstrating compliance with the criteria specified herein and shown on the Plans shall be prepared, signed, and stamped by a registered professional engineer licensed in the Commonwealth of Massachusetts and with a minimum of 5 years of experience in the design and construction of prefabricated retaining walls.

A. The design calculations shall include:

1. Statement of all assumptions made, and copies of all references used in the calculations. Calculations shall be performed in English units.

2. Analyses demonstrating compliance with all applicable earth, water, surcharges, seismic, or other applicable loads, as specified herein and required by the reference AASHTO LRFD. The design calculations shall include all applicable references to the LRFD code.

3. Analyses or studies demonstrating durability and corrosion resistance of the prefabricated retaining wall system for the proposed location and environment. The Contractor/Designers shall provide all corrosion protection devices necessary for the retaining wall to have a minimum service life of 75 years in the proposed location and environment.

4. Analyses demonstrating adequacy of design for external stability of the PM wall system. Sliding, overturning, global slope stability, and bearing pressures shall be evaluated for conformance with stipulated design requirements.

5. Structural design of coping, and final detailing of appurtenance structures in coordination with geometry and detailing required on Plans.

B. A detailed resume of the wall designer shall be provided, listing similar projects and demonstrating necessary experience to perform the retaining wall designs, including a brief description of each project that is similar in scope shall be provided for acceptance. A reference shall be included for each project listed. As a minimum, the reference shall include an individual's name, address, and current phone number.

C. A detailed listing of the relevant type of PM retaining walls that the Contractor has constructed shall be provided, including a brief description of each project and a listing of personnel who will construct the walls demonstrating their experience in construction of PM retaining walls. A reference shall be included for each project listed. As a minimum, the reference shall include an individual's name, address, and current phone number.

ITEM 996.5 (Continued)

D. Manufacturer's product data for the PM retaining wall system shall be provided, including material, manufacture and erection specifications, all specified erection equipment, details of buried wall elements, structures design properties, type of backfill, and details for connections between wall units.

E. Concrete mix design shall be in accordance with Section M4.

F. Provide Shop Drawings showing the configuration and all details, dimensions, quantities, and cross-sections necessary to construct the prefabricated retaining walls, including but not limited to the following:

1. A plan view of the wall, which shall include contract limits, stations and offsets, and the face of wall line as shown on the Plans.

2. An elevation view of the wall, which shall include the elevation at the top of the wall at all horizontal and vertical break points and at least every 25-feet along the face of the wall, all steps in the wall footings, the designation as to the type of retaining wall system, and an indication of the final ground line and maximum calculated bearing pressures. The theoretical face of wall as shown on the Plans shall be indicated.

3. A typical cross section or cross sections showing the elevation relationship between existing ground conditions and proposed grades, and the proposed wall configuration. The sections shall also indicate the location of the theoretical face of wall as shown on the Plans.

4. General notes pertaining to design criteria and wall construction.

5. A listing of the summary of material quantities for each wall.

6. Details of sleeves and pipes and other embedded items to be installed through the walls, if applicable. Annular space around the pipe shall be filled and sealed with closed cell foam.

7. Clearly indicate details for construction of walls or reinforcing elements around drainage, foundations, utilities or any other potential obstructions, where applicable.

8. Details of the finished surface treatment for the face of PM wall units.

9. Drainage design detail and design scheme.

10. Locations of adjacent utilities.

11. Sequence and schedule of construction, including overall construction schedule.

ITEM 996.5 (Continued)

12. Methods of excavation and backfill.

13. Method of maintaining stability of excavated trenches, where applicable.

14. Method of monitoring plumbness and deviation of wall.

15. Any acceptance testing and frequency.

16. Details and location of all necessary construction and expansion joints.

17. Details of impermeable membrane connection to PM wall units and to runoff collection system.

18. Details of maintaining stability, rigidity and alignment of the wall during construction, prior to wall construction completion, and prior to backfilling behind the top of the wall and roadway/moment slab construction at the top of the wall.

19. Groundwater elevation.

20. Layout and detail drawings for appurtenance structures.

CONSTRUCTION METHODS – PLANT FABRICATION

Fabrication of the precast concrete wall elements shall conform to Section M4.02.14 with the following additions.

The date of manufacture, production lot number, and the piece mark shall be clearly scribed on an unexposed face of each PM wall unit.

PM Wall Unit Fabrication Tolerances

Dimensions shall conform to the following tolerances:

1. Position of modular wall unit connection devices within 1 inch, except for coils and loop imbeds, which shall be 3/16-inch. All other dimensions within 3/16-inch.

2. Squareness of face of modular wall units, as determined by the difference between the two diagonals, shall not exceed 3/8-inch for precast units up to 10-feet wide and ½-inch for larger units.

3. Surface defects on smooth-formed surfaces measured over a length of 10-feet shall not exceed ¼-inch. Surface defects on textured-finished surfaces measured over a length of 10-feet shall not exceed ½-inch.

4. Length or height of modular wall units shall not exceed +/- 1/8-inch.

ITEM 996.5 (Continued)

Architectural Form Liners

Exposed PM wall unit face shall be cast using custom architectural form liners. Unless otherwise noted on the Plans, the unit face rustication shall be Ashlar Stone surface.

Form liners shall be manufactured by one of the following form liner manufacturers, or other manufacturers as approved by MassDOT:

1. Greenstreak Form Liners, by Greenstreak, St. Louis, Missouri.
2. Symons Form Liner, by Symons Corp., Des Plaines, Illinois.
3. Lithotex Formliner, by L.M. Scofield Co., Los Angeles, California.
4. Custom Rock Form Liners, by Custom Rock, St. Paul, Minnesota.

Lifting Devices and Threaded Inserts

Lifting sleeves and inserts shall be provided for the purpose of handling and placing. Care shall be taken during storage, transporting, hoisting, and handling to prevent cracking or damaging the precast units.

Repairs and replacement of PM wall units shall be in accordance with Section M4.02.14, *Repairs and Replacement for Proprietary Retaining Wall Systems*. Variations in the exposed face that substantially deviate from the approved architectural model unit as to color, texture, and reveal will be considered a Category 3 Rejectable Defect.

Storage and Shipping

The precast units shall be stored, shipped, and installed as specified in Section M4.02.14 Precast Concrete Highway Units.

CONSTRUCTION METHODS

Prefabricated modular gravity retaining walls shall be built in accordance with the Plans and accepted Shop Drawings for the proposed wall system.

The PM retaining walls shall be constructed in accordance with these specifications and in reasonably close conformance with the lines, grades, design criteria, and dimensions shown on the Plans or as established by the Engineer. The Contractor is responsible for coordination with installation of guardrail spacing and the precast unit layout coordination to prevent conflict and damage of precast unit, in addition placement of sidewalks.

The Contractor shall be responsible for the purchase or manufacture of the concrete modular wall units of the PM walls, plus all other necessary components, aggregate backfills, joint fillers, geotextile fabric, bearing pads, and membranes for a complete installation.

ITEM 996.5 (Continued)

Delivery, Storage, and Handing

The Contractor shall check the material upon delivery to assure that the proper material has been received. A product certification should be provided with each shipment.

All wall materials and PM wall units shall be stored elevated from the ground and protected to prevent all mud, wet cement, epoxy and like substances, which may affix themselves to the PM wall units. For storage exceeding 30 days in duration, all materials shall be stored in or beneath a trailer or covered with a colored tarpaulin to prevent long-term exposure.

Wall Excavation

Earth excavations shall be in accordance with the requirements of Section 120 and in close conformity to the limits shown on the Plans. Sections 120.80, 120.81, and 120.82 do not apply to the work covered in this section. Excavation and incidentals to complete the excavation for prefabricated retaining walls shall be included in the Prefabricated Modular Gravity Retaining Wall Item.

Foundation Preparation

The foundation for prefabricated retaining walls shall be graded level for a width equal to the width/depth of each course of wall unit plus 1-foot. Prior to wall construction, the foundation shall be compacted with at least 10 passes of an appropriate roller, weighing a minimum of 10,000 lbs. Compact the foundation area to provide a hard and level surface to support wall units. Any foundation soils found to be unsuitable shall be removed and replaced with Gravel Borrow for Bridge Foundation per Sections 120, 140, and 170. The foundation for the structure shall be accepted by the Engineer before erection is started.

In areas below the existing groundwater level, backfill shall consist of Crushed Stone for Bridge Foundations as per Section 150. When layer is greater than 4 in. thick, Crushed Stone shall be wrapped in non-woven filter fabric.

Wall Erection

The precast modular wall units shall be installed in accordance with approved manufacturer's recommendations. Special care shall be taken in setting the bottom course of units to true line and grade. While erecting each subsequent course, line and grade shall be examined and deviations shall be corrected to prevent accumulative inaccuracies in alignment. Joint filler and rubber pads shall be installed. Joints at corners or angle points shall be closed.

All wall units above the first course shall interlock with the lower courses. Vertical joints shall be staggered with each successive course or as approved on the Shop Drawings. The vertical joint opening in the front face of the wall shall not exceed 3/8 inches. All vertical joints between units shall be covered on the back side of the front face of the wall by a filter fabric, 12 inches in width, unless approved otherwise on the Shop Drawings.

ITEM 996.5 (Continued)

The overall tolerance of the wall (top to bottom) shall not exceed ¾ inch per 10 feet in vertical alignment and horizontal alignment.

Joints

Joints shall be installed to the dimensions and thickness in accordance with the Plans or approved shop drawings.

All joints between panels shall be covered on the back side of the wall with a non-woven geotextile fabric. The geotextile fabric shall conform to the requirements of AASHTO M288 for the intended application. Slit film and multifilament woven geotextile fabrics are not allowed for this application. The minimum width of the fabric shall be 12 inches. Fabric shall be lapped at least 4 inches where splices are required.

Backfill Placement

Backfill placement for PM walls shall follow erection of each course of modular wall units. Backfill shall be placed in such a manner as to avoid any damage or disturbance to the wall materials or misalignment of the modular wall units. Any wall materials, which become damaged or disturbed during backfill placement, shall be removed and replaced at the Contractor's expense. Any misalignment or distortion of the modular units due to placement of backfill outside specified limits shall be corrected.

Compaction of backfill material shall adhere to the following criteria unless otherwise shown on the Shop Drawings:

A. Backfill material conforming to the requirements specified herein shall be placed and compacted simultaneously with the placement of the modular units.

B. Backfill lifts shall be a maximum of 12 inches, uniform in thickness and compacted within the limits shown on the Plans. The Contractor shall decrease this lift thickness, if necessary, to obtain the specified degree of backfill compaction.

C. Placement and compaction shall be accomplished without distortion or displacement of the modular units.

D. At each panel level the backfill material shall be roughly leveled to an elevation approximately 2 inches above the level of the next course of modular units, but not more than 12 inches thick.

E. The compaction shall take place in a direction that is parallel to the wall.

ITEM 996.5 (Continued)

F. The specified compaction of the backfill material shall be accomplished by use of large, smooth drum, vibratory rollers with the exception of the 5-foot zone directly behind the wall face of the modular units, which may be performed with smaller compaction equipment specified herein, utilizing an appropriate lift thickness to achieve the required degree of backfill compaction.

G. Backfill shall be compacted to 95 percent of the maximum density as determined by AASHTO T99, Method C or D (with oversize corrections as outlined in Note 7 of that test).

H. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. Backfill materials shall have a placement moisture content less than or approximately equal to the optimum moisture content. Backfill material with a placement moisture content more than one percent moisture in excess of the optimum moisture content shall be removed and reworked until the moisture content is uniformly acceptable throughout the entire lift.

I. Within 5 feet of the wall face, small, single or double drum, hand operated, walk-behind vibratory rollers, or walk-behind vibrating plate compactors shall be used, and at least three passes shall be made.

J. When there is evidence of wall displacement or disturbance, if approved by the Engineer, compaction shall be accomplished by use of a smooth drum static roller.

K. At the end of each day's operation, the Contractor shall slope the last placed level of backfill away from the wall face to rapidly direct runoff of rainwater from the wall face. The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

METHOD OF MEASUREMENT

Item 996.5 will be measured for payment by the SQUARE FOOT.

BASIS OF PAYMENT

Item 995.5 will be paid at the Contract unit price per vertical square foot, which price shall include all labor, materials, equipment, design, fabrication, transportation, erection, and installation of prefabricated retaining wall, including backfill and all incidental costs required to complete the work.

ITEM 996.5 (Continued)

The unit price for Prefabricated Modular Block Gravity Retaining Wall shall include costs for:

A. All design work, preparation of written submittals and detailed construction drawings, revision of submittals, sample submittals and any other necessary preliminary work prior to and after acceptance of the retaining wall system by the Engineer.

B. All materials, including transportation, for the PM block retaining walls. For PM block walls this, includes concrete modular units, bearing blocks and shims, joint materials, cement concrete, reinforcing steel, aggregate backfill, anti-graffiti coating, and incidentals.

C. All labor and equipment required to prepare the wall foundation; erect the retaining walls to the lines and grades shown on the Plans; install the joint materials; install wall drainage; provide and install steel pipe sleeves for utility penetrations; provide, place, and compact backfill within wall units or backfill behind the wall units; and design, detail and construct any other items necessary to complete the prefabricated retaining walls.

D. Dewatering and the use of Crushed Stone below the groundwater will be considered incidental.

E. As required and approved by the Engineer, excavation and replacement of any unsuitable materials beyond the retaining wall payment limits shown on the Plans will be measured and paid for as defined in Sections 120 and Items 151 or 151.2.

F. PM Wall Representative shall be incidental to this line item.

G. Anti- Graffiti Coating shall be incidental to this line item.

The above schedule applies only to the prefabricated modular (PM) retaining wall system. Payment for similar materials and construction at locations other than at this structure shall not be included under this Item.

Design, installation, and removal of temporary earth supports, where required, are paid for under Item 950.2 Temporary Excavation Support.

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DETAIL SHEETS

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THE COMMONWEALTH OF MASSACHUSETTS
MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
TEN PARK PLAZA-BOSTON MA

ESTIMATE OF QUANTITIES – DETAIL SHEET

CITY-TOWN: Holden
STA: 10+28.37 TO 20+49.63

YEAR: 2026
ROAD: Salisbury Street
CLASS: Urban Minor Arterial

TYPE OF PROJECT: Bridge Replacement H-18-004 Salisbury Street over PW Railroad

DATE: April 24th, 2026

Unclassified Excavation	1550	Cu. Yards	Ordinary Borrow	675	Cu. Yards
Old Pavement Excavation	925	Sq. Yards	Gravel Borrow	390	Cu. Yards
Class "A" Trench Excavation	50	Cu. Yards	Special Borrow	130	Cu. Yards
Class "B" Trench Excavation	10	Cu. Yards	Gravel Borrow for Backfilling		
Class "B" Rock Excavation	50	Cu. Yards	Structures and Pipes	975	Cu. Yards
Bridge Excavation	950	Cu. Yards	Crushed Stone	230	Tons
			Seeding	975	Sq. Yards
			Loam for Lawns	140	Cu. Yards

Proposed Pavement Milling and Overlay **AREA = 910 SY**

Surface Course: 1 1/2" Superpave Bridge Surface Course 9.5 Polymer (SSC-B-9.5-P) over Asphalt Emulsion for Tack Coat (Rs-1h) over

Milling: 1 1/2" Pavement Fine Milling

Proposed Full Depth Pavement **AREA = 1882 SY**

Surface Course: 1 1/2" Superpave Bridge Surface Course 9.5 Polymer (SSC-B-9.5-P) over Asphalt Emulsion for Tack Coat (Rs-1h) over

Intermediate Course: 2 3/4" Superpave Intermediate Course 19.0 (SIC-19.0) over Asphalt Emulsion for Tack Coat (RS-1h) over

Base Course: 4" Superpave Base Course 37.5 (SBC-37.5) over

Subbase: 4" Dense Graded Crushed Stone over
8" Gravel Borrow Type b

Proposed Hot Mix Asphalt Sidewalk or Driveway **AREA = 191 SY**

HMA Sidewalk
Surface Course: 1 1/4" Superpave Surface Course 9.5 (SSC-9.5) over
1 3/4" Superpave Intermediate Course 12.5 (SSC-12.5)

Foundation: 8" Gravel Borrow Type b

HMA Driveway
Surface Course: 1 1/2" Superpave Surface Course 9.5 (SSC-9.5) over
2 1/2" Superpave Intermediate Course 12.5 (SSC-12.5)

Foundation: 8" Gravel Borrow Type b

Cement Concrete Sidewalk and Pedestrian Curb Ramp **AREA = 427 SY**

Surface: 4" Air-entrained, 4000 psi, ¾", 610 lb cement concrete over
Foundation: 8" Gravel Borrow, Type b

Cement Concrete Sidewalk Through Driveway **AREA = 19 SY**

Surface: 6" Air-entrained, 4000 psi, ¾", 610 lb cement concrete over
Foundation: 8" Gravel Borrow, Type b

Project File No. 612190

ESTIMATE OF QUANTITIES – DETAIL SHEET

City-Town: Holden
Road: Salisbury Street

101. Clearing and Grubbing

The contractor shall clear and grub the side slopes to the bottom of the proposed slope limits shown on the Construction Plans and where required by the Engineer.

Salisbury Street Const BL

Centroid Station	Centroid Offset
15+08.25	28.70 LT
16+89.25	25.98 LT

102.511 Tree Protection – Armoring & Pruning

As shown on the Construction Plans and where required by the Engineer to protect individual trees from damage during construction.

Salisbury Street Const BL

Station	Offset
12+16.20	19.77 LT
13+04.44	23.88 LT
13+18.57	34.30 RT
13+18.81	37.14 RT

102.521 Tree and Plant Protection Fence

As shown on the Construction Plans and where required by the Engineer to protect individual trees from damage during construction.

Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
13+04.31	28.91 LT	13+43.24	23.66 LT
16+57.63	65.53 RT	16+75.95	63.34 RT

103. Tree Removed – Diameter Under 24 Inches

As shown on the Construction plans or as required by the Engineer.
Salisbury Street Const BL

Type	Station	Offset
12M	13+28.50	35.90 RT
12A	15+77.22	33.31 LT
9A	15+80.31	29.84 LT
6RO	15+83.13	22.17 LT
9RO	15+83.29	39.31 LT
6-CLUSTER	15+86.18	30.16 LT

104. Tree Removed – Diameter 24 Inches and Over

As shown on the Construction plans or as required by the Engineer.

Salisbury Street Const BL

Type	Station	Offset
24T	12+91.30	20.28 LT

105. Stump Removed

As shown on the Construction plans or as required by the Engineer.

Salisbury Street Const BL

Station	Offset
12+91.30	20.28 LT

129.2 Old Pavement Excavation

The contractor shall remove old roadway pavement where the profile is being raised, as shown on the Construction plans or as required by the Engineer.

Salisbury Street Const BL

Start Station	End Station
14+67.00	18+00.00

141.1 Test Pit for Exploration

1 test pit per proposed drainage location, and proposed utility pole set in caisson as shown on the Utility Plans, or as required by the Engineer.

Salisbury Street Const BL

Station	Offset
13+58	12 LT
13+72	12 RT
14+15	12 LT
15+27	27 LT
17+65	12 RT
17+90	23 RT

1 test pit per proposed temp wood pole and proposed temp pedestrian signal head for the Temporary Traffic Signal at Main Street/Bailey Road as shown on the Temporary Traffic Signal Plans, or as required by the Engineer.

Number of Temporary Wood Poles: 2
Number of Temporary Pedestrian Signals: 4

201. Catch Basin

As shown in the Utility Plans.

Salisbury Street Const BL

Station	Offset
13+72.40	12.00 RT
14+15.70	12.00 LT
17+49.43	13.24 RT

202. Manhole

As shown in the Utility Plans.

Salisbury Street Const BL

Station	Offset
17+90.78	22.91 RT

220. Drainage Structure Adjusted

Adjustment of 6 inches or less of structures from existing grade to finished grade, as directed by the Engineer. Refer to Utility Plans.

Salisbury Street Const BL

Type	Station	Offset
DMH	12+47.35	4.29 RT
CB	12+62.78	12.28 RT
DMH	20+44.30	10.58 LT

220.3 Drainage Structure Change in Type

As shown in the Utility Plans.

Salisbury Street Const BL

Station	Offset
13+58.30	11.91 LT

222.3 Frame and Grate (or Cover) Municipal Standard

For all new proposed catch basins, drain manhole, change in type structures, and for adjusted catch basins and manholes as directed by the Engineer. Refer to Utility Plans.

Salisbury Street Const BL

Station	Offset
13+72.40	12.00 RT
14+15.70	12.00 LT
17+49.43	13.24 RT
12+47.35	4.29 RT
12+62.78	12.28 RT
20+44.30	10.58 LT
13+58.30	11.91 LT
17+90.78	22.91 RT

227.4 Masonry Plug

To plug pipes to be abandoned as shown on the Utility Plans and as directed by the Engineer.

Salisbury Street Const BL

Station	Offset
17+89.16	27.04 RT

243.12 12 Inch Reinforced Concrete Pipe Class IV

As shown in the Utility Plans.

Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
13+72.40	12.01 RT	13+58.27	11.91 LT
14+15.67	12.00 LT	13+58.27	11.99 LT
17+49.43	13.24 RT	17+90.75	23.05 RT

358. Gate Box Adjusted

As shown in the Utility Plans.

Salisbury Street Const BL

Station	Offset
12+74.47	16.05 RT
18+19.04	10.54 LT

376.5 Hydrant Adjusted

As shown in the Utility Plans.

Salisbury Street Const BL

Station	Offset
18+19.17	16.78 LT

482.4 Sawcutting Portland Cement Concrete

As shown on the Construction and Curb Tie Plans.

Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
11+10.56	16.46 RT	11+10.44	20.93 RT

504.2 Granite Curb Type VA4 – Splayed End

As shown on the Construction and Curb Tie Plans

Salisbury Street Const BL

Station	Offset
15+52.25	15.04 RT
16+28.10	15.02 RT

506. Granite Curb Type VB- Straight

As shown on the Construction and Curb Tie Plans.

Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
11+10.58	15.97 RT	12+33.43	13.05 RT
11+39.10	21.68 LT	12+34.00	14.51 LT
12+62.43	13.64 LT	13+35.82	13.60 LT
12+66.93	13.21 RT	15+50.25	15.04 RT
13+44.96	16.04 LT	13+60.67	24.83 LT
14+12.60	13.00 LT	15+36.16	15.00 LT
16+30.10	15.01 RT	17+55.86	14.15 RT
16+53.74	15.00 LT	17+68.10	13.00 LT
18+04.84	13.05 LT	18+40.15	13.18 LT
18+08.44	35.16 RT	18+09.97	31.68 RT
18+35.10	15.47 RT	18+46.74	15.17 RT

506.1 Granite Curb Type VB- Curved

As shown on the Construction and Curb Tie Plans.

Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
13+35.82	13.60 LT	13+44.96	16.04 LT
14+00.46	19.29 LT	14+12.60	13.00 LT
18+09.97	31.68 RT	18+17.25	22.22 RT
18+21.26	19.36 RT	18+35.10	15.47 RT

509. Granite Transition Curbs for Pedestrian Curb Ramps - Straight

Transition from 6-inch reveal (unless noted otherwise on pedestrian curb ramp and driveway tables) to flush reveal at sidewalk and driveways and meet existing ground surface at limits of work.

Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
12+33.43	13.05 RT	12+39.93	13.08 RT
12+34.00	14.51 LT	12+40.50	14.24 LT
12+51.93	13.14 RT	12+66.93	13.21 RT
12+55.93	13.77 LT	12+62.43	13.64 LT
15+36.16	15.00 LT	15+42.66	15.00 LT
16+47.24	15.00 LT	16+53.74	15.00 LT
17+68.10	13.00 LT	17+74.69	13.00 LT
17+98.25	13.03 LT	18+04.84	13.05 LT
18+40.15	13.18 LT	18+46.75	13.21 LT

509.1 Granite Transition Curbs for Pedestrian Curb Ramps - Curved

Transition from 6-inch reveal (unless noted otherwise on pedestrian curb ramp and driveway tables) to flush reveal at sidewalk and driveways.

Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
14+00.32	24.95 LT	14+00.46	19.29 LT
17+55.86	14.15 RT	17+62.40	15.09 RT

514. Granite Curb Inlet - Straight

As shown on the Construction and Curb Tie Plans.

Salisbury Street Const BL

Station	Offset
13+72.40	12.00 RT
14+15.70	12.00 LT
17+49.43	13.24 RT

570.3 Hot Mix Asphalt Curb Type 3

As shown on the Construction and Curb Tie Plans.
Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
18+46.74	15.17 RT	18+76.70	13.52 RT
18+64.72	12.89 LT	19+65.09	14.98 LT
18+99.31	12.17 RT	20+01.05	12.22 RT
19+86.91	14.73 LT	20+49.63	12.32 LT
20+21.23	12.56 RT	20+43.76	15.67 RT
20+45.41	15.35 RT	20+49.63	13.35 RT

595. Curb Inlet Removed and Discarded

As shown on the Construction and Curb Tie Plans.

Salisbury Street Const BL

Station	Offset
17+89.81	22.85 RT

630.2 Highway Guard Removed and Discarded

As shown on the Construction Plans and where required by the Engineer.

Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
13+06.43	16.56 RT	15+45.87	16.76 RT
13+97.69	16.11 LT	15+63.11	15.57 LT
16+36.72	16.50 RT	17+38.67	15.74 RT
16+53.94	15.45 LT	17+69.56	15.23 LT

634.11 Thrie Beam Guardrail System

As shown on the Construction Plans and where required by the Engineer.

657. Temporary Fence
657.5 Temporary Fence Removed and Reset

As shown on the Temporary Traffic Control Plans and where required by the Engineer.

767.121 Sediment Control Barrier

Throughout project on side slopes as shown on the Construction Plans. Additional locations as directed by the Engineer.

Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
11+40.77	29.82 RT	12+31.50	25.95 RT
12+78.74	27.73 RT	15+54.31	49.43 RT

772.161 Tree Evergreen – Nigra American Arborvitae – 5-6 Feet

As shown on the Construction Plans.

Salisbury Street Const BL

Station	Offset
17+01.46	32.72 LT
17+05.55	24.31 LT
17+14.09	26.73 LT
16+93.02	31.08 RT
17+03.48	29.35 RT
17+12.02	28.49 RT
17+22.37	27.30 RT

772.335 Tree Evergreen – Eastern Red Cedar – 4-5 Feet

As shown on the Construction Plans.

Salisbury Street Const BL

Station	Offset
17+10.07	33.00 LT
17+60.19	21.37 LT
17+67.30	20.56 LT
17+46.73	24.41 RT
17+51.61	31.13 RT

774.638 Tree Evergreen – White Spruce 5-6 Feet

As shown on the Construction Plans.
Salisbury Street Const BL

Station	Offset
17+25.13	26.20 LT
17+36.33	21.65 LT
17+49.70	22.97 LT
16+59.06	49.30 RT
16+69.70	42.21 RT
16+81.20	34.82 RT
17+34.51	28.53 RT

816.81 Temporary Traffic Control Signal

Temporary signal to be installed within the intersection of Main Street (Route 122A) and Bailey Road.

860.112 12 Inch Reflectorized White Line (Painted)

As shown on the Temporary Traffic Control Plans. Temporary stop lines for the temporary signal at the intersection of Main Street (Route 122A) and Bailey Road.

862.506 6-IN. Recessed White Line (MC, FD, WR)

Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
11+10.99	14.57 RT	20+49.63	11.64 RT
11+26.81	21.97 LT	20+49.63	11.13 LT

862.512 12-IN. Recessed White Line (MC, FD, WR)

Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
17+62.40	15.09 RT	18+26.65	15.12 RT
17+67.62	14.92 RT	17+67.69	17.32 RT
17+70.57	14.84 RT	17+70.70	19.51 RT
17+73.53	14.77 RT	17+73.69	22.22 RT
17+75.63	24.72 RT	18+14.63	24.76 RT
17+76.48	14.70 RT	17+76.67	24.70 RT
17+79.43	14.65 RT	17+79.59	24.65 RT
17+82.38	14.60 RT	17+82.51	24.60 RT
17+85.33	14.57 RT	17+85.43	24.57 RT
17+88.28	14.54 RT	17+88.35	24.54 RT
17+91.24	14.53 RT	17+91.27	24.53 RT
17+94.19	14.52 RT	17+94.19	24.52 RT
17+94.72	28.52 RT	18+11.63	28.70 RT
17+97.11	24.53 RT	17+97.14	14.53 RT
18+00.03	24.54 RT	18+00.09	14.54 RT
18+02.95	24.57 RT	18+03.04	14.57 RT
18+05.87	24.60 RT	18+06.00	14.60 RT
18+08.79	24.64 RT	18+08.95	14.65 RT
18+11.71	24.70 RT	18+11.90	14.70 RT
18+14.63	24.76 RT	18+14.85	14.76 RT
18+17.62	21.90 RT	18+17.80	14.84 RT
18+20.61	19.75 RT	18+20.75	14.92 RT
18+23.60	18.12 RT	18+23.70	15.01 RT

863.506 6-IN. Recessed Yellow Line (MC,FD,WR)

Salisbury Street Const BL

Start Station	Start Offset	End Station	End Offset
11+16.97	0.91 LT	20+49.63	0.50 LT
11+16.49	1.88 RT	20+49.63	0.50 RT

874.2 Traffic Sign Removed and Reset

As shown on the Sign and Pavement Plans.

Salisbury Street Const BL

Station	Offset
11+43.17	23.90 RT
12+28.63	17.46 LT
17+00.15	18.19 LT

874.4 Traffic Sign Removed and Stacked

For removal and stacking of traffic signs as shown on the Sign and Pavement Marking Plans.

Salisbury Street Const BL

Station	Offset
13+19.91	20.28 RT
17+81.13	17.07 RT

876.5 Solar Panels and Post Removed and Stacked

For removal and stacking of solar panels as shown on the Construction Plans.

Salisbury Street Const BL

Station	Offset
16+44.06	29.39 RT

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RAILROAD SPECIAL PROVISIONS

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OFFICE OF ASSISTANT VICE PRESIDENT – ENGINEERING DESIGN

General Specifications for
Sub-grade and Above Grade Utility Crossings of
Railroad's Right-of-Way

I. General Provisions

A. **Plan and cross-section (profile of crossing) drawings** (see example drawing ES 8090.2 and ES 8090.4) containing all pertinent details for the proposed crossing shall be submitted to the Engineering Department for approval prior to the preparation of any agreement. Plans shall illustrate the profile in relation to actual ground, track, and other facilities at the project site. All crossings (above grade/sub-grade) shall be substantially perpendicular to the Railroad Main Line and shall not be placed within a culvert or under bridges. The location of crossing shall be limited to crossing as few tracks as possible.

B. The plan will show all information for the proposed crossing installation with reference to the nearest railroad mile post or centerline of nearest street intersection.

C. The method of construction **will be detailed in the application.** Measurements should be made perpendicular to the track.

D. Request for installation shall be accompanied with a letter signed by the owner, company officer, or government agent.

E. The railroad will make the sole determination when flagmen are required and when railroad construction inspection may be required. Costs for these services are at the sole expense of the lessee. Advanced payment for the estimated costs of these services may be required.

F. The lessee will be responsible for any and all costs of repairs or maintenance of the Railroad's property and structures disturbed or damaged due to the installation or construction aftereffects.

G. The lessee of an installation approved by agreement will be required to provide proof of protective insurance for and during construction.

H. All power and communication lines constructed over, under or parallel to the railroad shall meet or exceed the requirements of the National Electric Safety Code (Canadian Standards Association in Canada), latest revision and all applicable state/province and local codes.

I. Where laws or orders of public authority prescribe a higher degree of protection than specified herein, then the higher degree of protection shall be deemed a part of these specifications.

II. Sub-grade Pipelines and Cables

A. General

1. **Plan and cross-section (profile of pipe) drawings** for pipeline crossings shall include the following information: (see example drawing ES 8090.4)
   - Distance from nearest mile post or road crossing
   - Distance from base of rail to top of outer most pipe
   - Minimum distance from natural ground or ditch line to top of outer most pipe
   - Casing length as dimensioned from the center of main track
   - Angle of crossing
   - Railroad right-of-way boundaries including distances from centerline of main track
   - Bore pit locations (including distances from the nearest track)
   - Carrier and casing pipe dimensions
   - Right of way warning sign locations
   - Vent pipe locations
   - Shut-off valve locations
   - GPS Coordinates

2. The method of installation **will be detailed in the application,** including the location of jacking pits and receiving pits as measured from centerline of nearest track. Measurements should be made perpendicular to the track.

3. All sub-grade carrier pipelines conveying liquids and wirelines shall be installed within a casing pipe (See exception for HDPE housing fiber-optic and other communication lines – Paragraph 7 below). Gas pipelines may be installed without casing provided that installation is 10 feet (3.05 m) or more below the base of rail to the top of pipe at its closest point and steel carrier pipe is used (see section II D below and see Table 1). The casing pipe may be omitted for non-pressure sewer or drainage crossing, where installation can be made by open cut (not normally allowed) or where reinforced concrete pipe can be jacked under the railroad.

4. Bore pit locations must be outside of Railroad right-of-way lines. Normally no open-cut crossings will be allowed. The pit will be protected with adequate sheeting, bulkheads, and sidewalls to protect the Railroad's roadbed. Proper barricades and lights, if necessary will be set around the pit for positive protection.

5. **All pipelines** (except those in streets) shall be prominently marked at right-of-way lines (on both sides of track for crossings) by durable, weatherproof signs located over the centerline of the pipe. Signs shall show the following:

   Name and address of owner
   Contents of pipe
   Pressure in pipe
   Pipe depth below graded at point of a sign
   Emergency telephone number in event of pipeline rupture

   Location of signs must be shown on both the plan and cross-section (profile of pipe) drawings.

6. Owner must maintain all signs on Railroad's right-of-way as long as the occupational agreement is in effect.

7. **Schedule 80 HDPE pipe** (SDR11 pipe is acceptable for pipes 2" in (50.8 mm) diameter or greater) is acceptable (with no casing pipe) for use when housing fiber optic or other communication lines. A metallic ribbon or wire must be included in the pipe to allow for radio locating at a later date.

8. At no time will construction interfere with the normal and safe operation of the Railroad. No construction, manpower, or equipment will enter or operate on the right-of-way within a safety clearance of 25.0 feet (7.6 m) from the centerline of near track. A railroad flagman must be present during any work on the railroad right-of-way. For pipes greater than 48 inches in diameter the following requirements apply:

9. All casing or pipe installations where the diameter is greater than 72 inches (1.83) will require a pre-construction conference with all parties, at the project location.

10. Pre-construction arrangements will be made with the Railroad at least one week prior to construction. A Railroad inspector must be present during the entire installation of the casing pipe. The inspector will have complete authority over the project on the Railroad's right-of-way.

11. All Construction Inspection Costs will be borne by the lessee.

12. Pipelines shall, where practicable, cross the railroad where tracks are carried on an embankment.

13. Pipeline shall not be placed within the limits of a turnout (switch) when crossing the track. The limits of the turnout extend from the point of switch to 15 feet (4.6 m) beyond the last long timber.

14. Pipeline shall not be placed within 50 feet (15.25 m) of a railroad bridge, building or other important structure.

B. Pipeline Casing Requirements:

1. All casing pipes will extend from right-of-way line to right-of-way line protecting the entire R/W crossing.

2. The Railroad will not permit casing installation by open-cut method through the track(s) roadbed.

3. The casing pipe may be omitted for non-pressure sewer or drainage crossings where class V, reinforced concrete pipe can be jacked under the railroad.

4. All electrical wirelines and gas pipelines (less than 10 feet (3.05 m) below base of rail) shall be encased with steel pipe.

5. The casing pipe must be installed at least 5.5 feet (1.7 m) below base of rail or a minimum of 3 feet (0.91 m) from natural ground grade or bottom of ditches (whichever is greater)(see Table 1).

6. Steel casing pipe: For carrier pipe less than 6 inches (168.3 mm) in diameter, the inside diameter of the casing pipe shall be at least 2 inches (50.8 mm) greater than the largest outside diameter of the carrier pipe joints or couplings. For carrier pipe 6 inches or greater in diameter, the inside diameter of the casing pipe shall be at least 4 inches (101.6 mm) greater than the largest outside diameter of the carrier pipe joints or couplings. Steel pipe shall have a specified minimum yield strength, SMYS, of at least 35,000 psi (241 Mpa). The ASTM or API specification and grade for the pipe are to be shown on the application form.

7. All joints or couplings, supports, insulators or centering devices for the carrier pipe shall be considered in the selection of the casing diameter.

8. Casing pipe shall have a **minimum** wall thickness as shown in the table provided below, unless computations indicate that a thicker wall is required (see paragraph 9). When casing is installed without benefit of a protective coating or said casing is not cathodically protected, the wall thickness shall be increased to the nearest standard size which is a minimum of 0.063 inches greater than the thickness required except for diameters under 12-3/4 inches. Wall thickness designations for steel casing pipe for Cooper E-80 loading including impact are as follows:

Nominal Diameter (inches)	Min. Thickness for Coated (inches)	Non Coated (inches)
12-3/4 and under (324 mm)	0.188 (4.77 mm)	0.188 (4.77 mm)
14 (356 mm)	0.188 (4.77 mm)	0.250 (6.35 mm)
16 (406 mm)	0.219 (5.59 mm)	0.281 (7.14 mm)
18 (457 mm)	0.250 (6.35 mm)	0.312 (7.92 mm)
20 and 22 (508 & 559 mm)	0.281 (7.14 mm)	0.344 (8.74 mm)
24 (610 mm)	0.312 (7.92 mm)	0.375 (9.53 mm)
26 (660 mm)	0.344 (8.74 mm)	0.406 (10.31 mm)
28 (711 mm)	0.375 (9.53 mm)	0.438 (11.13 mm)
30 (762 mm)	0.406 (10.31 mm)	0.469 (11.91 mm)
32 (813 mm)	0.438 (11.13 mm)	0.500 (12.70 mm)
34 and 36 (864 & 914 mm)	0.469 (11.91 mm)	0.531 (13.49 mm)
38 (965 mm)	0.500 (12.70 mm)	0.563 (14.27 mm)
40 (1016 mm)	0.531 (13.49 mm)	0.594 (15.09 mm)
42 (1067mm)	0.563 (14.27 mm)	0.625 (15.88 mm)
44 and 46 (1118 & 1168 mm)	0.594 (15.09 mm)	0.656 (16.66 mm)
48 (1219 mm)	0.625 (15.88 mm)	0.688 (17.48 mm)
50 (1270 mm)	0.656 (16.66 mm)	0.719 (18.26 mm)
52 (1321 mm)	0.688 (17.48 mm)	0.750 (19.05 mm)
54 (1372 mm)	0.719 (18.26 mm)	0.781 (19.84 mm)
56 and 58 (1422 & 1473 mm)	0.750 (19.05 mm)	0.813 (20.62 mm)
60 (1524 mm)	0.718 (19.84 mm)	0.844 (24.61 mm)
62 (1575 mm)	0.813 (20.62 mm)	0.875 (22.23 mm)
64 (1626 mm)	0.844 (21.44 mm)	0.906 (23.01 mm)

66 and 68 (1676 & 1727 mm)	0.875 (22.23 mm)	0.938 (23.83 mm)
70 (1778 mm)	0.906 (23.01 mm)	0.969 (24.61 mm)
72 (1829 mm)	0.938 (23.83 mm)	1.000 (25.40 mm)

(*) = Casing Pipe diameters exceeding 72 inches require review and approval from Railroad AVP - Design prior to use.

9. If casing pipe wall thickness deviates from the table in Subsection B.8, all casing thickness determinations will be based on Cooper E-80 Railroad Loading, using applicable formulas and computations performed by a registered professional engineer, registration must be in the project State. The (Signed/Sealed) computation results will accompany the plans for review by the Engineering Department.

10. All casing pipe joints will be welded in accordance with AISC Specifications, Section 1-7-2. All joint welds will be full penetration.

11. The inside diameter of the casing pipe shall be such as to allow the carrier pipe to be removed subsequently without disturbing the casing or the roadbed.

12. Casing Pipe Vents - All casing pipes, with the exception of electrical, communication or sewer lines, shall be properly vented. Vent pipes shall be of sufficient diameter, but in no case less than two (2) inches in diameter and shall be attached near each end of casing, projecting through ground surface and located a minimum of 45 feet from the centerline of the nearest track but preferably outside of Railroad property limits. Vent pipes shall extend not less than four (4) feet above ground surface. Top of vent pipes shall be fitted with a down-turned elbow, properly screened; or a relief valve installed.

13. All Casing pipe ends that are below ground level shall be constructed as to prevent leakage of any substance from the casing throughout its length. Each end of the casing shall require a sufficient seal to prevent the potential for leakage of any substance from the casing pipe. Grout fill is an acceptable method installed by pressure grouting. If used, the grout material should consist of non-shrink sand cement slurry or Railroad approved equivalent, and sufficiently seal the casing pipe ends to the satisfaction of the Railroad. If deemed necessary, and at the sole discretion of the AVP - Design, the entire void between the carrier pipe and casing pipe throughout the entire length of the casing pipe may be required to be filled upon notification from the Railroad. In this case vent pipes are not required.

C. Carrier Pipeline Specifications:

1. Reinforced concrete pipe:

   - Materials: Modified bell and spigot or tongue and groove in accordance with current ASTM Specification C76 Class V for Railroad strength pipe or current specification for pre-stressed concrete pipe.

   - Joints: Rubber and steel joint for pre-stressed pipe in accordance with current Lock Joint Pipe Company Specification on SP5, or equivalent. Joints for bell and spigot and tongue and groove pipe to be in accordance with current standard practice. Joints may be made using confined continuous rubber gasket.

2. Cast iron pipe:

- Materials: Pipe must conform to current ASTM Specification A142 for "Standard Pipe."

- Joints: Bell and spigot, caulked with lead and oakum, or approved mechanical type joint.

3. Plastic Pipe: The use of plastic carrier pipe for sewer, water, natural gas and other liquids is acceptable under specific circumstances per AREMA. The use of plastic pipe is satisfactory if the pipe is designed to meet all applicable federal and state codes, and if the carrier pipe is encased within a steel casing pipe per AREMA standards. The casing must extend the full width of the right-of-way. Plastic pipe material shall be resistant to the chemicals with which contact can be anticipated. Plastic carrier pipe shall not be utilized where there is potential for contact with petroleum contaminated soils or other non-polar organic compounds that may be present in surrounding soils.

4. Polyethylene pipe (HDPE): Pipe must conform to the current ASTM Specifications D2104, Schedule 40, for standard pipe when encased with steel casing.

5. Steel pipe:

   - Materials: Pipe must conform to current ASTM Specification A120.

   - Joints: All joints must be welded or of an approved mechanical type.

     - Steel pipe shall not be used to convey sewage, storm water or other liquids which could cause corrosion.

6. Carrier Pipe Shut-Off Valves - Carrier pipe under pressure shall have a sufficient shut-off valve(s) at each end outside of Railroad's right-of-way limits. Accessible emergency shut-off valves shall be installed within effective distances (normally within 2000 feet) each side of the railway as mutually agreed to by the engineer and the pipeline company. These valves should be marked with signs for identification. Where pipelines are provided with automatic control stations at locations and within distances approved by the engineer, no additional valves shall be required.

D. Uncased Gas Pipelines

1. Carrier line pipe under railroad tracks must be a **minimum 10 feet below base of rail** to top of pipe at its closest point. At all other locations on the rights-of-way the minimum ground cover must be 6 feet (see Table 1). Where it is not possible to secure the above depths, casings as specified in section II, B will be required.

2. Carrier pipe must be steel and conform to the requirements of ANSI B 31.8 Gas Transmission and Piping Systems, and other applicable ANSI Codes. All steel carrier pipes must be coated and cathodically protected to industry standards.

3. Joints for the carrier line pipe must be of an approved welded type. Steel pipe must have a specified minimum yield strength (SMYS), of at least 35,000 psi. The nominal wall thickness for the steel carrier pipe, SMYS, maximum allowable operating pressure (MAOP), and outside pipe diameter (D), are given in Appendix A.

4. Uncased gas pipelines shall be installed by boring or jacking or horizontal directional drilling (HDD).

E. Longitudinal Pipelines

1. Pipelines laid longitudinally on the Railroad's right-of-way shall be located as far as practicable from any tracks or other important structures and as close to the property line as possible. Longitudinal pipelines must not be located in earth embankments or within ditches located on the right-of-way. They must not be within 25 feet of any track and must have a minimum of 6 feet ground cover for flammable substances and 4 feet for non-flammable substances over the pipeline up to 50 feet, measured from the track centerline. Where pipeline is laid more than 50 feet from centerline of track, minimum cover shall be at least 5 feet for flammable substances and 3 feet for non-flammable substances. Longitudinal carrier pipeline shall be steel. Plastic carrier pipe may be utilized for longitudinal installation with approval by the engineer, but shall be encased within the limits of the right-of-way. Casing may be omitted with approval of the engineer, provided that minimum burial depth is increased to comply with the most conservative requirements of either: the engineer's instructions, current ANSI specifications, current OSHA regulations, or local regulatory agency specifications.

2. Allowable hoop stresses must comply with AREMA requirements and all applicable federal, state and local codes.

3. If Horizontal Directional Drilling (HDD) is used as the method of installation for the longitudinal occupancy, the minimum required depths in paragraph 1 above are increased by 2 feet.

4. For pipelines running longitudinally on the Railroad's property, signs shall be placed over the pipe (or offset and appropriately marked) at all changes in direction of the pipeline. Such signs should also be located so that when standing at one sign the next adjacent marker in either direction is visible. In no event shall they be placed more than 500 feet apart. Right of way warning signs must be shown on the plan view drawing.

F. Tunnel Liner Requirements:

1. All applicable preceding sections will govern tunnel liner usage.

2. Tunnel liner plate will be 12-gauge, galvanized, and all bolts and nuts will be galvanized.

3. Live load will be based on Cooper E-80 Railroad Loading, using applicable formulas and computations performed by a registered professional engineer, registration must be in the Project State. The (signed/Sealed) computation results will accompany the plans for review by the Engineering Department.

4. Grout holes, if required will be provided at 10-foot intervals along the roof and sides.

5. The tunnel liner-jacking shield will protect 180 degrees of the upper section and material removed to allow for a minimum 1:1 slope, with a minimum 2.0 feet of undisturbed soil supporting the overburden.

6. The tunnel liner installation will progress with sufficient manpower and supervision for around-the-clock construction until the liner is completed, through the limits of the right-of-way.

G. Abandoned Facilities

1. The owner of all pipe crossings proposed for abandonment shall notify the Railroad, in writing, of the intention to abandon.

2. Abandoned pipelines (carrier or casings) with an outer diameter greater than 2 inches shall be completely filled with cement grout, compacted sand, or other methods, as approved by the Railroad.

3. Abandoned manholes and other structures shall be removed to a minimum depth of 2 feet below finished grade and completely filled with cement grout, compacted sand, or other methods as approved by the Railroad.

4. The location of abandoned facilities shall be recorded and records maintained by the pipeline owner.

H. Guidelines for Horizontal Directional Drilling (HDD) Under Tracks

1. For pipelines conveying gas or liquid substances, steel pipe only may be installed under track(s) and/or right-of-way utilizing horizontal directional drilling.

2. For outermost pipe diameters 6 inches or less, the depth below natural ground or railroad ditch will be 1 ft greater than that allowed using the jack and bore method for each commodity. For outermost pipe diameters greater than 6 inches, the depth below natural ground or railroad ditch will be 2 ft greater than that allow using the jack and bore method for each commodity (see Table 1). For longitudinal occupancies, see E.3 above for the required depths.

3. For wireline installations, including fiber optic cable, HDPE Sch 80 or stronger pipe may be installed as the outermost pipe. Bundling is prohibited. All innerducts must have an outer casing pipe.

4. Minimum cover for all pipelines with outside diameter of 6 inches or less, regardless of product, shall be 10 feet minimum below base of rail. For all liquid or gas installations regardless of product, with nominal pipe sizes exceeding 6 inches outside diameter, minimum cover (measured from base of rail to top of pipe) shall be a minimum of 25 feet. For fiber optics or electrical installations, with casing/conduit nominal size exceeding 6 inches, minimum cover shall be 15 feet (see Table 1).

5. Applicant submittal shall include actual planned depth of pipe under each railroad track. The plan and profile views must show the entire bore, including the sending and receiving pits, regardless of the right-of-way limits.

6. Applicant must provide pipe specifications for casing and carrier pipes. Pipe must satisfy all applicable government and industry regulations.

7. Applicant must provide qualifications of drilling contractor, including specific instances of previous successful experience in drilling under railroad and other sensitive surface facilities.

8. Prior to commencement of drilling:

   a. The contractor must submit a Boring Plan that describes the anticipated rig capacity, the proposed equipment and the method for advancing the bore hole through expected soil conditions, angles, depth and exact location of the exit ditch, the pilot hole diameter, the proposed reaming plan, including the diameter of the pre-reams/back-reams and diameter of the final reamed bore hole, and the contingency equipment and plans for dealing with soil conditions that a soils engineer could reasonably expect to be encountered at the proposed HDD installation site. The Boring Plan should also address the anticipated hours of operation during the HDD bore hole drilling and installation process, the minimum number of personnel and their responsibilities on-duty and on-site during all HDD drilling operations. Consideration for working hours must be given to minimize risk to railroad operations during drilling operations. See "Additional Guidelines" (Item 10) for additional bore guidelines.

   b. The contractor must provide a detailed Fracture Mitigation (frac-out) Plan, including method of monitoring quantity and capturing the return of drilling fluids with particular attention to variation from proposed plan (i.e. volumes, pressure, or consistency).

   c. The contractor must establish a Survey Grid Line and provide a program of monitoring and documenting the actual location of the bore hole during drilling operations.

9. An engineering inspector is required to monitor the ground and track for movement during drilling, reaming, and pullback processes. The engineering inspector shall be provided by the applicant at their sole cost and expense. The installation process and all train movement must be immediately stopped if ground or track movement is detected. The damaged area must be immediately repaired. The installation process must be reviewed and modified as required before the installation can proceed. Applicant must pay all expenses for review and inspection.

10. Bore Plan Additional Requirements
    In addition to all the requirements outlined in the above guidelines, the bore plan should include the following:

    - Pre-bore survey grid line with angles and depths defined
    - Statement that once the bore enters railroad property, the work will be continuous until the drilling is complete and the pipe is pulled into place.
    - Statement that the bore will be tracked constantly, with the location and depth marked every 10 feet.
    - If the commodity to be conveyed permits the use of HDPE pipe, it must be schedule 80 (SDR11 pipe is acceptable for pipes 2" in (50.8 mm) diameter or greater) or better (thicker wall).
    - The maximum size of the bore hole may not exceed Outside Diameter (OD) X 1.5 if OD is 10 inches or less. If the OD is greater than 10 inches, the bore hole may not exceed OD X 1.3.
    - A defined slurry recovery method. Disposal on railroad property or within railroad ditches and facilities is prohibited.

- The launching and receiving pits must be situated at minimum outside the railroad right-of-way. In cases where the slope of the railroad grade extends beyond the right-of-way, pits must be located beyond the toe of the slope so as not to compromise the railroad grade.
- Statement of expected soil conditions and statement of all drill heads on site for expected and unexpected soil conditions.
- Specifications and capacities of the bore machine. This includes:
  - Maximum capacities
  - Intended capacities
  - Maximum drilling RPM
  - Intended drilling RPM
  - Maximum drilling PSI
  - Intended drilling PSI
  - Maximum GPM
  - Intended GPM

Table 1. UNDERGROUND PIPE DEPTH REQUIREMENTS

REQUIRED DEPTHS FROM BASE OF RAIL TO TOP OF PIPE

Commodity	Jack and Bore		Horizontal Direction Drill	
	Outermost Dia 6 Inch or less	Outermost Dia Greater than 6 Inch	Outermost Dia 6 Inch or less	Outermost Dia Greater than 6 Inch
Electrical	5.5 ft (1.68 m)	5.5 ft (1.68 m)	10 ft (3.05 m)	15 ft (4.57 m)
Fiber Optic	5.5 ft (1.68 m)	5.5 ft (1.68 m)	10 ft (3.05 m)	15 ft (4.57 m)
Non-Pressurized Liquid	5.5 ft (1.68 m)	5.5 ft (1.68 m)	10 ft (3.05 m)	25 ft (7.62 m)
Pressurized Liquid	5.5 ft (1.68 m)	5.5 ft (1.68 m)	10 ft (3.05 m)	25 ft (7.62 m)
Gas	5.5 ft (1.68 m) or 10 ft (3.05 m) if uncased	5.5 ft (1.68 m) or 10 ft (3.05 m) if uncased	10 ft (3.05 m)	25 ft (7.62 m)
Oil	5.5 ft (1.68 m)	5.5 ft (1.68 m)	10 ft (3.05 m)	25 ft (7.62 m)

REQUIRED DEPTHS FROM NATURAL GROUND OR BOTTOM OF DITCH TO TOP OF PIPE

Commodity	Jack and Bore		Horizontal Direction Drill	
	Outermost Dia 6 Inch or less	Outermost Dia Greater than 6 Inch	Outermost Dia 6 Inch or less	Outermost Dia Greater than 6 Inch
Electrical	3 ft (0.92 m)	3 ft (0.92 m)	4 ft (1.22 m)	5 ft (1.52 m)
Fiber Optic	3 ft (0.92 m)	3 ft (0.92 m)	4 ft (1.22 m)	5 ft (1.52 m)
Non-Pressurized Liquid	3 ft (0.92 m)	3 ft (0.92 m)	4 ft (1.22 m)	5 ft (1.52 m)
Pressurized Liquid	3 ft (0.92 m)	3 ft (0.92 m)	4 ft (1.22 m)	5 ft (1.52 m)
Gas	3 ft (0.92 m) or 6 ft (1.83 m) if uncased	3 ft (0.92 m) or 6 ft (1.83 m) if uncased	4 ft (1.22 m) or 7 ft (2.13 m) if uncased	5 ft (1.52 m) or 8 ft (2.44 m) if uncased
Oil	3 ft (0.92 m)	3 ft (0.92 m)	4 ft (1.22 m)	5 ft (1.52 m)

III. Above Grade Structures (Please see Genesee and Wyoming, Inc. Public Projects Manual for all highway overpasses and other public projects)

A. Standard overhead clearances for fixed structures, such as bridges and other overhead fixed structures shall provide a minimum of 23 feet vertical clearance above top of rail (T/R).

B. The bridge or other structure shall completely span the railroad right-of-way. Piers, columns or other structures must be located off the right-of-way.

C. Pre-design conference with the Engineering Department will set forth horizontal clearance of subgrade, grade, and above grade construction and structural limits.

D. The railroad shall be furnished as-built drawings showing the actual clearances as constructed.

E. Crashwalls, per AREMA Specifications, Chapter 8, Article 2.1.5, are required when the face of pier is closer than 25' 0" from the centerline of track, measured perpendicular to the track.

F. Drainage from the bridge shall be preferably collected with drain pipes and drained away from the railroad's right-of-way. Scuppers from the bridge must not drain on to railroad right-of-way.

G. Projects involving stormwater systems shall be designed for a 100 year storm event as a minimum.

H. All highway structures shall have a protective barrier fence that extends at least 8'-0" from the top of sidewalk or driving surface adjacent to the barrier wall. The fence may be placed on top of barrier wall and should also include anti-climb shields or be of a configuration to minimize the likelihood of climbing on the outside of the protective fencing.

I. For guidelines and specifications for progressing project such as highway overpasses, please see Public Projects Manual available at www.GWRR.com

IV. Above Grade Wirelines

A. All installations of aerial lines and cables will provide a minimum clearance above top of rail (T/R) of highest track. Standard overhead clearance for all aerial line crossings, both power and non-power line crossings, shall provide the following clearances (Clearances are based upon the maximum sag conditions, whether sag is created by thermal or physical conditions. refer to drawing ES 8090.2):

Nominal Voltage	Overhead Clearance
0 – 750	27' – 0"
To 15,000	28' – 0"
To 50,000	30' – 0"
69,000	30' – 8"
115,000	32' – 2"
138,000	33' – 0"
345,000	39' – 10"
500,000	45' – 0"
745,000	53' – 2"
765,000	53' – 10"

Nominal Voltage	Canadian Clearance
0 – 750	7.3 m (7.6 m)
To 22,000	7.6 m (7.9 m)
To 50,000	8.1 m (8.4 m)
90,000	8.4 m (8.7 m)
120,000	8.7 m (9.0 m)
150,000	9.0 m (9.3 m)
200,000	9.5 m (9.8 m)
220,000	9.7 m (10.0 m)
318,000	10.7 m (11.0 m)
442,000	11.9 m (12.2 m)

B. At Roadway Grade Crossings, provide safe clearances between warning devices and electrical transmission, distribution cables (including messenger and neutral wires), and all communication lines. All overhead utility crossings shall provide the minimum vertical clearance from top of rail (T/R) of highest track as shown in Subsection A above plus additional clearances necessary to obtain operational clearances from crossing warning device assemblies

1. 6'0" (1.8 m) vertical clearance from Gate tips in vertical position or structure mast (whichever is greater).
2. 13'-6" vertical clearance from Cantilever arm or structure mast (whichever is greater).
3. The minimum clearance from crossing gate tips, cantilever structures, signal masts, signal and other bridges, etc. shall conform to the National Electric Safety Code, section 23, rule 234, but in no case shall the overhead clearances shown in the table above or the additional clearances as outlined in 1 and 2 above be reduced.
4. For Canadian railroads, an additional 0.3 m of vertical clearance above rails shall be provided to account for rail lift per CSA 5.3.1.1 paragraph C.

C. The poles or towers supporting the crossing span should be located outside the railroad's right-of-way. If locating poles or towers outside the right-of-way is not possible, the side clearance of poles and towers from the nearest track shall be not less than 25 feet.

D. Wireline crossings not to be installed within 500 feet of the end of any railroad bridge or 300 feet from the centerline of any culvert or turnout (switch).

E. Wires and cables running longitudinally along the railroad's right-of-way shall be constructed as close to the property lines as possible, except in cases where doing so will interfere with Railroad operations, surface drainage or soil stability.

F. Poles and towers near public road crossings shall be located so as to not interfere with the sight-distance along the railroad from motorists on the public roadway.

G. Should the Railroad add or modify existing crossing warning devices or facilities at any highway grade crossings, existing wire lines or cables shall be raised or relocated immediately on notice from Railroad to lessee and at the sole cost and expense of the lessee.

V. Miscellaneous

A. Cathodic protection of pipelines, cables, or casings:

1. When cathodic protection is provided, it shall be installed so as not to induce currents, which will interfere with the signal apparatus of the Railroad. Any change required in the manner, method, or location of such cathodic protection shall be made at the sole cost and expense of the lessee and to the satisfaction of the Engineering Department of the Railroad.

2. Cathodic protection shall be applied to all pipelines carrying flammable substances on the Railroad's right-of-way.

B. Proposed structures must maintain a minimum 10-foot horizontal clearance to the face of any signal, post, crossing gate or other above grade obstruction.

VI. Standard Drawings

A. The following Standard Reference drawings in reference to these written specifications are available upon request:

1. **ES8049.1** – Mainline Design & Installation of CMP
2. **ES8090.2** – Information Required for Utility Crossing Applications (Overhead)
3. **ES8090.3** – Overhead Bridge Permit Information
4. **ES8090.4** – Information Required for Utility Crossing Applications (Underground)

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TEMPORARY PROTECTION SHIELDS FOR DEMOLITION AND CONSTRUCTION PROVIDENCE AND WORCESTER RAILROAD

Due to the conditions and activities existing at the location of this contract, the contractor will be required, in addition to complying with all Federal State and Local Laws and Regulations and the requirements contained in the Contract Documents and the Standard Specifications pertaining to the safety and health of individuals and the protection of property, to provide and maintain a specific level of protection over the Providence and Worcester Railroad Company's railroad track within the Providence and Worcester Railroad Company's Right of Way during the demolition, construction and or the rehabilitation of the bridge as may be shown on the plans and as described below:

Prior to the start of construction, the Contractor shall be required to submit the details of the temporary protection shield to the Providence and Worcester Railroad Company for review and approval. The plans will be reviewed as to the methods of erection and as to whether or not the proposed installation will provide the required level of protection. It is the Contractor's responsibility to design the protection shields to conform to all Federal State and Local Laws and Regulations and the requirements contained in the Contract Documents and the Standard Specifications pertaining to the safety and health of individuals. Shield plans and details shall be designed by a Professional Engineer registered in the State in which the project will take place. The drawings and calculations shall bear his/her seal when they are submitted to the Providence and Worcester Railroad Company's Director of Engineering or his authorized representative, for review and approval. Written approval must be received from the Providence and Worcester Railroad Company prior to the erection of the protection shields.

The horizontal shields shall be designed to carry a live load of 100 pounds per square foot. The shield, at a minimum, shall cover the area over the tracks and shall extend not less than ten (10'-00") feet beyond the centerline of the outside tracks.

The vertical shield shall be designed to carry a wind load of 30 pounds per square foot. The height of the vertical shield shall be 6'-6" above the top of the adjacent curb or sidewalk. Anti-climb wings shall be installed at each end of the vertical shield to prevent access over the Providence and Worcester Railroad Company's property.

The design and construction of the temporary protection shields shall be such as to prevent any dust, debris, concrete, formwork, paint, or tools from falling on the Providence and Worcester Railroad Company's property below.

The temporary protection shields shall be erected prior to the start of any work over the Providence and Worcester Railroad Company. The Providence and Worcester Railroad Company shall be the sole judge to determine whether or not sufficient protection has been provided to perform the work.

Caution shall be taken to control the demolition so that any debris that fell onto the shield shall not exceed the design live load of the shield.

The temporary protection shield shall be attached to the structure in accordance with plans submitted by the contractor and approved by the Providence and Worcester Railroad Company. Drilling through or welding to the structure shall not be permitted.

The erected temporary shield shall not intrude on any existing minimum vertical clearance shown on the plans.

The contractor will be required to complete the actual erection and removal of the temporary protection shields over the Providence and Worcester Railroad Company according to a schedule acceptable to the Providence and Worcester Railroad Company.

The Providence and Worcester Railroad Company shall have representatives present during the construction, erection, and removal of the shield. The contractor shall do no work to erect or remove the shields at any time during the operation of trains.

The temporary protection shields shall remain in place until all work over any particular area has been completed and shall be removed only when permitted by the Providence and Worcester Railroad Company.

All necessary plans shall be submitted to the Department which shall submit them to the Providence and Worcester Railroad Company.

Agreement Number:
Effective date:
Expiration date:

Rev. 4/21/2017

Providence and Worcester Railroad Company
Flagman Request Form

Instructions & Terms:

1. Prior to scheduling flagging, a right of entry permit must be obtained to access P&W property and all requirements of the agreement satisfied. Instructions for obtaining an access agreement can be found on the following website: https://gwrr.com/railroads/north_america/providence-and-worcester-railroad#m_tab-one-panel
2. All construction work within the right-of-way must be reviewed and approved by Engineering prior to commencement of work. Additional charges apply for engineering review and inspection.
3. Use of hyrail inspection vehicles is subject to approval by engineering and operations. Equipment will be allowed access within work windows between train traffic. Aside from general information regarding train frequency, P&W cannot provide scheduled times for freight train traffic. **A current hyrail inspection form meeting the requirements of 49 CFR Part 214.523 must accompany this request form.** P&W does not perform these inspections.
4. The request form must be submitted a minimum of 48 hours prior to the request. Scheduling of flagman is based on crew availability and filled based on the order received. **Submitting a request does not guarantee flagman availability.**
5. Cancellations must be received in writing a minimum of 24-hours in advance. Late cancellations may result in 1-day charge.
6. Flagging must be scheduled with an approved contractor from the list below. The request form must be filled out entirely and sent directly to the contractor. Coordination for scheduling and logistics should be handled directly with the contractor.
7. Flagging is invoiced at a daily fixed rate of $1400.00 for up to 12 hours. Work extending beyond 12-hours will result in additional daily charge for each 12-hour increment. Flagging must be pre-paid unless payment terms are arranged in advance with the flagging contractor.
8. For emergencies on site P&W's dispatcher can be reached at 508-755-4000 x 400

Massachusetts Chapter 634

1. Work performed on Massachusetts Chapter 634 bridges must be indicated by checking the box below. Requests involving both Chapter 634 and non-Chapter 634 bridges must have separate requests submitted. **Failure to properly identify Chapter 634 eligible work on the request form will result in flagging being charged.**
2. Flagging requests for Massachusetts Chapter 634 bridges must be sent directly to PWRZ-Flagging@gwrr.com **Requests for Chapter 634 bridges should not be sent to the approved contractors.**

P&W Flagging Contractor:

ECC Corporation
401-633-4603
flagging@ecccorporation.com

a Genesee & Wyoming Company

Providence and Worcester Railroad Company
Flagman Request Form

THIS SECTION TO BE COMPLETED BY REQUESTOR
The completed form should be transmitted directly to the desired flagging contractor above

Company Name: _____	Jobsite Contact: _____
Billing Address: _____	Jobsite Contact Cell: _____
_____	Dates Requested: _____
Requestors Name: _____	Report Time: _____
Requestor Email: _____	Specific railroad location and cross street:
Requestor Phone: _____	_____
Right of Entry Permit #: PWRZ- _____	Hyrail Vehicle Use: ☐ YES* ☑ NO *If yes please include current hyrail inspection form
Effective Date: _____ Expiration Date: _____ Right of entry permits are valid for 60 days from issue date	☐ Work is on a Massachusetts Chapter 634 Bridge

The undersigned agrees to the flagging terms and conditions and agrees to reimburse P&W and its approved flagging contractors at the rates listed above to fulfil this request. Submission of this request does not guarantee availability.

Authorized Signature: _____ Date: _____

Attachments (check if included): ☐ Hyrail inspection form

INTERNAL USE ONLY:

Flagging Contractor: _____	Flagman Name: _____
Dates Scheduled: _____	Cell Phone: _____
Branch: _____	Other Notes or Information:
Milepost: _____	☐ ROE Permit Verified ☐ Hyrail Inspection Reviewed

Insurance Requirements

Under state law the right of way of GWI and its subsidiary companies property is private property. Persons found on GWI's right of way without express written permission can be arrested and prosecuted.

Contractors

Contractors completing new installations or working on or around any of GWI's properties are required to obtain Railroad Protective Liability Insurance in the amounts of $2,000,000 per occurrence and $6,000,000 aggregate and it is required to name the specific railroad as the named insured. This coverage can now be purchased through GWI subsidiary railroads. A list of GWI subsidiary railroads can be found on the website.

In addition to providing Railroad Protective Liability insurance and Contractor is required to provide current proof of Commercial General Liability insurance naming the specific Railroad as additional insured. This coverage must meet minimum requirements of $2M per occurrence and $6M aggregate.

The General Liability certificate is also required to show proof of CG2417 or its equivalent as well as a waiver of subrogation in favor of the Railroad.

If you have questions or require additional information on how to obtain Railroad Protective Insurance coverage through a GWI subsidiary Railroad, please contact Donna Killingsworth at (904) 900-6286 or gwappseast@gwrr.com or Crystal Galbreath at (904) 596-7782 or gwappswest@gwrr.com

Applicants for Private Use Drive - Personal use only

For use of private (non-commercial use) grade crossings, individuals are required to maintain both personal and automobile liability coverage with minimum limits of $2,000,000 per occurrence and $6,000,000 aggregate as well as name the Railroad and GWI as additional insured. Evidence of this coverage is required and a current certificate is to be provided annually to the GWI Real Estate Department in Jacksonville, FL for its records.

With compliance of the required insurance per the terms of the agreement between the applicant and railroad, the property owner can maintain full use of the grade crossing over the railroad tracks. However, should there be any violation of the terms of the agreement between user and railroad (i.e. failure to maintain and provide evidence of valid liability coverage), the railroad has due cause to close or remove this access through the railroad right of way. An application can be completed by clicking on the link below. If you have any questions or require additional information please call or email the Regional Real Estate Manager for the specific GWI subsidiary railroad the proposed crossing involves.

Railroad Protective Liability Insurance Application:

https://www.gwrr.com/real_estate/insurance_requirements

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PROVIDENCE AND WORCESTER RAILROAD COMPANY

SPECIFICATIONS FOR

PIPELINE OCCUPANCY

SEPTEMBER 1, 2009

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1. SCOPE

a. These Specifications apply to the design and construction of pipelines carrying flammable and non-flammable substances across or along railroad property and facilities and tracks owned by others over which the Providence and Worcester Railroad (P&W) operates it's equipment.

b. Let it be implicit that the primary purpose of the railroad right-of-way is for operating a railroad. Therefore, all occupancies shall be designed and constructed in such a manner so as to not interfere, interrupt or endanger railroad facilities and operations. Additionally, the occupancy shall be designed and constructed in a way that will not limit unrestricted use of the property for current and future facilities and operations.

2. APPLICATION FOR OCCUPANCY

a. Individuals, corporations and municipalities desiring occupancy of railroad right-of-way by pipelines shall, upon approval of the railroad or in some cases, the right-of-way owner, sign an agreement and pay such fees as are appropriate for said occupancy.

b. Application for occupancy shall be by letter addressed to the Thomas W. Lewis, Chief Engineer, Providence and Worcester Railroad, 75 Hammond Street, Worcester, MA 01610, giving the following:

- Name of individual, corporation or municipality desiring the occupancy.
- Complete mailing address of applicant.
- Name and title of person who will sign the agreement.
- The State in which the applicant is incorporated.

c. All applications shall be accompanied with 3 copies of all plans, specifications and computations concerning the proposed occupancy all of which shall be prepared and stamped by a Professional Engineer.

3. APPROVAL OF PLANS

a. Plans for proposed pipeline installations shall be submitted to and meet the approval of the Chief Engineer prior to beginning construction.

b. Plans shall be drawn to scale and show the following (see Plates I, II, III and IV):

1. Plan view of proposed pipeline in relation to all railroad facilities (see Plate I).

2. Location of pipe (in feet) from nearest railroad mile post, centerline of a railroad bridge (giving bridge number), or centerline of an existing or former passenger station.

3. Railroad valuation map number and valuation stationing of the proposed occupancy.

4. Profile of ground on centerline of pipe from field survey showing relationship of pipe and casing to ground level, tracks and other facilities (see Plate II) for longitudinal occupations, the profile of adjacent track or tracks shall be shown (Plate III).

5. All known property lines. If pipeline is in a public highway, the limits of the right-of-way for the highway shall be clearly indicated with dimensions from centerline.

6. The angle of crossings in relation to centerline of tracks.

7. The location of valves or control stations of the pipeline.

8. "Pipe Crossing Data Sheet" completed and put on plan (see Plate IV).

c. The plan must be specific on railroad property and under tracks that are not on railroad property as to:

1. Method and details of installation including site access.

2. Size and material of casing pipe.

3. Size and material of carrier pipe.

These 3 items cannot have an alternative. If the plans indicate an alternative, they will be returned without further checking.

d. Location and dimensions of jacking, boring or tunneling pits shall be shown, with details of their sheeting and shoring. Pits shall be located as far as practicable from track, but in no event shall they be closer than 15 feet to any track, measured perpendicular to centerline of track.

e. Site access shall be shown from each side of the tracks unless prior arrangements have been made to using a crossing.

f. All plans and computations shall bear the seal of a Registered Professional Engineer; if not so imprinted, they will be returned without further consideration.

g. Computations for all structures involving the support or protection of railroad track embankment and facilities shall be submitted with the plans.

4. GENERAL REQUIREMENTS

4.1 CASING PIPE

a. Pipelines under railroad tracks and across operating right-of-way shall be encased in a larger pipe or conduit called the casing pipe as indicated in Plate II.

b. Casing pipe will be required for all pipelines carrying flammable, volatile or non-flammable substances under pressure, as determined by the Chief Engineer, which might cause damage if escaping on or near railroad property.

c. For non-pressure sewer or drainage crossings where the installation can be made by the open-cut method without interference to railroad operations, as determined by the Chief Engineer, the casing pipe may be omitted when the pipe strength is capable of withstanding railroad loading. The casing may also be omitted when reinforced concrete pipe can be jacked under the railroad.

d. The casing pipe shall be laid across the entire width of a right-of-way, as distinguished from area land, unless the right-of-way line-on either side of the tracks is less than the minimum length of casing specified in Para. 6, g., herein, in which case the casing shall be extended as required by Para. 6, g., even though such extension is beyond the right-of-way.

4.2 LOCATION OF PIPELINE

e. Pipelines laid longitudinally on railroad rights-of-way shall be located as far as practicable from any tracks or other important structures. If located within 15 ft. of the centerline of any track (see Plate III) or closer than 45 ft. to nearest point of any bridge, building or other important structure, the carrier pipe shall be encased (see also Para. 11, c., and Plate III).

f. Pipelines shall be located, where practicable to cross tracks at approximate right angles thereto, but preferably at not less than 45 degrees.

g. Pipelines shall not be placed within a culvert, under railroad bridges, nor closer than 45 feet to any portion of any railroad bridge, building, or other important structure, except in special cases, and then by special design as approved by the Chief Engineer.

h. Pipelines carrying flammable substances shall, where practicable, cross any railroad where tracks are carried on embankment.

4.3 PIPELINES WITHIN LIMITS OF A DEDICATED HIGHWAY

a. Pipelines within the limits of a dedicated highway are subject to all the requirements of the railroad's specification and must be designed and installed in accordance with them.

b. The limits of the dedicated highway (right-of-way) must be clearly shown on the plans.

c. Construction cannot begin until an agreement has been executed between the railroad, the utility owner and the owner of the highway.

4.4 MODIFICATION OF EXISTING FACILITIES

a. Any replacement or modification of a carrier pipe shall be considered a new installation, subject to the requirements of these specifications.

4.5 ABANDONED FACILITIES

a. The owner of all abandoned pipe crossings and other occupancies shall notify the railroad in writing, of the intention to abandon.

b. Abandoned pipelines shall be removed or completely filled with cement grout, or other method as approved by the Chief Engineer.

c. Abandoned manholes and other structures shall be removed to a minimum distance of 3 feet below finished grade and completely filled with cement grout or compacted sand.

4.6 CONFLICT OF SPECIFICATIONS

a. Where laws or orders of public authority prescribe a higher degree of protection than specified herein, then the higher degree so prescribed shall be deemed a part of these specifications.

4.7 INSULATION

a. Pipelines and casings shall be suitably insulated from underground conduits carrying electric wires on property over which the railroad operates.

4.8 EMERGENCY PROCEDURE

a. In the event of a pipeline leak or railroad derailment or incident that may jeopardize the integrity of the pipeline, an emergency response procedure shall be in place to guide those involved with a course of action. These procedures shall be specific and take into consideration local conditions.

5. CARRIER PIPE

a. Pipelines carrying flammable products shall conform to requirements of the current ANSI Codes, except that the maximum allowable stresses for design of steel pipe shall not exceed the following percentages of the specified minimum yield strength (multiplied by the longitudinal joint factor) of the pipe as defined in the ANSI Codes:

1. Steel pipe within a casing, under railroad tracks, across railroad rights-of-way, and longitudinally on railroad rights-of-way (the following percentages apply to hoop stress):

a. Seventy-two (72) percent for installation on oil pipelines.

b. Fifty (50) percent for pipelines carrying liquefied petroleum.

c. Sixty (60) percent for installation on gas pipelines.

2. Steel pipe without a casing laid longitudinally on railroad rights-of-way or on railroad property (the following percentages apply to hoop stress):

a. Sixty (60) percent for installation on oil pipelines.

b. Forty (40) percent for pipelines carrying liquefied petroleum gas and other flammable liquids with low flash point.

c. Forty (40) percent for installation on gas pipelines.

If the maximum allowable stress in the carrier pipe on either side of the occupancy of railroad property is less than specified above, the carrier pipe on railroad property shall be designed at the same stress as the adjacent carrier pipe.

Requisites for carrier pipe under railroad tracks shall apply for a minimum distance of 50 feet (measured at right angles) from centerline of outside tracks, or 2 feet beyond toe of slope, or 25 feet beyond the ends of casing, whichever is greater.

b. Pipelines carrying non-flammable substances shall be of accepted material and construction as approved by the Chief Engineer. Joints for carrier line pipe operating under pressure shall be mechanical or welded type.

c. Carrying pipes shall be laid with sufficient slack so that they are not in tension.

6. CASING PIPE

a. Casing pipe and joints shall be of metal and of leak proof construction, designed for the earth and/ or other pressure present, plus a Cooper's E-80 railroad live loading with 50% added for impact.

b. Steel pipe shall have a specified minimum yield strength (SMYS) of 35,000 psi.

c. When casing is installed without benefit of protective coating, and is not cathodically protected, the wall thickness shown above shall be increased to the next nearest standard size, which is a minimum of 0.063 inches greater than the thickness shown except for diameters less than 12 3/4 inches (see Table 1 below).

Table 1 - Minimum Wall Thickness for Steel Casing Pipe for E80 Loading

Nominal Diameter (inches)	When coated or cathodically protected Nominal Thickness (inches)	When not coated or cathodically protected Nominal Thickness (inches)
12.75	0.188	0.188
14	0.188	0.250
16	0.219	0.281
18	0.250	0.312
20 and 22	0.281	0.344
24	0.312	0.375
26	0.344	0.406
28	0.375	0.438
30	0.406	0.469
32	0.438	0.500
34 and 36	0.469	0.531
38	0.500	0.562
40	0.531	0.594
42	0.562	0.625
44 and 46	0.594	0.656
48	0.625	0.688
50	0.656	0.719
52	0.688	0.750
54	0.719	0.481
56 and 58	0.750	0.812
60	0.481	0.844
62	0.812	0.875
64	0.844	0.906
66 and 68	0.875	0.938
70	0.906	0.969
72	0.938	1.000

d. The inside diameter of the casing pipe shall be such as to allow the carrier pipe to be removed subsequently without disturbing the casing or the roadbed. For steel pipe casings, the inside diameter of the casing pipe shall be at least 2 inches greater than the largest outside diameter of the carrier pipe joints or couplings, for carrier pipe less than 6 inches in diameter; and at least 4 inches greater for carrier pipe 6 inches and over in diameter.

e. For flexible casing pipe; a minimum vertical deflection of the casing pipe of 3 percent of its diameter, plus 1/2 inch, shall be provided so that no loads from the roadbed, track, traffic, or casing pipe itself are transmitted to the carrier pipes. When insulators are used on the carrier pipe, the inside diameter of the flexible casing pipe shall be at least 2 inches greater than the outside diameter of the carrier pipe for pipe less than 8 inches in diameter; at least 3-1/4 inches greater for pipe 8 inches to 16 inches, inclusive, in diameter and at least 4-1/2 inches greater for pipe 18 inches and over in diameter.

f. When steel casing pipe is used, the joint shall be welded completely around the circumference of the pipe.

g. Casing pipe under railroad tracks and across railroad rights-of-way shall extend the greater of the following distances, measured at right angles to centerline of track:

1. 2 feet beyond toe of slope.

2. 3 feet beyond ditch line.

3. A minimum distance of 25 feet each side from centerline of outside track when casing is sealed at both ends.
4. A minimum distance of 45 feet from centerline of outside track when casing is open at both ends.

5. The distance 1.5 (C+D) + 4.5 feet as indicated on Plate II.

h. If additional tracks are constructed in the future, the casing shall be extended correspondingly at the expense of the utility owner.

i. Plastic carrier pipe conveying flammable substances shall be encased the entire limits of the right-of-way. If special conditions exist which prevent encasement within the entire limits of the right-of-way, the minimum encased lengths must be approved by the Chief Engineer.

7. SEALS - PROTECTION AT ENDS OF CASING

   a. Casings for carrier pipes of flammable substance shall be suitably sealed between the inside of the casing and the outside of the carrier pipe.

   b. Casings for carrier pipes of non-flammable substances shall have both ends of the casing blocked up is such a way as to prevent the entrance of foreign material, but allowing leakage to pass in the event of a carrier break.

   c. The ends of a casing pipe may be left open when the ends are at or above grade and above high water level, provided drainage is afforded in such a manner that leakage will be conducted away from railroad tracks and structures.

8. VENTS

   a. Sealed casings for flammable substances shall be properly vented. Vent pipes shall be of sufficient diameter, but in no case less than 2 inches in diameter, and shall be attached near each end of the casing and project through the ground surface at right-of-way lines or not less than 45 feet (measured at right angles) from centerline of nearest track.

   b. Vent pipes shall extend not less than 4 feet above the ground surface. Top of vent pipe shall have a down-turned elbow, properly screened, or a relief valve. Vents in locations subject to high water shall be extended above the maximum elevation of high water and shall be supported and protected in a manner approved by the Chief Engineer.

   c. When the pipeline is constructed in a public highway, street-type vents shall be used.

9. SIGNS

a. All pipelines (except those in streets where it would not be practical to do so) shall be prominently marked at rights-of-way (on both sides of track for undercrossings) by durable, weather-proof signs located over the centerline of the pipe. Signs shall show the following:
   - Name and address of owner
   - Contents of pipe
   - Pressure in pipe
   - Depth below grade at point of sign
   - Emergency telephone in event of pipe rupture.

b. For pipelines running longitudinally along the railroad, signs shall be placed over the pipe (or offset and appropriately marked) at all changes in direction of the pipeline. Such signs should also be located so that when standing at one sign the next adjacent marker in either direction is visible. In no event shall they be placed more than 500 feet apart unless otherwise specified by the railroad.

c. The owner of the pipeline shall maintain all signs along the right-of-way as long as the occupancy agreement is in effect.

d. In addition to signs, all pressure pipelines shall have a warning tape placed directly above the pipeline, 2 feet below the surface.

10. SHUT-OFF-VALVES

a. Accessible emergency shut-off valves shall be installed within distances each side of the railroad at locations selected by the negotiating agent of the railroad where hazard to life and property should be guarded against. Where pipelines are provided with automatic control stations and within distances approved by the Chief Engineer, no additional valves will be required.

11. DEPTH OF INSTALLATION

a. Casing pipe under railroad tracks and across railroad rights-of-way shall be not less than 5 1/2 feet from base of rail to top of casing at its closest point, except that under secondary or industry tracks this distance may be 4 1/2 feet as approved by the Chief Engineer. On other portions of rights-of-way where casing is not directly beneath any track the depth from ground surface or from bottom of ditches to top of the casing shall be not less than 3 feet.

b. Pipelines laid longitudinally on railroad rights-of-way, 50 feet or less from centerline of track, shall be buried not less than 5 feet from ground surface to top of pipe for pipelines carrying oil, gas, petroleum products, or other flammable or highly volatile substances under pressure and all non-flammable substances which by their nature or pressure in the judgment of the Chief Engineer may be hazardous to life or property. For pipelines carrying water, sewage and non-flammable substances, the distance from the surface of ground to top of pipe may be 4 feet.

c. When the distance 1.5 C (feet)+ 1.7 D (feet) + 4.5 feet from centerline of adjacent track (see Plate III) to a longitudinal pipeline totals 15 feet or greater, the pipeline is subjected to railroad loading and it shall require a casing or be of special design approved by the Chief Engineer.

d. Where pipeline is laid more than 50 feet from center line of track, the minimum cover shall be at least 3 feet.

12. INSPECTION AND TESTING

a. ANSI Codes current at the time of constructing the pipeline, shall govern the inspection and testing of the facility on railroad property. Proof-testing of strength of carrier pipe shall be in accordance with the requirements of ANSI for all pipelines carrying oil, liquefied petroleum gas, natural or manufactured gas, and other flammable substances.

b. It is the responsibility of the pipeline owner to conduct the necessary inspections without interference to the operations of the railroad. Should it become necessary to expose a pipe for inspection, or for its replacement, the owner shall design a procedure that does not interfere with railroad operations, and shall make prior arrangements with the railroad as may be necessary to permit safe conduct of the work.

c. Pipeline maintenance shall be limited to the installation of a new carrier pipe at a new crossing location, which is subject to the requirements of these specifications. Carrier pipes abandoned by new location work shall be backfilled by methods and materials as directed by the Engineer. The location of the abandoned facilities shall be recorded and records maintained by the pipeline owner.

d. The owners of pipelines not subject to regulations requiring inspections are expected to inspect their facilities as a matter of due diligence in the conduct of its business. The railroad may, as a right but not a duty, require an inspection of the construction, to include receiving a written report of findings

certified be a registered professional engineer. Maintenance of these facilities shall be conducted as above described.

13. CATHODIC PROTECTION

a. Cathodic protection shall be applied to all pipelines carrying flammable substances.

b. For crossings and at other locations where the pipeline must be placed within a casing, the casing is to have cathodic protection or the wall thickness is to be increased to the requirements of Section 6.

c. Where casing and/or carrier pipe is cathodically protected, the Chief Engineer shall be notified and suitable test shall be made, witnessed by the railroad, to insure that other railroad structures and facilities are adequately protected from the Cathodic current in accordance with the recommendations of current Reports of Correlating Committee on Cathodic Protection, published by the National Association of Corrosion Engineers.

14. SOIL INVESTIGATIONS

a. For all pipe crossings 60 inches in diameter and larger under tracks, and at other locations the Chief Engineer may direct soil borings or other soil investigations approved by the railroad shall be made to determine the nature of the underlying material. The number and nature of these explorations shall be approved by the railroad and shall be made as close as practicable to the site of the proposed construction.

b. For pipe crossings less than 60 inches in diameter under tracks, and at other locations the Chief Engineer may direct soil borings or other approved investigations may be required when, in the judgment of the Chief Engineer, they are necessary to determine the adequacy of the design and construction of the facilities.

c. Soil Borings shall be in accordance with the current issue of the American Railway Engineering and Maintenance-of-Way Association Manual for Railway Engineering, Chapter 1, Part 1, "Exploration and Testing”.

d. Soil boring logs shall be accompanied with a plan drawn to scale showing location of borings in relation to the tracks and the proposed pipe location, the elevation of ground surface at each boring, and the elevation of the base of rail of the tracks.

15. CONSTRUCTION

a. Casing pipe shall be so constructed as to prevent leakage of any substance from the casing throughout its length, except at ends of casing where ends are left open, or through vent pipes when ends of casing are sealed. Casing shall be installed so as to prevent the formation of a waterway under the railroad, and with an even bearing throughout its length, and shall slope to one end (except for longitudinal occupancy).

b. Installations by open-trench method will be permitted only with the approval of the Chief Engineer and shall comply with current American Railway Engineering and Maintenance-of-Way Association Specification, Chapt I, Part 4, “Installation of Pipe Culverts".

c. Casing and/or carrier pipes shall be installed by the following methods:

1. Jacking - This method shall be in accordance with the current American Railway Engineering and Maintenance-of-Way Association Specifications, Chapter 1, Part 4, "Jacking Culvert Pipe Through Fills". This operation shall be conducted without hand-mining ahead of the pipe and without the use of any type of boring or drilling equipment. Bracing and backstops shall be so designed and jacks of sufficient rating used so that the jacking can be progressed without storage (except for adding lengths of pipe) until the leading edge of the pipe is at least the distance 1.5 (C + D) + 4.5 feet (see Plate II) beyond the centerline of the outside track or a minimum of 25 feet from centerline of the outside track, which ever is farther.

    a. If an obstruction is encountered during installation to stop the forward action of the pipe, and it becomes evident that it is impossible to advance the pipe, operations will cease and the pipe shall be abandoned in place and filled completely with grout.

    b. Jacked installations shall have a bored hole essentially the same as the outside diameter of the pipe plus the thickness of the protective coating. If voids should develop or if the bored hole diameter is greater than the outside diameter of the pipe (plus coating) by more than approximately 1 inch, grouting or other methods approved by the railroad shall be employed to fill such voids.

2. Drilling - This method employs the use of an oil field type rock roller bit or a plate made up of individual roller cutter units which is solidly welded to

the pipe casing being installed and which is turned as it is advanced. The pipe is turned for its entire length from the drilling machine to the head to give the bit the necessary cutting action against the ground being drilled. A high density slurry (oil field drilling mud) is injected through a small supply line to the head which acts as a cutter lubricant. This slurry is injected at the rear of the cutter units to prevent any jetting action ahead of the pipe. The drilling machine runs on a set of steel rails and is advanced (thus advancing the pipe) by a set of hydraulic jacks. The method is the same whether earth or rock is being drilled. Methods of a similar nature shall be submitted to the Chief Engineer for approval.

3. Tunneling - Tunneling operations shall be conducted as approved by the Chief Engineer. Care shall be exercised in trimming the surface of the excavated section in order that the steel liner plates fit snugly against undisturbed material. Excavation shall not be advanced ahead of the previously installed liner plates any more than is necessary for the installation of the succeeding liner plate. The vertical face of the excavation shall be supported as necessary to prevent sloughing. At any interruption of the tunneling operation, the heading shall be completely bulkheaded. If required by the Chief Engineer, the tunneling shall be conducted continuously, on a 24-hour basis, until the tunnel liners extend at least the distance 1.5 (C + D) + 4.5 feet (see Plate II) beyond the centerline of the last track.

   A uniform mixture of 1.6 cement grout shall be placed under pressure behind the liner plates to fill any voids existing between the liner plated and the undisturbed material. Grout holes tapped for no smaller than 1 1/2 inch pipe, spaced at approximately 3 feet around the circumference of the tunnel liners, shall be provided in every third ring. Grouting shall start at the lowest hole in each grout panel and proceed upwards simultaneously on both sides of the tunnel. A threaded plug shall be installed in each grout hole as the grouting is completed at that hole.

   Grouting shall be kept as close to the heading as possible, using grout stops behind the liner plates if necessary. Grouting shall proceed as directed by the Chief Engineer, but in no event shall more than six lineal feet of tunnel be progressed beyond the grouting.

3 a. Tunneling Shields - All pipes 60 inches and larger in diameter shall be emplaced with the use of a tunneling shield, unless otherwise approved by the Chief Engineer. Pipes of smaller diameter may also require a shield when, at the sole discretion of the Chief Engineer, soil or other conditions indicate its need.

The shield shall be of steel construction, designed to support railroad track loading as specified in Paragraph 6., a., herein, in addition to other loading it must sustain. The advancing face shall be provided with a hood, extending no less than 20 inches beyond the face and extending around no less than the upper two-thirds of the circumference. It shall be of sufficient length to permit the installation of at least one complete ring of liner plates within the shield before it is advanced for the installation of the next ring of liner plates. It shall conform to and not exceed the outside dimensions of the pipe being emplaced by more than one inch at any point on the periphery unless otherwise approved by the Chief Engineer.

It shall be adequately braced and provided with necessary appurtenances for completely bulkheading the face with horizontal breastboards, and arranged so that the excavation can be benched as may be necessary. Excavation shall not be advanced beyond the edge of the hood, except in rock.

For jacking reinforced concrete pipe, the shield may be fabricated as a special section of reinforced concrete pipe with the steel cutting edge, hood, breasting attachments, etc., cast into the pipe. The wall thickness and reinforcing shall be designed for the jacking stresses.

Grout holes tapped for no less than 1 1/2" pipe spaced at approximately 3 feet centers around the circumference of the shield (or the a-for--mentioned special reinforced concrete section) and no more than 4 feet centers longitudinally shall be provided.

Detail plans sufficient to determine the adequacy of the shield, accompanied with design calculations, shall be submitted to the Chief Engineer for approval and no work shall proceed until such approval is obtained.

4. Boring - This method consists of pushing the pipe into the fill with a boring auger rotating within the pipe to remove the soil. When augers, or similar devices, are used for pipe emplacement, the front of the pipe shall be provided with mechanical arrangements or devices that will positively prevent the auger and cutting head from leading the pipe so that there will be no unsupported excavation ahead of the pipe. The arrangement shall be removable from within the pipe in the event an obstruction is encountered. The excavation by the cutting head shall not exceed the outside diameter of the pipe by more than one-half inch. The face of the cutting head shall be arranged to provide reasonable obstruction to the flow of soft or poor material.

The use of water or other liquids to facilitate casing emplacement and spoil removal is prohibited.

Plans and descriptions of the arrangement to be used shall be submitted to the Chief Engineer for approval and no work shall proceed until such approval is obtained.

Any method which employs simultaneous boring and jacking or drilling and jacking for pipes over 8 inches in diameter which does not have the above approved arrangements WILL NOT BE PERMITTED. For pipes 8 inches and less in diameter, augering or boring without this arrangement may be considered for use only as approved by the Chief Engineer.

e. Bored or jacked installations shall have a bored hole essentially the same as the outside diameter of the pipe plus the thickness of the protective coating. If voids should develop or if the bored hole diameter is greater than the outside diameter of the pipe (plus coating) by more than approximately 1 inch, grouting or other methods approved by the Chief Engineer shall be employed to fill such voids.

f. When water is known or expected to be encountered, pumps of sufficient capacity to handle the flow shall be maintained at the site and, upon approval of the railroad to operate them, they shall be in constantly attended operation on a 24-hour basis until, in the sole judgment of the railroad, their operation can be safely halted. When dewatering, close observation shall be maintained to detect any settlement or displacement of railroad embankment, tracks and facilities.

g. All operations shall be conducted so as not to interfere with, interrupt, or endanger the operation of trains nor damage, destroy, or endanger the integrity of the railroad facilities. All work on and near railroad property shall be conducted in accordance with railroad safety rules and regulations. The contractor shall secure and comply with the railroad safety rules and shall give written acknowledgement to the railroad that they have been received, read, and understood by the contractor and his employees. Operations will be subject to railroad inspection at any and all times.

h. All cranes, lifts, or other equipment that will be operated in the vicinity of the railroad's electrification and power transmission facilities shall be electrically grounded as directed by the railroad.

i. At all times when the work is being progressed, a field supervisor for the work with no less than 12 months experience in the operation of the equipment being used shall be present. If boring, drilling, or similar machines are being used, the machine operator also shall have no less than 12 months experience in the operation of the equipment being used.

j. Blasting will not be permitted under or near railroad tracks and facilities.

k. Whenever equipment or personnel are working closer than 15 feet to the centerline of an adjacent track, that track shall be considered as being obstructed. Insofar as possible, all operation shall be conducted no less than this distance. Operations closer than 15 feet to the centerline of a track shall be conducted only with the permission of, and as directed by, a duly qualified railroad employee present at the site of the work.

l. Crossing of tracks at grade by equipment and personnel is prohibited except by prior arrangement with, and as directed by the railroad.

16. SUPPORT OF TRACKS

a. When the jacking or the tunneling method of installation is used, and depending upon the size and location of the crossings, temporary track supporting structures shall be installed at the discretion of the Chief Engineer.

b. The type of temporary track supporting structures to be installed shall be approved by the Chief Engineer.

c. Unless otherwise agreed, all work involving rail, ties and other track material will be performed by the railroad's employees.

17. PIPELINES ON BRIDGES

a. Pipelines carrying flammable substances or nonflammable substances, which by their nature might cause damage if escaping on or near railroad facilities or personnel, shall not be installed on bridges over railroad tracks or bridges carrying railroad tracks.

b. In special cases when it can be demonstrated to the Chief Engineer's satisfaction that such an installation is necessary and that no practicable alternative is available, the Chief Engineer may permit the installation and only by special design approved by him.

c. Pipelines on bridges shall be located as to minimize the possibility of damage from vehicles, railroad equipment, vandalism and other external causes. They shall be encased in a casing pipe as the Chief Engineer may direct.

18. REIMBURSEMENT OF RAILROAD COSTS

a. All P&W costs associated with the pipe installation (inspections, flagging, track work, communication and signal work, etc.) shall be reimbursed to the P&W by the owner of the facility.

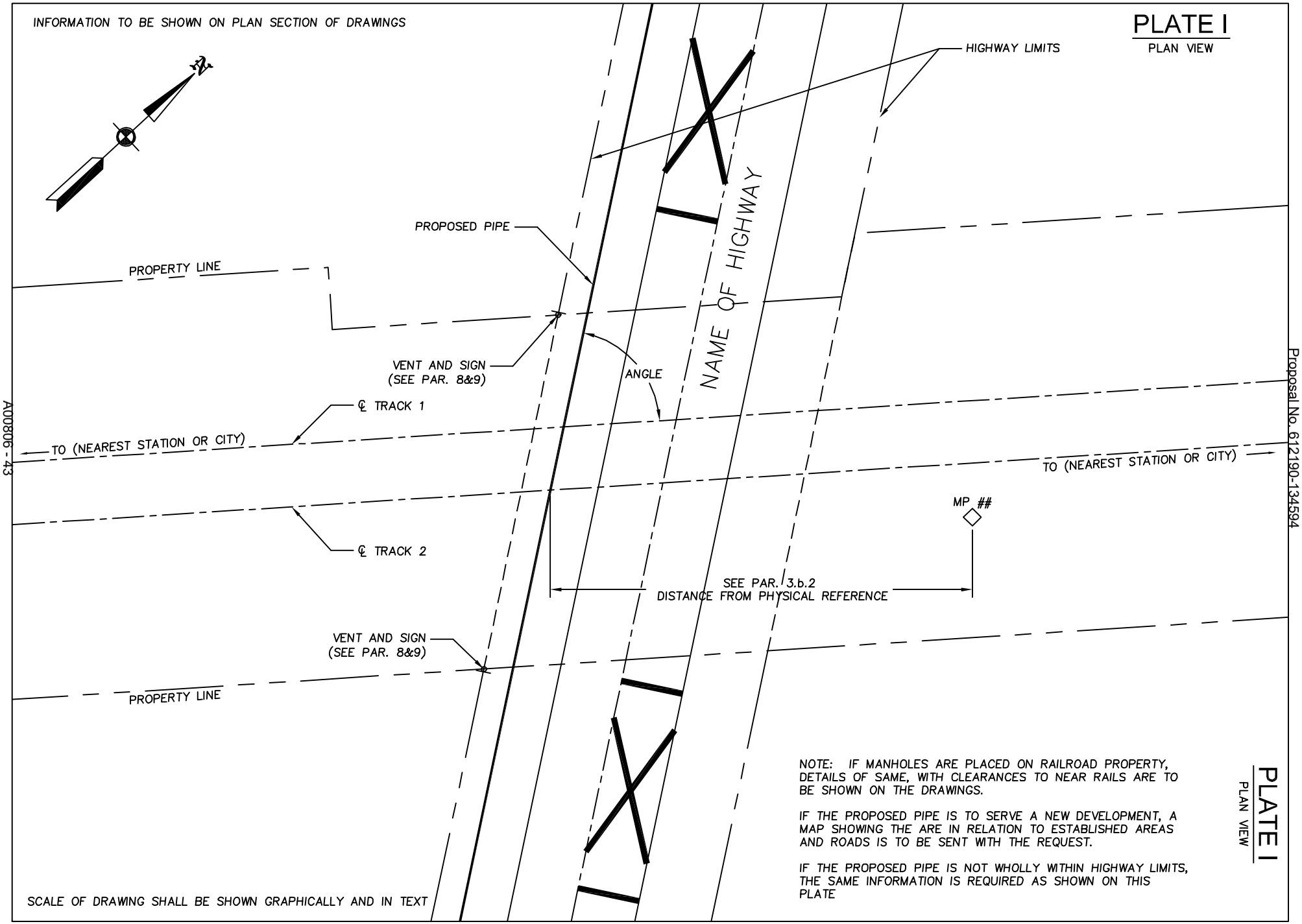
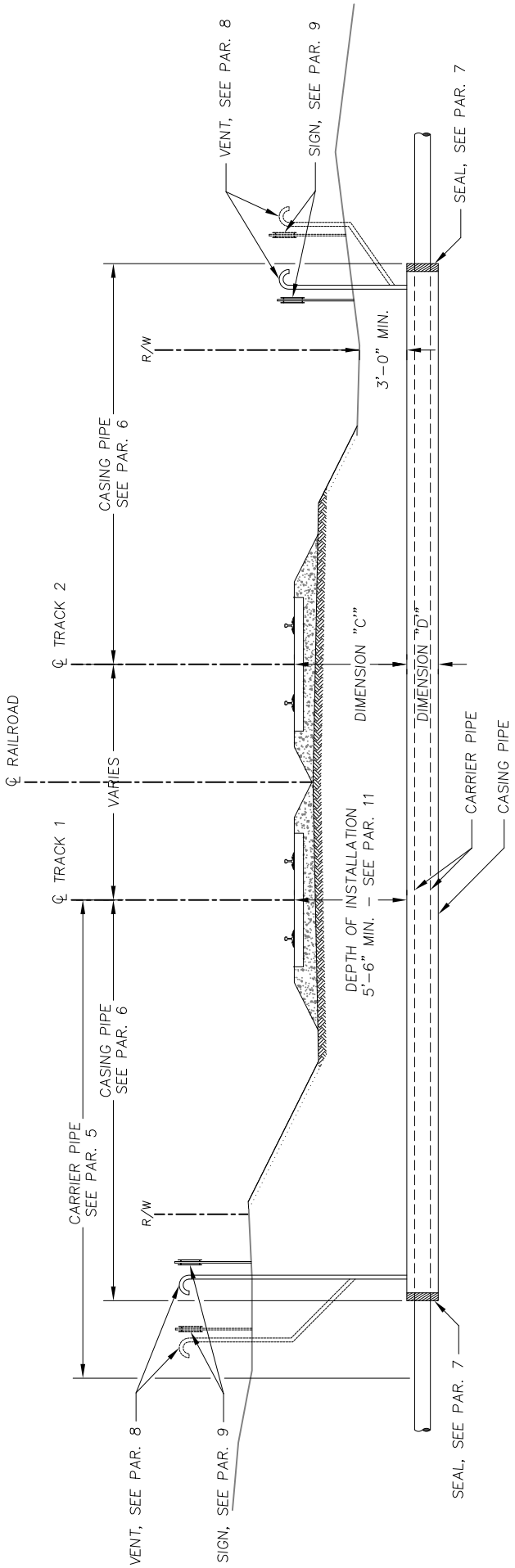

INFORMATION TO BE SHOWN ON PLAN SECTION OF DRAWINGS
PLATE I
PLAN VIEW
HIGHWAY LIMITS
PROPOSED PIPE
PROPERTY LINE
NAME OF HIGHWAY
VENT AND SIGN
(SEE PAR. 8&9)
ANGLE
℄ TRACK 1
TO (NEAREST STATION OR CITY)
TO (NEAREST STATION OR CITY)
MP ##
℄ TRACK 2
SEE PAR. 3.b.2
DISTANCE FROM PHYSICAL REFERENCE
VENT AND SIGN
(SEE PAR. 8&9)
PROPERTY LINE
NOTE: IF MANHOLES ARE PLACED ON RAILROAD PROPERTY, DETAILS OF SAME, WITH CLEARANCES TO NEAR RAILS ARE TO BE SHOWN ON THE DRAWINGS.
IF THE PROPOSED PIPE IS TO SERVE A NEW DEVELOPMENT, A MAP SHOWING THE ARE IN RELATION TO ESTABLISHED AREAS AND ROADS IS TO BE SENT WITH THE REQUEST.
IF THE PROPOSED PIPE IS NOT WHOLLY WITHIN HIGHWAY LIMITS, THE SAME INFORMATION IS REQUIRED AS SHOWN ON THIS PLATE
PLATE I
PLAN VIEW
SCALE OF DRAWING SHALL BE SHOWN GRAPHICALLY AND IN TEXT
A00806 - 43
Proposal No. 612190-134594

PLATE II
CROSS SECTION

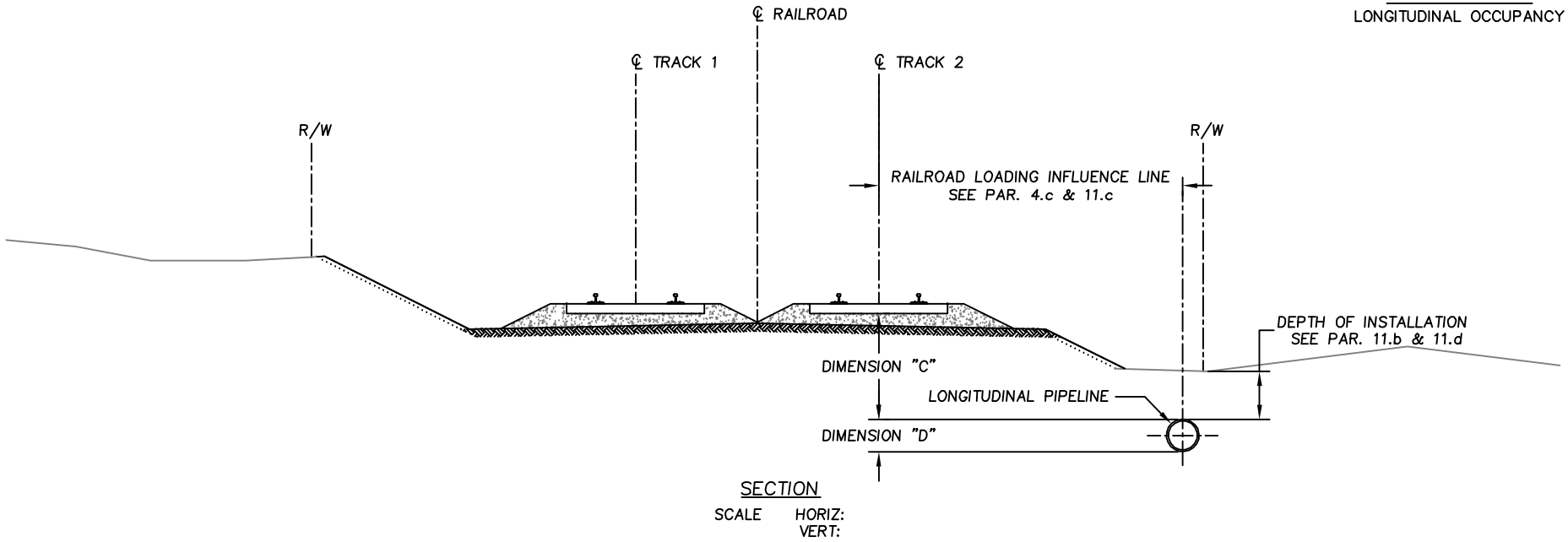
PLATE II
CROSS SECTION



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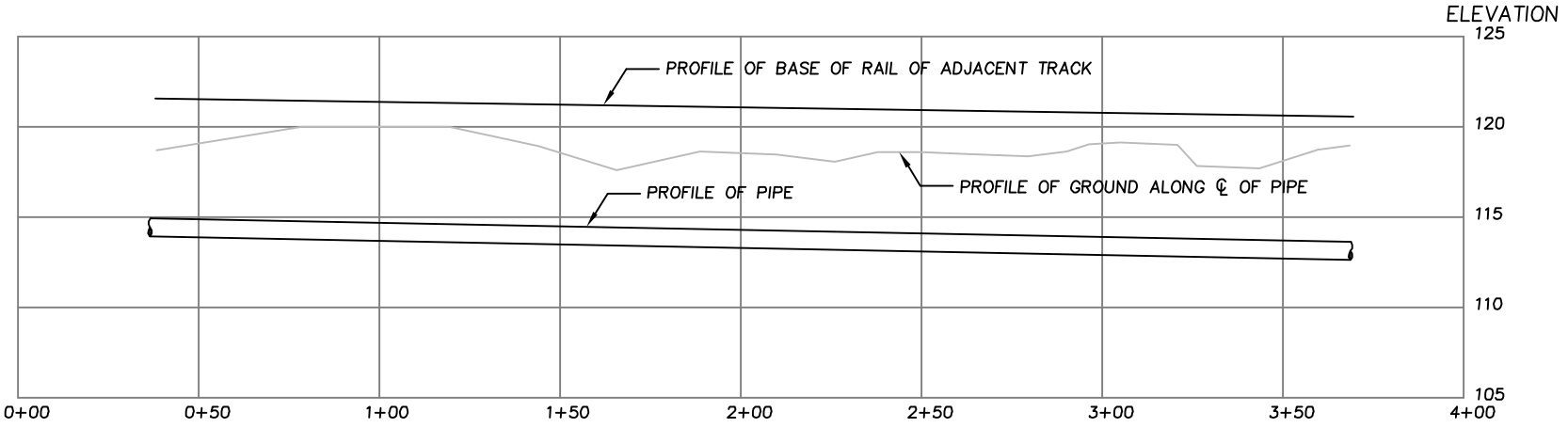
PLATE III

LONGITUDINAL OCCUPANCY



SECTION

SCALE HORIZ:
VERT:



PROFILE – SEE PAR. 3.b, 4

SCALE HORIZ:
VERT:

PLATE III

LONGITUDINAL OCCUPANCY

Proposal No. 612190-134594

PLATE IV
PIPE CROSSING DATA SHEET

PLATE IV
PIPE CROSSING DATA SHEET

	PIPE DATA	
	CARRIER PIPE	CASING PIPE
CONTENTS TO BE HANDLED		
OPERATING PRESSURE		
NOMINAL SIZE OF PIPE		
OUTSIDE DIAMETER		
INSIDE DIAMETER		
WALL THICKNESS		
MATERIAL		
WEIGHT PER FOOT		
SPECIFICATION		
GRADE OR CLASS		
MANUFACTURING PROCESS		
TEST PRESSURE		
JOINT TYPE		
COATING TYPE		
DETAILS OF CATHODIC PROTECTION		
DETAILS OF SEALS OR PROTECTION AT ENDS OF CASINGS		
METHOD OF INSTALLATION		
CHARACTER OF SUBSURFACE MATERIAL AT THE CROSSING LOCATION		
APPROXIMATE GROUND WATER LEVEL		
SOURCE OF INFORMATION ON SUBSURFACE CONDITIONS (BORINGS, TEST PITS OR OTHER)		
OTHER PERTINENT INFORMATION		

NOTE: ANY SUBSURFACE INVESTIGATION MADE ON RAILROAD PROPERTY OR ADJACENT TO TRACKS SHALL BE PERFORMED UNDER THE SUPERVISION OF THE PROVIDENCE AND WORCESTER RAILROAD COMPANY.

Right of Entry Application - 1.5.2021.xls

Genesee & Wyoming Railroad Services, Inc.

Real Estate Department, 13901 Sutton Park Dr., S, Suite 270, Jacksonville, FL 32224

Contractors Access/Occupancy on Railroad Property

☐ **Check box if Contractor unknown at this time** *(this form will need to be completed with contractor information and submitted prior to any work once bid process is complete)*

Incomplete or Inaccurate Information will delay application request

Section 1 - Applicant Data

Complete Legal Name of Applicant to appear on License Agreement: _____

Applicant Mailing Address: _____

_____

Applicant Overnight Address: _____

_____

Type of Entity: ☐ Corporation ☐ Partnership ☐ Sole Proprietor ☐ Individual ☐ Municipality ☐ Developer ☐ Other

If other please explain: _____

State of Incorporation or Partnership: _____

Contact during Application Process:

Name: _____

Contact Telephone _____ Email Address: _____

Section 2 - Location Data

Railroad Name: _____ Estimated Start Date _____

Specify the amount of time access is required: _____ Reason for extension of time beyond 60 days _____

Nearest City: _____ County: _____ State: _____

REQUIRED: Latitude/Longitude (Convert to Decimal Format) (ex 12.3456789/-64.101112): _____

Address of proposed worksite: _____

_____

Right of Entry Application - 1.5.2021.xls

Railroad Subdivision - if known _____ **US DOT/AAR Crossing Number - if available** _____

Section 3 - Existing Agreement Data

Is there an Existing Agreement at this Location which will be affected by this Request?

☐ Yes ☐ No If YES, List Agreement Number(s): _____

Will facility be exclusively used by Applicant? ☐ Yes ☐ No

If YES, List Name of Lessee: _____

Describe the complete scope of work on or around Railroad property (REQUIRED):

_____

_____

_____

_____

Section 4 - Department of Transportation (D.O.T.)

Is this installation associated with a Department of Transportation project? ☐ Yes ☐ No

If Yes, complete the following:

D.O.T. Contract Number: _____ **D.O.T. Project Number:** _____ **D.O.T. Project Name:** _____

D.O.T. Contact Information:

Name: _____

Address: _____

City: _____ **State:** _____ **Zip Code:** _____

Phone Number _____ **Email Address** _____

Some important items to note when completing the application:

Checklist prior to submittal

- ☐ Latitude & longitudinal information converted to digital decimal format with an aerial map of location
- ☐ Payment for fees included - check payable to specific railroad
- ☐ If paying fees by credit card a completed signed credit card release is included - only Visa, MasterCard or Discover can be accepted - US Roads only
- ☐ Applications can be emailed with a copy of the check in order to start the approval process. Only the check for the doc prep fees needs to be mailed or overnighted when the complete application packet is emailed. Include a copy of the application to make sure the payment is matched to the correct project.
- ☐ ***When returning the signed agreement and proof of insurance for final review and execution please allow 2-3 weeks prior to the start of work. Once all required fees are paid and documentation in place the agreement must go through an approval process before it can be finalized.***

Right of Entry Application - 1.5.2021.xls

Section 5 - Insurance Requirements - US Roads

Insurance Requirements prior to any construction project - Both the Utility Owner and the Contractor completing installation are required to provide proof of current Commercial General Liability Insurance. Prior to construction the Contractor is required to provide current proof of Railroad Protective Liability Insurance.

General Liability insurance must meet the minimum requirements of $2M per occurrence and $6M aggregate per the terms of the written contract.
Automobile Insurance must meet the minimum requirements of $1M bodily injury and property damage per occurrence.
The General Liability certificate is required to show proof of **CG2417 or its equivalent**. *(Contractual Liability Railroads)*
Evidence of **Workers Compensation** must be provided on certificate and meet the minimum requirements of $1M.
Certificate Holder naming *(specified Railroad)* **Specified Railroad names can be found at www.gwrr.com**

General Liability, Automobile Liability and Umbrella/Excess Liability provides additional insured status to the certificate holder and any other party(ies) specified in or required by written contract between the named insured and the certificate holder.

Where applicable and permitted by law, all policies include a blanket automatic waiver of subrogation endorsement that provides this feature in favor of the certificate holder and any other party(ies) specified in or required by written contract between the named insured and the certificate holder.

Prior to Construction or any access within 50' of Railroad a current **Certificate of Railroad Protective Liability insurance (RPL)** which shows the ***specific Railroad*** as named Insured. If the Contractor does not carry a policy of Railroad Protective Liability insurance, this coverage can be secured through the railroad. An application and current Fee structure for this coverage is available upon request.

Insurance Requirements for potentially hazardous pipelines such as natural gas, oil, petroleum, etc. to be amended as shown below

General Liability Insurance which names the ***specific Railroad*** as additional insured and must meet the limits of $**5M per occurrence and $10M aggregate**. Such policy shall be endorsed to provide Waiver of Subrogation in favor of the certificate holder per written contract.

Pollution Legal Liability Insurance with minimum limits of **Five Million Dollars ($5,000,000)** per occurrence naming the ***certificate holder*** as additional insured per written contract. Such policy shall be endorsed to provide Waiver of Subrogation in favor of the certificate holder per written contract.

Right of Entry Application - 1.5.2021.xls

Section 6 - Insurance requirements - Canadian Roads

Insurance Requirements prior to any construction project - Both the Utility Owner and the Contractor completing installation are required to provide proof of current Commercial General Liability Insurance.

General Liability insurance must meet the minimum requirements of $2M per occurrence and $2M aggregate per the terms of the written contract.
Automobile Insurance must meet the minimum requirements of $1M bodily injury and property damage per occurrence.
Where applicable, the General Liability certificate is required to show proof of **CG2417 or its equivalent.** (Contractual Liability Railroads)
Evidence of **Workers Compensation** must be provided on certificate and meet the minimum requirements of $1M.
Certificate Holder naming *(specified Railroad)* **Specified Railroad names can be found at www.gwrr.com**

General Liability, Automobile Liability and Umbrella/Excess Liability provides additional insured status to the certificate holder and any other party(ies) specified in or required by written contract between the named insured and the certificate holder.

Where applicable and permitted by law, all policies include a blanket automatic waiver of subrogation endorsement that provides this feature in favor of the certificate holder and any other party(ies) specified in or required by written contract between the named insured and the certificate holder.

IMPORTANT

Prior to application submittal, Questions can be answered and additional contact information obtained by visiting the website at www.gwrr.com - select the specific railroad and click on the link for Real Estate.

Plans for proposed installations shall be submitted to and approved by the Railroad, on behalf of itself, its subsidiaries, and affiliates, and designated engineer before work can begin! Applications submitted not meeting current specifications as outlined in the General Specifications for Sub-grade and Above grade Utility Crossings of Railway's Right-of-Way will be returned and may incur additional engineering review fees. For your convenience a copy of these specifications can be found on the website at www.gwrr.com.

Materials and installations are to be in strict accordance with specifications of National Electrical Safety Code, AREMA, current edition, and requirements of the Railroad.

Upon application approval, applicant agrees to reimburse Railroad for any cost incurred by Railroad incident to the installation, maintenance and/or supervision necessitated by the installation. Applicant further agrees to assume all liability for accidents or injuries that arise as a result of this installation.

This section must be completed in full, signed and dated prior to submittal to the Real Estate Department for processing. Unsigned applications, incomplete or inaccurate Information will delay application request and may incur additional fees.

Date: _____ **Signature:** _____

Phone Number _____ **Printed Name** _____

Fax Number: _____ **Title:** _____

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Please make check payable to the specific Railroad where proposed work is to occur. A list of Genesee & Wyoming, Inc. subsidiary railroads can be found at: www.gwrr.com . W-9 information available upon request.

Mail the application for proposed project, along with the applicable non-refundable fee(s) in U.S. Funds (Canadian Applicants please pay all fee in Canadian Funds plus HST) to:

Genesee & Wyoming Railroad Services, Inc.
Attn: Real Estate Department
13901 Sutton Park Dr. S., Suite 270
Jacksonville, FL 32224

In order for the application to be complete ALL required details pertinent to the proposed installation must be completed in full and submitted along with the following fees:

	# of Copies	Amount Due	Description
☐	1	$1,750	Engineer review fee, plans/drawings, no larger than 11 x 17. Larger drawings may incur additional engineering fees.
☐	1	$1,750	Completed Contractor's Access/Occupancy Application and Fee required with ALL application submittals. If the contractor is unknown at time of submittal just check the box under the heading on the form.
		$3,500	**Full amount due with submittal for new utility installations -** *Unless prior arrangements are made, applications received without payment will not be processed until receipt of payment. This could extend the time frame for the processing of your request.*

Standard Application processing takes approximately 6-8 weeks. PLEASE READ IN FULL - "Expedited processing" is available and will reduce the processing time to between 1-2 weeks at an additional cost of $2,500. *PLEASE READ BEFORE SUBMITTING EXPEDITE FEE:* For *all expedited requests* the application and plans submitted must meet engineering specifications and be approved in order for the applicable agreement(s) to be forwarded to the applicant for signature within 2 weeks *from receipt of all required information and full payment of required fees*. It is important to note that an incomplete application and plans submitted that do not meeting engineering specifications will cause a delay in the processing of expedited request and the two week guarantee no longer applies if revisions are required to be made by the applicant in order for them to meet engineering specs for engineering to approve the request.

The expedited processing of an application does not apply to the final review and execution phase of the agreement process. Once a signed agreement has been received and ALL required fees and insurance has been submitted the agreement(s) is(are) forwarded for final review by a VP of Real Estate, Legal and the signatory for the Railroad. This final review and execution process can take up to 2 weeks from receipt of all required documentation and fees. This part of the agreement process cannot be expedited.

Right of Entry Application - 1.5.2021.xls

At this time we are unable to expedite requests for the installation of new private grade crossings, industrial track agreements, and track leases. The process for these requests varies somewhat from the review and approval process for new utilities and takes a little longer to secure all required approvals.

Entering or working on the railroad right of way or any other railroad property without the permission of the railroad is trespassing and illegal. Violators risk the possibility of serious, even fatal injury and will be prosecuted.

REQUIREMENTS FOR TEMPORARY SHEETING AND SHORING TO SUPPORT TRACKS

PROVIDENCE AND WORCESTER RAILROAD COMPANY

The following items are to be included in the design and construction procedures for all permanent and temporary facilities adjacent to the tracks of the Providence and Worcester Railroad Company ("P&W"):

1. Footings for all piers, columns, walls or other facilities shall be located and designed so that any temporary sheeting and shoring for support of adjacent track or tracks during construction will not be closer than ten feet to centerline of the nearest track.

2. When support of tracks is necessary during construction, interlocking steel sheeting, adequately braced and designed to carry E-80 live load plus 50% impact factor, is required. Soldier piles and lagging will be permitted for supporting adjacent tracks only when required penetration of steel sheet piling cannot be obtained or when dry, stable material will be encountered.

3. Exploratory trenches three (3) feet deep and fifteen (15) inches wide in the form of an "H", with outside dimensions matching the outside of sheeting dimensions, are to be hand dug prior to placing and driving steel sheeting in areas where railroad underground installations are known to exist. These trenches are for exploratory purposes only and are to be backfilled and compacted immediately. This work must be done in the presence of a P&W inspector.

4. Absolute use of track is required while driving sheeting adjacent to any track. Arrangements for use of track shall be made through P&W's Director of Engineering or his authorized representative on the project.

5. Cavities adjacent to the sheet piling, created by driving of sheet piling, shall be filled with sand and any disturbed ballast must be restored and tamped immediately.

6. Sheet piling shall be cut off at or below top of tie during construction and then, after construction and backfilling is completed, the piling shall be completely removed unless otherwise authorized by P&W's Director of Engineering.

7. The excavation adjacent to the tracks shall be covered, tamped, and protected by handrails according to regulatory requirements. If required by P&W's engineering department, barricades and warning lights shall be provided to protect against personal injuries.

8. Final backfilling of the excavation shall be as required by project specifications.

9. The contractor is to advise P&W of the time schedule of each operation and obtain approval from P&W's engineering department for all work to be performed adjacent to their tracks so that it may be properly supervised by railroad personnel.

10. All drawings for temporary sheeting and shoring shall be prepared and stamped by a Registered Professional Engineer and shall be accompanied by complete design calculations when submitted for approval.

11. Where physical conditions of design impose insurmountable restrictions requiring the placing of sheeting closer than specified above, the matter must be submitted to P&W's Director of Engineering for approval of any modifications.

12. Particular care shall be taken to avoid erosion or filling of the drainage facilities serving P&W. Erosion and sediment controls in the vicinity of P&W's track shall be as approved by P&W's engineering department. Disrupted drainage facilities shall be remediated promptly at the contractor's expense.

There will be no separate payment for furnishing, placing, removing, or leaving in place, if required, sheeting and shoring, or for fulfilling other requirements outlined herein, and the costs thereof shall be included in the various items scheduled in the proposal.

May 14, 2009

WIRE, CONDUIT AND CABLE OCCUPATIONS ON PROVIDENCE AND WORCESTER RAILROAD COMPANY

1. Scope:

(a) These specifications apply to the design and construction of electric transmission wires and cables (power or communication) which are to be located over, under, across, or upon Railroad property and facilities and tracks owned by others over which the Railroad operates its equipment.

2. Construction requirements:

(a) Power and communication lines shall be constructed in accordance with the current issues of the National Electrical Safety Code Handbook (ANSI) and the National Electrical Code (NFPA) except as outlined in item 3(c) of these specifications and except that casing pipes having an outside diameter of over four (4) inches which contain power or communication wires or cables, shall be constructed in accordance with the current issue of "Specifications for Open Trench Installation and Pipeline Occupancy" (form CE8) of the Providence and Worcester Railroad Company.

(b) Wires and cables longitudinally along Railroad rights-of-way shall be constructed as close to Railroad property lines as possible, and in accordance with the requirements outlined below.

3. Approval of Plans:

(a) Plans for proposed wires or cable installations shall be submitted to and meet the approval of the Director of Engineering, prior to the start of construction.

(b) Plans shall be drawn to scale and show the following:

1. Plan view of crossing or occupation in relation to all Railroad facilities.
2. Location of centerline of wire, cable, pole, etc. from the nearest railroad bridge (giving bridge number), railroad milepost, or road crossing.
3. Railroad valuation map number and stationing of proposed occupancy.
4. Profile of ground on centerline of pole or tower line, showing clearances between top of rail and bottom of sag as well as clearances from bottom wire or cable to top wire or cable of the Railroad's overhead transmission, signal, or communication lines or third rail, if present. If none of these facilities are in existence at the point of crossing, the plan should so indicate. All minimum underclearances are to be shown. At no point shall any overhead wire measure less than 25'-0" to the top of rail.

5. Show all known property lines. If wires, cables, or conduits are within public highway limits, such limits should be clearly indicated with dimensions from centerline.
6. For underground occupations a cross-section shall be provided showing size, depth, location and material of construction of the proposed conduit in relation to the railroad tracks and facilities or other underground utilities that may be present.

(c) The plan must be specific as to:

1. Base diameter, height, class, and bury of poles. Poles shall be set no closer than 16'-0" from face of pole to centerline of the nearest track. When necessary, however, each location will be analyzed to consider speed, traffic, etc.
2. Size, material, and number of wires.
3. Nominal voltage of line.
4. Number, location, size, and material of anchors and all guying for poles and arms.

Note: Double cross-arms are required on poles adjacent to tracks. Any tower design must be accompanied by engineering computations and data.

5. Access locations and methods of construction. Directional boring operations must show proposed location of boring rig as well as laydown areas for pull-back of conduit.

4. Application for occupancy:

(a) Individuals, corporations, utility companies or municipalities desiring occupancy of Railroad property by wires, cable, or conduits shall, upon approval of the Railroad, sign an agreement and pay such fees as are appropriate for the said occupancy.

(b) Applications for an occupancy shall be by letter addressed to Bernard A. Cartier, Director of Engineering, Providence and Worcester Railroad Company, 75 Hammond Street, Worcester, MA 01610 and provide the following:

1. Name of individual, corporation, or municipality desiring the occupancy.
2. Complete mailing address of the applicant.
3. Title of person who will sign the agreement.
4. The State in which the applicant is incorporated, if applicable.

(c) All applications shall be accompanied by two copies of all plans, specifications, and computations concerning the proposed occupancy of Railroad company property. Complete sets of plans which indicate the entire route of a power line are not required.

5. Inductive interference:

(a) On agreements covering longitudinal occupation, provisions will be included that the applicant will provide appropriate remedies, at his own expense, to correct any inductive interference with Railroad facilities.

August 30, 2006

WORK WITHIN, ADJACENT TO, AND ABOVE THE RAILROAD RIGHT-OF-WAY

PROVIDENCE AND WORCESTER RAILROAD COMPANY

1. Definitions:

Whenever in these specifications the following words are used, they shall mean unless otherwise noted:

"Railroad" or "Railroad Company" – the Providence and Worcester Railroad Company

"Contractor" – The person(s), party(s), partnership(s), company, corporation and their subcontractors who are under contract to perform work on the Railroad right-of-way.

"Hazard" – the Railroad has furnished the statements quoted below explaining when they consider a hazard to operations exists.

Protection services will be required whenever the Contractor is performing work over, under or adjacent to the Railroad tracks or right-of-way, such as excavating, sheeting, shoring, erection and removal of forms, handling material, using equipment which by swinging or by failure could foul the track, and when any other type of work being performed, in the opinion of the Railroad Company, requires such service.

2. General:

Railroad traffic shall be maintained at all times with safety and continuity, and the Contractor shall conduct all of his operations on or over the Railroad's right-of-way fully within these rules, regulations, and requirements of the Railroad.

The Railroad may provide the Contractor with a schedule of track occupancy, if available, before proceeding with any construction or demolition work over, under, within, or adjacent to the Railroad's right-of-way. The Contractor shall submit for the approval of the Director of Engineering for the Railroad, plans and a detailed description of the method of procedure which will be followed for work within these areas. The work in the field shall not proceed until the plans and method of procedure have been approved by the Director of Engineering or his authorized representative.

All work to be done under, upon, or over the Railroad's right-of-way shall be performed by the Contractor in a manner satisfactory to the Director of

Engineering or his authorized representatives, and shall be performed at such times and in such manner, as not to interfere with the safe movement of trains or traffic upon the tracks of the Railroad.

The Contractor will note that the proposed work involves construction operations on, over or adjacent to property owned by the Railroad. The Contractor must exercise great care in the vicinity of the Railroad's tracks, structures and other facilities and must strictly observe those clearances and other instructions when performing his construction operations near the Railroad's facilities, and he shall use all necessary care and precaution in order to avoid accidents, damage or interference with the Railroad's trains or other property. Any violation of these requirements may be considered cause for the Railroad to take action including stopping work by the Contractor or his subcontractors and preventing their access to the Railroad right-of-way.

3. Plan Approvals:

All applicable plans for demolition, erection, sheeting, shoring or other construction activities on Railroad property shall be submitted to the Railroad for review and approval no less than sixty (60) days prior to the performance of any work covered by those plans. The Railroad shall approve or reject with comment all plans submitted for review within thirty (30) days of receipt of submission and prior to any work on, over or under the Railroad right-of-way.

4. Clearances:

Minimum clearances of twenty-five (25) feet vertical (above top of rail) and fifteen (15) feet horizontal (from track centerline) shall be maintained at all times during construction. If the Contractor wishes a deviation from this requirement, he shall submit a written request for approval of such deviation to the Railroad's Director of Engineering at least twenty-one (21) days prior to the day(s) such deviation is required.

The Contractor shall give written notice to Bernard A. Cartier, Director of Engineering, Providence and Worcester Railroad Company, 75 Hammond Street, Worcester, MA, 01610, telephone number (508) 755-4000, at least twenty-one (21) days in advance of the time the contractor's operations necessitate the fouling of an operated track or that arrangements can be made for proper protection.

Equipment of the Contractor to be used adjacent to the tracks shall be in first-class condition as to fully prevent failures of defective equipment that might cause delay in the operations of trains or damage to the Railroad's facilities.

Cranes, excavators, and any other equipment shall be considered as fouling a track when located in such a position that failure of same, with or without load, would bring any part of the equipment or load within fifteen (15) feet of the

center line of the nearest track. A lesser distance may be allowed if approved in advance by the Railroad.

Critical construction operations must be contained to limited periods, determined by the Railroad, when such work can be accomplished without interference with train schedules. It may be necessary that this work or a portion thereof, be performed during evening hours, night-time hours, Saturdays or Sundays. The Contractor will not be allowed additional compensation for working during these evening, night-time, and early morning hours, Saturdays and Sundays.

5. Interruption of Traffic:

When work on the Project is to be within, adjacent to or above the Railroad's tracks, railroad traffic shall be maintained without interruption, except those approved by the Railroad's Director of Engineering and subject to the following requirements:

Any request for the interruption shall be submitted to the Railroad for review and approval no less than sixty (60) days prior to the start of traffic interruption. The Railroad shall review and approve or reject with comment all interruption and requires within thirty (30) days after the receipt of a request.

If track outages are required for some construction work, some delay may be encountered in obtaining those outages from the Railroad. The Railroad will not be responsible for any extra costs resulting from these delays.

6. Protection:

The Contractor shall notify the Railroad's Director of Engineering or his authorized representative at least 21 days before flagmen will be required; this applies at the initial start of work, and after any long term break in the work. With the exception of the aforementioned, a minimum of two full working days of notification will be required. The Railroad may employ a conductor or one or more flagmen, at the contractor's expense, to ensure safe train operations through the Project construction area.

The Railroad may furnish and assign an engineer and inspector to the Project, at the contractor's expense, for general inspection purposes or for general protection of the Railroad's property and operations during construction.

The providing of such watchmen, and other precautionary measures shall not, however, relieve the Contractor from liability for payment of damages caused by his operations.

7. Demolition:

Before proceeding with any construction or demolition work, on, over or adjacent to the Railroad's property, a pre-construction meeting shall be held at which time the Contractor shall submit for approval of the Railroad's Director of Engineering, plans, computations, and a detailed description of his method of procedure for accomplishing the construction work required, including methods of protecting the Railroad traffic; however, such approval shall not serve in any way to relieve the Contractor of his complete responsibility for the adequacy and safety of his methods of procedure.

Demolition plans shall be submitted to the Railroad for review and approval no less than thirty (30) days prior to the performance of any demolition work covered by those plans. The Railroad shall approve or reject with comments all demolition plans within sixty (60) days of receipt of submission and prior to any work on, over or under Railroad right-of-way.

During any demolition procedure, the Contractor must provide an approved shield to prohibit all debris from falling onto the Railroad right-of-way. A temporary protective barrier must be provided if the existing protective barrier is removed during the demolition procedure. In addition, any openings above or adjacent to the Railroad right-of-way must be adequately secured and protected to prohibit trespassers from falling or entering into the unprotected area of the tracks.

8. Storage:

Materials and equipment belonging to the Contractor shall not be stored on the Railroad property without first having obtained permission from the Railroad's Director of Engineering and such permission will be on the condition that the Railroad will not be liable for damage to such material and equipment from any cause. The Contractor shall keep the tracks adjacent to the site clear of all refuse and debris that may accumulate from his operations, and shall leave the Railroad property in the condition existing before the start of his operations.

9. Endangerments:

If any project work endangers the Railroad's tracks or facilities, the contractor shall immediately do such work as necessary to restore safety. If the Contractor fails to carry out such orders immediately, the Railroad may take whatever steps are necessary to restore safe conditions. The cost and expense to the Railroad of restoring safe conditions or correcting any damage to the Railroad tracks or other facilities caused by the Contractor's operations shall be billed to the Contractor.

Any maintenance work carried out by the Railroad which was caused by the Contractor's negligence shall be charged to the Contractor. The Contractor shall reimburse the Railroad for all such work.

10. Final Acceptance:

Upon completion of the work the Contractor shall remove from within the limits of the Railroad's right-of-way, all machinery, equipment, surplus materials, falsework, rubbish and temporary building, and other property of the Contractor or any subcontractor and shall leave the right-of-way in a condition equal to that prior to the start of construction.

11. Blasting:

No blasting will be permitted adjacent to or on the Railroad property without written consent from the Railroad's Director of Engineering.

12. Crossings:

The Contractor will not be allowed to construct or use any temporary grade crossings on the Railroad property without written consent from the Railroad's Director of Engineering. Where such consent has been given, only rubber tired equipment shall be allowed to cross over the railroad tracks at an approved crossing. If it is necessary to cross the tracks with non-rubber tired equipment (e.g.- excavators, bulldozers, etc.) it must be done under the supervision of a qualified Railroad employee and in such a way that the rails are protected by the use of wood planking or other approved means.

13. Coordination:

The Contractor shall be responsible for the coordination of the work of his various subcontractors who, in turn, shall cooperate with the Railroad in carrying out his work.



CONTRACTOR
SAFETY
RULES

Issued to all North American Subsidiaries of

Genesee & Wyoming Inc.

Effective April 1, 2002
Revised Dec. 31, 2006

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Introduction:

These rules apply to contractors performing maintenance, repair or specialty work on or about railroad property; on other properties the railroad is responsible for and/or on property directly adjacent to the railroad track.

They do not apply to contractors providing incidental services that do not influence safety, such as janitorial services, food & drink services, laundry, or other supply services.

Contractor Responsibilities:

1. All contractor employees must be trained in the work practices necessary to safely perform his or her job.

2. Document that each contractor employee has received and understands the purpose of the Genesee & Wyoming Inc. Contractor Safety Rules.

    - The contractor must prepare a record, which contains the identity of the contractor employee, the date of the training and means used to verify that the employee understood the training.

3. Ensures that each contractor employee follows the railroad's safety rules and procedures.

4. The contractor must advise the railroad of any hazards presented by the contractor's work when they occur.

5. Unless otherwise provided in the contract, the contractor is responsible for restoring ballast, filling holes created when replacing ties and removing all debris generated as a result of the work that is being performed. Permanent or temporary safety precautions must be in place each day prior to the contractor leaving the worksite. These safety precautions are the responsibility of the contractor when providing hazard protection.

6. All applicable transportation department rules apply to contractors when rail cars are involved in the project i.e. (Riding on equipment, 3 Points of Contact, 3 Step Protection, Getting on or off equipment.)

7. All pertinent railroad safety rules and regional procedures must be reviewed prior to the commencement of work on railroad property.

8. All contractor employee injuries and all railroad property damaged by the contractor must be reported to the regional railroad's claims office and the Genesee & Wyoming Inc. claims office located in Rochester, NY at (716) 463-3406. All reports must be completed in accordance to FRA Reporting requirements.

Definitions:

Flagman: An employee designated to direct or restrict the movement of trains at a point on track to provide on-track protection for Roadway Workers. This employee must be qualified on the railroad's operating rules, roadway worker safety; and may not perform any other duties.

Foul Time: A method of establishing working limits through exclusive use of the track in which notification is given and recorded by the train dispatcher or block operator to an employee that no trains will operate within a specific segment of controlled track during a specific time period, and the required blocking devices have been placed on the control machine to protect the track fouled. Foul time must remain in effect until the employee to whom the foul time was issued has reported clear of the track.

Fouling A Track: The location of an individual or equipment in such proximity to a track that the individual or equipment could be struck by a moving train or on-track equipment, or whenever an individual or equipment is within four (4) feet of the field side of the near running rail.

Inaccessible Track: A method of establishing working limits on non-controlled track by preventing access to the working limits.

Lone Worker: An individual employee who is not being afforded On-Track Protection by another employee, who is not a member of a gang, and is not engaged in a common task with another employee.

Restricted Speed: Prepared to stop within one-half the range of vision-short of a train, obstruction, or switch improperly lined. Be on the lookout for broken rail.

Roadway Maintenance Machine: Powered equipment, other than by hand, which is being used on or near the track for maintenance, repair, construction or inspection of track; bridges; roadway; or signal, communication, or electric traction systems. These machines may have road or rail wheels or may be stationary.

Roadway Maintenance Work Train: A train that is being operated within working limits in conjunction with roadway maintenance, construction or repairs, under the direction of a designated employee in charge.

Roadway Worker: An employee, or employee of a contractor whose duties include inspection, construction, maintenance or repair of track, bridges, roadway, signal and communication systems, electric traction systems, roadway facilities or roadway maintenance machinery on or near track with the potential of fouling a track, and flagmen and watchmen affording on track protection.

Track Centers: The distance from the centerline of one track to the centerline of an adjacent track.

Gage: The distance (4 ft. 8 1/2 inches) between track rails.

Clear of Tracks: Minimum clearance of at least four feet outside the rail of all tracks, and not between main tracks.

Blue Flag Protection: A method of providing protection for people who work on, under, or between railroad rolling stock; freight cars, locomotives, etc.

1. Accident/Injury Requirements:

The contractor is required to have an employee qualified to give first aid. If a contractor employee is injured while working on railroad property, he or she should be given first aid at once. Medical assistance should be obtained as soon as possible if further care is needed.

2. Personal Protective Equipment:

a. Safety Footwear:

- Employees whose duties require them to work on or about tracks or equipment are required to wear leather laced type shoes that cover the entire foot. These shoes must be at least six inches high, and have safety toes, must have a defined heel of not more than 1 ¼ inches in height and must have oil resistant soles.
- Shoes that are excessively worn or, do not provide ankle support, have thin, loose or smooth soles must not be worn.

b. Eye Protection requirements:

- Safety glasses must be worn at all times while on railroad property. Protect your vision by wearing safety eyewear with side shields that are clean and properly fitted.
- If you wear corrective lenses, you must wear either approved prescription safety glasses with side shields or cover-all type goggles over your personal glasses:
- Do not face welding, heating, or grinding operations unless you are wearing appropriate eye protection.
- If you are performing work near electric (arc) welding or cutting operations, wear a welding helmet. If a welding helmet is not available, move a safe distance from the operation.

c. Hearing Protection:

- Wear hearing protection when you are welding, cutting, or exposed to flying sparks from these operations. Sparks from welding or cutting can burn your inner ear.
- Wear hearing protection when working in high noise areas in accordance with the railroad's hearing conservation policy, hereby attached.

d. Respiratory Protection

- Wear respiratory protection when you are exposed to fumes, dust, mist, or vapor.

e. Protective Clothing

- Wear protective gloves and clothing when you are handling or working on a wet cell battery, handling, pouring, or using acids, toxic substances, or solvents or, handling creosote materials.

f. High-visibility Workwear

All contractors are required to wear approved high-visibility workwear when they are on duty or on the Company property. Such high-visibility workwear must be worn as the outermost layer of clothing.

i. High-visibility workwear must be approved by the Regional Director of Safety and may consist of a vest, coveralls, T-shirt or other clothing of the prescribed color (yellow/green or orange) equipped with reflective striping as follows: a horizontal band around the waist, two vertical bands and/or an "X" on the back, and two vertical bands in front from the waist to the top of the shoulders. Stripes must be of silver or yellow reflective material and be at least 2 inches (5 cm) in width.

ii. Vests must be properly sized and constructed with tear-away features as approved by the Regional Director of Safety.

iii. Defective, damaged or lost workwear must be reported immediately to your supervisor and replaced before reporting for duty.

iv. Exceptions:

(a.) High-visibility workwear is not required when you are in these locations:

- Lunchroom;
- Locker room;
- Inside vehicles;
- Inside railway passenger cars;
- Inside locomotive cabs; or
- Offices.

(b.) When employees are working on locomotives or other equipment inside shop buildings, high-visibility workwear is recommended. All employees working outside of shop buildings require approved high-visibility workwear.

(c.) Accommodations for unusual conditions will be at the discretion of the Regional Director of Safety.

3. Working On Equipment:

Do not operate or ride on any equipment unless it is in the performance of your duties and you have been properly authorized to do so. Do not jump from equipment, platforms, or other elevated places. Use steps or a ladder.

4. Keep Clear of Suspended Loads or Cables/Chains under tension:

a. Keep clear of suspended loads.

b. Stand clear when chains, cables or other tackle in under tension.

5. Keeping Clear of Electrical Wires:

Keep at least 12 feet away from a dangling wire or any object that may be in contact with an electrical current. Keep others away until qualified personnel are notified and take charge.

NOTE: Qualified personnel are employees or contractors who have been trained or qualified to work with electricity.

6. Working With Tools:

a. Do not modify tools.

b. Before you use any tool, examine it for defects. Report any defects to your immediate supervisor.

c. Defective tools must not be used.

7. Working Around On-Track Equipment:

Expect locomotives, cars and track maintenance equipment to move on any track, in either direction, at any time. Therefore, employees must look in both directions before crossing tracks.

8. Avoiding Potential Hazards:

Example: Employees should avoid walking, stepping, resting foot on or sitting on rails, frogs, switches, guardrails, pipe or interlocking apparatus or connections.

9. Crossing Tracks:

Employees must not cross tracks closer than 50 feet from standing locomotives and cars.

10. Working Near Moving Trains:

a. Employees should never carry objects on their shoulders when they are near moving trains.

b. Employees should not cross in front of moving trains or equipment.

c. Placement of Material Near Tracks.

- Employees should place toolboxes, test equipment and other objects not less than 25 feet from the nearest track. Place all lid apparatus so that lid will open toward track and be secured in place.
- When performing work near tracks, arrange all tools, material, equipment or other objects so that a moving train or equipment will not strike them.

11. Working Near Standing Railroad Equipment:

Employees should keep themselves and material clear of and never lean against, sit on, or otherwise rest on standing railroad equipment.

12. Working In or Near Tunnels – On Bridges or Trestles:

a. Employees must move to a safe location when a train or equipment moves past their work location in tunnel or on bridges, trestles or overpasses.

b. Employees working in tunnels must be protected by railroad watchmen and must occupy safety manholes when a train approaches. Employees must secure loose clothing and maintain handhold if possible until train has passed.

c. Walking in tunnels or on bridges, trestles and overpasses should be avoided whenever possible.

- When an employee must walk through a tunnel or across a bridge, trestle or overpass the employee must look both ways and confirm with railroad personnel that they are properly protected and that he or she can safely complete the walk through the tunnel or across the bridge, trestle or overpass before any moving rail equipment passes through the tunnel or over that bridge, trestle or overpass.
- Extra care must be taken when crossing open floor bridges or trestles.

13. Action to take if Safe Passage of a train is at risk:

If an event occurs that would interfere with the safe passage of trains, the employee must take immediate action to stop trains by radio communication to trains or the person in charge of the track. If protection cannot be immediately ensured, or if communications fail, flag protection must be immediately provided as prescribed by the railroad's rules.

14. Protection When Fouling or Working on a Track:

a. Trains must be fully protected against any known condition that may interfere with their safe passage.

b. If work on or adjacent to a track will create a condition interfering with the safe passage of trains, that work must not be attempted without permission of the employee in charge of the track.

c. On Main Tracks or where Interlocking rules are in effect, protection is required in accordance with railroad operating and safety rules.

15. Returning Track to Service:

When track is to be returned to service, the employee in charge must take the following actions:

a. Notify the Dispatcher or railroad supervisor responsible for the safety of the track of any restrictions necessary for the safe passage of trains.

b. Ascertain that all track cars and trains are clear of the track, and notify the Dispatcher or railroad supervisor responsible for the safety of the track that they are clear.

c. An employee designated by the railroad must inspect the track prior to operating trains.

16. Interlocking Switches within Work Area:

Dispatchers controlling interlocking switches within the Work Area must line such switches for movements within the Work Area and must apply blocking devices to the controls of those switches. These blocking devices must not be removed without permission of the employee in charge of the Work Area. This requirement does not relieve employees operating within the Work Area from complying with interlocking signal indications.

17. Flag Protection is Required When:

a. Work is being performed by others not hired by railroad and the work is being performed on railroad property or adjacent to railroad right of way.

b. Work is being performed by entities hired by the railroad and the work is being performed within 25ft from the center the track.

18. Fouling Track

Whenever fouling track, the following procedures will apply:

a. Action Required Prior to Issuance:

Before fouling a track, the employee in charge must determine that no trains have been authorized to move in the direction of the point to be fouled, and must ensure that Stop Signals have been displayed and blocking devices applied by the dispatcher to controls of Switches and signals leading to the affected track to be protected.

b. Permission to Foul a Track:

Permission to foul a track must include the following information:

1. Designation of track to be fouled
2. Location of fouling (mile posts)
3. Time limit for fouling (beginning time and ending time)

Permission must be repeated by the receiving employee and confirmed by the Dispatcher or railroad supervisor responsible for track safety before it is acted upon.

***c.* Clearing Fouled Track.**

1. Stop all equipment and vehicles on the right of way while the train is passing
2. Stay clear until you are notified that it is safe to resume work

19. Safety Precautions: When working in yards and on tracks:

a. Keep at least 50 feet from passing trains and equipment, if possible. Face the direction from which the train is approaching. Watch for projecting, dragging, or falling objects.

b. Do not perform work that will interfere with the safe passage of trains.

c. Inspect all passing trains to detect a dangerous condition.

d. Cross tracks at least 50 feet from standing locomotives or cars.

e. Do not cross between cars standing less than 50 ft. apart.

f. Give hand signals for movement of work train or wreck train only if you are a member of the train crew. **EXCEPTION: Emergency stop signals may be given by anyone**

20. Employee In Charge:

The employee in charge is responsible for taking charge of the work performed by assembled gangs and arranging protection for the gangs.

The employee in charge is responsible for the safety, instruction, and performance of all employees under his or her jurisdiction.

The employee in charge advises the foremen of the assembled gangs how each of them will protect the safety of the employees under their direction.

The employee in charge is also responsible for:

a. Ensuring that employees comply with all applicable rules.

Take the track out of service, or get verbal permission to temporarily foul the track according to operating rules.

b. If employees are too scattered to hear the watchman's warning whistle or horn, assign advance (additional) watchmen as needed.

c. If bad weather limits visibility, use additional protective measures as needed.

21. Watchmen:

Responsibilities:

The employee in charge assigns watchmen to watch for approaching trains and warn employees to clear the tracks. If a watchman has not been assigned, the employee in charge acts as a watchman.

Follow these precautions if you have been assigned as a watchman:

a. Give your full attention to watching for trains and warning employees.

b. Do not perform any other duties, even momentarily.

c. If you do not have a full view of trains approaching in either direction, or if you cannot give your full attention to your duties as watchman, signal employees to clear the tracks.

d. Do not leave your station until the employee in charge determines that protection is no longer necessary, or the employee in charge has assigned another watchman who is in position and watching for approaching trains.

Watchman Duties:

Watchmen are responsible for watching for approaching trains and signaling employees to clear the tracks. If a watchman has not been assigned, the employee in charge acts as a watchman. A watchman's duty is to watch. Follow these procedures when you are performing the duties of a watchman:

When a train approaches from either direction, warn employees in time for them to clear track at least 15 seconds before the train approaches the point of work.

NOTE: You may need to give additional warnings around noisy operations. Example: Sounding a whistle or blowing a horn.

22. Clearing Controlled Track:

Follow this procedure for clearing on a Controlled Track, which is any track shown in the timetable as being under the control of a Dispatcher or Block Operator.

a. Clear all tracks, if possible, keeping at least 50 feet from passing trains and equipment.

b. If you cannot clear all tracks;

- Clear the track on which the train is approaching and the adjacent tracks.
- Watch for trains in both directions and determine the track on which other trains will approach. Clear enough tracks so that you will not be trapped.

c. If you are operating equipment within the gage of the track adjacent to the track being cleared, dismount the equipment and clear the track.

23. Working On Non-Controlled Industrial and Yard Tracks

Follow these procedures when working on and clearing Non-Controlled Track (Industrial, Yard, or any other track not controlled by a Dispatcher:

Make the working limits inaccessible to trains, engines or other on track equipment using one of the following procedures:

1. A switch lined and effectively secured in one of the following ways:
   - With a private lock on switches that will accommodate them.
   - Properly secured switch point clamp.
   - Driven spikes or wedges that require special tools to remove them.
2. Portable derail with flag.

24. Working Around Self Propelled Equipment:

Follow these safety precautions when working on or around self-propelled equipment:

a. Use the handrail when getting on, riding on, and getting off equipment. Maintain three points of contact.

b. Do not get on or off moving equipment.

c. When working near or observing equipment:

1. Perform a Job Safety Briefing and communicate with the operator of the equipment to cover the following:
   - Operating procedures.
   - Location of employees working around equipment.
   - Operator blind spots.
   - Signal to warn that equipment will move.
2. When your duties require you to be around the equipment, you must maintain a 50-foot safe area from the equipment.
3. If your duties require you to be within the 50-foot safe area of the equipment, perform those duties from the location established in your communication with the operator.

25. Roadway Maintenance Machine Operators

Follow these precautions when operating self propelled equipment:

a. **Communicate with employees in the vicinity of the equipment and cover;**
   - Normal operating procedures including operator's blind spots.
   - Test the brakes immediately after starting.
   - Do not allow anyone to distract you or interfere with your duties.
   - Constantly look out for obstructions or unsafe conditions in the direction you are moving.
   - If you cannot see ahead or behind, designate another employee to keep a lookout for you.

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Public Project Manual

For any activity or project that may involve the railroad

ENGINEERING SERVICES

a Genesee & Wyoming Company

Prepared by Public Projects Department
Revision: April 2019

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Section 1.02 – Introduction

Providence and Worcester Railroad (PW) (the Railroad) is a subsidiary of Genesee & Wyoming Inc. (G&W), the largest holding company in the U.S. of regional and short line railroads. G&W has more than 100 subsidiary railroads in 41 U.S. states and four Canadian provinces serving thousands of communities and customers. G&W also has a major rail freight presence in Australia and Europe.

Each G&W subsidiary railroad is its own separate legal entity with local decision making to best meet customers' needs. G&W's North American railroads are organized in six operating regions that provide a consistent focus on safety, operating standards, and marketing.

G&W railroads receive corporate staff support in areas such as accounting, engineering, legal, mechanical, real estate, and other functions.

The Public Projects Department (PPD) at G&W is part of Engineering Services with the goal to support the railroads. PPD is also tasked to support outside agencies by streamlining the flow of outside party projects and initiatives.

PPD is involved in a wide variety of projects initiated by government agencies, local businesses, and others. Accurate and timely communication of information between the Railroad and these parties improves planning, relationships, and successful completion of projects. The information in this manual explains important steps project sponsors should follow to streamline their projects and proposals.

G&W railroads place the highest priority on the safety of the public and their employees. Therefore, any activity that has the potential to adversely impact safe railroad operations must be evaluated by the Railroad. This manual is intended to be a general guide for reference to the Railroad's minimum requirements and standards. The Railroad reserves the right to deviate from any of the requirements or standards set forth in this manual.

We look forward to working together to serve the common goal of the safe operation of trains. We hope the information provided in this manual makes it easier to work together as a team.

Jacob Smith
Director of Public Projects

Section 1.03 – Basic Information in this Manual

This manual is intended to be a general guide, but it in no way overrides the express guidance, requirements, or standards of the Railroad. As a tool only, the information herein is intended for broad use and each project will be reviewed by PPD and the Railroad to ensure the safest actions are taken.

Any subject not covered in the manual should be routed to PPD for review.

Any activity that either directly or indirectly impacts railroad property must have approval by the Railroad.

Common Types of Public Projects

- **Highway-Rail Grade Crossings:** Closure, removal, installation, and alterations of public highway-rail grade crossings.
- **Bridges Over Railroad:** Construction, reconstruction, rehabilitation, repair, removal, painting, and maintenance of bridges over the Railroad by outside parties.
- **Parallel Roads/Facilities:** Construction, reconstruction, modification, removal, and maintenance of parallel roads or other public facilities affecting railroad property or operations.
- **Entry on to Railroad Property:** Temporary rights of entry onto railroad property and utility installation licenses.
- **Other Projects Involving Rail Corridors:** Publicly sponsored projects involving or altering railroad facilities or its property. These projects may be on, above, adjacent to, or otherwise have the potential to impact the property.
- **General Engineering Consultants (GEC):** Although the PPD is the primary point of contact, GECs provide additional engineering services as directed by the Railroad to assist the Railroad in managing public projects.

Section 1.04 – Definitions and Common Terms

- **Agency** – The project sponsor (i.e., state DOT, local agencies, private developer, etc.)
- **AREMA** – American Railway Engineering and Maintenance-of-Way Association – the North American railroad industry standards group. The use of this term shall be in specific reference to the AREMA Manual for Railway Engineering.
- **Basis for Design (BOD)** – The developed scope of a project needed to bid out the project.
- **Construction Engineering Inspection (CEI)** – Consultant who oversees the construction operations who is authorized to act on behalf of the Railroad to ensure that only the safest and least impactful practices are being performed.
- **Contractor** – The agency's representative retained to perform the project work.
- **Engineer** – G&W engineering representative or a GEC authorized to act on their behalf.
- **Employee in Charge (EIC)** – An employee or designated contractor qualified to protect a project team during an operation, activity, or project.
- **Flagman/Flagger** – A qualified EIC with the sole responsibility protect the outside public and contractors while facilitating the safe passage of trains.
- **General Engineering Consultant (GEC)** – Consultant who has been authorized to act on the behalf of the Railroad. GECs perform preliminary engineering, construction inspection, and monitoring under the direction of the engineering personnel. GEC personnel also perform day-to-day administration of certain types of projects.
- **Notice to Proceed (NTP)** – Authorization by the project sponsor allowing the Railroad, its appointed consultants, and subcontractors to proceed out of PE and move into construction.
- **Order of Magnitude (OOM)** – A high-level estimate to quantify the estimated total value of the project. Typically the estimate is marked up to account for the project unknowns.
- **Potential to Encroach** – Any activity having the possibility of impacting railroad property or operations, defined as one or more of the following:
    - Any activity where access onto railroad property is required.
    - Any activity where work is being performed on the Railroad's Right of Way (ROW).
    - Any excavation work adjacent to railroad tracks or facilities, within the theoretical railroad live load influence zone, or where the active earth pressure zone extends within railroad property.
    - The use of any equipment that, if tipped and laid flat in any direction (360 degrees) about its center pin, can encroach within twenty-five feet (**25′-0″**) of the nearest track. This is based upon the proposed location of the equipment during use and may be a function of the equipment boom length.
        - Note that hoisting equipment with the potential to foul must satisfy the 150% factor of safety requirement for lifting capacities.
    - Any activity where the scatter of debris or other materials has the potential to encroach within twenty-five feet (**25′-0″**) of the nearest track.
    - Any activity where significant vibration forces may be induced upon the track structure or existing structures located under, over, or adjacent to the track structure.

- Any other work that poses the potential to disrupt rail operations, threaten the safety of railroad employees, or otherwise negatively impact railroad property, as determined by the Railroad.

- **Preliminary Engineering (PE)** – The review and development of the project scope or project discovery that typically includes a site visit, design or design review, and estimate to complete the project.
- **Public Projects Department (PPD)** – A member of the G&W Public Projects team or assigned GEC representative.
- **Request for Proposal (RFP)** – The process by which a design-build contractor is selected and awarded to complete the project.
- **Right of Entry (ROE)** – Formal document applied for through the G&W Real Estate Department.
- **Right of Way (ROW)** – Railroad Right of Way as well as any railroad property and facilities. This includes all aerial space within the property limits and any underground facilities.
- **Theoretical Railroad Live Load Influence Zone** – 1 horizontal to 1 vertical theoretical slope line starting at bottom corner of tie.
- **Top of Rail (TOR)** – This is the base point for clearance measurements. It refers to the crown (top) of the steel rail, the point where train wheels bear on the steel rails. Use the higher of the two rails when track is superelevated.
- **Track Structure** – All load-bearing elements that support the train. This includes, but is not limited to, the rail, ties, appurtenances, ballast, sub-ballast, embankment, retaining walls, and bridge structures.
- **Vertical Clearance** – Distance measured from TOR to the lowest obstruction, within six feet (**6′-0″**) of the track centerline, in either direction.

Section 1.05 – Payment of Railroad Cost and Expenses

Summary

The project types addressed in this manual typically do not directly benefit railroad operations. In some cases, they create risk to and challenges for railroad operations and impact the Railroad's ability to serve its customers and the American economy. For these reasons, the Railroad seeks payment for its costs and expenses incurred in connection with project reviews and construction.

Types of Reimbursable Costs and Expenses

Costs reimbursable by the project sponsor in connection with the project include, but are not limited to:

- The Railroad's labor and support services
- Sums paid to railroad consultants and subcontractors
- Engineering reviews and CEI
- All out-of-pocket expenses
- Costs for equipment, tools, materials, and supplies
- Telephone, facsimile, and mailing expenses
- Real estate or legal reviews
- Cost for flagging or other action to protect rail operations and infrastructure

Key Points

- Preliminary engineering is usually initiated by the project sponsor with a commitment to reimburse for the project discovery and engineering services.
- The Railroad will not begin its preliminary engineering review until a PE agreement or other legal reimbursable agreement is provided.
- PE costs typically range between $10,000 to $30,000 depending on the project.
- All funding sources must be identified up front, and any time funding sources change, the Railroad must be immediately informed. All special funding requirements must be identified prior to the commencement of any project, such as "Buy America" or "Buy American" requirements.
- All costs billed will be actual cost and no profit will be gained by performing services on behalf of the project.
- Construction and CEI will be estimated prior to getting an NTP.
- The Railroad will not begin construction until all applicable contracts are provided along with an NTP.

Section 1.06 – Insurance Requirements for Public Projects

Summary

For any project that is performed on, above, or adjacent to railroad property, proper insurance must be obtained, submitted, and approved prior to work commencing. Insurance requirements will be incorporated in all applicable contracts.

The insurance requirements will be determined based on site-specific location as well as level of impact to the Railroad. Those specific requirements can be requested at the initiation of the project once the scope and project limits have been determined.

If during the project the insurance coverage expires or lapses, the agency or its contractor, as applicable, is responsible for notifying the Railroad and ceasing all work until the requirements have once again been met and approved by the Railroad.

Section 1.07 – Railroad Flagging Requirements

Summary

In the interest of public safety and the safety of the Railroad's and project sponsor's employees and property, the Railroad will work cooperatively with agencies, consultants, contractors, and others who need to access railroad property when work brings them in close proximity to active railroad tracks to determine the appropriate flagging services needed and to make arrangements for those services.

Flagging services may only be performed by personnel qualified by the Railroad who are trained in the proper procedures related to rail operations and safety requirements, familiar with rail operations and procedures in a project area and able to communicate directly with dispatching personnel and train crews.

All costs and expenses associated with railroad flagging services are the sole responsibility of the agency, consultant, or contractor. The GEC will provide its estimated costs prior to the start of the project work or its assignment of flagging personnel, but it is up to the agency to provide the estimated number of days the flagmen are needed.

Once flagging personnel are formally assigned to a specific work location, the period of assignment can only be changed with appropriate advanced arrangements. Charges for providing flagging services beyond a normal eight-hour weekday are calculated and billed at an overtime rate.

The GEC will coordinate the flagmen and should be the primary point of contact for scheduling, including changing the working schedule or duration the flagmen are required.

Conditions

The following are conditions that may require the use of a flagman by the Railroad:

- When any entity is working on, near, or adjacent to active railroad tracks.
- When an outside party is using railroad property or performing operations that may affect railroad property or facilities (including occasions when a party has been given express permission to enter railroad property or perform such operations under the terms of the applicable contracts).
- When work off railroad property has the potential to impact railroad property or operations.
- When off-highway construction equipment is crossing the railroad at a private or public crossing.
- When oversized equipment or highway vehicles are to cross the railroad at a private or public crossing.
- In other instances, as determined by the Railroad.

Section 1.08 – Engineering Reviews and Construction Monitoring

Summary

Any project proposals that may affect or be near the Railroad's right of way must be evaluated by the Railroad. To initiate a project, a PE agreement or other applicable contract is required to identify the project sponsor and the scope, define the tasks to be accomplished, and specify the payment required. Once the plans and scope are approved by the Railroad, the project can proceed into construction.

The purpose of PE is to identify issues related to safety, engineering, customer service, operations, legal and regulatory matters, expense, risk, and other considerations specific to any proposed project. The Railroad's review is only to determine that the plans and improvements constructed are in accordance with the Railroad standards and satisfy the Railroad's requirements. Plans should be submitted early in project development to ensure that the Railroad requirements can be incorporated up front. If property is leased, the review might require additional party signoff.

Cost and Timing

Prior to commencing with engineering, design, or reviews, a legal document or associated PE agreement must be executed where the outside party will bear the cost of the design or design reviews (**see Section 1.05**). This includes the cost of railroad employees as well as GEC support. The scope includes attending meetings, site surveys, reviewing plans, preparing plans, correspondence, and any other activity to support the review of the project and development of scope.

It is the goal of PPD to have a design review turned around within 30 to 45 days depending on the level of effort. It is in the interest of all parties to complete the PE review before commitments are made or construction steps begin. The Railroad and its GEC will work with the project sponsor to schedule PE and construction to meet project schedule objectives whenever possible, considering available resources.

Construction Monitoring

To ensure the safety of the public and railroad employees, maintain quality rail service to customers, and to protect railroad assets, the Railroad may require construction monitoring (in addition to flagman protection) of the project. The construction monitoring will be conducted by the Railroad and its GEC at the expense of the project sponsor.

Construction monitoring includes intermittent or continuous on-site presence of the Railroad or its GEC during construction activities. The following typically applies:

- The construction project sponsor, owner, or agency in charge will pay for the cost of construction monitoring. Construction monitoring will be specified, and the estimated cost will be included in the construction agreement for the project.
- Construction monitoring is in addition to railroad-required flagging.
- Construction monitoring includes the Railroad's review and approval of all plan changes and required contractor submissions during the construction phase of the project.
- The project sponsor is responsible for its safety and the safety of its property, contractors, and employees. The GEC, as part of its construction monitoring, will review the work site for activities that could interfere with safe operation of the Railroad.
- The GEC is only responsible for monitoring the general work activities for safety and impact to the Railroad and its property and not for managing the overall project work. Any observed unsafe acts or conditions will be reported immediately to the project sponsor or contractor representative.

Section 1.09 – Real Estate

Summary

All projects that modify or impact the Railroad's property must be reviewed by the G&W Real Estate Department to determine property descriptions, ownership, and implications. Any rail line requiring special handling due to a lease or property agreement must be taken into consideration when performing engineering reviews and providing project acceptance.

All parties accessing the Railroad's ROW for investigative activities or for the performance of construction work are required to have a written agreement with the Railroad fully detailing each party's responsibilities. Activities by others with the potential to affect the Railroad's property, operations, and/or personnel without actually entering the Railroad's property must also be reviewed by the Railroad and appropriate arrangements and agreements completed.

If a right of entry or utility license, or any applicable agreement is required for the project, the agency or its contractor, as applicable, will need to work directly with the G&W Real Estate Department to enter all contracts into place prior to commencing work on the property.

Construction and improvement projects involving railroad property may require a conveyance of property rights, subject to adequate consideration and corporate approvals. Such projects include, but are not limited to:

- Highway – rail grade crossings
- Bridges over/under the railroad
- Parallel roads/facilities
- Road/bridge widening projects

Further clarification can be requested by contacting the PPD and the appropriate G&W Real Estate Department specialist.

Section 1.10 – Project Requirements

Summary

The project requirements set forth in this Section 1.10 shall apply to any project, subject to the terms or conditions of any applicable contracts. The Railroad representative shall have final authority in all matters affecting the safe maintenance of railroad operations and property, and his or her approval shall be obtained by the agency or its contractor for methods of construction to avoid interference with railroad operations and property and all other matters contemplated by these requirements.

The agency or its contractor shall arrange and conduct its work so that there will be no interference with railroad operations, including train, signal, telephone, and telegraphic services, or damage to railroad property or to poles, wires, and other facilities of tenants on its property or right of way. The agency or its contractor shall store materials so as to prevent trespassers from causing damage to trains or property. Whenever work is likely to affect the operations or safety of trains, the method of doing such work shall first be submitted to the Railroad for approval, but such approval shall not relieve the agency or its contractor from liability in connection with such work. No work shall be performed without it first being approved by the Railroad.

If conditions arising from or in connection with the project require that immediate and unusual provisions be made to protect train operation or property, the agency or its contractor shall make such provisions. If the Railroad determines that such provisions are insufficient, the Railroad may, at the expense of the agency or its contractor, require or provide such provisions as may be deemed necessary, or cause the work to cease immediately.

If the agency or its contractor violate or fail to comply with any of the requirements in the section, the Railroad may:

- Require the agency and/or the contractor to vacate its property;
- Withhold monies due the agency and/or the contractor;
- Require the agency to withhold monies due to the contractor; and
- Cure such failure, and the agency and/or any contractor shall reimburse the Railroad for the cost of curing such failure.

Notice to Start Work

The agency or its contractor shall not commence any work on railroad property or ROW until it has entered into all applicable contracts and received all requisite approvals from the Railroad. Thereafter, unless otherwise specified in such applicable contracts, the agency or its contractor must:

- Notify the Railroad in writing of the date that it intends to commence work on the project. Such notice must be received at least 10 business days in advance of the date the agency or its contractor proposes to begin work on railroad property. The notice must refer to the specific project agreement. If flagging service is required, such notice shall be submitted at least thirty (**30**) business days in advance of the date scheduled to commence the work.
- Obtain authorization from the Railroad to begin work on the property, such authorization to include an outline of specific conditions with which it must comply.
- Obtain from the Railroad the names, addresses, and telephone numbers of railroad personnel who must receive notice under provisions in the construction agreement. Where more than one individual is designated, the area of responsibility of each shall be specified.

Hauling across Railroad

If the agency or its contractor desires access across the Railroad's property or tracks at a location other than an existing and open public road crossing in or adjacent to the construction of the project, the agency or contractor must first obtain the permission of the Railroad and shall execute any applicable contracts as described in **Section 1.09** Real Estate herein.

Cooperation & Delays

The agency or its contractor shall arrange a schedule with the Railroad for accomplishing stage construction involving work by the Railroad. In arranging its schedule, the agency or contractor shall ascertain from the Railroad the lead time required for assembling crews and materials and shall make due allowance therefore.

The agency or its contractor may not charge any costs or submit any claims against the Railroad for hindrance or delay caused by railroad traffic; for any work done by the Railroad or other delay incident necessary for safe maintenance of railroad traffic; or for any delays due to compliance with these requirements. Agency and contractor shall cooperate with others participating in the construction of the project to the end that all work may continue to move forward.

The agency and its contractor understand and agree that the Railroad does not assume any responsibility for work performed by others in connection with the project. The agency and contractor further understand and agree that they shall have no claim whatsoever against the Railroad for any inconvenience, delay, or additional cost incurred by the agency or contractor on account of operations by others.

Storage

The agency and its contractor shall not store their materials or equipment on railroad property or where they may potentially interfere with operations unless the agency or contractor has received prior written permission. The agency and contractor understand and agree that the Railroad will not be liable for any damage to such materials and equipment from any cause and that the Railroad may move, or require the agency or its contractor to move, such material and equipment at the agency's or contractor's sole expense. To minimize the possibility of damage to the Railroad tracks resulting from the unauthorized use of equipment, all grading or other construction equipment that is left parked near the tracks unattended shall be immobilized to the extent feasible so that it cannot be moved by unauthorized persons.

Construction

Construction work on railroad property shall be subject to the Railroad's inspection and approval. Work shall be in accordance with written specific conditions and with these requirements. The agency or its contractor shall obtain the Railroad and agency representative's prior written approval for use of explosives on or adjacent to railroad property. If permission for use of explosives is granted, the agency or contractor must comply with the following:

- Blasting shall be done with light charges under the direct supervision of a responsible officer or employee of agency or contractor.
- Electric detonating fuses shall not be used because of the possibility of premature explosions resulting from operation of two-way train radios.
- No blasting shall be done without the presence of the Railroad's CEI. At least 30 days' notice to the Railroad is required to arrange for site presence.
- Explosives shall not be stored on railroad property.

The Railroad will:

- Determine the approximate location of trains and advise the agency or contractor of the approximate amount of time available for the blasting operation and cleanup.
- Have the authority to order discontinuance of blasting if, in the Railroad's opinion, blasting is too hazardous or is not in accord with these requirements.

The agency or its contractor shall maintain all ditches and drainage structures free of silt or other obstructions that may result from their operations. The agency or contractor shall provide erosion control measures during construction and use methods that accord with applicable state standard specifications for road and bridge construction, including (1) silt fence; (2) hay or straw barrier; (3) berm or temporary ditches; (4) sediment basin; (5) aggregate checks; and (6) channel lining. All such maintenance and repair of damages due to agency's or contractor's operations shall be performed at agency's expense.

The agency shall arrange, upon approval from the Railroad, to have any utility facilities on or over railroad property changed as may be necessary to provide clearances for the proposed trackage.

The agency or its contractor, upon completion of the project, shall remove from railroad property any temporary grade crossings; any temporary erosion control measures used to control drainage; and all machinery, equipment, surplus materials, falsework, rubbish, or temporary buildings belonging to the agency or contractor. The agency or contractor, upon completion of the project, shall leave railroad property in neat condition, satisfactory to the Railroad.

Section 1.11 – Construction Submission Criteria

Summary

The intent of this manual is to guide outside parties and their contractors when performing work on, over, or with potential to impact railroad property. Work plans shall be submitted for review to the Railroad for all work that presents the potential to affect railroad property or operations. All work shall be performed in a manner that does not adversely impact the Railroad operations or safety; as such, the requirements of this manual shall be strictly adhered to, in addition to all other applicable standards associated with the construction.

General

- A construction work plan is required to be submitted by the agency or the Railroad for review and acceptance prior to accessing or performing any work with potential to foul.
- The agency or its representative shall submit sets of plans, specifications, supporting calculations, detailed means and methods, and procedures for the specific proposed work activity.
- Construction submissions shall include all information relevant to the work activity and shall clearly and concisely explain the nature of the work, how it is being performed, and what measures are being taken to ensure that railroad property and operations are continuously maintained.
- All construction plans shall include a map of the work site depicting the tracks, the ROW, proposed means of access, proposed locations for equipment and material staging (dimensioned from nearest track centerline), as well as all other relevant project information. An elevation drawing may also be necessary to depict clearances or other components of the work.
- Please note that the Railroad will not provide pricing to individual contractors involved in bidding projects. Bidding contractors shall request information from the agency only.
- The contractor shall install a geotextile fabric ballast protection system to prevent construction or demolition debris and fines from fouling ballast. The geotextile ballast protection system shall be installed and maintained by the contractor to the satisfaction of the Railroad.
- The Railroad shall be kept aware of the construction schedule. The contractor shall provide timely communication to the Railroad when scheduling the work such that a representative may be present during the work. The contractor's schedule shall not dictate the work plan review schedule, and flagging shall not be scheduled prior to receipt of an accepted work plan.

- At any time during construction activities, the Railroad may require revisions to the previously approved procedures to address weather, site conditions, or other circumstances that may create a potential hazard to rail operations or facilities. Such revisions may require immediate interruption or termination of ongoing activities until such time the issue is resolved to the Railroad's satisfaction. The Railroad shall not be responsible for any additional costs or time claims associated with such revisions.
- Blasting will not be permitted to demolish a structure over or within railroad property. When blasting off railroad property but with potential to foul, vibration monitoring, track settlement surveying, and/or other protective measures may be required as determined by the Railroad.
- Blasting is not permitted adjacent to the Railroad's ROW without written approval from the Railroad.
- Mechanical and chemical means of rock removal must be explored before blasting is considered. If written permission for the use of explosives is granted, the agency or contractor must submit a work plan (**see Section 1.08 & Section 1.10**).

Hoisting

All proposed hoisting operations with potential to foul shall be submitted in accordance with the following:

- A plan view drawing shall depict the work site, the track(s), the proposed location(s) of the lifting equipment, as well as the proposed locations for picking, any intermediate staging, and setting the load(s). All locations shall be dimensioned from the centerline of the nearest track. Crane locations shall also be dimensioned from a stationary point at the work site for field confirmation.
- Computations showing the anticipated weight of all picks. Computations shall be made based upon the field-verified plans of the existing structure. Pick weights shall account for the weight of concrete rubble or other materials attached to the component being removed; this includes the weight of subsequent rigging devices/components. Rigging components shall be sized for the subsequent pick weight.
- All lifting equipment, rigging devices, and other load bearing elements shall have a rated (safe lifting) capacity that is greater than or equal to 150% of the load it is carrying, as a factor of safety. Supporting calculations shall be furnished to verify the minimum capacity requirement is maintained for the duration of the hoisting operation.
- Dynamic hoisting operations are prohibited when carrying a load with the potential to foul. Cranes or other lifting equipment shall remain stationary during lifting (i.e., no moving picks).
- For lifting equipment, the manufacturer's capacity charts, including crane, counterweight, maximum boom angle, and boom nomenclature are to be submitted.
- A schematic rigging diagram must be provided to clearly call out each rigging component from crane hook to the material being hoisted. Copies of catalog or information sheets shall be provided to verify rigging weights and capacities.
- For built-up rigging devices, the contractor shall submit the following:
    - Details of the device, calling out material types, sizes, connections, and other properties.
    - Load test certification documents and/or design computations bearing the seal and signature of a professional engineer. Load tests shall be performed in the configuration of its intended use as part of the subject demolition procedure.
    - Copies of the latest inspection reports of the rigging device. The device shall be inspected within one (**1**) calendar year of the proposed date for use.
- A detailed drawing shall be provided showing the crane outrigger setup, including dimensions from adjacent slopes or facilities. The drawing shall indicate requirements for bearing surface preparation, including material requirements and compaction efforts. As a minimum, outriggers and/or tracks shall bear on mats positioned on level material with adequate bearing capacity.

- A complete written narrative shall be provided that describes the sequence of events, indicating the order of lifts and any repositioning or re-hitching of the crane(s).

Demolition

The agency or its contractor shall submit a detailed procedure for a controlled demolition of any structure on, over, or adjacent to the ROW. The controlled demolition procedure must be approved by the Railroad prior to beginning work on the project.

Existing condition of the structure being demolished:

- The contractor shall submit as-built plans for the structure(s) being demolished.
- If as-built plans are unavailable, the contractor shall perform an investigation of the structure, including any foundations, substructures, etc. The field measurements are to be made under the supervision of the professional engineer submitting the demolition procedure. Findings shall be submitted as part of the demolition means and methods submittal for review by the Railroad.
- Any proposed method for temporary stabilization of the structure during the demolition shall be based on the existing plans or investigative findings and submitted as part of the demolition means and methods for review by the Railroad.

Demolition work plans shall include a schematic plan depicting the proposed locations of the following at various stages of the demolition:

- All cranes and equipment, calling out the operating radii.
- All proposed access and staging locations with all dimensions referenced from the centerline of the nearest track.
- Proposed locations for stockpiling material or locations for truck loading.
- The location, with relevant dimensions, of all tracks, other railroad facilities, and wires, poles, adjacent structures, or buried utilities that could be affected, showing that the proposed lifts are clear of these obstructions.
- Note that no crane or equipment may be set on the rails or track structure and no material may be dropped on railroad property.

Demolition submittal shall also include the following information:

- A time schedule for each of the various stages must be shown as well as a schedule for the entire lifting procedure and hoisting. The proposed time frames for all critical subtasks (i.e., torch/saw cutting various portions of the superstructure or substructure, dismantling splices, installing temporary bracing, etc.) shall be furnished so that the potential impact(s) to operations may be assessed and eliminated or minimized.
- The names and experience of the key contractor personnel involved in the operation shall be included in the contractor's means and methods submission.
- Design and supporting calculations shall be prepared, signed, and sealed by the professional engineer for items including the temporary support of components or intermediate stages and shall be submitted for review. A guardrail will be required to be installed in the proximity of temporary bents or shoring towers when located within twelve feet (**12′-0″**) from the centerline of the track. The guardrail will be installed at the expense of the agency or its contractor.

Girders or girder systems shall be stable at all times during demolition. Temporary bracing shall be provided at the piers, abutments, or other locations to resist overturning and/or buckling of the member(s). The agency shall submit a design and details of the proposed temporary bracing system for review by the Railroad. Lateral wind forces for the temporary conditions shall be considered in accordance with the current version of AREMA.

Existing obsolete bridge piers shall be removed to a minimum of three feet (**3′-0″**) below the finished grade, final ditch line invert, or as directed by the Railroad.

A minimum quantity of twenty-five (**25**) tons of approved granite track ballast may be required to be furnished and stockpiled on-site by the contractor or as directed by the Railroad.

The use of acetylene gas is prohibited for use on or over railroad property. Torch cutting shall be performed utilizing other materials such as propane.

Tracks, signals, structures, and other railroad facilities shall be protected from damage during demolition of existing structure or replacement of deck slab.

Demolition Debris Shield

- On-track or ground-level debris shields (such as crane mats) are prohibited for use.
- The demolition debris shield shall be installed prior to the demolition of the bridge deck or other relevant portions of the structure. The demolition debris shield shall be erected from the underside of the bridge over the track area to catch all falling debris. The debris shield shall not be the primary means of debris containment.
    - The demolition debris shield design and supporting calculations, all signed and sealed by a professional engineer, shall be submitted for review and acceptance.
    - The demolition debris shield shall have a minimum design load of 50 pounds per square foot (**50 psf**) plus the weight of the equipment, debris, personnel, and all other loads.
    - The contractor shall verify the maximum particle size and quantity of the demolition debris generated during the procedure does not exceed the shield design loads. Shield design shall account for loads induced by particle impact; however, the demolition procedure shall be such that impact forces are minimized. The debris shield shall not be the primary means of debris containment.
    - The contractor shall include installation/removal means and methods for the demolition debris shield as part of the proposed controlled demolition procedure submission.
    - The demolition debris shield shall provide twenty-three feet (**23′-0″**) minimum vertical clearance or maintain the existing vertical clearance if the existing clearance is less than twenty-three feet (**23′-0″**).
    - Horizontal clearance to the centerline of the track should not be reduced unless approved by the Railroad.
    - The contractor shall clean the demolition debris shield daily or more frequently as dictated either by the approved design parameters or as directed by the Railroad.

Vertical Demolition Debris Shield

This type of shield may be required for substructure removals in close proximity to tracks and other facilities, as determined by the Railroad.

The agency or its contractor shall submit detailed plans with detailed calculations prepared, signed, and sealed by a professional engineer of the protection shield.

Erection

The agency or its contractor shall submit a detailed procedure for erection of a structure with potential to foul. The erection procedure must be approved by the Railroad prior to beginning work on the project.

Erection work plans shall include a schematic plan depicting the following, at all stages of the construction:

- All proposed locations of all cranes and equipment, calling out the operating radii.

- All proposed access and staging locations with all dimensions referenced from the centerline of the nearest track.
- All proposed locations for stockpiling material or locations for truck loading.
- The location, with relevant dimensions, of all tracks, other railroad facilities, and wires, poles, adjacent structures, or buried utilities that could be affected, showing that the proposed lifts are clear of these obstructions.
- No crane or equipment may be set on the rails or track structure and no material may be dropped on railroad property.

For erection of a structure over the tracks, the following information shall be submitted for review and acceptance by the Railroad at least thirty (**30**) days prior to erection:

- As-built beam seat elevations – field surveyed upon completion of pier/abutment construction.
- Current top of rail (TOR) elevations – field measured at the time of as-built elevation collection.
- Computations verifying the anticipated minimum vertical clearance in the final condition that account for all deflection and camber based upon the current TOR and as-built beam seat elevations. The anticipated minimum vertical clearance shall be greater than or equal to that which is indicated by the approved plans. Vertical clearance (see definitions) is measured from TOR to the lowest point on the overhead structure at any point within six feet (**6′-0″**) from the centerline of the track. Calculations shall be signed and sealed by a professional engineer.

Girders or girder systems shall be stable at all times during erection. No crane may unhook prior to stabilizing the beam or girder.

- Lateral wind forces for the temporary conditions shall be considered in accordance with the current version of AREMA.
- Temporary bracing shall be provided at the piers, abutments, or other locations to resist overturning and/or buckling of the member(s). The agency shall submit a design and details of the proposed temporary bracing system for review by the Railroad.
- Temporary bracing shall not be removed until sufficient lateral bracing or diaphragm members have been installed to establish a stable condition. Supporting calculations furnished by the professional engineer shall confirm the stable condition.

Erection procedure submissions shall also include the following information:

- A time schedule for each of the various stages must be shown as well as a schedule for the entire lifting procedure. The proposed time frames for all critical subtasks (i.e., performing aerial splices, installing temporary bracing, installation of diaphragm members, etc.) shall be furnished so that the potential impact(s) to operations may be assessed and eliminated or minimized.
- The names and experience of the key contractor personnel involved in the operation shall be included in the contractor's means and methods submission.
- A guardrail will be required to be installed in a track in the proximity of temporary bents or shoring towers when these are located within twelve feet (**12′-0″**) from the centerline of the track.
- Design and supporting calculations prepared by the professional engineer for items including the temporary support of components or intermediate stages shall be submitted for review.

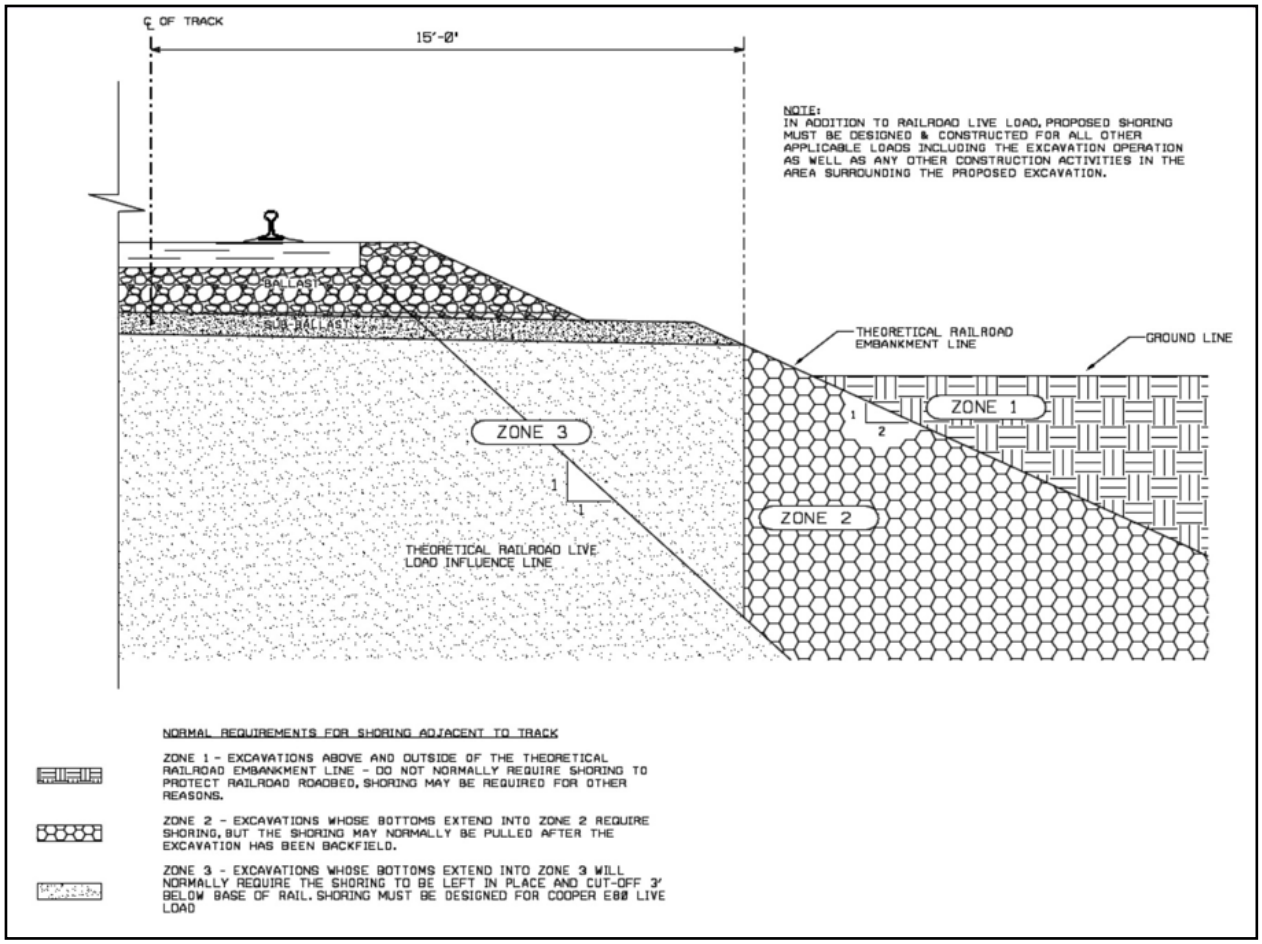
Excavation and Shoring

The agency or its contractor shall submit a detailed design and procedure for the installation of a sheeting/shoring system adjacent to the tracks. Shoring protection shall be provided when excavating with

potential to foul, or as otherwise determined by the Railroad. Shoring shall be provided in accordance with AREMA, except as noted below.

Shoring may not be required if all of the following conditions are satisfied:

- The excavation does not encroach within the theoretical live load influence zone. Please refer to figure below.



- The track structure is situated on level ground, or in a cut section, and on stable soil.
- The excavation does not adversely impact the stability of a railroad facility (i.e., signal bungalow, drainage facility, undergrade bridge, building, etc.), or the stability of any structure on, over, or adjacent to railroad property with potential to foul.
- Shoring is not required by any governing federal, state, local, or other construction code.

Shoring is required when excavating the toe of an embankment. Excavation of any embankment that supports an active track structure without shoring will not be permitted.

Trench boxes are not an acceptable means of shoring. Trench boxes are prohibited for use on railroad property or within the theoretical railroad live load influence zone.

Shoring shall be a cofferdam-type, which completely encloses the excavation. However, where justified by site or work conditions, partial cofferdams with open sides away from the track may be permissible, as determined by the Railroad.

Cofferdams shall be constructed using interlocking steel sheet piles, or when approved by the engineer, steel soldier piles with timber lagging. Wales and struts shall be included when dictated by the design.

The use of tiebacks can be permissible for temporary shoring systems when conditions warrant. Tiebacks shall have a minimum clear cover of six feet (**6′-0″**), measured from the bottom of the rail. Upon completion of the work, tiebacks shall be grouted, cut off, and remain in place.

All shoring systems on or adjacent to the Railroad's ROW shall be equipped with railings or other fall protection and be compliant with the governing federal, state, or local requirements. The area around pits shall be graded to eliminate all potential tripping hazards.

Interlocking steel sheet piles shall be used for shoring systems that qualify with one or more of the following conditions:

- Within eighteen feet (**18′-0″**) of the nearest track centerline
- Within the theoretical live load influence zone
- Within slopes supporting the track structure
- As otherwise deemed necessary by the Railroad

Sheet piles qualifying for one or more of the requirements listed in this document shall not be removed. Sheet piles shall be left in place and cut off a minimum of three feet (**3′-0″**) below the finished grade, the ditch line invert, or as otherwise directed by the Railroad. The ground shall be backfilled and compacted immediately after sheet pile is cut off.

The following design considerations shall be considered when preparing the shoring design package:

- Shoring shall be designed to resist a vertical live load surcharge of **1,882 lbs.** per square foot, in addition to active earth pressure. The surcharge shall be assumed to act on a continuous strip, eight feet six inches (**8′-6″**) wide. Lateral pressures due to surcharge shall be computed using the strip load formula shown in the current version of AREMA.
- Allowable stresses in materials shall be in accordance with the current version of AREMA.
- A minimum horizontal clearance of ten feet (**10′-0″**) from the centerline of the track to face of nearest point of shoring shall be maintained, provided twelve feet (**12′-0″**) of roadbed is maintained with a temporary walkway and handrail system.
- For temporary shoring systems with potential to foul, piles shall be plumb under full dead load. Maximum deflection at the top of wall, under full live load, shall be as follows:
    - One-half inch (**.5″**) for walls within twelve feet (**12′-0″**) of track centerline (measured from the centerline of the nearest track to the nearest point of the supporting structure).
    - One inch (**1″**) for walls located greater than twelve feet (**12′-0″**) from track centerline.

Shoring work plans shall be submitted in accordance with this document, as well as the following additional requirements:

- The work plan shall include detailed drawings of the shoring systems, calling out the sizes of all structural members and details of all connections. Both plan and elevation drawings shall be provided, calling out dimensions from the face of shoring relative to the nearest track centerline. The elevation drawing shall also show the height of shoring and track elevation in relation to the bottom of excavation.
- Full design calculations for the shoring system shall be furnished.
- A procedure for cutting off the sheet pile, backfilling, and restoring the embankment shall be included.

Track Monitoring

When work being performed has the potential to disrupt the track structure, a work plan must be submitted detailing a track monitoring program that will serve to monitor and detect both horizontal and vertical movement of the track and roadbed.

The program shall specify the survey locations, the distance between the location points, and frequency of monitoring before, during, and after construction. The Railroad reserves the right to modify the survey locations and monitoring frequency as necessary during the project.

The survey data shall be collected in accordance with the approved frequency and immediately furnished to the Railroad for analysis.

If any movement has occurred as determined by the Railroad, the Railroad, at its sole discretion, shall have the right to immediately require all contractor operations to be ceased, have the excavated area immediately backfilled, and/or determine what corrective action is required.

Soil and Water Management

The Railroad must review and approve reuse of soil on railroad property.

If the soil cannot be reused on railroad property, it must be properly disposed of at an approved disposal facility. The Railroad prohibits any contractor from taking soils for off-property for reuse. Coordinate with the Railroad to handle waste characterization and profiling into an approved disposal facility. The Railroad prohibits any environmental sampling of its property unless approved in writing. If the agency has arrangements with a disposal facility not approved by the Railroad, the agency can request to evaluate the disposal facility. A request to evaluate alternate disposal facilities should take place prior to work being initiated on railroad property.

If dewatering is planned for a public project, the Railroad must review and approve the dewatering plan prior to work being initiated on or near railroad property. The Railroad prohibits the discharge of water onto its property without prior approval. The Railroad prohibits environmental sampling of groundwater or surface water.

All materials discarded by or on behalf of the Railroad will be managed in accordance with local, state, and federal regulations as well as best management practices and sustainability goals. To ensure that these goals are achieved, the Railroad has mechanisms in place to monitor waste management activities.

The cleanup and disposal of material from the surface preparation for painting and actual painting must comply with all appropriate regulations. The materials removed during the surface preparation must not impact the surrounding area, including ground, water, or air impacts. Materials must not be stored on railroad property.

Drainage

For the installation of temporary or permanent shoring systems, including but not limited to soldier piles and lagging, and interlocked steel sheeting on or adjacent to the Railroad's ROW, the contractor may be required to submit a detailed track monitoring program for approval prior to performing any work near the Railroad's ROW.

When water is known or expected to be encountered, all plans and specifications must be submitted to the Railroad for approval before the process begins. Pumps of sufficient capacity to handle the flow shall be maintained at the site, provided the contractor has received approval to operate them. Pumps in operation shall be constantly attended on a 24-hour basis until, in the sole judgment of the Railroad, the operation can be safely halted. When dewatering, a process for monitoring for any settlement of track or structures must be in place.

If any track movement has occurred as determined by the Railroad, the Railroad, at its sole discretion, shall have the right to immediately require all contractor operations to be ceased, have the excavated area immediately backfilled, and/or determine what corrective action is required. Any corrective action required or performed by the Railroad, including the monitoring of corrective action of the contractor, will be at project expense.

All pipes, ditches, and other structures carrying surface drainage on railroad property and/or under track(s) shall be designed to carry the runoff from the **100-year, 24-hour design** storm without ponding of water against the roadbed.

Pipe(s) used to carry surface drainage on the Railroad's ROW shall have a minimum diameter of 24 inches (**24″**).

When calculating the capacity of existing or proposed drainage structures under track(s), the headwater calculation at the structure shall not be greater than one (**1**):

HW/D ≤ 1.

Rate and quantity of storm water runoff from any proposed development shall not exceed the rate and quantity of runoff prior to development. This standard shall be maintained for all design storms up to the **100-year storm event**.

Pipes (casing or carrier) placed under tracks shall not be less than five feet six inches (**5′-6″**) from base of rail to top of pipe at its shallowest point.

Pipelines laid longitudinally on ROW fifty feet (**50′-0″**) or less from the centerline of the track shall be buried not less than four feet (**4′-0″**) from ground surface to top of pipe. Where the pipeline is laid more than fifty feet (**50′-0″**) from the centerline of the track, the minimum cover shall be at least three feet (**3′-0″**).

Erosion prevention methods shall be used to protect railroad ditches and other drainage facilities during construction on and adjacent to ROW.

Permanent erosion and sediment pollution control facilities shall be designed for the **100-year storm**. Provide calculations and details of any riprap outlet protection and channel linings as needed within ROW.

Pipes and culverts within the theoretical live load influence zone shall conform to current AREMA recommendations and ASTM specifications. All such structures shall be designed to carry **Cooper E80** loading with diesel impact.

ROW shall not be utilized for retention, detention, or settling basins. Also, the Railroad embankment must not be used as any part of a detention pond structure.

Track roadbed fills shall not be used as dams or levees for retention of runoff.

Temporary sediment basins/traps shall not be constructed against track roadbed fill.

Formal approval of the proposed design by the appropriate governmental agency having jurisdiction shall be submitted to the Railroad for their review and acceptance.

Pipes and culverts are not to be located within the limits of a turnout or nor closer than fifty feet (**50′-0″**) to any railroad bridge, building, or any other important structure.

When excavation for a pipeline or other structure will be within the theoretical railroad embankment line of an adjacent track, interlocking steel sheet piling will be required to protect the track(s). Trench boxes are prohibited for use on ROW within the theoretical railroad live load influence zone.

Blasting is not permitted on or adjacent to the Railroad's ROW without prior written approval.

Crossing of tracks at grade by equipment and personnel is prohibited except by prior arrangement with and as directed by the Railroad.

Temporary track supports may be required when a jacking, boring, or tunneling method of installation is used, depending upon the size and location of the drainage crossing. The agency's contractor shall furnish and supply the approved track supports, with the installation and removal performed by a person approved by the Railroad. The agency shall reimburse the Railroad for all costs associated with the installation and removal of the track supports.

Plans submitted to the Railroad for approval shall be prepared by a professional engineer and should indicate design, suitable topographic plan, and outline of total drainage area.

If the drainage is to discharge into an existing drainage channel on ROW and/or through a drainage structure under track(s), the computations must include the hydraulic analysis of any existing ditch and/or structure.

Extension of pipes, culverts, and other drainage structures previously installed under tracks shall be made with culvert or drainage structure having the same size, shape, and dimensions as the existing pipe. In no case shall the existing drainage structure be extended so that the hydraulic capacity is decreased or obstructed. In some cases, it may be necessary to extend existing outlets with pipe or culvert of a larger size. Details of connections to mismatched culverts shall be submitted for approval.

The agency may be required to provide reasonable corrective measures to alleviate an existing drainage problem within railroad property that may be affected by the proposed development. It shall be the responsibility of the agency to obtain all drainage easements and permits. The Railroad shall be indemnified and held harmless of any liability.

The agency is to provide information on groundwater recharge if infiltration is proposed adjacent to railroad property. Soils testing and certification by a registered professional engineer shall be required.

Emergency spillways discharging onto railroad property are to be designed and constructed so that the basin berm is protected against erosion.

Energy dissipating devices are to be placed at all outlets discharging to railroad property.

Concrete end walls shall be placed at outlets discharging to railroad property. All concrete outlet pipes on property must be equipped with a trash rack.

Under no conditions shall any person be allowed to modify, alter, or change a previously approved storm water management (SWM) facility discharging to railroad property unless an approved alternate facility is approved.

Design of the drainage system, including alterations of the existing drainage system on ROW, is the responsibility of the agency. Drainage shall not be diverted, directed toward the Railroad, or increased in quantity without prior written approval.

Supporting calculations must be provided for all proposed drainage and storm water management facilities that discharge onto or impact property.

Occupancies shall be designed, and their construction shall be accomplished, so that adequate and uninterrupted drainage of the Railroad's ROW is maintained.

If, in the course of construction, it may be necessary to block a ditch, pipe, or other drainage facility, temporary pipes, ditches, or other proposed drainage facilities shall be installed to maintain adequate drainage, as approved. Upon completion of the project, the temporary facilities shall be removed, and the permanent facilities restored.

Temporary and permanent erosion control and sedimentation (E&S) devices must be provided to prevent the flow of sediment onto and adjacent to railroad property.

The design shall take into account and provide upstream areas within the entire watershed in computing discharge, sizing of pipes, inlets, and other structures.

When applicable, the agency is to provide maintenance and operation of E&S/storm water facilities.

Plans shall include, but not be limited to, the following:

- Existing property boundaries, easements, etc.
- Existing drainage features and topography.
- Existing utility locations.
- Existing structures, tracks, roads, features, etc.
- Existing topography, including wetlands and all environmental features.
- Delineation & dimension of proposed property acquisition or property easements.
- Dimension distances from all temporary and proposed E&S and SWM facilities to railroad property line and/or easement.
- Dimension distances from all temporary and proposed E&S and SWM facilities to tracks.
- Dimension of all temporary and proposed encroachments within property.
- Existing contours.
- TOR elevations.
- Proposed contours, site grading, and drainage facilities.
- Proposed improvements, including easements and property lines and limit of disturbance.
- Details for all temporary and proposed drainage structures, SWM, and E&S best management practices (BMP) devices.
- Details for proposed E&S, SWM, and drainage collection and conveyance systems (pipes, ditches, etc.).
    - Location, size, slope, and type of pipe.
    - Ditch cross sections.
    - Invert elevations.
    - Grate and rim elevations.
- If applicable, identification of the 100-year floodplain if project is within a specified flood zone.
- E&S plans in compliance with all state and local requirements.
- Signature and seal of state-licensed professional engineer.

Design Calculations

Pre- and post-development drainage area maps.

- Provide soils boundary lines & soil types.
- Delineate drainage areas.
- Provide time of concentration (Tc) flow path.
- Provide weighted CN and c-values (as applicable to design method).

Pre-development 100-year runoff volume and flows for all facilities draining to or on ROW.

Post-development 100-year runoff volume and flows for all facilities draining to or on ROW.

- Verify no increase in rate or quantity of runoff to property from pre-development conditions.
- Provide hydraulic analysis (depth and velocity calculations) for all facilities draining to or on ROW (existing and proposed) and verify sufficient capacity for proposed flow is provided.

Design of proposed collection and conveyance systems (pipes, ditches, etc.)

- Required capacity for **a 100-year, 24-hour storm.**
- Required a minimum diameter of **24-inches** for pipes within ROW.

Provide all temporary and permanent E&S and SWM BMP calculations.

Signature and seal of state-licensed professional engineer.

Project narrative/summary describing proposed improvements, drainage design, SWM and E&S methodologies, site soil and geological conditions (if known), flooding characteristics (if applicable), and state and local requirements used to produce designs.

Recommended: Photographs of the site and adjacent property as well as discharge locations and drainage facilities on property to receive runoff from the proposed development.

Section 1.12 – Railroad Property Safety

All work on or near railroad property shall be conducted in accordance with the Railroad's safety rules and regulations. Specifically, all agency's employees and contractors, while on railroad property, shall be required to wear a hard hart, safety glasses with side shields, 6″ lace up boots with a distinct heel, shirts with sleeves, and long pants; additional personal protective equipment may be required based on certain operations. The contractor and its employees shall always comply with the safety rules while occupying railroad property. Operations will be subject to inspection at any time. All personnel operating equipment must be qualified on it to perform task at hand.

The agency, its contractors, or any person refusing to comply with the Railroad's safety rules may be removed from the property at the Railroad's discretion. Although the GEC and the Railroad may perform site visits to verify compliance to safety rules and regulations, it is up to the agency and its contractors to adhere to all safety rules and regulations at all times.

Additionally, all equipment shall be used only in the manner it was designed for. All applicable safety rules shall be followed, including the use of seat belts on all equipment equipped with such. Equipment operators shall only operate equipment for which they are trained, certified, and qualified to operate. Operators shall have such credentials on their person anytime in which they operate on railroad property.

If an onsite flagman (**see Section 1.07**) is assigned, a job briefing must be performed by all persons entering the property even if no work is being performed. If a job function is being performed outside the view of the flagman, it is the responsibility of the agency and its contractors to brief with the flagman.

For additional safety requirements, please refer to "Contractor Safety Rules" document. It is the goal of the Railroad to have zero safety incidents every day.

Section 2.01 – Public Road Crossing Openings and Closures

Summary

The Railroad understands the importance of highway-rail grade crossings and their relevance to such priorities as economic development, emergency vehicle access, and other growth opportunities in the communities through which we operate. Because of the safety concerns associated with highway-rail grade crossings, however, every effort must be made to obtain alternative access or additional capacity using grade separations, or by other roads leading to existing crossings.

The Railroad shares the goal of eliminating at grade crossings with both the state DOTs and the Federal Railroad Administration (FRA). Likewise, the Federal Highway Administration (FHWA) Railroad-Highway Grade Crossing Handbook acknowledges that the first alternative that should always be considered for a highway-rail at-grade crossing is elimination. Elimination of a crossing provides the highest level of crossing safety because the point of intersection between highway and railroad is removed. Closing adjacent crossings simplifies the design, installation, and operation of highway-rail grade crossing warning systems.

The addition of any grade crossing brings the potential for incidents involving trains and motor vehicles. For this reason, both federal and state government policies discourage the creation of new grade crossings. As such the Railroad, other railroads, the United States Department of Transportation, and most state DOTs encourage communities to carefully consider all alternatives, including grade separations (crossings that go over or under railroad tracks), as opposed to the creation of new at-grade crossings.

The cost of a grade separation should not outweigh the enhanced safety it would provide for motorists.

Before agreeing to the establishment of a new crossing, the Railroad encourages communities to engage in a study with the purpose of identifying existing redundant public crossings for closure. To comply with and in support of the federal initiative to reduce grade crossings, the Railroad requires that the community identify the closure of three (**3**) or more comparable active public at-grade crossings.

As discussed above, the appropriate public authority will be expected to reimburse the Railroad for its cost of design, installation, and future maintenance of the crossing.

Process

- Appropriate public authority provides a written request to PPD outlining the reason for the new crossing or for seeking to convert a private crossing to a public one. Include the following:
  - A description of the proposed highway project, including proposed passive or active traffic control devices, and the need for preemption and/or interconnection with traffic signals, together with a scale drawing or sketch of the proposed highway and vicinity.
  - Expected annual average daily traffic (AADT), proposed vehicular speed limit, photographs, and aerial map. Please include any expected future development.
  - Identification of at-grade crossings to be closed. Include their vehicular speed limit, AADT, and traffic type.
  - The determination by the highway or regulatory authority of the need for passive or active traffic control devices and other safety treatments (i.e., signage, roadway medians, etc.), as selected by the highway authority consistent with applicable federal, state, and Manual on Uniform Traffic Control Devices (MUTCD) guidelines and requirements.
  - A plan to satisfy any appropriate regulatory authority's requirements, procedures, and approval. The project sponsor should coordinate with all applicable agencies (state, county, city, etc.) to ensure proper procedures are followed.

- Authorization for the Railroad to incur costs for its preliminary engineering to review the crossing request (whether or not its approved), design and construction expenses, and for the ongoing maintenance of the crossing surface and related grade crossing warning devices.

- PPD will review the request and follow up with appropriate state authorities.
- If it is approved by the Railroad, the state DOT, and appropriate roadway authorities, PPD will proceed with creating a project and starting the design review process. The design process will include, but is not limited to, the following:
  - Assignment of temporary DOT number.
  - Site survey & diagnostic review to determine level of protection.
  - Basis for design.
  - Estimate to complete.
  - Agency/sponsor and the Railroad enter into all applicable contracts.
  - RFP and vendor selection.
  - Design and order material.
  - Construct surface (must remain closed and inaccessible).
  - Install level of protection as indicated by DOT.
  - Testing and DOT signoff.
  - Open crossing and close offset crossings.
  - Update FRA to make DOT number permanent.

Section 2.02 – Highway-Rail Grade Crossing Warning Devices

Summary

PPD will process all projects proposing alterations to public highway-rail grade crossing warning systems. Included will be projects for opening new crossings, closing existing crossings, modifying or widening of existing crossings, installing new warning systems, removing and/or relocating existing warning systems and modifying/upgrading existing warning systems. This also pertains to preemption projects.

Each crossing has a unique DOT inventory identification number posted at the crossing. There is often more than one crossing on the same road. The number (i.e., DOT 654321D) must be used to identify the specific crossing in all communications with the Railroad to reduce possible confusion about the specific location.

Highway-rail grade crossing warning systems must adhere to all applicable federal and state standards and regulations; all local policies, laws, and ordinances; as well as the Railroad's standards. The state DOT and highway agency, not the Railroad, is responsible for determining the level of protection and configuration of warning devices for a public highway-rail grade crossing. In addition, the highway agency or other governmental agency responsible for making warning system and equipment determinations is responsible for selecting appropriate vehicular traffic control signs and/or devices for a specific public highway. Loop detection circuitry will not be designed, installed, owned, or maintained by the Railroad.

The highway agency must determine whether advanced or simultaneous preemption is needed.
The agency must also provide a traffic study to determine how much advanced preemption time is required if needed. The Railroad as well as AREMA and MUTCD discourage the use of excessive preemption times. The Railroad will furnish one preemption interconnection circuit of a normally closed contact that is designed to open upon the approach or presence of a train and will terminate the closed preemption interconnection circuit in a common cable junction box (set at ROW line) to be used for the interconnection of the traffic signals and the grade crossing warning devices.

Recommended practices and additional information are available in AREMA and the MUTCD.

The Railroad will provide engineering reviews, signal designs, and cost estimates for the installation of highway-rail grade crossing warning devices at the expense of the project sponsor as part of the preliminary engineering for a project. Changes to highway-rail grade crossing surfaces may also require engineering and pre-approval by the Railroad. Installation or modification of warning devices must be supervised and performed by a qualified entity as determined by the Railroad.

The Railroad typically does not allow the mixing of different equipment. If additional gates or equipment is added to a location, the entire location should be redesigned and upgraded to the latest standard.

If the roadway footprint changes in width, including adding a sidewalk or multiuse path, an easement review must be completed prior to the project construction start (**see Section 1.09**).

Process

- Agency requests a diagnostic review.
- Agency sends review results, and PPD supplies agency with OOM estimate.
- Agency/sponsor and the Railroad enter into applicable contracts.
- PPD assigns a GEC to develop BOD, estimate to complete, and RFP.
- GEC solicits bids for design-build contractor.
- Contractor completes design and orders material.
- Utility concerns are resolved.
- Construct warning system.
- Testing and DOT signoff and update FRA.

Section 2.03 – Highway-Rail Grade Crossing Surface Maintenance

Summary

The crossing surface provides a path for highway vehicles to cross railroad tracks. The objective is to provide a safe, smooth, and cost-effective crossing for highway and railroad traffic. Highway and railroad maintenance work near highway-rail grade crossings must consider safety concerns for both highway and railroad traffic before, during, and after the work is implemented.

Each public crossing has a unique DOT inventory identification number posted at the crossing. There is often more than one crossing on the same road. The number (i.e., DOT 654321D) must be used to identify the specific crossing in all communications with the Railroad to reduce possible confusion about the specific location.

Railroad track is continuous through the crossing and includes railroad ties, rail, and fasteners below the surface of the crossing (joints shall not be made within the crossing). The crossing surface for highway traffic can be made of several different materials. Drainage is required for all four quadrants at a crossing.

Crossing surface material and construction methods are selected for each crossing based on the type of highway and railroad traffic, past experience, and funding available from highway agencies for individual projects. Highway agencies seeking replacement of crossing surfaces should contact PPD. The request for the work and the recommended surface must be reviewed and approved by the Railroad.

Crossing work requires closing the entire highway-rail grade crossing. Replacement of track components through a crossing requires removal of the crossing surface, replacement of track ballast, and surfacing the

track through the crossing prior to replacement of the crossing surface. If the subgrade needs to be improved, the application of a hot mixed asphalt underlayment should be considered. Drainage will be reestablished for all four quadrants. After the crossing surface is replaced, the highway approach paving is completed and then the road is opened to highway traffic. Replacement of the track and crossing surface usually requires that the highway be closed for several days. In the event the agency wants to reopen the crossing prior to allowing the asphalt to properly cool, the agency is responsible for any rutting that may occur.

If the roadway footprint changes in width, including adding additional lanes, a sidewalk, or a multiuse path, an easement review must be completed prior to the project construction start (**see Section 1.09**).

Process

- Agency submits request to PPD.
- Agency and PPD research existing contractual requirements.
- Agency/sponsor and the Railroad enter into applicable contracts.
- The Railroad assigns GEC to develop estimate.
- The Railroad orders materials and schedules work.
- Reconstruct crossing:
  - Place barricades and close roadway.
  - Sawcut roadway.
  - Remove existing track panel, ballast, and sub-ballast.
  - Establish new foundation.
  - Install new track panel.
  - Run tonnage to settle system.
  - Install surface materials.
  - Install asphalt (and concrete if needed).
  - Let cool and cure.
  - Remove barricades.
- Cleanup.
- Agency signoff and update FRA.

Section 2.04 – Parallel Road Construction and Maintenance

Summary

New Roadway Construction

In the interest of public safety, parallel public roads shall be located off railroad property. Parallel roads involving intersections with existing or proposed highways where public or private crossings are present should be aligned to provide sufficient distance from the crossing for the largest vehicle (design vehicle) permitted to use the road to stop between the Railroad and the parallel road traffic control signs, markings, and warning devices without interfering with railroad operations, obstructing or preventing the operation of traffic control devices, or obstructing the crossing in any manner.

The design of highways and highway intersections and configuration of highway-rail grade crossings is the responsibility of the highway agency. Drainage for highway runoff, the railroad corridor, and adjacent property must be designed to reduce or maintain existing railroad drainage and to prevent standing water

and potential erosion. Access for railroad equipment to railroad property, structures, and track cannot be restricted or prevented.

Federal and state design manuals, the Manual on Uniform Traffic Control Devices (MUTCD), and additional recommended practices available in American Railway Engineering and Maintenance-of-Way Association (AREMA) manuals provide design information to be considered by the highway agency responsible for the project engineering. The table of contents of this document has additional information on the MUTCD and AREMA manuals and information.

If new construction encroaches on railroad property, an easement review must be completed prior to the project construction start (**see Section 1.09**).

Maintenance of Existing Roadway

Projects that are either parallel or bisect as roadway crossings within the Railroad's ROW require both a ROE and the use of a qualified flagman at the cost of the project sponsor (**see Section 1.09**).

Process

- Request a ROE through G&W Real Estate.
- Agency/sponsor and the Railroad will enter into applicable contracts, including contractor ROE agreement.
- Submit executed ROE and insurance documents to PPD.
- PPD coordinate with region to provide flagman.

Section 2.05 – Overhead and Undergrade Bridges

Summary

The Railroad requires that new overhead bridges (including existing bridge replacements) span the Railroad's right of way and have a minimum twenty-three feet (**23′-0″**) vertical clearance above top of rail. The Railroad requires that new undergrade bridges provide accommodations for future operating needs, as determined by the Railroad.

During project construction, rail operations must not be impeded. Temporary run-around track(s) and/or phased construction may be necessary as determined by the Railroad.

All bridge projects over or under the Railroad's ROW shall be governed by the appropriate criteria found in this document. This includes, but is not limited to, replacements, new construction, substructure modifications and/or repairs, superstructure replacement or repair, and deck replacement or overlay. The following criteria must be reviewed and approved by the Railroad prior to construction:

- Temporary and final drainage plans must be approved by the Railroad.
- The Railroad's access to its property must be maintained.
- Plans must show all tracks and horizontal and vertical track clearances for both the existing conditions and the proposed project.
- Bridge demolition criteria are found in the Construction Submission Criteria (**see Section 1.11**) in this document.
- Upon completion of construction, a full set of as-built drawings, showing actual measured vertical and horizontal clearances, shall be furnished to the Railroad.

If new construction is bisecting railroad property, an easement review must be performed prior to the project construction start (**see Section 1.09**). Please note that the project may require both a temporary construction easement and a permanent easement.

Process

- Agency/sponsor and the Railroad enter into applicable contracts.
- PPD assigns GEC.
- GEC works with the agency to gather easement documentation and ROE.
- GEC works directly with the agency and its contractor on submittal reviews.
- GEC sends agency an estimate to complete project.
- Agency schedules construction.
- The Railroad supplies flagman.
- GEC provides CEI services.
- Project completion when both the Railroad and agency signoff.
- Agency submits as-built plans.

Overhead Bridge Criteria

The Railroad has minimum requirements for outside parties constructing, rehabilitating, or replacing bridges over the Railroad's ROW. These requirements are intended to provide safe and continuous passage of all train traffic during and after construction of bridges over its tracks. Part of these requirements is for the outside party to submit a detailed plan of the project as well as provide details of the construction methodology. This document provides information on the requirements for overhead bridges over railroad property.

Plans and specifications for new or reconstructed bridges over the Railroad's ROW shall meet the following requirements:

General

- The Railroad's valuation station and the distance from the nearest milepost at the intersection of the centerline of the track and the centerline of the bridge shall be shown on the general plan.
- The existing and proposed minimum horizontal and vertical clearances shall be marked clearly on the general plan and elevation.
- At least one subsurface exploration boring for each substructure unit adjacent to the track shall be furnished to the Railroad during the design submittal. Borings shall provide enough information to design shoring and foundations.
- Prior to construction activities, all overhead bridge projects will require the procurement of the appropriate property rights from G&W Real Estate.
- All lifting equipment and connection devices shall have capacity for 150% of the actual lifting load. The factor of safety provided by the manufacturer in the lifting capacity data shall not be considered in the 150% requirement. A licensed professional engineer familiar with lifting and rigging and in the state where the construction work is proposed must sign and seal all plans and calculations related to critical lifting on the project.

Clearance

- Horizontal Clearance: Standard horizontal clearance from the centerline of the track to the face of the pier or abutment shall typically be twenty-five feet (**25′-0″**) or greater, but never less than eighteen feet (**18′-0″**), measured perpendicular to the track. Provisions for future tracks, access roads, other railroad facilities, and drainage may require the minimum clearance be increased or the use of multi-span

structures. The toe of footings shall not be closer than eleven feet (**11′-0″**) from the centerline of the track to provide adequate room for sheeting.

- Vertical Clearance: A standard vertical clearance of twenty-three feet (**23′-0″**) shall be provided, measured from top of high rail to lowest point of structure in the horizontal clearance area, which extends six feet (**6′-0″**) either side of the centerline of the track.
- Temporary construction clearances to be used shall be subject to approval by the Railroad, (typically reductions in clearance for construction are not permitted).
- As-built drawings showing actual clearances as constructed are to be provided to the Railroad.

Crashwalls

- Reference the AREMA specifications that cover the requirements for crashwalls. Crashwalls are required when the face of the pier is closer than twenty-five feet (**25′-0″**) from the centerline of the track, measured perpendicular to the track, except as noted below.

- Crashwalls shall meet the following requirements:
  - Crashwalls for single column piers shall be minimum two feet six inches (**2′-6″**) thick and shall extend a minimum of six feet (**6′-0″**) above the top of high rail for piers located between eighteen feet (**18′-0″**) and twenty-five feet (**25′-0″**) from the centerline of the nearest track. The wall shall extend minimum six feet (**6′-0″**) beyond the column on each side in the direction parallel to the track.
  - For multi-column piers, the columns shall relate to a wall of the same thickness as the columns or two feet six inches (**2′-6″**), whichever is greater. The wall shall extend a minimum of two feet six inches (**2′-6″**) beyond the end of the outside columns in a direction parallel to the track.
  - Reinforcing steel to adequately anchor the crashwalls to the column and footing shall be provided. For piers of heavy construction, crashwalls may be omitted. Solid piers with a minimum thickness of two feet six inches (**2′-6″**) and length of twenty feet (**20′-0″**), single column piers of minimum four feet by twelve feet six inches (**4′-0″ x 12′-6″**) dimensions, or any other solid pier sections with equivalent cross sections and minimum two feet six inches (**2′-6″**) thickness are considered as heavy construction.

Drainage

Drainage from the bridge shall be preferably collected with drain pipes and drained away from the Railroad's ROW. When open scuppers are provided on the bridge, none shall be closer than twenty-five feet (**25′-0″**) from the centerline of nearest track. Flow from the scuppers shall be directed away from railroad drainage ditches.

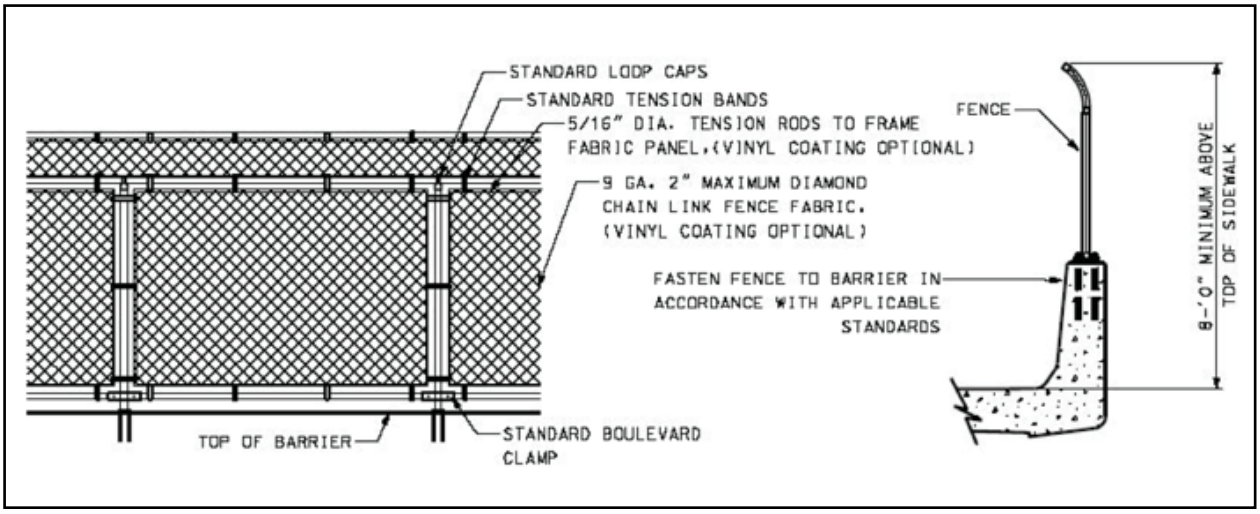
Projects including storm water systems shall be designed for a **100-year storm event** as a minimum. If storm water is drained on or to the Railroad ROW, calculations must be submitted to the Railroad to verify the **100-year storm event** is properly handled. Improvements to the adjacent drainage systems may be required at project expense to ensure the impacted system will meet the **100-year storm event** minimum condition.

During and after completion of construction, the outside party or its contractor must clear the Railroad's drainage ditches of all debris to the satisfaction of the Railroad.

Fencing

All highway structures shall have a protective barrier fence to extend at least eight feet (**8′-0″**) from the top of the sidewalk or driving surface adjacent to the barrier wall. The fence may be placed on top of the barrier wall. The fence shall be capable of preventing pedestrians from dropping debris onto the Railroad's ROW.

Openings in the fence shall not exceed two inches by two inches (**2″ x 2″**). Fencing should also include anti-climb shields or be of a configuration to minimize the likelihood of climbing on the outside of the protective fencing. A chain link fence option is shown below.



Excavation and Shoring

Shoring protection shall be provided when excavating adjacent to an active track. Shoring will be provided in accordance with AREMA, except as noted below.

Shoring will not be required if both the following conditions are satisfied:

- Excavation does not encroach upon a 1 horizontal to 1 vertical theoretical slope line starting at bottom corner of tie (theoretical live load influence zone).
- Track is on level ground or in a cut section and on stable soil.

When the track is on an embankment, excavating the toe of the embankment without shoring may affect the stability of the embankment. Therefore, excavation of the embankment toe without shoring will not be permitted.

Preferred protection is the cofferdam type that completely encloses the excavation. Where dictated by conditions, partial cofferdams with open sides away from the track may be used. Cofferdams shall be constructed using steel sheet piling or steel soldier piles with timber lagging. Wales and struts shall be provided as needed. The following shall be considered when designing cofferdams:

- Shoring shall be designed to resist a vertical live load surcharge of **1,882 lbs**. per square foot, in addition to active earth pressure. The surcharge shall be assumed to act on a continuous strip eight feet six inches (**8′-6″**) wide. Lateral pressures due to surcharge shall be computed using the strip load formula shown in AREMA.
- Allowable stresses in materials shall be in accordance with AREMA.
- A construction procedure for temporary shoring shall be shown on the drawing.
- Safety railing shall be installed when temporary shoring is within fifteen feet (**15′-0″**) of the centerline of the track.
- A minimum distance of ten feet (**10′-0″**) from the centerline of the track to the face of nearest point of shoring shall be maintained.

The contractor shall submit the following drawings and calculations for the Railroad's review and approval:

- Detailed drawings of the shoring systems showing sizes of all structural members, details of connections, and distances from the centerline of the track to the face of shoring. Drawing shall show a section that includes the height of shoring and track elevation in relation to the bottom of excavation.
- One set of calculations of the shoring design.
- The drawings and calculations shall be prepared by and bear the seal and signature of a licensed professional engineer in the state where the shoring is to be constructed. Shoring plans shall be approved by the Railroad.
- For sheeting and shoring within eighteen feet (**18′-0″**) of the centerline of the track, within the theoretical live load influence zone, and in slopes, the contractor shall use sheet pile. No sheet pile in slopes or within eighteen feet (**18′-0″**) of the centerline of the track shall be removed. Sheet piles shall be cut off three feet (**3′-0″**) below the finished ground line. The remaining three feet (**3′-0″**) shall be backfilled and compacted immediately after cutting off.

Demolition of Existing Structure

The contractor shall submit a detailed procedure for demolition of existing structures over or adjacent to the Railroad's ROW. The procedure shall clearly indicate the capacity of cranes, location of cranes with respect to the tracks, and calculated lifting loads. The demolition procedure shall be approved by the Railroad.

The Railroad's tracks, signals, structures, and other facilities shall be protected from damage during demolition of existing structure or replacement of deck slab. As a minimum, both of the following methods shall be used:

- During demolition of the deck, a debris shield shall be erected from the underside of the bridge over the track area to catch falling debris. The shield shall be supported from girders or beams. The deck shall be removed by cutting it in sections and lifting each section out. The shield shall be designed, with supporting calculations, for a minimum of **50 pounds** per square foot plus the weight of the equipment, debris, personnel, and other loads to be carried.

Large pieces of deck shall not be allowed to fall on the debris shield:

- A ballast protection system consisting of geofabric or canvas shall be placed over the track structure to keep the ballast clean. The system shall extend along the track structure for a minimum of twenty-five feet (**25′-0″**) beyond the limits of the demolition work, or farther if required by the Railroad.
- The contractor shall submit detailed plans, with supporting calculations, of the debris shield and ballast protection systems for approval prior to the start of demolition.
- Blasting will not be permitted to demolish a structure over or within the Railroad's ROW.

Erection

The contractor shall submit a detailed procedure for erecting over or adjacent to ROW. The procedure shall clearly indicate the capacity of cranes, location of cranes with respect to the tracks, and calculated lifting loads. The erection procedure shall be approved by the Railroad.

Pile Installation

For the installation of piles and sheeting for abutment foundations, pier foundations, retaining wall foundations, temporary and permanent shoring, and other structures on or adjacent to the Railroad's ROW, the contractor may be required to submit a detailed track monitoring program for review and approval by the Railroad.

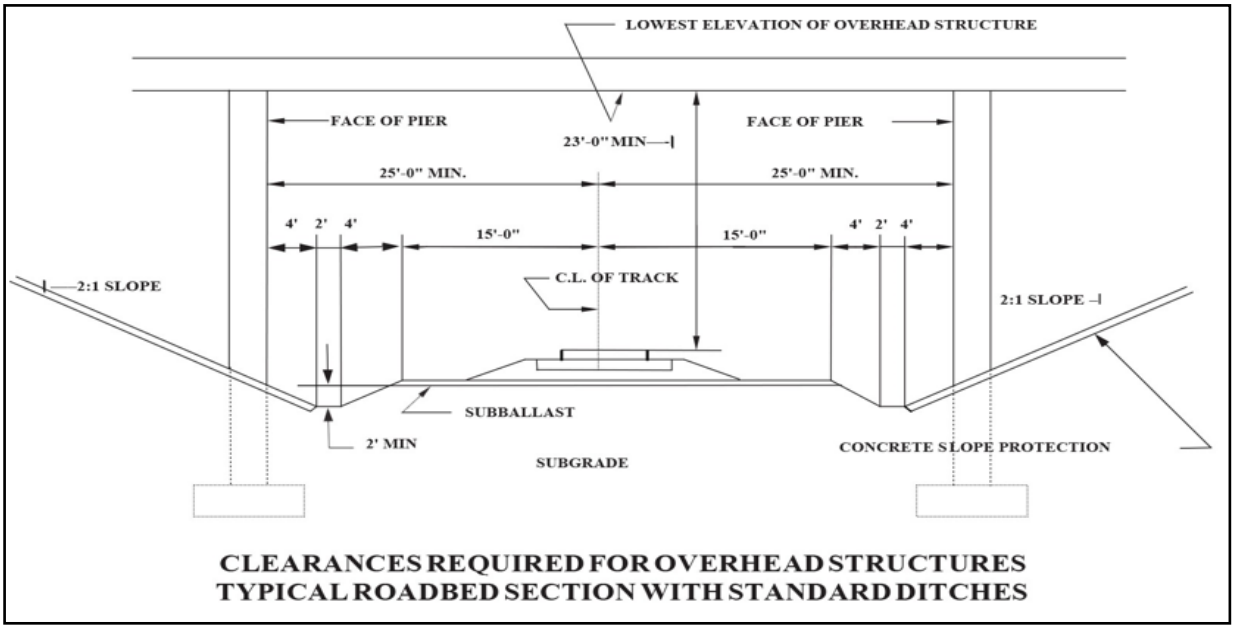
The program shall specify the survey locations, the distance between the location points, and the frequency of monitoring before, during, and after construction. The Railroad shall have the capability of modifying the survey locations and monitoring frequency as needed during the project.

If any settlement is observed, the Railroad shall be immediately notified. The Railroad shall have the right to immediately require all contractor operations to be ceased, have the excavated area immediately backfilled,

and/or determine what corrective action is required. Any corrective action required by the Railroad or performed by the Railroad, including the monitoring of corrective action of the contractor, will be at project expense.

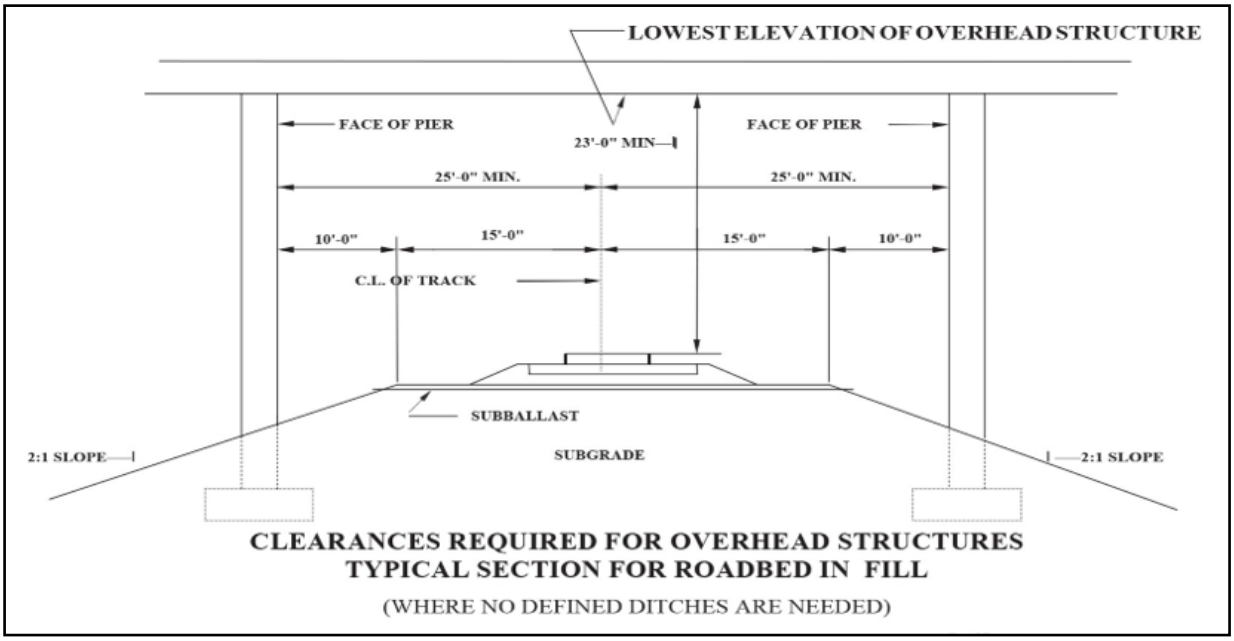
Pedestrian Bridge

- Pedestrian overhead bridges shall span the entire width of the Railroad's ROW. Intermediate piers or other supports will not be permitted.
- Pedestrian overhead bridges shall be completely enclosed with protective canopy or by other means to prevent users from dropping debris onto the Railroad's ROW.

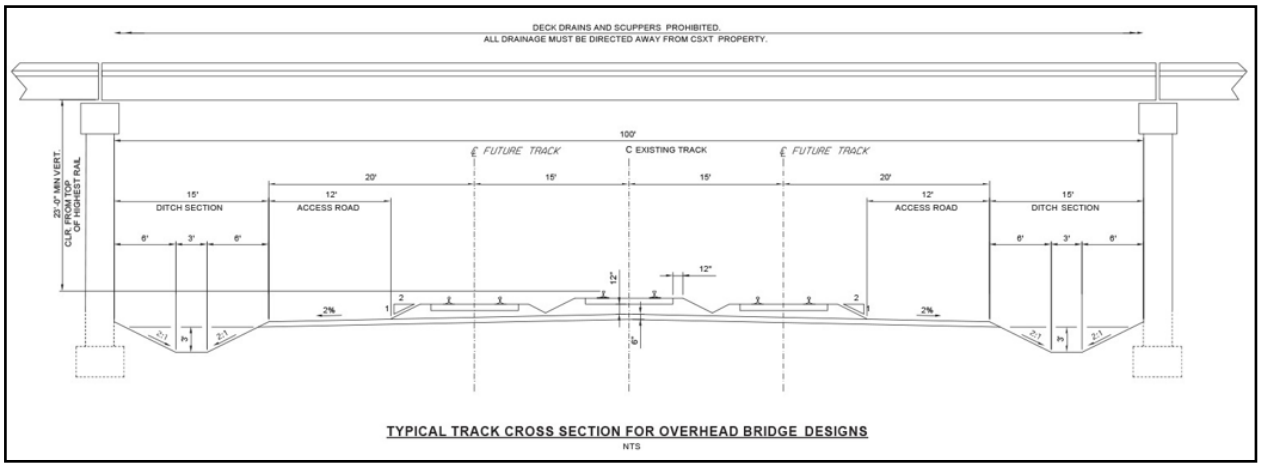


CLEARANCES REQUIRED FOR OVERHEAD STRUCTURES
TYPICAL ROADBED SECTION WITH STANDARD DITCHES

For multiple tracks, standard track centers are fifteen feet (**15′-0″**) wide. An access road may be required to provide thirty-three feet (**33′-0″**) minimum distance from the centerline of the track to the face of the pier.



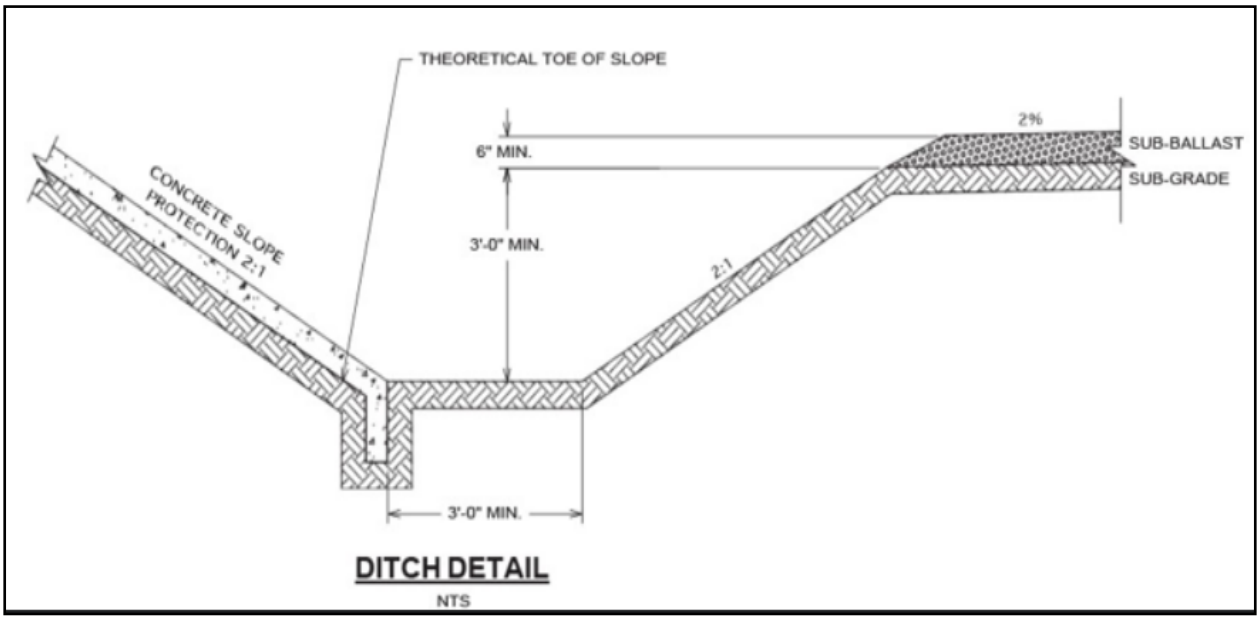
CLEARANCES REQUIRED FOR OVERHEAD STRUCTURES
TYPICAL SECTION FOR ROADBED IN FILL
(WHERE NO DEFINED DITCHES ARE NEEDED)



TYPICAL TRACK CROSS SECTION FOR OVERHEAD BRIDGE DESIGNS
NTS

The following applies to the typical cross section for bridges:

- Clear span width should account for the number of existing tracks at the specific project site. Each additional track adds fifteen feet (**15′-0″**) to the clear span width calculation.
- Horizontal dimensions shown are perpendicular to center of track.
- Crashwalls may be required based on specific parameters.
- Actual required horizontal clearances may need to be increased due to existing roadbed section, location of parallel ditches, hydrological conditions, and future track requirements.
- Theoretical toe of slope is based on the standard roadbed section. Actual toe of slope may vary due to ground line.
- The ditch section shown is the minimum acceptable section.
- The ditch section is to be increased as required by local conditions, based on hydrological and hydraulic studies.
- Horizontal dimensions shown are the minimum that will allow the construction of railroad standard roadbed section.



Undergrade Bridge Criteria

AREMA shall serve as the overarching authority for recommended practice in designing railroad bridges. The intent of this document is to provide criteria that supplements, modifies, and/or supersedes the applicable sections of AREMA for designing undergrade railway bridges that are to be owned and/or operated on by the Railroad. Additionally, these requirements help guide an outside party through the necessary procedures for interacting with the Railroad and delivering an acceptable structure that is constructible, inspectable, maintainable, long lasting, and reliable.

General

Bridge shall be designed in accordance with the applicable specifications from the current edition of AREMA. Applicable sections may include, but are not limited to, the following:

- Chapter 8 Concrete Structures and Foundations
- Chapter 9 Seismic Design for Railway Structures
- Chapter 15 Steel Structures

Special Considerations

- AREMA recommendations for dampproofing and deck waterproofing.
- Coating of structural steel shall be performed in accordance with AREMA.
- Bridge shall be located to provide optimal railroad geometry.

Construction Specifications

- Shall be in accordance with AREMA recommendations for fabrication and erection.
- Items not covered by shall be governed by applicable DOT specifications from the commonwealth, district, province, or state where the bridge is being constructed.

Non-traditional bridge systems require written notice of acceptance by the Railroad. The proposed use of such a system shall be presented for review with thorough investigation, data, and detailed engineering justification.

Bridge Layout

The general plan drawing of the bridge shall show the Railroad valuation stations at the front face of backwalls, and centerline of piers or bents, along the centerline of the bridge. Distance from front face of low milepost backwall to low milepost nearest the bridge shall also be shown. The following criteria will serve as a guide for labeling the bridge layout.

- Railroad bridges are laid out in direction of increasing milepost, increasing from left to right on plans.
- Plans should denote the railroad direction and the nearest significant terminal or junction leading away from either end of the bridge.
- For through plate and truss bridges, the substructures are numbered starting with zero and increasing in the direction of increasing mileposts.
- Superstructures are numbered starting with 1 and increasing in the direction of increasing mileposts.
- Floor systems of through plate girder, through truss, and deck truss spans are numbered starting with 0 and increasing in the direction of increasing mileposts.
- Bridge components are numbered from left to right facing the direction of increasing milepost.

Low mile post backwall GPS coordinates shall be detailed on plans in degrees-minutes-seconds or decimal format with precision to six decimal places.

For bridges on curves, the girders, abutments, and piers shall be located with reference to chords.

Clearances

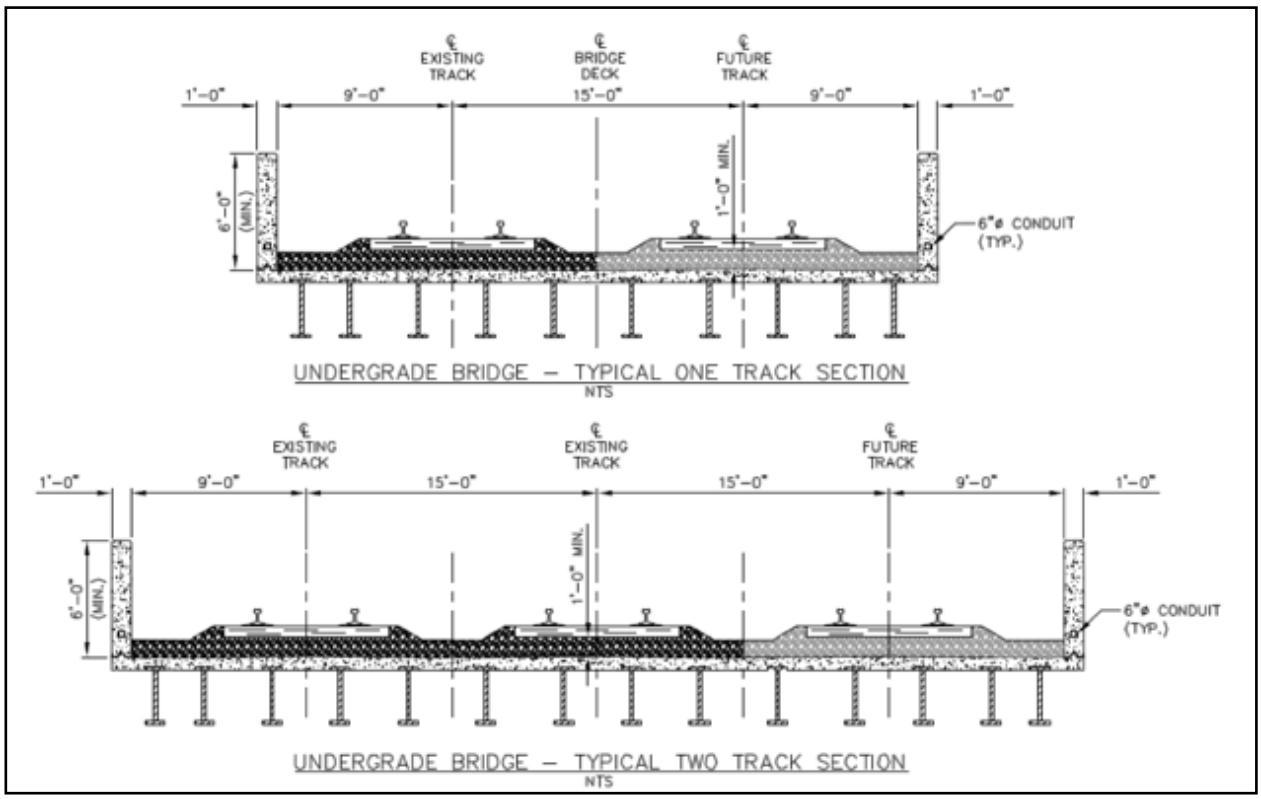
Under Bridge Vehicular Clearances

- Undergrade structures shall be designed to ensure that the structure will be protected from oversized or unauthorized loads by providing sufficient vertical clearance and protective devices. Provide a minimum vertical clearance over the entire roadway width for all new or reconstructed structures as follows:
  - Sixteen feet six inches (**16′-6″**) for steel superstructure with 5 or more beams or 4 or more deck plate girders per track.
  - Seventeen feet six inches (**17′-6″**) for steel through plate girders or less than 4 deck plate girders per track with bolted bottom flanges.
  - Twenty feet (**20′-0″**) for steel through plate girders or less than 4 deck plate girders per track with welded bottom flanges.
  - Vertical clearance must not be violated due to the deflection of the superstructure.
- Roadway profile and design roadway vehicle information shall be provided and considered in vertical clearance design.

Bridge Clearances

- Standard clearances on the bridge shall not be modified without written notice of approval by the Railroad. Any proposed modification shall be furnished with detailed engineering justification for review.
- Commonwealth, district, provincial, or state clearance laws must not be violated. Legal requirements must be upheld unless written permission for waiver is provided by the appropriate regulatory authority.
- Adequate clearance and capacity shall be provided for a future track.
- Track centers shall not be closer than fifteen feet (**15′-0″**).

- Minimum horizontal clearance on the bridge shall be provided as shown below:



- Standard clearances are for tangent track and increases must be provided to account for effects from curvature and superelevation.

Design Loads

Railroad bridges shall be designed for all loads specified in AREMA.

Live loads for steel structures shall consider both the **Cooper E80** loading and the alternate live load with full diesel impact, whichever produces the greater stress. Live loads for concrete structures shall consider **Cooper E80** loading with full diesel impact.

All bridges shall be designed with non-composite interaction between superstructure and deck. Mechanical connections shall be provided as necessary to satisfy design load requirements.

The weight of the minimum ballast depth one foot (**1′-0″**) plus an additional two feet (**2′-0″**) of ballast below the tie shall be included when computing the dead load of the structure.

Plans and Submittals

Preliminary Plans

- An electronic copy of type, size, and location (TS&L) plans shall be submitted to the Railroad for review and acceptance. The TS&L plan shall show plan view, elevation, and typical cross section of the proposed structure. Railroad acceptance must be granted before proceeding with design.
- Furnish cross sections showing the AREMA clearance envelope, topographic map with contours, and soil exploration data along with TS&L plans. Railroad acceptance must be granted before proceeding with design.

- The Railroad will assign a bridge designation (railroad, region, subdivision, MP) when TS&L plans are reviewed. This bridge designation shall be shown on all drawings.

Construction Work Plans

- The Railroad may require construction work plans to be submitted, particularly when work is being performed in the proximity of an active track, with potential to foul.
- All construction work plans shall be submitted in accordance with the Construction Submission Criteria (**see Section 1.11**).

Material Submissions

- Structural steel shop drawings shall be provided for review and acceptance prior to ordering material. Welding procedures shall be submitted with the structural steel shop drawings.
- Concrete mix designs shall be submitted for review and acceptance prior to ordering material.
- Third party testing reports shall be provided for review and acceptance in a timely manner.
- All other materials shall be provided in accordance with the plans. All materials shall be reviewed and approved by the agency or its representative. Proposed changes are subject to review and acceptance. Approved material submissions shall be furnished to the Railroad for confirmation and project documentation.

Final Plans

- Provide electronic set of final signed and sealed design plans and calculations for acceptance.
- Submit special provisions or special specifications for acceptance.
- Provide an electronic set of as-built plans to the Railroad upon completion of construction. All changes shall be noted and clearly called out on a redlined set of as-built plans. All pages shall be clearly marked “AS-BUILT” and include the date of completion.

Construction Considerations

After a construction contract is awarded, a copy of the contract shall be provided to the Railroad.

Maintenance of Railroad Traffic

- It is essential that the construction be performed with minimum interference to rail traffic. Continuity of safe rail operations will be required for the duration of the project.
- The agency’s design engineer should contact the PPD in the preliminary design stage to determine railroad operational requirements. The most effective method of maintaining traffic is to temporarily reroute traffic around the construction site using detour tracks. Detour tracks will be required where feasible. If detour tracks cannot be provided, the new superstructure shall be constructed adjacent to final location and rolled into place. Construction plans shall show complete details of temporary bridges and/or roll-in structure.
- A detailed construction procedure for maintaining traffic shall be shown on the plans. When construction requires total interruption of rail traffic, an estimate of the time required will be shown in the procedure. This interval must be within the approved time frame furnished by PPD.
- Prior to the start of construction, written approval from the Railroad for the construction procedure must be secured.

Bridge Decks

Walkways and Parapets

- Deck shall be a uniform ballast pan across all tracks and provide for a ballast walkway between all tracks and on the field side of the exterior tracks. Intermediate curbs shall not be permitted.
- All exterior walkways shall utilize the uniform ballast pan and be equipped with a **72-inch-**tall parapet wall, measured from top surface of bridge deck. Parapet walls should each include two six-inch ducts to accommodate signal and utility needs.
- Walkways and parapets shall be designed to satisfy the requirements specified by AREMA.

Minimum ballast depth shall be one foot (**1′-0″**) measured from top of deck waterproofing to the bottom of tie at the centerline of the low rail. This dimension shall be clearly labeled on cross section drawings.

On bridges, timber crossties (**7″ x 9″ x 8′6″**) shall be used, spaced at **19″** centers. Alternatively, concrete crossties may be used also at **20″** centers or steel crossties may be used at **24″** centers.

Track material shall be subject to review by the Railroad at project expense.

Steel Deck Plates

- Steel deck plates shall be shop welded with a pair of **5/16-inch** continuous fillet welds to each floor beam or deck girder. Deck units shall be shop assembled with multiple beams per unit, and areas to be field welded shall be masked and field painted after welding is complete.
- The closing deck plate between adjacent deck units shall be fillet welded to the beams with continuous **5/16-inch** fillet welds at each beam. After deck plates are welded to the beam, space between deck plates shall be filled at the joint with material compatible with deck waterproofing membrane.
- The minimum thickness of steel deck plates shall be as follows:

Plate Thickness	Maximum Clear Distance Between Beams
½ inch	1′-6″
5/8 inch	2′-0″
¾ inch	2′-4″

- For multiple deck girders with steel deck plates:
  - Provide a welded field splice in the deck plate at or near the centerline of bearing of the girders. Provide a closing deck plate from the abutments to this field splice that is normal to the girders and normal to the long direction of the main deck plates. This will avoid splicing deck plates over the back wall.
  - Outside girders shall be spaced such that deck plates will not overhang the flange of the outside girders by more than 2 inches and a concrete parapet wall shall be provided. The wall shall be securely anchored to the deck girder and have a minimum width of **12 inches** at the top.

Concrete Decks

- Bridge deck shall have adequate anchorage to the bridge superstructure. Shear studs shall not be permitted.
- The outside edge of the slab shall be not more than one foot six inches (**1′-6″**) from the centerline of the outside (fascia) girder.
- Provide a drip edge on the outside edge, bottom face of the deck slab.

Deck Drainage & Waterproofing

- Top surface of waterproofing protection shall have a minimum transverse slope of **1/8″** per foot with a crown at the centerline of the deck.
- Top surface of waterproofing protection shall have a minimum longitudinal slope of **0.5%.**
- Concrete decks shall be designed and constructed to provide the required slopes and to direct water to deck drains.
- When the deck is level or slopes less than **0.5%,** underlayment is to be used to provide required slopes.
- Deck drains shall be cast iron and downspouts shall be ductile iron. Deck drains shall have a grate or perforated cover. Downspouts shall be provided with cleanouts at each change in direction.
- All bridge decks shall be waterproofed using membrane waterproofing.
- All deck joints between spans shall be watertight.
- Waterproofing shall be applied to the entire surface of the deck and the bottom three feet (**3′-0″**) of inside faces of parapets or curb plates. Materials and construction are to be in accordance with AREMA, Chapter 8.

Superstructure

All bridges shall be composed of simple spans. Continuous spans are prohibited, and skewed spans are discouraged.

Design shall provide accommodations for future maintenance. Jacking locations as well as jack sizing shall be specifically denoted and laid out in the bridge plans. Jacks shall be sized to accommodate full dead load, including future ballast.

Welded Plate Girders

- A full penetration groove weld shall be used for flange to web connection.
- No more than two flange section transitions will be permitted without special permission.
- When a lateral bracing system is required as recommended by AREMA, girder connections shall be bolted.
- Jacking stiffeners are required at all end diaphragms. These locations must be specifically called out in the plans.
- Bearing stiffeners shall be welded or milled to bear for both top and bottom flanges.
- All cross frames shall be designed in accordance with AREMA recommendations.

Through Plate Girders

- Through plate girder bridges are only permitted for double track bridges. The use of intermediate girders in double track applications will not be permitted.
- Floor beam brackets (or knee braces) are stiffened diagonal plates that are bolted to the top flange of the floor beams and to vertical stiffeners on the through girder and shall be designed to satisfy AREMA recommendations.
- All stringers shall frame into floor beams.
- End floor beams and connections shall be designed such that the bridge can be jacked up by placing jacks between the end floor beams and pier or abutment. Jacking stiffeners shall be provided at points of jacking.

- Intermediate floor beams shall frame into the girder web using double connection angles and high strength bolts.
- All stringers shall have top and bottom flanges clipped at an angle not greater than **45 degrees** to permit field removal and installation.

Substructure

Design shall provide accommodations for future maintenance. Jacking locations as well as jack sizing shall be specifically denoted and laid out in the bridge plans.

Abutments and Wing Walls

- Abutment shall be designed in accordance with recommendations of AREMA, Chapter 8.
- The minimum abutment width shall be sufficient to provide for fifteen feet (**15′-0″**) track centers and standard road bed section.
- Wing walls shall be designed to support 2 horizontal to 1 vertical embankment slope as well as a level approach to the bridge walkways. MSE and sheet pile walls are not permissible.
- Provide minimum clearance necessary between end of structural steel and face of backwalls to accommodate expansion, but not less than two inches at each end.
- Provide keyways and water stops at all construction joints. Water stops shall be a hollow bulb **PVC 9″ X 3/8″** (**bulb ¾ inch inside diameter, 1½ inch outside diameter**) continuous across joint.
- Two feet of porous backfill, measured horizontally, shall be provided full height below sub-ballast, behind all abutments and wing walls.
- Provide adequate drainage behind abutments and wing walls utilizing perforated pipe drains at the base of the abutments and wing walls. When abutment geometry does not allow for perforated pipe drains, weep holes may be required.
- Non-perforated pipe shall be connected to the perforated pipe and drain away from the bridge with a **1% minimum slope.**

Piers

- Width of pier shall be minimum four feet (**4′-0″**), measured at the bearing seat.

Section 2.06 – Cleaning and Painting of Bridges

Summary

Requests are occasionally made by outside parties for various beautification projects, including painting of overhead and undergrade bridges. These requests are considered on a case-by-case basis by the Railroad. The cost of painting and future aesthetic maintenance will be the responsibility of the project sponsor proposing to paint the bridge.

All work over railroad property has the potential to impact rail operations. The Railroad will review bridge painting and cleaning projects to ensure environmental and engineering standards are met. This review, flagging protection, and construction monitoring costs will be paid for by the project sponsor.

Process

- Project sponsor engages a public entity (unless the public entity is the sponsor).
- Sponsor contacts PPD to identify objective.

- Agency/sponsor and the Railroad enter into applicable contracts.
- PPD assigns GEC to receive and review submittals.
- Agency contractor to request ROE.
- Agency/sponsor indicates number of days on/over/around railroad property.
- GEC supplies estimate to complete, including flagmen coverage.
- GEC helps to coordinate an onsite flagman.
- Project work (onsite CEI may be required).
- Site cleanup.
- The Railroad and agency signoff.

General

All proposals must comply with the Railroad's safety and environmental regulations and must not impact railroad property or operations. The public agency or its designee will be responsible for maintenance of the painted surfaces, including aesthetic damage caused by highway vehicles and vandalism. The Railroad will incur no costs or liabilities as a result of the project.

A written request by the party wishing to undertake such a project should be forwarded to the PPD for handling. The request should include information about the situation and the project objectives to assist with completion of the review. The following information should be included:

- The project sponsor and public agency that will execute appropriate agreements for implementation as well as future maintenance of the painted surfaces.
- Paint specifications, including color of the paint, that meet the Railroad's standards and methods for surface preparation, cleanup, and paint application.
- Qualifications and experience of the painting contractor. The Railroad will accept state qualified bridge painting contractors working for the responsible agency or company.
- The materials removed during the surface preparation must not impact the surrounding area, including ground, water, or air. Materials must not be stored on railroad property.
- Control of paint overspray and vapors during application. The work must be done complying with appropriate regulations and overspray controlled to prevent damage to adjacent property and vehicles in the area.
- Containment system cleanup and disposal of all paint and other material removed from the bridge. The cleanup and disposal of material from the surface preparation for painting and actual painting must comply with all appropriate regulations.
- Pictures and conceptual drawing should be submitted with the initial request from the community to simplify the initial review and comment by the Railroad.
- Work site safety plan, including keeping all personnel away from the tracks and fall protection measures where required.

Section 2.07 – Quiet Zones

Summary

The Railroad will fully comply with the train horn rules as specified by the FRA, which provides requirements for the sounding of locomotive horns when approaching public highway-rail grade crossings.
The rule also provides guidance for conditions under which a public authority with jurisdiction over the roadway crossing railroad tracks may apply for and establish Quiet Zones. A Quiet Zone is a section of a rail line that contains one or more consecutive public crossings at which locomotive horns are not routinely sounded. (For full details on the rules, please visit the FRA web site at **www.fra.dot.gov** or contact the FRA's Office of Safety at **202-493-6299**). While the complete responsibility for completion of a Quiet Zone analysis and application rests with the public authority, it should be done in conjunction with the Railroad.

Each crossing has a unique DOT inventory identification number posted at the crossing. There is often more than one crossing on the same road. The crossing number (i.e., 654321D) must be used to identify the specific crossing in all communications with the Railroad to reduce possible confusion about the specific location.
The rule clearly defines requirements that must be satisfied by the public authority requesting that a Quiet Zone be established or continued.

Process

- Agency contacts the FRA on intent.
- Agency contacts PPD on intent.
- Agency/sponsor issues a legal reimbursement document or PE agreement.
- PPD assigns GEC.
- GEC will schedule a diagnostic review with agency/PPD/FRA/state DOT.
    - Please plan out your SSMs and ASMs in the FRA calculator prior to the site review.
- PPD to provide OOM for all SSMs and ASMs dictated by the review.
- Agency works with FRA to establish a notice of intent (NOI).
- Agency mails NOI and FRA calculator to PPD.
    - Please note that the estimate for ASMs and SSMs in the calculator is to not account for actual railroad expenses. For these, refer to OOM from PPD.
- All designs of ASMs and SSMs are reviewed by the Railroad at the expense of the agency.
- All ASMs and SSMs requiring modifications to the Railroad or signal system will be designed by the Railroad at the agency's expense (**see Section 2.03**).
- GEC supplies estimate to complete (including flagmen coverage if needed).
- Agency issues NTP for construction with a legal reimbursement document or construction agreement.
- Project work is completed (CEI may be required).
- The Railroad places "No Horn" signs.
- Agency and the Railroad signoff.
- Agency coordinates with FRA for final review.
- Agency works with FRA on notice of establishment (NOE).
- Agency mails certified copy of NOE to FRA/PPD/and state DOT.
- The Railroad complies within timeframe set in the rule.
- FRA database is updated.

ACCESSING PROPERTY

Any entry or construction activities on railroad right of way must be authorized by the railroad in writing. Written authorization is obtained through a Right of Entry Permit or Contractor Occupancy/Access Agreement. The application is accessible via the link provided below.

The applicant must submit the completed application to the Real Estate Department including a check or money order, to cover the non-refundable fee of $1,750 made payable to the Railroad. The application must include latitude and longitude with aerial map of proposed worksite, and complete scope of work. If any of these items on the application are incomplete, the application will be immediately rejected.

The standard term for a Right of Entry Permit or Contractor Occupancy/Access Agreement is sixty (60) days. Longer terms are reviewed on a case by case basis and may be assessed additional fees.

Upon approval of the application, the Real Estate Department will draft an ag... EMERGENCY NUMBERS ...nt FIND A RAILROAD ...dc SERVICES ...ge CUSTOMERS ...us ABOUT ...
...signed document to the Real Estate Department along with the pertinent certificate of insurance outlined in the agreement. Once in receipt of these documents, the agreement will then be executed on behalf of the Railroad.

For "standard processing", the entire process takes between 6-8 weeks. "Expedited processing" will reduce the processing time to between 1-2 weeks and costs an additional $3,000. If the application and plans require engineering approval, and are returned to applicant for revisions in order to meet required specifications the expedited process could take longer than 2 weeks.

For any questions about Right of Entry permits please contact:

TRANSACTION COORDINATOR

Katie McGuier
Genesee & Wyoming Railroad Services, Inc.
katie.mcguier@gwrr.com
(904) 900-6276

REAL ESTATE COORDINATOR

Brittany Lewis
Genesee & Wyoming Railroad Services, Inc.
brittany.lewis@gwrr.com
(904) 596-7798

Related Documents

Right of Entry Application – 6.29.2023

RailroadProtectiveApplication

Customer Success Stories

All customer success stories

Tomahawk Railway's Unique Operation Fulfills Customer Warehousing Needs



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PROJECT UTILITY COORDINATION FORM

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Project Utilities Coordination (PUC) Form

CONTACTS AND GENERAL UTILITY INFORMATION

Revision Date:

City/Town:	Project File #:	PUC Completed by:	Utility Pole Set:	
Holden	612190	Rick Handfield	Holden Municipal Light	
Route/Street:	**Resident Engineer:**	**Mass DOT PM:**	**Scheduled Ad Date:**	**Total Poles Relocated:**
Salisbury Street	*TBD*	Stephen Soma	5/23/2026	

2/6/2026
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Consultant:	Contact:	Office #	Cell #	Email
Chappell Engineering Associates, LLC	Keith Lincoln	508-481-7400	857-998-2577	klincoln@chappellengineering.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
Holden Municipal Light	Barry Tupper	508-210-5400		btupper@holdenma.gov	X		X				X		X		X
Ripple Fiber	Chris Stevens	978-881-4543		christopher.stevens@ripplefiber.com		X		X	They are just installing facilities near the bridge, but it is not due to our project. Just listed to ensure coordination to let them be on the site install.		X		X	X	
Charter	John Yurkevicius	774-243-9834		John.yurkevicius@charter.com	X		X				X		X		X
Verizon	Paul Styspeck	508-294-7527		paul.m.styspeck@verizon.com	X		X				X		X		X
Eversource Gas	Jeffrey Evans-Mongeon	508-305-6970		Jeffrey.Evans-Mongeon@eversource.com	X		X				X		X	X	
Holden DPW	Nicholas Schwartz	508-210-5550		dpw_admin@holdenma.gov				X							
National Grid Electric	Manuel Munoz	401-895-9726		Manuel.Munoz@nationalgrid.com	X		X				X		X		X

Utility Relocation Notes for MassDOT Contractor

Unless otherwise noted by Contract, the MassDOT Contractor is to provide the District Construction Office with 7 Calendar Days advance notification in order to validate the current progress and provide the required 30 Days advance notice-to-proceed for the first Utility - and each subsequent Utility. These advance notifications are to be identified in the Contractor's Schedules (Pre-Con preparation, Baseline, Subnets, and Updated/Monthly Schedules) as specified in Subsection 8.02 (for DBB Contracts) and/or Section 9 (of DB Contracts). Note: The durations included below do not include these lead-times. See Additional 'Important Basis notes for Contractor' - on last PUC Form page.

Additional notes:

Contractor to coordinate relocation of gas line per plan. It should be noted that there are relocations required as part of this project which are reimbursable and labeled accordingly on the plans.

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 Holden. The information provided is the best available information prior to project advertisement.

Proposal No. 612190-134594

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

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massDOT Massachusetts Department of Transportation Highway Division

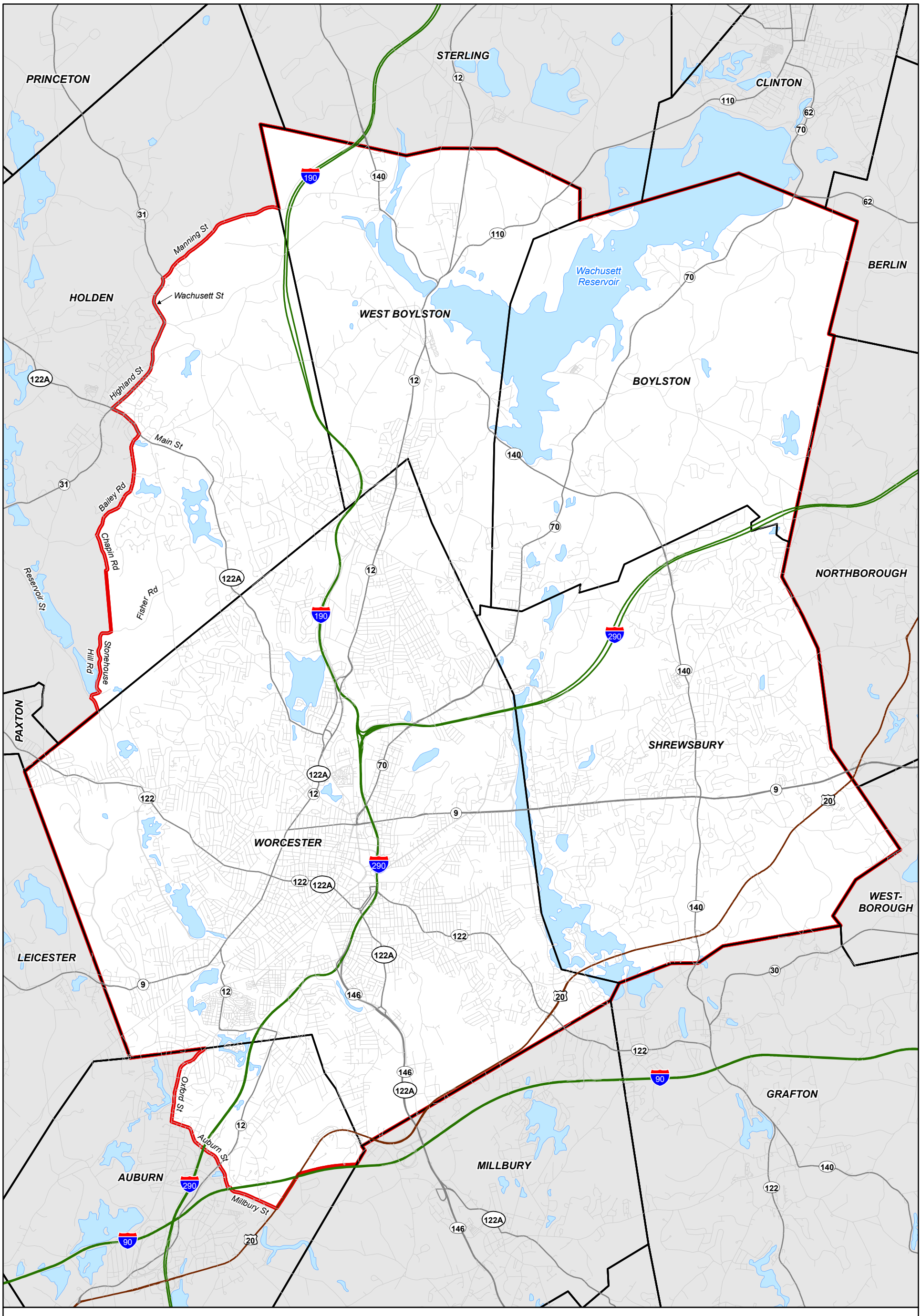
	RESPONSIBLE PARTY		DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by Utilities (Lead time not included)	Concurrent / Exclusive Utility Work				Access Restraint & Limitations of Operations Notes	
					Contractor note: In planning and executing the work, the Access Restraints listed in the Special Provisions, takes precedence over the checklist in these 4 columns.				Should an AR be considered for the Contractor ?	
					Exclusive Utility on site	Concurrent Utilities	Contractor Off-Site	Contractor Concurrent		
	C = Contractor	U = Utility Co.			Utility working with no other Utilities in vicinity	Utility working with other Utilities on site	No Contractor physical construction operations on-site (while Utility Contractor and Utility are working on-site - but NOT in the same vicinity	Contractor and Utility are working on-site - but NOT in the same vicinity	Potential Access Restraint (Yes/No)	Reason/Note (optional)
	C		Enabling work by the Contractor - At the preconstruction meeting, schedule a utility walkthrough to discuss pole locations and review tree trimming/removals. Survey will need to stake pole locations prior to the utility walkthrough. Contractor shall perform any necessary clearing and grubbing, tree removal and tree trimming as specified in the Contract Documents and in coordination with HMLD. Rough grading will be required prior to setting new poles at 15+28 LT± and 16+96 LT±. Pole proposed at STA 15+28 LT± will require a deep set pole. Holden Municipal Light to relocate pole mounted utility street lights. National Grid owns the wires crossing the north side of the bridge and should remove their wires prior to Holden Municpal Light relocating the poles. National Grid notified us that the wires running along the railroad are inactive. Contractor to confirm.								
			UTILITY OPERATIONS - Aerial							
Task: 1			***National Grid***							
		U	Site readiness: dig-safe, pre-checks, etc.	10	x			x	No	
		U	Remove OH spans between UP#173 and UP#168	3	x			x	No	
		U	Install new anchors, guys, and grounding wires for dead-ended pole #173 and #168	2	x			x	No	
			Sub-Total	**15**						
Task: 2			***Holden Municipal Light***							
		U	Install new utility poles	8	x			x	No	
		U	Frame poles	4	x			x	No	
		U	Install primary cable	1	x			x	No	
		U	Install secondary cable	1	x			x	No	
		U	Install transformers/bank	2	x			x	No	
		U	Terminations and services	2	x			x	No	
			Sub-Total	**18**						
Task: 3			***Charter***							
		U	Construct strand and ground new pole line	1	x			x	No	
		U	Construct New Coa>1 onto new strand	1	x			x	No	
		U	Cold Splice all new co8ll	2	x			x	No	
		U	Splice amps and activate.swing and replace drops to new coax	1	x			x	No	
		U	Relocate Power supplies to new poles and activate	60	x			x	No	
		U	Delash existing fibers and relocate slack for splicing.	5	x			x	No	
		U	Construct I Swing fiber onto new pole line	2	x			x	No	
		U	Splice multiple fibers at new locations ii needed.	2	x			x	No	
		U	Wreck out Fiber and coax throughout project.	1	x			x	No	
			Sub-Total	**75**						
Task: 4			***Verizon***							
		U	Verizon to assist HMLD with cut & kick placement of P4	1	x			x	No	
		U	Verizon places pole to anchor guys	1	x			x	No	
		U	Verizon construction places new strand & cables, transfer cable to new pole 4	10	x			x	No	
		U	Verizon splice to splice in new cables and trim out old cables	14	x			x	No	
		U	Verizon construction to remove old drops, cables & terminals	5	x			x	No	
		U	Verizon remove old PAG's	1	x			x	No	
			Sub-Total	**32**						
Task: 5			***Holden Municipal Light***							
		U	Remove Utility Poles	2	x			x	No	
			Sub-Total	**2**						
	C		Enabling' work by the Contractor - Contractor to coordinate relocation of gas line per plan. It should be noted that there are relocations required as part of this project which are reimbursable and labeled accordingly on the plans. Eversource Gas has provided durations for the work detailed below. The durations below assumes a conservative approach showing all work that needs to be done and full durations. Contractor to coordinate with Eversource Gas immediately after NTP. Required notice to Eversource Gas is 14 days prior to mobilization.								
			UTILITY OPERATIONS - Underground - Reimbursable							
Task: 1			***Eversource Gas***							
		U	Mobilize & Materials Delivery and Project Planning	2	x			x	No	
		U	Install 8" IP HDPE Gas Main in project scope bounds on Salisbury St (STA 11+95) to (STA 13+80).	6	x			x	No	
		U	Install 8" IP PH Gas Main and tie-in to existing plastic main at 2 locations	5	x			x	No	
		U	Pig new main	1	x			x	No	
		U	Pressure Test and nitrogen purge main into service	1	x			x	No	
		U	Abandon / Retire old 8" PY main (~200)	2	x			x	No	
		U	Backfill & Site restoration and demobilize	3	x			x	No	
			Sub-Total	**20**						

RESPONSIBLE PARTY C = Contractor U = Utility Co.	DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by **Utilities** (Lead time not included)	**Concurrent / Exclusive Utility Work** Contractor note: In planning and executing the work, the Access Restraints listed in the Special Provisions, takes precedence over the checklist in these 4 columns.				**Access Restraint & Limitations of Operations Notes** Should an AR be considered for the Contractor ?	
			Exclusive Utility on site	**Concurrent Utilities**	**Contractor Off-Site**	**Contractor Concurrent**		
			Utility working with no other Utilities in vicinity	Utility working with other Utilities on site	No Contractor physical construction operations on-site (while Utility	Contractor and Utility are working on-site - but NOT in the same vicinity	Potential **Access Restraint** (Yes/No)	Reason/Note (optional)
	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).							
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. Any costs associated with these tasks are deemed to be incidental to the project.							
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								

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ASIAN LONGHORNED BEETLE DOCUMENTS

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PRINCETON
STERLING
CLINTON
HOLDEN
WEST BOYLSTON
BOYLSTON
BERLIN
Wachusett Reservoir
Manning St
Wachusett St
Highland St
Main St
Bailey Rd
Chapin Rd
Fisher Rd
Reservoir St
Hill Rd
Stonehouse
NORTHBOROUGH
PAXTON
SHREWSBURY
WORCESTER
LEICESTER
WEST-BOROUGH
Oxford St
Auburn St
AUBURN
MILLBURY
Millbury St
GRAFTON
Regulated Area
Lakes and Ponds
Town Boundary
Interstate
U.S. Highway
State Route
Non-numbered route
Regulated Area to Suppress and Control the Asian Longhorned Beetle
October 17, 2011
0 0.5 1 Mile
N
dcr
Massachusetts
Geographic data supplied by the Office of Geographic Information (MassGIS) and DCR GIS.

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DOCUMENT A00810

MassDOT Herbicide Use Report

Proposal No. 612190-134594

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 A00818

BRIDGE INSPECTION REPORT

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MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

STRUCTURES INSPECTION FIELD REPORT

SPECIAL MEMBER INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
03	225	H-18-004

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	90-ROUTINE INSP. DATE	93*-SPEC. MEMB. INSP. DATE
HOLDEN	H18004-225-DOT-634	004.377	Jan 24, 2025	Apr 16, 2026

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	*YR REHAB'D (NON 106)
HWY SALISBURY ST		1907	1958	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
RR PWRR	Urban Minor Arterial	M. Azizi

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER	PROJ MGR
501 : Prestressed Concrete Slab	State Highway Agency	State Highway Agency	M. Amorando	Jacobs Engineering Group

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
2 : Concrete Precast Panels	Cloudy	27°C	J. VIDEIRA

WEIGHT POSTING — *Not Applicable* X

	H	3	3S2	Single
Actual Posting	N	N	N	N
Recommended Posting	N	N	N	N

Waived Date: 00/00/0000 EJDMT Date: 00/00/0000

Signs In Place (Y=Yes,N=No, NR=Not Required) Legibility/ Visibility

At bridge N	At bridge S	Advance N	Advance S

PLANS (Y/N): Y

(V.C.R.) (Y/N): N

TAPE#: _____

RATING

Rating Report (Y/N): Y Date: 06/01/2017

Recommend for Rating or Rerating (Y/N): Y

If YES please give priority: HIGH (X) MEDIUM ( ) LOW ( )

REASON: Several new areas of exposed and severed strands noted since previous rating.

Inspection data at time of existing rating

I 58: 4 I 59: 4 I 60: 6 I 62: - Date : 03/23/2016

SPECIAL MEMBER(S):

	MEMBER	CRACK (Y/N):	WELD'S CONDITION (0-9)	LOCATION OF CORROSION, SECTION LOSS (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC.	CONDITION PREVIOUS (0-9)	CONDITION PRESENT (0-9)	INV. RATING OF MEMBER FROM RATING ANALYSIS H-20	3	3S2	Deficiencies
A	Item 58.2 - Deck Condition	N		See Item 59.4.	4	3	24	30	47	S-A
B	Item 59.4 - Girders or Beams	N		See remarks in comments section.	4	3	24	30	47	S-A
C										
D										
E										

List of field tests performed:

Visual and Hands on inspection.

	I-58	I-59	I-60	I-62
(Overall Previous Condition)	3	3	5	-
(Overall Current Condition)	3	3	5	-

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

X=UNKNOWN **N=NOT APPLICABLE** **H=HIDDEN/INACCESSIBLE** **R=REMOVED**

F.C.(1)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
HOLDEN	**225**	**H-18-004**	**H18004-225-DOT-634**	**APR 16, 2026**

REMARKS

BRIDGE ORIENTATION

This bridge is a three (3) span structure oriented from South to North. There are eight (8) prestressed concrete deck beams (including the West sidewalk beam) labeled 1 through 8 from West to East. The spans and the piers are numbered from South to North **(see Sketches 1 and 2 and Photos 1-4 for typical photos)**.

GENERAL REMARKS

Bridge H-18-004 (225) carries Salisbury Street over the P&W Railroad in the Town of Holden, MA. The bridge consists of three (3) spans with a prestressed concrete deck beam superstructure that support an asphalt wearing surface **(see Photos 2-6)**. The superstructure is supported by two (2) reinforced concrete abutments and two (2) reinforced concrete piers.

ACCESS NOTES

The topside was inspected on foot from the sidewalk.

The underside was inspected using a Hi-Rail bucket truck in accordance with a P&W Railroad right of entry permit. A P&W Railroad Flagman was present onsite for the duration of the inspection and the rails were accessed from the track crossing at Industrial Avenue in Holden.

WEARING SURFACE CONDITION

The wearing surface was not part of the special member inspection but was inspected due to the reflective cracking above the beam joint lines. **DEF=S/A: There is up to 1" wide reflective cracking along the full length of the bridge, most prominent on the West half over Beams 2-5 (see Photos 4-6).** Specific deficiencies are as follows:

- Span 1 at South Abutment - 1'-11" long x 1'-8" wide x 2-1/2" deep pothole filled with water **(see Photo 7).**
- Above Piers 1 and 2 - Up to 3'-6" long x up to full bridge width areas of broken up bituminous concrete **(see Photo 4-6).**
- The curb line along the full length of the bridge exhibits several up to 3'-0" long x 1'-6" wide x 1" deep areas of delamination **(see Photo 8).**

INSPECTION FREQUENCY

Due to the increased number of defects noted at the beams, the special member inspection frequency was lowered during the January 2026 special member inspection to 3 months to monitor the spalls and exposed prestressing strands. The next scheduled special member inspection will occur in July 2026.

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Girders or Beams

The beams exhibit cracking with efflorescence, spalls with exposed rebar, moisture staining, and leakage throughout **(see Photos 1 and 9-40)**. Span 2, Beams 2 to 6 underside have monitoring devices installed. Span 2, Beam 4 and 5 monitors have fallen out of place and monitors on Beams 2, 4, 5 and 6 are hanging **(see Photo 1)**.

In Span 1, there is minor spalling along both fascia beams at the bridge railing anchorage locations and minor spalling and cracking, some with efflorescence or rust staining at the beams. **DEF=S/A: Span 1 Beam 2 exterior face exhibits exposed post-tensioning rods and missing grout at the post-tensioning anchorages. See Sketches 3-6 and Photos 9-14 for specific defect locations in Span 1.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
HOLDEN	**225**	**H-18-004**	**H18004-225-DOT-634**	**APR 16, 2026**

REMARKS

DEF=S/A: In Span 2, there is widespread heavy spalling with exposed rebar and exposed prestressing strands to the beams, especially along the West half of the span. At several locations the exposed prestressing is severed or exhibits section loss. There are also exposed post-tensioning rods and missing grout at the post-tensioning anchorages. The beams exhibit differential deflections and gaps between the beams, and there is moisture staining and efflorescence throughout the underside of the span. See Sketches 3-6 and Photos 15-34 for specific defect locations in Span 2.

In Span 3, the beams exhibit spalling, scattered areas of active leakage, and cracking throughout. **DEF=S/A: Beam 1 is partially unsupported with a void due defects at the abutment and backfill is spilling through. DEF=S/A: Span 3 Beam 2 exterior face exhibits exposed post-tensioning rods and missing grout at the post-tensioning anchorages. See Sketches 3-6 and Photos 35-40 for specific defect locations in Span 3.**

Sketch / Photo Log

Sketch 1 : Location Map.
Sketch 2 : Framing Plan.
Sketch 3 : Beam Deficiencies - Framing Plan.
Sketch 4 : Beam Deficiencies - Defect List (1 of 3).
Sketch 5 : Beam Deficiencies - Defect List (2 of 3).
Sketch 6 : Beam Deficiencies - Defect List (3 of 3).
Photo 1 : Typical underside (Span 2 shown), looking North. Note hanging monitoring devices.
Photo 2 : Bridge from South Approach, looking North.
Photo 3 : Bridge from North Approach, looking South.
Photo 4 : Typical top of deck Span 1 - Reflective cracking and broken up bituminous concrete.
Photo 5 : Typical top of deck Span 2 - Reflective cracking and broken up bituminous concrete.
Photo 6 : Typical top of deck Span 3 - Reflective cracking and broken up bituminous concrete.
Photo 7 : Span 1 at South Abutment - Pothole filled with water.
Photo 8 : Beam 1 (Sidewalk Beam) - Several areas of delamination along the curbline.
Photo 9 : DEF=S/A: Span 1 Beam 2 at midspan - Post tensioning rod pocket missing grout with heavy rust staining within the pocket.
Photo 10 : Span 1 Beam 3, midspan, West side - Spall and cracks with efflorescence.
Photo 11 : Span 1 Beam 8, at midspan - Longitudinal hairline cracking with active leakage, rust staining and heavy efflorescence with stalactites.
Photo 12 : Span 1, between Beams 1 and 2 - Joint material hanging down.
Photo 13 : Span 1 Beam 4 at North end - Area of moderate scaling.
Photo 14 : Span 1 Beam 8, East face - Hairline map cracking with efflorescence.
Photo 15 : Span 2 Beam 1 - Negative camber relative to Beam 2 concrete curb.
Photo 16 : DEF=S/A: Span 2 Beam 2 at North end - Post tensioning rod pocket missing grout with exposed post tensioning rod.
Photo 17 : DEF=S/A: Span 2 Beam 2, West side - Spall with exposed/debonded strands with section loss.
Photo 18 : DEF=S/A: Span 2 Beam 2, East side - Spall with exposed/debonded stands with section loss and hairline cracks with efflorescence.
Photo 19 : DEF=S/A: Span 2, between Beams 2 and 3 - Vertical misalignemnt with a gap between beams.
Photo 20 : Span 2 Beam 3, North end, West side - Spall with delamination and a boundary crack.
Photo 21 : DEF=S/A: Span 2 Beam 3, North end, East side - Spall with severed strands and adjacent hollow area and heavy efflorescence.
Photo 22 : Span 2 Beam 3 at Pier 2 - Crack with rust staining and efflorescence build up.
Photo 23 : DEF=S/A: Span 2, between Beams 3 and 4 - Vertical misalignment with a gap between beams.

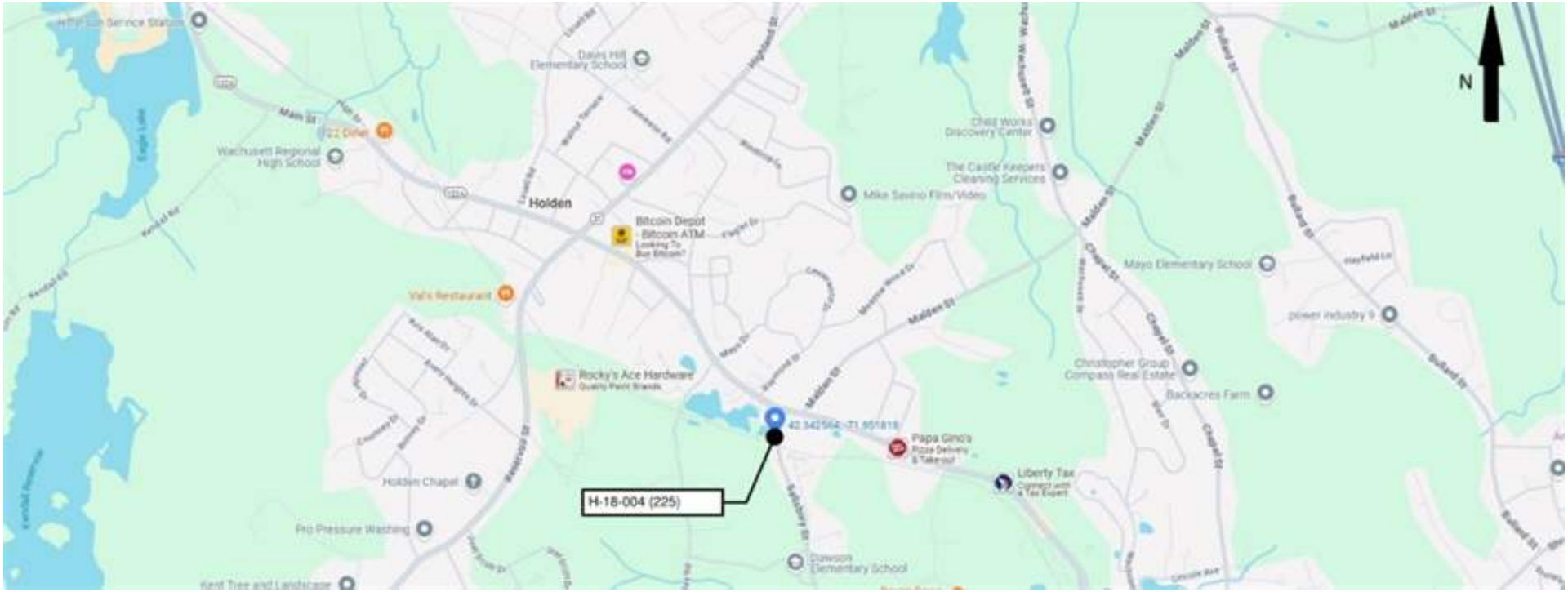
CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
HOLDEN	**225**	**H-18-004**	**H18004-225-DOT-634**	**APR 16, 2026**

REMARKS

Photo 24 : DEF=S/A: Span 2 Beam 4, South end, West side - Spall with exposed/severed strands.
Photo 25 : DEF=S/A: Span 2 Beam 4, midspan, West side - Spall with exposed/severed strands and adjacent hollow area.
Photo 26 : DEF=S/A: Span 2 Beam 4, North end near Pier 2, West side - Spall with exposed rusted rebar and sections of exposed/severed strands.
Photo 27 : DEF=S/A: Span 2 Beam 4, South end, East side - Spall with exposed rusted rebar and exposed/debonded/severed strands.
Photo 28 : DEF=S/A: Span 2 Beam 4, midspan, East side - Spall with exposed rusted rebar and exposed/severed strands.
Photo 29 : DEF=S/A: Span 2, between Beams 4 and 5 - Vertical misalignment with a gap between beams.
Photo 30 : Span 2 Beam 4, near Pier 2 on East side - Area of delamination with adjacent spall.
Photo 31 : Span 2 Beam 7 at Pier 1 - Area of heavy effloresecence with stalactites.
Photo 32 : DEF=S/A: Span 2, between Beams 7 and 8 - Vertical misalignment with a gap between beams.
Photo 33 : Span 2 Beam 8 South end - Map cracking with effloresecence and minor spalls.
Photo 34 : DEF=S/A: Span 2 Beam 8, North end, East corner - Missing grout with exposed post tensioning rod and spall and map cracking.
Photo 35 : DEF=S/A: Span 3 Beam 1 at the North Abutment - Section of abutment collapsed with a void exposing the back of the beam.
Photo 36 : DEF=S/A: Span 3 Beam 2 at midspan - Post tensioning rod pocket missing grout and heavy rust with pigeon debris.
Photo 37 : Span 3 Beams 2 to 6 at Pier 2 - Heavy effloresecence at the beam ends with stalactites and moisture stains and leakage.
Photo 38 : Span 3 Beam 3 at Pier 2, East side - Spall with heavy effloresecence with stalactites.
Photo 39 : Span 3 Beam 3, midspan, East side - Spall with heavy effloresecence.
Photo 40 : Span 3 Beam 5, midspan, East side - Failed patch.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
HOLDEN	225	H-18-004	H18004-225-DOT-634	APR 16, 2026

SKETCHES



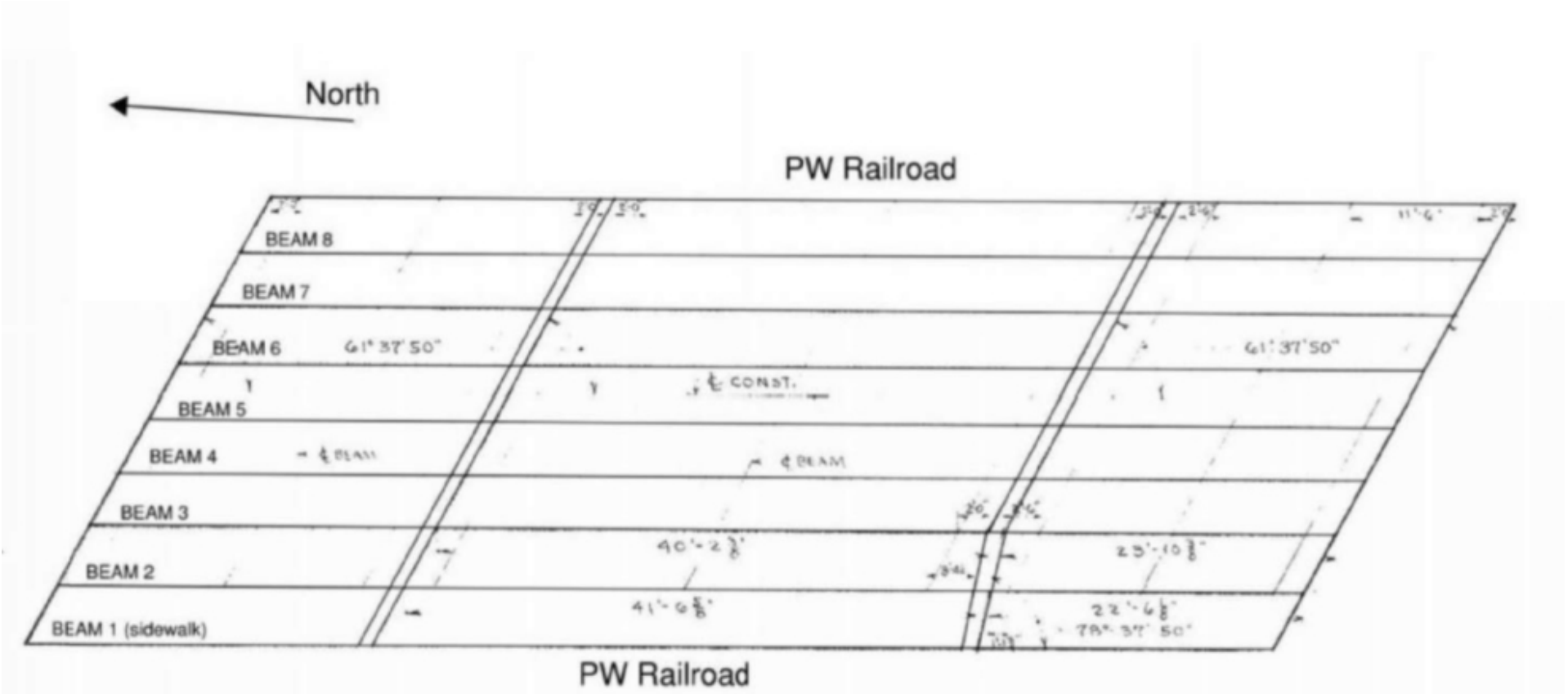
Sketch 1: Location Map.

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Proposal No. 612190-134594

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
HOLDEN	225	H-18-004	H18004-225-DOT-634	APR 16, 2026

SKETCHES



Sketch 2: Framing Plan.

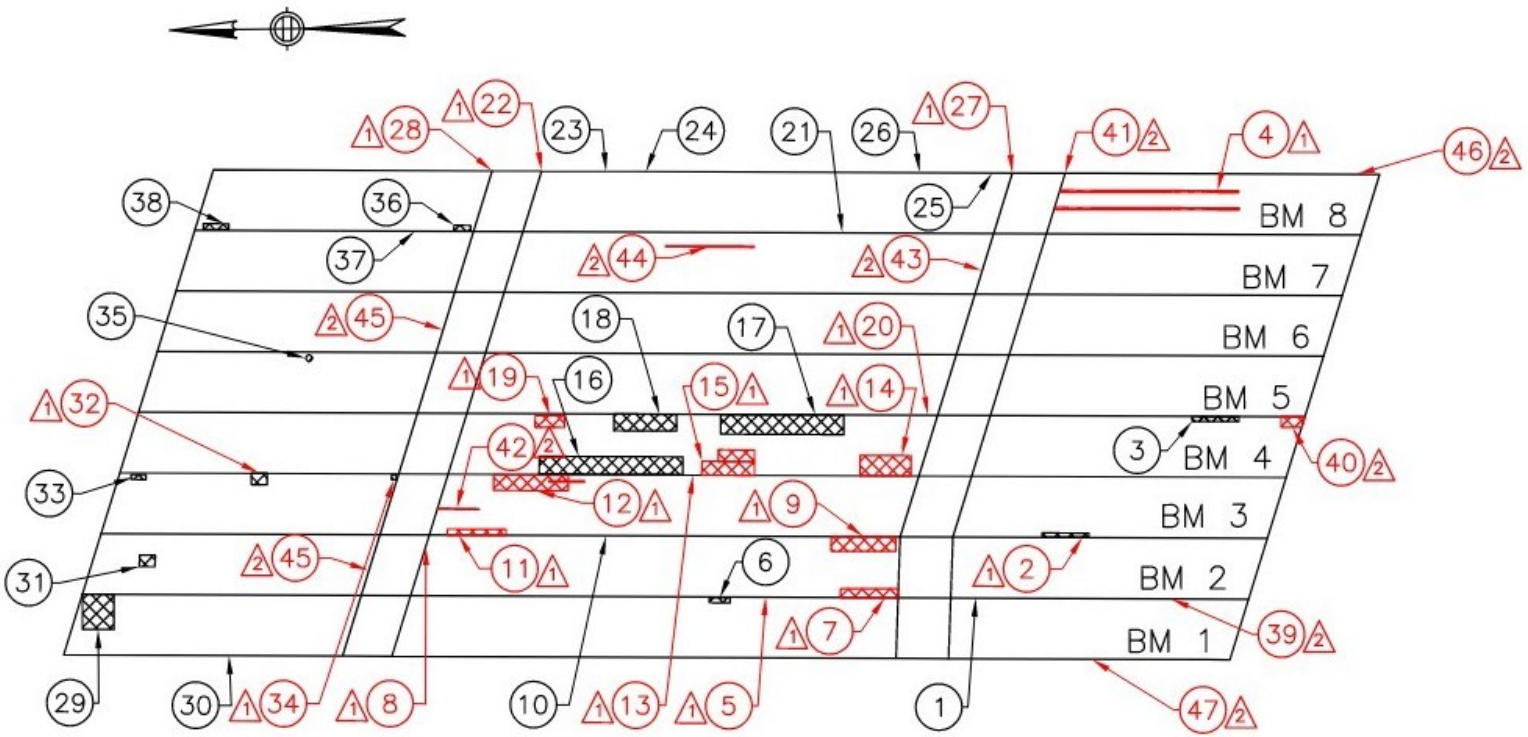
A00818 - 8

Proposal No. 612190-134594

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
HOLDEN	225	H-18-004	H18004-225-DOT-634	APR 16, 2026

SKETCHES

BIN 225



LEGEND:

- SPALL
- DELAM/HOLLOW AREA
- CRACK
- 1 – CHANGED CONDITION FROM PREVIOUS INSPECTION (1/26)
- 2 – NEW CONDITION (4/26)

Sketch 3: Beam Deficiencies - Framing Plan.

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Proposal No. 612190-134594

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
HOLDEN	225	H-18-004	H18004-225-DOT-634	APR 16, 2026

SKETCHES

NOTES:

SPAN 1

1. DEF=S/A: BEAM 2 – POST–TENSIONING ROD POCKETS MISSING GROUT WITH HEAVY RUST STAINING WITHIN THE POCKET.
2. (1) BEAM 3, MIDSPAN, WEST SIDE – 4'–0" LONG x 5" WIDE x 3" DEEP SPALL AND CRACKS WITH EFFLORESCENCE.
3. BEAM 4, 5'–6" FROM SOUTH ABUTMENT – 4'–0" LONG x 5" WIDE x 2–1/2" DEEP SPALL WITH EXPOSED REBAR.
4. (1) BEAM 8, MIDSPAN – LONGITUDINAL HAIRLINE CRACKING UP TO 9'–0" LONG WITH ACTIVE LEAKAGE, RUST STAINING, AND HEAVY EFFLORESCENCE AND STALACTITES.
39. (2) BEAMS 1 AND 2 – JOINT MATERIAL HANGING DOWN.
40. (2) BEAM 4 – 9" LONG X 8" WIDE AREA OF MODERATE SCALING.
41. (2) BEAM 8, EAST FACE – HAIRLINE MAP CRACKING WITH EFFLORESCENCE.
46. (2) BEAM 8, EAST FACE – 7" LONG X 3" WIDE X 2" DEEP SPALLS UNDER POSTS.
47. (2) BEAM 1, WEST FACE – 7" LONG X 2" WIDE X 5" DEEP SPALLS UNDER POSTS 2 AND 4 FROM THE PIER.

SPAN 2

5. (1) BEAM 1 – NEGATIVE CAMBER RELATIVE TO BEAM 2 CONCRETE CURB (ON TOP OF DECK). MAXIMUM VERTICAL DIFFERENCE OF 1–1/2".
6. BEAM 1, TOP OF BEAM AT SIDEWALK – 1'–9" LONG x 5" WIDE x 2–1/2" DEEP SPALL WITH EXPOSED REBAR.
7. (1) DEF=S/A: BEAM 2, WEST SIDE – 4'–11" LONG x 9" WIDE x 8" HIGH X 2–1/2" DEEP SPALL WITH THREE (3) EXPOSED STRANDS AND TWO (2) DEBONDED STRANDS DOWN TO 3/8" REMAINING.
8. (1) DEF=S/A: BEAM 2, NORTH END, WEST FACE – POST–TENSIONING ROD POCKETS MISSING GROUT WITH EXPOSED POST–TENSIONING ROD AND A 2'–8" LONG x .008" WIDE CRACK WITH MINOR EFFLORESCENCE. THE OPEN JOINT BETWEEN BEAMS 1 AND 2 IS ALLOWING ICE AND SNOW TO ENTER THE POST–TENSIONING POCKET.
9. (1) DEF=S/A: BEAM 2, EAST SIDE – 5'–6" LONG x 1'–3" WIDE x UP TO 7" DEEP (3" AVERAGE) SPALL WITH SEVEN (7) EXPOSED STRANDS AND FOUR (4) DEBONDED STRANDS WITH LESS THAN 10% SECTION LOSS AND HAIRLINE CRACKS WITH EFFLORESCENCE. TWO (2) CRACKS ARE UP TO 1/8" WIDE. REMAINING CONCRETE IS DAMP/PUNKY.
10. DEF=S/A: BEAMS 2 AND 3 – UP TO 3/4" VERTICAL MISALIGNMENT WITH 1/2" WIDE GAP.
11. (1) BEAM 3, NORTH END, WEST SIDE – 5'–8" LONG x 6" WIDE DELAMINATION WITH BOUNDARY CRACK UP TO 1/8" WIDE WITH A 8" LONG X 3" WIDE X 1" DEEP SPALL.
12. (1) DEF=S/A: BEAM 3, NORTH END, EAST SIDE – 6'–6" LONG x 1'–4" WIDE x 4" DEEP SPALL WITH THREE (3) EXPOSED STRANDS, TWO (2) ARE SEVERED AND ADJACENT 1'–4" LONG x 10" WIDE HOLLOW AREA WITH BLEEDING RUST AND EFFLORESCENCE BUILD UP AND TWO (2) CRACKS 6'–5" LONG x 0.125" WIDE WITH HEAVY EFFLORESCENCE.
13. (1) DEF=S/A: BEAMS 3 AND 4 – UP TO 3/4" VERTICAL MISALIGNMENT WITH 5/8" WIDE GAP.

Sketch 4: Beam Deficiencies - Defect List (1 of 3).

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
HOLDEN	225	H-18-004	H18004-225-DOT-634	APR 16, 2026

SKETCHES

NOTES:

1 14. DEF=S/A: BEAM 4, SOUTH END, WEST SIDE – 5'–11" LONG x 1'–9" WIDE x 2–1/2" DEEP SPALL WITH SIX (6) EXPOSED STRANDS, TWO (2) SEVERED STRANDS AND ONE (1) STRAND WITH ONE (1) SEVERED TENDON.

1 15. DEF=S/A: BEAM 4, MIDSPAN, WEST SIDE – 4'–6" LONG x 10" WIDE x 2–1/2" DEEP WITH TWO (2) EXPOSED STRANDS, ONE (1) STRAND WITH TWO (2) SEVERED TENDONS AND AN ADJACENT 6" LONG X 1'–0" WIDE HOLLOW AREA.

16. DEF=S/A: BEAM 4, NORTH END, 5'–0" FROM PIER 2, WEST SIDE – 12'–3" LONG x 1'–6" WIDE x 4" DEEP SPALL WITH EXPOSED RUSTED REBAR AND TWO SECTIONS OF EXPOSED STRANDS, ONE AREA WITH FIVE (5) PRESTRESSING STRANDS EXPOSED AND ONE (1) DEBONDED/BROKEN STRAND 9'–0" FROM PIER 2 AND THREE (3) EXPOSED AND SEVERED STRANDS 15'–0" FROM PIER 2.

17. DEF=S/A: BEAM 4, SOUTH END, EAST SIDE – 10'–6" LONG x 1'–8" WIDE x 4" DEEP SPALL WITH EXPOSED RUSTED REBAR, SIX (6) PRESTRESSING STRANDS EXPOSED AND THREE (3) STRANDS DEBONDED AND SEVERED. SOUTH EDGE IS 8'–0" FROM PIER 1.

18. DEF=S/A: BEAM 4, MIDSPAN, EAST SIDE – 5'–4" LONG x 1'–5" WIDE x 3" DEEP SPALL WITH EXPOSED AND RUSTED REBAR AND TWO (2) OF THREE (3) PRESTRESSING STRANDS SEVERED. NORTH EDGE IS 7'–9" FROM PIER 2.

1 19. BEAM 4, 6'–0" FROM PIER 2, EAST SIDE – 3'–0" LONG x 1'–2" WIDE AREA OF DELAMINATION WITH AN ADJACENT 2'–2" LONG X 7" WIDE X 1–1/2" DEEP SPALL.

1 20. DEF=S/A: BEAMS 4 AND 5 – UP TO 3/4" VERTICAL MISALIGNMENT WITH 1/2" WIDE GAP FOR 3/4 OF THE SPAN.

21. DEF=S/A: BEAMS 7 AND 8 – UP TO 3/4" VERTICAL MISALIGNMENT WITH 1/2" WIDE GAP.

1 22. BEAM 8, NORTH END, EAST CORNER – 10" LONG x 4" HIGH x 2–1/2" DEEP SPALL. EAST FACE WITH FULL HEIGHT X 1'–0" LONG X LESS THAN 0.008" WIDE MAP CRACKING WITH EFFLORESCENCE.

23. DEF=S/A: BEAM 8, WEST FACE – MISSING GROUT WITH EXPOSED POST–TENSIONING ROD.

24. BEAM 8, 2ND POST FROM PIER 2 – TWO (2) 10" HIGH x 1'–0" WIDE x 1" DEEP SPALLS AT RAILING ANCHORAGE.

25. BEAM 8, 1ST POST FROM PIER 1 – TWO (2) 10" HIGH x 1'–0" WIDE x 2" DEEP SPALLS AT RAILING ANCHORAGE.

26. BEAM 8, 2ND POST FROM PIER 1 – TWO (2) 10" HIGH x 1'–0" WIDE x 2" DEEP SPALLS AT RAILING ANCHORAGE.

1 27. BEAM 8, SOUTH END – UP TO 5'–0" LONG AREA OF HAIRLINE MAP CRACKING WITH EFFLORESCENCE AND TWO (2) LONGITUDINAL CRACKS UP TO 1'–2" LONG X 0.014" WIDE AND MINOR SPALLS UP TO 1" DEEP.

2 42. BEAM 3 AT PIER 2 – 2'–11" LONG X 0.006" WIDE LONGITUDINAL CRACK WITH RUST AND EFFLORESCENCE BUILD UP.

2 43. BEAM 7 AT PIER 1 – 5'–0" LONG AREA OF HEAVY EFFLORESCENCE WITH STALACTITES.

2 44. BEAM 7 – 7'–0" LONG HAIRLINE CRACK WITH EFFLORESCENCE.

Sketch 5: Beam Deficiencies - Defect List (2 of 3).

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
HOLDEN	225	H-18-004	H18004-225-DOT-634	APR 16, 2026

SKETCHES

NOTES:

SPAN 3

1. 28. SOUTH END – 2'–0" LONG X 1'–8" WIDE AREA OF HAIRLINE MAP CRACKING WITH HEAVY EFFLORESCENCE.
29. DEF=S/A: BEAM 1, NORTH ABUTMENT – SECTION OF ABUTMENT PREVIOUSLY NOTED AS COLLAPSED CREATING 8" LONG x 10" WIDE x 5" DEEP VOID, EXPOSING BACK OF BEAM. BEAM 1 UNSUPPORTED FOR 2'–3" WIDE. BACKFILL IS SPILLING THROUGH DUE TO THE VOID BEHIND THE BEAM.
30. BEAM 1, WEST FACE – FULL HEIGHT x 1'–0" WIDE x 1" DEEP SPALLS AT ANCHOR OF WEST RAILING POSTS.
31. DEF=S/A: BEAM 2 – POST–TENSIONING ROD POCKET MISSING GROUT AND EXHIBITS HEAVY RUST AND PIGEON DEBRIS.
1. 32. BEAM 3, MIDSPAN, EAST SIDE – 1'–4" LONG x 1'–0" WIDE x UP TO 3" DEEP SPALL WITH HEAVY EFFLORESCENCE.
33. BEAM 3, NORTH END, EAST SIDE – 1'–3" LONG x 5" WIDE x 2" DEEP SPALL.
1. 34. BEAM 3, AT PIER 2, EAST SIDE – 5" LONG x 5" WIDE x 2" DEEP SPALL AND HEAVY EFFLORESCENCE AND STALACTITES.
35. BEAM 5, MIDSPAN, EAST SIDE – 7" DIAMETER x 1" DEEP FAILED PATCH.
36. BEAM 8, SOUTH END, WEST SIDE – 1'–5" LONG x 6" WIDE x 2" DEEP SPALL WITH HEAVY EFFLORESCENCE.
37. BEAM 8, SOUTH END, WEST SIDE – FULL HEIGHT x 5" WIDE x UP TO 1" DEEP SPALL.
38. BEAM 8, NORTH END, WEST SIDE – 2'–2" LONG x WIDE x 1" DEEP SPALL.
2. 45. BEAMS 2–6 – HAIRLINE MAP CRACKS WITH EFFLORESCENCE BUILD UP AND STALACTITIES UP TO 2'–0" LONG.

Sketch 6: Beam Deficiencies - Defect List (3 of 3).

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
HOLDEN	**225**	**H-18-004**	**H18004-225-DOT-634**	**APR 16, 2026**

PHOTOS



Photo 1: **Typical underside (Span 2 shown), looking North. Note hanging monitoring devices.**



Photo 2: **Bridge from South Approach, looking North.**

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PHOTOS



Photo 3: **Bridge from North Approach, looking South.**



Photo 4: **Typical top of deck Span 1 - Reflective cracking and broken up bituminous concrete.**

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PHOTOS



Photo 5: **Typical top of deck Span 2 - Reflective cracking and broken up bituminous concrete.**



Photo 6: **Typical top of deck Span 3 - Reflective cracking and broken up bituminous concrete.**

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PHOTOS



Photo 7: **Span 1 at South Abutment - Pothole filled with water.**



Photo 8: **Beam 1 (Sidewalk Beam) - Several areas of delamination along the curbline.**

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PHOTOS



Photo 9: **DEF=S/A: Span 1 Beam 2 at midspan - Post tensioning rod pocket missing grout with heavy rust staining within the pocket.**



Photo 10: **Span 1 Beam 3, midspan, West side - Spall and cracks with efflorescence.**

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PHOTOS



Photo 11: **Span 1 Beam 8, at midspan - Longitudinal hairline cracking with active leakage, rust staining and heavy effloresence with stalactites.**



Photo 12: **Span 1, between Beams 1 and 2 - Joint material hanging down.**

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PHOTOS



Photo 13: Span 1 Beam 4 at North end - Area of moderate scaling.



Photo 14: Span 1 Beam 8, East face - Hairline map cracking with efflorescence.

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PHOTOS



Photo 15: **Span 2 Beam 1 - Negative camber relative to Beam 2 concrete curb.**



Photo 16: **DEF=S/A: Span 2 Beam 2 at North end - Post tensioning rod pocket missing grout with exposed post tensioning rod.**

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PHOTOS



Photo 17: **DEF=S/A: Span 2 Beam 2, West side - Spall with exposed/debonded strands with section loss.**



Photo 18: **DEF=S/A: Span 2 Beam 2, East side - Spall with exposed/debonded stands with section loss and hairline cracks with efflorescence.**

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PHOTOS



Photo 19: **DEF=S/A: Span 2, between Beams 2 and 3 - Vertical misalignemnt with a gap between beams.**



Photo 20: **Span 2 Beam 3, North end, West side - Spall with delamination and a boundary crack.**

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PHOTOS



Photo 21: **DEF=S/A: Span 2 Beam 3, North end, East side - Spall with severed strands and adjacent hollow area and heavy efflorescence.**



Photo 22: **Span 2 Beam 3 at Pier 2 - Crack with rust staining and efflorescence build up.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
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PHOTOS



Photo 23: **DEF=S/A: Span 2, between Beams 3 and 4 - Vertical misalignment with a gap between beams.**



Photo 24: **DEF=S/A: Span 2 Beam 4, South end, West side - Spall with exposed/ severed strands.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
HOLDEN	225	H-18-004	H18004-225-DOT-634	APR 16, 2026

PHOTOS



Photo 25: **DEF=S/A: Span 2 Beam 4, midspan, West side - Spall with exposed/ severed strands and adjacent hollow area.**



Photo 26: **DEF=S/A: Span 2 Beam 4, North end near Pier 2, West side - Spall with exposed rusted rebar and sections of exposed/severed strands.**

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PHOTOS



Photo 27: **DEF=S/A: Span 2 Beam 4, South end, East side - Spall with exposed rusted rebar and exposed/debonded/severed strands.**



Photo 28: **DEF=S/A: Span 2 Beam 4, midspan, East side - Spall with exposed rusted rebar and exposed/severed strands.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
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PHOTOS



Photo 29: **DEF=S/A: Span 2, between Beams 4 and 5 - Vertical misalignment with a gap between beams.**



Photo 30: **Span 2 Beam 4, near Pier 2 on East side - Area of delamination with adjacent spall.**

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PHOTOS



Photo 31: Span 2 Beam 7 at Pier 1 - Area of heavy efflorescence with stalactites.



Photo 32: DEF=S/A: Span 2, between Beams 7 and 8 - Vertical misalignment with a gap between beams.

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PHOTOS

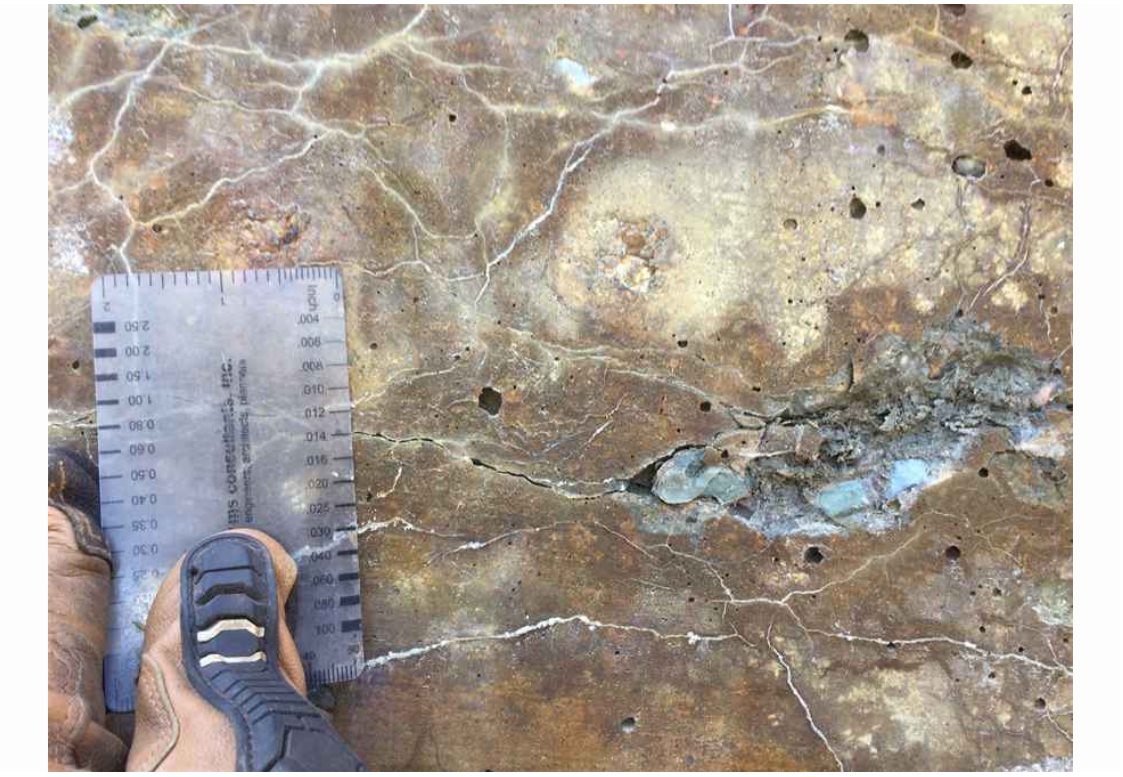


Photo 33: **Span 2 Beam 8 South end - Map cracking with efflorescence and minor spalls.**



Photo 34: **DEF=S/A: Span 2 Beam 8, North end, East corner - Missing grout with exposed post tensioning rod and spall and map cracking.**

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PHOTOS



Photo 35: DEF=S/A: Span 3 Beam 1 at the North Abutment - Section of abutment collapsed with a void exposing the back of the beam.



Photo 36: DEF=S/A: Span 3 Beam 2 at midspan - Post tensioning rod pocket missing grout and heavy rust with pigeon debris.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
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PHOTOS



Photo 37: **Span 3 Beams 2 to 6 at Pier 2 - Heavy efflorescence at the beam ends with stalactites and moisture stains and leakage.**



Photo 38: **Span 3 Beam 3 at Pier 2, East side - Spall with heavy efflorescence with stalactites.**

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PHOTOS



Photo 39: Span 3 Beam 3, midspan, East side - Spall with heavy efflorescence.



Photo 40: Span 3 Beam 5, midspan, East side - Failed patch.

State Information

BDEPT#= H18004 Agency Br.No.

Town= Holden L.O. MHD

B.I.N= 225 AASHTO= 020.1

RANK= 239 H.I.= 77.3 % FHWA Select List= Y (6/21/2017)

Identification

(8) Structure Number	H18004225DOT634
(5) Inventory Route	131000000
(2) State Highway Department District	03
(3) County Code 027 (4) Place code	30560
(6) Features Intersected	**RR PWRR**
(7) Facility Carried	**HWY SALISBURY ST**
(9) Location	400 FT SOUTH OF RTE 122-A
(11) Kilometerpoint	0004.377
(12) Base Highway Network	N
(13) LRS Inventory Route & Subroute	000000000000
(16) Latitude	42 DEG 20 MIN 32.89 SEC
(17) Longitude	71 DEG 51 MIN 06.17 SEC
(98) Border Bridge State Code	Share %
(99) Border Bridge Structure No. #	

Structure Type and Material

(43) Structure Type Main: Prestressed Concrete Code 501

Slab Jointless bridge type: Not applicable

(44) Structure Type Appr:

Other Code 000

(45) Number of spans in main unit	003
(46) Number of approach spans	0000

(107) Deck Structure Type - Concrete Precast Panels Code 2

(108) Wearing Surface / Protective System:

A) Type of wearing surface - Bituminous Code 6

B) Type of membrane - Built-up Code 1

C) Type of deck protection - Unknown Code 8

Age and Service

(27) Year Built	1907
(106) Year Reconstructed	1958

(42) Type of Service: On - Highway-Ped

Under - Railroad Code 52

(28) Lanes: On Structure 02	Under structure 00
(29) Average Daily Traffic	005658
(30) Year of ADT 2024	(109) Truck ADT 10 %
(19) Bypass, detour length	009 KM

Geometric Data

(48) Length of maximum span	0012.3 M
(49) Structure Length	00027.4 M
(50) Curb or sidewalk: Left 01.5 M	Right 00.0 M
(51) Bridge Roadway Width Curb to Curb	007.9 M
(52) Deck Width Out to Out	009.8 M
(32) Approach Roadway Width (w/shoulders)	008.2 M

(33) Bridge Median - No median Code 0

(34) Skew 28 DEG (35) Structure Flared N

(10) Inventory Route MIN Vert Clear	99.99 M
(47) Inventory Route Total Horiz Clear	09.8 M
(53) Min Vert Clear Over Bridge Rdwy	99.99 M
(54) Min Vert Underclear ref R	05.56 M
(55) Min Lat Underclear RT ref R	02.6 M
(56) Min Lat Underclear LT	06.2 M

Navigation Data

(38) Navigation Control - Not applicable, no waterway Code N

(111) Pier Protection Code

(39) Navigation Vertical Clearance	000.0 M
(116) Vert-lift Bridge Nav Min Vert Clear	M
(40) Navigation Horizontal Clearance	0000.0 M

Classification

	Code
(112) NBIS Bridge Length	Y
(104) Highway System	N
(26) Functional Class - Urban Minor Arterial	16
(100) Defense Highway	0
(101) Parallel Structure	N
(102) Direction of Traffic - 2-way traffic	2
(103) Temporary Structure	N
(105) Federal Lands Highways	0
(110) Designated National Network	N
(20) Toll - On free road	3
(21) Maintain - State Highway Agency	01
(22) Owner - State Highway Agency	01
(37) Historical Significance undetermined	

Condition

	Code
(58) Deck	3
(59) Superstructure	3
(60) Substructure	5
(61) Channel & Channel Protection	N
(62) Culverts	N

Load Rating and Posting

	Code
(31) Design Load - H 20=M 18	4
(63) Operating Rating Method - Load Factor (LF)	1
(64) Operating Rating	54.2
(65) Inventory Rating Method - Load Factor (LF)	1
(66) Inventory Rating	32.4
(70) Bridge Posting	5
(41) Structure - Open	A

Appraisal

	Code
(67) Structural Evaluation	3
(68) Deck Geometry	2
(69) Underclearances, vert. and horiz.	3
(71) Waterway adequacy	N
(72) Approach Roadway Alignment	7
(36) Traffic Safety Features	0 0 1 0
(113) Scour Critical Bridges	N

Inspections

(90) Inspection Date 01/24/25 (91) Frequency 03 MO

(92) Critical Feature Inspection: (93) CFI DATE

(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	N	00	MO B)	00/00/00
(C) Other Special Inspection	Y	03	MO C)	04/16/26
(*) Other Inspection ()	N	00	MO *)	00/00/00
(*) Closed Bridge	N	00	MO *)	00/00/00
(*) UW Special Inspection	N	00	MO *)	00/00/00
(*) Damage Inspection			MO *)	00/00/00

Rating Loads

Report Date 06/01/17	H20	Type 3	Type 3S2	Type HS
Operating	24.0	31.0	47.0	34.0
Inventory	25.0	31.0	47.0	35.0

Field Posting

Status LEGAL Posting Date 01/25/18

	2 Axle	3 Axle	5 Axle	Single
Actual				
Recommended				

Missing Signs N

Misc.

Bridge Name

N Anti-missile fence N Acrow Panel N Jointless Bridge

Freeze/Thaw N : Not Applicable

Stairs On/Adjacent 0 Stair Owner(s)

Accessibility (Needed/Used)

N / N	Liftbucket	N / N	Rigging	Y / Y	Other
N / N	Ladder	N / N	Staging	HIRAIL	
N / N	Boat	N / N	Traffic Control		
N / N	Wader	Y / Y	RR Flagperson	Inspection Hours:	085
P / N	Inspector 50	N / N	Police		

National Bridge Element Inspection

BDEPT# **H-18-004**
B.I.N. **225**
Item 8 **H18004-225-DOT-634**
Span Group **1**
Town **Holden**
District **3**

Date **04/16/2026**
District Bridge Inspection Eng'r **Mahmood Azizi**
Inspecting Agency **Jacobs Engineering Group**
Team Leader **Mike Amorando**
Team Member(s) **Jacob Videira**

El #	Element Name	Units	Env.	Total Q.	% or Q	State 1	State 2	State 3	State 4
15	**Pre Concrete Top Flange**	sq feet	2	2,790.000	☐ %	2,790.000			
Notes :									
> 510	Wearing Surfaces	sq feet	2	2,330.000	☐ %	1,930.000		400.000	
Notes :									
> > 3220	*Crack (Wearing Surface)*	sq feet	2	800.000	☐ %	400.000		400.000	
Notes :									
104	**Pre Clsd Box Girder**	feet	2	720.000	☐ %	585.000	30.000	65.000	40.000
Notes :									
> 1080	*Delamination/Spall/Patched Area*	feet	2	45.000	☐ %		20.000	20.000	5.000
Notes :	Condition State 4 rating is due to excessive spalling to the beam undersides.								
> 1100	*Exposed Prestressing*	feet	2	60.000	☐ %			25.000	35.000
Notes :	Condition State 4 rating is due to exposed and severed prestressing strand locations.								
> 1110	*Cracking (PSC)*	feet	2	30.000	☐ %		10.000	20.000	
Notes :									
213	**Masonry Pier Wall**	feet	2	190.000	☐ %			190.000	
Notes :									
> 1610	*Mortar Breakdown (Masonry)*	feet	2	190.000	☐ %			190.000	
Notes :									
215	**Re Conc Abutment**	feet	2	96.000	☐ %	90.000	3.000	3.000	
Notes :									
> 1080	*Delamination/Spall/Patched Area*	feet	2	3.000	☐ %			3.000	
Notes :									
> 1130	*Cracking (RC and Other)*	feet	2	3.000	☐ %		3.000		
Notes :									

National Bridge Element Inspection

BDEPT#	**H-18-004**	Date	**04/16/2026**
B.I.N.	**225**	District Bridge Inspection Eng'r	**Mahmood Azizi**
Item 8	**H18004-225-DOT-634**	Inspecting Agency	**Jacobs Engineering Group**
Span Group	**1**	Team Leader	**Mike Amorando**
Town	**Holden**	Team Member(s)	**Jacob Videira**
District	**3**		

El #	Element Name	Units	Env.	Total Q.	% or Q	State 1	State 2	State 3	State 4
234	**Re Conc Pier Cap**	feet	2	68.000	☐ %	33.000	10.000	25.000	
Notes :									
> 1080	*Delamination/Spall/Patched Area*	feet	2	35.000	☐ %		10.000	25.000	
Notes :									
330	**Metal Bridge Railing**	feet	2	170.000	☐ %		115.000	40.000	15.000
Notes :									
> 1000	*Corrosion*	feet	2	170.000	☐ %		115.000	40.000	15.000
Notes :	Condition State 4 rating is due to disconnected railing sections.								
> 515	Steel Protective Coating	sq feet	2	510.000	☐ %				510.000
Notes :									
> > 3440	*Eff (Stl Protect Coat)*	sq feet	2	510.000	☐ %				510.000
Notes :									

National Bridge Element Inspection

			Previous Inspection	Current Inspection
BDEPT#	**H-18-004**	Date	**04/16/2026**	
B.I.N.	**225**	Distr. Br. Insp. Eng'r	**Mahmood Azizi**	
Item 8	**H18004-225-DOT-634**	Inspecting Agency	**Jacobs Engineering Group**	
Span Group	**1**	Team Leader	**Mike Amorando**	
Town	**Holden**	Team Member(s)	**Jacob Videira**	
District	**3**			

El #	Element Name	Units	Env.	Total Q.	% or Q	State 1	State 2	State 3	State 4
15	**Pre Concrete Top Flange**	sq feet	2	2,790.000	%	2,790.000			
> 510	Wearing Surfaces	sq feet	2	2,330.000	%	1,930.000		400.000	
> > 3220	*Crack (Wearing Surface)*	sq feet	2	800.000	%	400.000		400.000	
104	**Pre Clsd Box Girder**	feet	2	720.000	%	585.000	30.000	65.000	40.000
> 1080	*Delamination/Spall/Patched Area*	feet	2	45.000	%		20.000	20.000	5.000
> 1100	*Exposed Prestressing*	feet	2	60.000	%			25.000	35.000
> 1110	*Cracking (PSC)*	feet	2	30.000	%		10.000	20.000	
213	**Masonry Pier Wall**	feet	2	190.000	%			190.000	
> 1610	*Mortar Breakdown (Masonry)*	feet	2	190.000	%			190.000	
215	**Re Conc Abutment**	feet	2	96.000	%	90.000	3.000	3.000	
> 1080	*Delamination/Spall/Patched Area*	feet	2	3.000	%			3.000	
> 1130	*Cracking (RC and Other)*	feet	2	3.000	%		3.000		
234	**Re Conc Pier Cap**	feet	2	68.000	%	33.000	10.000	25.000	

National Bridge Element Inspection

			Previous Inspection	Current Inspection
BDEPT#	**H-18-004**	Date	**04/16/2026**	
B.I.N.	**225**	Distr. Br. Insp. Eng'r	**Mahmood Azizi**	
Item 8	**H18004-225-DOT-634**	Inspecting Agency	**Jacobs Engineering Group**	
Span Group	**1**	Team Leader	**Mike Amorando**	
Town	**Holden**	Team Member(s)	**Jacob Videira**	
District	**3**			

El #	Element Name	Units	Env.	Total Q.	% or Q	State 1	State 2	State 3	State 4
> 1080	*Delamination/Spall/Patched Area*	feet	2	35.000	%		10.000	25.000	
330	**Metal Bridge Railing**	feet	2	170.000	%		115.000	40.000	15.000
> 1000	*Corrosion*	feet	2	170.000	%		115.000	40.000	15.000
> 515	Steel Protective Coating	sq feet	2	510.000	%				510.000
> > 3440	*Eff (Stl Protect Coat)*	sq feet	2	510.000	%				510.000

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DOCUMENT A00820

Massachusetts Department of Transportation
Conditions of Custody

REQUEST FOR RELEASE OF MASSDOT AUTOCAD FILES FORM
(Only to be used following award of contract)

City/Town: HOLDEN Project File Number: 612190

Contract Number: 134594

Project Description: Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad

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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 A00844

U.S. FISH AND WILDLIFE SERVICE

NLAA CONCURRENCE VERIFICATION LETTER

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 05/14/2025 18:42:54 UTC
Project code: 2025-0096842
Project Name: 612190 - HOLDEN- BRIDGE REPLACEMENT, H-18-004, SALISBURY STREET OVER G&W RAILROAD

Subject: Not Likely to Adversely Affect Concurrence verification letter for the '612190 - HOLDEN- BRIDGE REPLACEMENT, H-18-004, SALISBURY STREET OVER G&W RAILROAD' project under the December 13, 2024, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat, Northern Long-eared Bat, and Tricolored Bat.

To whom it may concern:

This letter records the determination of effects to federally listed (or proposed) bat species anticipated to result from the 612190 - HOLDEN- BRIDGE REPLACEMENT, H-18-004, SALISBURY STREET OVER G&W RAILROAD (the Project). This determination is based upon information you entered into the assisted determination key (Dkey) associated with the above referenced Programmatic Biological Opinion/Conference Opinion (PBO/PCO) in the U.S. Fish and Wildlife Service's (Service) Information for Planning and Consultation (IPaC) system on the date listed above to verify that the Project may rely on the concurrence provided in the PBO/PCO to satisfy requirements under section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (16 USC 1536), as amended.

Ensuring Accurate Determinations When Using IPaC:

The Service developed the IPaC system and this Dkey in accordance with the ESA and based on the PBO/PCO. All information submitted by the project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in the Dkey invalidates this letter. Answers to certain questions in the Dkey commit the project proponent to implementation of conservation measures that must be followed for the ESA determinations to remain valid. Carefully review this letter, your ESA requirements are <u>NOT</u> yet complete.

Determinations:

Based on the information you provided (Project Description shown below), you have determined that the Project is within the scope and adheres to the criteria of the PBO/PCO, including the adoption of applicable avoidance and minimization measures. Based on your IPaC submission and the PBO/PCO, the Project is consistent with the following effect determinations:

Species	Listing Status	Determination
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	NLAA

The tricolored bat is proposed for listing as endangered under the ESA, but not yet listed. For actions that may affect a proposed species, agencies cannot consult, but they can confer under the authority of section 7(a)(4) of the ESA. Such conferences can follow the procedures for a consultation and be adopted as such if the proposed species is listed. Should the tricolored bat be listed, agencies must review projects that are not yet complete, or projects with ongoing effects within the tricolored bat range that previously received a no effect or not likely to adversely affect (NLAA) determination from the key to confirm that the determination is still accurate.

The Service has 14 calendar days to notify the lead Federal action agency or designated non-federal representative if we determine that the Project does not meet the criteria for a NLAA determination under the PBO/PCO. **If the Service does <u>not</u> notify the lead Federal action agency or designated non-federal representative within that timeframe, you may proceed with the Project under the terms of the NLAA concurrence provided in the PBO/PCO**. This verification period allows Service Field Offices to apply local knowledge to implementation of the PBO, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, Service Field Offices may request additional information that is necessary to verify inclusion of the proposed action under the PBO/PCO.

If the Project is modified, or new information reveals that it may affect the Indiana bat, northern long-eared bat, or tricolored bat in a manner or to an extent not considered in the PBO/PCO, further review to conclude the requirements of ESA section 7(a)(2) may be required.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities:

If your initial bridge, culvert, or structure assessment failed to detect Indiana bat, northern long-eared bat, or tricolored bat use or occupancy, yet bats are later detected prior to, or during construction, promptly notify the local Service Field Office within 2 working days of the discovery. In addition, please document whether incidental take occurred, and if so, the type (i.e. kill or harm) and amount (i.e. number of individuals) and submit documentation to the local Service Field Office within 5 working days from the completion of the bridge, culvert, or structure construction (use Appendix E - Post Assessment Discovery of Bats at Bridge/Culvert or Structure Form in the User's Guide). In these instances, potential incidental take of Indiana bats, northern long-eared bats, or tricolored bats may be exempted provided that the take is reported to the Service. In these instances, potential incidental take of Indiana bats, northern long-eared bats, or tricolored bats may be exempted provided that the take is reported to the Service.

If the Project may affect any other federally listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Field Office is required for those species/designated critical habitat. If the Project has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency to contact this Service Field Office

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

612190 - HOLDEN- BRIDGE REPLACEMENT, H-18-004, SALISBURY STREET OVER G&W RAILROAD

DESCRIPTION

612190 - HOLDEN- BRIDGE REPLACEMENT, H-18-004, SALISBURY STREET OVER G&W RAILROAD

The purpose of this project is to replace the bridge carrying Salisbury Street over the Providence and Worcester Railroad. The project will also include roadway pavement overlay, new pavement markings, as well as bicycle and ADA compliant pedestrian curb ramps and sidewalks. A 10-foot shared use path tapers to a 5.5-foot-wide sidewalk at the bridge on the west side in accordance with all applicable design guides. A detour is being proposed during the summer months when school is out to replace the bridge.

Monarch Butterfly: Proposed Threatened Species only. The project action will not have an intentional take on the species and therefore will not jeopardize the continued existence of the proposed species.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.34292015,-71.85181895530663,14z



DETERMINATION KEY RESULT

Based on your answers provided, this project(s) may affect, but is not likely to adversely affect the Indiana bat, northern long-eared bat or tricolored bat, therefore, consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 et seq.) is required. However, also based on your answers provided, this project may rely on the concurrence provided in the Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024.

QUALIFICATION INTERVIEW

1. Which Federal Agency is the lead federal agency the action?

   A) Federal Highway Administration (FHWA)

2. Does the Action Area intersect the species list area of the tricolored Bat (TCB)?

   Automatically answered
   Yes

3. Does your project's activities include raising the road profile above the tree canopy in documented habitat for the Indiana bat, NLEB, or TCB?

   Note: For the definition of documented habitat, refer to Appendix A: https://www.fws.gov/media/users-guide-range-wide-programmatic-consultation-indiana-bat-and-northern-long-eared-bat

   No

4. Is your project located within a karst area?

   No

5. Will the project include bridge, culvert, or structure removal, replacement, and/or alteration activities?

   Note: For definitions of bridge, culvert, and structure, refer to Appendix A: https://www.fws.gov/media/users-guide-range-wide-programmatic-consultation-indiana-bat-and-northern-long-eared-bat.

   Yes

6. Do your project’s activities involve tree removal/trimming, temporary lighting, new/additional permanent lighting, ground disturbance, percussives that involves noise/vibration above existing background levels, vibrations, or slash pile burning?

   Yes

7. Is there suitable summer habitat for the Indiana bat, NLEB, or TCB within the project action area?

   Note: See the Service's summer survey guidance for current definitions of suitable habitat [https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html].

   Yes

8. Have P/A surveys for the Indiana bat, NLEB, or TCB been conducted within the suitable summer habitat located within your project action area? This refers to mist-netting or acoustic surveys, not bridge assessments.

   Note: See the Service's survey guidance https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html

   Yes

   SUBMITTED DOCUMENTS
   - *612190_Acoustic Report_Holden_Salisbury St_612190_Final_Compiled_reduced.pdf https://ipac.ecosphere.fws.gov/project/AZXLWXXPTZHYVG43ZTJWJCPKCA/projectDocuments/162078379*

9. Did the P/A surveys detect Indiana bats, NLEBs, or TCBs?

   Note: If Indiana bats, NLEBs, or TCBs are detected, the action area is considered **documented habitat.**

   No

10. Did the local Service Field Office verify that this P/A survey can be used to determine Indiana bat, NLEB, and TCB are **not likely to be present** within the suitable summer habitat located within your project area?

    Yes

11. Will the project include **bridge** removal, replacement, and/or alteration activities?

    Yes

12. Has a Bridge Bat Assessment been conducted **within the last 24 months** to determine if the bridge is being used by the Indiana bat, NLEB, or TCB? If yes, upload assessment.

    Note: Refer to the Service's current survey guidance for acceptable assessment practices and validity timeframe of bridge/culvert and structure bat assessments: https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

    SUBMITTED DOCUMENTS
    - *612190_Holden_Bridge_Assessment.pdf https://ipac.ecosphere.fws.gov/project/AZXLWXXPTZHYVG43ZTJWJCPKCA/projectDocuments/162078425*

13. Please select one of the following results of the Bridge Bat Assessment:

    ***c)** Indicates the **absence** of Indiana bats, NLEBs, or TCBs roosting in/under the bridge (no bats, guano, etc.)?*

14. Does the project include **culvert** removal, replacement, and/or alteration activities?

    No

15. Does the project include **structure** removal, replacement, and/or alteration activities?

    No

16. Does the Action Area intersect the species list area of the tricolored Bat (TCB)?

    Automatically answered
    Yes

PROJECT QUESTIONNAIRE

1. Have you made a No Effect determinations for all other species included on the FWS IPaC generated species list?

   Yes

2. Have you made a May Affect determination for any other species on the FWS IPaC generated list?

   No

3. Please enter the date of the bridge assessment.

   10/9/2024

AVOIDANCE AND MINIMIZATION MEASURES (AMMS)

This determination key result includes the commitment to implement the following Avoidance and Minimization Measures (AMMs):

GAMM1
Ensure all operators, employees, and contractors working in areas of Indiana bat, NLEB, or TCB suitable habitat are aware of all Transportation Agency environmental commitments, including all applicable AMMs.

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING IBAT, NLEB, OR TCB

This key was last updated in IPaC on April 29, 2025. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) and may affect the federally listed endangered Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), and/or federally proposed endangered tricolored bat (*Perimyotis subflavus*).

This decision key should only be used to verify project applicability with the Service's Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024. The programmatic consultation limited transportation activities that may affect the covered bat species and addresses situations that are both likely and not likely to adversely affect the covered bat species. This decision key will assist in identifying the effect of a specific project/activity and the applicability of the programmatic consultation. The programmatic consultation is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic consultation, or that may affect ESA-listed species other than the Indiana bat, northern long-eared bat, or tricolored bat, or their designated critical habitat, may require additional ESA Section 7 consultation.

IPAC USER CONTACT INFORMATION

Agency: Massachusetts Department of Transportation
Name: Emily Puglisi
Address: 10 Park Plaza
City: Boston
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LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

DOCUMENT A00846

BAT ACOUSTIC SURVEY

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November 2, 2023

Ref: 14394.10

Mr. Dave Paulson
Wildlife and Endangered Species Program Supervisor
Massachusetts Department of Transportation – Highway Division
Ten Park Plaza, Room 7360
Boston, MA 02116-3973
David.J.Paulson.@dot.state.ma.us
(857) 262-3378

Project	Northern Long-eared Bat (NLEB) Presence/Absence Acoustic Survey
MassDOT Project #	612190
MassDOT Project Title	Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad
Town	Holden, Massachusetts
Surveyor Name/Firm	*Kimberley Justham, Casey Bardier, Evan Deluski, Savannah McInvale, Chelsea Glinka/VHB*
Detector Operation Dates	June 20-22, 2023, July 5-7, 2023, July 25-27, 2023
Acoustic Survey Results	**NLEB NOT DETECTED**
Acoustic Survey Results	**MYLE NOT DETECTED**
Acoustic Survey Results	**MYLU NOT DETECTED**
Acoustic Survey Results	**PESU NOT DETECTED**

Dear Mr. Paulson:

This report contains the results of the Massachusetts Department of Transportation (MassDOT) northern long-eared bat (*Myotis septentrionalis*, hereafter NLEB) summer presence/absence survey performed at the proposed Bridge (H-18-004) Replacement Project (Project) on Salisbury Street over the PW Railroad (MassDOT #612190) in Holden, Massachusetts. Acoustic detectors deployed by VHB did not detect the presence of NLEB. There were no calls classified as the state endangered eastern small-footed bat (*Myotis leibeii;* MYLE), the state-endangered little brown bat (*Myotis lucifigus;* MYLU), or the state endangered tricolored bat (*Perimyotis subflavus;* PESU) and subsequent qualitative analysis did not detect any of these species.

VHB did not conduct a visual bridge assessment of Bridge H-18-004 due to the logistical challenges of gaining permission to access the railroad right-of-way from the railroad owners. VHB discussed this with MassDOT and MassDOT indicated that they would address the bridge assessment internally.

Sincerely,

VHB

Chelsea O. Glinka
Project Manager/Senior Environmental Scientist
cglinka@vhb.com

Attachments: NLEB Survey Report for Holden, 612190

US FISH AND WILDLIFE SERVICE PHASE 2 BAT ACOUSTIC SURVEY REPORT
MASSDOT PROJECT #612190

Bridge Replacement, H-18-004, Salisbury Street Over the Providence and Worcester (PW) Railroad

Holden, Massachusetts

PREPARED FOR

Massachusetts Department of Transportation
10 Park Plaza
Boston, Massachusetts 02116
857.368.4636

PREPARED BY

101 Walnut Street
P.O. Box 9151
Watertown, Massachusetts 02471
617.924.1770

NOVEMBER 2023

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1

Introduction

This report summarizes the results of the Phase 2 Presence/Probable Absence Acoustic Monitoring Surveys (acoustic surveys) targeting the northern long-eared bat (*Myotis septentrionalis* or MYSE) performed by VHB on behalf of the Massachusetts Department of Transportation (MassDOT) for the proposed replacement of Bridge H-18-004 on Salisbury Street over the Providence and Worcester (PW) Railroad in Holden, Massachusetts (MassDOT Project #612190, **Figure 1** in **Appendix A**). The MYSE is state-endangered in Massachusetts and has recently been reclassified from federally threatened to federally endangered under the Endangered Species Act (ESA; 16 U.S.C. § 1531 et seq.). The final rule to reclassify MYSE as federally endangered was published in the Federal Register on November 30, 2022, and took effect March 31, 2023 (Federal Register, Vol. 87 No. 229). This survey was performed as a due diligence effort because the Project is within the range of MYSE and contains potentially suitable bat habitat. The survey was conducted in accordance with the MYSE Phase 2 Study Plan for the Project which was approved by USFWS in June 2023. MassDOT did not require a bridge structure assessment under this Project as the PW Railroad is an active rail line and surveying the bottom of the bridge would have posed a safety concern to VHB biologists.

The acoustic surveys targeted the following Massachusetts state-endangered species in addition to MYSE: tricolored bat (*Perimyotis subflavus*; PESU), little brown bat (*Myotis lucifugus*, MYLU), and eastern small-footed bat (*Myotis leibii*, MYLE). Two of these species are under consideration for federal protections as well: on September 14, 2022, the USFWS published their proposal to list the PESU as endangered under the ESA (Federal Register, Vol. 87, No. 177) and they are conducting a discretionary review on the status of MYLU (USFWS, 2021) expected to be completed in 2023. In 2013 the USFWS issued a 12-Month Finding on a petition to list the MYLE as endangered or threatened under the ESA and determined that listing MYLE was not warranted (Federal Register, Vol. 78, No. 191).

1.1 Project Overview

The Project includes the replacement of the Salisbury Street Bridge over the PW Railroad (Bridge H-18-004) and the bridge approaches along both sides on Salisbury Road (the Project Area). According to the MassDOT ArcGIS Bridge Map, Bridge H-18-004 is pre-stressed concrete slab structure. The proposed work also includes the reconstruction of sidewalks, highway guardrails, pavement marking, loam borrow and seeding, and other

incidental work that may arise during construction. The total length of the Project is approximately 0.1 kilometer (km). However, the Project limits were extended to reach a Project length of one km in anticipation that additional MassDOT-planned work will occur in the adjacent suitable summer habitat in the near future. This approach is consistent with the MassDOT MYSE Survey Protocol for Small Projects and Bridges.

1.2 Existing Conditions

Bridge H-18-004 carries Salisbury Street over the PW Railroad in Holden, Massachusetts. The land use surrounding Bridge H-18-004 consists of mixed residential and commercial services in the northern extent of the Project Area and predominately residential properties in the southern extent of the Project Area. Mixed deciduous and evergreen forests abut Salisbury Street. Suitable summer bat habitat exists along Salisbury Street and the PW Railroad right-of-way.

2

Methods

VHB biologists with bat acoustic survey experience conducted the acoustic survey in accordance with the Phase 2 Study Plan approved by the USFWS in June 2023. The Study Plan was developed in accordance with the *USFWS 2023 Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines (*2023 *Guidelines)*.

2.1 Habitat Assessment and Site Selection

Per the USFWS *Guidelines*, sites were selected through a desktop analysis (i.e., aerial photo interpretation) during the development of the Study Plan by VHB biologists to ensure sufficient coverage of the linear Project. The survey was planned for two detector locations over two calendar nights to target the minimum survey effort of four detector nights. Due to weather events and the low number recordings during initial survey efforts, the survey effort was repeated and spanned non-consecutive calendar nights as described in Section 2.2 below. Each survey location was micro-sited in the field to ensure that suitable site conditions were present, and that optimal microphone placement was achieved. The acoustic detectors were spaced at least the recommended 200 meters apart.

The acoustic detector at Site 1 was deployed on the eastern shoulder of Salisbury Street and north of Bridge H-18-004 for two separate survey efforts. During the first survey on June 20-22, 2023 the microphone was oriented east, parallel with the PW railroad (referred to as Site 1). During the second survey effort on July 5-7, 2023 the microphone was oriented south, parallel with the tree line (referred to as Site 1R). The dominant vegetation at Site 1/1R included eastern white pine (*Pinus strobus*), northern red oak (*Quercus rubra*), black locust (*Robinia pseudoacacia*), paper birch (*Betula papyrifera*), and an assortment of grasses.

The acoustic detector at Site 2 was placed on the northern side of the driveway to the Dawson Elementary School on the west side of Salisbury Street. The microphone was oriented west, parallel to the adjacent tree line. The dominant vegetation at Site 2 included northern red oak, eastern white pine, and maintained cool season turf grasses.

2.2 Detector and Microphone Deployment and Placement

Two Pettersson D500x ultrasonic full spectrum detectors (detector) with Pettersson external, directional microphones were deployed within the Project Area (**Figure 1**) for the following dates:

- Two consecutive calendar nights from June 20-22, 2023. Data from this survey effort was only available for Site 1 due to the low volume of recordings at Site 2; night two of this survey effort did not meet survey weather criteria (see Section 2.3).
- Two consecutive calendar nights from July 5-7, 2023. Data from this survey effort was only used for Site 1 due to an equipment malfunction at Site 2. This survey is referred to as Site 1 repeat (1R).
- Two consecutive calendar nights from July 25-27, 2023 at Site 2; night one of this survey effort did not meet survey weather criteria.

The combined survey efforts resulted in six calendar nights and detector nights between the two sites, but only four nights met the required weather criteria as described in Section 2.3. Photographs of the completed survey sites and field data forms are included in **Appendix B**. A concise summary of the survey effort for this project is detailed in **Tables 1** and **2** provided in **Appendix C**.

Detector locations were micro-sited in the field to meet the USFWS survey protocols for detector and microphone placement, as described in the approved Study Plan. This includes raising the microphone to a height of at least three meters above the ground level vegetation and orienting the microphone toward potential flight corridors such as forest canopy openings, near water sources, parallel to woodland edges, or other suitable survey locations with minimal to no vegetation obstruction in front of the microphone within the detection cone (which is 100 feet in front of highly directional microphones). Due to the nature of the Project Area, it was not always possible to find a location where the cone of detection was absent of vegetation within 100 feet in front of the microphone. However, detectors were placed in vegetative clearings parallel to woodland edges in areas that were either clear of vegetation or contained minimal distant vegetation (i.e., overhanging branches) in the detection cones; these areas were determined suitable for the acoustic survey based on VHB's professional judgement and past survey experience, as applicable. When practical and within reach, any overhanging branches within the 100-foot detection cones were broken and removed to further reduce clutter. The detectors were set up at a minimum of 10 feet away from the mature forest vegetation line to the extent practical based on the site constraints. Site descriptions are included on the field data forms provided in **Appendix B**. Detector equipment function was verified prior to deployment and at retrieval with a clap and/or finger rub test at the microphone, along with verification of the detector settings and review of the event logs. Refer to **Table 1** provided in **Appendix C** for additional equipment details. Specific information for each detector by site is listed in **Table 2**, also provided in **Appendix C**.

2.3 Weather Criteria

Of the six calendar nights that were surveyed for this Project, the following four dates met the weather criteria per the USFWS Guidelines:

- June 20, 2023
- July 5, 2023
- July 6, 2023
- July 26, 2023

For the above dates, the temperatures did not fall below 50°F during the first five hours of the survey period; no precipitation (rain and/or fog) that exceeded 30 minutes continuously or continued intermittently during the first five hours of the survey period; and no sustained wind speeds greater than nine miles per hour for 30 minutes continuously during the first five hours of the survey period. Hourly weather conditions were monitored from the nearest active Weather Underground Station: KMAHOLDE26- Bailey Road.

The second calendar night of the first deployment at Site 1 (June 21, 2023) included a temperature drop below 50 degrees in the fourth hour of recording and therefore did not meet the weather criteria noted above. During the last deployment for Site 2, the first calendar night (July 25, 2023) included light rain during the first hour of recording and therefore did not meet the weather criteria noted above. The remaining four calendar nights met the weather criteria noted above and fulfilled the four-detector night minimum. Refer to **Table 1** provided in **Appendix C** for an abbreviated weather summary for each calendar night.

2.4 Call Analysis

VHB biologists trained in conducting acoustic analyses (principally Chelsea Glinka and Kim Justham resumes provided in **Appendix D**) were responsible for automated call analysis and the qualitative review of call files. Although only four nights met the weather criteria, recordings from all six survey nights were included in the analysis. Sound files were processed through SonoBat Data Wizard Version 4.4.5 to attribute metadata to each file and then calls were scrubbed with the SonoBat Data Wizard Batch File Scrubber to remove sound files that registered below 20 kilohertz (kHz). This step removes obvious non-bat files to reduce the file processing time. Full spectrum files were auto classified with Kaleidoscope Pro Version 5.4.7. Total call counts by species and the MLE ("maximum likelihood estimator" or p-values) assigned by Kaleidoscope Pro are included in **Table 3** provided in **Appendix C**. Species that have been qualitatively reviewed are also denoted in **Table 3**. The bat species abbreviations are listed in **Table 4** in **Appendix C.**

Qualitative analysis (manual vetting) was conducted by VHB (principally by Chelsea Glinka) for all calls that were auto-identified as high frequency (i.e., *Myotis* sp., PESU, and eastern red bat (*Lasiurus borealis* or LABO) regardless of MLE value) and any unknown calls which have a characteristic frequency (Fc) of 35 kHz. The suite of species evaluated in the manual vetting process includes the federally and state endangered MYSE and the state endangered MYLU, MYLE, and PESU. Select calls that were auto classified as low frequency species were also manually reviewed to confirm presence. Qualitative analysis was performed on a total of 25 calls that met the qualitative review criteria, along with low frequency species to confirm presence, as detailed in **Table 5** provided in **Appendix C.** VHB conducted qualitative analysis in full spectrum format using SonoBat Version 4.4.5

All qualitatively reviewed calls were provided to Janet Tyburec of Bat Survey Solutions for secondary qualitative review as part of the QA/QC process. Ms. Tyburec provides over 30 years of acoustic surveying experience including field deployment, teaching, and qualitative call analysis using zero cross and full spectrum files. Her resume is provided in **Appendix D**. Secondary qualitative analysis by Ms. Tyburec was performed on all calls that

were identified by the Kaleidoscope software as MYSE, UNKN, MYLU, LABO, PESU and select low frequency species calls; refer to **Table 5** provided in **Appendix C** for a summary of these results. Manually confirmed species have been incorporated into the overall call counts in **Table 3** with an asterisk (*) indicating when all or a portion of the call count was qualitatively reviewed.

Decisions on manual identification of calls are made based on a variety of call characteristics, including characteristic slope (Fs), Fc, the length of the sequence, frequency modulation, the type of call (search phase, attack phase, feeding buzz, etc.), the presence of harmonics, among other factors. References consulted during the qualitative analysis process are based on in-person workshops on manual vetting, Echolocation Call Characteristics of Eastern U.S. Bats, and the USGS Guide to Processing Bat Acoustic Data for the North American Bat Program. These sources are included in the **References** section below.

2.5 Visual Bridge Assessment

A visual bridge assessment to identify potential indicators of bat roosting was not conducted for Bridge H-18-004 due to the logistical issues of gaining access permission from the owners of the PW Railroad, Genesee & Wyoming Railroad. Bridge H-18-004 is listed as a Chapter 634 Bridge meaning that MassDOT has the right to inspect this bridge as part of routine inspection and maintenance activities, however, insurance fees to gain access to the bridge may apply. VHB discussed this matter with MassDOT and on June 6, 2023 MassDOT indicated that they would conduct the visual assessment internally.

3

Results

3.1 Acoustic Survey Results

This survey resulted in a probable absence determination for the federally endangered and state endangered MYSE, and the state endangered PESU and MYLE. Automated and qualitative analysis of calls resulted in the detection of the following species: LABO, big brown bat (*Eptesicus fuscus* or EPFU), silver-haired bat (*Lasionycteris noctivagans* or LANO), LABO, and hoary bat (*Lasiurus cinereus* or LACI). Additionally, nine calls were manually confirmed within the EFPU/LANO guild, meaning that the call characteristics could not be distinguished between these two species. The results of the data analysis efforts are detailed in **Tables 3** through **5** provided in **Appendix C.** Spectrograms of select calls are provided in **Appendix E**. The event logs for each detector night are provided in **Appendix F**.

The completed USFWS Northeast 2023 Reporting Form for Acoustic Surveys will be submitted to USFWS as an electronic Excel spreadsheet following this report submission.

4

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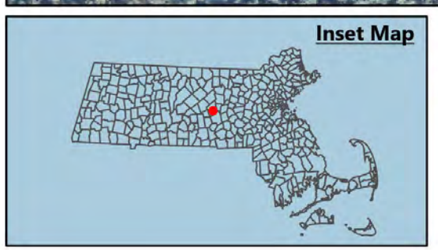
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Appendix A: Site Figure





Legend

- Project Limit of Disturbance
- Extended Project Survey Area
- Bat Acoustic Survey Location
- Microphone Orientation

Note:
Project Length: 1 KM
MassDOT Project: 612190
Detector Nights Surveyed: 4

0 200 400 Feet

Figure 1

Northern Long-eared Bat Acoustic Survey
Bridge Replacement, H-18-004, Salisbury Street Over PW Railroad
Holden, MA

November 2023

Appendix B: Field Data Forms and Site Photos

Bat Acoustic Monitoring Data Form & Photo Log

Project:	Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad (612190)			**Site#:**	1	**Site Name:**	PW Railroad
Municipality:	Holden	**County:**	Worcester	**State:**	MA	**Survey Contact:**	kjustham@vhb.com
Latitude:	42.34260301	**Longitude:**	-71.85169332	**Datum:**	WGS84		
Surveyed By:	K Justham and S McInvale			**Setup:**	06/20/2023 12:52	**Retrieval:**	06/22/2023 11:16

Land Use:	Commercial Services; Transport/Utilities; Mixed Deciduous and Evergreen; Lakes; Forested	**Mic Test**	**Setup**	Yes	**Battery Capacity (v)**	**Setup**	5	**CF Card Capacity (GB)**	**Setup**	59.82
			Retrieval	Yes		**Retrieval**	4.6		**Retrieval**	44.59

BD #	Trigger Sensitivity	Mic	Mic Orientation	HT [1]	Clutter	Gain	Trigger	Interval	Recording Start Time	Recording End Time
52505	Medium	External, High Frequency, Directional Horned	E	4.88	EDGE	45	160	0	19:58	05:41

Site Description / Additional Notes

White pine, white oak, scrub oak, black locust, tree of heaven, white birch, snag 50 feet north. Monitor east side of Salisbury Street facing auto shop and railroad right-of-way to the southeast



Site sketch

[1] *Height of microphone above ground level (in meters)*

MassDOT Project #612190
Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad
Holden, MA

Bat Acoustic Monitoring Data Form & Photo Log

Photo 1: Site 1 - PW Railroad – Cone of Detection

Date Taken:

July 5, 2023

Orientation:

E

Description:

Detector is positioned on the eastern shoulder of Salisbury Street and north of the bridge over the PW Railroad.



Photo 2: Site 1 - PW Railroad

Date Taken:

June 20, 2023

Orientation:

E

Description:

View of detector set up along the eastern shoulder of Salisbury Street showing the adjacent tree line and nearby car shop.



MassDOT Project #612190
Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad
Holden, MA

Bat Acoustic Monitoring Data Form & Photo Log

Photo 3: Site 1 - PW Railroad

Date Taken:

June 20, 2023

Orientation:

N

Description:

View of detector set up along the eastern shoulder of Salisbury Street showing the roadway, guardrail, and adjacent tree line.



Photo 4: Site 1 - PW Railroad

Date Taken:

June 20, 2023

Orientation:

S

Description:

View of detector set up along the eastern shoulder of Salisbury Street showing the roadway, bridge over the PW Railroad, and adjacent tree line.



MassDOT Project #612190
Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad
Holden, MA

Bat Acoustic Monitoring Data Form & Photo Log

Photo 5: Site 1 - PW Railroad

Date Taken:

July 5, 2023

Orientation:

SW

Description:

View of detector set up along the eastern shoulder of Salisbury Street showing the roadway, bridge over the PW Railroad, and adjacent tree line.



Bat Acoustic Monitoring Data Form & Photo Log

Project:	Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad (612190)			**Site#:**	1R	**Site Name:**	PW Railroad Repeat						
Municipality:	Holden	**County:**	Worcester	**State:**	MA	**Survey Contact:** cbardier@vhb.com							
Latitude:	42.34260387	**Longitude:**	-71.85168421		**Datum:**	WGS84							
Surveyed By:	C. Bardier, E. Deluski, C. Glinka				**Setup:** 07/05/2023 13:24			**Retrieval:** 07/07/2023 09:31					
Land Use:	Commercial Services, Transport / Utilities, Mixed Herbaceous Shrub and Brush, Mixed Deciduous and Evergreen			**Mic Test**	**Setup**	Yes	**Battery Capacity (v)**	**Setup**	5.9	**CF Card Capacity (GB)**	**Setup**	59.62	
					Retrieval	Yes		**Retrieval**	5.2		**Retrieval**	58.85	

BD #	Trigger Sensitivity	Mic	Mic Orientation	HT [1]	Clutter	Gain	Trigger	Interval	Recording Start Time	Recording End Time
52523	Medium	External / High Frequency / Directional Horned	S	4.57	EDGE	45	160	0	20:00	05:45

Site Description / Additional Notes

Detector 52523 set up on eastern shoulder of Salisbury Street, to the north of the PW railroad. Microphone is facing south along the roadside vegetation. Vegetation includes eastern white pine, northern red oak, black locust, grasses, and white birch. Microphone is set up in a small clearing of the roadside embankment, to the outside of the existing guardrail. Detector set up approximately 15 feet from edge of vegetation.



Site sketch

[1] *Height of microphone above ground level (in meters)*

MassDOT Project #612190
Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad
Holden, MA

Bat Acoustic Monitoring Data Form & Photo Log

Photo 1: Site 1R - PW Railroad Repeat

Date Taken:

July 7, 2023

Orientation:

N

Description:

View of detector set up along the eastern shoulder of Salisbury Street showing the roadway, guardrail, and adjacent tree line.



Photo 2: Site 1R - PW Railroad Repeat

Date Taken:

July 7, 2023

Orientation:

E

Description:

View of detector set up along the eastern shoulder of Salisbury Street showing the adjacent tree line and nearby car shop.



MassDOT Project #612190
Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad
Holden, MA

Bat Acoustic Monitoring Data Form & Photo Log

Photo 3: Site 1R - PW Railroad Repeat – Cone of Detection

Date Taken:

July 7, 2023

Orientation:

S

Description:

View of detector set up along the eastern shoulder of Salisbury Street showing the roadway, bridge over the PW Railroad, and adjacent tree line.



Photo 4: Site 1R - PW Railroad Repeat

Date Taken:

July 7, 2023

Orientation:

SW

Description:

View of detector set up along the eastern shoulder of Salisbury Street showing the roadway, bridge over the PW Railroad, and adjacent tree line.



Bat Acoustic Monitoring Data Form & Photo Log

Project:	Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad (612190)			**Site#:**	2	**Site Name:**	Dawson Elementary School
Municipality:	Holden	**County:**	Worcester	**State:**	MA	**Survey Contact:**	kjustham@vhb.com
Latitude:	42.33849176	**Longitude:**	-71.85050108	**Datum:**	WGS84		
Surveyed By:	K. Justham, C. Bardier			**Setup:**	07/25/2023 10:38	**Retrieval:**	07/27/2023 15:54

Land Use:	Residential, Mixed Deciduous and Evergreen, Forested	**Mic Test**	**Setup**	Yes	**Battery Capacity (v)**	**Setup**	5.1	**CF Card Capacity (GB)**	**Setup**	59.62
			Retrieval	Yes		**Retrieval**	5		**Retrieval**	59.15

BD #	Trigger Sensitivity	Mic	Mic Orientation	HT [1]	Clutter	Gain	Trigger	Interval	Recording Start Time	Recording End Time
52220	Medium	External / High Frequency / Directional Horned	W	4.88	EDGE	45	160	0	19:45	06:04

Site Description / Additional Notes

Redo of original survey due to low count. Detector 52220 set up on north side of Dawson Elementary School driveway on the west side Salisbury Street. Microphone facing west, perpendicular to the road and approximately 10 feet from the edge of vegetation. Vegetation includes northern red oak, eastern white pine, and maintained cool season turf grasses.



Site sketch

[1] *Height of microphone above ground level (in meters)*

MassDOT Project #612190
Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad
Holden, MA

Bat Acoustic Monitoring Data Form & Photo Log

Photo 1: Site 2 - Dawson Elementary School – Cone of Detection

Date Taken:

July 25, 2023

Orientation:

W

Description:

Detector is positioned on the northern shoulder of the driveway to the Dawson Elementary School along the edge of the tree line and west of Salisbury Street.



Photo 2: Site 2 - Dawson Elementary School

Date Taken:

July 25, 2023

Orientation:

W

Description:

View of detector set up along the northern shoulder of the driveway to the Dawson Elementary School and west of Salisbury Street showing the school and adjacent tree line.



MassDOT Project #612190
Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad
Holden, MA

Bat Acoustic Monitoring Data Form & Photo Log

Photo 3: Site 2 - Dawson Elementary School

Date Taken:

July 25, 2023

Orientation:

E

Description:

View of detector set up along the northern shoulder of the driveway to the Dawson Elementary School showing Salisbury Street and the adjacent tree line.



Photo 4: Site 2 - Dawson Elementary School

Date Taken:

July 25, 2023

Orientation:

S

Description:

View of detector set up along the northern shoulder of the driveway to the Dawson Elementary School showing the school and Salisbury Street (left).



MassDOT Project #612190
Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad
Holden, MA

Bat Acoustic Monitoring Data Form & Photo Log

Photo 5: Site 2 - Dawson Elementary School

Date Taken:

July 25, 2023

Orientation:

N

Description:

View of detector set up along the northern shoulder of the driveway to the Dawson Elementary School showing the adjacent tree line.



Appendix C: Data Tables

Table 1: Project and Equipment Overview

Project Name	Bridge Replacement, H-18-004, Salisbury Street Over the PW Railroad
MassDOT Project #	612190
Project Location	Holden, Worcester County, Massachusetts
Weather Summary	6/20/2023-6/21/2023: High Temp: 63.80°F, Low Temp: 55.40°F, Avg Temp: 58.19°F, Avg Wind Speed: 0.14 mph, Precipitation: No 6/21/2023-6/22/2023: High Temp: 63.20°F, Low Temp: 47.90°F*, Avg Temp: 52.60°F, Avg Wind Speed: 0.05 mph, Precipitation: No 7/5/2023-7/6/2023: High Temp: 75.70°F, Low Temp: 66.40°F, Avg Temp: 69.09°F, Avg Wind Speed: 0.00 mph, Precipitation: No 7/6/2023-7/7/2023: High Temp: 79.50°F, Low Temp: 66.90°F, Avg Temp: 71.66°F, Avg Wind Speed: 0.04 mph, Precipitation: No 7/25/2023-7/26/2023: High Temp: 66.00°F, Low Temp: 61.70°F, Avg Temp: 63.70°F, Avg Wind Speed: 0.17 mph, Precipitation: 0.02** 7/26/2023-7/27/2023: High Temp: 73.90°F, Low Temp: 67.80°F, Avg Temp: 70.22°F, Avg Wind Speed: 0.24 mph, Precipitation: 0.00 Weather Underground Station: Bailey Road (KMAHOLDE26) *Temperature dropped below 50°F during hour 4 of recording and therefore survey weather criteria were not met for this calendar **Rain occurred within first hour of recording and therefore survey weather criteria were not met for this calendar night
Principal Equipment	Pettersson D500x; D500x external, high frequency, full spectrum microphone with a directional horn and PVC tube
VHB Personnel	Chelsea Glinka, Kimberley Justham, Savannah McInvale, Evan Deluski, Casey Bardier; Refer to resumes in **Appendix D**
BSS Personnel	Janet Tyburec (provided second opinion on qualitative analysis of calls); Refer to resume in **Appendix D**.
Standard Pettersson D500x Settings	Sampling Frequency = 500 PreTrig = Off Recording Length = 5 seconds HP-Filter = Yes Auto-Record = Yes Input Gain = 45 Trigger Level = 160 Interval = 0 Trigger Sensitivity: Medium
Standard Microphone Setup	Height above ground = 4.88 meters Vertical orientation = 0 degrees; horizontal plane (assuming 0 degrees is parallel with the ground). Clap sound test performed at deployment and retrieval to determine proper functioning, along with review of event log.

Table 1: Project and Equipment Overview Cont.

Acoustic Analysis Software	**Program:** Kaleidoscope Pro 5.4.7 for automated analysis; SonoBat, V 4.4.5 for qualitative analysis
	Filters or Parameters: Files were scrubbed and attributed using SonoBat Data Wizard V 4.4.5, set to medium: accepts all but poor-quality calls; accepts some noise with tonal content, include signals from 20 kHz and above.
	Program Settings Signal detection parameters (default parameters) Minimum and Maximum Frequency Range: 8-120 kHz Minimum and Maximum Length of Detected Pulses: 2-500 ms Maximum inter-syllable gap: 500 ms Min. # of pulses for species ID = 2 Other relevant settings affecting ID = Kaleidoscope Pro set to Massachusetts species setting Suite of species included in program analysis: EPFU, LANO, LABO, LACI, MYLE, MYLU, MYSE, PESU Classifier Sensitivity: -1 More Sensitive (Liberal)

Table 2: Detector Details

Site	Detector #	Detector Night Start Dates	Latitude[1]	Longitude[1]	Start Time	End Time	Microphone Orientation	Clutter	Distance to Nearest Vegetation or Obstruction	Habitat Type[2]
1	52505	6/20/2023 6/21/2023	42.34260301	-71.85169332	19:58	5:41	E	Edge	15-20 feet	Detector set up on eastern shoulder of Salisbury Street oriented east towards the railroad and adjacent tree line.
1R	52523	7/5/2023 7/6/2023	42.34260387	-71.85168421	20:00	05:45	S	Edge	15 feet	Detector set up on eastern shoulder of Salisbury Street oriented south along the roadway and adjacent tree line.
2	52220	7/25/2023 7/26/2023	42.33849176	-71.85050108	19:45	06:04	W	Edge	10 feet	Detector set up on northern side of driveway to Dawson Elementary School and west of Salisbury Street. Microphone oriented west along adjacent tree line.

1 Sub-meter accuracy.
2 Refer to the Field Data Forms in Appendix B for more detailed site information.

Table 3: Recorded Bat Calls

Site # & Detector Night		Species Identification[1]											Total # of Significant[3] Calls	Total # of Calls
		EPFU	LABO	LACI	LANO	EPFU/ LANO	MYLE	MYLU	MYSE	PESU	MYsp	UNKN		
Site 1 6/20/2023 – 6/21/2023	**Number of Calls**	*5**	0	2	1	*1***	0	0	0	0	0	0	*6*	9
	MLE (p)[2]	0.00	-	0.28	0.94	-	-	-	-	-	-	-		
Site 1 6/21/2023 – 6/22/2023	**Number of Calls**	0	0	*1*	0	*1***	0	0	0	0	0	0	*2*	2
	MLE (p)[2]	-	-	0.01	-	-	-	-	-	-	-	-		
Site 1R 7/5/2023 – 7/6/2023	**Number of Calls**	*40*	0	*21*	15	*3***	0	0	0	0	0	1**	*64*	80
	MLE (p)[2]	0	-	0	0.71	-	-	-	-	-	-	-		
Site 1R 7/6/2023 – 7/7/2023	**Number of Calls**	*21**	*1**	*8**	5	*1***	0	0	0	0	0	0	*31*	36
	MLE (p)[2]	0	0.06	0.00	1	-	-	-	-	-	-	-		
Site 2 7/25/2023 – 7/26/2023	**Number of Calls**	*78**	0	*7**	1	*2***	0	0	0	0	0	0	*87*	88
	MLE (p)[2]	0	-	0.80	1	-	-	-	-	-	-	-		
Site 2 7/26/2023 – 7/27/2023	**Number of Calls**	*7*	0	*2**	0	*1***	0	0	0	0	0	0	*10*	10
	MLE (p)[2]	0.00	-	0.45	-	-	-	-	-	-	-	-		
												TOTAL CALLS FOR ALL SITES	**-**	**225**
												TOTAL SIGNIFICANT CALLS FOR ALL SITES[3]	***200***	**-**

1 Refer to species key in Table 4

2 MLE ("maximum likelihood estimator" or p-values) <0.05 indicate a high level of certainty assigned by the auto-classification software and suggest presence; calls with MLE values <0.05 and calls that have been manually vetted have been italicized to indicate a high level of certainty for presence.

3 Significant calls are those that either have an MLE value <0.05 and/or have been manually vetted, in accordance with Electronic Submittal of Bat Survey Data for USFWS; this does not include any calls classified as MYsp, or UNKN.

* All or a portion of the calls were qualitatively reviewed to confirm species presence.

** Note that if an MLE value is missing it's because it was classified via manual vetting and does not include a software generated MLE value

Calendar nights 6/21/2023 and 7/25/2023 did not meet the survey weather criteria.

Table 4: Bat Species Key[1]

Species Abbreviation	Scientific Name	Common Name
EPFU	*Eptesicus fuscus*	Big Brown Bat
LABO	*Lasiurus borealis*	Eastern Red Bat
LACI	*Lasiurus cinereus*	Hoary Bat
LANO	*Lasionycteris noctivagans*	Silver-haired Bat
EPFU/LANO	*Eptesicus fuscus/ Lasionycteris noctivagans*	Big Brown Bat/Silver-haired Bat Guild
MYLE	*Myotis leibii*	Eastern Small-footed Bat
MYLU	*Myotis lucifugus*	Little Brown Bat
MYSE	*Myotis septentrionalis*	Northern Long-eared Bat
PESU	*Perimyotis subflavus*	Tri-colored Bat
MYsp	*Myotis sp.*	Unknown Myotis
UNKN	*Unknown*	Assigned to calls that are too fragmented or poor quality to be classified to species

1 The Massachusetts Natural Heritage Program indicates that the Indiana bat (*Myotis sodalis*) (https://www.mass.gov/doc/indiana-bat/download) is extirpated in Massachusetts. Therefore, this species is not included in the analysis.

Table 5: Qualitative Analysis Summary

Site	Detector Night Start Date	Auto-ID by KPro 5.4.7	QA-QC ID by VHB/BSS	Comments
Site 1	6/20/2023	EPFU	EPFU	Archetypical clutter/approach/edge recording for EPFU.
Site 1	6/20/2023	EPFU	EPFU	Archetypical clutter/approach/edge recording for EPFU.
Site 1	6/20/2023	LANO	EPFU/LANO	Out of range, too much diffuse echo to confidently identify.
Site 1	6/21/2023	LACI	Noise	Non-bat noise.
Site 1	6/21/2023	LANO	EPFU/LANO	Slightly out of range and with much diffuse echo; cannot discriminate between EPFU and LANO.
Site 1	7/5/2023	EPFU	EPFU/LANO	Much diffuse echo and low-bandwidth pulses making discrimination between EPFU/LANO impossible.
Site 1	7/5/2023	LACI	Unknown Low Frequency	Much diffuse echo and low-bandwidth pulses making discrimination between EPFU/LANO /LACI impossible.
Site 1	7/5/2023	LANO	EPFU/LANO	Much diffuse echo and low-bandwidth pules making discrimination between EPFU/LANO impossible.
Site 1	7/5/2023	LANO	EPFU/LANO	Much diffuse echo and low-bandwidth pulses making discrimination between EPFU/LANO impossible.
Site 1	7/6/2023	EPFU	EPFU	Despite diffuse echo, pulse shape and bandwidth consistent with archetypical EPFU.
Site 1	7/6/2023	LACI	LANO	Much diffuse echo and low-bandwidth pulses making discrimination between EPFU/LANO impossible.
Site 1	7/6/2023	LACI	LACI	Despite diffuse echo, pulse shape and bandwidth consistent with what is known for LACI.
Site 1	7/6/2023	LABO	LABO	Despite diffuse echo, pulse shape and bandwidth consistent with what is known for LABO.
Site 2	7/25/2023	EPFU	EPFU	Despite diffuse echo, call bandwidth, shape, and Fc[1] consistent with EPFU.
Site 2	7/25/2023	EPFU	EPFU	Despite diffuse echo, call bandwidth, shape, and Fc[1] consistent with EPFU.
Site 2	7/25/2023	LANO	EPFU	Despite diffuse echo, call bandwidth, shape, and Fc[1] consistent with EPFU.

Site	Detector Night Start Date	Auto-ID by KPro 5.4.7	QA-QC ID by VHB/BSS	Comments
Site 2	7/25/2023	LANO	EPFU	Despite diffuse echo, call bandwidth, shape, and Fc[1] consistent with EPFU.
Site 2	7/25/2023	LANO	EPFU/LANO	Much diffuse echo and low-bandwidth pulses making disambiguation between EPFU/LANO impossible.
Site 2	7/25/2023	LACI	EPFU/LANO	Much diffuse echo and low-bandwidth pulses making disambiguation between EPFU/LANO impossible.
Site 2	7/25/2023	LACI	LACI	Despite diffuse echo, call bandwidth, shape, and Fc[1] consistent with LACI.
Site 2	7/25/2023	LACI	LACI	Despite diffuse echo, call bandwidth, shape, and Fc[1] consistent with LACI.
Site 2	7/25/2023	LACI	LACI	Despite diffuse echo, call bandwidth, shape, and Fc[1] consistent with LACI.
Site 2	7/25/2023	LACI	LACI	Despite diffuse echo, call bandwidth, shape, and Fc[1] consistent with LACI.
Site 2	7/26/2023	EPFU	EPFU/LANO	Much diffuse echo and low-bandwidth pulses making disambiguation between EPFU/LANO impossible.
Site 2	7/26/2023	LACI	LACI	Despite diffuse echo, call bandwidth, shape, and Fc[1] consistent with LACI.

[1] Fc = characteristic frequency; the frequency of a call pulse at its flattest point, where the slope is closest to horizontal; this is usually at the terminal end of a bat call pulse, except in cases where lower intensity, toes are present; many bats put the most power, or intensity (i.e., volume) at or near the characteristic frequency.

Appendix D: Resumes of Qualified Individuals

Chelsea Glinka

Senior Environmental Scientist



Chelsea Glinka is a Senior Environmental Scientist in VHB's Providence, Rhode Island office. Her experience includes assessing permitting needs and developing environmental permit applications for small and large-scale projects within the private and public sectors. She supports project by leading rare, threatened, and endangered species surveys and facilitating Section 7 consultations under the Endangered Species Act through U.S. Fish and Wildlife Service and NOAA Fisheries.

13 years of professional experience

Education

MS, Natural Resources, University of Connecticut, 2013

BS, Environmental Sciences, University of Rhode Island, 2010

Ct, Bat Acoustic Qualitative Analysis Training (Titley Scientific), 2020

Ct, Acoustic Survey Methods (Bat Survey Solutions) 2021

Presentations

Co-Panelist; Meghan Lout (VTrans), Timothy Dexter (MassDOT), David Paulson (MassDOT); "Transportation Panel Discussion about Bat Surveys" Northeast Bat Working Group Conference; Burlington, VT; Jan. 2023

MassDOT Environmental Services Master Services Agreement

Chelsea Glinka is the Project Manager for bat survey efforts conducted on behalf of the Massachusetts Department of Transportation (MassDOT). Since 2015, Chelsea has conducted passive acoustic surveys targeting the northern long-eared bat (*Myotis septentrionalis;* MYSE) for MassDOT. Her responsibilities include assessing survey effort in accordance with the most recently issued survey guidelines by the U.S. Fish and Wildlife Service (USFWS), developing Phase II Acoustic Study Plan for review and approval by USFWS, conducting acoustic surveys and visual bridge assessments and training VHB staff in survey techniques and equipment operation, acoustic analysis using auto-classification software and manual vetting of high frequency calls, report review and finalization and completion of the USFWS Northeastern US Bat Reporting Spreadsheet for Acoustic Surveys. Chelsea also prepares files for submission to the North American Bat Monitoring Project (NABat) on behalf of MassDOT. Chelsea recently worked with MassDOT to provide a Project Review Package under the Section 7 consultation process for a project location where NLEB presence was detected via acoustic surveys. The package included the description of the action area, potential impacts to MYSE, and proposed conservation measures to mitigate and minimize Project impacts to MYSE. The USFWS issued their concurrence for a determination of "may affect, not likely to adversely affect".

RIDOT Master Price Agreement Visual Bridge Assessments for Bat Presence

Chelsea managed the visual bridge assessment effort of 34 bridges throughout Rhode Island for evidence of bat roosting. The inspections were performed during the active bat season in 2022. VHB confirmed probable absence of roosting bats at most bridge locations slated for the 2023 construction season and detected potential presence of roosting bats based on guano and staining. Chelsea coordinated with RIDOT environmental staff, project management, and RIDOT Construction Supervisors for the design and implementation of traffic control set ups for bridge inspections occurring on Interstate 95 and other high-traffic volume roadways; performed work site hazard assessments and safety tailboard meetings; prepared inspection reports using the USFWS reporting form and consulted with USFWS Endangered Species Biologists at the New England Field Office.

CTDOT Environmental Services Task Orders

Chelsea conducted an acoustic bat survey along the proposed linear route of the I-95 Interchange 74 Improvements at Route 161 and Replacement of Bridge No. 250 in East

Lyme Connecticut in 2022. The survey effort included the development of a Phase II Acoustic Study Plan with proposed survey locations for submission to USFWS, conducting the acoustic survey at five survey locations within the Project limits to target a range of potentially suitable summer habitat, training VHB staff in survey techniques, acoustic analysis, and report development.

NHDOT, Exit 4A Interstate 93 Interchange & Keene-Swanzey Floodplain Compensatory Storage

Chelsea led the acoustic bat survey effort for two NHDOT projects targeting the NLEB in 2021 and 2022. Survey tasks included development and review of the Phase II Acoustic Study Plan, conducting the survey in accordance with USFWS survey guidelines, acoustic analysis, and report development. Chelsea trained VHB team members in survey techniques and worked closely with the client to ensure that all reporting requirements were met for these surveys.

Confidential Solar Project, VT

Chelsea assisted in the natural resource assessment in support of a 20 MW solar development in central Vermont by leading the acoustic bat survey effort to detect the probable absence or presence of Indiana bat (*Myotis sodalis*) and MYSE. Chelsea assisted in the development of the Phase II Acoustic Study Plan and coordinated with Vermont Fish and Wildlife Department for plan approval. Chelsea conducted the acoustic survey and trained VHB staff in survey techniques and performed acoustic analysis and determined the presence of six species. The findings of this work will be incorporated into project reporting, permitting, and design to ensure compliance with state and federal regulations.

NJDMAVA, NABat Acoustic Survey Reporting, RI

Chelsea is the Project Manager of an acoustic data management project with the New Jersey Department of Military and Veterans Affairs (NJDMAVA). Chelsea is leading efforts to analyze acoustic bat data collected during surveys at various NJDMAVA facilities from 2009 through 2021 and standardize the metadata and call files for upload to the North American Bat Monitoring Program (NABat). The Project has compiled and formatted the metadata to NABat standards for survey efforts dating back to 2009 and analyzed files via auto-classification software approved by USFWS. VHB has also collaborated with NABat to develop a methodology to manually vet a subset of data from each survey due to the large volume of data. VHB is working with a subconsultant to complete the manual vetting and verify the presence or probable absence of bat species recorded during the survey efforts. VHB has also consolidated NABat protocols and tailored them to the specificities of the NJDAMVA datasets to develop a standard operating procedure that can be used for future data analysis and upload efforts. This project will consolidate several years of bat survey data and make it more readily usable as a reference source by the New Jersey Army National Guard when new activities must consider potential impacts on state and federally-listed bat species.

Kimberley M. Justham

Ecologist



Kimberley is an Ecologist in the Environmental Permitting and Natural Sciences Group in VHB's Worcester, Massachusetts, office. Her background includes environmental compliance monitoring, wetland delineation and restoration oversight, federally and state-listed rare species surveys and monitoring (bats, turtles, birds, plants), invasive species management, and habitat restoration.

16 years of professional experience

Education

MS, Environmental Science, University of Rhode Island, 2016

BS, Conservation Biology, University of Rhode Island, 2005

MassDOT Acoustic Bat Surveys and Visual Bridge Surveys, Massachusetts

Kim has led the VHB field team conducting northern long-eared bat acoustic surveys and visual bridge assessments over multiple locations in a variety of habitat types for the Massachusetts Department of Transportation (MassDOT). Her responsibilities have included assisting with the development of Phase II Acoustic Study Plans for review and approval by USFWS, conducting habitat assessments, acoustic surveys and visual bridge assessments, training VHB staff in these survey techniques and equipment operation, acoustic analysis using auto-classification software, compiling and reviewing year-end reporting, and completion of the USFWS Northeastern US Bat Reporting Spreadsheet for Acoustic Surveys. Kim also prepares files for submission to the North American Bat Monitoring Project (NABat) on behalf of MassDOT.

Interstate 93 Exit 4A Interchange Project Bat Acoustic Monitoring – Londonderry and Derry, NH (2021)

As a consultant for the NHDOT, Kim assisted with the field work for the Phase 2 Presence/Probable Absence Acoustic Monitoring Surveys targeting the northern long-eared bat (*Myotis septentrionalis* or NLEB) and other NH state-listed bat species in accordance with the procedures and standards outlined in the United States Fish and Wildlife Service (USFWS) *Range-Wide Indiana Bat Survey Guidelines* (dated March 2020) and USFWS-approved Study Plan for the project.

New Jersey Department of Military and Veterans Affairs, North American Bat Monitoring Program Acoustic Survey Results Reporting, NJ

VHB provided acoustic call and metadata processing and file upload services to NJDMAVA. Kim assisted in creating a process to extract, organize, process, and post over ten years' of bat monitoring data to the North American Bat Monitoring Program data clearinghouse site. Her responsibilities have included extraction of data from acoustic survey and mistnet survey reports, compilation of metadata for bulk upload processing in NABat, and processing bat call files for AutoID using SonoBat and Kaleidoscope Pro. Kim has compiled the metadata documents into the NABat bulk metadata template and uploaded the processed metadata and ZC (call) files to the NABat website.

CTDOT Environmental Services Task Orders

VHB conducted an acoustic bat survey along the proposed linear route of the the I-95 Interchange 74 Improvements at Route 161 and Replacement of Bridge No. 250 in East Lyme Connecticut in 2022. The survey effort included the development of a Phase II Acoustic Study Plan with proposed survey locations for submission to USFWS, conducting the acoustic survey at five survey locations within the Project limits to target a range of potentially suitable summer habitat, training VHB staff in survey techniques, acoustic analysis, and report development. Kim assisted in the preparation of the final report submitted to USFWS.

MA Division of Fisheries and Wildlife, Westborough, MA

Prior to joining VHB, Kim was a Conservation Biologist for the Natural Heritage and Endangered Species Program. She wrote habitat management plans and secured wetland permits for rare plant species habitat restoration projects and monitored several federally listed plant species annually. Kim designed sampling protocols and conducted and supervised vegetation sampling, data entry and data clean-up for a sandplain grassland restoration monitoring project and led a large-scale, multi-year habitat restoration project on a remote, 75-acre island in Buzzards Bay. Restoration activities included a prescribed burn of the entire island, herbicide applications to control for invasive and woody plants, and site prep and seeding with locally sourced warm season grasses. She interpreted aerial photographs, topographic maps, and site plans to accurately map rare species observations. Kim used ArcGIS Desktop to delineate regulated and non-regulated habitat areas for state and federally listed bats, mammals, and vernal pool invertebrates. She worked with the database team to input, manage, and distribute rare species data. She conducted control of invasive and aggressive vegetation through application of herbicides and mechanical removal. Kim monitored and mapped Natural Communities over 4 years; managed habitat for terns and censused and banded terns over 8 years; conducted avian monitoring, including nightjar, marsh bird, and shorebird surveys over 5 years; and conducted salamander surveys and trapping, mussel surveys, and vernal pool surveys over 4 years. She also conducted active searches by foot, nesting surveys, trapping surveys and radio-telemetry surveys of MESA-listed turtle species, including the federally listed bog turtle over 5 years.

RI Department of Environmental Management, Providence, RI

Prior to joining VHB, Kim was an Environmental Scientist on the Wetlands Enforcement team where she performed DEM Wetland Permit and RIPDES compliance inspections, identified wetland violations, supervised the installation and maintenance of ESC measures, and supervised wetland restorations. ACOE methodology included identification of wetland plant communities, hydric soils, and other hydrologic indicators. Kim interpreted aerial photographs, topographic maps, and site plans to help determine the extent of wetlands violations and areas to be restored. She coordinated with Rhode Island state and town officials, farmers, landowners, contractors, and consultants to resolve wetland violations. She supervised restorations and served as the point of contact for landowners throughout the inspection and restoration process.

Savannah McInvale

Environmental Scientist

Savannah is an Environmental Scientist in VHB's Providence, Rhode Island office. Her experience includes environmental compliance monitoring, wetland delineation and restoration oversight, vernal pool surveys, federally and state-listed rare species surveys and monitoring (bats, turtles, birds, plants) and habitat restoration.

Education

MS, Conservation Biology
Antioch University, 2020

BS, Animal Science, University of Vermont, 2011

Ct, Acoustic Survey Methods (Bat Survey Solutions) 2021

9 years of professional experience

MassDOT Acoustic Bat Surveys and Visual Bridge Surveys, Massachusetts

Savannah is a part of the VHB field team conducting northern long-eared bat acoustic surveys and visual bridge assessments over multiple locations in a variety of habitat types for the Massachusetts Department of Transportation (MassDOT). Her responsibilities have included acoustic surveys and visual bridge assessments, acoustic analysis using auto-classification software, and compiling and reviewing year-end reporting.

CTDOT Route 7/15 Interchange Improvement Project, Norwalk, Connecticut

Savannah assisted and led the field work for the Acoustic Monitoring Surveys targeting the northern long-eared bat (*Myotis septentrionalis* or NLEB) and other CT state-listed bat species in accordance with the procedures and standards outlined in the United States Fish and Wildlife Service (USFWS) *Range-Wide Indiana Bat Survey Guidelines* (dated March 2020) and USFWS-approved Study Plan for the project.

Gravel Pit Solar Project: American Kestrel Monitoring and Implementation of the Migratory Bird Treaty Act, East Windsor, CT

Savannah leads the American Kestrel (*Falco sparverius*) nest monitoring program in support of a 120 MW solar development on several parcels in East Windsor, CT. Savannah helped develop a weekly monitoring plan that is implemented during the active American Kestrel nesting season. Throughout the season, Savannah provides expertise and insight on the movements and activities of state and federally listed avian species within the Project Area. At the culmination of the nesting season, Savannah compiles an annual report on the success and failures of listed species at the Project Site.

CT Solar Projects: Breeding Bird and Vernal Pool Surveys

Savannah assists with the planning and implantation of Breeding Bird and Vernal Pool surveys at multiple solar project sites in Connecticut. During the early spring, Savannah assists in identifying potential vernal pools and utilizing the definition and guidelines for vernal pool surveys provided by Klemens and Calhoun 2022[1], to confirm vernal

[1] Calhoun, A. J. K. and M. W. Klemens. 2002. Best development practices: Conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States. MCA Technical Paper No. 5, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, New York.

pool resource areas. Between late April and early June, Savannah leads breeding bird surveys at potential solar project parcels to identify the presence or absence of state and federally listed avian species. At the culmination of the vernal pool breeding and avian migration periods, Savannah assists in compilation of reports on the findings.

Conservation Field Inspector: Town of North Andover, Massachusetts

Prior to joining VHB, Savannah was a Conservation Field Inspector for the Town of North Andover, Massachusetts. She conducted environmental reviews for building projects near wetlands, including wetland delineations, site surveys, vegetation surveys, and endangered species habitat assessments. Savannah enforced regulations imposed by the MA Wetlands Protection Act and the Town of North Andover Conservation by-laws and assisted in running Conservation Commission meetings. She used GIS and mapping resources to help establish management restoration projects related to the North Region gas pipe explosions in 2018.

Conservation Biologist II: Department of Conservation and Recreation

Prior to joining VHB, Savannah was a Conservation Biologist II for the Department of Conservation and Recreation in Massachusetts. Savannah's responsibilities included coordinating schedules and creating training materials for the crew of three Conservation Biologists. She also created and implemented educational activities for schools, the general public and for state department staff. Her primary duties included monitoring endangered shorebird species of Massachusetts, including Piping Plovers (*Charadrius melodus*) and Least Tern (*Sternula antillarum*). She conducted and reviewed biological data on the population trends and impacts of various environmental factors and compiled end of the season reports, including Habitat Conservation Plan, and submitted them to Massachusetts Wildlife Coastal Waterbird Division.

Casey Bardier

Environmental Scientist



Education

BS, Fisheries, Wildlife & Conservation Biology, North Carolina State University, 2021

Casey is an Environmental Scientist in the Environmental Permitting and Natural Sciences Group in VHB's Watertown, Massachusetts, office. Her background includes federally and state-listed rare species surveys and monitoring (bats, turtles, birds, plants), environmental compliance monitoring, wetland delineation, and environmental permitting.

2 years of professional experience

MassDOT Acoustic Bat Surveys and Visual Bridge Surveys, MA

Casey has assisted the VHB team conducting northern long-eared bat acoustic surveys and visual bridge assessments over multiple locations in a variety of habitat types for the Massachusetts Department of Transportation (MassDOT). Her responsibilities have included acoustic surveys and visual bridge assessments, data compilation for reporting, and assisting with compilation of year-end reporting.

Confidential Client, Biological Inventories, Southeastern, US

VHB was contracted by a private land holding company to conduct natural resource inventories and prepare detailed reports for a total of 53 properties throughout the southeastern United States. As a Natural Resource Investigator, Casey conducted seasonal amphibian, reptile, and bird surveys on site, processed all collected data, and assisted with the production of the natural resources inventory reports for all of the projects.

NCDOT Endangered Species Surveys, NC

VHB was contracted by the North Carolina Department of Transportation (NCDOT) to conduct a variety of endangered species surveys throughout the state of North Carolina. Casey assisted with multiple plant (Schweinitz's sunflower, dwarf-flower heartleaf, and Michaux's sumac) and visual bat assessments in bridges and culverts. Her responsibilities included conducting surveys in the field, reporting the presence or absence of species of interest, and coordinating with state officials for reporting.

National Development, The District Burlington Modified Master Plan, Burlington, MA

In her role as an Environmental Scientist, Casey helped the environmental permitting for a redevelopment project to create two new life science/laboratory buildings, a new parking garage, and utility and stormwater management improvements for National Development. She contributed to the preparation and submittal of the Notice of Intent (NOI) and an additional amendment for submittal to the Burlington Conservation Commission and the Massachusetts Department of Environmental Protection.

National Grid, Footer Inspection Delineation, Southern NH & Northern MA
In her role as an Environmental Scientist, Casey assisted with the delineation of an extensive study area covering hundreds of acres in contract with Southfield Redevelopment Authority. In addition to her field work duties, she also helped with the field data processing and submittals of Abbreviated Notices of Resource Area Delineations (ANRADs) for the four towns in which the project lies.

Eversource, Kingston Reliability Project, Carver/Plympton/Kingston, MA
In her role as an Environmental Scientist, Casey conducted Stormwater Pollution Prevention Plan (SWPPP) inspections, generated the weekly reports, and coordinated with the client team. Additionally, Casey also assisted with telemetry surveys of a large population of over 40 eastern box turtles located in areas of priority habitat as established by the MassWildlife's Natural Heritage and Endangered Species Program (NHESP) within the limits of the 8-mile long project area.

North Carolina State University, Raleigh, NC
Prior to joining VHB, Casey was an Aquatic Plant Management Technician for the North Carolina State University Extension Office. Within her role, she worked alongside laboratory staff and graduate students to establish and maintain numerous research projects involving the management of invasive aquatic plants in reservoirs, lakes, and rivers across the state of North Carolina. The research projects involved the effects of herbicide treatments in controlled greenhouse and field trials. She also contributed to the revegetation of native aquatic plants in various lakes across the state in partnership with the North Carolina Wildlife Resources Commission.

North Carolina Wildlife Resources Commission, Raleigh, NC
Prior to joining VHB, Casey was an intern with the North Carolian Wildlife Resources Commission working on the Box Turtle Connection Project. As part of her duties, Casey conducted mark-recapture surveys of Eastern Box Turtles over a 105-acre study area. She also operated radio telemetry equipment to track a population of turtles, their movements, and perform weekly health assessments.

JANET DEBELAK TYBUREC

PROFESSIONAL PROFILE

Experienced author, educator, photographer, presenter, and wildlife biologist specializing in environmental and nature studies, especially addressing bat conservation and research. Works in various settings: lecture halls, classrooms, and outdoor field locations. Professional development, coordination, and management of multi-day trainings, workshops, and field surveys. Since 1992 has organized, conducted, and instructed at over 175 workshop venues, personally training over 2,500 students on research skills, including bat capture, handling, identification, and echolocation call recording and analysis. Has been the primary investigator on projects for studying and managing bat populations and conducting field research across North America.

RELEVANT EXPERIENCE

Author, Educator, Photographer, Wildlife Biologist (September 2012 to present)

Bat Survey Solutions, LLC owned by Janet Tyburec Consulting, Tucson AZ

Duties: Provide training and instruction on bat research, inventory, and monitoring, including physical capture techniques, radio-tracking, and acoustic surveys for private, federal and state agencies, including the USDA Forest Service, USDI Bureau of Land Management, National Park Service, Fish and Wildlife Service, and the Department of Defense and Army Corps of Engineers. Perform professional bat surveys for agency directors, staff, wildlife biologists, resource managers, seasonal employees, and volunteers.

Contract Instructor (September 2002 to September 2012)

Bat Conservation International (BCI), Austin TX

Job Duties: Design and teach summer field workshops for BCI and its partner agencies and organizations about bat research and conservation, advanced capture techniques, acoustic monitoring, *Myotis sodalis* survey techniques, and inventory and management techniques; using field study techniques including mist netting, harp trapping, acoustic monitoring equipment and software; radio-tracking, banding, light-tagging, species identification, habitat assessment and management, status determination, and data management tools.

Director of Education Programs (June 1996-September 2002); Assistant Dir. (September 1989-June 1996)

Bat Conservation International (BCI), Austin TX

Administrative Duties: Prepare annual departmental budget for three program activities; contribute to semi-annual departmental reports and provide organizational and donor annual reports.

Job Duties: Organize, schedule, promote, and instruct at BCI's educational workshops. Develop and edit educational materials, posters, books, audio/visual programs.

EDUCATION

Trinity University, San Antonio TX. May 1989

B.A., Biology and English: Undergraduate Science Studies: Botany, Plant Physiology, Vertebrate Zoology, Ecology, Oceanography, Genetics, General Biology, Chemistry, Physics, Statistics
Undergraduate English Studies: Elizabethan Playwrights, Complete Works of Shakespeare, American Novelists, Complete Works of Faulkner, Language Arts, Magazine Writing

University of Colorado, Boulder CO. August 1988

Course work in Comparative Ecology of Alpine and Desert Ecosystems

Pima Community College, Tucson AZ. August 1984 - May 1985

Course work in Creative Writing

Janet Debelak Tyburec, 1832 N. Whispering Bells Dr., Tucson AZ 95745 **T:** 520.404.7406 **E:** *jtyburec@mac.com*

JANET DEBELAK TYBUREC

SELECT PUBLICATIONS

Tyburec, J.D. 1998. Memoirs from bat camp. *BATS* 16(3): 8-9.
Tyburec, J.D. 1998. (Ed.) *Discover Bats*! Bat Conservation International, Austin. 228 pages.
Tyburec, J.D. 1999. Vacation bat watching in the tropics. *BATS* 17(4): 10-13.
Tyburec, J.D 2003. "A Gallery of Workshop Wildlife" (photo essay) *BATS* 21(3): 10.
Tyburec, J.D., C. Weise, A. McIntire, and S. Richardson. 2011. Bat Conservation: Priorities and Initiatives in the Sonoran Desert Region. *Sonorensis* 31 (1): 20-25.
Tyburec, J.D. 2014. "Bats." In: *Cave Creek Canyon: Revealing the Heart of Arizona's Chiricahua Mountains*. ECO Wear & Publishing, Rodeo NM 274 pages.
Tyburec, J.D. 2015 (2nd Ed.). "Bats." In: *A Natural History of the Sonoran Desert*. S.J. Phillips and P.W. Comus (Eds.) University of California Press, Berkeley. Pages 401-410.
Robbins, L.W., J.D. Tyburec, J.C. Timpone, and V. Brack, Jr. 2021. *Bats of Oklahoma*, Center for Bat Research, Outreach, and Conservation, Indiana State University, Terre Haute. 100 pages.

SELECT PRESENTATIONS

Tyburec, J.D. 2012. *Acoustic Monitoring: A Silver-bullet or a Sticky-wicket?* Presentation at the Northeast Bat Working Group Meeting, Carlisle PA, January 2012.
Tyburec, J.D. 2012. *Harp trap effectiveness for the Capture of* Myotis leibii*, small-footed myotis*. Presentation at the Northeast Bat Working Group Meeting, Carlisle PA, January 2012
Tyburec, J.D. and J.D. Chenger. 2013. *Using Auto-classifiers for Acoustic Surveys: Do Results Reflect Reality?* Presentation at the Northeast Bat Working Group Meeting, Albany NY, January 2013.
Tyburec, J.D. and J.D. Chenger. 2013. *Auto-classifiers for Acoustic Surveys: A Bat in the Hand is Worth how Many Detectors in the Bush?* Presentation at the Southeast Bat Diversity Network Meeting, Pikeville TN. February 2013.
Chenger, J.D. and J.D. Tyburec. 2014. Comparing bat detector deployments at different heights, in different orientations, and using different microphone types. Presentation (poster) at the Southeast Bat Diversity Network Meeting, Nacogdoches TX. February 2014.
Tyburec, J.D., J.D Chenger and J.M. Szewczak. 2014. Comparing four acoustic analysis software packages and the accuracies of their auto-classification results for determining bat occupancy in a habitat. Presentation at the Southeast Bat Diversity Network Meeting, Nacogdoches TX. February 2014.
Tyburec, J.D., and J.D. Chenger. 2019. Improving Bat Survey Efficiency and Probable Presence Results by Combining Physical Capture and Acoustic Recording Methods. Oral presentation at the American Fisheries Society and The Wildlife Society's 2019 Join Conference in Reno NV. October 2019.
Tyburec, J.D., and J.D. Chenger. 2021. Stationary Point (Passive) Acoustic Surveys for Bats: Using Auto-classification Software Results to Infer Relative Bat Activity - The Problem of Multiple Bat Passes in a Recording. Oral presentation at the Northeast Bat Working Group 2021 Virtual Meeting, 10-11 March.

SELECT BAT-SURVEY & ACOUSTIC-MONITORING PROJECTS

2009 - Acoustic Identification Summary for 2005-2008 Bat Surveys conducted by the ***USDA-Forest Service, Region 1*** (Idaho/Montana), involving reviewing, vetting and reporting results for over 6,500 full-spectrum echolocation recordings.
2009 - Acoustic Identification Summary for a 2009 Bat Survey conducted by ***Sanders Environmental***, involving reviewing, vetting and reporting results for over 33,000 full-spectrum echolocation call recordings from the Northeastern U.S. to identify federally listed T&E species and state-sensitive species.

Janet Tyburec Consulting, Post Office Box 86493, Tucson AZ 95754 **T:** 520.404.7406 **E:** *jtyburec@mac.com*

2010 - Acoustic Identification Summary for a 2010 Bat Survey conducted by ***Sanders Environmental***, involving reviewing, vetting and reporting results for over 380,000 full-spectrum echolocation call recordings from the Northeastern U.S.

2011 - Acoustic Analysis provided for a 2011 Bat Survey conducted by ***Sanders Environmental***, involving reviewing, vetting and reporting results from over 60,000 full-spectrum echolocation call recordings from the Northeastern U.S. using SonoBat software.

2012 - Capture and Acoustic Field Survey for the ***US Army Corps of Engineers*** (Illinois/Missouri), involving site selection for capture and concurrent acoustic surveys designed to assess management needs for T&E bats, data collection, and reviewing, vetting and reporting results from over 120 bats captured and 12,000 full-spectrum echolocation call recordings collected, with 100% manual vetting of the acoustic files.

2014 - Acoustic Field survey for ***URS Corporation*** to assess *Myotis leibii* habitat along a proposed Pennsylvania Power and Light, right-of-way development in the Pocono Mountains (Wilkes-Barre PA), deploying over 190 bat-detectors, collecting and analyzing over 90,000 recordings from nearly 6,000 hours of full-spectrum monitoring, with 100% of the acoustic files manually vetted.

2016 - Acoustic Analysis of nearly 600 full-spectrum echolocation call recordings from 17 passive monitoring deployments and 2 mobile transects for the ***Environmental Research Group, LLC*** of Bainbridge GA. The analysis included auto-classification outputs from SonoBat4 (NE) and KaliedoscopePRO with manual vetting of both results to document 6 eastern U.S. bat species according to current USF&WS Indiana Bat Summer Survey Guidelines.

2016 - Manual Vetting to provide a second opinion on nearly 1,000 full-spectrum echolocation call recordings, representing nearly 1,200 distinct bat passes, from select locations monitoring from the years of 2011 thru 2016 for the ***U.S. Fish and Wildlife Service, Sheldon-Hart Mountain National Wildlife Refuge Complex***, in Lakeview OR. Analysis included auto-classification outputs from SonoBat4 (NW) with manual vetting to confirm the presence of 13 bat species, including 5 northwestern *Myotis* species.

2016 - Capture and Acoustic Survey, Morphological Identification, Manual Acoustic Vetting, and Acoustic Survey Report Comparing and Summarizing a 2-week Survey Effort in each of 3 locations: in Southeastern Arizona, Northern California and Western Kentucky, which together comprised over 1,000 capture records, 20,000 acoustic recordings, and documented 12 - 20 bat species per location. (100% of the acoustic files were manually vetted with results presented in Tyburec et al. Poster Presentation at the 2016 North American Symposium on Bat Research in San Antonio TX.)

2017 - Capture and Acoustic Field Survey for the ***Sky Island Alliance*** and Appletton-Whitell Audubon Research Ranch to survey bat occurrence at managed wetlands designed for mitigation to aid recovery of the Chiricahua Leopard Frog (Santa Cruz County, Arizona); site selection for capture and acoustic inventories of a 4-site; 7-night period with over 12 capture survey hours and 272 acoustic survey hours, where 12 individual bats of three species were captured and nearly 4,000 individual bat passes were recorded and almost 2,800 were confidently identified to 14 different species.

2017 - Manual Vetting of nearly 400 full-spectrum echolocation call recordings, representing almost 500 individual bat passes, from select monitoring locations during the years of 2014 thru 2016 for the ***Canadian Wildlife Service, Northern Conservation Division, Whitehorse YT***. Analysis included auto-classification outputs from SonoBat4 (WY) with manual vetting to confirm the presence of four (4) bat species including 3 common northwestern *Myotis* species.

2018 - Passive Acoustic Survey, Manual Vetting, and Acoustic Survey Report for a 17-night passive acoustic survey conducted at a southern Arizona grassland community near Elgin, summarizing 5 detector locations, totaling over 19,000 recordings (60GB), from 614 acoustic survey hours, and 66 detector-survey nights, that yielded almost 29,000 bat-passes (that were 100% manually vetted) and confirmed the presence of 19 southwestern bat species: *Antrozous pallidus, Choeronycteris mexicana Eptesicus fuscus, Lasionycteris noctivagans, Lasiurus blossevillii, Lasiurus cinereus, Lasiurus xanthinus, Leptonycteris yerbabuenae, Myotis auriculus, Myotis californicus, Myotis ciliolabrum, Myotis occultus, Myotis thysanodes, Myotis velifer, Myotis volans, Myotis yumanensis, Nyctinomops* spp. *Pipistrellus hesperus*, and *Tadarida brasiliensis*.

2018 - Manual Vetting to provide a second opinion of over 100 full-spectrum echolocation call recordings, representing 130 distinct bat passes, from select monitoring stations deployed in 2017 by the ***Maryland Department of Natural Resources***. Analysis included auto-classification outputs from SonoBat4 (NE, NNE, and PA-VA-NY) with manual vetting to confirm the presence of nearly 50 confidently identified passes from 5 bat species, including *Myotis lucifugus*.

2016-2018 - Passive and Mobile Acoustic Surveys, Manual Vetting, and Acoustic Survey Report summarizing 3 years of acoustic survey work conducted near Punta Gorda FL in association with the Bat Survey Solutions, LLC, Acoustic Survey Methods trainings, summarizing efforts at 35 detector locations, totaling 12,000 recordings (45GB) that were 100% manually vetted, and confirmed the presence of 8 southeastern bat species: *Eptesicus fuscus, Eumops floridanus, Lasiurus borealis/seminolus, Lasiurus intermedius, Nycticeius humeralis, Pipistrellus subflavus*, and *Tadarida brasiliensis*.

2019 - Bat Survey Efforts (including physical captures with single-high mist nets, triple-high mist nets, twin-bank harp traps, and triple-bank harp traps; and full-spectrum active and passive acoustic recording using full-spectrum Wildlife Acoustics SongMeter detectors, Pettersson M500 microphones, and SonoBat LIVE recorders) for ***Merlin Tuttle's Bat Consrvation*** "Experience Texas Bats" Natrual History Tour in Big Bend National Park, TX during April 2019. Presented a bat survey summary presentation at the end of the week analyzing over 4,000 acoustic records and over 200 capture records, documenting 18 of the 24 suspected species found in the park, with breakdown of species only captured physically, only acoustically, and both via capture and acoustic methods, with 100% of the acoustic collection manually vetted to species or species-guild.

2019 - Manual Vetting to provide a second opinion/species identification confirmation of 1,200 zero-cross recordings collected during an ***Office of Surface Mining*** acoustic survey in Pennsylvania. Analysis and manual vetting performed with KaleidoscopePRO software, using USF&WS Indiana Bat Summer Survey Guidelines.

2019 - Manual Vetting to provide a second opinion/species identification confirmation of 50 suspected Myotis species recordings collected in Pennsylvania by ***Bat Conservation and Managment***. Analysis performed with Kaleidoscope PRO software and manual vetting performed with SonoBat software.

2019 - Manual Vetting to provide species occupancy report on 350 zero-cross recordings collected from 10 survey locations in Alaska for the ***Alaska Center for Conservation Science***. Analysis and manual vetting performed using KaleidoscopePRO software.

2020 - Manual Vetting to provide a second opinion and species identification confirmation of 100 recordings suspected to be of *Myotis* species bats collected by the ***Maryland Department of Conservation***.

2020 - Manual Vetting to provide species occupancy report on 7,000 full-spectrum files collected by ***Sanders Environmental*** to identify T&E species (*M. septentrionalis* and *M. sodalis*) in Pennsylvania using current USF&WS Indiana Bat Summer Survey Guidelines. Analysis and vetting performed using MLE results from KaleidoscopePRO software and full-spectrum qualitative analysis using the SonoBat viewer.

2020 - Manual Vetting to provide a second opinion/species identification confirmation on 4,000 full-spectrum recordings collected in Pennsylvania by ***Sanders Environmental*** to provide species occupancy report from fall swarming habitats near mine features, using current USF&WS Indiana Bat Summer Survey Guidelines.

2021 - Manual Vetting to provide second opinions and species identification confirmation on 300 full-spectrum recordings for ***Bat Consrvation and Management*** from a proposed development in Pennsylvania to determine *Myotis sodalis* and/or *M. septentrionalis* presence at the site, using current USF&WS Indiana Bat Summer Survey Guidelines.

2021 - Acoustic survey report to identify true-positive, false-positive, and false-negative auto-classifier decisions to provide a site-level species occupancy report at a four-site, three-night survey in southern Arizona performed by ***Copperhead Consulting***. Analysis and manual vetting of over 8,000 zero-cross recordings using KaleidoscopePRO software.

JANET DEBELAK TYBUREC

BAT SURVEY TRAINING CLASSES DEVELOPED & TAUGHT

From 1992-2012 Janet Debelak Tyburec worked for Bat Conservation International (Austin TX) to develop their "Bat Conservation and Management" workshops, "Educator" workshops and "Decision Makers" workshops which were conducted at venues in Arizona, California, Kentucky, Montana, Pennsylvania, Texas, Virginia and Toronto, Ontario CANADA, working with founder Merlin D. Tuttle and Director of Eduction, Patricia A. Morton to manage and direct all training efforts. In 2001 BCI began offering "Acoustic Monitoring for Bats" workshops at the "flagship" venues in the Chiricahua Mountains of Arizona (May/June), Lava Beds National Monument in California (July), Mammoth Cave National Park in Kentucky (July/August), and at Canoe Creek State Park in Central Pennsylvania (August/September). Beginning in 2008 Janet became a private contractor and federal agency contractor, and worked with Bat Conservation and Management (BCM, Carlisle PA) to offer "Bat Study and Survey Techniques" workshops at venues in Arizona, California, Indiana, Kentucky, Maryland, New Jersey, New York, Pennsylvania, Tennessee, Texas and West Virginia. In 2012 she formed her own company to take over all bat-survey training after BCM and BCI dropped educational outreach from their respective missions. Below is a select list of notable training courses.

2008 "Forest Bat Conservation and Inventory Techniques" workshop for the United States Forest Service, Coronado National Forest in Tucson AZ, 18-19 September.

2009 "Acoustic Monitoring as a Non-contact Bat Survey Method" workshop for Cleveland MetroParks in Akron OH, 25 August.

2009 "Bat Survey Techniques for Caves, Mines, Buildings, and Bridges" workshop for the United States Forest Service, Doublehead Ranger District, in Dillon MT, 14-17 September.

2009 "Forest Bat Conservation and Inventory Techniques" workshop for the United States Forest Service, Coronado National Forest and local partner agencies, in Tucson AZ, 12-13 November.

2010 "Introduction to Bat Conservation, Survey Methods, and Management" workshop for the United States Forest Service, Guadalupe National Forest, Carlsbad Ranger District, in Carlsbad NM, 6-8 July.

2010 "Forest Bat Conservation: Water, Mines, and Man-made Structures" workshop for the United States Forest Service, Lincoln National Forest, Smokey Bear Ranger District in Ruidoso NM, 15-17 July.

2010 "AnaBat Acoustic Survey Training" workshop for the Department of Defense, Nellis Air Force Base in Las Vegas NV, 22-24 October.

2011 "Bat Inventory and Monitoring" workshop for the United States Forest Service, Guadalupe National Forest and the Bureau of Land Management, in Carlsbad NM, 10-13 August.

2011"White-nose Syndrome in Bats, History, Prevention, and Prognosis" class for the Department of Defense, in Sierra Vista AZ, 30 August-1 September.

2012 "Bat Capture and Acoustic Survey Techniques" class for the United States Forest Service, North Central Research Station, in Portal AZ, 19-21 May.

2012 "Bat Inventory and Monitoring" workshop for the Utah Bat Conservation Cooperative, joint agency: Bureau of Land Management, National Park Service and United States Forest Service in Escalante UT, 30 July-2August.

2012 "AnaBat Acoustic Inventory Methods" workshop for the United States Fish and Wildlife Service, in McBee SC, 23-24 April.

2013 "SonoBat Acoustic Analysis Techniques" class for Pima County Parks Department, Tucson AZ, 22 April.

2013 "Acoustic Survey Field Techniques for Bat Studies" workshop for the United States Fish and Wildlife Service, in State College PA, 20-21 October

2014 "Pettersson Detector and SonoBat Software Acoustic Survey Techniques" workshop for Sanders Environmental Clients and Sub-contractors, in Somerset PA, 7-9 April.

2014 "Bat Detectors and Acoustic Survey Protocols" workshop for the United States Fish and Wildlife Service, in Dixon IA, 3-5 June.

2015 "Acoustic Data Management" training workshops in Alton, IL (7-9 March); Hollidaysburg PA (28-29 April); Harrisburg, PA (12-14 October); and Fairfield ME (14-16 June).

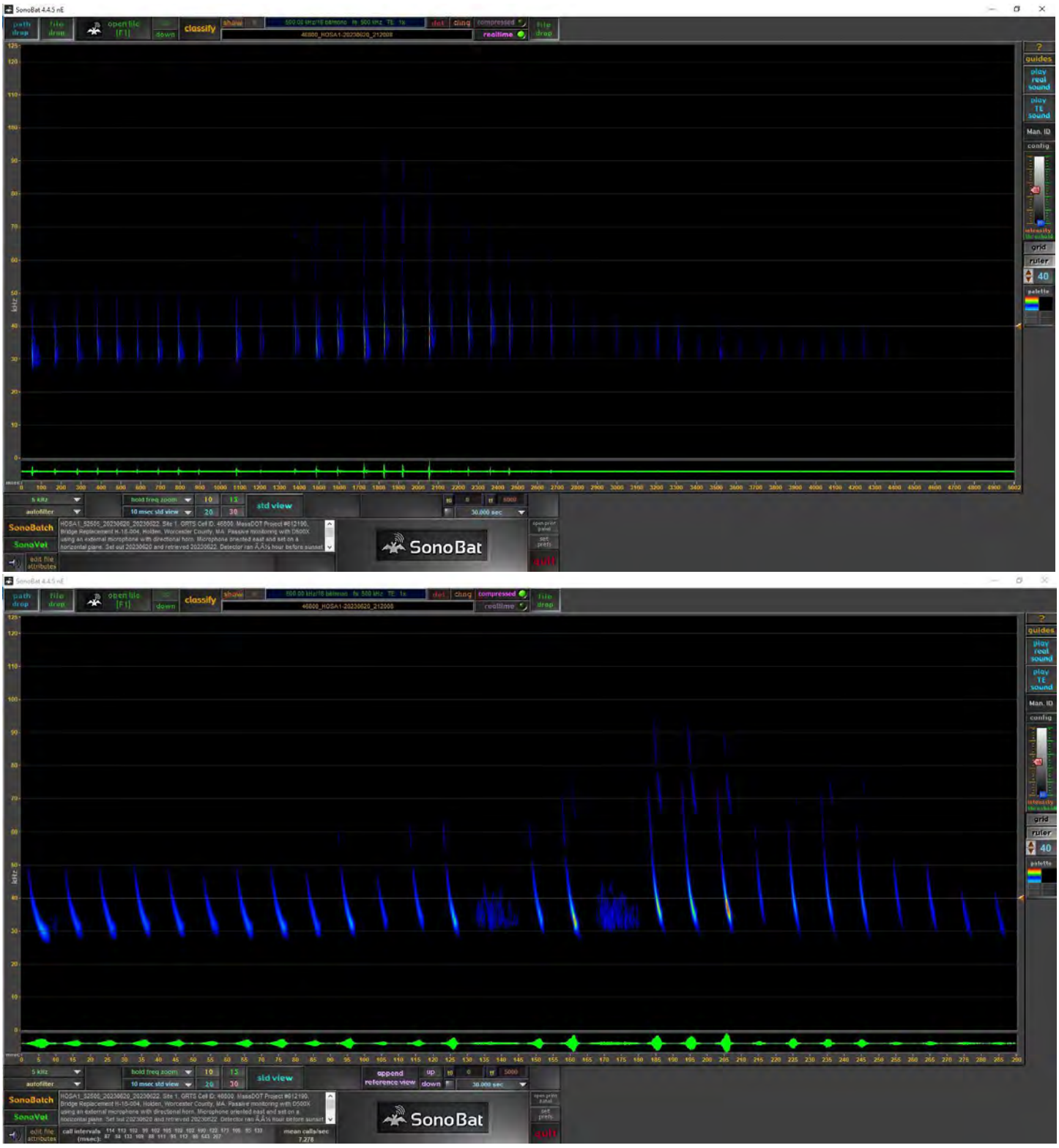
Janet Tyburec Consulting, Post Office Box 86493, Tucson AZ 95754 **T:** 520.404.7406 **E:** *jtyburec@mac.com*

2015 "Combined Field Survey Techniques" training workshops in Portal AZ (20-26 May); Tulelake CA (10-17 July); and Mammoth Cave, KY (19-25 September).
2015 "Field Survey Techniques" training for National Park Service, Mammoth Cave, KY, 14-17 September.
2016 "Acoustic Data Management" training workshops in Duluth MN (7-9 March), Wells ME (7-9 April), and Harrisburg PA (17-19 October).
2016 "Acoustic Survey Methods" training workshop in Punta Gorda FL, 1-5 February.
2016 "Combined Field Survey Techniques for Bats" training workshops in Portal AZ (22-29 May), Tulelake CA (10-17 July), and Mammoth Cave KY (28 August - 4 September).
2016 "Field Survey Techniques for Bats" training workshop for California Department of Fish and Game, Tulelake CA, 18-22 July.
2017 "Acoustic Survey Methods" training course in Punta Gorda FL (23-27 January) and Tucson AZ (3-7 April)
2017 "Combined Field Survey Techniques" training workshops in Portal AZ (13-20 May), Tulelake CA (14-21 July), and Mammoth Cave KY (22-30 August).
2017 "Field Survey Techniques" training workshop for National Park Service staff in Tulelake CA, 24-28 July.
2017 "Acoustic Data Management" training class in Harrisburg PA, 11-13 October.
2018 "Acoustic Survey Methods" training course in Punta Gorda FL, 21-26 January.
2018 "Combined Field Survey Techniques for Bats" training workshop in Portal AZ (8-15 May), Tulelake CA (29 July - 5 August), and Mammoth Cave KY (4-12 September).
2018 "Combined Field Survey Techniques for Bats" training workshop for National Park Service staff at Santa Monica Mountains National Recreation Area, Los Angeles County CA, 18-20 September.
2018 "Acoustic Data Management" training class in Harrisburg PA, 16-18 October.
2019 "Acoustic Survey Methods" training course in Punta Gorda FL, 8-13 January.
2019 "Acoustic Survey Methods" training course for the Seminole Tribe in Big Cypress FL, 11-13 March.
2019 Bat Survey for Merlin Tuttle's Bat Conservation "Discover Texas Bats," Big Bend TX, 27 March - 4 April.
2019 "Acoustic Survey Methods" training course in Tucson AZ, 8-13 April.
2019 "Acoustic Data Management" training class in Tulsa OK, 26-28 April.
2019 "Cave Conservation and Management for Bats" field training workshop in San Marcos TX, 7-9 May
2019 "Combined Field Survey Techniques for Bats" field training workshop in Portal AZ, 20-27 May.
2019 "Acoustic Data Management using KaleidoscopePRO Software" custom training class for Environmental Science Associates consultants in Tampa FL, 24-25 July.
2019 "Bat Survey Techniques for Agency Biologists" training workshop in Great Basin (Baker) NV, 15-19 July.
2019 "Combined Field Survey Techniques for Bats" training workshop in Great Basin (Baker) NV, 21-28 July.
2019 "Combined Field Survey Techniques for Bats" training workshop in Mammoth Cave KY, 4-12 September.
2019 "Acoustic Data Management" training class in Harrisburg PA, 22-24 October.
2020 "Acoustic Survey Methods" training course in Punta Gorda FL, 10-16 January.
2020 "Acoustic Survey Methods for Conducting North American Bat Conservation Program Surveys" for the Southwest Bat HUB, on-line training workshop, 14-18 September.
2020 "Acoustic Survey Methods for Conducting Florida Bonneted Bat Surveys using KaleidoscopePRO" for KCA Environmental Consultants (Tampa FL), on-line training workshop (24-26 August) and follow-up mock-survey consultation (29 September - 1 October).
2021 "Acoustic Survey Methods/NABat Survey Methods" field training course in Tucson AZ, 21-25 June.
2021 "Acoustic Survey Methods/NABat Survey Methods" field training course in Elgin AZ, 5-9 July.

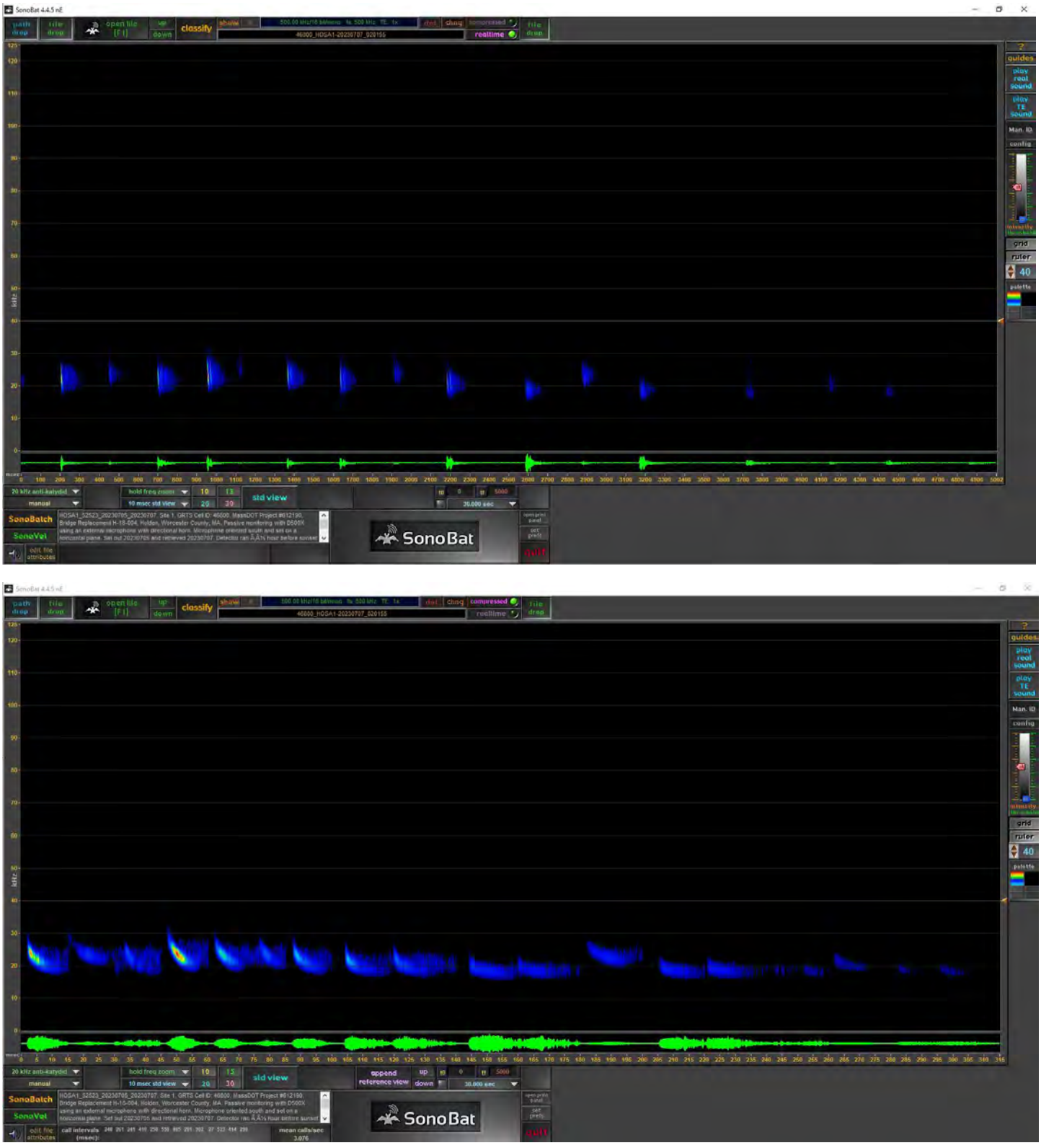
SKILLS

Writing (non-fiction, fiction, and creative), Photography (outdoor and nature; digital and film), Design/Layout (computer assisted), Drawing, drafting, painting, Cycling (recreational road biking; racing), Sea Kayaking, Running Exercise/Health/Nutrition/Fitness, Hiking, Nature Study and Travel

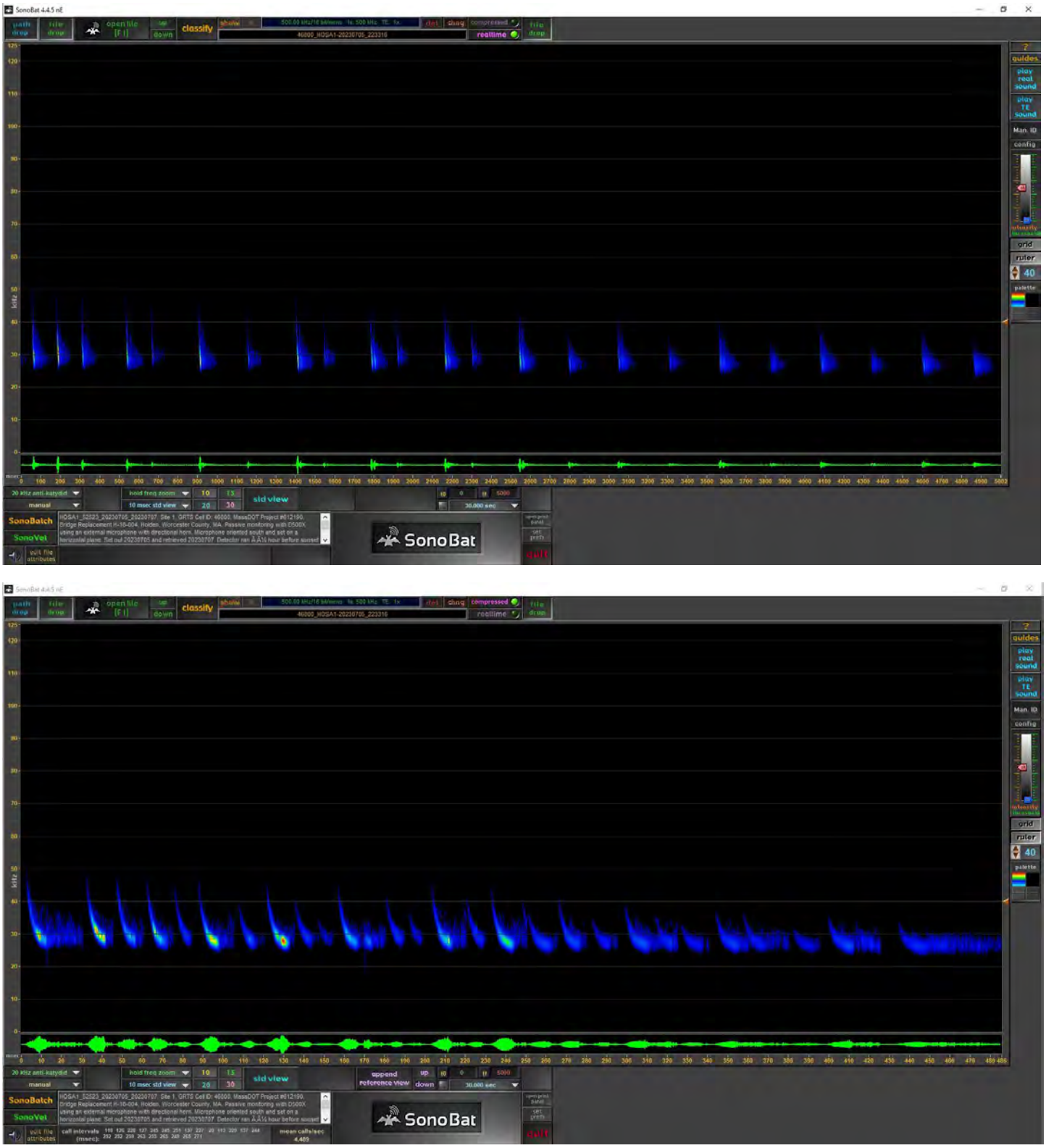
Appendix E: Representative Spectrograms



Spectrogram 1: A confirmed big brown bat (*Eptesicus fuscus;* EPFU) recorded at Site 1 on the night of June 20, 2023, as shown in full-spectrum format via Sonobat 4.4.5 in true-time format (top) and compressed format (bottom). This call is archetypical for clutter, approach, and edge recording for EPFU.



Spectrogram 2: A confirmed hoary bat (*Lasiurus cinereus;* LACI) recorded at Site 1R on the night of July 6, 2023, as shown in full-spectrum format via Sonobat 4.4.5 in true-time format (top) and compressed format (bottom). This call shows a pulse shape and bandwidth that is consistent with what is known for LACI, despite diffuse echo.



Spectrogram 3: This call has been manually classified to the EPFU/silver-haired bat (*Lasionycteris noctivagans*; LANO) guild recorded at Site 1R on the night of July 6, 2023, as shown in full-spectrum format via Sonobat 4.4.5 in true-time format (top) and compressed format (bottom). This call shows a very diffuse echo and low-bandwidth pulses making discrimination between EPFU/LANO impossible.

Appendix F: Event Logs

Detector 52505_20230620_20230622_Event Log
MODEL NO: TS32GCF133
FW REV: 20171204
SERIAL: 9G17975020351AE00002
LABEL: D500X
2023-06-20 13:02:18 $$SYSTEM START, FW VERSION: D500X V2.4.5 201211, 12:06:56, S/N: 52505, TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 5.1V, FILE: -, TOTAL FREE: 44.73G
2023-06-20 13:09:30 $$TIMER SLEEP ------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 5.1V, FILE: -, TOTAL FREE: 44.73G
2023-06-20 14:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 5.1V, FILE: -, TOTAL FREE: 44.73G
2023-06-20 15:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 5.1V, FILE: -, TOTAL FREE: 44.73G
2023-06-20 16:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 5.1V, FILE: -, TOTAL FREE: 44.73G
2023-06-20 17:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 5.1V, FILE: -, TOTAL FREE: 44.73G
2023-06-20 18:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 5.1V, FILE: -, TOTAL FREE: 44.73G
2023-06-20 19:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 5.1V, FILE: -, TOTAL FREE: 44.73G
2023-06-20 19:58:02 $$TIMER WAKEUP ------ TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 5.1V, FILE: -, TOTAL FREE: 44.73G
2023-06-20 20:00:03 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 5.0V, FILE: -, TOTAL FREE: 44.73G
2023-06-20 21:00:01 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.9V, FILE: M000004.WAV, TOTAL FREE: 44.71G
2023-06-20 22:00:04 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.8V, FILE: M000007.WAV, TOTAL FREE: 44.70G
2023-06-20 23:00:02 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.8V, FILE: M000007.WAV, TOTAL FREE: 44.70G
2023-06-21 00:00:01 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.7V, FILE: M000011.WAV, TOTAL FREE: 44.68G
2023-06-21 01:00:04 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.7V, FILE: M000013.WAV, TOTAL FREE: 44.67G
2023-06-21 02:00:03 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.7V, FILE: M000015.WAV, TOTAL FREE: 44.66G
2023-06-21 03:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.7V, FILE: M000015.WAV, TOTAL FREE: 44.66G
2023-06-21 04:00:01 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.7V, FILE: M000016.WAV, TOTAL FREE: 44.66G
2023-06-21 05:00:04 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.7V, FILE: M000016.WAV, TOTAL FREE: 44.66G
2023-06-21 05:41:30 $$TIMER SLEEP ------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.6V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 06:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.6V, FILE: M000018.WAV, TOTAL FREE: 44.65G

2023-06-21 07:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.6V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 08:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.7V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 09:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.7V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 10:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.7V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 11:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.7V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 12:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.8V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 13:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.8V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 14:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.8V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 15:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.8V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 16:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.8V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 17:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.8V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 18:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.8V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 19:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.8V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 19:58:02 $$TIMER WAKEUP ------ TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.8V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 20:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.8V, FILE: M000018.WAV, TOTAL FREE: 44.65G
2023-06-21 21:00:04 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.6V, FILE: M000021.WAV, TOTAL FREE: 44.63G
2023-06-21 22:00:05 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.5V, FILE: M000024.WAV, TOTAL FREE: 44.62G
2023-06-21 23:00:04 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:29/05:13, DST=DIS, BATTERY: 4.5V, FILE: M000029.WAV, TOTAL FREE: 44.60G
2023-06-22 00:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.5V, FILE: M000030.WAV, TOTAL FREE: 44.59G
2023-06-22 01:00:02 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.5V, FILE: M000031.WAV, TOTAL FREE: 44.59G
2023-06-22 02:00:05 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.5V, FILE: M000031.WAV, TOTAL FREE: 44.59G
2023-06-22 03:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.5V, FILE: M000031.WAV, TOTAL FREE: 44.59G
2023-06-22 04:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.5V, FILE: M000031.WAV, TOTAL FREE: 44.59G
2023-06-22 05:00:03 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.5V, FILE: M000031.WAV, TOTAL FREE: 44.59G
2023-06-22 05:41:30 $$TIMER SLEEP ------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.5V, FILE: M000031.WAV, TOTAL FREE: 44.59G

2023-06-22 06:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.5V, FILE: M000031.WAV, TOTAL FREE: 44.59G
2023-06-22 07:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.5V, FILE: M000031.WAV, TOTAL FREE: 44.59G
2023-06-22 08:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.5V, FILE: M000031.WAV, TOTAL FREE: 44.59G
2023-06-22 09:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.6V, FILE: M000031.WAV, TOTAL FREE: 44.59G
2023-06-22 10:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.6V, FILE: M000031.WAV, TOTAL FREE: 44.59G
2023-06-22 11:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.6V, FILE: M000031.WAV, TOTAL FREE: 44.59G
2023-06-22 11:14:06 $$KEYBOARD WAKEUP --- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.7V, FILE: M000031.WAV, TOTAL FREE: 44.59G
2023-06-22 11:17:28 $$KEYBOARD SLEEP ---- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 20:30/05:13, DST=DIS, BATTERY: 4.6V, FILE: M000031.WAV, TOTAL FREE: 44.59G

Detector 52523_20230705_20230707_Event Log
MODEL NO: TS32GCF133
FW REV: 20171204
SERIAL: 9G17976020351AD61031
LABEL: D500X
2023-07-05 13:29:37 $$SYSTEM START, FW VERSION: D500X V2.4.5 201211, 12:06:56, S/N: 52523, TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.9V, FILE: -, TOTAL FREE: 59.63G
2023-07-05 13:30:00 $$TIMER SLEEP ------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.9V, FILE: -, TOTAL FREE: 59.63G
2023-07-05 14:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.9V, FILE: -, TOTAL FREE: 59.63G
2023-07-05 15:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.9V, FILE: -, TOTAL FREE: 59.63G
2023-07-05 16:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.9V, FILE: -, TOTAL FREE: 59.63G
2023-07-05 17:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.9V, FILE: -, TOTAL FREE: 59.63G
2023-07-05 18:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.9V, FILE: -, TOTAL FREE: 59.63G
2023-07-05 19:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.9V, FILE: -, TOTAL FREE: 59.63G
2023-07-05 20:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.9V, FILE: -, TOTAL FREE: 59.63G
2023-07-05 20:00:02 $$TIMER WAKEUP ------ TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.9V, FILE: -, TOTAL FREE: 59.63G
2023-07-05 21:00:03 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.6V, FILE: M000009.WAV, TOTAL FREE: 59.61G
2023-07-05 22:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.5V, FILE: M000019.WAV, TOTAL FREE: 59.56G
2023-07-05 23:00:01 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000039.WAV, TOTAL FREE: 59.47G
2023-07-06 00:00:01 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000051.WAV, TOTAL FREE: 59.41G
2023-07-06 01:00:02 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.3V, FILE: M000067.WAV, TOTAL FREE: 59.34G
2023-07-06 02:00:02 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.3V, FILE: M000080.WAV, TOTAL FREE: 59.28G
2023-07-06 03:00:01 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.2V, FILE: M000095.WAV, TOTAL FREE: 59.21G
2023-07-06 04:00:02 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.2V, FILE: M000100.WAV, TOTAL FREE: 59.19G
2023-07-06 05:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.1V, FILE: M000104.WAV, TOTAL FREE: 59.17G
2023-07-06 05:45:30 $$TIMER SLEEP ------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.1V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 06:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.2V, FILE: M000106.WAV, TOTAL FREE: 59.16G

2023-07-06 07:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.2V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 08:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.3V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 09:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.3V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 10:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.3V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 11:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 12:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 13:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 14:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 15:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 16:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 17:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 18:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 19:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 20:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 20:00:03 $$TIMER WAKEUP ------ TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.4V, FILE: M000106.WAV, TOTAL FREE: 59.16G
2023-07-06 21:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.1V, FILE: M000113.WAV, TOTAL FREE: 59.12G
2023-07-06 22:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.1V, FILE: M000121.WAV, TOTAL FREE: 59.09G
2023-07-06 23:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.0V, FILE: M000129.WAV, TOTAL FREE: 59.05G
2023-07-07 00:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.0V, FILE: M000143.WAV, TOTAL FREE: 58.99G
2023-07-07 01:00:04 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.0V, FILE: M000145.WAV, TOTAL FREE: 58.98G
2023-07-07 02:00:04 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.0V, FILE: M000152.WAV, TOTAL FREE: 58.95G
2023-07-07 03:00:01 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 4.9V, FILE: M000158.WAV, TOTAL FREE: 58.92G
2023-07-07 04:00:03 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 4.9V, FILE: M000158.WAV, TOTAL FREE: 58.92G
2023-07-07 05:00:02 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 4.9V, FILE: M000162.WAV, TOTAL FREE: 58.90G
2023-07-07 05:45:30 $$TIMER SLEEP ------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 4.8V, FILE: M000173.WAV, TOTAL FREE: 58.85G

2023-07-07 06:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 4.9V, FILE: M000173.WAV, TOTAL FREE: 58.85G
2023-07-07 07:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 4.9V, FILE: M000173.WAV, TOTAL FREE: 58.85G
2023-07-07 08:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.0V, FILE: M000173.WAV, TOTAL FREE: 58.85G
2023-07-07 09:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.1V, FILE: M000173.WAV, TOTAL FREE: 58.85G
2023-07-07 09:28:51 $$KEYBOARD WAKEUP --- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.3V, FILE: M000173.WAV, TOTAL FREE: 58.85G
2023-07-07 09:32:55 $$KEYBOARD SLEEP ---- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:08/02:01, DST=DIS, BATTERY: 5.2V, FILE: M000173.WAV, TOTAL FREE: 58.85G

Detector 52220_20230725_20230727_Event Log
MODEL NO: SDCFXS-032G
FW REV: HDX16.01
SERIAL: H ZA210112115373
LABEL: D500X
2023-07-25 09:51:40 $$SYSTEM START, FW VERSION: D500X V2.3.8 201211, 12:06:07, S/N: 52220, TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.2V, FILE: -, TOTAL FREE: 59.63G
2023-07-25 10:45:30 $$TIMER SLEEP ------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.1V, FILE: -, TOTAL FREE: 59.63G
2023-07-25 11:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.1V, FILE: -, TOTAL FREE: 59.63G
2023-07-25 12:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.2V, FILE: -, TOTAL FREE: 59.63G
2023-07-25 13:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.2V, FILE: -, TOTAL FREE: 59.63G
2023-07-25 14:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.2V, FILE: -, TOTAL FREE: 59.63G
2023-07-25 15:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.2V, FILE: -, TOTAL FREE: 59.63G
2023-07-25 16:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.3V, FILE: -, TOTAL FREE: 59.63G
2023-07-25 17:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.3V, FILE: -, TOTAL FREE: 59.63G
2023-07-25 18:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.3V, FILE: -, TOTAL FREE: 59.63G
2023-07-25 19:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.3V, FILE: -, TOTAL FREE: 59.63G
2023-07-25 19:45:02 $$TIMER WAKEUP ------ TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.3V, FILE: -, TOTAL FREE: 59.63G
2023-07-25 20:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.0V, FILE: M000001.WAV, TOTAL FREE: 59.62G
2023-07-25 21:00:02 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.9V, FILE: M000045.WAV, TOTAL FREE: 59.41G
2023-07-25 22:00:03 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.9V, FILE: M000068.WAV, TOTAL FREE: 59.31G
2023-07-25 23:00:01 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.9V, FILE: M000075.WAV, TOTAL FREE: 59.27G
2023-07-26 00:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.9V, FILE: M000079.WAV, TOTAL FREE: 59.25G
2023-07-26 01:00:01 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.8V, FILE: M000080.WAV, TOTAL FREE: 59.25G
2023-07-26 02:00:02 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.8V, FILE: M000082.WAV, TOTAL FREE: 59.24G
2023-07-26 03:00:03 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.9V, FILE: M000082.WAV, TOTAL FREE: 59.24G
2023-07-26 04:00:02 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.9V, FILE: M000082.WAV, TOTAL FREE: 59.24G

2023-07-26 05:00:02 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.8V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 06:00:01 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.8V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 06:04:30 $$TIMER SLEEP ------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.9V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 07:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.9V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 08:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.9V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 09:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.0V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 10:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.0V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 11:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.0V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 12:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.1V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 13:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.1V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 14:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.1V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 15:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.1V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 16:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.1V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 17:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.1V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 18:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.2V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 19:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.2V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 19:45:02 $$TIMER WAKEUP ------ TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.2V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 20:00:03 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.2V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 21:00:04 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.1V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 22:00:04 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.1V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-26 23:00:03 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.0V, FILE: M000091.WAV, TOTAL FREE: 59.20G
2023-07-27 00:00:02 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.8V, FILE: M000093.WAV, TOTAL FREE: 59.19G
2023-07-27 01:00:03 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.8V, FILE: M000095.WAV, TOTAL FREE: 59.18G
2023-07-27 02:00:01 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.8V, FILE: M000096.WAV, TOTAL FREE: 59.17G
2023-07-27 03:00:03 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.8V, FILE: M000097.WAV, TOTAL FREE: 59.17G

2023-07-27 04:00:03 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.8V, FILE: M000097.WAV, TOTAL FREE: 59.17G
2023-07-27 05:00:00 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.7V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 06:00:01 $$HOUR LOG ---------- TIMER ON, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.8V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 06:04:30 $$TIMER SLEEP ------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.8V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 07:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.8V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 08:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.9V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 09:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.9V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 10:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 4.9V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 11:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.0V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 12:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.0V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 13:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.0V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 14:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.0V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 15:00:00 $$HOUR LOG ---------- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.0V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 15:55:26 $$KEYBOARD WAKEUP --- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.1V, FILE: M000101.WAV, TOTAL FREE: 59.15G
2023-07-27 15:56:39 $$KEYBOARD SLEEP ---- TIMER OFF, INPUT GAIN=45, TRIG LEV=160, INTERVAL=0, RTIMER ON/OFF: --:--/--:--, SET/RISE 14:10/02:03, DST=DIS, BATTERY: 5.0V, FILE: M000101.WAV, TOTAL FREE: 59.15G

DOCUMENT A00847

BAT HABITAT INSPECTION

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Maura Healey, Governor
Kimberley Driscoll, Lieutenant Governor
Monica Tibbits-Nutt, Secretary & CEO

massDOT
Massachusetts Department of Transportation

November 12, 2024

Holden (DOT Project #612190) BRIDGE REPLACEMENT, H-18-004, SALISBURY STREET OVER G&W RAILROAD
Bat Habitat Inspection

The MassDOT Wildlife and Endangered Species Unit (WESU) conducted a visual inspection for roosting bats and bat habitat at Bridge H-18-004 associated with MassDOT Project #612190 HOLDEN- BRIDGE REPLACEMENT, H-18-004, SALISBURY STREET OVER G&W RAILROAD. The project will include the removal and replacement of the existing bridge structures. The proposed bridge will consist of pre-stressed, pre-cast, reinforced concrete NEXT D beams. The structure will be slightly larger, 39' out-to-out to accommodate two 11' wide, two-way vehicular travel lanes, two 2' wide shoulders, one 10' wide multi use sidewalk on the west side of the road, and S3-TL4 bridge rail with attached protective screening on both sides of the bridge. The new bridge will share a similar footprint and horizontal alignment as the existing bridge. During the inspection, WESU biologists used flashlights, binoculars, and a borescope to search gaps, crevices, and other locations on bridge structures that could potentially hold roosting bats. **No bats, guano, or staining were observed at the bridge during the inspection.**

Bridge H-18-004 is a concrete flat slab structure with concrete decking over a G&W Railroad (Figures 1-2). Inspection of gaps, open surfaces, and any small cracks/crevices of the bridge provided no indication of bat roosting (Figures 6-9) While suitable roosting habitat for several bat species may exist within gaps in concrete, many of the observed gaps are unlikely to provide thermal protection due to their shallow depths and/or large widths. Similarly, visual inspection of the bridge's metal guardrails indicated they are unlikely to provide suitable roosting habitat due to the lack of crevices.

In conclusion, while the MassDOT WESU did observe limited areas of potential roosting bat habitat within gaps and other cracks/crevices in the concrete decking and abutments, no roosting bats, or evidence of roosting bats, were observed during the inspection of Bridge H-18-004. A completed bridge assessment form is included as Appendix A.

Sincerely,

David Paulson

David Paulson
Wildlife and Endangered Species Unit Supervisor, MassDOT, Environmental Services

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TTY: 857-368-0655
mass.gov/massdot



Figures 1-2. Bridge H-18-004 over G&W Railroad



Figure 3. Atop Bridge H-18-004 over G&W Railroad



Figures 4-5. Underside Bridge H-18-004 over G&W Railroad



Figure 6. Crevice in concrete decking at Bridge H-18-004 over G&W Railroad



Figure 7. Concrete abutment at Bridge H-18-004 over G&W Railroad





Figures 8-9. Existing conditions at Bridge H-18-004 over G&W Railroad

Appendix A. Bridge Assessment Form

APPENDIX D: Bridge/Structure Bat Assessment Form

Bridge/Structure Bat Assessment Form Instructions

- This form will be completed to document bat occupancy or bat use of bridges, culverts, and other structures. This form shall be submitted to the appropriate personnel within the DOT and USFWS for recordkeeping (or uploaded into the Information, Planning, and Consultation (IPaC) Determination Key for use of the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat) prior to conducting: any activities below the deck surface either from the underside or from above the deck surface that bore down to the underside; any activities that could impact expansion joints; any activities involving deck removal on bridges; or any activities involving structure demolition for bridges, culverts, and/or other structures.
- Assessments must be completed within two (2) years of conducting any work (see the above bullet), regardless of whether assessments have been conducted in the past. Assessments must be completed in appropriate weather conditions, suitable for the assessor to observe common signs of bat use.
- Evidence of bat use may include visual observation (live and/or dead), presence of guano, presence of staining, audible observation, and/or odor observation. Presence of one or more indicators is sufficient evidence that bats may be using the bridge, culvert, and/or other structure.
- If bat use of a bridge, culvert, and/or other structure is noted, additional studies may be undertaken during bat active season to identify the specific bat species utilizing the structure, or protected bat species presence can be assumed, in order to comply with threatened and endangered species regulations. Bat active season dates, typically between April and November, vary regionally and by species, so assessors should consult with their local USFWS Field Office for more specific active season dates.
- For use of the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat – If the bridge/structure is 1,000 feet or more from suitable bat habitat[1] (e.g., an urban or agricultural area without suitable foraging habitat or corridors linking the bridge to suitable foraging habitat), check the appropriate box and fill out the table below. **No further assessment is required.**

Date & Time of Assessment	**DOT Project #**	**Route/Facility Carried**	**County**
10/9/2024 1:30pm	612190	Salisbury Street	Worcester County, MA
Federal Structure ID H-18-004	**Structure Coordinates** (latitude and longitude) 42.342475, -71.851735	☐ This bridge/structure is 1,000 feet or more from suitable bat habitat[2] Name: Trevor Burns Signature: Trevor Burns	

- Any questions pertaining to assessments or this form should be directed to the local USFWS Field Office.

[1] Refer to the USFWS's summer survey guidance for the definition of suitable habitat (http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html).

[2] This condition is only for use of the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat

Proposal No. 612190-134594

Bridge/Structure Bat Assessment Form

Date & Time of Assessment	DOT Project Number	Route/Facility Carried	County
10/9/2024 1:30pm	612190	Salisbury Street	Worcester County, MA
Federal Structure ID	**Structure Coordinates (latitude and longitude)**	**Structure Height (approximate)**	**Structure Length**
H-18-004	42.342475, -71.851735	16 feet	80 feet

Structure Type (check one)

Bridge Construction Style

○ Cast-in-place		○ Pre-stressed Girder	
◉ Flat Slab/Box		○ Steel I-beam	
○ Truss		○ Covered	
○ Parallel Box Beam		○ Other:	

Culvert Type

○ Box	
○ Pipe/Round	
○ Other:	

Other Structure

○

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
☐ Metal	☒ None	☒ Concrete
☒ Concrete	☐ Concrete	☐ Timber
☐ Timber	☐ Steel	☒ Stone/Masonry
☐ Open grid	☐ Timber	☐ Other:
☐ Other:	☐ Other:	

Creosote Evidence

○ Yes ◉ No ○ Unknown

Culvert Material

☐ Metal
☐ Concrete
☐ Plastic
☐ Stone/Masonry
☐ Other:

Notes:

Crossings Traversed (check all that apply)

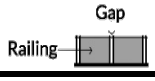
☐ Bare ground	☐ Open vegetation
☐ Rip-rap	☐ Closed vegetation
☐ Flowing water	☒ Railroad
☐ Standing water	☐ Road/trail - Type:
☐ Seasonal water	☐ Other:

Surrounding Habitat (check all that apply)

☐ Agricultural	☐ Grassland
☐ Commercial	☐ Ranching
☒ Residential-urban	☐ Riparian/wetland
☐ Residential-rural	☐ Mixed use
☒ Woodland/forested	☐ Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	**Assessment Notes**	**Evidence of Bats** (include photos if present)
☒ All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☒ Concrete surfaces (open roosting on concrete)	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between concrete end walls and the bridge deck	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Crack between concrete railings on top of the bridge deck 	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Vertical surfaces on concrete I-beams	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between walls, ceiling joists	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Weep holes, scupper drains, and inlets/pipes	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☒ All guiderails	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All expansion joints	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species

Name: Trevor Burns

Signature: Trevor Burns

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DOCUMENT A00848

MASSACHUSETTS DEPARTMENT OF CONSERVATION AND RECREATION

MASSACHUSETTS WATERSHED PROTECTION ACT

APPLICABILITY DECISION WA2025-031

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dcr
Massachusetts

Massachusetts Watershed Protection Act
Applicability Decision WA2025-031

Recording information for Register of Deeds
Grantor: Massachusetts Comm Conservation & Recreation
Grantee/Owner: Peter M. Lukes
Marginal reference: Book N/A, Page N/A

Pursuant to the:
Massachusetts Watershed Protection Act
M.G.L. c. 92A½
313 CMR 11.00

Initial Intake Date: 7/10/2025
Submission Date (complete): 7/23/2025

TO: Peter M. Lukes
Name of Owner

1204 Main Street
Holden, MA 01520
Address

FROM: Department of Conservation and Recreation, Division of Water Supply Protection, Wachusett/Sudbury Section

DATE OF ISSUANCE: 7/29/2025

REGARDING: Salisbury Street, Holden over Providence and Worcester rail
Property Address/Location

dcr
Massachusetts

Massachusetts Watershed Protection Act
Applicability Decision WA2025-031

Description of Proposed Structure, Use and/or Activity, if applicable:
Replacement of the existing Massachusetts Department of Transportation (MassDOT) bridge (H-18-004 on Salisbury Street above the Providence and Worcester railroad tracks .

Plans/Information Filed:

Massacusetts Department of Transportation, Highway Division 75% Salisbury Street Over the P&W Railroad, Bridge# H-18-004, Holden	N/A
Plan Title	*Date of Plan*

Chappell Engineering Associates & MassDOT
Prepared by

- DETERMINATION -

The Department of Conservation and Recreation, Division of Water Supply Protection, (the Division) has reviewed the Request for Determination of Applicability referenced by the DCR file number above. Based on the information available to the Division at this time, the Division makes the following Decision.

Statement of Jurisdiction

Division staff have reviewed the jurisdictional areas of the Watershed Protection Act (WsPA), 313 CMR 11.04, relative to the parcel and have determined that *portions/all* of your lot are:

- ☒ 0-200 ft from a Tributary. *No alteration is allowed in this area unless eligible for an exemption or subject to a Variance Decision.*
- ☒ 200-400 ft from a Tributary. *Certain restrictions apply to activities in this area.*
- ☒ Low yield aquifer. *Certain restrictions apply to activities in this area.*

Each of the above referenced zones are identified on the attached map.

In addition, it appears there may exist bordering vegetated wetlands subject to the Act (313 CMR 11.04(1)(e)), the exact location of which should be approved/determined by the Holden Conservation Commission. These wetlands are not shown on the enclosed map.

Location

☒ The Division has determined the lot identified on page one was properly included on the List of Affected Parcels. It is within the areas regulated by the Watershed Protection Act and any activities on this site must be in conformance with the restrictions outlined in it. If you do not wish to comply with the restrictions, you may apply for a finding of exemption, a variance, or exemption of a tributary. See below for additional information.

dcr
Massachusetts

Massachusetts Watershed Protection Act
Applicability Decision WA2025-031

Exemption

☒ The Division has determined that the proposed structure, use, or activity **is exempt** as **Maintenance of Public Roadways in Existence** under **313 CMR 11.05 (8)** of the Watershed Protection Act.

Statement of Reasons: On the basis of the Request for Watershed Determination of Applicability, supporting documents, and the following Conditions, the Division finds the proposed activity Exempt. This is because the Act provides an exemption [313 CMR 11.05(8)] that the maintenance, repair, replacement or reconstruction of public roadways existing as of September 1, 1989 including associated drainage systems, that are necessary to preserve or restore the facility's serviceability for the number of travel lanes and uses existing as of September 1, 1990; provided, however, that in the case of any replacement the design is substantially the functional equivalent of, and is of similar alignments to that which is being replaced and also provided that work is done according to the following General Conditions and without impairing the quality of water in the Watersheds.

GENERAL CONDITIONS

1. This Decision and the following conditions are based on a site visit conducted on 7/17/2025, the Request for Determination Application received complete on 7/10/2025 and the accompanying plans, as noted on page two, on file with DCR-DWSP Wachusett/Sudbury Section, Environmental Quality Office, 180 Beaman Street, West Boylston, MA 01583 (herein referred to as “this office”).

2. Any changes, revisions or alterations to approved plans must be submitted to this office prior to the commencement of any work on this site. The Division shall review those changes and make a finding whether an amendment to this Decision or a new filing for a Variance would be required.

3. The Division shall have the right to enter and inspect the property, (per 313 CMR 11.06(6)) at reasonable times, for compliance with this Decision, the Act and the Watershed Protection Regulations (313 CMR 11.00).

4. This Decision shall apply to any successor in interest or successor in control of the property.

5. In case of emergencies, problems or the need to discuss site conditions with the Division, the contact telephone number is (508) 792-7806.

PRIOR TO CONSTRUCTION:

6. The applicant shall assure that all contractors, subcontractors, and any other personnel performing the permitted work are fully aware of the terms and conditions of this Decision

and are provided a copy of this Decision and referenced documents before commencement of construction.

7. Please contact Bernadette DeBlander at Bernadette.DeBlander2@mass.gov or 857-303-5427 to provide the name, address, and telephone numbers of the project supervisor or contractor who shall be responsible for ensuring compliance with the conditions in this Decision.

8. Following the installation of erosion and sedimentation controls, the applicant shall notify the Division at least two business days before the start of construction, so that the Division will have the opportunity to inspect the erosion and sedimentation controls. Please contact Bernadette DeBlander at Bernadette.DeBlander2@mass.gov (857) 303-5427.

DURING CONSTRUCTION:

9. Erosion and sedimentation control measures shall be inspected regularly and after every storm event and cleaned or replaced as necessary to retain functions and shall remain in place until the work area is stabilized.

10. The Division reserves the right to impose additional conditions on this project to mitigate any impacts resulting from erosion and sediment migration.

This Decision applies to the structure, use, or activity only as it has been represented in the Request for Determination of Applicability. If the structure, use, or activity changes, notice shall be made to the Division so that the revised information can be reviewed.

This Decision does not relieve the Applicant of the responsibility of complying with all other applicable Federal, State or local laws and regulations including the General Rules and Regulations for the Protection of Watersheds and the Watershed System (313 CMR 11.09).

dcr
Massachusetts

Massachusetts Watershed Protection Act
Applicability Decision WA2025-031

APPEALS PROCEDURE

Request for a formal hearing must be made within 21 days of the issuance of this Decision by filing a Notice of Claim for an Adjudicatory Proceeding with the Commission and the Division. A Notice of Claim for appeal must comply with 801 CMR 1.00 *et seq.* and must include the following information: DCR File number; name and address of applicant and attorney, if any; and a statement of grounds for the appeal. The Notice should be filed with both:

Commissioner
Department of Conservation and Recreation
State Transportation Building
10 Park Plaza
Suite 6620
Boston, MA 02116

and

Director
DCR Division of Water Supply Protection
State Transportation Building
10 Park Plaza
Suite 6620
Boston, MA 02116

Issued by the Division of Water Supply Protection, Department of Conservation and Recreation, on the **29th day of July 2025.**

Worcester County

Kelley M. Freda

Kelley Freda
Regional Director
Wachusett/Sudbury Region

County

DCR-DWSP Watershed Protection Act Determination Map

Property Details

NOTE: Details based on MassGIS Level 3 Assessors parcels.

DCR File Number:

LOC ID:

Parcel Unique ID:

Parcel Map Num:

Parcel Number:

Address:

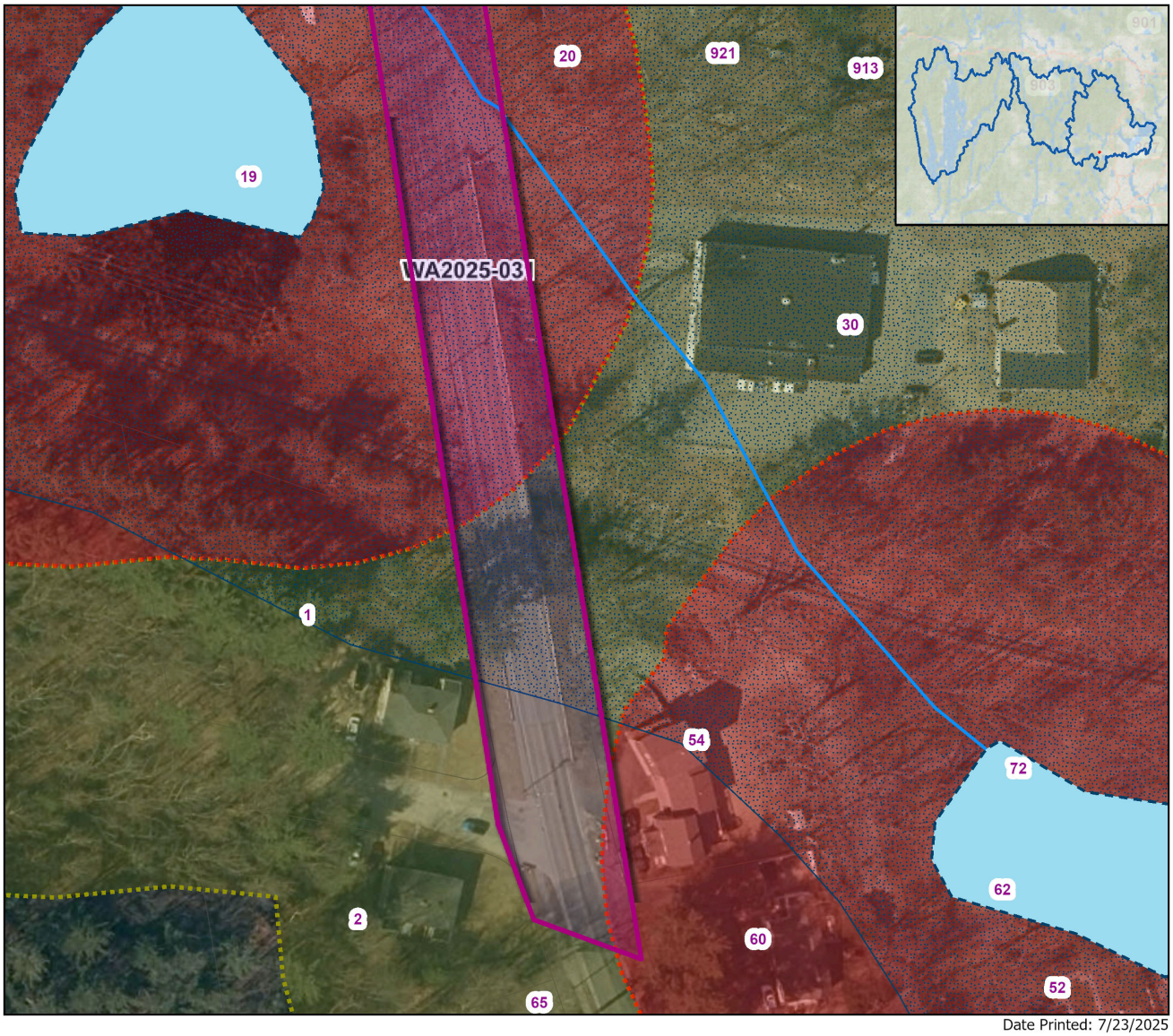
Town:

- Watershed Protection Act Regulatory Watershed Boundaries
- Streams
- Open Water
- Low Yield
- WsPA Primary Protection Zone
- WsPA Secondary Protection Zone
- Massachusetts Property Tax Assessor Parcels

Assessor parcel lines are not surveyed property lines. They approximate the size and shape of parcels. No certification of accuracy for these Assessor Parcels are conveyed or intended. Please be aware that if there is a discrepancy between the location of the tributary on the map and the location in the field, the field location will be used.

N

0 90 180 ft



Date Printed: 7/23/2025

DOCUMENT A00875

POLICY DIRECTIVE P-22-001
AND
POLICY DIRECTIVE P-22-002

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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.

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.).

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

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massDOT Massachusetts Department of Transportation Highway Division

Number: P-22-002
Date: 9/23/22

POLICY DIRECTIVE

Jonathan Gulliver (signature on original)
HIGHWAY ADMINISTRATOR

Use of MassDOT Property for Staging and other Construction-Related Operations

Purpose

This Policy Directive is intended to address the use of MassDOT property by MassDOT Contractors for construction staging and other construction-related operations that are not specifically defined in the construction contract. Such use of MassDOT property will only be allowed if permitted by the District Office in accordance with 700 CMR 13.00, Approval of Access to MassDOT Highways and Other Property. This includes the use of MassDOT property for staging, laydown, and storage of equipment and materials, including soil excavated from a project site.

This Policy Directive requires the Contractor/applicant to obtain a Non-Vehicular Access Permit from MassDOT to use MassDOT property for these purposes.

This Policy Directive is effective immediately and applies to all MassDOT construction projects.

General Permit Considerations and Conditions

In addition to other normal MassDOT Access Permit procedures, MassDOT shall consider the following during the application, review, implementation and monitoring processes of Access Permits required by this Policy Directive:

- Storage and placement of the Contractor's equipment and materials should not be allowed within the clear zone of the roadway.
- Stockpiled soils should not be located within 500 feet of residential receptors, as defined herein to include, but not be limited to, residential dwellings, residentially zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities.
- The Contractor/applicant shall identify the access/egress locations of the proposed storage areas. MassDOT will only approve locations determined to be safe for roadway users, construction workers and the general public.
- The Contractor may be required to submit a Traffic Management Plan and/or Lighting Plan for MassDOT review and approval as part of the permit application, depending on the proposed use of the area.

- The Contractor shall submit the permit application through MassDOT's online State Highway Access Permit System (SHAPS).
- MassDOT will waive the permit application fee for any application received from a MassDOT Contractor for any permit required by this Policy Directive and will waive any subsequent amendment and extension fees that may otherwise be required.
- MassDOT will review the permit application in accordance with applicable standard procedures and will apply standard permit terms and conditions, as necessary.
- The Resident Engineer will verify that the permit is approved before allowing the Contractor to use the affected area for the requested purpose.
- Areas permitted are for use by the approved applicant only and are not to be shared with or used by other vendors. Subcontractors specifically engaged with the applicant working on the specific MassDOT project will be allowed to use the area in accordance with the terms of the permit.
- Permits are issued on an annual basis and will require the Contractor to file for an extension each year to continue use.

Exemptions from Permit Requirements

Equipment and materials being used for active construction operations and located within the work zone of the construction contract are exempt from this permit requirement, provided they do not interfere with the safety or operation of the roadway or the work zone. Examples of these types of exempt uses are:

- Equipment and materials parked or stored within a protected (barriered) work zone.
- Materials placed in the work zone prior to same-day installation or use.
- Soils excavated temporarily and scheduled to be replaced, such as for trenching operations or for installation of drainage structures.

DOCUMENT B00420

PROPOSAL

HOLDEN

For: **Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad**

COMMONWEALTH OF MASSACHUSETTS

LOCATION

The work referred to herein is in the Town of HOLDEN in Worcester County, in the Commonwealth of Massachusetts, and is shown by the locus map (Document 00331) in the Proposal Pamphlet, the work locations extend as follows:

Salisbury Street

Beginning – Station 10+28.37 +/-

Bridge # H-18-004

Ending –Station 20+49.63 +/-

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 **510 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 # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
101.	1	CLEARING AND GRUBBING AT _____ PER ACRE		
102.1	100	TREE TRIMMING AT _____ PER FOOT		
102.3	16	HERBICIDE TREATMENT OF INVASIVE PLANTS AT _____ PER HOUR		
102.33	10	INVASIVE PLANT MANAGEMENT STRATEGY AT _____ PER HOUR		
102.511	5	TREE PROTECTION - ARMORING AND PRUNING AT _____ EACH		
102.521	100	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.	1	TREE REMOVED - DIAMETER 24 INCHES AND OVER AT _____ EACH		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
105.	1	STUMP REMOVED AT _____ EACH		
114.1	1	DEMOLITION OF SUPERSTRUCTURE OF BRIDGE NO. H-18-004 AT _____ LUMP SUM		
120.1	1,550	UNCLASSIFIED EXCAVATION AT _____ PER CUBIC YARD		
127.1	400	REINFORCED CONCRETE EXCAVATION AT _____ PER CUBIC YARD		
129.2	925	OLD PAVEMENT EXCAVATION AT _____ PER SQUARE YARD		
140.	950	BRIDGE EXCAVATION AT _____ PER CUBIC YARD		
141.	50	CLASS A TRENCH EXCAVATION AT _____ PER CUBIC YARD		
141.1	20	TEST PIT FOR EXPLORATION AT _____ PER CUBIC YARD		
142.	10	CLASS B TRENCH EXCAVATION AT _____ PER CUBIC YARD		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
144.	50	CLASS B ROCK EXCAVATION AT _____ PER CUBIC YARD		
150.	675	ORDINARY BORROW AT _____ PER CUBIC YARD		
150.1	130	SPECIAL BORROW AT _____ PER CUBIC YARD		
151.	390	GRAVEL BORROW AT _____ PER CUBIC YARD		
151.2	300	GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AT _____ PER CUBIC YARD		
156.	230	CRUSHED STONE AT _____ PER TON		
160.3	34	CONTROLLED LOW-STRENGTH MATERIAL (> 300 PSI) AT _____ PER CUBIC YARD		
170.	2,700	FINE GRADING AND COMPACTING - SUBGRADE AREA AT _____ PER SQUARE YARD		
180.01	1	ENVIRONMENTAL HEALTH AND SAFETY PROGRAM AT _____ LUMP SUM		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
180.02	40	PERSONAL PROTECTION LEVEL C UPGRADE AT _____ PER HOUR		
180.03	40	LICENSED SITE PROFESSIONAL SERVICES AT _____ PER HOUR		
181.11	3,300	DISPOSAL OF UNREGULATED SOIL AT _____ PER TON		
181.12	190	DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY AT _____ PER TON		
181.13	190	DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY AT _____ PER TON		
181.14	40	DISPOSAL OF HAZARDOUS WASTE AT _____ PER TON		
184.1	1	DISPOSAL OF TREATED WOOD PRODUCTS AT _____ PER TON		
201.	3	CATCH BASIN AT _____ EACH		
202.	1	MANHOLE AT _____ EACH		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
220.	3	DRAINAGE STRUCTURE ADJUSTED AT _____ EACH		
220.2	25	DRAINAGE STRUCTURE REBUILT AT _____ PER FOOT		
220.3	1	DRAINAGE STRUCTURE CHANGE IN TYPE AT _____ EACH		
220.5	2	DRAINAGE STRUCTURE REMODELED AT _____ EACH		
221.	5	FRAME AND COVER AT _____ EACH		
222.3	10	FRAME AND GRATE (OR COVER) MUNICIPAL STANDARD AT _____ EACH		
227.3	10	REMOVAL OF DRAINAGE STRUCTURE SEDIMENT AT _____ PER CUBIC YARD		
227.31	50	REMOVAL OF DRAINAGE PIPE SEDIMENT AT _____ PER FOOT		
227.4	2	MASONRY PLUG AT _____ PER SQUARE FOOT		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
243.12	130	12 INCH REINFORCED CONCRETE PIPE CLASS IV AT _____ PER FOOT		
358.	2	GATE BOX ADJUSTED AT _____ EACH		
376.5	1	HYDRANT - ADJUSTED AT _____ EACH		
402.	220	DENSE GRADED CRUSHED STONE FOR SUB-BASE AT _____ PER CUBIC YARD		
415.2	975	PAVEMENT FINE MILLING AT _____ PER SQUARE YARD		
431.	5	HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE AT _____ PER SQUARE YARD		
440.	10,800	CALCIUM CHLORIDE FOR ROADWAY DUST CONTROL AT _____ PER POUND		
443.	15	WATER FOR ROADWAY DUST CONTROL AT _____ PER 1000 GALLONS		
450.32	310	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0) AT _____ PER TON		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
450.42	450	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5) AT _____ PER TON		
450.601	280	SUPERPAVE BRIDGE SURFACE COURSE - 9.5 POLYMER (SSC-B - 9.5 - P) AT _____ PER TON		
450.701	44	SUPERPAVE BRIDGE PROTECTIVE COURSE - 9.5 POLYMER (SPC-B - 9.5 - P) AT _____ PER TON		
451.	70	HMA FOR PATCHING AT _____ PER TON		
452.	360	ASPHALT EMULSION FOR TACK COAT AT _____ PER GALLON		
453.	1,450	HMA JOINT ADHESIVE AT _____ PER FOOT		
458.71	340	EXPANDED SHALE LIGHTWEIGHT AGGREGATE AT _____ PER CUBIC YARD		
472.	50	TEMPORARY ASPHALT PATCHING AT _____ PER TON		
482.4	10	SAWCUTTING PORTLAND CEMENT CONCRETE AT _____ PER FOOT		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
504.2	2	GRANITE CURB TYPE VA4 - SPLAYED END AT _____ EACH		
506.	1,100	GRANITE CURB TYPE VB - STRAIGHT AT _____ PER FOOT		
506.1	60	GRANITE CURB TYPE VB - CURVED AT _____ PER FOOT		
509.	80	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - STRAIGHT AT _____ PER FOOT		
509.1	20	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - CURVED AT _____ PER FOOT		
514.	3	GRANITE CURB INLET - STRAIGHT AT _____ EACH		
570.3	340	HOT MIX ASPHALT CURB TYPE 3 AT _____ PER FOOT		
595.	1	CURB INLET REMOVED AND DISCARDED AT _____ EACH		
620.12	100	GUARDRAIL, TL-2 (SINGLE FACED) AT _____ PER FOOT		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
627.1	2	TRAILING ANCHORAGE AT _____ EACH		
627.83	2	GUARDRAIL TANGENT END TREATMENT, TL-3 AT _____ EACH		
628.24	1	TRANSITION TO BRIDGE RAIL AT _____ EACH		
628.314	2	TEMPORARY IMPACT ATTENUATOR, REDIRECTIVE, TL-2 AT _____ EACH		
630.2	675	HIGHWAY GUARD REMOVED AND DISCARDED AT _____ PER FOOT		
634.11	450	THRIE BEAM GUARDRAIL SYSTEM AT _____ PER FOOT		
644.148	140	48 INCH CHAIN LINK FENCE (SPRING TENSION WIRE) VINYL COATED (LINE POST OPTION) AT _____ PER FOOT		
657.	200	TEMPORARY FENCE AT _____ PER FOOT		
657.5	200	TEMPORARY FENCE REMOVED AND RESET AT _____ PER FOOT		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
697.1	10	SILT SACK AT _____ EACH		
698.3	765	GEOTEXTILE FABRIC FOR SEPARATION AT _____ PER SQUARE YARD		
701.	450	CEMENT CONCRETE SIDEWALK AT _____ PER SQUARE YARD		
701.1	30	CEMENT CONCRETE SIDEWALK AT DRIVEWAYS AT _____ PER SQUARE YARD		
701.2	20	CEMENT CONCRETE PEDESTRIAN CURB RAMP AT _____ PER SQUARE YARD		
702.	50	HOT MIX ASPHALT SIDEWALK OR DRIVEWAY AT _____ PER TON		
711.	1	BOUND REMOVED AND RESET AT _____ EACH		
722.3	1	SCHEDULE OF OPERATIONS (TYPE C) - FIXED PRICE $55,500 AT Fifty Five Thousand Five Hundred Dollars LUMP SUM	$55,500.00	$55,500.00
740.	17	ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) AT _____ PER MONTH		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
748.	1	MOBILIZATION AT _____ LUMP SUM		
751.1	140	LOAM FOR LAWNS AT _____ PER CUBIC YARD		
751.7	40	COMPOST BLANKET AT _____ PER CUBIC YARD		
751.765	80	COMPOST AND SEED OVER MODIFIED ROCK AT _____ PER CUBIC YARD		
765.	975	SEEDING AT _____ PER SQUARE YARD		
765.21	10	ANNUAL COVER CROP FOR NATIVE SEEDING AT _____ PER POUND		
765.411	1	SHORT GRASSLAND MIX AT _____ PER POUND		
765.635	230	NATIVE SEEDING AND ESTABLISHMENT AT _____ PER SQUARE YARD		
767.121	400	SEDIMENT CONTROL BARRIER AT _____ PER FOOT		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
769.1	280	PAVEMENT MILLING MULCH UNDER GUARDRAIL AT _____ PER SQUARE YARD		
772.161	7	TREE EVERGREEN - NIGRA AMERICAN ARBORVITAE - 5-6 FEET AT _____ EACH		
772.335	5	TREE EVERGREEN - EASTERN RED CEDAR - 4-5 FEET AT _____ EACH		
774.638	7	TREE EVERGREEN WHITE SPRUCE - 5-6 FEET AT _____ EACH		
816.81	1	TEMPORARY TRAFFIC CONTROL SIGNAL AT _____ LUMP SUM		
832.	20	WARNING-REGULATORY AND ROUTE MARKER - ALUMINUM PANEL (TYPE A) AT _____ PER SQUARE FOOT		
847.1	10	SIGN SUP (NOT GUIDE)+RTE MKR W/1 BRKWAY POST ASSEMBLY - STEEL AT _____ EACH		
850.41	220	ROADWAY FLAGGER AT _____ PER HOUR		
851.1	70	TRAFFIC CONES FOR TRAFFIC MANAGEMENT AT _____ PER DAY		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
852.	625	SAFETY SIGNING FOR TRAFFIC MANAGEMENT AT _____ PER SQUARE FOOT		
853.1	10	PORTABLE BREAKAWAY BARRICADE TYPE III AT _____ EACH		
853.2	70	TEMPORARY BARRIER (TL-2) AT _____ PER FOOT		
853.21	70	TEMPORARY BARRIER REMOVED AND RESET AT _____ PER FOOT		
854.016	100	TEMPORARY PAVING MARKINGS - 6 INCH (PAINTED) AT _____ PER FOOT		
854.1	100	PAVEMENT MARKING REMOVAL AT _____ PER SQUARE FOOT		
856.	190	ARROW BOARD AT _____ PER DAY		
856.12	2,000	PORTABLE CHANGEABLE MESSAGE SIGN AT _____ PER DAY		
859.	38,900	REFLECTORIZED DRUM AT _____ PER DAY		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
860.112	60	12 INCH REFLECTORIZED WHITE LINE (PAINTED) AT _____ PER FOOT		
862.506	2,000	6-IN. RECESSED WHITE LINE (MC, FD, WR) AT _____ PER FOOT		
862.512	310	12-IN. RECESSED WHITE LINE (MC, FD, WR) AT _____ PER FOOT		
863.506	2,000	6-IN. RECESSED YELLOW LINE (MC, FD, WR) AT _____ PER FOOT		
874.	2	STREET NAME SIGN AT _____ EACH		
874.2	3	TRAFFIC SIGN REMOVED AND RESET AT _____ EACH		
874.4	2	TRAFFIC SIGN REMOVED AND STACKED AT _____ EACH		
876.5	1	SOLAR PANELS AND POST REMOVED AND STACKED AT _____ EACH		
945.10	2,100	DRILLED MICROPILES AT _____ PER FOOT		

Project # 612190	Contract # 134594			
Location : HOLDEN				
Description : Bridge Replacement, H-18-004, Salisbury Street over G&W Railroad				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
948.60	1	MICROPILE VERIFICATION LOAD TEST AT _____ EACH		
948.61	4	MICROPILE PROOF LOAD TEST AT _____ EACH		
950.2	1	TEMPORARY EXCAVATION SUPPORT AT _____ LUMP SUM		
986.	575	MODIFIED ROCKFILL AT _____ PER TON		
994.01	1	TEMPORARY PROTECTIVE SHIELDING BRIDGE NO. H-18-004 (CNU) AT _____ LUMP SUM		
995.01	1	BRIDGE STRUCTURE, BRIDGE NO. H-18-004 (CNU) AT _____ LUMP SUM		
996.4	1	SOLDIER PILE AND LAGGING WALL AT _____ LUMP SUM		
996.5	960	PREFABRICATED MODULAR GRAVITY RETAINING WALL AT _____ PER SQUARE FOOT		
Total Qty:	85,431			

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