

VOLUME 1 OF 2

COMMONWEALTH OF MASSACHUSETTS



**CONTRACT DOCUMENTS
AND SPECIAL PROVISIONS**

PROPOSAL NO.	608051-132406
P.V. =	\$37,384,000.00
PLANS	YES

FOR

**Federal Aid Project No. STP/CMQ/HSI-0034(030)X
Reconstruction on Route 38 (Main Street), from Route 62 to the Woburn C.L.**

in the Town of

WILMINGTON

In accordance with the STANDARD SPECIFICATIONS
for HIGHWAYS and BRIDGES dated 2025

This Proposal to be opened and read:

TUESDAY, JANUARY 27, 2026 at 2:00 P.M.

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DOCUMENT 00010

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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, JANUARY 27, 2026 at 2:00 P.M. **

WILMINGTON

Federal Aid Project No. STP/CMQ/HSI-0034(030)X

Reconstruction on Route 38 (Main Street), from Route 62 to the Woburn C.L.

****Date Subject to Change**

PROJECT VALUE = \$37,384,000.00

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

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

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

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

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

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

NOTICE TO CONTRACTORS (Continued)

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

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

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

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

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

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

NOTICE TO CONTRACTORS (Continued)**PRICE ADJUSTMENTS**

This Contract contains price adjustments for hot mix asphalt and Portland cement mixtures, diesel fuel, and gasoline. For reference the base prices are as follows: liquid asphalt \$625.00 per ton, Portland cement \$425.13 per ton, diesel fuel \$2.996 per gallon, and gasoline \$2.411 per gallon, and Steel Base Price Index 381.4 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, NOVEMBER 22, 2025

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DOCUMENT 00210

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

July 1, 1981, updated October 2016

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

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

- (1) "Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A to forty-four H, inclusive, of chapter one hundred and forty-nine, which is for an amount or estimated amount greater than one hundred thousand dollars.
- (2) "Contract" means any contract awarded or executed pursuant to sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A through forty-four H, inclusive, of chapter one hundred and forty-nine, which is for amount or estimated amount greater than one hundred thousand dollars.
- (3) "Records" means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memoranda, invoices, computer printouts, tapes, discs, papers and other documents or transcribed information of any type, whether expressed in ordinary or machine language.
- (4) "Independent Certified Public Accountant" means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his residence or principal office and who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant's independence shall not be confined to the relationships existing in connection with the filing of reports with the awarding authority.
- (5) "Audit", when used in regard to financial statements, means an examination of records by an independent certified public accountant in accordance with generally accepted accounting principles and auditing standards for the purpose of expressing a certified opinion thereon, or, in the alternative, a qualified opinion or a declination to express an opinion for stated reasons.
- (6) "Accountant's Report", when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which he has made and sets forth his opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefor shall be stated. An accountant's report shall include as a part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of the financial condition of the contractor.
- (7) "Management", when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the contractor.
- (8) Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.

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

- (1) The contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and
- (2) Until the expiration of six years after final payment, the office of inspector general, and the commissioner of capital asset management and maintenance shall have the right to examine any books, documents, papers or records of the contractor or of his subcontractors that directly pertain to, and involve transactions relating to, the contractor or his subcontractors, and
- (3) If the agreement is a contract as defined herein, the contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his description the date of the change and reasons therefor, and shall accompany said description with a letter from the contractor's independent certified public accountant approving or otherwise commenting on the changes, and
- (4) If the agreement is a contract as defined herein, the contractor has filed a statement of management on internal accounting controls as set forth in paragraph (c) below prior to the execution of the contract, and
- (5) If the agreement is a contract as defined herein, the contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in paragraph (d) below.

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

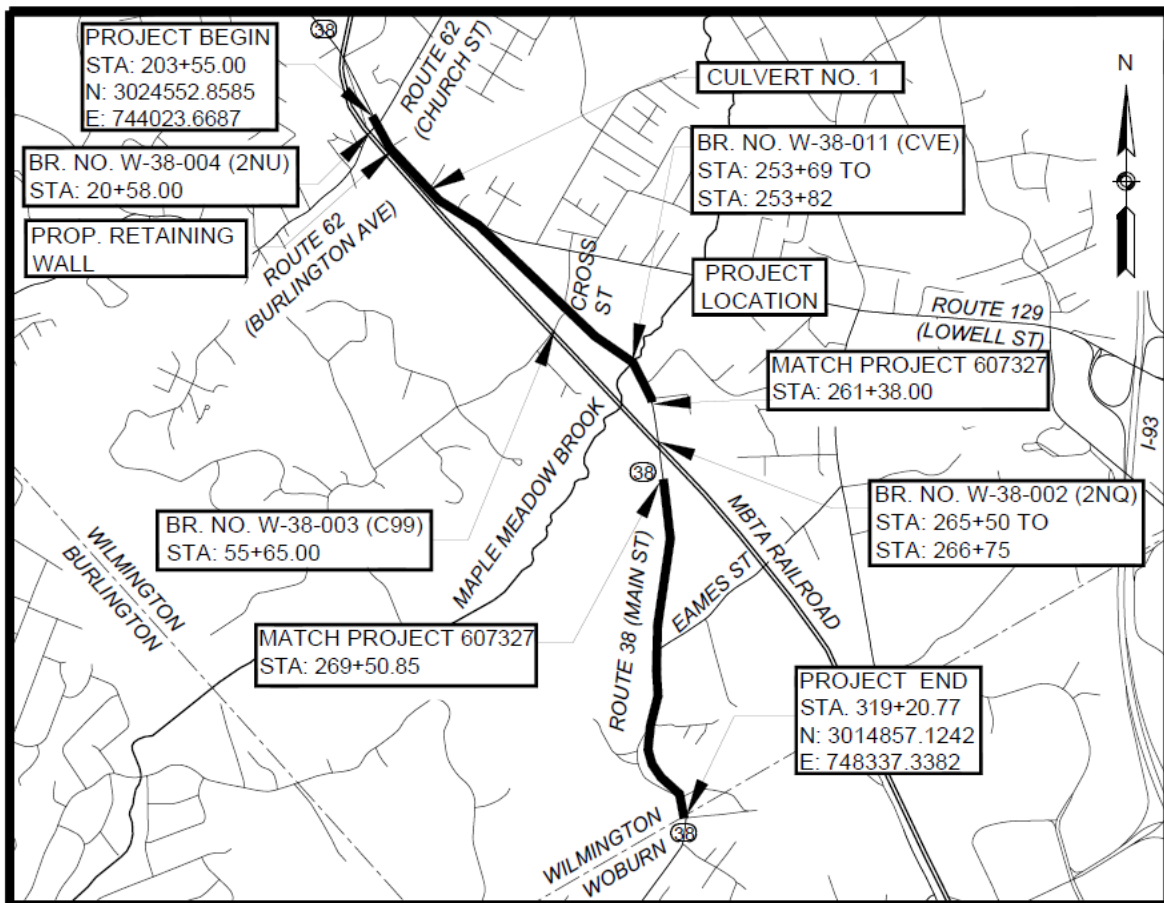
- (1) transactions are executed in accordance with management's general and specific authorization;
- (2) transactions are recorded as necessary
 - i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and
 - ii. to maintain accountability for assets;
- (3) access to assets is permitted only in accordance with management's general or specific authorization; and
- (4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

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

- (1) whether the representations of management in response to this paragraph and paragraph (b) above are consistent with the result of management's evaluation of the system of internal accounting controls; and
- (2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

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DOCUMENT 00331

LOCUS MAP**WILMINGTON****Federal Aid Project No. STP/CMQ/HSI-0034(030)X****Reconstruction on Route 38 (Main Street), from Route 62 to the Woburn C.L.**

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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/DateContractor 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): __________



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: _____

[illegible]

WORK NOT COMPLETED WITHIN SPECIFIED TIME:

DOCUMENT 00710
GENERAL CONTRACT PROVISIONS
Revised: 04-16-25

NOTICE OF AVAILABILITY

The STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES dated 2025, 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

SEPTEMBER 30, 2025

The 2025 *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 2.00: PROPOSAL REQUIREMENTS AND CONDITIONS

Subsection 2.09: Rejection of Proposals

Replace the first bullet in the third paragraph with the following:

- award of the contract would result in the Bidder exceeding the Aggregate Bonding Capacity or the Single Bonding Capacity established by its Surety Company, or the Bidder's Proposal exceeds its Single Contract Limit, or the Bidder was not prequalified in the specified class of work on or before the time of bid opening; or

SECTION 3.00: AWARD AND EXECUTION OF THE CONTRACT

Subsection 3.02: Award of Contract

Replace the third paragraph with the following:

The successful bidder will be notified by mail or otherwise that their bid has been accepted and that they have been awarded the Contract.

SECTION 7.00: LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

Subsection 7.01: Laws to be Observed

In paragraph 701.G Buy America Provisions change Federally-aid to Federal-aid.

Subsection 7.05: Insurance Requirements

Change the title of paragraph A to Workers' Compensation Insurance

Subsection 7.22: Labor, Lodging, Board, Maximum Hours of Employment, Weekly Payment, Keeping of Payroll Records.

Replace this subsection with the following;

Subsection 7.22: Labor, Lodging, Board; Maximum Hours of Employment; Minimum Wage Rates; Payment of Wages; Keeping of Payroll Records

Every employee in public work shall lodge, board and trade where and with whom he elects; and no person or their agents or employees under contract with the commonwealth, a county, city or town, or with a department, board, commission or officer acting therefor, for the doing of public work shall directly or indirectly require, as a condition of employment therein, that the employee shall lodge, board or trade at a particular place or with a particular person. This section shall be made a part of the contract for such employment. (M.G.L. c. 149, § 25).

Every contract, except for the purchase of material or supplies, involving the employment of laborers, workers, mechanics, foremen or inspectors, to which the commonwealth or any county or any town, subject to section thirty, is a party, shall contain a stipulation that no laborer, worker, mechanic, foreman or inspector working within the commonwealth, in the employ of the contractor, sub-contractor or other person doing or contracting to do the whole or a part of the work contemplated by the contract, shall be required or permitted to work more than eight hours in any one day or more than forty-eight hours in any one week, or more than six days in any one week, except in cases of emergency, or, in case any town subject to section thirty-one is a party to such a contract, more than eight hours in any one day, except as aforesaid; provided, that in contracts entered into by the department of highways [a predecessor agency to MassDOT] for the construction or reconstruction of highways there may be inserted in said stipulation a provision that said department, or any contractor or sub-contractor for said department, may employ laborers, workers, mechanics, foreman and inspectors for more than eight hours in any one day in such construction or reconstruction when, in the opinion of the commissioner [currently defined in M.G.L. c. 149, § 1 as the director of the Department of Labor Standards], public necessity so requires. Every such contract not containing the aforesaid stipulation shall be null and void. (M.G.L. c. 149, § 34).

Attention of Bidders is called to M.G.L. c. 149, § 26-27H (the Prevailing Wage Law), requiring that the rate per hour of the wages paid to mechanics and apprentices, teamsters, chauffeurs and laborers in the construction of public works shall not be less than the rate or rates of wages to be determined by the director of the department of labor standards, and M.G.L. c. 149, § 148 requiring the weekly or bi-weekly payment of employees.

The Contractor shall furnish certified copies of any or all payrolls for the Contract, showing the name, address, and occupational classification of each employee on said works, and the hours worked by, and the wages paid to each such employee. Such payroll shall also include the rates paid for rented trucks or rental equipment of any kind used on the work. This requirement shall also apply to the work of any Subcontractor, having a Subcontract for any of the work performed on the project. Such records shall be kept in such manner as the Director of Labor Standards shall prescribe, and shall be open to inspection by the Engineer or any authorized representative of the Department of Labor Standards at any reasonable time and as often as may be necessary.

SECTION 8.00: PROSECUTION AND PROGRESS

Subsection 8.01: Subletting or Assignment of Contract

In the first bullet of the third paragraph replace the title of Subsection 7.22 Labor, Lodging, Board; Maximum Hours of Employment; Minimum Wage Rates; Payment of Wages; Keeping of Payroll Records

SECTION 9.00: MEASUREMENT AND PAYMENT

Subsection 9.03: Payment for Extra Work

Replace 903.B, first paragraph, numbers (2) and (3) with the following.

- (2) Plus 13 percent of direct labor, for the estimated costs of Federal Insurance Contribution Act (FICA) including Medicare; Federal Unemployment Tax Act (FUTA); State Unemployment Tax Act (SUTA), which includes Unemployment Insurance, the Workforce Training Fund Program,-Employer Medical Assistance Contribution, and COVID-19 Recovery Assessment; Earned Sick Time (EST) Law (940 CMR 33.00); and Paid Family and Medical Leave (PFML) Act (458 CMR 2.00); or, as an alternative to the above 13 percent, the Contractor may elect to use actual rates for FICA, FUTA, SUTA, EST and PFML provided the actual rates are supported with verifiable documentation and shall be subject to review by MassDOT Audit Operations.
- (3) Plus the estimated cost of Workers' Compensation and Liability Insurance, Health, Welfare and Pension benefits, and such additional fringe benefits which the Contractor is required to pay as a result of Union Labor Agreements and/or is required by authorized governmental agencies;

In 903.B, second paragraph, number (3), replace the word "Workmen's" with "Workers".

DIVISION II

CONSTRUCTION DETAILS

SECTION 300: WATER SYSTEMS

SUBSECTION 301: WATER SYSTEMS

Subsection 301.60G: Laying Pipe

Revise the third paragraph to read as follows:

Pipe sections shall be laid with the bell on the upgrade end. Before laying the pipe, the outside of the spigot and the inside of the bell shall be wire brushed and wiped clean and dry.

Subsection 301.80: Method of Measurement

Delete the words cast iron in the first paragraph.

Replace the second paragraph with the following;

Fittings, consisting of bends, tees, caps, wyes, sleeves, reducers, increasers, blow-off fittings and other special fittings, apply only when new materials are necessary and which are not specifically provided for under other items in the Proposal. Fittings other than new will not be paid separately but only under the applicable pipe items. When new fittings are measured separately for payment, the length of pipe occupied by the fittings will not be measured for payment.

SECTION 700: INCIDENTAL WORK

SUBSECTION 715: RURAL MAIL BOXES REMOVED AND RESET

Subsection 715: Rural Mail Boxes Removed and Reset

Change the words mail box and mail boxes to the word mailbox or mailboxes where encountered in the title, and all subsections.

SECTION 800: TRAFFIC CONTROL DEVICES

SUBSECTION 850: TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE OPERATIONS

Subsection 850.29: Temporary Barrier and Temporary Barrier Removed and Reset

Delete this subsection.

Subsection 850.49: Temporary Barrier

Delete this subsection.

Subsection 850.69: Temporary Barrier and Temporary Barrier Removed and Reset

Delete this subsection.

Subsection 850.80: Method of Measurement

Delete the fifth paragraph from the end of this subsection.

Subsection 850.81: Basis of Payment

Delete the sixth and seventh paragraphs from the end of this subsection.

SUBSECTION 853: TEMPORARY BARRIERSubsection 853.: Temporary Barrier

Add this new subsection:

DESCRIPTION**853.20: General**

Work under this Subsection consists of furnishing, placing, adjusting, resetting, maintaining, and removing temporary barrier.

MATERIALS**853.40: General**

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

Material	Section
Precast, Prestressed, and Prefabricated Concrete Products	M4.09.0
Temporary Barrier	M10.16.0
Limited Deflection Temporary Barrier	M10.16.1
Delineators for Temporary Barrier	M10.16.2

The Contractor shall supply a temporary barrier system that meets or exceeds the Test Level (TL) designated in the description of the bid item.

If the Contractor uses a proprietary temporary barrier system, it shall be listed on the QTCE.

Temporary barrier segments that appear to be damaged or in otherwise unsuitable condition may be rejected or ordered to be replaced by the Engineer at no additional cost.

853.41: Deflection

The deflection of a temporary barrier system is defined as the measured deflection, permanent and/or dynamic, during MASH Test Designation 2-11 (for TL-2) or Test Designation 3-11 (for TL-3).

The Contractor shall supply a temporary barrier system that is equal to or less than the maximum allowable deflection (permanent and/or dynamic) for each run of temporary barrier, as shown in the Plans or stated in the Special Provisions. If no distinction between permanent and temporary deflection is shown in the plans or Special Provisions, then dynamic deflection shall govern.

853.42: Precast Concrete Barriers

Precast Concrete Barriers used as temporary barriers shall be fabricated in accordance with M4.09.0: Precast, Prestressed, and Prefabricated Concrete Products. The Contractor shall submit a Certificate of Compliance (CoC) attesting to meeting this requirement.

853.43: Delineation

Delineators installed at 20-ft intervals throughout the entire barrier run shall be included. The delineators shall conform to M10.16.2: Delineators for Temporary Barrier. Delineators that may act as a washer on a bolted connection shall not be used unless specifically allowed by the barrier manufacturer. Delineators that are damaged, are no longer reflective, or go missing while temporary barrier is deployed shall be replaced in kind by the Contractor.

Delineators may be top or side-mounted to the barrier and oriented in a manner to maximize reflectivity to approaching traffic.

Temporary barrier placed on the right side of the travel way, or top-mounted and separating two or more lanes traveling in the same direction, shall use white delineators. Temporary barrier placed on the left side of the travel way shall use amber or yellow delineators; if separating two-way traffic and top-mounted, the delineator shall be double-sided.

853.44: Anchored Barrier

Temporary barrier systems that include an anchor system in order to meet performance requirements of the contract and/or meet MASH testing requirements may be accepted for use at the discretion of the Department.

Barrier that utilizes an anchor system shall use the same pattern, placement, and material of anchors that was used in MASH crash testing.

853.45: Shop Drawings

Within 30 days of the Notice to Proceed, the Contractor shall provide Shop Drawings showing the proposed temporary barrier system and confirming that it conforms to 853.40: General and will meet the allowable deflection requirements as described in 853.41: Deflection.

If anchors are proposed, the means, methods, pattern, placement, and materials for anchoring and subsequent pavement and/or deck repairs following removal of the temporary barrier system shall be included in the Shop Drawing submittal. If the use of an anchor system is rejected by the Department, the Contractor shall select an unanchored system that meets or exceeds the contract specified performance requirements, at no additional cost.

Shop Drawings for proprietary barrier systems shall include manufacturer's instructions for installation.

CONSTRUCTION METHODS

853.60: General

A Traffic Management Plan approved by the Department is required prior to the installation of the temporary barrier system.

The Contractor shall install temporary barrier systems in accordance with the Plans.

Barrier ends shall not be exposed to approaching traffic during installation. Crashworthy shielding or attenuation shall be provided at all times.

Proprietary temporary barrier systems shall be installed per the manufacturer's instructions.

The Contractor shall not place any breaks in the temporary barrier system that will result in sections that are shorter than the tested minimum length-of-need (LON) under MASH Test 2-11 (for TL-2) or 3-11 (for TL-3). Exceptions shall be allowed for gate systems or changeable length segments placed over expansion joints, if those barrier segment types have been determined to be crashworthy per MASH.

Temporary barrier shall not be placed on unpaved surfaces, unless otherwise shown in the Plans.

The Contractor shall not store materials, vehicles, or other equipment within the measured dynamic deflection envelope, as defined in 853.41: Deflection.

853.61: Temporary Barrier Removed and Reset

Temporary Barrier Removed and Reset consists of relocating a string of temporary barrier from one alignment to another to support the sequence and phasing of construction, as shown in the Plans.

Temporary Barrier Removed and Reset does not include moving all or a portion of the temporary barrier system to gain access to a work area, for the convenience of the Contractor, or to realign units that have moved due to construction activities or a traffic incident.

853.62: Quality Control Inspection

After temporary barrier installation is completed, the Contractor shall perform a Quality Control (QC) Inspection in the presence of the Engineer. QC Inspection activities shall include, but are not limited to the following reviews:

- Installation location per the approved Plans.
- Alignment and connection mechanism between adjacent barrier segments.
- Alignment and connection mechanism between barrier segment and attenuator, if present.
- Anchor system installation, if present.

For proprietary barrier systems, the QC Inspection shall also include any manufacturer-specific inspection details or criteria found in the installation instructions.

Work behind the barrier shall not commence until the QC Inspection has been accepted by the Engineer.

COMPENSATION

853.80: Method of Measurement

Temporary Barrier will be measured by the foot installed, in place.

Temporary Barrier Removed and Reset will be measured by the foot removed and reset.

853.81: Basis of Payment

Temporary Barrier will be paid for at the contract unit price per foot which shall provide full compensation for fabrication, storage, transport, furnishment, installation, delineation, alignment, maintenance, repair, and final removal of the temporary barrier.

Temporary Barrier Removed and Reset will be paid for at the contract unit price per foot which shall provide full compensation for removing, relocating, transporting, and installing new anchorage (if used). If more than one accepted temporary barrier system is approved for use in a single contract, the unit cost for Temporary Barrier Removed and Reset shall not differ among systems.

All costs associated with fabrication, installation, and maintenance of temporary barrier delineators shall be considered incidental to the cost of the item.

All costs associated with Shop Drawings and COCs shall be considered incidental to the item.

All costs associated with patching or repairing the road surface or bridge deck due to the installation and removal of temporary barrier and/or anchors for a temporary barrier system shall be considered incidental to the cost of the item.

853.82: Payment Items

Item number	Description	Unit
853.2	Temporary Barrier (TL-2)	Foot
853.21	Temporary Barrier Removed and Reset	Foot
853.23	Temporary Barrier (TL-3)	Foot
853.33	Temporary Barrier – Limited Deflection (TL-3)	Foot

SECTION 900: STRUCTURES

SUBSECTION 902: ULTRA HIGH PERFORMANCE CONCRETE

Subsection 902.32: Mockup

In Table 902.32-1 change the Link Slab width to 2 ft – 0 in. and change the Joint Header width to 0 ft – 6 in. .

Subsection 902.32: - 902.38

Renumber section 902.32 Surface Preparation to 902.33 Surface Preparation and renumber section 902.33 through 902.38 to 902.34 through 902.39.

DIVISION III

MATERIALS SPECIFICATIONS

SECTION M2: AGGREGATES AND RELATED MATERIALS

Subsection M2.01.0 Crushed Stone

Replace the fourth paragraph and the associated asterisk notes with the following;

The crushed stone shall have a maximum 45% wear as determined by the Los Angeles Abrasion Test (AASHTO T 96)

SECTION M5: PIPE, CULVERT SECTIONS AND CONDUIT

Subsection M5.01.0 Joint Materials for Pipe

Replace this subsection with the following;

- Jute or oakum furnished for use in pipe joints shall be of an accepted grade approved for common usage.
- Mortar shall conform to the requirements of M4.04.0: Cementitious Grout, Mortar and Concrete Products
- Standard couplers as approved by the manufacturer shall be used to join corrugated metal pipe
- Rubber ring or plastic gaskets for concrete pipe joints, or manholes section joints shall be of tough, flexible, chemical-resistant material, and of such size and shape as to ensure satisfactory pipe joints when incorporated in the work and shall conform to AWWA C153.
- Rubber gasket joints for ductile iron pipe shall be Styrene-Butadiene Rubber (SBR), Ethylene Propylene Diene Monomer (EPDM) or Nitrile and conform to AWWA C111

Subsection M5.05.03.B Gate Valves

Replace this subsection with the following;

Gate valves shall conform to the requirements of AWWA Standard C500 and/or to the type used by the municipality as specified in the Special Provisions.

SECTION M7: PAINTS, PROTECTIVE COATINGS AND PAVEMENT MARKINGS

Subsection M7.01.04 Fast Drying White and Yellow Waterborne Traffic Paint

Replace the subsection with the following;

Approved waterborne traffic paint shall be tested in accordance with AASHTO M 348 and be listed on the QCML. The dry paint film shall be under the Toxicity Characteristic Leaching Procedure (TCLP) limits for all contaminants listed in 40 CFR 261.24. The markings shall be installed using reflective glass beads meeting the requirements of M7.01.07. For waterborne yellow paint use Organic Yellow No. 65 or No. 75 pigment.

SECTION M9: MISCELLANEOUS MATERIALS

Subsection M9.12.0 Reflectors for Barriers

Delete this subsection.

SECTION M10: TRAFFIC CONTROL DEVICES

Subsection M10.16.0: Temporary Barrier

Subsection M10.16.1: Limited Deflection Temporary Barrier

Subsection M10.16.2: Delineators for Temporary Barrier

Add these new subsections.

DOCUMENT 00719

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

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

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POLICY

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

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

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

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

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

1. DEFINITIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2. DBE PARTICIPATION

a. Goal

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

☒ Design-Bid-Build Projects: DBE Participation Goal 0 %
(One half of this goal shall be met in the form of Subcontractor construction activity)

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

b. Bidders List

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

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

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

3. CONTRACTOR ASSURANCES

No Contractor or any Subcontractor shall discriminate on the basis of race color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in all respects and as applicable prior to, or subsequent to, award of U.S. DOT assisted Contracts. The Contractor agrees to affirmatively seek out and consider DBE firms as Contractors, Subcontractors, and/or suppliers of materials and services for this Contract. No Contract will be approved until MassDOT has reviewed Bidders'/Contractors' affirmative actions concerning DBEs. Failure to carry out these requirements is a material breach of this Contract which may result in the termination of the Contract or such other remedy as MassDOT or FHWA deem appropriate.

4. REQUIRED SUBCONTRACT PROVISIONS

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

5. ELIGIBILITY OF DBES

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

a. Massachusetts DBE Directory

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

Contractors are encouraged to make use of the DBE Directory maintained by SDO on the Internet. This listing is updated daily and may be accessed at the SDO's website at:

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

b. DBE Certification

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

c. Joint Venture Approval

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

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

6. COUNTING DBE PARTICIPATION TOWARDS DBE PARTICIPATION GOALS

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

a. Commercially Useful Function

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

b. Counting Participation Toward The Contract Participation Goal

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

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

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- (2) MassDOT will count the entire amount of fees or commissions charged by a DBE firm for providing bona fide services, such as professional, technical, consultant, or managerial services, or for providing bonds or insurance specifically required for the performance of a U.S. DOT assisted Contract, toward DBE participation goals, provided it is determined that the fee is reasonable and not excessive as compared with fees customarily allowed for similar services.
 - (3) When a DBE performs as a participant in a joint venture, MassDOT will count toward DBE participation goals a portion of the total dollar value of the contract that is equal to the distinct, clearly defined portion of the work of the Contract that the DBE performs with its own forces.
 - (4) MassDOT will use the following factors in determining whether a DBE trucking company is performing a commercially useful function:
 - (i) the DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract; there cannot be a contrived arrangement for the purpose of meeting DBE participation goals.
 - (ii) the DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the Contract.
 - (iii) the Contractor will receive DBE credit for the total value of the transportation services the DBE provides on the Contract using trucks owned, insured, and operated by the DBE itself and using drivers the DBE employs alone.
 - (iv) the DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The Contractor who has a contract with a DBE who leases trucks from another DBE will receive credit for the total value of the transportation services of the lease.
 - (v) the DBE may also lease trucks from a non-DBE firm, including an owner-operator. The Contractor who has a Contract with a DBE who leases trucks from a non-DBE is entitled to credit for the total value of the transportation services provided by non-DBE lessees not to exceed the value of transportation services provided by DBE-owned trucks on the Contract. Additional participation by non-DBE lessees receives credit only for the fee or commission it receives as a result of the lease arrangement, fee or commission it receives as a result of the lease arrangement. The DBE does not receive credit for the total value of the transportation services provided by the lessee, since these services are not provided by a DBE.
 - (vi) the lease must indicate that the DBE has exclusive use of, and control over, the truck. This does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the name and identification number of the DBE.
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- (5) MassDOT will count the Prime Contractor's expenditures with DBEs for materials or supplies toward DBE participation goals as follows:
- (i) if the materials or supplies are obtained from a DBE manufacturer, as defined in Section 1 above, MassDOT will count one hundred (100%) percent of the cost of the materials or supplies toward DBE participation goals, provided the DBE meets the other requirements of the regulations.
 - (ii) if the materials or supplies are purchased from a DBE regular dealer, as defined in Section 1 above, MassDOT will count sixty (60%) percent of the cost of the materials or supplies toward the Contract participation goal, provided the DBE meets the other requirements of the regulations.
 - (iii) for materials or supplies purchased from a DBE which is neither a manufacturer nor a regular dealer, MassDOT will count the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site toward the Contract participation goal, provided that MassDOT determines the fees to be reasonable and not excessive as compared with fees customarily allowed for similar services; the cost of the materials and supplies themselves will not be counted; and provided the DBE meets the other requirements of the regulations.

c. Joint Check Policy

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

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

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

Other factors MassDOT may consider:

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

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

d. Joint Check Procedure(s)

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

7. AWARD DOCUMENTATION AND PROCEDURES

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

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

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

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

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

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

8. COMPLIANCE

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

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

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

n. Prompt Payment.

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

9. SANCTIONS

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

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

10. FURTHER INFORMATION; ENFORCEMENT, COOPERATION AND CONFIDENTIALITY.

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

- (1) If you are a firm that does not meet the eligibility criteria of 49 CFR, Parts 26.61 to 26.73 (“subpart D”), that attempts to participate in a DOT- assisted program as a DBE on the basis of false, fraudulent, or deceitful statements or representations or under circumstances indicating a serious lack of business integrity or honesty, MassDOT or FHWA may initiate suspension or debarment proceedings against you under 49 CFR Part 29.
 - (2) If you are a firm that, in order to meet DBE Contract participation goals or other DBE Program requirements, uses or attempts to use, on the basis of false, fraudulent or deceitful statements or representations or under circumstances indicating a serious lack of business integrity or honesty, another firm that does not meet the eligibility criteria of subpart D, FHWA may initiate suspension or debarment proceedings against you under 49 CFR Part 29.
 - (3) In a suspension or debarment proceeding brought either under subparagraph a.(1) or b.(2) of this section, the concerned operating administration may consider the fact that a purported DBE has been certified by a recipient. Such certification does not preclude FHWA from determining that the purported DBE, or another firm that has used or attempted to use it to meet DBE participation goals, should be suspended or debarred.
 - (4) FHWA may take enforcement action under 49 CFR Part 31, Program Fraud and Civil Remedies, against any participant in the DBE Program whose conduct is subject to such action under 49 CFR Part 31.
 - (5) FHWA may refer to the Department of Justice, for prosecution under 18 U.S.C. 1001 or other applicable provisions of law, any person who makes a false or fraudulent statement in connection with participation of a DBE in any DOT-assisted program or otherwise violates applicable Federal statutes.
- b. Pursuant to 49 CFR Part 26.109, the rules governing information, confidentiality, cooperation, and intimidation or retaliation are as follows:
- (1) Availability of records.
 - (i) In responding to requests for information concerning any aspect of the DBE Program, FHWA complies with provisions of the Federal Freedom of Information and Privacy Acts (5 U.S.C. 552 and 552a). FHWA may make available to the public any information concerning the DBE Program release of which is not prohibited by Federal law.
 - (ii) MassDOT shall safeguard from disclosure to unauthorized persons information that may reasonably be considered as confidential business information, consistent with Federal and Massachusetts General Law (M.G.L. c. 66, § 10, M.G.L. c. 4, §7 (26), 950 CMR 32.00).
 - (2) Confidentiality of information on complainants. Notwithstanding the provisions of subparagraph b.(1) of this section, the identity of complainants shall be kept confidential, at their election. If such confidentiality will hinder the investigation, proceeding or hearing, or result in a denial of appropriate administrative due process to other parties, the complainant must be advised for the purpose of waiving the privilege. Complainants are advised that, in some circumstances, failure to waive the privilege may result in the closure of the investigation or dismissal of the proceeding or hearing.

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

11. LIST OF ADDITIONAL DOCUMENTS.

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

REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS

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

ATTACHMENTS

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

I. GENERAL

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

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

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

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

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work

performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract. 23 CFR 633.102(d).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6. Training and Promotion:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

10. Assurances Required:

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

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

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

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

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

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

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

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

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

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

III. NONSEGREGATED FACILITIES

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

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

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

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

Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

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

1. Minimum wages (29 CFR 5.5)

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

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

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

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

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

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

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

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

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

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

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

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

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

(5) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division

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

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

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

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

2. Withholding (29 CFR 5.5)

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

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

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

- (1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;
- (2) A contracting agency for its procurement costs;
- (3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;
- (4) A contractor's assignee(s);
- (5) A contractor's successor(s); or
- (6) A claim asserted under the Prompt Payment Act, [31 U.S.C. 3901](#)–3907.

3. Records and certified payrolls (29 CFR 5.5)

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

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

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

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

b. Certified payroll requirements (1) Frequency and method of submission. The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to the contracting

agency. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

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

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

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

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

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

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

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

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

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

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

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

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

(3) *Required information disclosures.* Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address

of each covered worker, and must provide them upon request to the contracting agency, the State DOT, the FHWA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

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

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

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

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

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

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

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

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

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

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

6. Subcontracts. The contractor or subcontractor must insert FHWA-1273 in any subcontracts, along with the applicable wage determination(s) and such other clauses or contract modifications as the contracting agency may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate. 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

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

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

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

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

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

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

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

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

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

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

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

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

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

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph 1. of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or

mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph 1. of this section, in the sum currently provided in 29 CFR 5.5(b)(2)* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1. of this section.

* \$31 as of January 15, 2023 (See 88 FR 88 FR 2210) as may be adjusted annually by the Department of Labor, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990.

3. Withholding for unpaid wages and liquidated damages

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

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

- (1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;
- (2) A contracting agency for its procurement costs;
- (3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;
- (4) A contractor's assignee(s);
- (5) A contractor's successor(s); or
- (6) A claim asserted under the Prompt Payment Act, [31 U.S.C. 3901](#)–3907.

4. **Subcontracts.** The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs 1. through 5. of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1. through 5. In the

event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

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

- a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;
- b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;
- c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or
- d. Informing any other person about their rights under CWHSSA or this part.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

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

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

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

- (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
- (2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
 (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

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

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

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

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

5. The 30-percent self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

VII. SAFETY: ACCIDENT PREVENTION

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

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

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and

health standards (29 CFR Part 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704). 29 CFR 1926.10.

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

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

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

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

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

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

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

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

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

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

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

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

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

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

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

1. Instructions for Certification – First Tier Participants:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3. Instructions for Certification - Lower Tier Participants:

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

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

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

this transaction originated may pursue available remedies, including suspension and/or debarment.

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

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

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

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

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

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

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily

excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment. 2 CFR 180.325.

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

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

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

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

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

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

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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

November 26, 2025

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

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

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

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

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

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

Base Prices and Period Prices are defined as follows:

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

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

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

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

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

Period Prices are determined as follows:

Period Price = Base Price X Index Factor

Index Factor = Period Price Index / Base Price Index

Example of a Period Price Calculation:

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

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

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

Index Factor = Period Price Index / Base Price Index = $218.0 / 229.4 = 0.950$

Period Price = Base Price X Index Factor = $\$0.82/\text{Pound} \times 0.950 = \$0.78/\text{Pound}$

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	\$0.59
2	ASTM A27 (AASHTO M103) Steel Castings, H-Pile Points & Pipe Pile Shoes (See Note below.)	\$0.82
3	ASTM A668 / A668M (AASHTO M102) Steel Forgings	\$0.82
4	ASTM A108 (AASHTO M169) Steel Forgings for Shear Studs	\$0.84
5	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Plate	\$0.89
6	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Shapes	\$0.83
7	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Plate	\$0.89
8	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Shapes	\$0.83
9	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Plate	\$0.92
10	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Shapes	\$0.84
11	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W 345W Structural Steel Plate	\$0.92
12	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W or 345W Structural Steel Shapes	\$0.84
13	ASTM A709/A709M Grade HPS 50W / AASHTO M270M/M270 Grade HPS 50W or 345W Structural Steel Plate	\$0.96
14	ASTM A709/A709M Grade HPS 70W / AASHTO M270M/M270 Grade HPS 70W or 485W Structural Steel Plate	\$1.04
15	ASTM A514/A514M-05 Grade HPS 100W / AASHTO M270M/M270 Grade HPS 100W or 690W Structural Steel Plate	\$1.58
16	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Plate	\$0.92
17	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Shapes	\$0.84
18	ASTM A276 Type 316 Stainless Steel	\$4.75
19	ASTM A240 Type 316 Stainless Steel	\$4.75
20	ASTM A148 Grade 80/50 Steel Castings (See Note below.)	\$1.63
21	ASTM A53 Grade B Structural Steel Pipe	\$1.04
22	ASTM A500 Grades A, B, 36 & 50 Structural Steel Pipe	\$1.04
23	ASTM A252, Grades 240 (36 KSI) & 414 (60 KSI) Pipe Pile	\$0.82
24	ASTM 252, Grade 2 Permanent Steel Casing	\$0.82
25	ASTM A36 (AASHTO M183) for H-piles, steel supports and sign supports	\$0.86
26	ASTM A328 / A328M, Grade 50 (AASHTO M202) Steel Sheetpiling	\$1.56
27	ASTM A572 / A572M, Grade 50 Sheetpiling	\$1.56
28	ASTM A36/36M, Grade 50	\$0.89
29	ASTM A570, Grade 50	\$0.86
30	ASTM A572 (AASHTO M223), Grade 50 H-Piles	\$0.89
31	ASTM A1085 Grade A (50 KSI) Steel Hollow Structural Sections (HSS), heat-treated per ASTM A1085 Supplement S1	\$1.04
32	AREA 140 LB Rail and Track Accessories	\$0.53

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

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DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

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

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

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

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

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

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

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

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

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

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DOCUMENT 00820

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

I. Definitions

For purposes of this contract,

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

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

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

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

II. Equal Opportunity, Non-Discrimination and Affirmative Action

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

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

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

The Contractor shall post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the Massachusetts Commission Against Discrimination setting forth the provisions of the Fair Employment Practices Law of the Commonwealth (Massachusetts General Laws Chapter 151 B).

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

III. Minority and Women Workforce Participation

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

IV. Liaison Committee

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

V. Reports and Records

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

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

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

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

VI. Access to Work Site

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

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

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

VIII. Sanctions

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

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

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

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

IX. Severability

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

X. Contractor's Certification

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

XI. Subcontractor Requirements

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

Rev'd 03/07/14

*** END OF DOCUMENT ***

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DOCUMENT 00821

**ELECTRONIC REPORTING REQUIREMENTS
CIVIL RIGHTS PROGRAMS AND CERTIFIED PAYROLL**

Implemented on March 2, 2009

Revised June 04, 2019

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

Contractor and Sub-Contractor EBO User Certification

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

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

Vetting of Firms and Designated Firm Individuals

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

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

Interim Reporting Requirements

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

*** END OF DOCUMENT ***

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DOCUMENT 00859

CONTRACTOR/SUBCONTRACTOR CERTIFICATION FORM ‡*The contractor shall submit this completed document 00859 to MassDOT for each subcontract.*_____
(Contractor) Date: __________
(Subcontractor) ☐ District Approved SubcontractorContract No: 132406 Project No. 608051 Federal Aid No.: STP/CMQ/HSI-0034(030)XLocation: WILMINGTONProject Description: Reconstruction on Route 38 (Main Street), from Route 62 to the Woburn C.L.

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: _____

(Print Name and Title)

Telephone Number: _____

Federal I.D. Number: _____

Estimated Start Date: _____

Estimated Completion Date: _____

Estimated Dollar Amount: _____

(Authorized Signature)

(Date)

DOCUMENT 00860

COMMONWEALTH OF MASSACHUSETTS PUBLIC EMPLOYMENT LAWS

Revised February 20, 2019

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

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

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

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

The Prevailing Wage Rate generally includes the following:

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

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

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

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

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

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

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

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

STATEMENT OF COMPLIANCE

Date: _____

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

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

(Contractor or Subcontractor)

on the _____
(MassDOT Project Location and Contract Number)

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

Signature _____

Title _____

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

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

MassDOT will request the updates no later than two 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 HEALY
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:	WILMINGTON
Contract Number:	132406		
Description of Work:	WILMINGTON - Federal Aid Project No. STP/CMQ/HSI-0034(030)X Reconstruction on Route 38 (Main Street), from Route 62 to the Woburn C.L.		
Job Location:	Route 38 (Main Street), from Route 62 to the Woburn C.L.		

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 from 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	12/1/2025	\$40.95	\$15.57	\$21.78	\$0.00	\$0.00	\$78.30
TEAMSTERS JOINT COUNCIL NO. 10	1/1/2026	\$40.95	\$16.17	\$21.78	\$0.00	\$0.00	\$78.90
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	\$41.95	\$16.17	\$21.78	\$0.00	\$0.00	\$79.90
	12/1/2026	\$41.95	\$16.17	\$23.52	\$0.00	\$0.00	\$81.64
	1/1/2027	\$41.95	\$16.77	\$23.52	\$0.00	\$0.00	\$82.24
(3 AXLE) DRIVER - EQUIPMENT	12/1/2025	\$41.02	\$15.57	\$21.78	\$0.00	\$0.00	\$78.37
TEAMSTERS JOINT COUNCIL NO. 10	1/1/2026	\$41.02	\$16.17	\$21.78	\$0.00	\$0.00	\$78.97
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	\$42.02	\$16.17	\$21.78	\$0.00	\$0.00	\$79.97
	12/1/2026	\$42.02	\$16.17	\$23.52	\$0.00	\$0.00	\$81.71
	1/1/2027	\$42.02	\$16.77	\$23.52	\$0.00	\$0.00	\$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT	12/1/2025	\$41.14	\$15.57	\$21.78	\$0.00	\$0.00	\$78.49
TEAMSTERS JOINT COUNCIL NO. 10	1/1/2026	\$41.14	\$16.17	\$21.78	\$0.00	\$0.00	\$79.09
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	\$42.14	\$16.17	\$21.78	\$0.00	\$0.00	\$80.09
	12/1/2026	\$42.14	\$16.17	\$23.52	\$0.00	\$0.00	\$81.83
	1/1/2027	\$42.14	\$16.77	\$23.52	\$0.00	\$0.00	\$82.43
ADS/SUBMERSIBLE PILOT	1/1/2024	\$117.16	\$10.08	\$11.62	\$12.67	\$0.00	\$151.53
PILE DRIVER LOCAL 56							
PILE DRIVER LOCAL 56 (ZONE 1)							
For apprentice rates see "Apprentice- PILE DRIVER"							
AIR TRACK OPERATOR	12/1/2025	\$41.97	\$10.15	\$9.50	\$9.11	\$0.00	\$70.73
LABORERS	6/1/2026	\$43.41	\$10.15	\$9.50	\$9.11	\$0.00	\$72.17
LABORERS - ZONE 2	12/1/2026	\$44.85	\$10.15	\$9.50	\$9.11	\$0.00	\$73.61
	6/1/2027	\$46.30	\$10.15	\$9.50	\$9.11	\$0.00	\$75.06
	12/1/2027	\$47.75	\$10.15	\$9.50	\$9.11	\$0.00	\$76.51
	6/1/2028	\$49.25	\$10.15	\$9.50	\$9.11	\$0.00	\$78.01
	12/1/2028	\$50.75	\$10.15	\$9.50	\$9.11	\$0.00	\$79.51
For apprentice rates see "Apprentice- LABORER"							
AIR TRACK OPERATOR (HEAVY & HIGHWAY)	12/1/2025	\$41.97	\$10.15	\$9.50	\$9.21	\$0.00	\$70.83
LABORERS	6/1/2026	\$43.41	\$10.15	\$9.50	\$9.21	\$0.00	\$72.27
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$44.85	\$10.15	\$9.50	\$9.21	\$0.00	\$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
ASBESTOS REMOVER - PIPE / MECH. EQUIPT.	12/1/2025	\$44.80	\$14.50	\$4.30	\$6.75	\$0.00	\$70.35
HEAT & FROST INSULATORS LOCAL 6							
HEAT & FROST INSULATORS LOCAL 6 (BOSTON)							
ASPHALT RAKER	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.11	\$0.00	\$70.23
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.11	\$0.00	\$71.67
LABORERS - ZONE 2	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.11	\$0.00	\$73.11
	6/1/2027	\$45.80	\$10.15	\$9.50	\$9.11	\$0.00	\$74.56
	12/1/2027	\$47.25	\$10.15	\$9.50	\$9.11	\$0.00	\$76.01
	6/1/2028	\$48.75	\$10.15	\$9.50	\$9.11	\$0.00	\$77.51
	12/1/2028	\$50.25	\$10.15	\$9.50	\$9.11	\$0.00	\$79.01
For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
ASPHALT RAKER (HEAVY & HIGHWAY)	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.21	\$0.00	\$70.33
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.21	\$0.00	\$71.77
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.21	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE	12/1/2025	\$59.28	\$16.05	\$13.25	\$3.25	\$0.00	\$91.83
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$60.58	\$16.05	\$13.25	\$3.25	\$0.00	\$93.13
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$62.03	\$16.05	\$13.25	\$3.25	\$0.00	\$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
BACKHOE/FRONT-END LOADER	12/1/2025	\$59.28	\$16.05	\$13.25	\$3.25	\$0.00	\$91.83
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$60.58	\$16.05	\$13.25	\$3.25	\$0.00	\$93.13
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$62.03	\$16.05	\$13.25	\$3.25	\$0.00	\$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
BARCO-TYPE JUMPING TAMPER	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.11	\$0.00	\$70.23
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.11	\$0.00	\$71.67
LABORERS - ZONE 2	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.11	\$0.00	\$73.11
	6/1/2027	\$45.80	\$10.15	\$9.50	\$9.11	\$0.00	\$74.56
	12/1/2027	\$47.25	\$10.15	\$9.50	\$9.11	\$0.00	\$76.01
	6/1/2028	\$48.75	\$10.15	\$9.50	\$9.11	\$0.00	\$77.51
	12/1/2028	\$50.25	\$10.15	\$9.50	\$9.11	\$0.00	\$79.01
For apprentice rates see "Apprentice- LABORER"							
BLOCK PAVER, RAMMER / CURB SETTER	12/1/2025	\$41.97	\$10.15	\$9.50	\$9.11	\$0.00	\$70.73
LABORERS	6/1/2026	\$43.41	\$10.15	\$9.50	\$9.11	\$0.00	\$72.17
LABORERS - ZONE 2	12/1/2026	\$44.85	\$10.15	\$9.50	\$9.11	\$0.00	\$73.61
	6/1/2027	\$46.30	\$10.15	\$9.50	\$9.11	\$0.00	\$75.06
	12/1/2027	\$47.75	\$10.15	\$9.50	\$9.11	\$0.00	\$76.51
	6/1/2028	\$49.25	\$10.15	\$9.50	\$9.11	\$0.00	\$78.01
	12/1/2028	\$50.75	\$10.15	\$9.50	\$9.11	\$0.00	\$79.51
For apprentice rates see "Apprentice- LABORER"							
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY)	12/1/2025	\$41.97	\$10.15	\$9.50	\$9.21	\$0.00	\$70.83
LABORERS	6/1/2026	\$43.41	\$10.15	\$9.50	\$9.21	\$0.00	\$72.27
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$44.85	\$10.15	\$9.50	\$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

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
4	75.00	\$36.09	\$7.07	\$10.74	\$4.50	\$0.00	\$58.40
5	80.00	\$38.50	\$7.07	\$11.45	\$4.80	\$0.00	\$61.82
6	85.00	\$40.90	\$7.07	\$12.18	\$5.10	\$0.00	\$65.25
7	90.00	\$43.31	\$7.07	\$12.88	\$5.40	\$0.00	\$68.66
8	95.00	\$45.71	\$7.07	\$13.62	\$5.70	\$0.00	\$72.10
Apprentice to Journeyworker Ratio: 1:4							
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	8/1/2025	\$65.81	\$11.49	\$15.57	\$7.33	\$0.00	\$100.20
BRICKLAYERS LOCAL 3	2/1/2026	\$67.16	\$11.49	\$15.57	\$7.33	\$0.00	\$101.55
BRICKLAYERS LOCAL 3 (LOWELL)	8/1/2026	\$69.36	\$11.49	\$15.57	\$7.33	\$0.00	\$103.75
	2/1/2027	\$70.76	\$11.49	\$15.57	\$7.33	\$0.00	\$105.15
Apprentice: BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) Effective Date: 8/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$32.91	\$11.49	\$15.57	\$7.33	\$0.00	\$67.30
2	60.00	\$39.49	\$11.49	\$15.57	\$7.33	\$0.00	\$73.88
3	70.00	\$46.07	\$11.49	\$15.57	\$7.33	\$0.00	\$80.46
4	80.00	\$52.65	\$11.49	\$15.57	\$7.33	\$0.00	\$87.04
5	90.00	\$59.23	\$11.49	\$15.57	\$7.33	\$0.00	\$93.62
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	\$33.58	\$11.49	\$15.57	\$7.33	\$0.00	\$67.97
2	60.00	\$40.30	\$11.49	\$15.57	\$7.33	\$0.00	\$74.69
3	70.00	\$47.01	\$11.49	\$15.57	\$7.33	\$0.00	\$81.40
4	80.00	\$53.73	\$11.49	\$15.57	\$7.33	\$0.00	\$88.12
5	90.00	\$60.44	\$11.49	\$15.57	\$7.33	\$0.00	\$94.83
Apprentice to Journeyworker Ratio: 1:5							
BULLDOZER/GRADER/SCRAPER OPERATING ENGINEERS LOCAL 4	12/1/2025	\$58.62	\$16.05	\$13.25	\$3.25	\$0.00	\$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$59.90	\$16.05	\$13.25	\$3.25	\$0.00	\$92.45
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$61.34	\$16.05	\$13.25	\$3.25	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
CAISSON & UNDERPINNING BOTTOM MAN LABORERS	12/1/2025	\$49.85	\$10.15	\$9.50	\$9.80	\$0.00	\$79.30
LABORERS - FOUNDATION AND MARINE	6/1/2026	\$51.40	\$10.15	\$9.50	\$9.80	\$0.00	\$80.85
	12/1/2026	\$52.90	\$10.15	\$9.50	\$9.80	\$0.00	\$82.35

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"							
CAISSON & UNDERPINNING LABORER	12/1/2025	\$48.70	\$10.15	\$9.50	\$9.80	\$0.00	\$78.15
LABORERS	6/1/2026	\$50.25	\$10.15	\$9.50	\$9.80	\$0.00	\$79.70
LABORERS - FOUNDATION AND MARINE	12/1/2026	\$51.75	\$10.15	\$9.50	\$9.80	\$0.00	\$81.20
For apprentice rates see "Apprentice- LABORER"							
CAISSON & UNDERPINNING TOP MAN	12/1/2025	\$49.03	\$10.15	\$9.50	\$9.80	\$0.00	\$78.48
LABORERS	6/1/2026	\$50.58	\$10.15	\$9.50	\$9.80	\$0.00	\$80.03
LABORERS - FOUNDATION AND MARINE	12/1/2026	\$52.08	\$10.15	\$9.50	\$9.80	\$0.00	\$81.53
For apprentice rates see "Apprentice- LABORER"							
CARBIDE CORE DRILL OPERATOR	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.11	\$0.00	\$70.23
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.11	\$0.00	\$71.67
LABORERS - ZONE 2	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.11	\$0.00	\$73.11
	6/1/2027	\$45.80	\$10.15	\$9.50	\$9.11	\$0.00	\$74.56
	12/1/2027	\$47.25	\$10.15	\$9.50	\$9.11	\$0.00	\$76.01
	6/1/2028	\$48.75	\$10.15	\$9.50	\$9.11	\$0.00	\$77.51
	12/1/2028	\$50.25	\$10.15	\$9.50	\$9.11	\$0.00	\$79.01
	For apprentice rates see "Apprentice- LABORER"						
CARPENTER	9/1/2025	\$50.35	\$10.33	\$11.47	\$8.50	\$0.00	\$80.65
CARPENTERS	3/1/2026	\$51.60	\$10.33	\$11.47	\$8.50	\$0.00	\$81.90
CARPENTERS -ZONE 2 (Eastern Massachusetts)	9/1/2026	\$52.85	\$10.33	\$11.47	\$8.50	\$0.00	\$83.15
	3/1/2027	\$54.10	\$10.33	\$11.47	\$8.50	\$0.00	\$84.40

Apprentice: CARPENTER							
Effective Date: 9/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	\$22.66	\$10.33	\$0.00	\$1.73	\$0.00	\$34.72
2	45.00	\$22.66	\$10.33	\$0.00	\$1.73	\$0.00	\$34.72
3	55.00	\$27.69	\$10.33	\$0.00	\$3.40	\$0.00	\$41.42
4	55.00	\$27.69	\$10.33	\$0.00	\$3.40	\$0.00	\$41.42
5	70.00	\$35.25	\$10.33	\$11.41	\$5.10	\$0.00	\$62.09
6	70.00	\$35.25	\$10.33	\$11.41	\$5.10	\$0.00	\$62.09
7	80.00	\$40.28	\$10.33	\$11.44	\$6.80	\$0.00	\$68.85
8	80.00	\$40.28	\$10.33	\$11.44	\$6.80	\$0.00	\$68.85

Apprentice: CARPENTER							
Effective Date: 3/1/2026							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	\$23.22	\$10.33	\$0.00	\$1.73	\$0.00	\$35.28
2	45.00	\$23.22	\$10.33	\$0.00	\$1.73	\$0.00	\$35.28
3	55.00	\$28.38	\$10.33	\$0.00	\$3.40	\$0.00	\$42.11
4	55.00	\$28.38	\$10.33	\$0.00	\$3.40	\$0.00	\$42.11

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: CARPENTER							
Effective Date: 3/1/2026							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
5	70.00	\$36.12	\$10.33	\$11.41	\$5.10	\$0.00	\$62.96
6	70.00	\$36.12	\$10.33	\$11.41	\$5.10	\$0.00	\$62.96
7	80.00	\$41.28	\$10.33	\$11.44	\$6.80	\$0.00	\$69.85
8	80.00	\$41.28	\$10.33	\$11.44	\$6.80	\$0.00	\$69.85

Apprentice to Journeyworker Ratio: 1:5

CARPENTER WOOD FRAME	10/1/2025	\$27.75	\$7.02	\$3.80	\$1.00	\$0.00	\$39.57
CARPENTERS	10/1/2026	\$28.85	\$7.02	\$3.80	\$1.00	\$0.00	\$40.67
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	\$16.65	\$7.02	\$0.00	\$0.00	\$0.00	\$23.67
2	60.00	\$16.65	\$7.02	\$0.00	\$0.00	\$0.00	\$23.67
3	65.00	\$18.04	\$7.02	\$0.00	\$1.00	\$0.00	\$26.06
4	70.00	\$19.43	\$7.02	\$0.00	\$1.00	\$0.00	\$27.45
5	75.00	\$20.81	\$7.02	\$3.80	\$1.00	\$0.00	\$32.63
6	80.00	\$22.20	\$7.02	\$3.80	\$1.00	\$0.00	\$34.02
7	85.00	\$23.59	\$7.02	\$3.80	\$1.00	\$0.00	\$35.41
8	90.00	\$24.98	\$7.02	\$3.80	\$1.00	\$0.00	\$36.80

Apprentice: CARPENTER WOOD FRAME							
Effective Date: 10/1/2026							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	\$17.31	\$7.02	\$0.00	\$0.00	\$0.00	\$24.33
2	60.00	\$17.31	\$7.02	\$0.00	\$0.00	\$0.00	\$24.33
3	65.00	\$18.75	\$7.02	\$0.00	\$1.00	\$0.00	\$26.77
4	70.00	\$20.20	\$7.02	\$0.00	\$1.00	\$0.00	\$28.22
5	75.00	\$21.64	\$7.02	\$3.80	\$1.00	\$0.00	\$33.46
6	80.00	\$23.08	\$7.02	\$3.80	\$1.00	\$0.00	\$34.90
7	85.00	\$24.52	\$7.02	\$3.80	\$1.00	\$0.00	\$36.34
8	90.00	\$25.97	\$7.02	\$3.80	\$1.00	\$0.00	\$37.79

Apprentice to Journeyworker Ratio: 1:5

CEMENT MASONRY/PLASTERING	7/1/2024	\$49.19	\$13.35	\$16.43	\$7.78	\$1.80	\$88.55
BRICKLAYERS LOCAL 3							
BRICKLAYERS LOCAL 3 (LOWELL)							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: CEMENT MASONRY/PLASTERING							
Effective Date: 7/1/2024							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$24.60	\$13.35	\$16.43	\$0.00	\$0.00	\$54.38
2	60.00	\$29.51	\$13.35	\$16.43	\$2.78	\$1.80	\$63.87
3	65.00	\$31.97	\$13.35	\$16.43	\$3.78	\$1.80	\$67.33
4	70.00	\$34.43	\$13.35	\$16.43	\$4.78	\$1.80	\$70.79
5	75.00	\$36.89	\$13.35	\$16.43	\$5.78	\$1.80	\$74.25
6	80.00	\$39.35	\$13.35	\$16.43	\$6.78	\$1.80	\$77.71
7	90.00	\$44.27	\$13.35	\$16.43	\$7.78	\$1.80	\$83.63

Apprentice to Journeyworker Ratio: 1:3

CHAIN SAW OPERATOR	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.11	\$0.00	\$70.23
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.11	\$0.00	\$71.67
LABORERS - ZONE 2	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.11	\$0.00	\$73.11
	6/1/2027	\$45.80	\$10.15	\$9.50	\$9.11	\$0.00	\$74.56
	12/1/2027	\$47.25	\$10.15	\$9.50	\$9.11	\$0.00	\$76.01
	6/1/2028	\$48.75	\$10.15	\$9.50	\$9.11	\$0.00	\$77.51
	12/1/2028	\$50.25	\$10.15	\$9.50	\$9.11	\$0.00	\$79.01

For apprentice rates see "Apprentice- LABORER"

CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES	12/1/2025	\$60.48	\$16.05	\$13.25	\$3.25	\$0.00	\$93.03
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$61.81	\$16.05	\$13.25	\$3.25	\$0.00	\$94.36
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$63.29	\$16.05	\$13.25	\$3.25	\$0.00	\$95.84

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

COMPRESSOR OPERATOR	12/1/2025	\$37.97	\$16.05	\$13.25	\$3.25	\$0.00	\$70.52
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$38.83	\$16.05	\$13.25	\$3.25	\$0.00	\$71.38
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$39.78	\$16.05	\$13.25	\$3.25	\$0.00	\$72.33

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

DELEADER (BRIDGE)	7/1/2025	\$58.51	\$10.30	\$11.95	\$12.50	\$0.00	\$93.26
PAINTERS LOCAL 35	1/1/2026	\$59.56	\$10.35	\$12.00	\$12.60	\$0.00	\$94.51
PAINTERS LOCAL 35 - ZONE 2							

Apprentice: DELEADER (BRIDGE)							
Effective Date: 7/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$29.26	\$10.30	\$0.00	\$0.00	\$0.00	\$39.56
2	55.00	\$32.18	\$10.30	\$0.00	\$6.88	\$0.00	\$49.36
3	60.00	\$35.11	\$10.30	\$0.00	\$7.50	\$0.00	\$52.91
4	65.00	\$38.03	\$10.30	\$0.00	\$8.13	\$0.00	\$56.46
5	70.00	\$40.96	\$10.30	\$11.95	\$8.75	\$0.00	\$71.96
6	75.00	\$43.88	\$10.30	\$11.95	\$9.38	\$0.00	\$75.51

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: DELEADER (BRIDGE) Effective Date: 7/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
7	80.00	\$46.81	\$10.30	\$11.95	\$10.00	\$0.00	\$79.06
8	90.00	\$52.66	\$10.30	\$11.95	\$11.25	\$0.00	\$86.16
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	12/1/2025	\$48.75	\$10.15	\$9.50	\$9.65	\$0.00	\$78.05
LABORERS	6/1/2026	\$50.30	\$10.15	\$9.50	\$9.65	\$0.00	\$79.60
LABORERS - ZONE 2	12/7/2026	\$51.80	\$10.15	\$9.50	\$9.65	\$0.00	\$81.10
	6/7/2027	\$53.40	\$10.15	\$9.50	\$9.65	\$0.00	\$82.70
	12/6/2027	\$55.00	\$10.15	\$9.50	\$9.65	\$0.00	\$84.30
	6/5/2028	\$56.68	\$10.15	\$9.50	\$9.65	\$0.00	\$85.98
	12/4/2028	\$58.35	\$10.15	\$9.50	\$9.65	\$0.00	\$87.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BACKHOE/LOADER/HAMMER OPERATOR	12/1/2025	\$49.75	\$10.15	\$9.50	\$9.65	\$0.00	\$79.05
LABORERS	6/1/2026	\$51.30	\$10.15	\$9.50	\$9.65	\$0.00	\$80.60
LABORERS - ZONE 2	12/7/2026	\$52.80	\$10.15	\$9.50	\$9.65	\$0.00	\$82.10
	6/7/2027	\$54.40	\$10.15	\$9.50	\$9.65	\$0.00	\$83.70
	12/6/2027	\$56.00	\$10.15	\$9.50	\$9.65	\$0.00	\$85.30
	6/5/2028	\$57.68	\$10.15	\$9.50	\$9.65	\$0.00	\$86.98
	12/4/2028	\$59.35	\$10.15	\$9.50	\$9.65	\$0.00	\$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BURNERS	12/1/2025	\$49.50	\$10.15	\$9.50	\$9.65	\$0.00	\$78.80
LABORERS	6/1/2026	\$51.05	\$10.15	\$9.50	\$9.65	\$0.00	\$80.35
LABORERS - ZONE 2	12/7/2026	\$52.55	\$10.15	\$9.50	\$9.65	\$0.00	\$81.85
	6/7/2027	\$54.15	\$10.15	\$9.50	\$9.65	\$0.00	\$83.45
	12/6/2027	\$55.75	\$10.15	\$9.50	\$9.65	\$0.00	\$85.05
	6/5/2028	\$57.43	\$10.15	\$9.50	\$9.65	\$0.00	\$86.73
	12/4/2028	\$59.10	\$10.15	\$9.50	\$9.65	\$0.00	\$88.40
For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTER/SAWYER LABORERS	12/1/2025	\$49.75	\$10.15	\$9.50	\$9.65	\$0.00	\$79.05
LABORERS - ZONE 2	6/1/2026	\$51.30	\$10.15	\$9.50	\$9.65	\$0.00	\$80.60
	12/7/2026	\$52.80	\$10.15	\$9.50	\$9.65	\$0.00	\$82.10
	6/7/2027	\$54.40	\$10.15	\$9.50	\$9.65	\$0.00	\$83.70
	12/6/2027	\$56.00	\$10.15	\$9.50	\$9.65	\$0.00	\$85.30
	6/5/2028	\$57.68	\$10.15	\$9.50	\$9.65	\$0.00	\$86.98
	12/4/2028	\$59.35	\$10.15	\$9.50	\$9.65	\$0.00	\$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: JACKHAMMER OPERATOR LABORERS	12/1/2025	\$49.50	\$10.15	\$9.50	\$9.65	\$0.00	\$78.80
LABORERS - ZONE 2	6/1/2026	\$51.05	\$10.15	\$9.50	\$9.65	\$0.00	\$80.35
	12/7/2026	\$52.55	\$10.15	\$9.50	\$9.65	\$0.00	\$81.85
	6/7/2027	\$54.15	\$10.15	\$9.50	\$9.65	\$0.00	\$83.45
	12/6/2027	\$55.75	\$10.15	\$9.50	\$9.65	\$0.00	\$85.05
	6/5/2028	\$57.43	\$10.15	\$9.50	\$9.65	\$0.00	\$86.73
	12/4/2028	\$59.10	\$10.15	\$9.50	\$9.65	\$0.00	\$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: WRECKING LABORER LABORERS	12/1/2025	\$48.75	\$10.15	\$9.50	\$9.65	\$0.00	\$78.05
LABORERS - ZONE 2	6/1/2026	\$50.30	\$10.15	\$9.50	\$9.65	\$0.00	\$79.60
	12/7/2026	\$51.80	\$10.15	\$9.50	\$9.65	\$0.00	\$81.10
	6/7/2027	\$53.40	\$10.15	\$9.50	\$9.65	\$0.00	\$82.70
	12/6/2027	\$55.00	\$10.15	\$9.50	\$9.65	\$0.00	\$84.30
	6/5/2028	\$56.68	\$10.15	\$9.50	\$9.65	\$0.00	\$85.98
	12/4/2028	\$58.35	\$10.15	\$9.50	\$9.65	\$0.00	\$87.65
For apprentice rates see "Apprentice- LABORER"							
DIRECTIONAL DRILL MACHINE OPERATOR OPERATING ENGINEERS LOCAL 4	12/1/2025	\$58.62	\$16.05	\$13.25	\$3.25	\$0.00	\$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$59.90	\$16.05	\$13.25	\$3.25	\$0.00	\$92.45
	12/1/2026	\$61.34	\$16.05	\$13.25	\$3.25	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
DIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	\$78.11	\$10.08	\$11.62	\$10.04	\$0.00	\$109.85
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Diver wage 70/80/90 2A \$69.83, 3A \$91.79,4A \$102.14 Total Rate							
DIVER TENDER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	\$55.79	\$10.08	\$11.62	\$12.67	\$0.00	\$90.16
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Piledriver wage 70/80/90 2A \$54.20, 3A \$73.93,4A \$82.05 Total Rate							
DIVER TENDER (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	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 1)	8/1/2024	\$117.16	\$10.08	\$11.62	\$12.67	\$0.00	\$151.53
For apprentice rates see "Apprentice- PILE DRIVER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
DRAWBRIDGE OPERATOR (Construction)	7/1/2020	\$26.77	\$6.67	\$3.93	\$0.00	\$0.16	\$37.53
DRAWBRIDGE - SEIU LOCAL 888							
DRAWBRIDGE - SEIU LOCAL 888							

ELECTRICIAN	9/1/2025	\$66.17	\$13.00	\$14.37	\$8.72	\$0.00	\$102.26
ELECTRICIANS LOCAL 103	3/1/2026	\$66.86	\$13.00	\$14.64	\$9.00	\$0.00	\$103.50
ELECTRICIANS LOCAL 103	9/1/2026	\$68.78	\$13.00	\$14.69	\$9.00	\$0.00	\$105.47
	3/1/2027	\$69.97	\$13.00	\$14.73	\$9.00	\$0.00	\$106.70
	9/1/2027	\$71.88	\$13.00	\$14.79	\$9.00	\$0.00	\$108.67
	3/1/2028	\$73.08	\$13.00	\$14.82	\$9.00	\$0.00	\$109.90

Apprentice: ELECTRICIAN

Effective Date: 9/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	\$26.47	\$13.00	\$0.79	\$0.00	\$0.00	\$40.26
2	40.00	\$26.47	\$13.00	\$0.79	\$0.00	\$0.00	\$40.26
3	45.00	\$29.78	\$13.00	\$13.27	\$3.92	\$0.00	\$59.97
4	45.00	\$29.78	\$13.00	\$13.27	\$3.92	\$0.00	\$59.97
5	50.00	\$33.09	\$13.00	\$13.37	\$4.36	\$0.00	\$63.82
6	55.00	\$36.39	\$13.00	\$13.47	\$4.80	\$0.00	\$67.66
7	60.00	\$39.70	\$13.00	\$13.57	\$5.23	\$0.00	\$71.50
8	65.00	\$43.01	\$13.00	\$13.67	\$5.67	\$0.00	\$75.35
9	70.00	\$46.32	\$13.00	\$13.77	\$6.10	\$0.00	\$79.19
10	75.00	\$49.63	\$13.00	\$13.87	\$6.54	\$0.00	\$83.04

Apprentice: ELECTRICIAN

Effective Date: 3/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	\$26.74	\$13.00	\$0.80	\$0.00	\$0.00	\$40.54
2	40.00	\$26.74	\$13.00	\$0.80	\$0.00	\$0.00	\$40.54
3	45.00	\$30.09	\$13.00	\$13.53	\$4.05	\$0.00	\$60.67
4	45.00	\$30.09	\$13.00	\$13.53	\$4.05	\$0.00	\$60.67
5	50.00	\$33.43	\$13.00	\$13.63	\$4.50	\$0.00	\$64.56
6	55.00	\$36.77	\$13.00	\$13.73	\$4.95	\$0.00	\$68.45
7	60.00	\$40.12	\$13.00	\$13.83	\$5.40	\$0.00	\$72.35
8	65.00	\$43.46	\$13.00	\$13.93	\$5.85	\$0.00	\$76.24
9	70.00	\$46.80	\$13.00	\$14.03	\$6.30	\$0.00	\$80.13
10	75.00	\$50.15	\$13.00	\$14.13	\$6.75	\$0.00	\$84.03

Apprentice Notes

:

Apprentice to Journeyworker Ratio: 2:3

ELEVATOR CONSTRUCTOR	1/1/2025	\$74.17	\$16.28	\$10.96	\$10.40	\$0.00	\$111.81
ELEVATOR CONSTRUCTORS LOCAL 4	1/1/2026	\$77.26	\$16.38	\$11.06	\$10.70	\$0.00	\$115.40

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTORS LOCAL 4	1/1/2027	\$80.55	\$16.48	\$11.16	\$11.00	\$0.00	\$119.19

Apprentice: ELEVATOR CONSTRUCTOR							
Effective Date: 1/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$37.09	\$0.00	\$0.00	\$0.00	\$0.00	\$37.09
2	55.00	\$40.79	\$16.28	\$10.96	\$10.40	\$0.00	\$78.43
3	65.00	\$48.21	\$16.28	\$10.96	\$10.40	\$0.00	\$85.85
4	70.00	\$51.92	\$16.28	\$10.96	\$10.40	\$0.00	\$89.56
5	80.00	\$59.34	\$16.28	\$10.96	\$10.40	\$0.00	\$96.98

Apprentice: ELEVATOR CONSTRUCTOR							
Effective Date: 1/1/2026							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$38.63	\$0.00	\$0.00	\$0.00	\$0.00	\$38.63
2	55.00	\$42.49	\$16.38	\$11.06	\$10.70	\$0.00	\$80.63
3	65.00	\$50.22	\$16.38	\$11.06	\$10.70	\$0.00	\$88.36
4	70.00	\$54.08	\$16.38	\$11.06	\$10.70	\$0.00	\$92.22
5	80.00	\$61.81	\$16.38	\$11.06	\$10.70	\$0.00	\$99.95

Apprentice to Journeyworker Ratio: 1:1

ELEVATOR CONSTRUCTOR HELPER	1/1/2025	\$51.92	\$16.28	\$10.96	\$10.40	\$0.00	\$89.56
ELEVATOR CONSTRUCTORS LOCAL 4	1/1/2026	\$54.08	\$16.38	\$11.06	\$10.07	\$0.00	\$91.59
ELEVATOR CONSTRUCTORS LOCAL 4	1/1/2027	\$56.39	\$16.48	\$11.16	\$11.00	\$0.00	\$95.03

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY)	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.21	\$0.00	\$70.33
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.21	\$0.00	\$71.77
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.21	\$0.00	\$73.21

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

FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY	11/1/2025	\$53.56	\$16.05	\$13.25	\$3.25	\$0.00	\$86.11
OPERATING ENGINEERS LOCAL 4	5/1/2026	\$55.00	\$16.05	\$13.25	\$3.25	\$0.00	\$87.55
OPERATING ENGINEERS LOCAL 4	11/1/2026	\$56.29	\$16.05	\$13.25	\$3.25	\$0.00	\$88.84
	5/1/2027	\$57.72	\$16.05	\$13.25	\$3.25	\$0.00	\$90.27

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY	11/1/2025	\$55.17	\$16.05	\$13.25	\$3.25	\$0.00	\$87.72
OPERATING ENGINEERS LOCAL 4	5/1/2026	\$56.62	\$16.05	\$13.25	\$3.25	\$0.00	\$89.17
OPERATING ENGINEERS LOCAL 4	11/1/2026	\$57.92	\$16.05	\$13.25	\$3.25	\$0.00	\$90.47
	5/1/2027	\$59.37	\$16.05	\$13.25	\$3.25	\$0.00	\$91.92

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY	11/1/2025	\$26.03	\$16.05	\$13.25	\$3.25	\$0.00	\$58.58
OPERATING ENGINEERS LOCAL 4	5/1/2026	\$26.88	\$16.05	\$13.25	\$3.25	\$0.00	\$59.43

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
OPERATING ENGINEERS LOCAL 4	11/1/2026	\$27.64	\$16.05	\$13.25	\$3.25	\$0.00	\$60.19
	5/1/2027	\$28.49	\$16.05	\$13.25	\$3.25	\$0.00	\$61.04
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIRE ALARM INSTALLER	9/1/2025	\$66.17	\$13.00	\$14.37	\$9.00	\$0.00	\$102.54
ELECTRICIANS LOCAL 103	3/1/2026	\$66.86	\$13.00	\$14.64	\$9.00	\$0.00	\$103.50
ELECTRICIANS LOCAL 103	9/1/2026	\$68.78	\$13.00	\$14.69	\$9.00	\$0.00	\$105.47
	3/1/2027	\$69.97	\$13.00	\$14.73	\$9.00	\$0.00	\$106.70
	9/1/2027	\$71.88	\$13.00	\$14.79	\$9.00	\$0.00	\$108.67
	3/1/2028	\$73.08	\$13.00	\$14.82	\$9.00	\$0.00	\$109.90
For apprentice rates see "Apprentice- ELECTRICIAN"							
FIRE ALARM REPAIR / MAINTENANCE	9/1/2025	\$52.94	\$13.00	\$13.97	\$6.98	\$0.00	\$86.89
/ COMMISSIONING	3/1/2026	\$53.49	\$13.00	\$14.23	\$7.20	\$0.00	\$87.92
ELECTRICIANS LOCAL 103	9/1/2026	\$55.02	\$13.00	\$14.28	\$7.20	\$0.00	\$89.50
ELECTRICIANS LOCAL 103	3/1/2027	\$55.98	\$13.00	\$14.31	\$7.20	\$0.00	\$90.49
	9/1/2027	\$57.50	\$13.00	\$14.36	\$7.20	\$0.00	\$92.06
	3/1/2028	\$58.46	\$13.00	\$14.38	\$7.20	\$0.00	\$93.04
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"							
FIREMAN (ASST. ENGINEER)	12/1/2025	\$47.69	\$16.05	\$13.25	\$3.25	\$0.00	\$80.24
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$48.75	\$16.05	\$13.25	\$3.25	\$0.00	\$81.30
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$49.93	\$16.05	\$13.25	\$3.25	\$0.00	\$82.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FLAGGER & SIGNALER (HEAVY & HIGHWAY)	12/1/2025	\$28.09	\$10.15	\$9.50	\$9.21	\$0.00	\$56.95
LABORERS	6/1/2026	\$29.21	\$10.15	\$9.50	\$9.21	\$0.00	\$58.07
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$29.21	\$10.15	\$9.50	\$9.21	\$0.00	\$58.07
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
FLOORCOVERER	9/1/2025	\$57.74	\$10.33	\$11.47	\$8.80	\$0.00	\$88.34
FLOORCOVERERS LOCAL 2168	3/1/2026	\$59.24	\$10.33	\$11.47	\$8.80	\$0.00	\$89.84
FLOORCOVERERS LOCAL 2168 ZONE I	9/1/2026	\$60.74	\$10.33	\$11.47	\$8.80	\$0.00	\$91.34
	3/1/2027	\$62.24	\$10.33	\$11.47	\$8.80	\$0.00	\$92.84

Apprentice: FLOORCOVERER							
Effective Date: 9/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	\$25.98	\$10.33	\$0.00	\$1.76	\$0.00	\$38.07
2	45.00	\$25.98	\$10.33	\$0.00	\$1.76	\$0.00	\$38.07
3	55.00	\$31.76	\$10.33	\$0.00	\$3.52	\$0.00	\$45.61
4	55.00	\$31.76	\$10.33	\$0.00	\$3.52	\$0.00	\$45.61
5	70.00	\$40.42	\$10.33	\$11.47	\$5.28	\$0.00	\$67.50
6	70.00	\$40.42	\$10.33	\$11.47	\$5.28	\$0.00	\$67.50
7	80.00	\$46.19	\$10.33	\$11.47	\$7.04	\$0.00	\$75.03
8	80.00	\$46.19	\$10.33	\$11.47	\$7.04	\$0.00	\$75.03

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: FLOORCOVERER							
Effective Date: 3/1/2026							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	\$26.66	\$10.33	\$0.00	\$1.76	\$0.00	\$38.75
2	45.00	\$26.66	\$10.33	\$0.00	\$1.76	\$0.00	\$38.75
3	55.00	\$32.58	\$10.33	\$0.00	\$3.52	\$0.00	\$46.43
4	55.00	\$32.58	\$10.33	\$0.00	\$3.52	\$0.00	\$46.43
5	70.00	\$41.47	\$10.33	\$11.47	\$5.28	\$0.00	\$68.55
6	70.00	\$41.47	\$10.33	\$11.47	\$5.28	\$0.00	\$68.55
7	80.00	\$47.39	\$10.33	\$11.47	\$7.04	\$0.00	\$76.23
8	80.00	\$47.39	\$10.33	\$11.47	\$7.04	\$0.00	\$76.23

Apprentice Notes

Steps are 750 hrs.

Apprentice to Journeyworker Ratio: 1:1

FORK LIFT/CHERRY PICKER	12/1/2025	\$59.28	\$16.05	\$13.25	\$3.25	\$0.00	\$91.83
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$60.58	\$16.05	\$13.25	\$3.25	\$0.00	\$93.13
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$62.03	\$16.05	\$13.25	\$3.25	\$0.00	\$94.58

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GENERATOR/LIGHTING PLANT/HEATERS	12/1/2025	\$37.97	\$16.05	\$13.25	\$3.25	\$0.00	\$70.52
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$38.83	\$16.05	\$13.25	\$3.25	\$0.00	\$71.38
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$39.78	\$16.05	\$13.25	\$3.25	\$0.00	\$72.33

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)	7/1/2025	\$48.01	\$10.30	\$11.95	\$12.50	\$0.00	\$82.76
GLAZIERS LOCAL 35	1/1/2026	\$49.06	\$10.35	\$12.00	\$12.60	\$0.00	\$84.01
GLAZIERS LOCAL 35 (ZONE 2)							

Apprentice: GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)							
Effective Date: 7/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$24.01	\$10.30	\$0.00	\$0.00	\$0.00	\$34.31
2	55.00	\$26.41	\$10.30	\$0.00	\$6.88	\$0.00	\$43.59
3	60.00	\$28.81	\$10.30	\$0.00	\$7.50	\$0.00	\$46.61
4	65.00	\$31.21	\$10.30	\$0.00	\$8.13	\$0.00	\$49.64
5	70.00	\$33.61	\$10.30	\$11.95	\$8.75	\$0.00	\$64.61
6	75.00	\$36.01	\$10.30	\$11.95	\$9.38	\$0.00	\$67.64
7	80.00	\$38.41	\$10.30	\$11.95	\$10.00	\$0.00	\$70.66
8	90.00	\$43.21	\$10.30	\$11.95	\$11.25	\$0.00	\$76.71

Construction

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

HOISTING ENGINEER/CRANES/GRADALLS	12/1/2025	\$59.28	\$16.05	\$13.25	\$3.25	\$0.00	\$91.83
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$60.58	\$16.05	\$13.25	\$3.25	\$0.00	\$93.13
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$62.03	\$16.05	\$13.25	\$3.25	\$0.00	\$94.58

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	\$16.05	\$13.25	\$3.25	\$0.00	\$68.42
3	65.00	\$38.86	\$16.05	\$13.25	\$3.25	\$0.00	\$71.41
4	70.00	\$41.85	\$16.05	\$13.25	\$3.25	\$0.00	\$74.40
5	75.00	\$44.84	\$16.05	\$13.25	\$3.25	\$0.00	\$77.39
6	80.00	\$47.82	\$16.05	\$13.25	\$3.25	\$0.00	\$80.37
7	85.00	\$50.81	\$16.05	\$13.25	\$3.25	\$0.00	\$83.36
8	90.00	\$53.80	\$16.05	\$13.25	\$3.25	\$0.00	\$86.35

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	\$33.32	\$0.00	\$0.00	\$0.00	\$0.00	\$33.32
2	60.00	\$36.35	\$16.05	\$13.25	\$3.25	\$0.00	\$68.90
3	65.00	\$39.38	\$16.05	\$13.25	\$3.25	\$0.00	\$71.93
4	70.00	\$42.41	\$16.50	\$13.25	\$3.25	\$0.00	\$75.41
5	75.00	\$45.44	\$16.50	\$13.25	\$3.25	\$0.00	\$78.44
6	80.00	\$48.46	\$16.50	\$13.25	\$3.25	\$0.00	\$81.46
7	85.00	\$51.49	\$16.50	\$13.25	\$3.25	\$0.00	\$84.49
8	90.00	\$54.52	\$16.50	\$13.25	\$3.25	\$0.00	\$87.52

Apprentice to Journeyworker Ratio: 1:6

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
HVAC (DUCTWORK)	8/1/2025	\$60.98	\$14.91	\$18.74	\$9.53	\$2.98	\$107.14
SHEETMETAL WORKERS LOCAL 17	2/1/2026	\$62.93	\$14.91	\$18.74	\$9.53	\$2.98	\$109.09
SHEETMETAL WORKERS LOCAL 17 - A							
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (ELECTRICAL CONTROLS)	9/1/2025	\$66.17	\$13.00	\$14.37	\$8.72	\$0.00	\$102.26
ELECTRICIANS LOCAL 103	3/1/2026	\$66.86	\$13.00	\$14.64	\$9.00	\$0.00	\$103.50
ELECTRICIANS LOCAL 103	9/1/2026	\$68.78	\$13.00	\$14.69	\$9.00	\$0.00	\$105.47
	3/1/2027	\$69.97	\$13.00	\$14.73	\$9.00	\$0.00	\$106.70
	9/1/2027	\$71.88	\$13.00	\$14.79	\$9.00	\$0.00	\$108.67
	3/1/2028	\$73.08	\$13.00	\$14.82	\$9.00	\$0.00	\$109.90
For apprentice rates see "Apprentice- ELECTRICIAN"							
HVAC (TESTING AND BALANCING - AIR)	8/1/2025	\$60.98	\$14.91	\$18.74	\$9.53	\$2.98	\$107.14
SHEETMETAL WORKERS LOCAL 17	2/1/2026	\$62.93	\$14.91	\$18.74	\$9.53	\$2.98	\$109.09
SHEETMETAL WORKERS LOCAL 17 - A							
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (TESTING AND BALANCING -WATER)	9/1/2025	\$69.08	\$13.45	\$13.75	\$9.30	\$0.00	\$105.58
PIPEFITTERS LOCAL 537							
PIPEFITTERS LOCAL 537							
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HVAC MECHANIC	9/1/2025	\$69.08	\$13.45	\$13.75	\$9.30	\$0.00	\$105.58
PIPEFITTERS LOCAL 537							
PIPEFITTERS LOCAL 537							
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HYDRAULIC DRILLS	12/1/2025	\$41.97	\$10.15	\$9.50	\$9.11	\$0.00	\$70.73
LABORERS	6/1/2026	\$43.41	\$10.15	\$9.50	\$9.11	\$0.00	\$72.17
LABORERS - ZONE 2	12/1/2026	\$44.85	\$10.15	\$9.50	\$9.11	\$0.00	\$73.61
	6/1/2027	\$46.30	\$10.15	\$9.50	\$9.11	\$0.00	\$75.06
	12/1/2027	\$47.75	\$10.15	\$9.50	\$9.11	\$0.00	\$76.51
	6/1/2028	\$49.25	\$10.15	\$9.50	\$9.11	\$0.00	\$78.01
	12/1/2028	\$50.75	\$10.15	\$9.50	\$9.11	\$0.00	\$79.51
For apprentice rates see "Apprentice- LABORER"							
HYDRAULIC DRILLS (HEAVY & HIGHWAY)	12/1/2025	\$41.97	\$10.15	\$9.50	\$9.21	\$0.00	\$70.83
LABORERS	6/1/2026	\$43.41	\$10.15	\$9.50	\$9.21	\$0.00	\$72.27
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$44.85	\$10.15	\$9.50	\$9.21	\$0.00	\$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
INSULATOR (PIPES & TANKS)	9/1/2025	\$60.34	\$14.75	\$9.52	\$10.09	\$0.00	\$94.70
HEAT & FROST INSULATORS LOCAL 6	9/1/2026	\$63.76	\$14.75	\$9.52	\$10.09	\$0.00	\$98.12
HEAT & FROST INSULATORS LOCAL 6 (BOSTON)							

Apprentice: INSULATOR (PIPES & TANKS)

Effective Date: 9/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$30.17	\$14.75	\$9.27	\$5.05	\$0.00	\$59.24

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate																																																								
Apprentice: INSULATOR (PIPES & TANKS) Effective Date: 9/1/2025 <table><thead><tr><th>Step</th><th>Percent</th><th>Apprentice Base Wage</th><th>Health</th><th>Pension</th><th>Annuity</th><th>Supplemental Unemployment</th><th>Total Rate</th></tr></thead><tbody><tr><td>2</td><td>60.00</td><td>\$36.20</td><td>\$14.75</td><td>\$9.32</td><td>\$6.05</td><td>\$0.00</td><td>\$66.32</td></tr><tr><td>3</td><td>70.00</td><td>\$42.24</td><td>\$14.75</td><td>\$9.37</td><td>\$7.06</td><td>\$0.00</td><td>\$73.42</td></tr><tr><td>4</td><td>80.00</td><td>\$48.27</td><td>\$14.75</td><td>\$9.42</td><td>\$8.07</td><td>\$0.00</td><td>\$80.51</td></tr></tbody></table>								Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate	2	60.00	\$36.20	\$14.75	\$9.32	\$6.05	\$0.00	\$66.32	3	70.00	\$42.24	\$14.75	\$9.37	\$7.06	\$0.00	\$73.42	4	80.00	\$48.27	\$14.75	\$9.42	\$8.07	\$0.00	\$80.51																								
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate																																																								
2	60.00	\$36.20	\$14.75	\$9.32	\$6.05	\$0.00	\$66.32																																																								
3	70.00	\$42.24	\$14.75	\$9.37	\$7.06	\$0.00	\$73.42																																																								
4	80.00	\$48.27	\$14.75	\$9.42	\$8.07	\$0.00	\$80.51																																																								
Apprentice: INSULATOR (PIPES & TANKS) Effective Date: 9/1/2026 <table><thead><tr><th>Step</th><th>Percent</th><th>Apprentice Base Wage</th><th>Health</th><th>Pension</th><th>Annuity</th><th>Supplemental Unemployment</th><th>Total Rate</th></tr></thead><tbody><tr><td>1</td><td>50.00</td><td>\$31.88</td><td>\$14.75</td><td>\$9.27</td><td>\$5.05</td><td>\$0.00</td><td>\$60.95</td></tr><tr><td>2</td><td>60.00</td><td>\$38.26</td><td>\$14.75</td><td>\$9.32</td><td>\$6.05</td><td>\$0.00</td><td>\$68.38</td></tr><tr><td>3</td><td>70.00</td><td>\$44.63</td><td>\$14.75</td><td>\$9.37</td><td>\$7.06</td><td>\$0.00</td><td>\$75.81</td></tr><tr><td>4</td><td>80.00</td><td>\$51.01</td><td>\$14.75</td><td>\$9.42</td><td>\$8.07</td><td>\$0.00</td><td>\$83.25</td></tr></tbody></table> Apprentice to Journeyworker Ratio: 1:4								Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate	1	50.00	\$31.88	\$14.75	\$9.27	\$5.05	\$0.00	\$60.95	2	60.00	\$38.26	\$14.75	\$9.32	\$6.05	\$0.00	\$68.38	3	70.00	\$44.63	\$14.75	\$9.37	\$7.06	\$0.00	\$75.81	4	80.00	\$51.01	\$14.75	\$9.42	\$8.07	\$0.00	\$83.25																
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate																																																								
1	50.00	\$31.88	\$14.75	\$9.27	\$5.05	\$0.00	\$60.95																																																								
2	60.00	\$38.26	\$14.75	\$9.32	\$6.05	\$0.00	\$68.38																																																								
3	70.00	\$44.63	\$14.75	\$9.37	\$7.06	\$0.00	\$75.81																																																								
4	80.00	\$51.01	\$14.75	\$9.42	\$8.07	\$0.00	\$83.25																																																								
IRONWORKER/WELDER IRONWORKERS LOCAL 7 IRONWORKERS LOCAL 7 (LAWRENCE AREA)	9/16/2025	\$53.46	\$9.05	\$12.75	\$14.50	\$0.00	\$89.76																																																								
Apprentice: IRONWORKER/WELDER Effective Date: 9/16/2025 <table><thead><tr><th>Step</th><th>Percent</th><th>Apprentice Base Wage</th><th>Health</th><th>Pension</th><th>Annuity</th><th>Supplemental Unemployment</th><th>Total Rate</th></tr></thead><tbody><tr><td>1</td><td>60.00</td><td>\$32.08</td><td>\$9.05</td><td>\$12.75</td><td>\$4.50</td><td>\$0.00</td><td>\$58.38</td></tr><tr><td>2</td><td>75.00</td><td>\$40.10</td><td>\$9.05</td><td>\$12.75</td><td>\$4.50</td><td>\$0.00</td><td>\$66.40</td></tr><tr><td>3</td><td>85.00</td><td>\$45.44</td><td>\$9.05</td><td>\$12.75</td><td>\$4.50</td><td>\$0.00</td><td>\$71.74</td></tr><tr><td>4</td><td>0.00</td><td>\$0.00</td><td>\$0.00</td><td>\$0.00</td><td>\$0.00</td><td>\$0.00</td><td>\$0.00</td></tr><tr><td>5</td><td>0.00</td><td>\$0.00</td><td>\$0.00</td><td>\$0.00</td><td>\$0.00</td><td>\$0.00</td><td>\$0.00</td></tr><tr><td>6</td><td>0.00</td><td>\$0.00</td><td>\$0.00</td><td>\$0.00</td><td>\$0.00</td><td>\$0.00</td><td>\$0.00</td></tr></tbody></table> Apprentice to Journeyworker Ratio: 1:4								Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate	1	60.00	\$32.08	\$9.05	\$12.75	\$4.50	\$0.00	\$58.38	2	75.00	\$40.10	\$9.05	\$12.75	\$4.50	\$0.00	\$66.40	3	85.00	\$45.44	\$9.05	\$12.75	\$4.50	\$0.00	\$71.74	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
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate																																																								
1	60.00	\$32.08	\$9.05	\$12.75	\$4.50	\$0.00	\$58.38																																																								
2	75.00	\$40.10	\$9.05	\$12.75	\$4.50	\$0.00	\$66.40																																																								
3	85.00	\$45.44	\$9.05	\$12.75	\$4.50	\$0.00	\$71.74																																																								
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																																																								
JACKHAMMER & PAVING BREAKER OPERATOR LABORERS LABORERS - ZONE 2	12/1/2025 6/1/2026 12/1/2026 6/1/2027 12/1/2027 6/1/2028 12/1/2028	\$41.47 \$42.91 \$44.35 \$45.80 \$47.25 \$48.75 \$50.25	\$10.15 \$10.15 \$10.15 \$10.15 \$10.15 \$10.15 \$10.15	\$9.50 \$9.50 \$9.50 \$9.50 \$9.50 \$9.50 \$9.50	\$9.11 \$9.11 \$9.11 \$9.11 \$9.11 \$9.11 \$9.11	\$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00	\$70.23 \$71.67 \$73.11 \$74.56 \$76.01 \$77.51 \$79.01																																																								
For apprentice rates see "Apprentice- LABORER"																																																															
LABORER LABORERS LABORERS - ZONE 2	12/1/2025 6/1/2026 12/1/2026	\$41.22 \$42.66 \$44.10	\$10.15 \$10.15 \$10.15	\$9.50 \$9.50 \$9.50	\$9.11 \$9.11 \$9.11	\$0.00 \$0.00 \$0.00	\$69.98 \$71.42 \$72.86																																																								

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	6/1/2027	\$45.55	\$10.15	\$9.50	\$9.11	\$0.00	\$74.31
	12/1/2027	\$47.00	\$10.15	\$9.50	\$9.11	\$0.00	\$75.76
	6/1/2028	\$48.50	\$10.15	\$9.50	\$9.11	\$0.00	\$77.26
	12/1/2028	\$50.00	\$10.15	\$9.50	\$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
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	\$25.60	\$10.15	\$9.50	\$9.11	\$0.00	\$54.36
2	70.00	\$29.86	\$10.15	\$9.50	\$9.11	\$0.00	\$58.62
3	80.00	\$34.13	\$10.15	\$9.50	\$9.11	\$0.00	\$62.89
4	90.00	\$38.39	\$10.15	\$9.50	\$9.11	\$0.00	\$67.15

Apprentice to Journeyworker Ratio: 1:5

LABORER (HEAVY & HIGHWAY)	12/1/2025	\$41.22	\$10.15	\$9.50	\$9.21	\$0.00	\$70.08
LABORERS	6/1/2026	\$42.66	\$10.15	\$9.50	\$9.21	\$0.00	\$71.52
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$44.10	\$10.15	\$9.50	\$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	\$25.60	\$10.15	\$9.50	\$9.21	\$0.00	\$54.46
2	70.00	\$29.86	\$10.15	\$9.50	\$9.21	\$0.00	\$58.72
3	80.00	\$34.13	\$10.15	\$9.50	\$9.21	\$0.00	\$62.99

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate																
Apprentice: LABORER (HEAVY & HIGHWAY) Effective Date: 6/1/2026 <table><thead><tr><th>Step</th><th>Percent</th><th>Apprentice Base Wage</th><th>Health</th><th>Pension</th><th>Annuity</th><th>Supplemental Unemployment</th><th>Total Rate</th></tr></thead><tbody><tr><td>4</td><td>90.00</td><td>\$38.39</td><td>\$10.15</td><td>\$9.50</td><td>\$9.10</td><td>\$0.00</td><td>\$67.14</td></tr></tbody></table> Apprentice to Journeyworker Ratio: 1:5								Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate	4	90.00	\$38.39	\$10.15	\$9.50	\$9.10	\$0.00	\$67.14
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate																
4	90.00	\$38.39	\$10.15	\$9.50	\$9.10	\$0.00	\$67.14																
LABORER: CARPENTER TENDER	12/1/2025	\$41.22	\$10.15	\$9.50	\$9.11	\$0.00	\$69.98																
LABORERS	6/1/2026	\$42.66	\$10.15	\$9.50	\$9.11	\$0.00	\$71.42																
LABORERS - ZONE 2	12/1/2026	\$44.10	\$10.15	\$9.50	\$9.11	\$0.00	\$72.86																
	6/1/2027	\$45.55	\$10.15	\$9.50	\$9.11	\$0.00	\$74.31																
	12/1/2027	\$47.00	\$10.15	\$9.50	\$9.11	\$0.00	\$75.76																
	6/1/2028	\$48.50	\$10.15	\$9.50	\$9.11	\$0.00	\$77.26																
	12/1/2028	\$50.00	\$10.15	\$9.50	\$9.11	\$0.00	\$78.76																
For apprentice rates see "Apprentice- LABORER"																							
LABORER: CEMENT FINISHER TENDER	12/1/2025	\$41.22	\$10.15	\$9.50	\$9.11	\$0.00	\$69.98																
LABORERS	6/1/2026	\$42.66	\$10.15	\$9.50	\$9.11	\$0.00	\$71.42																
LABORERS - ZONE 2	12/1/2026	\$44.10	\$10.15	\$9.50	\$9.11	\$0.00	\$72.86																
	6/1/2027	\$45.55	\$10.15	\$9.50	\$9.11	\$0.00	\$74.31																
	12/1/2027	\$47.00	\$10.15	\$9.50	\$9.11	\$0.00	\$75.76																
	6/1/2028	\$48.50	\$10.15	\$9.50	\$9.11	\$0.00	\$77.26																
	12/1/2028	\$50.00	\$10.15	\$9.50	\$9.11	\$0.00	\$78.76																
For apprentice rates see "Apprentice- LABORER"																							
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER	12/1/2025	\$41.31	\$10.15	\$9.50	\$9.65	\$0.00	\$70.61																
LABORERS	6/1/2026	\$42.75	\$10.15	\$9.50	\$9.65	\$0.00	\$72.05																
LABORERS - ZONE 2	12/7/2026	\$44.19	\$10.15	\$9.50	\$9.65	\$0.00	\$73.49																
	6/7/2027	\$45.64	\$10.15	\$9.50	\$9.65	\$0.00	\$74.94																
	12/6/2027	\$47.09	\$10.15	\$9.50	\$9.65	\$0.00	\$76.39																
	6/5/2028	\$48.59	\$10.15	\$9.50	\$9.65	\$0.00	\$77.89																
	12/4/2028	\$50.09	\$10.15	\$9.50	\$9.65	\$0.00	\$79.39																
For apprentice rates see "Apprentice- LABORER"																							
LABORER: MASON TENDER	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.11	\$0.00	\$70.23																
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.11	\$0.00	\$71.67																
LABORERS - ZONE 2	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.11	\$0.00	\$73.11																
	6/1/2027	\$45.80	\$10.15	\$9.50	\$9.11	\$0.00	\$74.56																
	12/1/2027	\$47.25	\$10.15	\$9.50	\$9.11	\$0.00	\$76.01																
	6/1/2028	\$48.75	\$10.15	\$9.50	\$9.11	\$0.00	\$77.51																
	12/1/2028	\$50.25	\$10.15	\$9.50	\$9.11	\$0.00	\$79.01																
For apprentice rates see "Apprentice- LABORER"																							
LABORER: MASON TENDER (HEAVY & HIGHWAY)	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.21	\$0.00	\$70.33																
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.21	\$0.00	\$71.77																
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.21	\$0.00	\$73.21																
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"																							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORER: MULTI-TRADE TENDER	12/1/2025	\$41.22	\$10.15	\$9.50	\$9.11	\$0.00	\$69.98
LABORERS	6/1/2026	\$42.66	\$10.15	\$9.50	\$9.11	\$0.00	\$71.42
LABORERS - ZONE 2	12/1/2026	\$44.10	\$10.15	\$9.50	\$9.11	\$0.00	\$72.86
	6/1/2027	\$45.55	\$10.15	\$9.50	\$9.11	\$0.00	\$74.31
	12/1/2027	\$47.00	\$10.15	\$9.50	\$9.11	\$0.00	\$75.76
	6/1/2028	\$48.50	\$10.15	\$9.50	\$9.11	\$0.00	\$77.26
	12/1/2028	\$50.00	\$10.15	\$9.50	\$9.11	\$0.00	\$78.76

For apprentice rates see "Apprentice- LABORER"

LABORER: TREE REMOVER	12/1/2025	\$41.22	\$10.15	\$9.50	\$9.11	\$0.00	\$69.98
LABORERS	6/1/2026	\$42.66	\$10.15	\$9.50	\$9.11	\$0.00	\$71.42
LABORERS - ZONE 2	12/1/2026	\$44.10	\$10.15	\$9.50	\$9.11	\$0.00	\$72.86
	6/1/2027	\$45.55	\$10.15	\$9.50	\$9.11	\$0.00	\$74.31
	12/1/2027	\$47.00	\$10.15	\$9.50	\$9.11	\$0.00	\$75.76
	6/1/2028	\$48.50	\$10.15	\$9.50	\$9.11	\$0.00	\$77.26
	12/1/2028	\$50.00	\$10.15	\$9.50	\$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	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.11	\$0.00	\$70.23
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.11	\$0.00	\$71.67
LABORERS - ZONE 2	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.11	\$0.00	\$73.11
	6/1/2027	\$45.80	\$10.15	\$9.50	\$9.11	\$0.00	\$74.56
	12/1/2027	\$47.25	\$10.15	\$9.50	\$9.11	\$0.00	\$76.01
	6/1/2028	\$48.75	\$10.15	\$9.50	\$9.11	\$0.00	\$77.51
	12/1/2028	\$50.25	\$10.15	\$9.50	\$9.11	\$0.00	\$79.01

For apprentice rates see "Apprentice- LABORER"

LASER BEAM OPERATOR (HEAVY & HIGHWAY)	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.21	\$0.00	\$70.33
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.21	\$0.00	\$71.77
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.21	\$0.00	\$73.21

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

MARBLE & TILE FINISHERS	8/1/2025	\$52.08	\$11.49	\$15.57	\$6.05	\$0.00	\$85.19
BRICKLAYERS LOCAL 3	2/1/2026	\$53.16	\$11.49	\$15.57	\$6.05	\$0.00	\$86.27
BRICKLAYERS LOCAL 3 - MARBLE & TILE	8/1/2026	\$54.92	\$11.49	\$15.57	\$6.05	\$0.00	\$88.03
	2/1/2027	\$56.04	\$11.49	\$15.57	\$6.05	\$0.00	\$89.15

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 8/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$26.04	\$11.49	\$15.57	\$6.05	\$0.00	\$59.15
2	60.00	\$31.25	\$11.49	\$15.57	\$6.05	\$0.00	\$64.36
3	70.00	\$36.46	\$11.49	\$15.57	\$6.05	\$0.00	\$69.57
4	80.00	\$41.66	\$11.49	\$15.57	\$6.05	\$0.00	\$74.77
5	90.00	\$46.87	\$11.49	\$15.57	\$6.05	\$0.00	\$79.98

Construction

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

Apprentice: MARBLE & TILE FINISHERS**Effective Date: 2/1/2026**

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$26.58	\$11.49	\$15.57	\$6.05	\$0.00	\$59.69
2	60.00	\$31.90	\$11.49	\$15.57	\$6.05	\$0.00	\$65.01
3	70.00	\$37.21	\$11.49	\$15.57	\$6.05	\$0.00	\$70.32
4	80.00	\$42.53	\$11.49	\$15.57	\$6.05	\$0.00	\$75.64
5	90.00	\$47.84	\$11.49	\$15.57	\$6.05	\$0.00	\$80.95

Apprentice to Journeyworker Ratio: 1:5

MARBLE MASONS,TILELAYERS & TERRAZZO MECH	8/1/2025	\$67.97	\$11.49	\$15.57	\$7.99	\$0.00	\$103.02
BRICKLAYERS LOCAL 3	2/1/2026	\$69.32	\$11.49	\$15.57	\$7.99	\$0.00	\$104.37
BRICKLAYERS LOCAL 3 - MARBLE & TILE	8/1/2026	\$71.52	\$11.49	\$15.57	\$7.99	\$0.00	\$106.57
	2/1/2027	\$72.92	\$11.49	\$15.57	\$7.99	\$0.00	\$107.97

Apprentice: MARBLE MASONS,TILELAYERS & TERRAZZO MECH**Effective Date: 8/1/2025**

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$33.99	\$11.49	\$15.57	\$7.99	\$0.00	\$69.04
2	60.00	\$40.78	\$11.49	\$15.57	\$7.99	\$0.00	\$75.83
3	70.00	\$47.58	\$11.49	\$15.57	\$7.99	\$0.00	\$82.63
4	80.00	\$54.38	\$11.49	\$15.57	\$7.99	\$0.00	\$89.43
5	90.00	\$61.17	\$11.49	\$15.57	\$7.99	\$0.00	\$96.22

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	\$34.66	\$11.49	\$15.57	\$7.99	\$0.00	\$69.71
2	60.00	\$41.59	\$11.49	\$15.57	\$7.99	\$0.00	\$76.64
3	70.00	\$48.52	\$11.49	\$15.57	\$7.99	\$0.00	\$83.57
4	80.00	\$55.46	\$11.49	\$15.57	\$7.99	\$0.00	\$90.51
5	90.00	\$62.39	\$11.49	\$15.57	\$7.99	\$0.00	\$97.44

Apprentice to Journeyworker Ratio: 1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES)	12/1/2025	\$58.62	\$16.05	\$13.25	\$3.25	\$0.00	\$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$59.90	\$16.05	\$13.25	\$3.25	\$0.00	\$92.45
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$61.34	\$16.05	\$13.25	\$3.25	\$0.00	\$93.89

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE	12/1/2025	\$58.62	\$16.05	\$13.25	\$3.25	\$0.00	\$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$59.90	\$16.05	\$13.25	\$3.25	\$0.00	\$92.45
OPERATING ENGINEERS LOCAL 4							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	12/1/2026	\$61.34	\$16.05	\$13.25	\$3.25	\$0.00	\$93.89

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 2)	1/6/2025	\$45.03	\$10.08	\$11.47	\$10.00	\$0.00	\$76.58
MILLWRIGHTS LOCAL 1121	1/5/2026	\$47.36	\$10.08	\$11.47	\$10.00	\$0.00	\$78.91
MILLWRIGHTS LOCAL 1121 - Zone 2							

Apprentice: MILLWRIGHT (Zone 2)

Effective Date: 1/6/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	\$24.77	\$10.08	\$0.00	\$5.50	\$0.00	\$40.35
2	65.00	\$29.27	\$10.08	\$0.00	\$6.50	\$0.00	\$45.85
3	75.00	\$33.77	\$10.08	\$11.47	\$7.50	\$0.00	\$62.82
4	85.00	\$38.28	\$10.08	\$11.47	\$8.50	\$0.00	\$68.33

Apprentice: MILLWRIGHT (Zone 2)

Effective Date: 1/5/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	\$26.05	\$10.08	\$0.00	\$5.50	\$0.00	\$41.63
2	65.00	\$30.78	\$10.08	\$0.00	\$6.50	\$0.00	\$47.36
3	75.00	\$35.52	\$10.08	\$11.47	\$7.50	\$0.00	\$64.57
4	85.00	\$40.26	\$10.08	\$11.47	\$8.50	\$0.00	\$70.31

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	\$41.47	\$10.15	\$9.50	\$9.11	\$0.00	\$70.23
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.11	\$0.00	\$71.67
LABORERS - ZONE 2	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.11	\$0.00	\$73.11
	6/1/2027	\$45.80	\$10.15	\$9.50	\$9.11	\$0.00	\$74.56
	12/1/2027	\$47.25	\$10.15	\$9.50	\$9.11	\$0.00	\$76.01
	6/1/2028	\$48.75	\$10.15	\$9.50	\$9.11	\$0.00	\$77.51
	12/1/2028	\$50.25	\$10.15	\$9.50	\$9.11	\$0.00	\$79.01

For apprentice rates see "Apprentice- LABORER"

OILER (OTHER THAN TRUCK CRANES,GRADALLS)	12/1/2025	\$25.68	\$16.05	\$13.25	\$3.25	\$0.00	\$58.23
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$26.27	\$16.05	\$13.25	\$3.25	\$0.00	\$58.82
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$26.94	\$16.05	\$13.25	\$3.25	\$0.00	\$59.49

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

OILER (TRUCK CRANES, GRADALLS)	12/1/2025	\$31.65	\$16.05	\$13.25	\$3.25	\$0.00	\$64.20
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$32.37	\$16.05	\$13.25	\$3.25	\$0.00	\$64.92
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$33.17	\$16.05	\$13.25	\$3.25	\$0.00	\$65.72

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
OTHER POWER DRIVEN EQUIPMENT - CLASS II	12/1/2025	\$58.62	\$16.05	\$13.25	\$3.25	\$0.00	\$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$59.90	\$16.05	\$13.25	\$3.25	\$0.00	\$92.45
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$61.34	\$16.05	\$13.25	\$3.25	\$0.00	\$93.89

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

PAINTER (BRIDGES/TANKS)	7/1/2025	\$58.51	\$10.30	\$11.95	\$12.50	\$0.00	\$93.26
PAINTERS LOCAL 35	1/1/2026	\$59.56	\$10.35	\$12.00	\$12.50	\$0.00	\$94.41
PAINTERS LOCAL 35 - ZONE 2							

Apprentice: PAINTER (BRIDGES/TANKS)							
Effective Date: 7/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$29.26	\$10.30	\$0.00	\$0.00	\$0.00	\$39.56
2	55.00	\$32.18	\$10.30	\$0.00	\$6.88	\$0.00	\$49.36
3	60.00	\$35.11	\$10.30	\$0.00	\$7.50	\$0.00	\$52.91
4	65.00	\$38.03	\$10.30	\$0.00	\$8.13	\$0.00	\$56.46
5	70.00	\$40.96	\$10.30	\$11.95	\$8.75	\$0.00	\$71.96
6	75.00	\$43.88	\$10.30	\$11.95	\$9.38	\$0.00	\$75.51
7	80.00	\$46.81	\$10.30	\$11.95	\$10.00	\$0.00	\$79.06
8	90.00	\$52.66	\$10.30	\$11.95	\$11.25	\$0.00	\$86.16

Apprentice: PAINTER (BRIDGES/TANKS)							
Effective Date: 1/1/2026							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$29.78	\$10.35	\$0.00	\$0.00	\$0.00	\$40.13
2	55.00	\$32.76	\$10.35	\$0.00	\$6.93	\$0.00	\$50.04
3	60.00	\$35.74	\$10.35	\$0.00	\$7.56	\$0.00	\$53.65
4	65.00	\$38.71	\$10.35	\$0.00	\$8.19	\$0.00	\$57.25
5	70.00	\$41.69	\$10.35	\$12.00	\$8.82	\$0.00	\$72.86
6	75.00	\$44.67	\$10.35	\$12.00	\$9.45	\$0.00	\$76.47
7	80.00	\$47.65	\$10.35	\$12.00	\$10.08	\$0.00	\$80.08
8	90.00	\$53.60	\$10.35	\$12.00	\$11.34	\$0.00	\$87.29

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	7/1/2025	\$49.41	\$10.30	\$11.95	\$12.50	\$0.00	\$84.16
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.	1/1/2026	\$50.46	\$10.35	\$12.00	\$12.60	\$0.00	\$85.41
PAINTERS LOCAL 35							
PAINTERS LOCAL 35 - ZONE 2							

Apprentice: PAINTER (SPRAY OR SANDBLAST, NEW) *							
Effective Date: 7/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$24.71	\$10.30	\$0.00	\$0.00	\$0.00	\$35.01

Construction

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

Apprentice: PAINTER (SPRAY OR SANDBLAST, NEW) *

Effective Date: 7/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
2	55.00	\$27.18	\$10.30	\$0.00	\$6.88	\$0.00	\$44.36
3	60.00	\$29.65	\$10.30	\$0.00	\$7.50	\$0.00	\$47.45
4	65.00	\$32.12	\$10.30	\$0.00	\$8.13	\$0.00	\$50.55
5	70.00	\$34.59	\$10.30	\$11.95	\$8.75	\$0.00	\$65.59
6	75.00	\$37.06	\$10.30	\$11.95	\$9.38	\$0.00	\$68.69
7	80.00	\$39.53	\$10.30	\$11.95	\$10.00	\$0.00	\$71.78
8	90.00	\$44.47	\$10.30	\$11.95	\$11.25	\$0.00	\$77.97

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)	7/1/2025	\$47.47	\$10.30	\$11.95	\$12.50	\$0.00	\$82.22
PAINTERS LOCAL 35	1/1/2026	\$48.52	\$10.35	\$12.00	\$12.60	\$0.00	\$83.47
PAINTERS LOCAL 35 - ZONE 2							

Apprentice: PAINTER (SPRAY OR SANDBLAST, REPAINT)

Effective Date: 7/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$23.74	\$10.30	\$0.00	\$0.00	\$0.00	\$34.04
2	55.00	\$26.11	\$10.30	\$0.00	\$6.88	\$0.00	\$43.29
3	60.00	\$28.48	\$10.30	\$0.00	\$7.50	\$0.00	\$46.28
4	65.00	\$30.86	\$10.30	\$0.00	\$8.13	\$0.00	\$49.29
5	70.00	\$33.23	\$10.30	\$11.95	\$8.75	\$0.00	\$64.23
6	75.00	\$35.60	\$10.30	\$11.95	\$9.38	\$0.00	\$67.23
7	80.00	\$37.98	\$10.30	\$11.95	\$10.00	\$0.00	\$70.23
8	90.00	\$42.72	\$10.30	\$11.95	\$11.25	\$0.00	\$76.22

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: PAINTER (SPRAY OR SANDBLAST, REPAINT)							
Effective Date: 1/1/2026							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$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

Apprentice to Journeyworker Ratio: 1:1

PAINTER / TAPER (BRUSH, NEW) *	7/1/2025	\$48.01	\$10.30	\$11.95	\$12.50	\$0.00	\$82.76
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.	1/1/2026	\$49.06	\$10.35	\$12.00	\$12.60	\$0.00	\$84.01
PAINTERS LOCAL 35							
PAINTERS LOCAL 35 - ZONE 2							

Apprentice: PAINTER / TAPER (BRUSH, NEW) *							
Effective Date: 7/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$24.01	\$10.30	\$0.00	\$0.00	\$0.00	\$34.31
2	55.00	\$26.41	\$10.30	\$0.00	\$6.88	\$0.00	\$43.59
3	60.00	\$28.81	\$10.30	\$0.00	\$7.50	\$0.00	\$46.61
4	65.00	\$31.21	\$10.30	\$0.00	\$8.13	\$0.00	\$49.64
5	70.00	\$33.61	\$10.30	\$11.95	\$8.75	\$0.00	\$64.61
6	75.00	\$36.01	\$10.30	\$11.95	\$9.38	\$0.00	\$67.64
7	80.00	\$38.41	\$10.30	\$11.95	\$10.00	\$0.00	\$70.66
8	90.00	\$43.21	\$10.30	\$11.95	\$11.25	\$0.00	\$76.71

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

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice to Journeyworker Ratio: 1:1							
PAINTER / TAPER (BRUSH, REPAINT)	7/1/2025	\$46.07	\$10.30	\$11.95	\$12.50	\$0.00	\$80.82
PAINTERS LOCAL 35	1/1/2026	\$47.12	\$10.35	\$12.00	\$12.60	\$0.00	\$82.07
PAINTERS LOCAL 35 - ZONE 2							

Apprentice: PAINTER / TAPER (BRUSH, REPAINT)							
Effective Date: 7/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$23.04	\$10.30	\$0.00	\$0.00	\$0.00	\$33.34
2	55.00	\$25.34	\$10.30	\$0.00	\$6.88	\$0.00	\$42.52
3	60.00	\$27.64	\$10.30	\$0.00	\$7.50	\$0.00	\$45.44
4	65.00	\$29.95	\$10.30	\$0.00	\$8.13	\$0.00	\$48.38
5	70.00	\$32.25	\$10.30	\$11.95	\$8.75	\$0.00	\$63.25
6	75.00	\$34.55	\$10.30	\$11.95	\$9.38	\$0.00	\$66.18
7	80.00	\$36.86	\$10.30	\$11.95	\$10.00	\$0.00	\$69.11
8	90.00	\$41.46	\$10.30	\$11.95	\$11.25	\$0.00	\$74.96

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	\$41.22	\$10.15	\$9.50	\$9.21	\$0.00	\$70.08
LABORERS	6/1/2026	\$42.66	\$10.15	\$9.50	\$9.21	\$0.00	\$71.52
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$44.10	\$10.15	\$9.50	\$9.21	\$0.00	\$72.96

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

PANEL & PICKUP TRUCKS DRIVER	12/1/2025	\$40.78	\$15.57	\$21.78	\$0.00	\$0.00	\$78.13
TEAMSTERS JOINT COUNCIL NO. 10	1/1/2026	\$40.78	\$16.17	\$21.78	\$0.00	\$0.00	\$78.73
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	\$41.78	\$16.17	\$21.78	\$0.00	\$0.00	\$79.73
	12/1/2026	\$41.78	\$16.17	\$23.52	\$0.00	\$0.00	\$81.47
	1/1/2027	\$41.78	\$16.77	\$23.52	\$0.00	\$0.00	\$82.07

PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK)	8/1/2024	\$55.79	\$10.08	\$11.62	\$12.67	\$0.00	\$90.16
PILE DRIVER LOCAL 56							
PILE DRIVER LOCAL 56 (ZONE 1)							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- PILE DRIVER"							
PILE DRIVER	8/1/2024	\$55.79	\$10.08	\$11.62	\$12.67	\$0.00	\$90.16
PILE DRIVER LOCAL 56							
PILE DRIVER LOCAL 56 (ZONE 1)							

Apprentice: PILE DRIVER**Effective Date: 8/1/2024**

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

Apprentice to Journeyworker Ratio: 1:5

PIPEFITTER & STEAMFITTER	9/1/2025	\$69.08	\$13.45	\$13.75	\$9.30	\$0.00	\$105.58
PIPEFITTERS LOCAL 537							
PIPEFITTERS LOCAL 537							

Apprentice: PIPEFITTER & STEAMFITTER**Effective Date: 9/1/2025**

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	\$27.63	\$13.45	\$13.75	\$9.30	\$0.00	\$64.13
2	45.00	\$31.09	\$13.45	\$13.75	\$9.30	\$0.00	\$67.59
3	60.00	\$41.45	\$13.45	\$13.75	\$9.30	\$0.00	\$77.95
4	70.00	\$48.36	\$13.45	\$13.75	\$9.30	\$0.00	\$84.86
5	80.00	\$55.26	\$13.45	\$13.75	\$9.30	\$0.00	\$91.76

Apprentice to Journeyworker Ratio: 1:3

PIPELAYER	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.11	\$0.00	\$70.23
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.11	\$0.00	\$71.67
LABORERS - ZONE 2	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.11	\$0.00	\$73.11
	6/1/2027	\$45.80	\$10.15	\$9.50	\$9.11	\$0.00	\$74.56
	12/1/2027	\$47.25	\$10.15	\$9.50	\$9.11	\$0.00	\$76.01
	6/1/2028	\$48.75	\$10.15	\$9.50	\$9.11	\$0.00	\$77.51
	12/1/2028	\$50.25	\$10.15	\$9.50	\$9.11	\$0.00	\$79.01

For apprentice rates see "Apprentice- LABORER"

PIPELAYER (HEAVY & HIGHWAY)	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.21	\$0.00	\$70.33
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.21	\$0.00	\$71.77
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.21	\$0.00	\$73.21

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

PLUMBERS & GASFITTERS	9/1/2025	\$71.74	\$14.32	\$12.61	\$8.00	\$0.00	\$106.67
PLUMBERS & GASFITTERS LOCAL 12	3/2/2026	\$73.89	\$14.32	\$12.61	\$8.00	\$0.00	\$108.82
PLUMBERS & GASFITTERS LOCAL 12	8/31/2026	\$76.04	\$14.32	\$12.61	\$8.00	\$0.00	\$110.97

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	3/1/2027	\$78.19	\$14.32	\$12.61	\$8.00	\$0.00	\$113.12
	8/30/2027	\$80.34	\$14.32	\$12.61	\$8.00	\$0.00	\$115.27
	2/28/2028	\$82.54	\$14.32	\$12.61	\$8.00	\$0.00	\$117.47
	9/4/2028	\$84.74	\$14.32	\$12.61	\$8.00	\$0.00	\$119.67
	3/5/2029	\$86.94	\$14.32	\$12.61	\$8.00	\$0.00	\$121.87
	9/3/2029	\$89.14	\$14.32	\$12.61	\$8.00	\$0.00	\$124.07
	3/4/2030	\$91.09	\$14.32	\$12.61	\$8.00	\$0.00	\$126.02

Apprentice: PLUMBERS & GASFITTERS

Effective Date: 9/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	35.00	\$25.11	\$14.32	\$4.61	\$2.80	\$0.00	\$46.84
2	40.00	\$28.70	\$14.32	\$5.22	\$3.20	\$0.00	\$51.44
3	55.00	\$39.46	\$14.32	\$7.07	\$4.40	\$0.00	\$65.25
4	65.00	\$46.63	\$14.32	\$8.30	\$5.20	\$0.00	\$74.45
5	75.00	\$53.81	\$14.32	\$9.53	\$6.00	\$0.00	\$83.66

Apprentice: PLUMBERS & GASFITTERS

Effective Date: 3/2/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	35.00	\$25.86	\$14.32	\$4.61	\$2.80	\$0.00	\$47.59
2	40.00	\$29.56	\$14.32	\$5.22	\$3.20	\$0.00	\$52.30
3	55.00	\$40.64	\$14.32	\$7.07	\$4.40	\$0.00	\$66.43
4	65.00	\$48.03	\$14.32	\$8.30	\$5.20	\$0.00	\$75.85
5	75.00	\$55.42	\$14.32	\$9.53	\$6.00	\$0.00	\$85.27

Apprentice to Journeyworker Ratio: 1:2

PNEUMATIC CONTROLS (TEMP.)	9/1/2025	\$69.08	\$13.45	\$13.75	\$9.30	\$0.00	\$105.58
PIPEFITTERS LOCAL 537							
PIPEFITTERS LOCAL 537							

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

PNEUMATIC DRILL/TOOL OPERATOR	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.11	\$0.00	\$70.23
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.11	\$0.00	\$71.67
LABORERS - ZONE 2	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.11	\$0.00	\$73.11
	6/1/2027	\$45.80	\$10.15	\$9.50	\$9.11	\$0.00	\$74.56
	12/1/2027	\$47.25	\$10.15	\$9.50	\$9.11	\$0.00	\$76.01
	6/1/2028	\$48.75	\$10.15	\$9.50	\$9.11	\$0.00	\$77.51
	12/1/2028	\$50.25	\$10.15	\$9.50	\$9.11	\$0.00	\$79.01

For apprentice rates see "Apprentice- LABORER"

PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY)	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.21	\$0.00	\$70.33
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.21	\$0.00	\$71.77
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.21	\$0.00	\$73.21

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

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER	12/1/2025	\$42.22	\$10.15	\$9.50	\$9.11	\$0.00	\$70.98
LABORERS	6/1/2026	\$43.66	\$10.15	\$9.50	\$9.11	\$0.00	\$72.42
LABORERS - ZONE 2	12/1/2026	\$45.10	\$10.15	\$9.50	\$9.11	\$0.00	\$73.86
	6/1/2027	\$46.55	\$10.15	\$9.50	\$9.11	\$0.00	\$75.31
	12/1/2027	\$48.00	\$10.15	\$9.50	\$9.11	\$0.00	\$76.76
	6/1/2028	\$49.50	\$10.15	\$9.50	\$9.11	\$0.00	\$78.26
	12/1/2028	\$51.00	\$10.15	\$9.50	\$9.11	\$0.00	\$79.76
For apprentice rates see "Apprentice- LABORER"							
POWDERMAN & BLASTER (HEAVY & HIGHWAY)	12/1/2025	\$42.22	\$9.90	\$9.50	\$9.21	\$0.00	\$70.83
LABORERS	6/1/2026	\$43.66	\$9.90	\$9.50	\$9.21	\$0.00	\$72.27
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	\$45.10	\$9.90	\$9.50	\$9.21	\$0.00	\$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
POWER SHOVEL/DERRICK/TRENCHING MACHINE	12/1/2025	\$59.28	\$16.05	\$13.25	\$3.25	\$0.00	\$91.83
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$60.58	\$16.05	\$13.25	\$3.25	\$0.00	\$93.13
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$62.03	\$16.05	\$13.25	\$3.25	\$0.00	\$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PUMP OPERATOR (CONCRETE)	12/1/2025	\$58.62	\$16.05	\$13.25	\$3.25	\$0.00	\$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$59.90	\$16.05	\$13.25	\$3.25	\$0.00	\$92.45
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$61.34	\$16.05	\$13.25	\$3.25	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PUMP OPERATOR (DEWATERING, OTHER)	12/1/2025	\$37.97	\$16.05	\$13.25	\$3.25	\$0.00	\$70.52
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$38.83	\$16.05	\$13.25	\$3.25	\$0.00	\$71.38
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$39.78	\$16.05	\$13.25	\$3.25	\$0.00	\$72.33
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
READY-MIX CONCRETE DRIVER	5/1/2025	\$30.50	\$11.57	\$6.65	\$0.00	\$0.00	\$48.72
TEAMSTERS 170	1/1/2026	\$30.50	\$11.97	\$6.65	\$0.00	\$0.00	\$49.12
TEAMSTERS 170 - J.G. MacLellan (Lowell)							
RECLAIMERS	12/1/2025	\$58.62	\$16.05	\$13.25	\$3.25	\$0.00	\$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$59.90	\$16.05	\$13.25	\$3.25	\$0.00	\$92.45
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$61.34	\$16.05	\$13.25	\$3.25	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
RIDE-ON MOTORIZED BUGGY OPERATOR	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.11	\$0.00	\$70.23
LABORERS	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.11	\$0.00	\$71.67
LABORERS - ZONE 2	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.11	\$0.00	\$73.11
	6/1/2027	\$45.80	\$10.15	\$9.50	\$9.11	\$0.00	\$74.56
	12/1/2027	\$47.25	\$10.15	\$9.50	\$9.11	\$0.00	\$76.01
	6/1/2028	\$48.75	\$10.15	\$9.50	\$9.11	\$0.00	\$77.51
	12/1/2028	\$50.25	\$10.15	\$9.50	\$9.11	\$0.00	\$79.01
For apprentice rates see "Apprentice- LABORER"							
ROLLER/SPREADER/MULCHING MACHINE	12/1/2025	\$58.62	\$16.05	\$13.25	\$3.25	\$0.00	\$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$59.90	\$16.05	\$13.25	\$3.25	\$0.00	\$92.45
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$61.34	\$16.05	\$13.25	\$3.25	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
ROOFER (Inc.Roofing Waterproofing &Roofing Damproofg)	8/1/2025	\$53.53	\$13.28	\$12.67	\$9.03	\$0.00	\$88.51
ROOFERS LOCAL 33	2/1/2026	\$54.78	\$13.28	\$12.67	\$9.03	\$0.00	\$89.76
ROOFERS LOCAL 33							

Apprentice: ROOFER (Inc.Roofing Waterproofing &Roofing Damproofg)							
Effective Date: 8/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$26.77	\$13.28	\$6.52	\$9.03	\$0.00	\$55.60
2	60.00	\$32.12	\$13.28	\$12.67	\$9.03	\$0.00	\$67.10
3	65.00	\$34.79	\$13.28	\$12.67	\$9.03	\$0.00	\$69.77
4	75.00	\$40.15	\$13.28	\$12.67	\$9.03	\$0.00	\$75.13
5	85.00	\$45.50	\$13.28	\$12.67	\$9.03	\$0.00	\$80.48

Apprentice: ROOFER (Inc.Roofing Waterproofing &Roofing Damproofg)							
Effective Date: 2/1/2026							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$27.39	\$13.28	\$6.52	\$9.03	\$0.00	\$56.22
2	60.00	\$32.87	\$13.28	\$12.67	\$9.03	\$0.00	\$67.85
3	65.00	\$35.61	\$13.28	\$12.67	\$9.03	\$0.00	\$70.59
4	75.00	\$41.09	\$13.28	\$12.67	\$9.03	\$0.00	\$76.07
5	85.00	\$46.56	\$13.28	\$12.67	\$9.03	\$0.00	\$81.54

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	8/1/2025	\$53.78	\$13.28	\$12.67	\$9.03	\$0.00	\$88.76
ROOFERS LOCAL 33	2/1/2026	\$55.03	\$13.28	\$12.67	\$9.03	\$0.00	\$90.01
ROOFERS LOCAL 33							

For apprentice rates see "Apprentice- ROOFER"

SHEETMETAL WORKER	8/1/2025	\$60.98	\$14.91	\$18.74	\$9.53	\$2.98	\$107.14
SHEETMETAL WORKERS LOCAL 17	2/1/2026	\$62.93	\$14.91	\$18.74	\$9.53	\$2.98	\$109.09
SHEETMETAL WORKERS LOCAL 17 - A							

Apprentice: SHEETMETAL WORKER							
Effective Date: 8/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	42.00	\$25.61	\$14.91	\$6.13	\$0.00	\$0.00	\$46.65
2	42.00	\$25.61	\$14.91	\$6.13	\$0.00	\$0.00	\$46.65
3	47.00	\$28.66	\$14.91	\$11.01	\$1.25	\$1.62	\$57.45
4	47.00	\$28.66	\$14.91	\$11.01	\$1.25	\$1.62	\$57.45
5	52.00	\$31.71	\$14.91	\$11.74	\$1.50	\$1.74	\$61.60

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: SHEETMETAL WORKER Effective Date: 8/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
6	52.00	\$31.71	\$14.91	\$11.74	\$1.75	\$1.75	\$61.86
7	60.00	\$36.59	\$14.91	\$12.90	\$2.00	\$1.93	\$68.33
8	65.00	\$39.64	\$14.91	\$13.63	\$2.25	\$2.04	\$72.47
9	75.00	\$45.74	\$14.91	\$15.09	\$2.75	\$2.28	\$80.77
10	85.00	\$51.83	\$14.91	\$16.55	\$2.75	\$2.49	\$88.53
Apprentice: SHEETMETAL WORKER Effective Date: 2/1/2026							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	42.00	\$26.43	\$14.91	\$6.19	\$0.00	\$0.00	\$47.53
2	42.00	\$26.43	\$14.91	\$6.19	\$0.00	\$0.00	\$47.53
3	47.00	\$29.58	\$14.91	\$10.93	\$1.25	\$1.62	\$58.29
4	47.00	\$29.58	\$14.91	\$10.93	\$1.25	\$1.62	\$58.29
5	52.00	\$32.72	\$14.91	\$11.66	\$1.50	\$1.74	\$62.53
6	52.00	\$32.72	\$14.91	\$11.66	\$1.75	\$1.75	\$62.79
7	60.00	\$37.76	\$14.91	\$12.84	\$2.00	\$1.93	\$69.44
8	65.00	\$40.90	\$14.91	\$13.58	\$2.25	\$2.04	\$73.68
9	75.00	\$47.20	\$14.91	\$15.06	\$2.75	\$2.28	\$82.20
10	85.00	\$53.49	\$14.91	\$16.53	\$2.75	\$2.49	\$90.17
Apprentice to Journeyworker Ratio: 1:4							
SPECIALIZED EARTH MOVING EQUIP < 35 TONS	12/1/2025	\$41.24	\$15.57	\$21.78	\$0.00	\$0.00	\$78.59
TEAMSTERS JOINT COUNCIL NO. 10	1/1/2026	\$41.24	\$16.17	\$21.78	\$0.00	\$0.00	\$79.19
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	\$42.24	\$16.17	\$21.78	\$0.00	\$0.00	\$80.19
	12/1/2026	\$42.24	\$16.17	\$23.52	\$0.00	\$0.00	\$81.93
	1/1/2027	\$42.24	\$16.77	\$23.52	\$0.00	\$0.00	\$82.53
SPECIALIZED EARTH MOVING EQUIP > 35 TONS	12/1/2025	\$41.53	\$15.57	\$21.78	\$0.00	\$0.00	\$78.88
TEAMSTERS JOINT COUNCIL NO. 10	1/1/2026	\$41.53	\$16.17	\$21.78	\$0.00	\$0.00	\$79.48
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	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
	1/1/2027	\$42.53	\$16.77	\$23.52	\$0.00	\$0.00	\$82.82
SPRINKLER FITTER	10/1/2025	\$72.05	\$12.25	\$7.40	\$19.50	\$0.00	\$111.20
SPRINKLER FITTERS LOCAL 550	1/1/2026	\$72.05	\$13.45	\$7.45	\$18.25	\$0.00	\$111.20
SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1							

Apprentice: SPRINKLER FITTER Effective Date: 10/1/2025							
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: SPRINKLER FITTER Effective Date: 10/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	35.00	\$25.22	\$12.25	\$14.22	\$0.00	\$0.00	\$51.69
2	40.00	\$28.82	\$12.25	\$15.20	\$0.00	\$0.00	\$56.27
3	45.00	\$32.42	\$12.25	\$16.18	\$0.00	\$0.00	\$60.85
4	50.00	\$36.03	\$12.25	\$17.15	\$0.00	\$0.00	\$65.43
5	55.00	\$39.63	\$12.25	\$18.12	\$0.00	\$0.00	\$70.00
6	60.00	\$43.23	\$12.25	\$19.10	\$0.00	\$0.00	\$74.58
7	65.00	\$46.83	\$12.25	\$20.08	\$0.00	\$0.00	\$79.16
8	70.00	\$50.44	\$12.25	\$21.04	\$0.00	\$0.00	\$83.73
9	75.00	\$54.04	\$12.25	\$22.02	\$0.00	\$0.00	\$88.31
10	80.00	\$57.64	\$12.25	\$23.00	\$0.00	\$0.00	\$92.89
Apprentice: SPRINKLER FITTER Effective Date: 1/1/2026							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	35.00	\$25.22	\$13.45	\$13.84	\$0.00	\$0.00	\$52.51
2	40.00	\$28.82	\$13.45	\$14.75	\$0.00	\$0.00	\$57.02
3	45.00	\$32.42	\$13.45	\$15.67	\$0.00	\$0.00	\$61.54
4	50.00	\$36.03	\$13.45	\$16.57	\$0.00	\$0.00	\$66.05
5	55.00	\$39.63	\$13.45	\$17.49	\$0.00	\$0.00	\$70.57
6	60.00	\$43.23	\$13.45	\$18.40	\$0.00	\$0.00	\$75.08
7	65.00	\$46.83	\$13.45	\$19.32	\$0.00	\$0.00	\$79.60
8	70.00	\$50.44	\$13.45	\$20.22	\$0.00	\$0.00	\$84.11
9	75.00	\$54.04	\$13.45	\$21.15	\$0.00	\$0.00	\$88.64
10	80.00	\$57.64	\$13.45	\$22.05	\$0.00	\$0.00	\$93.14
Apprentice Notes Apprentice entered prior 9/30/10:							
Apprentice to Journeyworker Ratio: 1:3							
STEAM BOILER OPERATOR	12/1/2025	\$58.62	\$16.05	\$13.25	\$3.25	\$0.00	\$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$59.90	\$16.05	\$13.25	\$3.25	\$0.00	\$92.45
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$61.34	\$16.05	\$13.25	\$3.25	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN	12/1/2025	\$58.62	\$16.05	\$13.25	\$3.25	\$0.00	\$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$59.90	\$16.05	\$13.25	\$3.25	\$0.00	\$92.45
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$61.34	\$16.05	\$13.25	\$3.25	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TELECOMMUNICATION TECHNICIAN	9/1/2025	\$52.94	\$13.00	\$13.97	\$6.98	\$0.00	\$86.89
TELECOMMUNICATION TECHNICIAN	3/1/2026	\$53.49	\$13.00	\$14.23	\$7.20	\$0.00	\$87.92

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
ELECTRICIANS LOCAL 103	9/1/2026	\$55.02	\$13.00	\$14.28	\$7.20	\$0.00	\$89.50
ELECTRICIANS LOCAL 103	3/1/2027	\$55.98	\$13.00	\$14.31	\$7.20	\$0.00	\$90.49
	9/1/2027	\$57.50	\$13.00	\$14.36	\$7.20	\$0.00	\$92.06
	3/1/2028	\$58.46	\$13.00	\$14.38	\$7.20	\$0.00	\$93.04

For apprentice rates and ratios see "Apprentice- ELECTRICIAN"

Apprentice: TELECOMMUNICATION TECHNICIAN							
Effective Date: 9/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	\$23.82	\$13.00	\$0.71	\$0.00	\$0.00	\$37.53
2	45.00	\$23.82	\$13.00	\$0.71	\$0.00	\$0.00	\$37.53
3	50.00	\$26.47	\$13.00	\$13.17	\$3.49	\$0.00	\$56.13
4	50.00	\$26.47	\$13.00	\$13.17	\$3.49	\$0.00	\$56.13
5	55.00	\$29.12	\$13.00	\$13.25	\$3.84	\$0.00	\$59.21
6	60.00	\$31.76	\$13.00	\$13.33	\$4.19	\$0.00	\$62.28
7	65.00	\$34.41	\$13.00	\$13.41	\$4.54	\$0.00	\$65.36
8	70.00	\$37.06	\$13.00	\$13.49	\$4.89	\$0.00	\$68.44
9	75.00	\$39.71	\$13.00	\$13.57	\$5.24	\$0.00	\$71.52
10	80.00	\$42.35	\$13.00	\$13.65	\$5.58	\$0.00	\$74.58

Apprentice: TELECOMMUNICATION TECHNICIAN							
Effective Date: 3/1/2026							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	\$24.07	\$13.00	\$0.72	\$0.00	\$0.00	\$37.79
2	45.00	\$24.07	\$13.00	\$0.72	\$0.00	\$0.00	\$37.79
3	50.00	\$26.75	\$13.00	\$13.43	\$3.60	\$0.00	\$56.78
4	50.00	\$26.75	\$13.00	\$13.43	\$3.60	\$0.00	\$56.78
5	55.00	\$29.42	\$13.00	\$13.51	\$3.96	\$0.00	\$59.89
6	60.00	\$32.09	\$13.00	\$13.59	\$4.32	\$0.00	\$63.00
7	65.00	\$34.77	\$13.00	\$13.67	\$4.68	\$0.00	\$66.12
8	70.00	\$37.44	\$13.00	\$13.75	\$5.04	\$0.00	\$69.23
9	75.00	\$40.12	\$13.00	\$13.83	\$5.40	\$0.00	\$72.35
10	80.00	\$42.79	\$13.00	\$13.91	\$5.76	\$0.00	\$75.46

Apprentice to Journeyworker Ratio: 1:1

TERRAZZO FINISHERS	8/1/2025	\$66.89	\$11.49	\$15.57	\$8.02	\$0.00	\$101.97
BRICKLAYERS LOCAL 3	2/1/2026	\$68.24	\$11.49	\$15.57	\$8.02	\$0.00	\$103.32
BRICKLAYERS LOCAL 3 - MARBLE & TILE	8/1/2026	\$70.44	\$11.49	\$15.57	\$8.02	\$0.00	\$105.52
	2/1/2027	\$71.84	\$11.49	\$15.57	\$8.02	\$0.00	\$106.92

Apprentice: TERRAZZO FINISHERS							
Effective Date: 8/1/2025							
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: TERRAZZO FINISHERS Effective Date: 8/1/2025							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$33.45	\$11.49	\$15.57	\$8.02	\$0.00	\$68.53
2	60.00	\$40.13	\$11.49	\$15.57	\$8.02	\$0.00	\$75.21
3	70.00	\$46.82	\$11.49	\$15.57	\$8.02	\$0.00	\$81.90
4	80.00	\$53.51	\$11.49	\$15.57	\$8.02	\$0.00	\$88.59
5	90.00	\$60.20	\$11.49	\$15.57	\$8.02	\$0.00	\$95.28
Apprentice: TERRAZZO FINISHERS Effective Date: 2/1/2026							
Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	\$34.12	\$11.49	\$15.57	\$8.02	\$0.00	\$69.20
2	60.00	\$40.94	\$11.49	\$15.57	\$8.02	\$0.00	\$76.02
3	70.00	\$47.77	\$11.49	\$15.57	\$8.02	\$0.00	\$82.85
4	80.00	\$54.59	\$11.49	\$15.57	\$8.02	\$0.00	\$89.67
5	90.00	\$61.42	\$11.49	\$15.57	\$8.02	\$0.00	\$96.50
Apprentice to Journeyworker Ratio: 1:5							
TEST BORING DRILLER	12/1/2025	\$52.70	\$10.15	\$9.50	\$9.80	\$0.00	\$82.15
LABORERS	6/1/2026	\$54.25	\$10.15	\$9.50	\$9.80	\$0.00	\$83.70
LABORERS - FOUNDATION AND MARINE	12/1/2026	\$55.75	\$10.15	\$9.50	\$9.80	\$0.00	\$85.20
For apprentice rates see "Apprentice- LABORER"							
TEST BORING DRILLER HELPER	12/1/2025	\$48.82	\$10.15	\$9.50	\$9.80	\$0.00	\$78.27
LABORERS	6/1/2026	\$50.37	\$10.15	\$9.50	\$9.80	\$0.00	\$79.82
LABORERS - FOUNDATION AND MARINE	12/1/2026	\$51.87	\$10.15	\$9.50	\$9.80	\$0.00	\$81.32
For apprentice rates see "Apprentice- LABORER"							
TEST BORING LABORER	12/1/2025	\$48.70	\$10.15	\$9.50	\$9.80	\$0.00	\$78.15
LABORERS	6/1/2026	\$50.25	\$10.15	\$9.50	\$9.80	\$0.00	\$79.70
LABORERS - FOUNDATION AND MARINE	12/1/2026	\$51.75	\$10.15	\$9.50	\$9.80	\$0.00	\$81.20
For apprentice rates see "Apprentice- LABORER"							
TRACTORS/PORTABLE STEAM GENERATORS	12/1/2025	\$58.62	\$16.05	\$13.25	\$3.25	\$0.00	\$91.17
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$59.90	\$16.05	\$13.25	\$3.25	\$0.00	\$92.45
OPERATING ENGINEERS LOCAL 4	12/1/2026	\$61.34	\$16.05	\$13.25	\$3.25	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TRAILERS FOR EARTH MOVING EQUIPMENT	12/1/2025	\$41.82	\$15.57	\$21.78	\$0.00	\$0.00	\$79.17
TEAMSTERS JOINT COUNCIL NO. 10	1/1/2026	\$41.82	\$16.17	\$21.78	\$0.00	\$0.00	\$79.77
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	\$42.82	\$16.17	\$21.78	\$0.00	\$0.00	\$80.77
	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

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
TUNNEL WORK - COMPRESSED AIR LABORERS	12/1/2025	\$60.93	\$10.15	\$9.50	\$10.25	\$0.00	\$90.83
LABORERS (COMPRESSED AIR)	6/1/2026	\$62.48	\$10.15	\$9.50	\$10.25	\$0.00	\$92.38
	12/1/2026	\$63.98	\$10.15	\$9.50	\$10.25	\$0.00	\$93.88
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) LABORERS	12/1/2025	\$62.93	\$10.15	\$9.50	\$10.25	\$0.00	\$92.83
LABORERS (COMPRESSED AIR)	6/1/2026	\$64.48	\$10.15	\$9.50	\$10.25	\$0.00	\$94.38
	12/1/2026	\$65.98	\$10.15	\$9.50	\$10.25	\$0.00	\$95.88
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - FREE AIR LABORERS	12/1/2025	\$53.00	\$10.15	\$9.50	\$10.25	\$0.00	\$82.90
LABORERS (FREE AIR TUNNEL)	6/1/2026	\$54.55	\$10.15	\$9.50	\$10.25	\$0.00	\$84.45
	12/1/2026	\$56.05	\$10.15	\$9.50	\$10.25	\$0.00	\$85.95
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - FREE AIR (HAZ. WASTE) LABORERS	12/1/2025	\$55.00	\$10.15	\$9.50	\$10.25	\$0.00	\$84.90
LABORERS (FREE AIR TUNNEL)	6/1/2026	\$56.55	\$10.15	\$9.50	\$10.25	\$0.00	\$86.45
	12/1/2026	\$58.05	\$10.15	\$9.50	\$10.25	\$0.00	\$87.95
For apprentice rates see "Apprentice- LABORER"							
VAC-HAUL TEAMSTERS JOINT COUNCIL NO. 10	12/1/2025	\$41.24	\$15.57	\$21.78	\$0.00	\$0.00	\$78.59
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
WAGON DRILL OPERATOR LABORERS	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.11	\$0.00	\$70.23
LABORERS - ZONE 2	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.11	\$0.00	\$71.67
	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.11	\$0.00	\$73.11
	6/1/2027	\$45.80	\$10.15	\$9.50	\$9.11	\$0.00	\$74.56
	12/1/2027	\$47.25	\$10.15	\$9.50	\$9.11	\$0.00	\$76.01
	6/1/2028	\$48.75	\$10.15	\$9.50	\$9.11	\$0.00	\$77.51
	12/1/2028	\$50.25	\$10.15	\$9.50	\$9.11	\$0.00	\$79.01
For apprentice rates see "Apprentice- LABORER"							
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) LABORERS	12/1/2025	\$41.47	\$10.15	\$9.50	\$9.21	\$0.00	\$70.33
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	\$42.91	\$10.15	\$9.50	\$9.21	\$0.00	\$71.77
	12/1/2026	\$44.35	\$10.15	\$9.50	\$9.21	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
WASTE WATER PUMP OPERATOR OPERATING ENGINEERS LOCAL 4	12/1/2025	\$59.28	\$16.05	\$13.25	\$3.25	\$0.00	\$91.83
OPERATING ENGINEERS LOCAL 4	6/1/2026	\$60.58	\$16.05	\$13.25	\$3.25	\$0.00	\$93.13
	12/1/2026	\$62.03	\$16.05	\$13.25	\$3.25	\$0.00	\$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
WATER METER INSTALLER PLUMBERS & GASFITTERS LOCAL 12	9/1/2025	\$71.74	\$14.32	\$12.61	\$8.00	\$0.00	\$106.67
PLUMBERS & GASFITTERS LOCAL 12	3/2/2026	\$73.89	\$14.32	\$12.61	\$8.00	\$0.00	\$108.82
	8/31/2026	\$76.04	\$14.32	\$12.61	\$8.00	\$0.00	\$110.97
	3/1/2027	\$78.19	\$14.32	\$12.61	\$8.00	\$0.00	\$113.12
	8/30/2027	\$80.34	\$14.32	\$12.61	\$8.00	\$0.00	\$115.27

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	2/2/2028	\$82.54	\$14.32	\$12.61	\$8.00	\$0.00	\$117.47
	9/4/2028	\$84.74	\$14.32	\$12.61	\$8.00	\$0.00	\$119.67
	3/5/2029	\$86.94	\$14.32	\$12.61	\$8.00	\$0.00	\$121.87
	9/3/2029	\$89.14	\$14.32	\$12.61	\$8.00	\$0.00	\$124.07
	3/4/2030	\$91.09	\$14.32	\$12.61	\$8.00	\$0.00	\$126.02

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

Marine Drilling

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

Op Eng Marine (Dredging Work)

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

Outside Electrical

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

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 TimetablesTimetableGoals (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 AreasSTATE: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

4.8

MA Hampden, MA Hampshire

Non-SMSA Counties: MA Barnstable, MA Dukes, MA Nantucket

3.6

Non-SMSA Counties: MA Franklin

5.9

APPENDIX C

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

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration (FHWA), as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin (including limited English proficiency), age, sex, disability, or low-income status in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.
3. **Solicitations for Subcontractors, including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor’s obligations under this contract and the Acts and the Regulations relative to nondiscrimination on the grounds of race, color, national origin (including limited English proficiency), age, sex, disability, or low-income status.
4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto, and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Massachusetts Department of Transportation (MassDOT) or FHWA to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor will so certify to MassDOT or FHWA, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a contractor’s noncompliance with the Nondiscrimination provisions of this contract, MassDOT will impose such contract sanctions as it or FHWA may determine to be appropriate, including, but not limited to:
 - a. withholding payments to the contractor under the contract until the contractor complies; and/or
 - b. cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as MassDOT or FHWA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request MassDOT to enter into any litigation to protect the interests of MassDOT. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

APPENDIX D

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

PERTINENT NON-DISCRIMINATION AUTHORITIES:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-Aid programs and projects)
- Federal-Aid Highway Act of 1973 (23 U.S.C. § 324 *et seq.*) (prohibits discrimination on the basis of sex)
- Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. § 794 *et seq.*), as amended (prohibits discrimination on the basis of disability) and 49 CFR Part 27
- The Age Discrimination Act of 1975, as amended (42 U.S.C. § 6101 *et seq.*) (prohibits discrimination on the basis of age)
- Airport and Airway Improvement Act of 1982 (49 U.S.C. § 471, Section 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex)
- The Civil Rights Restoration Act of 1987 (PL 100-209) (broadened the scope, coverage, and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975, and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms “programs or activities” to include all of the programs or activities of Federal-Aid recipients, sub-recipients, and contractors, whether such programs or activities are Federally funded or not)
- Titles II and III of the Americans with Disabilities Act (42 U.S.C. §§ 12131-12189), as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38 (prohibits discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities)
- The Federal Aviation Administration’s Non-Discrimination Statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex)
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (ensures discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations)
- Executive Order 13166, Improving Access to Services for People with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100)
- Title IX of the Education Amendments Act of 1972, as amended (20 U.S.C. 1681 *et seq.*) (prohibits discrimination on the basis of sex in education programs or activities)

*** END OF DOCUMENT ***

DOCUMENT 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: MA20250021 12/12/2025

Superseded General Decision Number: MA20240021

State: Massachusetts

Construction Type: Highway

County: Middlesex County in Massachusetts.

HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2025
1	03/21/2025
2	07/11/2025
3	07/18/2025
4	09/26/2025
5	12/12/2025

ELEC0103-007 09/01/2025

	Rates	Fringes
ELECTRICIAN.....	\$ 66.17	37.08

ENGI0004-026 06/01/2025

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Group 1.....	\$ 57.83	33.70
Group 2.....	\$ 57.18	33.70

FOOTNOTE FOR POWER EQUIPMENT OPERATORS:

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

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

Group 1: Backhoe/Excavator/Trackhoe; Bobcat/Skid
Steer/Skid

Loader; Broom/Sweeper; Gradall; Loader; Paver (Asphalt,
Aggregate, and Concrete)
Group 2: Bulldozer; Grader/Blade; Milling Machine; Roller

IRON0007-031 09/16/2025

	Rates	Fringes
IRONWORKER (ORNAMENTAL, REINFORCING, AND STRUCTURAL).....	\$ 57.87	37.67

LABO0039-002 06/01/2018

	Rates	Fringes
LABORER		
Asphalt, Includes Raker, Shoveler, Spreader and Distributor.....	\$ 33.50	22.92
Landscape.....	\$ 33.25	22.92

PAIN0035-023 07/01/2024

	Rates	Fringes
PAINTER (Steel).....	\$ 56.76	36.00

SUMA2014-011 01/11/2017

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 47.93	19.46
CEMENT MASON/CONCRETE FINISHER...	\$ 56.70	21.08
LABORER: Common or General.....	\$ 36.58	19.40
LABORER: Concrete Saw (Hand Held/Walk Behind).....	\$ 41.78	18.37

LABORER: Guardrail Installation.....	\$ 37.70	15.37
OPERATOR: Crane.....	\$ 57.61	0.00
OPERATOR: Forklift.....	\$ 64.67	0.00
OPERATOR: Mechanic.....	\$ 48.14	17.02
OPERATOR: Piledriver.....	\$ 44.46	16.94
OPERATOR: Post Driver (Guardrail/Fences).....	\$ 41.49	23.07
PAINTER: Spray (Linestriping)....	\$ 40.87	13.86
PILEDRIVERMAN.....	\$ 45.65	23.33
TRAFFIC CONTROL: Flagger.....	\$ 23.00	20.44
TRAFFIC CONTROL: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper.....	\$ 44.49	12.41
TRUCK DRIVER: Concrete Truck....	\$ 33.69	15.79
TRUCK DRIVER: Dump Truck.....	\$ 38.92	9.73
TRUCK DRIVER: Flatbed Truck.....	\$ 48.53	0.00

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

=====
=====

Note: Executive Order (EO) 13706, Establishing Paid Sick
Leave
for Federal Contractors applies to all contracts subject to
the

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

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least \$13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections

under Executive Order 13658 is available at
www.dol.gov/whd/govcontracts.

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

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

Union Rate Identifiers

A four-letter identifier beginning with characters other
than
"SU", "UAVG", "SA", or "SC" denotes that a union rate
was
prevailing for that classification in the survey. Example:
PLUM0198-005 07/01/2024. PLUM is an identifier of the union
whose collectively bargained rate prevailed in the survey
for
this classification, which in this example would be
Plumbers.

0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

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

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio.

The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

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

Survey Rate Identifiers

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

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

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the

state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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

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

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

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

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

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

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

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END OF GENERAL DECISION"

"General Decision Number: MA20250006 12/12/2025

Superseded General Decision Number: MA20240006

State: Massachusetts

Construction Type: Heavy Dredging

Counties: Massachusetts Statewide.
STATEWIDE

Massachusetts All Dredging, except self-propelled hopper dredges, on the Atlantic Coast & tributary waters emptying into the Atlantic Ocean.

Modification Number	Publication Date
0	01/03/2025
1	02/21/2025
2	12/12/2025

ENGI0025-001 10/01/2024

STATEWIDE

	Rates	Fringes
Dredging:		
CLASS A1.....	\$ 47.07	15.34+a+b
CLASS A2.....	\$ 41.94	14.99+a+b
CLASS B1.....	\$ 40.71	14.90+a+b
CLASS B2.....	\$ 38.31	14.73+a+b
CLASS C1.....	\$ 37.26	14.66+a+b
CLASS C2.....	\$ 36.07	14.57+a+b
CLASS D.....	\$ 29.96	14.15+a+b

CLASSIFICATIONS:

CLASS A1: Deck Captain; Mechanical Dredge Operator, Leverman, Licensed Tug Operator over 1000 HP.
CLASS A2: Crane Operator (360 swing).
CLASS B1: Derrick Operator (180 swing), Spider/Spill Barge

Operator, Engineer, Electrician, Chief Welder, Chief Mate,
Fill Placer, Operator II, Maintenance Engineer, Licensed Boat Operator, Licensed Crew Boat Operator.
CLASS B2: Certified Welder.
CLASS C1: Mate, Drag Barge Operator, Assistant Fill Placer,
Welder, Steward.
CLASS C2: Boat Operator.
CLASS D: Oiler, Deckhand, Shoreman, Rodman, Scowman, Cook,
Messman, Porter/Janitor.

INCENTIVE PAY: (Add to Hourly Rate)

Operator (NCCCO License/Certification) \$1.80 Licensed Tug

Operator over 1000 HP (Assigned as Master) (USCG licensed

Master of Towing Vessels (MOTV) \$1.80; Licensed Boat Operator (Assigned as lead boat captain) USCG licensed boat operator \$1.30; Engineer (QMED and Tankerman endorsement or licensed engineer (USCG) \$1.80
Oiler (QMED and Tankerman endorsement (USCG) \$1.80; All classifications (Tankerman endorsement only) USCG \$1.55; Deckhand or Mate (AB with Lifeboatman endorsement (USCG) \$1.80; All classifications (lifeboatman endorsement only (USCG) \$1.55; Welder (ABS certification) \$1.55

FOOTNOTES APPLICABLE TO ABOVE CRAFTS:

- a. PAID HOLIDAYS: New Year's Day, Martin Luther King, Jr.'s Birthday, Memorial Day, Good Friday, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and Christmas Day
- b. VACATION: Eight percent (8%) of the straight time rate,
multiplied by the total hours worked.

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 \$13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing

on the contract in 2025. 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

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?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).

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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

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

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

the requestor considers relevant to the issue.

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

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

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END OF GENERAL DECISION"

"General Decision Number: MA20250008 12/12/2025

Superseded General Decision Number: MA20240008

State: Massachusetts

Construction Types: Heavy (Heavy and Marine)

Counties: Barnstable, Bristol, Dukes, Essex, Middlesex,
Nantucket, Norfolk, Plymouth and Suffolk Counties in
Massachusetts.

HEAVY AND MARINE CONTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2025
1	03/07/2025
2	03/14/2025
3	03/21/2025
4	07/11/2025
5	07/18/2025
6	08/01/2025
7	09/12/2025
8	09/26/2025
9	11/21/2025
10	12/12/2025

BOIL0029-001 01/01/2025

	Rates	Fringes
BOILERMAKER.....	\$ 50.62	28.82

BRMA0001-011 02/01/2023

FOXBORO CHAPTER

BRISTOL (Attleboro, Berkley, Dighton, Mansfield, North
Attleboro, Norton, Raynham, Rehoboth, Seekonk, Taunton);
NORFOLK, (Bellingham, Canton, Dedham, Foxboro, Franklin,
Norfolk, Norwood, Plainville, Sharon, Walpole, Westwood,
Wrentham); and PLYMOUTH (Lakeville)

	Rates	Fringes
Bricklayer/Cement Mason.....	\$ 60.35	34.40

BRMA0001-012 02/01/2023

LOWELL CHAPTER

MIDDLESEX (Acton, Ashby, Ayer, Bedford, Billerica, Boxboro, Carlisle, Chemsford, Dracut, Dunstabale, Ft Devens, Groton, Littleton, Lowell, North Acton, Pepperell, Shirley, South Acton, Tewksbury, Townsend, Tyngsboro, West Acton, Westford, Wilmington)

	Rates	Fringes
BRICKLAYER.....	\$ 58.21	33.71

BRMA0001-013 08/01/2023

LOWELL CHAPTER

MIDDLESEX (Ashland, Framingham, Holliston, Hopkinton, Hudson, Maynard, Natick, Sherbourn, Stow); and NORFOLK (Medfield, Medway, Millis)

	Rates	Fringes
BRICKLAYER.....	\$ 62.40	34.40

BRMA0003-001 08/01/2024

	Rates	Fringes
Marble & Tile Finisher.....	\$ 49.32	35.26
Marble, Tile & Terrazzo		

Workers.....	\$ 64.52	37.51
TERRAZZO FINISHER.....	\$ 63.44	37.33

BRMA0003-003 08/01/2024

BOSTON CHAPTER

MIDDLESEX (Arlington, Cambridge, Everett, Malden, Medford, Melrose, Somerville); NORFOLK (Brookline, Milton); and SUFFOLK

	Rates	Fringes

BRICKLAYER.....	\$ 64.50	37.54

BRMA0003-011 08/01/2024

LYNN CHAPTER

ESSEX (Amesbury, Andover, Beverly, Boxford, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipswich, Lawrence, Lynn, Lynnfield, Manchester, Marblehead, Merrimac, Methuen, Middleton, Nahant, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salisbury, Salem, Saugus, Swampscott, Topsfield, Wakefield, Wenham, West Newbury); and MIDDLESEX (North Reading, Reading, Wakefield)

	Rates	Fringes

Bricklayer/Cement Mason.....	\$ 64.50	37.54

BRMA0003-012 08/01/2024

	Rates	Fringes

BRICKLAYER

WALTHAM CHAPTER -
MIDDLESEX (Belmont,
Burlington, Concord,
Lexington, Lincoln,
Stoneham, Sudbury,
Waltham, Watertown,
Wayland, Weston,
Winchester, Woburn).....\$ 64.50 37.54

BRMA0003-014 08/01/2024

QUINCY CHAPTER

PLYMOUTH COUNTY (Abington, Bridgewater, Brockton, Carver,
Duxbury, East Bridgewater, Halifax, Hanover, Hanson,
Hingham,
Hull, Kingston, Marshfield, Middleboro, Norwell, Pembroke,
Plymouth, Rockland, Scituate, West Bridgewater, Whitman)

Rates Fringes

Bricklayer/Cement Mason.....\$ 64.50 37.54

BRMA0003-025 08/01/2024

NEW BEDFORD CHAPTER

BARNSTABLE; BRISTOL (Acushnet, Dartmouth, Fairhaven, Fall
River,
Freetown, New Bedford, Somerset, Swansea, Westport); DUKES;
NANTUCKET; PLYMOUTH (Marion, Mattapoisett, Rochester,
Wareham)

Rates Fringes

Bricklayer/Cement Mason.....\$ 64.50 37.54

BRMA0003-033 08/01/2024

NEWTON CHAPTER

MIDDLESEX (Newton); NORFOLK (Dover, Needham, Wellesley)

	Rates	Fringes
Bricklayer, Plasterer.....	\$ 64.50	37.54

CARP0056-001 08/01/2024

All of SUFFOLK COUNTY; and those areas of BARNSTABLE,
BRISTOL,
ESSEX, MIDDLESEX, NORFOLK, and PLYMOUTH COUNTIES situated
INSIDE Boston Beltway (I-495) and North of Cape Cod Canal.
ALL
of DUKES and NANTUCKET COUNTIES

	Rates	Fringes
PILEDRIVERMAN.....	\$ 55.79	35.47

CARP0056-002 08/01/2024

The areas of BARNSTABLE, BRISTOL, PLYMOUTH, and NORFOLK
COUNTIES situated OUTSIDE Boston Beltway (I-495) and South
of
Cape Cod Canal

	Rates	Fringes
PILEDRIVERMAN.....	\$ 51.97	35.47

CARP0056-003 08/01/2024

Those areas of ESSEX and MIDDLESEX COUNTIES situated
OUTSIDE
Boston Beltway (I-495)

	Rates	Fringes
PILED RIVERMAN.....	\$ 49.19	35.47

CARP0056-004 08/01/2024

	Rates	Fringes
DIVER TENDER.....	\$ 61.70	35.47
DIVER.....	\$ 78.11	35.47

CARP0327-002 09/01/2025

MIDDLESEX (Belmont, Cambridge, Everett, Malden, Medford,
Somerville); NORFOLK (Brookline, Dedham, Milton); AND
SUFFOLK
COUNTIES

	Rates	Fringes
CARPENTER.....	\$ 61.19	31.55

CARP0339-002 09/01/2025

BRISTOL (Attleborough, North Attleborough); ESSEX;
MIDDLESEX
(Except Belmont, Cambridge, Everett, Malden, Medford,
Somerville); AND NORFOLK (Bellingham, Braintree, Canton,
Cohasset, Foxboro, Franklin, Medfield, Medway, Millis,
Needham, Norfolk, Norwood, Plainville, Quincy, Sharon,
Walpole,
Wellesley, Westwood, Weymouth, Wrentham) COUNTIES

	Rates	Fringes
CARPENTER.....	\$ 50.10	31.45

CARP0346-001 09/01/2025

NORFOLK (Braintree, Quincy, Cohasset, Weymouth, etc.)
PLYMOUTH
(Duxbury, Hanover, Hull, Hingham, Marshfield, Norwell,
Pembroke
Rockland, Scituate)

	Rates	Fringes
CARPENTER.....	\$ 50.10	31.45

CARP0624-002 09/01/2017

DUKES; NANTUCKET

	Rates	Fringes
CARPENTER.....	\$ 46.43	28.35

CARP0624-006 09/01/2017

BARNSTABLE; BRISTOL (Except Attleboro & North Attleboro);
NORFOLK (Avon, Holbrook, Randolph, Stoughton); PLYMOUTH
(Bridgewater, Kingston, Lakeville, Middleboro, Plymouth, S.
Hanover, Whitman)

	Rates	Fringes
CARPENTER.....	\$ 39.28	27.90

CARP1121-001 04/21/2025

SUFFOLK COUNTY

	Rates	Fringes
MILLWRIGHT.....	\$ 50.47	33.50

CARP1121-005 04/21/2025		

BARNSTABLE, BRISTOL, DUKES, ESSEX, MIDDLESEX, NANTUCKET,
NORFOLK and PLYMOUTH COUNTIES

	Rates	Fringes
MILLWRIGHT.....	\$ 45.03	33.25

ELEC0096-001 09/07/2025		

MIDDLESEX (Ashby, Ashland, Ayer, Ft. Devens, Groton,
Hopkinton,
Hudson, Marlboro, Pepperell, Shirley, Stow, Townsend)

	Rates	Fringes
ELECTRICIAN.....	\$ 48.16	36.20
Teledata System Installer.....	\$ 36.12	34.51

ELEC0099-001 06/01/2025		

BRISTOL (Attleboro, North Attleboro, Seekonk)

	Rates	Fringes
ELECTRICIAN.....	\$ 56.11	44.10%
Teledata System Installer.....	\$ 42.09	10.45%+15.31

ELEC0103-002 09/01/2025		

ESSEX (Amesbury, Andover, Boxford, Georgetown, Groveland,
Haverhill, Lawrence, Merrimac, Methuen, Newbury,
Newburyport,
North Andover, Rowley, Salisbury, West Newbury); MIDDLESEX
(Bedford, Billerica, Boxboro, Burlington, Carlisle,
Chelmsford,
Dracut, Dunstable littleton, Lowell, North Reading,
Tewksbury,
Tyngsboro, Westford, Wilmington)

	Rates	Fringes
ELECTRICIAN.....	\$ 66.17	37.08

ELEC0103-004 09/01/2025		

ESSEX (Beverly, Danvers, Essex, Gloucester, Hamilton,
Ipswich,
Manchester, Marblehead, Middleton, Peabody, Rockport,
Salem,
Topsfield, Wenham)

	Rates	Fringes
ELECTRICIAN.....	\$ 66.17	37.08

ELEC0103-005 09/01/2025		

ESSEX (Lynn, Lynnfield, Nahant, Saugus, Swampscott);
MIDDLESEX
(Acton, Arlington, Belmont, Cambridge, Concord, Everett,
Framingham, Holliston, Lexington, Lincoln, Malden, Maynard,
Medford, Melrose, Natick, Newton, Reading, Sherborn,
Somerville, Stoneham, Sudbury, Wakefield, Waltham,
Watertown,
Wayland, Weston, Winchester, Woburn); NORFOLK (Bellingham,
Braintree, Brookline, Canton, Cohasset, Dedham, Dover,
Foxboro,
Franklin, Medfield, Medway, Millis, Milton, Needham,
Norfolk,

Norwood, Quincy, Sharon, Walpole, Wellesley, Westwood,
Weymouth, Wrentham); PLYMOUTH (Hingham and Hull); SUFFOLK

	Rates	Fringes
ELECTRICIAN.....	\$ 66.17	37.08

ELEC0104-001 09/01/2024

	Rates	Fringes
Line Construction:		
Cableman.....	\$ 58.41	30.19+A
Equipment Operator.....	\$ 49.65	26.72+A
Groundman.....	\$ 32.13	12.70+A
Lineman.....	\$ 58.41	30.19+A

A. PAID HOLIDAYS: New Year's Day; Memorial Day;
Independence Day; Labor Day; Thanksgiving Day; Christmas
Day and Columbus Day, provided the employee has been
employed 5 working days prior to any one of the listed
holidays.

ELEC0223-002 09/01/2024

BARNSTABLE, BRISTOL (Except Attleboro, North Attleboro,
Seekonk); DUKES; NANTUCKET; PLYMOUTH (Except Hingham and
Hull
Twps); NORFOLK (Avon, Halbrook, Randolph, Sloughton)

	Rates	Fringes
ELECTRICIAN.....	\$ 50.02	31.09%+15.50

ENGI0004-009 06/01/2025

	Rates	Fringes

Power equipment operators:

Group 1.....	\$ 57.83	33.70
Group 2.....	\$ 57.18	33.70
Group 3.....	\$ 37.02	33.70
Group 4.....	\$ 46.52	33.70
Group 5.....	\$ 25.02	33.70
Group 6.....	\$ 30.85	33.70

HOURLY PREMIUM FOR BOOM LENGTHS (Including Jib):

Over 150 ft.	+2.18
Over 185 ft.	+3.84
Over 210 ft.	+5.39
Over 250 ft.	+8.16
Over 295 ft.	+11.29
Over 350 ft.	+13.14

FOOTNOTE FOR POWER EQUIPMENT OPERATORS:

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

POWER EQUIPMENT OPERATORS CLASSIFICATIONS [HEAVY
CONSTRUCTION]

GROUP 1: Power shovel; crane; truck crane; derrick; pile
driver; trenching machine; mechanical hoist pavement
breaker; cement concrete paver; dragline; hoisting
engine;
three drum machine; pumpcrete machine; loaders; shovel
dozer; front end loader; mucking machine; shaft hoist;
steam engine; backhoe; gradall; cable way; fork lift;
cherry picker; boring machine; rotary drill; post hole
hammer; post hole digger; asphalt plant on job site;
concrete batching and/or mixing plant on job site;
crusher
plant on job site; paving concrete mixer; timber jack
GROUP 2: Sonic or vibratory hammer; grader; scraper;
tandem

scraper; bulldozer; tractor; mechanic - maintenance; York
rake; mulching machine; paving screed machine; stationary
steam boiler; paving concrete finishing machine; grout
pump; portable steam boiler; portable steam generator;
roller; spreader; asphalt paver; locomotives or machines
used in place thereof; tamper (self propelled or
tractor-draw); cal tracks; ballast regulator; rail anchor
machine; switch tamper; tire truck

GROUP 3: Pumps (1-3 grouped); compressor; welding
machines

(1-3 grouped); generator; sighting plant; heaters (power
driven, 1- 5); syphon-pulsometer; concrete mixer; valves
controlling permanent plant air steam, conveyor,
wellpoint

system (operating)

GROUP 4: Assistant engineer (fireman)

GROUP 5: Oiler (other than truck cranes and gradalls)

GROUP 6: Oiler (on truck cranes and gradalls)

IRON0007-001 09/16/2025

AREA 1: BRISTOL (Easton); ESSEX (Beverly, Gloucester, Lynn,
Lynnfield, Manchester, Marblehead, Nahant, Rockport,
Salem,

Saugus, Swampscott); MIDDLESEX (Arlington, Bedford,
Belmont,

Burlington, Cambridge, Carlisle, Concord, Dunstable,
Everett,

Framingham, Lexington, Lincoln, Malden, Maynard, Medford,
Melrose, Natick, Newton, Reading, Sherborn, Somerville,
Stoneham, Sudbury, Wakefield, Waltham, Watertown, Wayland,
Weston, Winchester, Woburn); NORFOLK (Except Medway);

PLYMOUTH

(Abington, Bridgewater, Brocton, Duxbury, East Bridgewater,
Halifax, Hanover, Hanson, Hingham, Hull, Kingston,
Marshfield,

Norwell, Pembroke, Plymouth, Plympton, Rockland, Scituate,
West

Bridgewater, Whitman); SUFFOLK

AREA 2: ESSEX (Amesbury, Andover, Boxford, Danvers, Essex, Georgetown, Hamilton, Haverhill, Ipswich, Lawrence, Merrimac, Methuen, Newbury, Newburyport, North Andover, Rowley, Salisbury, Topsfield, Wenham, West Newbury); MIDDLESEX (Action, Billerica, Chelmsford, Dracut, Groton, Groveland, Littleton, Lowell, Middleton, North Reading, Pepperell, Tewksbury, Tyngsboro, Westford, Wilminton)

	Rates	Fringes
IRONWORKER		
AREA 1.....	\$ 57.87	37.67
AREA 2.....	\$ 53.46	37.67

IRON0007-010 09/16/2025		

MIDDLESEX (Ashby, Ashland, Ayer, Boxboro, Holliston, Hopkinton, Hudson, Marlboro, Shirley, Stow, Townsend); NORFOLK (Medway)

	Rates	Fringes
IRONWORKER.....	\$ 57.57	37.67

IRON0037-002 09/16/2025		

BARNSTABLE; BRISTOL (Acushnet, Attleboro, Berkley, Dartmouth, Dighton, Fairhaven, Fall River, Freetown, Mansfield, New Bedford, North Attleboro, Norton, Raynham, Rehoboth, Seekonk, Somerset, Swansea, Taunton, Westport); DUKES; NANTUCKET; NORFOLK (Billingham, Franklin, Plainville, Wrentham); PLYMOUTH (Lakeville, Marion, Mattapoissett, Middleboro, Rochester, Wareham)

	Rates	Fringes
IRONWORKER.....	\$ 43.03	33.53

LABO0022-006 12/01/2024

SUFFOLK COUNTY (Boston, Chelsea, Revere, Winthrop, Deer & Nut Islands); MIDDLESEX COUNTY (Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Medford, Melrose, Reading, Somerville, Stoneham, Wakefield, Winchester, Winthrop and Woburn only); NORFOLK COUNTY (Brookline, Dedham, and Milton only)

	Rates	Fringes
Laborers:		
GROUP 1.....	\$ 46.20	29.70
GROUP 2.....	\$ 46.20	29.70
GROUP 3.....	\$ 46.20	29.70
GROUP 4.....	\$ 46.20	29.70
GROUP 5.....	\$ 27.01	29.70
GROUP 6.....	\$ 46.20	29.70

LABORERS CLASSIFICATIONS

GROUP 1: Laborers; carpenter tenders; cement finisher tenders

GROUP 2: Asphalt raker; fence and guard rail erector; laser beam operator; mason tender; pipelayer; pneumatic drill operator; pneumatic tool operator; wagon drill operator

GROUP 3: Air track operator; block paver; rammer; curb setter

GROUP 4: Blaster; powderman

GROUP 5: Flagger

GROUP 6: Asbestos Abatement; Toxic and Hazardous Waste Laborers

LABO0022-012 12/01/2024

Counties of BARNSTABLE; BRISTOL; DUKES; ESSEX; NANTUCKET; PLYMOUTH; MIDDLESEX (With the exception of Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Melrose, Reading, Somerville, Stoneham, Wakefield, Winchester, Winthrop and Woburn); NORFOLK (With the exception of Brookline, Dedham, and Milton)

	Rates	Fringes
Laborers:		
GROUP 1.....	\$ 38.95	29.70
GROUP 2.....	\$ 38.95	29.70
GROUP 3.....	\$ 38.95	29.70
GROUP 4.....	\$ 38.95	29.70
GROUP 5.....	\$ 27.01	29.70
GROUP 6.....	\$ 46.10	29.70

LABORERS CLASSIFICATIONS

GROUP 1: Laborers; carpenter tenders; cement finisher tenders

GROUP 2: Asphalt raker; fence and guard rail erector; laser beam operator; mason tender; pipelayer; pneumatic drill operator; pneumatic tool operator; wagon drilloperator

GROUP 3: Air track operator; block paver; rammer; curb setter; hydraulic & similar self powere drills

GROUP 4: Blaster; powderman

GROUP 5: Flagger

GROUP 6: Asbestos Abatement; Toxic and Hazardous Waste Laborers

LABO0022-013 12/01/2024

Rates

Fringes

Laborers:

(FREE AIR OPERATION):

SHIELD DRIVEN AND LINER

PLATE IN FREE AIR)

GROUP 1.....\$ 50.50

29.70

GROUP 2.....\$ 50.50

29.70

(OPEN AIR CASSONS,

UNDERPINNING AND TEST

BORING INDUSTRIES):

TEST BORING & WELL DRILLING

Driller.....\$ 50.20

29.70

Laborer.....\$ 46.20

29.70

(OPEN AIR CASSONS,

UNDERPINNING AND TEST

BORING INDUSTRIES):

OPEN AIR CASSON,

UNDERPINNING WORK & BORING

CREW

Bottom man.....\$ 47.35

29.70

Laborers; Top man.....\$ 46.20

29.70

(TUNNELS, CAISSON &

CYLINDER WORK IN

COMPRESSED AIR)

GROUP 1.....\$ 47.95

29.70

GROUP 2.....\$ 58.43

29.70

GROUP 3.....\$ 58.43

29.70

GROUP 4.....\$ 58.43

29.70

GROUP 5.....\$ 58.43

29.70

GROUP 6.....\$ 58.43

29.70

CLEANING CONCRETE AND

CAULKING TUNNEL (Both New

& Existing)

GROUP 1.....	\$ 50.50	29.70
GROUP 2.....	\$ 50.50	29.70
ROCK SHAFT, CONCRETE LINING OF SAME AND TUNNEL IN FREE AIR		
GROUP 1.....	\$ 47.95	29.70
GROUP 2.....	\$ 50.50	29.70
GROUP 3.....	\$ 50.50	29.70
GROUP 4.....	\$ 50.50	29.70
GROUP 5.....	\$ 52.50	29.70

LABORERS CLASSIFICATIONS for TUNNELS, CAISSON & CYLINDER
WORK
IN COMPRESSED AIR

GROUP 1: Powder watchman; Top man on iron bolt; change
house
attendant

GROUP 2: Brakeman; trackman; groutman; tunnel laborer;
outside lock tender; lock tender; guage tender

GROUP 3: Motorman, miner

GROUP 4: Blaster

GROUP 5: Mucking machine operator

GROUP 6: Hazardous Waste work within the ""HOT"" zone.
(A
premium of two dollars \$2.00 per hour over the basic wage
rate.

LABORERS CLASSIFICATIONS for (FREE AIR OPERATION): SHIELD
DRIVEN AND LINER PLATE IN FREE AIR

GROUP 1: Miner; miner welder; conveyor operator;
motorman;
mucking machine operator; nozzle man; grout man-; pumps,
shaft and tunnel steel and rodman; shield and erector arm
operators, mole nipper, outside motorman, burner, TBM
operator, safety miner; laborer topside; heading
motormen;

erecting operators; top signal men

GROUP 2: Brakeman; trackman

LABORERS CLASSIFICATIONS FOR CLEANING CONCRETE AND
CAULKING

TUNNEL (Both New & Existing)

GROUP 1: Concrete workers; strippers and form movers
(wood &
steel), cement finisher

GROUP 2: Form erector (wood & steel and all accessories)

LABORERS CLASSIFICATIONS for ROCK SHAFT, CONCRETE LINING
OF

SAME AND TUNNE IN FREE AIR

GROUP 1: Change house attendants

GROUP 2: Laborers, topside, bottom men (when heading is
50
ft. from shaft) and all other laborers

GROUP 3: Brakeman; trackman; tunnel laborers; shaft
laborers

GROUP 4: Miner; cage tender; bellman

GROUP 5: Hazardous Waste work within the ""HOT"" zone.

(A
premium of two dollars \$2.00 per hour over the basic wage
rate)

FOOTNOTE FOR LABORERS:

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

LAB01421-001 12/02/2024

WRECKING LABORERS:

	Rates	Fringes
Laborers: (Wrecking)		
Group 1.....	\$ 46.25	29.70
Group 2.....	\$ 47.00	29.70
Group 3.....	\$ 47.25	29.70
Group 4.....	\$ 42.25	29.70
Group 5.....	\$ 45.35	29.70
Group 6.....	\$ 46.25	29.70

Group 1: Adzeman, Wrecking Laborer.

Group 2: Burners, Jackhammers.

Group 3: Small Backhoes, Loaders on tracks, Bobcat Type Loaders, Hydraulic "Brock" Type Hammer Operators,

Concrete

Cutting Saws.

Group 4: Yardman (Salvage Yard Only).

Group 5: Yardman, Burners, Sawyers.

Group 6: Asbestos, Lead Paint, Toxic and Hazardous Waste.

PAIN0035-001 07/01/2024

BARNSTABLE BRISTOL; DUKES; ESSEX; NANTUCKET; PLYMOUTH
(Remainder of NORFOLK; MIDDLESEX AND SUFFOLK COUNTIES)

Rates	Fringes

PAINTER

NEW CONSTRUCTION:

Bridge.....	\$ 50.36	30.25
Brush, Taper.....	\$ 39.86	30.25
Spray, Sandblast.....	\$ 41.26	30.25

REPAINT:

Bridge.....	\$ 56.76	36.00
Brush, Taper.....	\$ 37.92	30.25
Spray, Sandblast.....	\$ 39.32	30.25

PAIN0035-015 07/01/2024

MIDDLESEX (Cambridge, Everett, Malden, Medford,
Sommerville)

SUFFOLK COUNTY (Boston, Chelsea) NORFOLK COUNTY (Brookline)

Rates

Fringes

PAINTER

NEW CONSTRUCTION:

Brush, Taper.....	\$ 46.26	36.00
Spay, Sandblast.....	\$ 47.66	36.00
Spray, Sandblast.....	\$ 47.05	30.25

REPAINT:

Bridge.....	\$ 56.76	36.00
Brush, Taper.....	\$ 44.32	36.00
Spray, Sandblast.....	\$ 45.72	36.00

PLAS0534-001 07/01/2024

ESSEX; MIDDLESEX; NORFOLK AND SUFFOLK COUNTY

Rates

Fringes

CEMENT MASON/CONCRETE FINISHER...	\$ 49.19	40.86

PLUM0004-001 09/01/2025

MIDDLESEX (Ashby, Ayer-West of Greenville branch of Boston
and
Maine Railroad, Ft. Devens, Groton, Shirley, Townsend)

	Rates	Fringes
Plumbers and Pipefitters.....	\$ 55.00	31.57

PLUM0012-001 03/02/2025

ESSEX (Ames, Andover, Beverly, Boxford, Byfield, Danvers,
Essex, Georgetown, Gloucester, Groveland, Hamilton,
Haverhill,
Ipswich, Lawrence, Manchester, Marblehead, Merrimac,
Methuen,
Middleton, Newbury, Newburyport, North Andover, Peabody,
Rockport, Rowley, Salem, Salisbury, Topsfield, Wenham,
West
Newbury)

	Rates	Fringes
PLUMBER.....	\$ 69.84	36.43

PLUM0012-003 03/02/2025

ESSEX (Ames, Andover, Beverly, Boxford, Byfield, Danvers,
Essex, Georgetown, Gloucester, Groveland, Hamilton,
Haverhill,
Ipswich, Lawrence, Manchester, Marblehead, Merrimac,
Methuen,
Middleton, Newbury, Newburyport, North Andover, Peabody,
Rockport, Rowley, Salem, Salisbury, Topsfield, Wenham, West
Newbury)

	Rates	Fringes

Plumber, Pipefitter,
Steamfitter.....\$ 69.84 36.43

PLUM0012-006 03/02/2025

ESSEX (Lynn, Lynnfield, Nahant, Saugus, and Swampscott);
MIDDLESEX (Acton, Arlington, Ashland, Ayer - except W. of
Greenville Branch of Boston & Maine RR, Bedford, Belmont,
Billerica, Boxboro, Burlington, Cambridge, Carlisle,
Chelmsford, Concord, Dracut, Dunstable, Everett,
Framingham,
Hudson, Holliston, Hopkinton, Lexington, Lincoln,
Littleton,
Lowell, Malden, Marlboro, Maynard, Medford, Melrose,
Natick,
Newton, North Reading, Pepperell, Reading, Sherborn,
Somerville, Stoneham, Stow, Sudbury, Tewksbury, Tyngsboro,
Wakefield, Waltham, Watertown, Wayland, Westford,
Wilmington,
Winchester, Woburn); NORFOLK (Bellingham, Braintree,
Brookline, Canton, Cohasset, Dedham, Dover, Foxboro,
Franklin,
Medfield, Medway, Millis, Milton, Needham, Norfolk,
Norwood,
Plainville, Quincy, Sharon, Walpole, Wellesley, Westwood,
Weymouth, Wrentham); PLYMOUTH (Hingham, Hull, Scituate);
SUFFOLK

Rates Fringes
PLUMBER.....\$ 69.84 36.43

PLUM0051-005 08/26/2024

BARNSTABLE; BRISTOL; DUKES; NANTUCKET; NORFOLK (Avon,
Holbrook,
Randolph, Stoughton) PLYMOUTH (Remainder of County)

Rates Fringes

Plumbers and Pipefitters.....\$ 52.49 33.60

PLUM0537-001 03/01/2025

MIDDLESEX (Arlington, Cambridge, Everett, Malden, Medford,
Melrose, Reading, Wakefield, Winchester and Woburn);

NORFOLK

(Bellingham, Braintree, Brookline, Canton Cashasset,
Dedham,

Foxboro, Franklin, Millis, Milton, Sharon, Walpole,
Westwood,

and Wrentham); PLYMOUTH (Hingham, Hull, Scituate); ESSEX
(Ames,

Andover, Beverly, Boxford, Byfield, Danvers, Essex,
Georgetown,

Gloucester, Groveland, Hamilton, Haverhill, Ipswich,

Lawrence, Lynn, Lynnfield, Manchester, Marblehead, Merrimac,

Methuen, Middleton, Nahant, Newbury, Newburyport, North

Andover, Peabody, Rockport, Rowley, Salem, Salisbury,

Saugus,

Swampscott, Topsfield, Wenham, West Newbury)

Rates

Fringes

PIPEFITTER.....\$ 66.58 39.22

TEAM0379-001 06/01/2025

Rates

Fringes

Truck drivers:

Group 1.....\$ 40.78 37.35+a+b

Group 2.....\$ 40.95 37.35+a+b

Group 3.....\$ 41.02 37.35+a+b

Group 4.....\$ 41.14 37.35+a+b

Group 5.....\$ 41.24 37.35+a+b

Group 6.....\$ 41.53 37.35+a+b

Group 7.....\$ 41.82 37.35+a+b

POWER TRUCKS \$.25 DIFFERENTIAL BY AXLE
TUNNEL WORK (UNDERGROUND ONLY) \$.40 DIFFERENTIAL BY AXLE
HAZARDOUS MATERIALS (IN HOT ZONE ONLY) \$2.00 PREMIUM

TRUCK DRIVERS CLASSIFICATIONS

Group 1: Station wagons; panel trucks; and pickup trucks

Group 2: Two axle equipment; & forklift operator

Group 3: Three axle equipment and tireman

Group 4: Four and Five Axle equipment

Group 5: Specialized earth moving equipment under 35 tons

other than conventional type trucks; low bed; vachual;
mechanics, paving restoration equipment

Group 6: Specialized earth moving equipment over 35 tons

Group 7: Trailers for earth moving equipment (double hookup)

FOOTNOTES:

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

B. PAID VACATION: Employees with 4 months to 1 year of service receive 1/2 day's pay per month; 1 week vacation for 1 - 5 years of service; 2 weeks vacation for 5 - 10 years of service; and 3 weeks vacation for more than 10 years of service

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 \$13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025. 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**WILMINGTON****Federal Aid Project No. STP/CMQ/HSI-0034(030)X****Reconstruction on Route 38 (Main Street), from Route 62 to the Woburn C.L.**

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

The work under this Contract consists of improvements to Route 38 (Main Street) in the Town of Wilmington. The project begins at the intersection of Routes 38 and Route 62 and ends at the City Line with Woburn, a distance of approximately 10,850 feet (excluding Project No. 607327). The project includes geometric improvements; full depth pavement reconstruction; widening to provide bike lanes in each direction; a new traffic signal at Cross Street and Butters Row intersection; signal upgrades to the intersections at Church Street and Route 129 (Lowell Street); matching into approaches for the replacement bridge over the MBTA railroad that is to be performed under a separate contract; excavation; pavement fine milling and box widening; pavement resurfacing; installing new drainage structures and pipe; installing a new water main, wetland area replication; installing new granite curb; removing and resetting existing granite curb; constructing ADA compliant cement concrete sidewalks and pedestrian curb ramps; constructing retaining walls; work adjacent to the MBTA Wilmington Station to provide MBTA services and fencing; construction of Bridge W-38-011 (CVE) which includes the installation of precast three-sided frame units resting on a cast-in-place pile cap supported by micropiles, as well as the construction of cast-in-place wingwalls; installing erosion control devices; installing guardrail; furnishing and spreading loam and seed; planting landscape areas; installing signs and pavement markings; furnishing and setting bounds; providing traffic control; and other incidental items of work listed in the proposal.

SUBSECTION 7.05 INSURANCE REQUIREMENTS

The insurance requirements set forth in this subsection are in addition to the requirements of the Standard Specifications.

7.05.B: Public Liability Insurance 1. and
7.05.B: Public Liability Insurance 2.

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

7.05.B: Public Liability Insurance 4.

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

INSURANCE REQUIREMENTS

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

Railroad Operations Directorate: Section F:

The Contractor shall furnish, with respect to the operations of the Contractor or any of the Contractor's Subcontractors performing within the Railroad right-of-way, broad form Railroad Protective Liability Insurance covering all work performed under this Contract in the amount of not less than \$5,000,000 per occurrence, \$10,000,000 aggregate combined bodily injury and property damage. The Contractor shall carry Worker's Compensation Insurance, including Employers Liability Insurance as provided by Massachusetts General Laws, Chapter 152, as amended, covering all work performed by him under the Contract. The Contractor shall carry Umbrella Liability Coverage with limits of not less than \$10,000,000 per occurrence, covering all work performed by him under this Contract. Automobile Liability Insurance: The Contractor shall provide Automobile Liability Insurance to include the use of all vehicles; owned, leased, hired and non-owned, with limits not less than \$1,000,000 combined single limit covering all work performed under the Contract.

2. Such insurance shall be written on an occurrence basis.

3. The MBTA and applicable railroads shall be the named insureds on such insurance. Additional named insured are listed below. Original policies and certificates shall be made out to the MBTA and applicable railroads and mailed to:

INSURANCE REQUIREMENTS (Continued)

MBTA: Treasurer-Controller
 Massachusetts Bay Transportation Authority
 10 Park Plaza
 Boston, MA 02116
 Tel. (617) 222-3064

Keolis: General Counsel
 Keolis Commuter Services, LLC
 470 Atlantic Avenue
 Boston, MA 02210

AMTRAK: General Superintendent
 230 Congress Street
 Boston, MA 02110
 Tel. (617) 654-2020

CSX: General Manager
 CSX
 1 Bell Crossing Road
 RD. #2, Box 145
 Selkirk, NY 12158-9618
 Tel. (518) 767-6111

4. The Contractor shall furnish to the MBTA and railroad companies a signed original of the Railroad Protective Liability Policy prior to entry upon the railroad right-of-way.

5. Such policies shall provide 30 days notice to each named insured by the insurance company before any change or cancellation of the policies.

6. Such Railroad Protective Insurance policies may be provided in forms commonly referred to as AAR/AASHTO or ISO/RIMA but not Oregon.

Questions regarding insurance should be directed to the MBTA's Risk Manager at 617-222-3064.

The contractor shall be aware of the latest MBTA insurance limits / requirements. See the following link for more information:

<https://www.mbtarealty.com/licenses.html>

SCHEDULE OF WORK

All proposed works hours shall conform to Subsection 7.09 of the Standard Specifications and be subject to written approval of the Engineer. Normal working hours for this project shall be from 7:00 AM to 3:30 PM, unless otherwise required by the Engineer. Work on Saturdays or nighttime shall only be allowed when prior approval is obtained from the Engineer. No additional compensation shall be made for work scheduled during nighttime hours.

Work may not proceed beyond the normal 8-hour day unless prior approval is obtained from the Engineer for that day. Approval to work beyond the scheduled work hours will only be given when special conditions exist that warrant working beyond the scheduled hours, as determined by the Engineer.

These time periods include the "set-up" and "breakdown" of the traffic pattern employed. No operations, personnel, or equipment will be allowed on the roadways except during working hours.

Lane shifts or closures requiring the use of rigid barriers (e.g. reconstruction at the intersection of Route 38 at Route 62; one-lane alternating traffic flow at bridge or culvert replacements) may be permitted to continue outside normal working hours if a given setup's associated signal timing installations or changes depicted in the Plans are implemented, or as directed by the Engineer.

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.

PROTECTION OF UNDERGROUND FACILITIES

Reading Municipal Light Dept. 230 Ash Street
Reading, MA 01867

National Grid Gas
40 Sylvan Road, 3rd Floor W3.244
Waltham, MA 02451

Tennessee Gas Pipeline Company
8 Anggina Drive
Enfield, CT 06082

Verizon
385 Myles Standish Blvd.
Taunton, MA 02780

PROTECTION OF UNDERGROUND FACILITIES (Continued)

Wilmington Water & Sewer Division
121 Glen Road
Wilmington, MA 01887

MWRA
2 Griffin Way
Chelsea, MA 02150

MBTA
10 Park Plaza-Room 5170
Boston, MA 02116

CSX
2000 West Cabot Blvd, Suit 130
Langhorne, PA 19047

Comcast Cable Corporation
PO Box 6505, 5 Omni Way
Chelmsford, MA 01824

Crown Castle
80 Central Street
Bosborough, MA 01719

AT&T / Teleport Communications America
c/o Siena Engineering Group
50 Mall Road – Suite 203
Burlington, MA 01803

Wilmington Fire Alarm
1 Adelaide Street
Wilmington, MA 01887

Wilmington Engineer Director
121 Glen Road
Wilmington, MA 01887

Raytheon Company
800 technology Park Drive, MS-T4051
Billerica, MA 01821
Peter Price
Tel: (781) 942-6429

Melissa Owens
Tel: (781) 907-2845
Melissa.Owens@nationalgrid.com

PROTECTION OF UNDERGROUND FACILITIES (Continued)

David Wood
Tel: (860) 763-6005
David_Wood@kindermorgan.com

Karen Mealey
(774) 409-3160
karen.m.mealey@verizon.com

Jamie Magaldi
Tel: (978) 658-4481
jmagaldi@wilmington.gov

Kevin McKenna
(617) 305-5965
Kevin.McKenna@mwra.state.ma.us

Christine Bresnahan
(617) 222-3361
CBresnahan@mbta.com

Michael Sliper
(518) 767-6081
Michael_Sliper@csx.com

Wendy Brown
(978) 848-5163
Wendy_Brown@comcast.com

Mark Bonano
(508) 616-7818
mark.bonanno@crowncastle.com

Erica Hudson
(781) 221-8400
erica.hudson@sienaengineeringgroup.com

John Brown
(978) 658-3346

Paul Alunni
(978) 658-4499
palunni@wilmingtonma.gov

Douglas Flynn
(978) 436-8554
flynn@rtx.com

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.

HOLIDAY WORK RESTRICTIONS (Continued)**Memorial Day (Federal Holiday)**

No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Bunker Hill Day (Suffolk County State Holiday)

No work restrictions due to traffic concerns.

Juneteenth

No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

Independence Day (Federal Holiday)

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

Labor Day (Federal Holiday)

No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Columbus Day (Federal Holiday)

No work on major arterials from 5:00 AM on the Friday before, until the normal start of business on the following day

Veterans' Day (Federal Holiday)

No work restrictions due to traffic concerns.

Thanksgiving Day (Federal Holiday)

No work on major arterials from 5:00 AM two days before until the normal start of business on the following Monday.

Christmas Day (Federal Holiday)

No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day.

ENVIRONMENTAL PERMITTING

An Order of Conditions has been obtained from the Wilmington Conservation Commission under the Wetlands Protection Act. A 401 Water Quality Certification has been obtained from The Massachusetts Department of Environmental Protection under the Clean Waters Act. Section 404 Authorization has been obtained from the Army Corp of Engineers under the Clean Waters Act. If field conditions and/or Contractor-proposed erection, demolition, storage, or other procedures not originally allowed by existing environmental permits require work to occur 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 either amended or obtained allowing such work. The Contractor must notify the District 4 Highway Director and Resident Engineer in writing at least 60 days prior to desired commencement of the proposed activity. All environmental submittals, including any contact with Local, State, or Federal environmental agencies, must be coordinated with the District 4 Environmental Engineer. The Contractor is expected to fully cooperate with requests for information and provide same in a timely manner. The Contractor is further advised that the Department will not entertain a delay claim due to the time required to modify or obtain the environmental permits.

PAYMENT FOR SPECIALTY SERVICES

Labor, equipment, and material required by Keolis for the Gas work shall be charged to the MassDOT contractor under a 3rd party agreement. This bill will be reimbursed to the Contractor under Non-bid Item.

Payment to Keolis through a Third Party Agreement for Splicing and Shut downs, Back up Generator, etc. is reimbursed under Non-Bid item, Specialty Services.

SUPPLEMENTAL REQUIREMENTS FOR NON-BID ITEMS

(Supplementing Subsection 3.04)

The Contractor will be paid for additional artisans, equipment rental, materials, engineering services and specialty services required to perform the work plus (10%) percent, plus actual increased bond premium.

The Contractor shall be required to furnish certified paid receipts for additional artisans, equipment rental, materials, engineering services and specialty services that are required to perform the work prior to payment by the Department. Increased bond premium for additional artisans, equipment rental, materials, engineering services and specialty services will be paid after a certified paid receipt is submitted showing payment of the increased bond.

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 for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat revised February 5, 2018 and amended March 31, 2023.

On May 30th, 2023, Normandeau, on behalf of MassDOT Highway Division Environmental Services, conducted a northern long-eared bat summer presence/absence survey using acoustic detection methods, in accordance with the 2023 survey guidelines. The survey confirmed the presence of NLEB and/or TCB, and as stated within the survey guidelines, the survey is valid for five years. If additional stressor producing work is proposed by the Contractor past this date, additional review is required by the MassDOT Highway Division's Environmental Services Section, and additional review and restrictions may be required by the USFWS.

The project is eligible for a May Affect, Not Likely to Adversely Affect (NLAA) determination, with Avoidance and Minimizations Measures (AMMs), in accordance with the FHWA, FRA and FTA Range-wide Programmatic Consultation for Indiana Bat and Northern Long-eared Bat. On behalf of FHWA, the lead federal agency for Section 7 consultation, MassDOT submitted a Programmatic Consultation for Transportation Projects affecting NLEB or Indiana Bat to the USFWS through the Information for Planning and Consultation (IPaC) webpage and generated a NLAA documentation letter (see **Document A00870**). Therefore, the project has completed Section 7 consultation through the 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.

Lighting AMMs

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

NORTHERN LONG-EARED BAT AND TRICOLORED BAT PROTECTION (Continued)**Tree Removal AMMs**

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

Bridge AMMs

- On August 19th, 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 August 19th, 2026, assessment of the bridge for the presence of, or evidence of use by, bats shall be completed by contractor/consultant/DOT prior to continuing bridge work. The Contractor shall notify the MassDOT Wildlife Unit no later than fourteen (14) days prior to August 19th, 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.

SOIL STOCKPILING DIRECTIVE P-22-001

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

TRUCK SAFETY DEVICES

(Supplementing Subsection 7.04: Motor Vehicles)

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

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

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

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

BIDDERS LIST

Pursuant to the provisions of 49 CFR Part 26.11 all official bidders will be required to report the names, addresses and telephone numbers of all firms that submitted bids or quotes in connection with this project. Failure to comply with a written request for this information within 15 business days may result in a recommendation to the Prequalification Committee that prequalification status be suspended until the information is received.

The Department will survey all firms that have submitted bids or quotes during the previous year prior to setting the annual goal and shall request that each firm report its age and gross receipts for the year.

BUILD AMERICA BUY AMERICA PREFERENCE

On Federally-aid projects the Buy America (23.CFR § 635.410) and Build America, Buy America Act. 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.

BUILD AMERICA BUY AMERICA PREFERENCE (Continued)

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.

NATIONAL GRID EMERGENCY TELEPHONE NUMBERS**GAS:**

Emergency: 1-800-233-5325

New Service: 1- 877-696-4743

Customer Support: 1-800-732-3400

KINDER MORGAN GAS

For all work within 25’ of Kinder Morgan Facilities, the Contractor shall:

- Contact Wes Maribito at least 7 business days prior to any work within 25 feet of KM Facilities at 508-309-9029.
- Call 811 prior to start of work
- Invite Kinder Morgn to the pre-construction meeting
- The proposed water line crossing shall maintain a minimum of 24 inches of vertical separation from the gas main.
- The proposed water main shall be installed with poly-wrapping within the area of the pipeline crossing, as shown on the plans.
- No staging of material or equipment is allowed within KM property.

**GENERAL REQUIREMENTS FOR DEMOLITION AND
WORK INVOLVING PAINTED STEEL**

(02/06/2020)

Demolition and work involving painted steel shall conform to the requirements of Document 00961.

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.

**MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION FILE
NUMBER SIGN**

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

For this project the Massachusetts Department of Environmental Protection File Number is 344-1566.

MBTA FLAGGING

The Contractor shall provide a minimum two week notice for flagging support for MBTA bridges and railroads. This applies only to bridges and railroads operated by Keolis Commuter Services (KCS). This two week notice does not apply to emergency work, only to routine or scheduled work activities. The contact person for advance request for flagging services is Rich Arnold, MBTA Railroad Operations Department, Phone number (617)-222-3635, email address: rarnold@mbta.com.

MBTA COMMUTER RAIL

Keolis Commuter Service (KCS) operates the commuter rail for the MBTA. All references to MBTA in the provisions will mean Keolis Commuter Service (KCS).

MBTA RAILROAD COORDINATION / ACCESS TO MBTA PROPERTY

The Contractor shall be required to coordinate the work of this Contract with the MBTA and Keolis Commuter Services Co. ("KCS") through the MassDOT Resident Engineer and MassDOT designated Field Staff. A majority of the prerequisites for the Contractor to perform work on or adjacent to MBTA transit lines may be found in the "MBTA Special Instructions" provided herein. The Contractor shall be required to comply with all applicable requirements of the latest edition of the MBTA Special Instructions available at the time of Contract Award.

The Contractor will have to perform construction related activities on, over, under, within or adjacent to railroad property owned or controlled by the MBTA. Any work that will affect Commuter Rail operations, involve work on, over, under, within or adjacent to the commuter rail right of way must be coordinated with MBTA Railroad Operations and KCS and shall comply with the latest version of the MBTA Railroad Operations Directorate.

An owner or Contractor who wishes permission to enter upon or perform work over, on, under or adjacent to MBTA property shall submit to the offices of the MBTA's designated representative, a request in writing, a minimum of forty-two (42) days prior to the owner or the Contractor's planned commencement of any of the above stated activities.

MBTA COORDINATION – SUBSTITUTE BUSING

Substitute bus transportation will be required for weekend MBTA Commuter Rail shutdowns. The Contractor must coordinate with MBTA Operations Department for provision of bus service. The Contractor shall contact MBTA Operations Dept. a minimum of 6 weeks prior to any planned rail shutdown. The MBTA will be responsible for planning, procuring, and administering the necessary substitute bus transportation services and operations based on the Contractor's approved work schedule.

Prime Contact:
Eric Ciborowski
32 Cobble Hill Road
Somerville, MA 02143
617-634-2567
ECIBOROWSKI@MBTA.com

Secondary Contact:
Delrico Gomes
32 Cobble Hill Road
Somerville, MA 02143
857-366-0404
DGOMES@MBTA.COM

The Contractor shall be required to attend the MBTA Weekly Track Outage Schedule Coordination Meetings held Wednesdays at 10:00 am at 32 Cobble Hill Road in the small classroom located in the training area at the rear of the building.

ROUTE 38 TRAFFIC MANAGEMENT FOR TEMPORARY PEDESTRIAN BRIDGE INSTALLATION

Installation of the temporary pedestrian bridge proposed as part of the mitigation for bridge replacement over Maple Meadow Brook may require closure of most or all of Route 38. The Coordination shall occur between the Contractor, Engineer, MassDOT, and the Town of Wilmington regarding what types of closures may be required and what pedestrian and traffic management will be necessary during installation of the temporary bridge. Temporary traffic management for the installation of the temporary pedestrian bridge shall be incidental to item 993.2. The Contractor shall submit shop drawings for approval by the Engineer prior to installation of the temporary pedestrian bridge and associated traffic management.

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.

MATERIAL OPTIONS

The Contractor shall inform the Engineer of his option prior to the installation of the material. Once the option is designated, all material for the option item(s) shall remain the same throughout the job.

OPTIONS

<u>Item Number</u>	<u>Item Description</u>	<u>Unit</u>
234.12	12 Inch Drainage Pipe-Option	Foot
234.15	15 Inch Drainage Pipe-Option	Foot
234.18	18 Inch Drainage Pipe-Option	Foot
234.24	24 Inch Drainage Pipe-Option	Foot

Pipe Options

Reinforced Concrete Pipe
Corrugated Plastic (Polyethylene) Pipe
Corrugated Plastic (Polypropylene) Pipe

Item Number

235.12	12 Inch Drainage Pipe Flared End - Option	Foot
235.15	15 Inch Drainage Pipe Flared End - Option	Foot

Pipe Options

Reinforced Concrete Flared End
Corrugated Plastic (Polyethylene) Flared End
Corrugated Plastic (Polypropylene) Flared End

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.

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

CONTAMINATED SOIL

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

HAZARDOUS MATERIALS

A Hazardous Materials Review Memorandum has been prepared for this project and is included in Document A00881. The Contractor shall review the memorandum in its entirety prior to the start of work and comply with the requirements and recommendations contained therein. The memorandum identifies areas of potential environmental concern within the project limits. The Contractor shall take all necessary precautions and follow applicable federal, state, and local regulations governing the handling, management, and disposal of any hazardous or contaminated materials encountered during construction.

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.

WATER SYSTEM

The Contractor shall perform all work on the Wilmington Water System in accordance with the Town of Wilmington Standards found at the following website, or as amended:

https://www.wilmingtonma.gov/sites/g/files/vyhlf5221/f/uploads/rules_regs_including_2020_rates_update.pdf

DRAINAGE SYSTEM

The cone sections shall be replaced with flat top sections as needed at no additional cost. Flat tops shall not be used unless approved by the Engineer.

COORDINATION WITH OTHER PROJECTS

The Contractor shall coordinate his activities with three other MassDOT projects that are within or near the project site. These projects are:

1. Project 607327 Bridge Replacement, W-38-002, Route 38 (Main Street) over MBTA
2. Project 608929 Bridge Replacement, W-38-003, Butters Row over MBTA
3. Project 608703 Bridge Replacement, W-38-029 (2KV), ST 129 Lowell Street over I-93

The Contractor shall conduct and arrange his work so as not to impede or interfere with the work of other contractors working in the same area.

The Contractor shall coordinate traffic control, especially temporary traffic control signs, with the other projects to avoid duplicate signs, contradictory messages and conflicting traffic patterns.

Project 607327 requires a full closure of Main Street for an anticipated three (3) weeks to allow for moving the proposed bridge structure being assembled next to the existing bridge into place. The Contractor shall consider this closure when scheduling the proposed work for the Bridge over Maple Meadow Brook.

Project 608929 will require short-term full closure or alternating traffic pattern on Main Street for some of the work at the intersection.

COORDINATION WITH VERIZON

The Contractor shall coordinate with Verizon for relocating the conduit and duct bank as needed for constructing the roadway improvements. The Contractor may use steel plates capable of safely sustaining an HS20 Loading with 33% impact for covering trenches to restore traffic lanes without backfilling each day as provided in Subsection 7.09: Public Safety and Convenience. The cost of furnishing and installing the steel plates shall be considered incidental to the project. HMA for ramps at steel plates, if necessary, will be measured for payment under item 472.

NOTIFICATION OF FUNDING SOURCES FOR WORK TO BE PAID BY OTHERS

This contract contains work that shall be paid by the *Town of Wilmington*. The *Town of Wilmington* shall be responsible for construction costs associated with a Non-Participating Agreement with MassDOT.

COORDINATION WITH NATIONAL GRID GAS

The Contractor shall coordinate all work with National Grid for the relocation of gas facilities within the project limits. This shall include coordination for the relocation of gas mains at Dublin Avenue Culvert and Maple Meadow Brook Bridge.

The Contractor shall coordinate with National Grid to schedule shutdowns of the gas mains at these two drainage structure locations. Such coordination shall be undertaken to eliminate the need for installation of temporary gas bypass facilities. Such scheduled shutdowns of the gas mains must occur outside of heavy gas demand seasons and the contractor shall coordinate and schedule all work related accordingly.

The Contractor shall provide the Engineer with a copy of the approved schedule and written confirmation from the gas company for the shutdown of gas mains prior to commencement of work affecting these facilities.

The Contractor shall notify the gas company a minimum of 30 calendar days in advance of any work requiring relocation or shutdown. Copies of all correspondence with the gas company shall be furnished to the Engineer.

Failure by the Contractor to properly coordinate with the gas company may result in delays to the Work, for which no additional compensation or time extensions will be granted.

VALUE ENGINEERING CHANGE PROPOSAL

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

VECP’s under this provision are to be initiated, developed and submitted to MassDOT by the Contractor. The VECP must show the contemplated changes to the Drawings, Specifications and other requirements in the Contract. 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 Critical Path Method schedule as specified in Section 8.0 / Subsection 8.02 of this Contract*) of the projected Work that remains including the proposed VECP related schedule changes (*inclusive of the timeline to review accept the VECP and the timeline for implementing the design changes*) in the remaining work. This shall be submitted in the form of a Proposal Schedule until the VECP has been formally accepted. Note: All of this information is to be updated, recertified, and formally accepted by MassDOT before final acceptance of this this VECP is issued.

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.
 - 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.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)**Net Savings:**

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

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.
- 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.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

- 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.

- 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.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

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.

SUBSECTION 8.14 UTILITY COORDINATION, DOCUMENTATION, AND MONITORING RESPONSIBILITIES

A. GENERAL

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

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

B. PROJECT UTILITY COORDINATION (PUC) FORM

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

C. INITIATION OF UTILITY WORK

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

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

C.1 - BASELINE SCHEDULE – UTILITY BASIS

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

SUBSECTION 8.14 (Continued)

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

C.3 – PROPOSAL SCHEDULE - CHANGES TO THE PUC FORM

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

D. UTILITY DELAYS

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

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

SUBSECTION 8.14 (/Continued)

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

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

E. LOCATION OF UTILITIES

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

F. POST UTILITY SURVEY – NOTIFICATION

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

G. MEETINGS AND COOPERATION WITH UTILITY OWNERS

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

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

H. FORCE ACCOUNT / UTILITY MONITORING REQUIREMENTS

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

I. ACCESS AND INSPECTION

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

COMPLIANCE WITH THE NATIONAL DEFENSE AUTHORIZATION ACT

(Supplementing Subsection 7.01)

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

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

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

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

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

SUBSECTION 8.02 SCHEDULE OF OPERATIONS

Replace this subsection with the following:

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

SECTION 722 CONSTRUCTION SCHEDULING DESCRIPTION

722.20 General

The Contractor's approach to prosecution of the Work shall be disclosed to the Department by submission of a Critical Path Method (CPM) schedule and a cost/resource loaded Construction Schedule as defined by the schedule type set forth below. These requirements are in addition to any requirements imposed in other sections.

This section establishes the requirement for scheduling submissions. There are four schedule types identified as types A, B, C and D.

All schedules shall be prepared and submitted in accordance with this specification and the instructions contained in the Construction Schedule Toolkit located on the MassDOT-Highway Division website at <https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit>.

Type A –

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

Type B –

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

Type C –

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

SECTION 722 (Continued)**Type D -**

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

EQUIPMENT, PERSONNEL**722.40 General****A. Software Requirements**

The Contractor shall use Primavera P6 computer scheduling software.

In addition to the requirements of Section 740 – Engineer’s Field Office and Equipment, the Contractor shall provide to the Department one (1) copy of the scheduling software, one (1) software license and one (1) computer capable of running the scheduling software for the duration of the Contract. This computer and software shall be installed in the Engineer’s Field Office. The computer and software shall be maintained and serviced at no additional cost to the Department.

B. Scheduler Requirements

The Scheduler shall be approved by the Engineer.

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

SCHEDULING METHODS**722.60 General****A. Schedule Planning Session**

The Contractor shall conduct a schedule planning session prior to submission of the Baseline Schedule. This session will be attended by the Department and its consultants. During this session, the Contractor shall present its planned approach to the project including, but not limited to:

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

SECTION 722 (Continued)

9. a summary of the anticipated quarterly cash flow over the life of the project.

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

B. Schedule Reviews by the Department**1. Baseline Schedule Reviews**

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

2. Contract Progress Schedule / Monthly Update Reviews / Recovery Schedules

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

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

722.61 Schedule Content and Preparation Requirements

All schedules shall be prepared and submitted in accordance with the instructions contained in the Construction Schedule Toolkit located on the MassDOT-Highway Division website at:

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

and the following:

A. LOGIC

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

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

SECTION 722 (Continued)**B. ACTIVITIES**

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

1. Notice to Proceed
2. Work Breakdown Structure
3. The Critical Path is clearly defined and organized.
4. Float shall be clearly identified.
5. Detailed activities to satisfy permit requirements.
6. Subcontractor approvals at fifteen (15) Calendar Days from submittal to response
7. The preparation and submission of shop drawings, procedures, and other required submittals, with a planned duration that is to be demonstrated to the Engineer as reasonable.
8. The review and return of shop drawings, procedures, and other required submittals, approved or with comments, the duration of which shall be thirty (30) Calendar Days, unless otherwise specified or as approved by the Engineer.
9. Procurement of fabricated materials and equipment with long lead times, including time for review and approval of submittals required before procuring and fabricating.
10. Each component of the Work defined by specific activities.
11. Right-of-Way (ROW) takings that have been identified in the Contract.
12. Early Utility Relocation (by others) that has been identified in the Contract.
13. Interfaces with adjacent work, utility companies, other public agencies, sensitive abutters, and/or any other third-party work affecting the Contract.
14. Utility work to be performed in accordance with the Project Utility Coordination (PUC) Form as provided in Section 8.14 - Utilities Coordination, Documentation and Monitoring Responsibilities
15. Access Restraints – restrictions on access to areas of the Work that are defined by the Department in the bid package, in Subsection 8.06 – Limitations of Operations or elsewhere in the Contract
16. Limitations of Work – time of year restrictions and any other limitations identified in the contract
17. Traffic work zone set-up and removal, night work and phasing
18. Material Certifications
19. Milestones listed in Subsection 8.03 - Prosecution of Work or elsewhere in the Contract Documents
20. For Type A and B Contracts only: All items to be paid for, including all Unit Price and Lump Sum pay items, shall be identified by activity. This shall include all non-construction activities such as engineering work; purchase of permanent materials and equipment, purchase of structural steel stock, equipment procurement, equipment delivery to the site or storage location and the representative amount of overhead/indirect costs that was included in the Contractor's Bid Prices.

SECTION 722 (Continued)

21. Contractor's request for validation of FBU (ready to open to traffic)
22. Full Beneficial Use (FBU) Contract Milestone per the following requirements: The majority of contract Work has been completed and the asset(s) has been opened for full multi-modal transportation use, except for limited contract work items that do not materially impair or hinder the intended public use of the transportation facility. All anticipated lane takings have been completed, except for minor, short term work items and as defined in Subsection 8.03 - Prosecution of Work
23. The Department's confirmation of completed work to allow for FBU.
24. Contractor's request for validation of Substantial Completion
25. Department generated punch list of twenty-one (21) Calendar Days
26. Substantial Completion Contract Milestone as defined in the standard specifications.
27. Punch list Completion Period of at least thirty (30) Calendar Days per the requirements of Subsections 5.11 - Final Acceptance, 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes
28. Contractor confirmation that all punchlist work and documentation has been completed.
29. Physical Completion of the Work Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
30. Documentation Completion per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
31. Contractor Field Completion Contract Milestone (which can also be considered the completion date) per the following requirements: All physical contract Work is complete including punchlist. The Contractor has fully de-mobilized from field operations and as defined in Subsection 5.11

C. EARLY AND LATE DATES

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

D. DURATIONS

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

SECTION 722 (Continued)

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

E. MATERIALS ON HAND

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

F. ACTIVITY DESCRIPTIONS

The Contractor shall use activity descriptions in all schedules that clearly describe the work to be performed using a combination of words, structure numbers, station numbers, bid item numbers, work breakdown structure (WBS) and/or elevations in a concise and compact label.

G. ACTIVITY IDENTIFICATION NUMBERS

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

H. ACTIVITY CODES

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

I. CALENDARS

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

Project Special Provisions identify specific calendar restrictions some examples of special calendars include, but are not limited to:

- Winter Shutdown Period, specific work is required by separate special provision to be performed during the winter. See Special Provision 8.03 (if applicable)
- Peak traffic hours on heavily traveled roadways. This shall be from 6:30 am to 9:30 am and from 3:30 pm to 7:00 pm, unless specified differently elsewhere in the Contract.
- Special requirements by sensitive abutters, railroads, utilities and/or other state agencies as defined in the Contract.
- Planting seasons for trees, shrubs and grasses and wetlands mitigation work.

SECTION 722 (Continued)

- Cape Cod and the Islands Summer Roadway Work Restrictions: A general restriction against highway and bridge construction is enforced between Memorial Day and Labor Day, unless otherwise directed by the Engineer. Cape Ann Summer Roadway Work Restrictions: While there are no general restrictions for Cape Ann as there are for Cape Cod and the Islands, project-specific restrictions may be enforced.
- Turtle and/or Fish Migration Periods and/or other in-water work restrictions: Refer to the Project Special Provisions for specific restrictions.
- Working over Waterways Restricted Periods.
- Night-time paving and striping operations, traffic, and temperature restrictions.
- Utility Restrictions shall be as specified within the Contract.

J. FLOAT

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

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

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

1. Each schedule activity shall have an assigned cost that accurately represents the value of the Work. Each schedule activity shall have its resources assigned to it by craft and the anticipated hours to accomplish the work. Each schedule activity's equipment resources shall be assigned to it by equipment type and hours operated. Front-loading or other unbalancing of the cost distribution will not be permitted.
2. The sum of the cost of all schedule activities shall be equal to the Contractor's Bid Price.
3. Indicating the labor hours per individual, per day, by craft and equipment hours/day will be acceptable.
4. The Engineer reserves the right to use the cost-loading as a means to resolve changes, disputes, time entitlement evaluations, increases or decreases in the scope of Work, unit price renegotiations and/or claims.
5. For all Type A and B Schedules, all subnets, fragnets, Proposal Schedules, and Recovery Schedules shall be cost and resource- loaded to help to quickly validate and monitor the duration of the Work to be performed.
6. For Type A Schedules, cost-loading of the schedule will also be used for cash flow projection purposes.
7. The cost-loading of each activity shall indicate the portion of the cost for that activity that is applicable to a specific bid item (cost account.) The total cost for each cost account must equal the bid item price.

SECTION 722 (Continued)**L. NOT TO BE USED IN THE CONTRACTOR'S CPM SCHEDULE**

1. Milestones or constraint dates not specified in the Contract.
2. Scheduled work not required for the accomplishment of a Contract Milestone
3. Use of activity durations, logic ties and/or sequences deemed unreasonable by the Engineer.
4. Delayed starts of follow-on trades.
5. Float suppression techniques.
6. Leads such as leads, lags, SS, SF, & FF relationships without the expressed permission of the Department.

722.62 Submittal Requirements

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

Each monthly Contract Progress Schedule submittal shall be uniquely identified.

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

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

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

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

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

A. Narratives

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

1. itemize and describe the flow of work for all activities on the Critical Path in a format that includes any changes made to the schedule since the previous Contract Progress Schedule / Monthly Update or the Baseline Schedule, whichever is most recent.
2. provide a description of any specification requirements that are not being followed. Identify those that are improvements and those that are not considered to be meeting the requirements.

SECTION 722 (Continued)

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

SECTION 722 (Continued)**B. CPM Bar Charts**

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

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

C. Detailed Activity Schedule Comparisons

A Detailed Activity Schedule Comparison (DASC) is a simple reporting tool in the format of a graphical report that will provide Resident Engineers with immediate, timely and up-to-date information. The DASC consists of an updated bar chart that overlays the current time period's bar chart onto the previous time period's bar chart for an easily read comparison of progress during the present and previous reporting periods.

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

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

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

1. activity ID and description,
2. forecast start and finish dates for each activity and,
3. when submitted as a revised schedule, actual start, and finish dates for each completed activity.
4. any variance to the estimated contract quantity shall be shown.

E. Resource Graphs (Type A only)

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

SECTION 722 (Continued)**F. Projected Spending Reports**

A Projected Spending Report (PSR) shall be prepared and submitted monthly. The PSR shall indicate the monthly spending (cash flow) projection for each month from NTP to Contractor Field Completion (CFC). Each month's actual spending shall be calculated using all CQEs paid during that month. The Projected Spending Report (PSR) shall be depicted in a tabular format and provided in both an .XLS and .PDF.

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

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

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

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

B. Interim Progress-Only Schedule Submissions

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

SECTION 722 (Continued)**C. Contract Progress Schedules / Monthly Updates**

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

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

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

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

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

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

SECTION 722 (Continued)**D. Short-Term Construction Schedule**

The Contractor shall provide a Short-Term Construction Schedule that details daily work activities, including any multiple shift work that the Contractor intends to conduct, in a spreadsheet format. The daily activities shall directly correspond to the Contract Progress Schedule activities, with a matching reference to the activity identification number in the Contract Progress Schedule and may be at a greater level of detail. The Short-Term Construction Schedule shall be submitted every two weeks. It shall display all work for a thirty-five (35) Calendar Day period consisting of completed work for the two (2) week period prior and all planned work for the following three (3) week period. The initial submission shall be provided no later than thirty (30) Calendar Days after NTP or as required by the Engineer.

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

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

The Contractor shall notify the Engineer in writing, with copies to the District and State Construction Engineers, within fifteen (15) of the start of any delays to the Critical Path that are caused by actions or inactions that were not within the control of the Contractor. Delay notifications that are not provided in a letter to the Engineer, such as a delay notification in the schedule narrative, will not be recognized as contractual notice in the determination of any Time Extension related to the impacts to the work associated with this specific alleged delay. Should such a delay continue for more than one (1) week, the Contractor shall note it in the Schedule Narrative until the delay is no longer impacting the Critical Path for the completion of the Contract Milestones. The Engineer will evaluate the alleged delay and its impact and will respond to the Contractor within ten (10) Calendar Days after receipt of a notice of delay.

B. Time Entitlement Analysis

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

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

SECTION 722 (Continued)

TEAs shall be submitted:

1. as part of any Extra Work Order that may impact Contract Time,
2. with a request for a Time Extension,
3. within fifteen (15) Calendar Days after a request for a TEA by the Engineer for any other reason.

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

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

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

When accepted, the changes included in a TEA shall be incorporated into the next Contract Progress Schedule per the requirements of Subsection 722.63.C - Contract Progress Schedules / Monthly Updates. During the review of any TEA, all Contract Progress Schedules shall continue to be submitted as required.

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

C. Recovery Schedules

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

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

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

SECTION 722 (Continued)**D. Proposal Schedules**

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

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

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

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

Proposal Schedules shall clearly indicate any proposed acceleration including overtime hours, additional shifts, and the resources that are proposed to be incorporated in the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts. Proposal Schedules that contain a cost element shall be submitted with a separate Cost Proposal.

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

E. Disputes

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

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

SECTION 722 (Continued)**722.65 Schedule Type D Requirements**

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

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

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

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

A. Bar Chart Schedule

A Bar Chart that shall include the following:

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

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

SECTION 722 (Continued)**B. Short-Term Construction Schedule**

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

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

The Contractor shall be prepared to discuss the Short-Term Construction Schedule, in detail, with the Engineer in order to coordinate field inspection staff requirements, the schedule of work affecting abutters and any corresponding work with affected utilities.

C. Project Spending Report (PSR)

A Projected Spending Report (PSR) shall be prepared and submitted monthly. The PSR shall be for all active work assignments, broken down by work assignment. The PSR shall indicate the monthly spending (cash flow) projection for each month from NTP to Contractor Field Completion (CFC). Each month's actual spending shall be calculated using all CQEs paid during that month. The Projected Spending Report (PSR) shall be depicted in a tabular format and provided in both an .XLS and .PDF

SECTION 722 (Continued)**COMPENSATION****722.80 Method of Measurement****Schedule of Operations (Type A, B and C)**

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

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

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

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

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

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

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

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

Schedule of Operations (Type D)

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

SECTION 722 (Continued)**722.81 Basis of Payment**

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

All required schedule-related work, including, but not limited to computers, computer software, the planning and coordination with utilities, training, schedule preparation and schedule submittals (including monthly progress schedules, short-term schedules, project spending reports, TEAs, recovery schedules or impacted schedules) shall be included in this work.

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

All Contract Progress Schedule Updates submitted later than ten (10) Calendar Days after the CQE (Contract Quantity Estimate) completion date, or greater than forty (40) Calendar Days from the Data Date of the previous submission, will be deemed to be no longer useful and will not qualify for payment. The late submission of Impacted schedules, including TEAs, recovery schedules and proposal schedules will result in the forfeiture of the monthly payment for the month in which they were due and subsequent months until the submission is made. Late submission of missed submittals will not result in recovery of the previously forfeited portion of the Schedule of Operations Fixed Price Payment Item.

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

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

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

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

722.82 Payment Items

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

ITEM 100.99**MBTA TRACK DEFORMATION MONITORING****LUMP SUM**

The work under this item includes furnishing all supervision, labor, materials, equipment, layout and services required to install, maintain, and monitor deformation monitoring points (DMPs) as specified herein.

The purpose of the proposed monitoring is to protect the railroad tracks owned by Massachusetts Bay Transportation Authority (MBTA) during installation, excavation, dewatering, construction and backfill of adjacent permanent earth support required for the replacement of the culvert at approximately STA 218+80. The monitoring procedures specified below are intended to confirm that the earth support is performing in a satisfactory manner and to identify locations of excessive ground movement so that it can be controlled and corrected in a timely manner. Any corrective actions required by the Contractor will be at no additional cost to the Department or MBTA.

The Contractor shall monitor the vertical and horizontal/lateral movements of railroad track rails by installing survey deformation monitoring points (DMPs) consisting of a permanently affixed assembly. Alternatively, DMPs may consist of reflective electro-optical distance measuring (EDM) targets that are affixed to the rails with appropriate adhesive. DMPs shall be installed at no more than sixteen (16) foot spacing on the track rails and extend fifty (50) feet along the tracks beyond the limits of the earth support at each end. Contractor shall coordinate responsibilities for installation and monitoring of DMPs on tracks with MBTA Track Engineers.

Procedure

Installation of monitoring points shall be coordinated with the MBTA. Survey of the monitoring points on the MBTA tracks shall be performed by the Contractor and signed off by MBTA Track Engineers.

Contractor shall submit the locations and identification numbers of all monitoring points prior to the start of the Work.

Contractor shall submit the records of measurements to the Engineer and MBTA within twenty-four (24) hours of measurement in tabular format allowing comparison of current data to previous data, including baseline, and showing a complete history of movement versus time.

Monitor DMPs every two days during installation of the braced steel sheeting, or more frequently if movements are approaching the specified Response Values. The frequency of the readings may be adjusted (more or less frequent) in agreement with the MBTA and Engineer based on interpretation of the data and the type of activity occurring at the site. Additional monitoring points and increases in the survey frequency shall be considered incidental to the costs associated with this Item.

A minimum of two (2) sets of independent baseline readings of each DMP shall be taken and submitted to the Engineer prior to beginning installation of the support of excavation. Survey both vertical and horizontal positions. Survey data shall be reported to an accuracy of 0.01 feet.

In cases where track maintenance activities are performed to correct movements, new baseline measurements shall be established and its relationship to the previous baseline documented.

ITEM 100.99 (Continued)

Survey instruments used for vertical deformation monitoring shall have a minimum accuracy of ± 0.10 inches (standard deviation for one mile of double run leveling) and a minimum setting accuracy of ± 1.0 arc seconds. Leveling staffs shall be non-telescopic in design (i.e., 'Chicago' style leveling staff). A bull's eye bubble shall be used to plumb the leveling rod.

Survey instruments used for horizontal deformation monitoring shall have a minimum accuracy of ± 3.0 arc seconds and a minimum display reading less than or equal to the accuracy. Distances less than 30 feet shall be measured with a standardized steel tape used in conjunction with a tension handle. Distances greater than 30 feet shall be measured with an Electro-Optical Distance Measuring Instrument (EDM). Distances between 30 and 100 feet shall be verified with a standardized steel tape in conjunction with a tension handle. Electronic pointing shall be used to minimize error due to possible misalignment of the EDM axis and telescope. Centering shall be accomplished using high precision optical plummets or mechanical centering devices.

EDM equipment used for horizontal deformation monitoring shall, after calibration, have a minimum accuracy of ± 0.20 inches plus 5 parts per million

Interpretation of data and implementation of plans of action:

The Engineer shall interpret data from all survey deformation monitoring points (DMPs) described herein as well as any additional data the Contractor elects to collect.

Table 1 indicates Response Values for selected instruments. The actions associated with these Response Values are defined below. Plans for such actions are referred to herein as plans of action, and actual actions to be implemented are referred to herein as response actions. Response Values are subject to adjustment by the Engineer as indicated by prevailing conditions or circumstances.

TABLE 1. RESPONSE VALUES

Instrument	Response Value
DMPs on MBTA Track Rails	1/4-inch

If the Response Values are met or exceeded, the Contractor shall stop work immediately and notify the Engineer and MBTA. Contractor shall meet with the Engineer and MBTA and agree upon what response action shall be taken. Contractor shall then implement remedial action(s) within 24 hours to mitigate deformations, as directed by the Engineer. Remedial work/response actions shall be at no additional cost to the Department or MBTA. MBTA may elect to do the remedial track work with their own forces, in which case the Contractor shall reimburse the Department for that work.

ITEM 100.99 (Continued)

The criteria presented herein are intended only to establish a guideline and in no way relieves the Contractor of his/her responsibility for preventing detrimental movements or damage causing distress to the train track rails or adjacent structures. Contractor shall provide all measures necessary to control movements to within 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 opinion of the Geotechnical or Structural Engineer, the measured or observed movements are detrimental or damaging.

All work shall be executed in a manner as to prevent damage to existing tracks, structures and to any other public or private property. Damage to existing facilities shall be repaired by the Contractor at his/her own expense.

Contractor shall monitor and interpret data from additional instrumentation that he/she deems necessary to insure the safety of his work. The Geotechnical Engineer, Structural Engineer, MassDOT and MBTA are not responsible for safety of the work based on the instrumentation data.

Remove monitoring points at the completion and acceptance of all work adjacent to the MBTA tracks.

BASIS OF PAYMENT

Item 100.99 will be paid for at the Contract Lump Sum Price, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

The lump sum price will be submitted for payment on the following schedule:

30% upon installation of monitoring points, submittal of required equipment documentation, baseline survey and monitoring, and acceptance by the Engineer.

50% in equal monthly amounts based on the anticipated schedule of monitoring in accordance with the Contractor's approved schedule.

20% remaining upon satisfactory completion and Engineer's acceptance of the work.

ITEM 101.**CLEARING AND GRUBBING****ACRE**

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

The work shall include clearing from Station 306+65 LT to 309+40 LT. In addition to other rock slide mitigation measures performed, all trees from the lower portion of the slope to a height of 20 feet above the roadway level shall be cut to about 2 feet above ground level (not uprooted), leaving the stumps in place to help absorb rock fall energy.

METHOD OF MEASUREMENT

Item 101. will be measured for payment by Acre, measured the horizontal plane area and will be the number of acres within the limiting stations of the project and or as designated by the Engineer and the outside limits of measurement shall extend to a point 5 feet beyond the top or bottoms of slopes, excluding roadway and shoulder surfaces, streams or bodies of water.

BASIS OF PAYMENT

Item 101. will be paid for as per Subsection 101.81.

<u>ITEM 102.3</u>	<u>HERBICIDE TREATMENT OF INVASIVE PLANTS</u>	<u>HOUR</u>

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

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

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

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

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

This item is not intended for manual removal of plants.

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

Herbicide shall be applied during daytime hours only.

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

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

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

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

ITEM 102.3 (Continued)

Areas identified for vegetation control measures shall be as shown on the plans and as determined in the field by the Engineer and a MassDOT Landscape Architect. Contact at MassDOT Landscape Design Section may be contacted at: Tara.Mitchell @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.
4. Crew leader must have expertise with invasive plant control and provide the following:
 - a. Have held Core license for at least five (5) years.
 - b. Resume listing five (5) or more years of experience applying pesticides with the company or with another company specializing in vegetation management.

ITEM 102.3 (Continued)**SUBMITTALS**

No work shall begin without approval of the submittals.

Submittals include the following items:

Invasive Plant Management Strategy (IPMS)

At least thirty (30) days prior to proposed treatment the IPMS shall be submitted for approval by the Engineer and MassDOT Landscape Architect. All chemicals, methods and work done under this item shall be consistent with the IPMS. The IPMS shall be as described under Item 102.33.

Herbicide Use Report

Within two (2) weeks after each application, the Contractor shall provide to the Engineer and the MassDOT Landscape Architect a completed and signed MassDOT Herbicide Use Report.

Photo Documentation

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

MATERIALS

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

METHODS

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

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

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

ITEM 102.3 (Continued)**Herbicide Applications**

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

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

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

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

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

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

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

Disposal Of Invasive Plant Material

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

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

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

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

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

ITEM 102.3 (Continued)

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.

BASIS OF PAYMENT

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

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

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

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

ITEM 102.33**INVASIVE PLANT MANAGEMENT STRATEGY****HOUR**

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

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

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

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

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

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

QUALIFICATIONS

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

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

SUBMITTALS**Task Summary & Reports**

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

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

ITEM 102.33 (Continued)**Invasive Plant Management Strategy (IPMS)**

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

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

I. Project Information

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

II. Brief Description of Conditions

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

III. Coordination with Roadway Contractor regarding other work

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

IV. Soil Management

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

V. Invasive Plant Treatment & Management

- a. Proposed chemical and methods of treatment for each species or area.
- b. Time of treatment based on target plant species.
- c. Submit product label including application methods and rates (entire MSDS information need not be submitted if available online).
- d. Proposed performance metrics or measure of treatment success if different from that specified under Item 102.3.

ITEM 102.33 (Continued)

- 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.

Interim Site Monitoring Inspection Reports

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

Final Inspection

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

ITEM 102.33 (Continued)**METHOD OF MEASUREMENT**

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

BASIS OF PAYMENT

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

ITEM 102.511 **TREE PROTECTION – ARMORING AND PRUNING** **EACH**

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

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

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

REFERENCES

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

MATERIALS

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

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

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

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

METHODS OF WORK

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

Care shall be taken to avoid damage to the bark during installation and removal of armoring. Trunk armoring shall be maintained such that it is effective for as long as required or replaced when materials are found to be damaged or ineffective, as determined by the Engineer. Replacement, if required, shall be incidental to the work. Armoring shall be removed immediately upon completion of work activities adjacent to the protected tree(s). Pruning of limbs shall conform to the techniques and standards of the most recent ANSI A300 standards.

ITEM 102.511 (Continued)**DAMAGES OR LOSS**

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

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

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

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

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

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

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

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

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

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

ITEM 102.521**TREE AND PLANT PROTECTION FENCE****FOOT**

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

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

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

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

MATERIALS

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

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

REFERENCES

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

ESTABLISHMENT OF THE TPPZ

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

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

ITEM 102.521 (Continued)

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

The Contractor shall not engage in any construction activity within the TPPZ without the approval of the Engineer. Activities may include 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 preservation, 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.

ITEM 102.521 (Continued)

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

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

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

ITEM 102.531**TREE CARE - PRUNING****EACH**

The work under this item shall conform to the relevant provisions of Sections 771 and shall be for when specialized or significant limb pruning is required. Pruning shall be to prevent injury to the tree from construction equipment and activities, pruning of dead limbs, and/or pruning for health and balance of the tree to mitigate impacts of construction activities on the root zone.

Trees to be pruned shall be those listed below.

258+25 Right

QUALIFICATIONS

Individuals performing the work must have, at a minimum, an ISA Certified Tree Worker or demonstrate equivalent training and experience. Certification shall be submitted to the Engineer for approval prior to work.

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.

METHODS OF WORK

Prior to construction activities, the Engineer, the Contractor, and the Arborist shall review trees noted on the plans and listed herein to be pruned. Final decision as to trees pruned shall be per the Engineer.

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

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.531 will be measured and paid at the contract unit price per Each. This will include full compensation for all labor, equipment, tools, materials, and incidentals for the satisfactory completion of the work.

ITEM 114.1**DEMOLITION OF SUPERSTRUCTURE OF
BRIDGE NO. W-38-011 (802)****LUMP SUM**

The work under this Item shall conform to the relevant provisions of Subsections 112, 120, 901, 950, and 960 of the Standard Specifications and the following:

The work shall include furnishing all material, labor, equipment, and tools necessary to perform the removal and satisfactory disposal of the entire superstructure of the existing bridge as shown on the Plans or as directed by the Engineer. Except as specified, all materials and debris shall become property of the Contractor, and shall be recycled, reused or disposed of in accordance with applicable local, state and federal requirements.

The demolition of the substructure of the existing bridge is specified and paid for separately under Item No. 144. Class B Rock Excavation.

The Contractor shall make adequate provisions for the protection of the water quality of the Maple Meadow Brook due to his/her demolition operations. The contractor shall be responsible for providing temporary protective shielding to prevent any debris from falling into Maple Meadow Brook as a result of their operation. Payment for temporary protective shielding shall be made under Item 994.01 Temporary Protective Shielding Bridge No. W-38-011 (CVE).

The Department makes no assurances regarding the presented conditions, dimensions, and materials of the existing structure as shown on the Contract Drawings. The Contractor shall verify all the existing conditions and construction features of the bridges to be demolished, as necessary, for the proper planning and completion of the work. The Contractor shall base his/her bid on his/her own findings without any additional compensation for variances from the Plans or these Special Provisions regarding actual conditions for the items to be removed.

The following is a description of elements to be demolished:

Superstructure

Elements of the superstructure to be removed and disposed of under this item include but are not limited to:

1. Concrete parapets
2. Concrete deck slab
3. Steel I-beams, including any railroad tracks embedded in the concrete slab
4. Steel bridge railing

Demolition work for the existing bridge superstructure shall conform to the construction staging sequence outlined in the Construction Drawings. The Contractor shall schedule demolition operations subject to the compliance with the general construction phasing scheme and subject to approval of the Engineer. Means and methods of performing the demolition work are the responsibility of the Contractor.

ITEM 114.1 (Continued)

The Contractor shall prepare and submit a plan indicating his/her proposed demolition procedures and methods to be used, including equipment, tools, devices, crane capacity and location, schedule of operations, etc., to the Engineer for approval.

The requirements for equipment and all procedures utilized shall be in conformance with the intent of Subsection 960.61 Erection, of the Standard Specifications for Highway and Bridges. The demolition procedure and any necessary calculations and drawings shall be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts, certifying that all existing structural members are suitably braced and supported throughout the demolition process. Work under this Item may not commence until the Engineer has given written approval of the method of demolition.

The Contractor shall take all necessary measures to prevent any debris resulting from demolition or equipment from falling into the brook or its banks. All materials removed in this demolition shall become property of the Contractor and shall be recycled, reused, or disposed of in accordance with all applicable. The Contractor is responsible for facilitating the staged removal of the existing superstructure in compliance with the Plans and the need to maintain traffic on the partially removed existing structure during Stage 1. Any damage to the existing superstructure to remain as a result of the demolition procedures shall be immediately repaired by the Contractor as incidental work and cost to this item.

Local, State, and Federal requirements. Any material or equipment that accidentally falls into the brook or adjacent banks shall be removed immediately at the Contractor's expense. Any damage to any bridge components that are designed to remain that are damaged as a result of the Contractor's operations shall be repaired by the Contractor to the satisfaction of the Engineer and at no additional expense. The Contractor shall be responsible for protecting the existing utilities that pass over, under and/or are attached to the bridge from any damage.

BASIS OF PAYMENT

Item 114.1 "Demolition of Superstructure of Bridge No. W-38-011 (802)" will be paid for by the unit of Lump Sum at the Contract Bid Price, which price shall include full compensation for all labor, tools, equipment, materials, testing, loading, transportation, disposal, approvals, permits, Engineering Services and submittals necessary for the completion of the work including all costs associated with hazardous material and compliance with the ESA requirements and incidental costs required to complete the work.

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

ITEM 114.1 (Continued)

The Contractor shall submit in duplicate for approval, by the Engineer, a cost schedule for the “Demolition of Superstructure of Bridge No. W-38-011 (802)”. The approval of the cost schedule by the Engineer shall not be considered as a guarantee to the Contractor of the quantities assumed in developing any part of the submittal cost schedule. The schedule is only for the purpose of estimating partial payments, and it shall not affect the contract terms in any way.

The Engineer shall make partial payments in proportion as the demolition work progresses with the final ten percent (10%) paid upon the satisfactory removal of demolition material from the site, and site restored to its original condition.

ITEM 120.01 EXCAVATION IN FLOOD COMPENSATION AREA CUBIC YARD

The work under this item shall conform to the relevant provisions of Subsections 101, 120, and 751 of the Standard Specifications. Items 102.521 and 767.121 of the Special Provisions and the following:

The work shall include protection and retention of natural features as described herein and excavation for the flood compensation area.

Flood compensation area shall be constructed prior to impacts unless otherwise approved by the Engineer. Construction schedule shall be appropriate to planting and seeding season (see below). Changes to this schedule will require written approval from the Engineer.

DESCRIPTION OF WORK

Excavation in the flood compensation area shall be completed as shown on the drawings at the following location(s):

Area/s A at Station: 257+25 to 260+00

Volume = 4320 cubic feet at the elevations shown on the drawing

Flood Compensation Area shall be constructed to meet the requirements of all associated permits and certifications.

The Contractor is responsible for protection and preservation of natural areas adjacent to the Flood Compensation Area both within and outside the project limits and for the duration of the Contract. Damage to soils or vegetation due to sedimentation, compaction, trampling, vehicles, storage of materials, or other negligence shall be repaired to the satisfaction of the Engineer and at the Contractor's expense and in accordance with payment for damages in Item 102.521 Tree and Plant Protection Fence.

MATERIALS

Sediment control barriers shall be per Item 767.121.

Temporary erosion control for disturbed areas adjacent to wetland shall be compost blanket, jute mesh, or seeding with an appropriate and approved mix.

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

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

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

ITEM 120.01 (Continued)

Construction of and access to the Flood Compensation Area shall minimize damage to existing vegetation and soils.

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

Subgrade shall be graded to meet the finished grades after the application of the Compost Blanket. Grades shall be inspected and approved by the Engineer prior to application of compost blanket.

Compost Blanket shall be applied per the requirements of Item 751.7. The Contractor shall use boards, timber or composite mats, or other approved materials as necessary, to protect existing and/or new topsoil from compaction due to foot traffic or if equipment is required to travel over soil. All labor and materials required for protection and preservation of site shall be incidental to this item.

Sediment Barriers

Placement: Sediment barriers shall be installed along the downslope perimeter of the Flood Compensation Area beginning and ending in the surrounding upland so that no excavated material or disturbed soil can enter adjacent wetlands or waters. Sediment barriers shall be in place and approved by the Engineer prior to excavation work. No work shall take place outside the barriers.

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

Existing Trees and Woody Debris to Remain

Tree protection shall be per the relevant specifications and as shown on the plans or as required by the Engineer. To protect root systems of existing trees to remain, the limits of the Flood Compensation Area may be adjusted, but, the volume of cut at the designated elevations shall be as shown on the plans.

Trees to be retained as snags (upright dead or dying trees left for wildlife habitat) within or adjacent to the Compensation Area shall be as directed by the Wetland Specialist and the Mass DOT Landscape Design Representative during the initial site walk. Trees to remain as snags shall be clearly marked prior to clearing. Trees to remain as snags shall be growing at an existing elevation that is within two feet of the proposed elevation. Trees that pose a potential fall hazard (i.e., are near a roadway) should have limbs and trunk cut such that the tree does not pose a fall hazard.

ITEM 120.01 (Continued)

Incorporation of Wood Debris Wetland Specialist or Landscape Architect during the initial site walk, shall identify woody debris to be incorporated into the Flood Compensation Area. Material shall be placed as directed by the Wetland Specialist or Landscape Architect prior application of compost and/or seed. Where trees are cut for construction purposes, logs of a minimum length of 8 feet must comprise a minimum of 50% of the woody material left on site. Brush shall be included along with logs and stumps as directed. Woody material shall be placed in a deliberate and naturalistic manner

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

Excavation & Grading

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

Final Grading

The finished grade of the Compensation Area shall be at an elevation that will provide an unrestricted hydrologic connection between the Compensation Area and adjacent 100-year flood elevation. The hydrologic connection should be in keeping with restoring the intended function of providing flood storage at the elevations shown on the drawing. The Contractor shall verify that this elevation is not at a level that could negatively alter the hydrology of an adjacent wetland. Final elevations and grading of the Compensation Area shall be approved by the Engineer.

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

VEGETATION RESTORATION

Work to restore vegetation, and stabilize soils shall be according and be paid under the Items listed.

Flood Compensation area shall be seeded with 756.554 WETLAND SEASONALLY FLOODED MIX.

Compost Blanket shall be applied in areas of seeding and shall meet the requirements of 751.7 COMPOST BLANKET.

Requirements for seeding shall meet the requirements of 756.554 WETLAND SEASONALLY FLOODED MIX, 765.635 NATIVE SEEDING AND ESTABLISHMENT.

ITEM 120.01 (Continued)**CONDITIONAL ACCEPTANCE OF WORK**

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

Upon completion of construction, the Contractor shall submit a Request for Conditional Acceptance that includes a brief narrative demonstrating that the Compensation Area construction work was done according to plans (or how modified) and meets required permit conditions. The narrative shall include photo-documentation of pre-construction conditions as well as soil work, planting, and seeding.

Upon receipt of a Request for Conditional Acceptance, the Engineer and representative from Mass DOT Landscape Design Section shall assess the Compensation Area and surrounding areas. At a minimum, the following conditions shall be included in the narrative and reviewed as part of the on-site assessment of whether:

- The final finished target elevations have been met and maintained relative to the approved plans and reference flood elevation. Areas that are too high or too low should be identified along with suggested corrective measures.
- There is an unrestricted hydraulic connection to the floodplain.
- Specified seed mix has been seeded.
- Soils are stabilized and there is no sediment in the Compensation Area and adjacent wetland and no channeling of slopes.
- There are no invasive plants visible in the Compensation Area.

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

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

FINAL ACCEPTANCE OF WORK

Following one full growing season, the Contractor shall submit a Request for Final Acceptance. Submittal shall include a brief narrative of conditions. Upon receiving the Request, the Engineer, Contractor, and representative from MassDOT Landscape Design Section shall assess the Compensation Area.

ITEM 120.01 (Continued)

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

- The unrestricted hydraulic connection to the floodplain is functioning as intended.
- The desired seeded species are establishing well and meet the acceptance requirements of Native Seeding and Establishment.
- No sediments have entered the Compensation Area or adjacent wetland.
- Adjacent slopes are stabilized with desirable vegetation.
- There are no visible invasive plants.
- Silt fence and non-biodegradable sediment barrier materials have been removed.

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

ACCEPTANCE OF WORK

The Contractor shall submit a certified as built topographic survey of the Flood Compensation Area.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 120.01, Excavation in Flood Compensation Area, will be measured and paid for at the Contract unit price per cubic yard, which price shall include all labor, materials, equipment, submittals, as-built plans and all incidental costs required to complete the work.

Payment shall be as follows:

- 80% upon Conditional Acceptance.
- 20% after receipt of as built topographic survey.

Clearing shall be paid under Item 101.

Tree Protect Fence shall be paid under 102.521.

Tree Removal shall be paid under 103.

Compost Blanket shall be paid under 751.7

Wetland Specialist shall be paid under 755.75

Native Seed Mix shall be paid by pound under 765.554

Native Seeding and Establishment shall be paid under 765.635

Sediment Barrier will be paid under Item 767.121

Coir Fiber Roll for will be paid under Item 767.13

ITEM 120.1**UNCLASSIFIED EXCAVATION****CUBIC YARD****ITEM 122.****PRESPLITTING ROCK****SQUARE YARD**

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

Add the following to the end of Subsection 120.62:

In addition, the following requirements apply:

- Excavation and blasting for any rock removal shall be performed using tools and methods that prevent rock from being sprayed or dropped onto the roadway below. Care should be taken to avoid over-fracturing, loosening, or undercutting the rock face. Blasting is precluded to the west of the roadway due to the proximity of the work to the transmission towers. Blasting to the east of the roadway is permitted subject to approval by MassDOT, the Town of Wilmington, and the affected utility owner of a comprehensive package prepared by the Contractor describing procedures, monitoring, and protection of the traveling public. The Contractor shall adhere to the requirements in 527 CMR 1.00: Massachusetts Comprehensive Fire Safety Code and the requirements listed below.
- Temporary barriers shall be used to intercept or deflect small rocks, fragments ejected during excavation, rock scaling removal, and vegetation removal. Heavy rubber mats, such as blasting mats, draped over the rock face may help stabilize and constrain the surface temporarily during excavation and blasting activities. Temporary barriers shall be measured and paid for under items 853.33 and 853.331.
- Potentially hazardous surface boulders located at or near the crest of the proposed rock cut shall be scaled or removed wherever feasible. Rock scaling removal and disposal shall be considered incidental to the work under Items 120.1 and 122.
- Over-excavations that create overhangs or overbreaks on the rock face shall be addressed with dental grouting to restore stability. Where required, use concrete grout to fill joints, cavities, depressions, and overhangs. Prior to placement, the surfaces of the joint, cavity, depression, or overhang shall be thoroughly cleaned using air or water jets. Provide maximum aggregate size of 3/8 inch.
- Surface vegetation shall be cleared to minimize root expansion within rock discontinuities, which could loosen the rock over time. Vegetation removal and disposal shall be considered incidental to the work under Items 120.1 and 122.
- All rock slopes shall be thoroughly scaled and cleaned. For rock excavations involving multiple lifts, scaling of upper lifts shall be completed prior to drilling and fragmenting of lower lifts. Scaled rock slopes shall be stable and free from possible hazards of falling rocks or rockslides that endanger public safety.

ITEMS 120.1 & 122. (Continued)

- Submit for approval by the Engineer of the following at least 30 days prior to the rock excavation:
 - Documentation that the excavation contractor has successfully completed within the previous 5 years at least 3 projects involving rock scaling and excavation of similar scope.
 - A plan of the proposed rock removal area showing the limits of the removal area and the landing and collection area for rock in relation to the public travel way.
 - Proposed means, methods, and equipment for accessing the slopes, removing vegetation, scaling loose rock, excavating rock by mechanical means, clean up and removal of excavated rock from the work area, and disposal of excavated rock and vegetation.
 - Blasting plan, including details of the blasting pattern and techniques proposed for controlled blasting.
 - Proposed means for preventing falling rock and other debris from entering the travel way, and contingency measures for immediately removing any rock or debris that falls within the travel way.
 - Planned daily schedule for rock excavation.
- Additional requirements for blasting: Perform authorized blasting by authorized and qualified workers as approved as to the number, length, placing and direction, and loading of holes. Do not use charges which will make the excavation unduly large or irregular, nor shatter the rock upon or against which masonry is to be built, nor injure masonry or existing structures at the site or in the vicinity.
 - Cover each blast with a woven wire cable mat weighted with heavy timbers. Blasting will not be permitted within 25 feet of existing or completed pipeline or structure.
 - Discontinue blasting whenever it is determined that further blasting may injure or damage adjacent rock, masonry, utility lines, or other structures. In such cases, excavate the remaining rock by barring, wedging, or other approved methods.
 - Where sewers, gas, water, steam, or other utility ducts or lines, catch basin connections, or other structures have been exposed during excavation, adequately protect such structures from damage before proceeding with the blasting. Promptly repair any structure damaged by blasting at no addition to the Contract Price.
 - Take due precautions to prevent accidental discharge of electric blasting caps from current induced by radar, radio transmitters, lightning, adjacent powerlines, dust storms or other sources of extraneous electricity.
 - Keep a sufficient quantity of explosives on hand to avoid delay to the Work on the site when rock excavation is in progress. At no time keep a quantity in excess of that which will be required for use within the following 12 hours.

ITEMS 120.1 & 122. (Continued)

- Store, handle and use such explosives in conformity with all laws, ordinances, and regulations of the County or governing body governing the storage and use of explosives at the construction site.
- Provide a magazine keeper to keep accurate daily records and account for each piece of explosive, detonator and equipment from time of delivery at the magazine until used or removed from the site. Abandon no explosives or blasting agents.
- Take sole responsibility for the methods of handling, use, and storage of explosives and any damage to persons or property resulting therefrom. Approval of these methods or failure to order that blasting be discontinued does not relieve the CONTRACTOR of any of this responsibility.

ITEM 180.01 ENVIRONMENTAL HEALTH AND SAFETY PROGRAM LUMP SUM

The work shall consist of ensuring the health and safety of the Contractor's employees and subcontracting personnel, the Engineer, their representatives, the environment, and public welfare from any on-site chemical contamination present in air, soil, water and sediment.

The Contractor shall prepare and implement a site-specific Environmental Health and Safety Plan (EHASP) which has been approved and stamped by a Certified Industrial Hygienist (CIH) and includes the preparer's name and work experience. The EHASP shall include appropriate components required by OSHA Standard 29 CFR 1910.120(b) and the Massachusetts Contingency plan (MCP) 310 CMR 40.0018 and must comply with all applicable state and federal laws, regulations, standards and guidelines, and provide a degree of protection and training appropriate for implementation on the project. The EHASP shall be a dynamic document with provision for change to reflect new information, new practices or procedures, changing site environmental conditions or other situations which may affect site workers and the public. The EHASP shall be developed and implemented independently from the standard construction HASP required to work on all MassDOT construction projects.

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

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

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

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

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

ITEM 180.01 (Continued)**Method of Measurement and Basis of Payment**

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

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

ITEM 180.02**PERSONAL PROTECTION LEVEL C UPGRADE****HOUR**

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

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

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

ITEM 180.03**LICENSED SITE PROFESSIONAL SERVICES****HOUR**

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

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

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

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

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).

LSP hours for groundwater management (including characterization, obtaining off-site discharge permits, compliance testing, etc.) is incidental to Item 183.1.

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

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

Excavation of existing subsurface materials may include the excavation of contaminated soils. The Contractor shall be responsible for the proper coordination of characterization, transport and disposal, recycling or reuse of contaminated soils. Disposal, recycling or reuse will be referred to as “disposal” for the purposes of this specification. However, regardless of the use of the term herein, there will be no compensation under these items for reuse within the project limits. The Contractor will be responsible for coordinating the activities necessary for characterization, transport and disposal of contaminated soils. Such coordination will include the Engineer and his/her designee overseeing management of contaminated materials. Contaminated soils must be disposed of in a manner appropriate for the soil classification as described below and in accordance with the applicable laws of local, state and federal authorities. The Contractor shall be responsible for identifying disposal facility (ies) licensed to accept the class of contaminated soils to be managed and assure that the facility can accept the anticipated volume of soil contemplated by the project. The Contractor shall be responsible for hiring a Licensed Site Professional (LSP) and all ancillary professional services including laboratories as needed for this work. The Contractor will be responsible for obtaining all permits, approvals, manifests, waste profiles, Bills of Lading, etc. subject to the approval of the Engineer prior to the removal of the contaminated soil from the site. The Contractor and LSP shall prepare and submit to the Engineer for approval all documents required under the Massachusetts Contingency Plan (MCP) and related laws and environmental regulations to conduct characterization, transport, and disposal of contaminated materials.

CLASSES OF CONTAMINATED SOILS

The Contractor and its LSP shall determine if soil excavated or soil to be excavated is unregulated soil or contaminated soil as defined in this section. Such materials shall be given a designation for purposes of reuse or disposal based on the criteria of the MCP. Soils and sediments which are not suitable for reuse will be given a designation for purposes of off-site disposal based on the characterization data and disposal facility license requirements. The Classes of Contaminated Soils are defined as follows:

ITEMS 181.11 through 181.14 (Continued)

UNREGULATED SOIL consists of soil, fill and dredged material with measured levels of oil and hazardous material (OHM) contamination at concentrations below the applicable Reportable Concentrations (RCs) presented in the MCP. Unregulated soil consists of material which may be reused (or otherwise disposed) as fill within the Commonwealth of Massachusetts subject to the non-degradation criteria of the MCP (310 CMR 40.0032(3), in a restricted manner, such that they are sent to a location with equal or higher concentrations of similar contaminants. Disposal areas include licensed disposal facilities, approved industrial settings in areas which will be capped or covered with pavement or loamed and seeded, and for purposes of this project should be reused as fill within the project site construction corridor whenever possible. The material cannot be placed in residential and/or environmentally sensitive (e.g. wetlands) areas. Under no circumstances shall contaminated soils be placed in an uncontaminated or less contaminated area (including the area above the groundwater table if this area shows no sign of contamination).

The Contractor shall submit to MassDOT the proposed disposal location for unregulated soils for approval. If such a disposal location is not a licensed disposal facility, the Contractor shall submit to the Engineer analytical data to characterize the disposal area sufficiently to verify that the unregulated material generated within the MassDOT construction project limits is equal to or less than the contaminant levels at the disposal site and meets the non-degradation requirements of the MCP. In addition, the Contractor shall provide written confirmation from the owner of the proposed disposal location that they have been provided with the analytical data for both the materials to be disposed as well as the disposal site characterization and that s/he agrees to accept this material. A Material Shipping Record or Bill of Lading, as appropriate, shall be used to track the off-site disposal of unregulated soil and a copy, signed by the disposal facility or property owner, shall be provided to the Engineer in order to document legal disposal of the unregulated material.

The cost of on-site disposal of unregulated soil within the project area will be considered incidental to the item of work to which it pertains.

ITEMS 181.11 through 181.14 (Continued)

REGULATED SOIL consists of materials containing measurable levels of OHM that are equal to or exceed the applicable Reportable Concentrations for the site as defined by the MCP, 310 CMR 40.0000. Regulated soil which meets the MCP reuse criteria of the applicable soil/groundwater category for this project area may be reused on site provided that it meets the appropriate geotechnical criteria established by the Engineer. Regulated Soil may be reused (as daily or intermediate cover or pre-cap contouring material) or disposed (as buried waste) at lined landfills within the Commonwealth of Massachusetts or at an unlined landfill that is approved by the Massachusetts Department of Environmental Protection (DEP) for accepting such material, in accordance with DEP Policy #COMM-97-001, or at a similar out-of-state facility. It should be noted that soils which exceed the levels and criteria for disposal at in-state landfills, as outlined in COMM-97-001, may be shipped to an in-state landfill, but require approval from the DEP Division of Solid Waste Management and receiving facility. An additional management alternative for this material is recycling into asphalt. Regulated Soils may also be recycled at a DEP approved recycling facility possessing a Class A recycling permit subject to acceptance by the facility and compliance with DEP Policy #BWSC-94-400. Regulated Soil removed from the site for disposal or treatment must be removed via an LSP approved Bill of Lading, Manifest or applicable material tracking form. This type of facility shall be approved/permitted by the State in which it operates to accept the class of contaminated soil in accordance with all applicable local, state and federal regulations.

HAZARDOUS WASTE consists of materials which must be disposed of at a facility permitted and operated in full compliance with Federal Regulation 40 CFR 260-265, Massachusetts Regulation 310 CMR 30.000, Toxic Substances Control Act (TSCA) regulations, or the equivalent regulations of other states, and all other applicable local, state, and federal regulations. All excavated materials classified as hazardous waste shall be disposed of at an out-of-state permitted facility. This facility shall be a RCRA hazardous waste or TSCA facility, or RCRA hazardous waste incinerator. This type of facility shall be approved/permitted by the State in which it operates to accept hazardous waste in accordance with all applicable local, state and federal regulations and shall be permitted to accept all contamination which may be present in the soil excavate. The Contractor shall ensure that, when needed, the facility can accept TSCA waste materials i.e. polychlorinated biphenyls (PCBs). Hazardous waste must be removed from the site for disposal or treatment via an LSP approved Manifest.

MONITORING/SAMPLING/TESTING REQUIREMENTS

The Contractor shall be responsible for monitoring, sampling and testing during and following excavation of contaminated soils to determine the specific class of contaminated material. Monitoring, sampling and testing frequency and techniques should be performed in accordance with Item 180.03 – LSP Services. Additional sampling and analysis may be necessary to meet the requirements of the disposal facility license. The cost of such additional sampling and analysis shall be included in the bid cost for the applicable disposal items. The Contractor shall obtain sufficient information to demonstrate that the contaminated soil meets the disposal criteria set by the receiving facility that will accept the material.

ITEMS 181.11 through 181.14 (Continued)

No excavated material will be permanently placed on-site or removed for off-site disposal until the results of chemical analyses have been received and the materials have been properly classified. The Contractor shall submit to the Engineer results of field and laboratory chemical analyses tests within seven days after their completion, accompanied by the classification of the material determined by the Contractor, and the intended disposition of the material. The Contractor shall submit to the Engineer for review all plans and documents relevant to LSP services, including but not limited to, all documents that must be submitted to the DEP.

WASTE TRACKING:

Copies of the fully executed Weight Slips/Bills of Lading/ Manifests/Material Shipping Records or other material tracking form received by the Contractor from each disposal facility and for each load disposed of at that facility, shall be submitted to Engineer and the Contractor's LSP within three days of receipt by the Contractor. The Contractor is responsible for preparing and submitting such documents for review and signature by the LSP or other appropriate person with signatory authority, three days in advance of transporting soil off-site. The Contractor shall furnish a form attached to each manifest or other material tracking form for all material removed off-site, certifying that the material was delivered to the site approved for the class of material. If the proposed disposition of the material is for reuse within the project construction corridor, the Contractor shall cooperate with MassDOT to obtain a suitable representative sample(s) of the material to establish its structural characteristics in order to meet the applicable structural requirements as fill for the project.

All material transported off-site shall be loaded by the Contractor into properly licensed and permitted vehicles and transported directly to the selected disposal or recycling facility and be accompanied by the applicable shipping paper. At a minimum, truck bodies must be structurally sound with sealed tail gates, and trucks shall be lined and loads covered with a liner, which shall be placed to form a continuous waterproof tarpaulin to protect the load from wind and rain.

DECONTAMINATION OF EQUIPMENT

Tools and equipment which are to be taken from and reused off site shall be decontaminated in accordance with applicable local, state and federal regulations. This requirement shall include, but not be limited to, all tools, heavy machinery and excavating and hauling equipment used during excavation, stockpiling and handling of contaminated material. Decontamination of equipment is considered incidental to the applicable excavation item.

ITEMS 181.11 through 181.14 (Continued)**REGULATORY REQUIREMENTS**

The Contractor shall be responsible for adhering to regulations, specifications and recognized standard practices related to contaminated material handling during excavation and disposal activities. MassDOT shall not be responsible at any time for the Contractor's violation of pertinent State or Federal regulations or endangerment of laborers and others. The Contractor shall comply with all rules, regulations, laws, permits and ordinances of all authorities having jurisdiction including, but not limited to, Massachusetts DEP, the U.S. Environmental Protection Agency (EPA), Federal Department of Transportation (DOT), Massachusetts Water Resources Authority (MWRA), the Commonwealth of Massachusetts and other applicable local, state and federal agencies governing the disposal of contaminated soils.

All labor, materials, equipment and services necessary to make the work comply with such regulations shall be provided by the Contractor without additional cost to MassDOT. Whenever there is a conflict or overlap within the regulations, the most stringent provisions shall apply. The Contractor shall reimburse MassDOT for all costs it incurs, including damages and/or 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 182.1**INSPECTION AND TESTING FOR ASBESTOS****LUMP SUM**

The work shall include the inspecting and testing of all materials suspected of containing asbestos. It is suspected that the insulation/wrapping on the existing telephone conduits within the project limits may contain asbestos. When any demolition is required to enable the inspection and testing of the suspected material it will be considered incidental to this Item and the Contractor must perform all asbestos handling and testing in accordance with the regulations stated below.

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

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

Regulations

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

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

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

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

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

Massachusetts Department of Labor and Industries Regulations, (DLI) including but not limited to:

- 453 CMR 6.00 Removal, Containment and Encapsulation of Asbestos

ITEM 182.1 (Continued)

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

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

Massachusetts Division of Industrial Safety 45 CMR 10.00

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

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

BASIS OF PAYMENT

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

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

ITEM 182.2**REMOVAL OF ASBESTOS****FOOT**

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

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

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

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

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

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

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

ITEM 182.2 (Continued)

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

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

454 CMR 28.00 Removal, Containment and
Encapsulation of Asbestos

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

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

Massachusetts Division of Industrial Safety 45 CMR 10.00

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

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

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

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

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

ITEM 182.2 (Continued)**NOTIFICATION AND PERMITS**

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

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

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

STANDARD OPERATING PROCEDURES

The standard operating procedure shall ensure the following:

1. Proper site security including posting of warning signs and restricting access to prevent unauthorized entry into the work spaces.
2. Proper protective clothing and respiratory protection prior to entering the work spaces.
3. Safe work practices including provisions for communications; exclusion of eating, drinking, smoking, or use of procedures or equipment that would in any way reduce the effectiveness of respiratory protection or other engineering controls.
4. Proper exit practices from the work space through the showering and decontamination facilities.
5. Removing asbestos containing material in ways that minimize release of fibers.
6. Packing, labeling, loading, transporting and disposing of contaminated material in a way that minimizes or prevents exposure and contamination.
7. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.
8. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces and entanglements in loose hoses and equipment.
9. Provisions for effective supervision and OSHA - specified personnel air monitoring for exposure during work.

ITEM 182.2 (Continued)**REQUIRED SUBMITTALS**

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

1. Name, experience and DLS certification of proposed Supervisors and Foreman responsible for asbestos work.
2. Summary of workforce by disciplines and a notarized statement documenting that all proposed workers, by name, have received all required medical exams and have been properly trained and certified for asbestos removal work, respirator use and appropriate Massachusetts DLS, EPA and OSHA standards.
3. Notarized statement that workers are physically fit and able to wear and use the type of respiratory protection proposed for the project. Notarized certification signed by an officer of the abatement contracting firm that exposure measurements, medical surveillance and worker training records are being kept in conformance with 29 CFR 1926.
4. Written plan of action and standard operating procedures (HASP) to include: location and layout of decontamination areas; sequencing of asbestos work; detailed schedule of work activities by date and interface with other project activities which affect work performance; methods used to assure safety and security; worker protection and exposure monitoring; contingency and emergency evacuation procedures; detailed description of methods to be employed to control pollution; waste handling procedures.
5. Written respiratory protection program specifying level of protection intended for each operation required by the project and details of daily inspection and maintenance elements.
6. Copies of the U.S. EPA, State and local asbestos removal pre-notification forms. If applicable, lists and copies of all permits, licenses, or manifests which will be applied for and used.
7. Name, location and applicable approval certificates for primary and secondary landfill for disposal of asbestos-containing or asbestos contaminated waste. Name, address and licenses number(s) of hauler permitted to transport waste. (Submit copies of completed manifests upon disposal).

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

ITEM 182.2 (Continued)**METHOD OF MEASUREMENT**

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

BASIS OF PAYMENT

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

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

ITEM 183.1**TREATMENT OF
CONTAMINATED GROUNDWATER****GALLON**

This Item addresses the treatment and disposal of contaminated groundwater encountered during excavation operations. The work generally consists of furnishing the materials, equipment, labor, services, testing/sampling, waste characterization, transportation, disposal, permits and agreements necessary to perform the work required for the collection, treatment, and disposal of contaminated groundwater.

The Contractor is advised that contaminated groundwater may be encountered during dewatering activities. The levels and nature of contamination may vary depending on location and/or depth. No data has been provided in this specification indicating the types of contaminants that may be found in groundwater encountered during this work. It will be the responsibility of the Contractor to ensure that water removed during dewatering operations is treated and disposed of in accordance with all applicable laws and regulations and in accordance with this specification.

The Contractor shall monitor the quantity of groundwater collected for treatment using an in-line totalizer flowmeter or an alternate method approved by MassDOT. The Contractor shall, at all times, minimize the quantity of groundwater removed from the excavations. All groundwater determined to be contaminated will be managed in accordance with all applicable local, state, and federal regulations.

It is not the intent herein for the Department to design for or specify to the Contractor which particular treatment is to be used, if necessary. Rather, it is the Department's intent to provide guidance to the Contractor for informational and bidding purposes only. It is, therefore, the Contractor's responsibility to use a treatment method to allow him/her to meet any and all laws, regulations, policies, guidelines, and permit requirements. Treatment of contaminated groundwater for dewatering operations is generally performed using a mobile treatment trailer equipped with one or more granular-activated carbon (GAC) canisters, although other techniques are also used.

It is likely that treatment of the contaminated groundwater using granular-activated carbon will be required to complete the work under this Contract. The Methods described under Item 183.1 provides for the identification, testing, management and treatment or disposal of contaminated groundwater and shall be implemented, at a minimum and as necessary by the Contractor via Methods under Item 183.1.

The overall handling and management of contaminated groundwater is regulated under the provisions of 310 CMR 40.0000, 314 CMR 3.00 and 5.00, NPDES and other applicable laws. The unpermitted discharge of contaminated dewatering effluent into the environment (storm drain, surface water body, onto the ground) is a violation of federal and state laws and regulations. Should dewatering of contaminated groundwater be necessary, approvals must be sought from the appropriate federal, state, or local regulatory jurisdiction. The USEPA will not specify a treatment system or method, but normally requires that the treated discharge meet Massachusetts Drinking Water Standards.

ITEM 183.1 (Continued)

The discharge standards are normally met by treating the dewatered groundwater through granular-activated carbon canisters, or similar techniques. Longer term discharges to surface waters or storm drains, and any discharges to the ground, require approval and/or issuance of a permit from the DEP Division of Water Pollution Control. The Contractor shall be responsible for applying for, paying all fees for, and obtaining all permits required for treatment and/or disposal of contaminated groundwater. Additional requirements may be mandated by local/regional sewer authorities for discharge to sanitary sewer or Publicly Owner Treatment Works (POTW). Copies of permit applications and correspondence from federal and state agencies and sewer authorities shall be supplied to the Engineer prior to dewatering activities.

EPA regulations require a National Pollutant Discharge Elimination System (NPDES) Dewatering and Remediation General Permit (DRGP) for all contaminated construction site dewatering activities in Massachusetts (MAG910000) that will involve the discharge of water to classes of receiving waters designated in the Massachusetts Water Quality Standards (314 CMR 4.00). The application requires that operators of proposed new discharges seeking coverage under this general permit submit a Notice of Intent (NOI) to EPA New England post-marked at least 30 days prior to commencement of discharge. The Contractor is solely responsible for applying for and obtaining coverage under the NPDES Dewatering and Remediation General Permit from EPA and, if applicable, DEP, including the costs associated with sampling and analysis of groundwater and any application fees. The Contractor is required to submit a completed copy of the NOI to the Engineer and the Director of Environmental Programs, Construction Division, 10 Park Plaza, Boston, prior to commencement of discharge.

Upon permanent cessation of the discharges authorized by the DRGP, the Contractor shall be responsible for submitting a Notice of Termination (NOT) to EPA New England within 30 days of the permanent cessation. The Contractor is required to submit to MassDOT a completed copy of the NOT within 30 days of the permanent cessation of the discharges authorized by the DRGP. All costs and fees associated with the submission of the NOT will be the responsibility of the Contractor.

The Contractor shall be responsible for adhering to regulations, specifications, and recognized standard practices related to contaminated groundwater handling during dewatering activities. MassDOT shall not be responsible at any time for the Contractor's violation of pertinent local, 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 Department of Environmental Protection (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 this work.

ITEM 183.1 (Continued)

The Contractor shall be responsible for determining compliance with the requirements of any permit and for any sampling, testing, and disposal required in connection with said permits. MassDOT and the City/Town reserve the right to collect additional samples of dewatered groundwater to determine the Contractor's compliance with the Permit's requirements. All laboratory testing is to be performed by a DEP certified laboratory for all parameters being tested. Copies of all field and laboratory testing results, reports, etc. required by the permits must be supplied to the Engineer. MassDOT, DEP, and the permit-granting agency, where applicable, reserve the right to collect additional samples of discharged groundwater to verify compliance with permit requirements.

For the purpose of these specifications and to establish a basis for the bid, it is anticipated that granular-activated carbon will be the treatment medium for dewatered contaminated groundwater. The bidder shall factor into the payment item all costs associated with the testing and analyses that may be required by the permitting agency. In addition, any laboratory testing of groundwater is to be performed by a DEP certified laboratory for the parameters being tested. Copies of all field and laboratory testing results will be supplied to the Engineer. Bid price shall also include full compensation for labor, materials, maintenance, mobilization, rental, and other related costs. Item 183.2 will be used for disposal of used granular-activated carbon canisters.

SUBMITTALS

Prior to initiating work, the Contractor shall submit an excavation dewatering plan to the MassDOT that includes a detailed description of the approach to dewatering, a description of methodology for sealing the excavation to minimize infiltration of groundwater, if deemed applicable to the work, anticipated treatment, discharge points, sampling frequency, required permits, transporters and waste facilities complete with license numbers, permit numbers, contact person, and address and telephone number that the Contractor plans to utilize for waste disposal. The plan shall be submitted for the record.

The Contractor shall submit to MassDOT for review, the proposed methods for dewatering and groundwater treatment and disposal for the various portions of the work to be done. The review shall be for methods only. The Contractor shall remain responsible for the maintenance, performance, structural integrity, and safety of the systems installed for this work as well as regulatory compliance of the applicable local, state, and federal discharge standards. The contractor shall provide all groundwater sampling and analyses, results and reports required by all applicable local, state, and federal agencies. The Contractor shall submit to MassDOT for review all plans and documents that must be submitted to the EPA and DEP, including NOI, NOT, treatment system analytical reports and correspondence. Copies of all permits and approvals and lab analyses and test results associated with groundwater treatment and disposal must be submitted to MassDOT within 3 days of receipt by the Contractor.

ITEM 183.1 (Continued)**ESTABLISHMENT OF TREATMENT PROCEDURE**

Since concentrations of contaminants in groundwater cannot be easily assessed in the field, all groundwater extracted from the ground will be considered contaminated and will be initially pumped and stored into open settling tank(s) or a fractionation tank until it can be sampled and analyzed, unless otherwise directed by MassDOT. The Contractor will perform initial sampling and analyses of the groundwater to determine the need for a permit to dispose of contaminated groundwater. Based on the results of the initial sample analysis, which must be provided to the Engineer within twenty-four (24) hours of the time the samples are received by the laboratory, the Contractor will determine the necessity for treatment(s) and disposal procedures. Sampling must also be performed to meet applicable discharge criteria as set by the appropriate regulatory agencies for the permit obtained for disposal. All discharges must meet regulatory standards set forth in the permits required for discharge. For the purposes of the bidding process, it is anticipated that the treatment system will consist of sedimentation tanks, an oil water separator and liquid-phase granular activated carbon as the primary on-site treatment medium for dewatered contaminated groundwater. MassDOT may require additional treatment processes if such is determined necessary during the groundwater testing procedure. The Contractor shall integrate the additional treatment process into the treatment system, if necessary.

The Contractor shall provide all labor, equipment and appurtenances required to treat the groundwater, subject to the approval of MassDOT. Groundwater stored and tested but not requiring treatment or off-site disposal shall be discharged to a location subject to the approval of MassDOT without payment to the Contractor.

TREATMENT UNITS

The Contractor shall furnish all labor and materials, and shall install and operate temporary groundwater treatment and disposal system(s) as necessary to treat contaminated groundwater pumped from excavations during construction activities under the Contract. Such systems shall be capable of treating groundwater to meet applicable discharge criteria as set by the appropriate regulatory agencies.

The Contractor or their Environmental Consultant shall operate, maintain, and modify the selected treatment system, and conduct the necessary monitoring and reporting of influent, midpoint, and effluent results, as required by the discharge permit for the disposal option selected.

ITEM 183.1 (Continued)**METHOD OF MEASUREMENT**

Provide a treatment system that meets permit discharge requirements, mobilize it to the site, provide copies of laboratory analytical data indicating that the system is performing appropriately to meet permit requirements, and demobilize it from the site. This includes management and disposal of wastes generated during treatment prior to discharging such as activated carbon, etc. Work under Item 183.1 is based upon the number of gallons disposed or contaminated groundwater pumped through the granular-activated carbon (Item 183.2) as the medium for the treatment of contaminated groundwater that is found in pipe trenches, manhole excavations, catch basin excavations, that need to be dewatered.

BASIS OF PAYMENT

Payment shall be made at the unit price bid per gallon of groundwater pumped, stored, treated as needed and tested as required by discharge permits and regulatory requirements, which price shall be full compensation for all necessary labor and materials, mobilization, maintenance, demobilization of the appropriate unit(s), freight, rental costs, field, and laboratory testing costs and permits. Costs associated with the disposal of granular-activated carbon shall be covered under Item 183.2.

ITEM 183.2**DISPOSAL OF
GRANULAR-ACTIVATED CARBON****POUND**

Work under Item 183.2 is based upon the disposal of used granular-activated carbon as the treatment medium for contaminated groundwater (Item 183.1) that is found during excavations in which contaminated groundwater is encountered.

BASIS OF PAYMENT

Payment shall be made at the unit price bid per pound of carbon that is properly disposed and replaced, as necessary, to meet treated water discharge requirements during dewatering operations at the site. Payment for Disposal of Granular Activated Carbon shall include compensation for all labor, equipment, materials, permits, characterization, sampling and on-site or laboratory analysis as needed or required by permits, for replacement and disposal of liquid phase activated carbon for the on-site contaminated groundwater pumping, collection, treatment and treated water discharge system during the time period required to complete the work. No payments shall be made for replacing carbon which is spent due to the Contractor's failure to remove floating petroleum product or excess sediments prior to the groundwater entering the carbon treatment units. All other costs associated with treatment of contaminated groundwater will be covered under Item 183.1- Treatment of Contaminated Groundwater.

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.

<u>ITEM 201.</u>	<u>CATCH BASIN</u>	<u>EACH</u>
<u>ITEM 201.7</u>	<u>CATCH BASIN – DOUBLE GRATE</u>	<u>EACH</u>
<u>ITEM 201.9</u>	<u>CATCH BASIN (6.5 FOOT AND OVER)</u>	<u>EACH</u>

The work under these Items shall conform to the relevant provisions of Subsection 201 of the Standard Specifications, the Construction Details and the following:

Materials

Catch Basins shall conform with Construction Standard Details, Drawing No. 201.0.2, except as otherwise noted in the Contract Drawings.

Catch Basins – Double Grate shall be constructed as shown in the Plans.

Units shall be precast concrete.

Flat top sections shall be rated for HS-20 loading, produced by manufacturers on the MassDOT approved list and shop drawings shall be submitted for approval.

Construction Methods

The cone sections shall be replaced with flat tops sections as needed at no additional cost.

METHOD OF MEASUREMENT

Items 201, 201.7 and 201.9 will be measured for payment per Subsection 201.80 of the Standard Specifications.

BASIS OF PAYMENT

Items 201, 201.7 and 201.9 will be paid for per subsection 201.81 of the Standard Specifications.

ITEM 202.5**MANHOLE (5 FT DIAMETER)****EACH**

The work under this item shall conform to the relevant provisions of Subsection 201 of the Standard Specifications and the following:

Materials

Drain manholes that are 5' in diameter shall be precast concrete conforming to the latest ASTM Specifications for precast reinforced concrete sections (ASTM C478). Concrete shall have a minimum compressive strength of 5,000 psi. Reinforcing steel shall conform to the latest ASTM A1064 Specifications. The manhole shall be capable of supporting an HS 20-44 live load.

The joints of the precast manhole sections shall be sealed with either a round rubber "O"-ring gasket or a flexible joint sealant. The "O"-ring shall conform to ASTM C443.

Construction Methods

All proposed 5' dia. Manholes shall be constructed on a bedding of 6 inches of crushed stone or as directed by the engineer.

All castings located within the pavement area shall not be set to finished grade until after the binder course has been placed.

Cut and plug of existing utilities in order to replace proposed drainage structures shall be coordinated with utility companies prior the work.

All frames shall be set in a concrete collar conforming to Construction Standard Detail E 223.0.1 prior to placement of the top course pavement.

METHOD OF MEASUREMENT

Item 202.5 will be measured in accordance with Subsection 201.80 of the Standard Specifications.

BASIS OF PAYMENT

Item 202.5 will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment, excavation, and incidentals costs required to complete the work. Incidental costs include the cutting and plugging of existing utilities in order to install new drainage structure. The cost of the concrete collar will be included in the unit price bid for this item.

Crushed stone for bedding will be paid for under Item 156. Crushed Stone. The cone sections of catch basins shall be replaced with flat tops sections, if approved, at no additional cost.

Frame and cover shall conform to and will be paid for under Item 221 Frame and Cover.

Over excavation for bedding will be measured and paid for under Item 142. Class B Trench Excavation.

ITEM 203.2**CURB COVER AND FRAME****EACH**

The work under this Item shall conform to the relevant provisions of Subsection 201 of the Standard Specifications and the following:

The work shall consist of constructing the curb cover and frame for structures situated on the proposed curb line when relocation of the utility structure is not feasible, to maintain the minimum sidewalk clear path width required per ADA and to provide adequate access for future maintenance of the utility structure.

Materials

The Curb Cover and Frame shall meet specifications detailed on the Plans. The assembly shall be provided as a one-piece, factory-welded unit, not to be disassembled in the field. Cover shall include spring-assisted lift mechanism and recessed lift pockets for operation. Assembly shall be designed for pedestrian traffic only and shall be clearly marked as such if required by the Engineer.

Construction Methods

The Curb Cover and Frame shall be constructed as detailed on the Plans.

Contractor shall field-locate the existing manhole and verify cover alignment with the existing structure.

Existing manhole structure shall be retained and protected during construction. Any damage to the existing structure shall be repaired at the Contractor's expense.

The cover and frame shall be installed flush with the surrounding sidewalk and curb, ensuring full accessibility and proper drainage.

All work shall comply with ADA/AAB and PROWAG accessibility requirements, ensuring no trip hazards or surface discontinuities.

Cover shall be installed with hinges oriented for a full 180° opening away from the traveled way or as directed by the Engineer.

Manhole access shall remain operational throughout construction, except as approved by the Engineer.

METHOD OF MEASUREMENT

Item 203.2 will be measured for payment by each, complete in place curb cover and frame installed.

BASIS OF PAYMENT

Item 203.2 will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 203.6**OUTLET CONTROL STRUCTURE****EACH**

The work under this Item shall conform to the relevant provisions of Subsection 201 of the Standard Specifications, the Construction Details and the following:

Materials

Outlet control structures shall be precast concrete conforming to the latest ASTM Specifications for precast reinforced concrete sections (ASTM C478). Concrete shall have a minimum compressive strength of 5,000 psi. Reinforcing steel shall conform to the latest ASTM A1064 Specifications. The manhole shall be capable of supporting an HS 20-44 live load.

The joints of the precast sections shall be sealed with either a round rubber "O"-ring gasket or a flexible joint sealant. The "O"-ring shall conform to ASTM C443.

Construction Methods

All excavation for the structures shall be included in the cost of this item, except Class B Rock which will be paid under Item 144. Units shall be precast concrete.

The Outlet Control Structure shall be constructed with a 2-foot sump. The Outlet Control Structure shall be constructed on a bedding of 6 inches of crushed stone. Crushed Stone shall be placed to a depth of 6" below the structure and 12" beyond the structure wall at a height of 6" above the bottom of the structure. No additional payment beyond these limits will be allowed unless approved in advance by the Engineer.

The cone sections shall be replaced with flat tops sections as needed at no additional cost.

All castings located within the pavement area shall not be set to finished grade until after the binder course has been placed and shall be set to finished grade no more than 7 calendar days prior to final paving. The cost of adjusting castings prior to setting to the final grade is included in the cost of this item.

All frames shall be set in a concrete collar conforming to Construction Standard Details, Drawing No. 223.0.1 prior to placement of the top course pavement.

METHOD OF MEASUREMENT

Item 203.6 will be measured for payment by the Each, outlet concrete structure installed, complete in place regardless of required depth. There shall be no additional compensation for the sump.

ITEM 203.6 (Continued)**BASIS OF PAYMENT**

Item 203.6 will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment, all excavation, backfill, concrete, reinforcing steel, forming and incidental costs required to complete the work. The cost of the frame and cover shall be paid under Item 222.3.

All excavation for the structures shall be included in the cost of this item, except Class B Rock which will be paid for under Item 144. The cost of the concrete collar will be included in the unit price bid for this item, Item 203.6.

ITEM 205.21
ITEM 205.22**SUBSURFACE INFILTRATION SYSTEM NO. 1**
SUBSURFACE INFILTRATION SYSTEM NO. 2**LUMP SUM**
LUMP SUM

The work under these items shall conform to the relevant provisions of Subsection 201 of the Standard Specifications and the following:

The work shall consist of furnishing and installing a subsurface chamber system at the locations shown in the Plans in accordance with the plans and manufacturer requirements and

The Contractor shall furnish a Subsurface Chamber System that provides at least 8,202 and 7,768 cubic-feet of storage capacity for SCM-1 and SCM-3 respectively, and that is designed by the system manufacturer to provide the storage system within the elevations shown on the Plans. The total storage capacity is inclusive of the perimeter stone as shown on the drawings. Also included under these items is crushed stone, geotextile fabric, system chamber interconnections, PVC pipe for inspection ports, manifolds, HDPE connection pipes, isolator rows, surface caps and concrete collars, all excavation, backfill to the roadway subbase gravel borrow layer, excavation support, steel plates and all other incidentals required to construct the system.

The Subsurface Infiltration System shall be open-bottomed, arch shaped high density polyethylene or polypropylene chamber system as manufactured by StormTech, LLC, Wethersfield, CT; Cultec, Inc., Brookfield, CT; or HydroLogic Solutions, Inc., Occoquan, VA or approved equal. System units shall be designed to withstand HS-20 loads when installed in accordance with manufacturer's instructions. Chambers shall incorporate a raised integral cap at the top of the arch in the center of each unit to be used as an optional inspection port or clean-out.

The Contractor shall excavate test pits for the purpose of characterizing maximum groundwater levels and in-situ soil properties to determine the bearing capacity of the subgrade soils at each location. The Contractor shall promptly notify the Engineer if groundwater or clay is encountered during excavation. The costs for this work is included in this item.

The Contractor shall notify the Engineer once subgrade soils below the system are exposed so the Engineer can confirm the texture of subgrade soils.

The Contractor shall submit shop drawings consisting of the storage capacity calculations, plans and details for each system. The Contractor shall not order the systems until the shop drawings have been approved. The shop drawings shall show each individual system layout as meeting storage and horizontal/vertical constraints and is suitable for installation. Non-conforming designs shall be rejected and the Contractor shall resubmit revised shop drawings to achieve conformance with the Contract Documents.

The Contractor shall provide excavation support for the installation of the system and the excavation must be secured at the end of each working day with steel plates to allow for two-way traffic during non-working hours.

The Contractor shall install the subsurface chamber system at the location shown on the Plans in accordance with the approved shop drawings and manufacturer's written instructions. Included with each system shall be crushed stone, PVC pipe for inspection ports, inspection port caps, frames and covers, concrete collars, geotextile filter fabric, and other such components required to complete each individual system.

ITEMS 205.21 & 205.22 (Continued)**BASIS OF PAYMENT**

Item 205.21 and Item 205.22 will be paid for at the respective Contract unit prices per Lump Sum, which price shall include all labor, materials, tools, equipment, and incidental costs required to complete the work.

The lump sum price bid for each subsurface infiltration system shall be full compensation for all crushed stone, geotextile fabric, system chamber interconnections, PVC pipe for inspection ports, manifolds, HDPE connection pipes, isolator rows, surface caps and concrete collars, all excavation, backfill to the roadway subbase gravel borrow layer, excavation support, placement of steel plates at the end of each work day and removal at the beginning of each work day, protection of existing utilities, design and all other incidentals required to complete these items.

Upon final acceptance by the Town and MassDOT of the excavation for the system including excavation support and steel plating, a payment equal to fifty percent (50%) of the Contract Lump Sum price shall be paid. The remaining fifty percent (50%) of the Lump Sum shall be paid upon final acceptance of the work.

ITEM 220.8**SANITARY STRUCTURE REMODELED****EACH**

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

Construction Methods

All sanitary structures which are the property of the municipality shall be remodeled to meet the proposed grade when the adjustment of the structure to line or grade or both line and grade is greater than 6 inches. Existing castings shall be retained.

Work shall include remodeling existing sanitary structures, including brick and mortar, concrete collar and frames to allow the frame to be set to proposed line and grade. All associated work shall conform to the Municipality's requirements.

METHOD OF MEASUREMENT

Item 220.8 will be measured for payment by Each, sanitary structure remodeled and complete in place.

BASIS OF PAYMENT

Item 220.8 will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work. The removal and resetting of the casting will be incidental to the work.

ITEM 223.1**FRAME AND GRATE (OR COVER)
REMOVED AND STACKED****EACH**

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

Construction Methods

The existing frames and grates or covers from existing structures shown on the Plans to be abandoned, removed, or changed in type, shall be removed and stacked unless, in the judgment of the Engineer, they are unsuitable for salvage. Unsuitable frames, grates and covers shall become the property of the Contractor and shall be legally disposed of off the site at no additional cost to the Owner in accordance with all state and local requirements. New frames, grates, and covers shall be furnished and installed for new structures and change in type structures, and paid for under their respective items.

Existing frames and grates or covers owned by the Town of Wilmington shall be removed, transported, unloaded, and stacked at the Town of Wilmington Department of Public Works Yard.

Existing frames and grates or covers owned by MassDOT shall be removed, transported, unloaded, and stacked at the MassDOT Depot. The Contractor shall coordinate removal and delivery with the MassDOT Resident Engineer.

METHOD OF MEASUREMENT

Item 223.1 will be measured for payment by each for each existing structure whose frame and grate or cover was actually removed and stacked (or discarded).

BASIS OF PAYMENT

Item 223.1 will be paid for at the contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work. This price will also include full compensation for removing, transporting, and stacking or discarding of the frames and grates or covers.

<u>ITEM 235.12</u>	<u>12 INCH DRAINAGE PIPE FLARED END - OPTION</u>	<u>EACH</u>
<u>ITEM 235.15</u>	<u>15 INCH DRAINAGE PIPE FLARED END - OPTION</u>	<u>EACH</u>

The work under these Items shall conform to the relevant provisions of Subsection 230 of the Standard Specifications and the following:

The work under these Items shall consist of the installation of drainage pipe flared end - option as shown on the plans.

Construction Methods

Drainage Pipe Flared End – Option shall be installed as shown on the plans.

METHOD OF MEASUREMENT

Item 235.12 and Item 235.15 will be measured for payment respectively by the EACH drainage pipe flared end - option.

BASIS OF PAYMENT

Item 235.12 and Item 235.15 will be paid for at the respective Contract unit prices per EACH, which prices shall include all labor, material, equipment, and all incidental costs required to complete the work.

<u>ITEM 302.12</u>	<u>12 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET)</u>	<u>FOOT</u>
<u>ITEM 303.06</u>	<u>6 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT)</u>	<u>FOOT</u>
<u>ITEM 303.08</u>	<u>8 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT)</u>	<u>FOOT</u>
<u>ITEM 303.10</u>	<u>10 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT)</u>	<u>FOOT</u>
<u>ITEM 303.12</u>	<u>12 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT)</u>	<u>FOOT</u>
<u>ITEM 309.</u>	<u>DUCTILE IRON FITTINGS FOR WATER PIPE</u>	<u>POUNDS</u>
<u>ITEM 309.12</u>	<u>12 INCH MECHANICAL RESTRAINED JOINT</u>	<u>EACH</u>
<u>ITEM 374.24</u>	<u>24 INCH DUCTILE IRON PIPE CASING FOR WATER PIPE</u>	<u>FOOT</u>

The work under these items shall conform to the relevant provisions of Subsection 301 of the Standard Specifications, the American Water Works Association (AWWA) C-600 Standards, and in accordance with the current requirements of the Wilmington Water and Sewer Department(https://www.wilmingtonma.gov/sites/g/files/vyhli5221/f/uploads/rules_regs_including_05.25_rates_and_fees_update.pdf).

The work under these items shall include furnishing, lay, joint, test, and disinfect all water pipe and fittings, as indicated on the Contract Drawings.

Item 309.12 shall be used for restraining Item 302.12 at fittings, bends, and appurtenances.

The Contractor is responsible for notifying the Wilmington Water and Sewer Department and the Engineer of service shutdown 48 hours prior to the actual shutdown. The shutdown of the water services will be performed only by personnel of the Wilmington Water and Sewer Department. Valves, hydrants, corporations and curb stops will be operated by the Wilmington Water and Sewer Department personnel only. Shutdown of fire service(s) requires prior notification to, and approval of, the Wilmington Fire Department.

The new water mains are to be installed as shown on the plans. The existing water mains shall remain in service until all water services and hydrants are connected to the new mains and tested. The existing main shall be abandoned in place. The existing main shall be cut and plugged where shown or as directed.

No water main or service supplying any home, place of business or fire hydrant shall be shut down for more than two (2) hours unless an approved temporary means of supply is provided. Such temporary provisions will be considered as being for the convenience of the Contractor and as much will not be measured for direct payment. Notice shall be given to owners of properties affected by proposed shutdowns of water mains and services at least 24 hours prior to shutdown.

The Contractor shall notify and coordinate with the Town and owners of business and commercial establishments of any disruptions to, or shutdowns of, water service to their facilities. The Contractor shall schedule service disruptions or shutdowns such that operations of business and commercial establishments are not impacted, and furthermore shall coincide with periods of minimal water usage by these properties.

Data relative to existing water mains, services, etc. shown on the plans has been compiled from plans and field information but such data is not guaranteed as to exact location or elevation.

ITEMS 302.12, 303.06, 303.08, 303.10, 303.12, 309, 309.12 and 374.24 (Continued)**Materials****Ductile Iron Pipe and Fittings**

All material shall be new and shall be of the type currently used by the Wilmington Water and Sewer Department. Gasket joint water mains shall be cement-lined, seal-coated ductile iron pipe with push-on type joints. Pipe shall conform to AWWA C151 (thickness class 52). Pipe joints and gaskets shall be of the push-on type in accordance with ANSI A21.11/AWWA C111. Pipes shall be lined with cement in accordance with ANSI A21.4/AWWA C104.

Mechanical joint water mains shall be cement-lined, seal-coated ductile iron pipe with mechanical joints. Pipe shall conform to AWWA C151 (thickness class 52). Pipe joints and gaskets shall be of the mechanical joint type in accordance with ANSI A21.11/AWWA C111. Pipes shall be lined with cement in accordance with ANSI A21.4/AWWA C104.

Sleeves shall be Class 350 ductile iron with mechanical joint, long body style meeting or exceeding the requirements of ANSI/AWWA C110/A21.10 or latest revision thereto.

Joints

Gasket joints shall be furnished with mechanical joint restraint.

Ductile iron fittings shall be Thickness Class 52, Pressure Class 350, cement lined, and shall meet the requirements of ANSI A21.54/AWWA C104. All fittings are required to be equipped with mechanical joints and retainer glands. Mechanical joint fittings in sizes 6 inch through 12 inch shall be ductile iron compact fittings conforming to AWWA C153. All nuts and bolts shall be of a type equal to ductile iron or KOR-10 T-bolts and nuts. Mechanical joints shall be furnished with suitable appliances for insuring electrical conductivity, in accordance with the recommendations of the manufacturer.

Tees for hydrant branches and for stubs for future use shall have mechanical joints on the run with a plain end and having an integral rotating gland on the branch. The gland will anchor mechanical joint pipe or valve ends to the plain end of the tee.

Mechanical Joint Restraint

Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A 536-80. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN.

Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/A21.53 of latest revision. Twist-off nuts shall be used to insure proper actuating of the restraining devices. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1.

ITEMS 302.12, 303.06, 303.08, 303.10, 303.12, 309, 309.12 and 374.24 (Continued)

The method of restraining shall be an interlocking type of mechanical joint with retainer gland as specified by the Wilmington Water and Sewer Department.

Joints shall be furnished with either follower glands or ductile iron retaining glands as shown on the drawings.

Mechanical joint restraints shall be approved by the Town of Wilmington Water and Sewer Department.

Lining and Coating

The inside of ductile iron pipe and fittings shall be given a cement lining and bituminous seal coat in accordance with AWWA C104/ANSI A21.4. Cement lining shall be double thickness.

The outside of ductile iron pipe and fittings shall be coated with bituminous varnish as required by AWWA C104/ANSI A21.4.

Machined surfaces shall be cleaned and coated with a suitable rust preventive coating at the shop immediately after being machined.

Anchor Harness Rods, Tie Rods and Clamps

Anchor harness rods, tie rods and clamps shall be furnished and installed in accordance with the Standard Construction Details or as directed by the Engineer.

Anchor harness rods and tie rods shall have minimum diameter of $\frac{3}{4}$ inch. Tie rods as clamps shall be as manufactured by Carpenter Paterson, Inc., Woburn, Mass.; Star National Products of Columbus, Ohio; or Metcalfe Industries, Palm Beach, Florida; or approved equal.

Anchor harness rod, tie rod and clamp assemblies incorporated in the work shall be thoroughly coated with two coats of a heavy duty protective coating conforming to "Coal Tar Protective Coating P-101," Subsection M7.04.01 of the Standard Specifications.

Ductile Iron Casing Pipe

24 inch ductile iron casing pipe shall conform to Item 302.24 in the MassDOT Standard Specifications. Spacers shall be attached to the 12 inch ductile iron water pipe. Attachment to the insulation is not permitted. Payment for the spacers and casing end seals is incidental to the casing pipe.

ITEMS 302.12, 303.06, 303.08, 303.10, 303.12, 309, 309.12 and 374.24 (Continued)**Construction Methods**Lines and Grades

Piping shall be installed at the locations indicated on the Contract Drawings and as designated in these Specifications. Unless otherwise shown or stated, the minimum total finished cover over the top of the barrel of all installed pipe shall be 5 feet. All excavation necessary for the pipe installation, excluding Class B Trench Excavation and Class B Rock Excavation, shall be included in the cost of the pipe. The location of the pipe is to be marked with an identification tape buried 2 feet below finished grade. The tape shall be 3 inches in width by 0.004 inches in thickness, polyethylene plastic, solid blue in color and shall read "Caution - Water Line Buried Below" on a continuously printed caption in black letters.

Pipe Foundations

All pipes, fittings and appurtenances to be laid in open trench excavations shall be bedded in and uniformly supported over its full length as shown on the Contract Drawings.

Inspection of Pipe Before Installation

All pipe fittings and appurtenances shall be carefully inspected in the field by the Engineer before lowering into the trench. All pieces found to be defective as determined by the Engineer, shall be pulled out and not installed. Such rejected pipe shall be clearly tagged in such a manner as not to deface or damage it, and the rejected pipe shall be removed from the job site.

Installation of Pipe and Fittings

All pipe and fittings shall be carefully handled by equipment of sufficient capacity and proper design to avoid damage to the pipe and fittings. No defective pipe or fittings shall be laid or placed in the piping. Any piece discovered to be defective after having been laid shall be removed and replaced by a sound and satisfactory piece at the expense of the Contractor.

Each pipe and fitting shall be cleared of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.

Pipe and fittings shall be laid accurately to the lines and grade indicated on the drawings or as required. Care shall be taken to ensure alignment both horizontally and vertically, and to give buried pipe a firm bearing along its entire length. Pipes shall not be laid in water; nor shall water be allowed to flow through them. The Contractor shall take all necessary precautions to prevent flotation of the pipe in the trench.

Backfilling of the pipe trench shall be done as specified under Subsection 140 of the Standard Specifications.

ITEMS 302.12, 303.06, 303.08, 303.10, 303.12, 309, 309.12 and 374.24 (Continued)

Reaction or thrust blocks of concrete shall be constructed at all tees, plugs, and bends, as directed or as detailed on the drawings. The blocks shall be poured against undisturbed original ground and shall be so placed that pipe joints will be accessible for any possible future repairs. Method of restraint may be either locking joint or mechanical restraint as approved by the Wilmington Water and Sewer Department.

Connection to Other Facilities

The water pipe shall be connected to existing or new structures and/or piping by the Contractor as shown on the Contract Drawings. Test pits shall be dug as directed by the Engineer to verify the size and the type of existing pipe where connections are to be made. The Contractor shall furnish and install all such fittings and appurtenances as are necessary to make the connections shown whether all such fittings are detailed or not. Couplings, where required, shall be as specified under Items 371.08, 371.10 and Item 372.12.

All concrete for thrust blocks shall be as specified under Item 903. The other means of restraint (method of restraining may either be of an interlocking type or mechanical joint with retainer gland as specified by the Wilmington Water and Sewer Department) shall be installed in addition to or in lieu of thrust blocks as directed by the Wilmington Water and Sewer Department. Pipe anchors and thrust collars shall be used when and as directed.

Laying Pipe and Fittings

Gasket type joints shall be made up by first inserting the gasket into the groove of the bell and applying a thin film of special non-toxic gasket lubricant uniformly over the inner surface of the gasket which will be in contact with the spigot end of the pipe. The end of the plain pipe shall be chamfered to facilitate assembly. The end shall be inserted into the gasket and then forced past it until it seats against the bottom of the socket. A metal feeler shall then be used to make certain the gasket is properly located.

A minimum of two brass wedges shall be installed per pipe joint and fitting to maintain conductivity and facilitate locating pipe in the future.

Restrained type joints shall be used where straight pipe joints are deflected to bend pipe line on a curve. The method of restraining may either be of an interlocking type or mechanical joint with retainer gland as specified by the Wilmington Water and Sewer Department.

Hydrant connections are to be restrained for the full length of the pipe from the main to the hydrant.

Handling and Cutting Pipe

The Contractor's attention is directed to the fact that the cement lining is comparatively brittle. Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe or lining, scratching or marring machined surfaces, and abrasion of the pipe coating or lining.

ITEMS 302.12, 303.06, 303.08, 303.10, 303.12, 309, 309.12 and 374.24 (Continued)

Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.

If any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portion, if so approved by the Engineer, may be cut off before the pipe is laid so that the pipe used is perfectly sound. The cut shall be made in the sound barrel at a point at least 12 inches from the visible limits of the crack. The cracked portion shall not be included as part of the measurement for payment under this section.

Deflection of Pipe

In laying ductile iron pipe, the following deflections, based upon a 20-foot length of pipe, shall not be exceeded.

Nominal Size of Pipe, in.	Gasket Type Jacket Deflection, in.
6	12
8	12
10	12
12	12

Field Testing

The testing shall conform to AWWA Standard C600, and all equipment shall be approved by the Town of Wilmington Water and Sewer Department. The water pipe shall be given pressure and leakage tests in sections of approved length. For these tests, the Contractor shall furnish a water measuring device and a pressure gage. The Contractor shall also furnish and install suitable temporary testing plugs or caps for the pipeline; all necessary pressure pumping equipment, pipe connections, and other similar equipment; water; and all labor required; all without additional compensation. Compensation for testing shall be included in the unit price for pipe and fittings. The meter and gage shall be installed by the Contractor in such a manner that all water entering the section under test will be measured and the pressure in the section indicated, and equipment shall be kept in use during both tests. Meters, gages, and other test equipment shall be approved by the Engineer.

The scheduling of pressure and leakage tests shall be as approved by the Engineer.

Unless it has already been done, the section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If air release assemblies are not available at high points for releasing air, the Contractor shall make the necessary excavations and do the necessary backfilling and shall make the necessary taps at such points and install corporation stops. Corporation stops shall be capped with brass or bronze caps upon completion of the test and left in place.

ITEMS 302.12, 303.06, 303.08, 303.10, 303.12, 309, 309.12 and 374.24 (Continued)

The pressure and leakage tests shall be as specified in Section 301.60 J of the Standard Specifications for Highways and Bridges, and the American Water Works Association Standard C600, Section 5.2.

Tests for strength and leakage shall be made with all hydrants in place with branch gate valves and all required corporation stops installed and in the closed position. Before testing pipelines having flexible joints, the Contractor must make certain that the pipelines are securely held to prevent their movement.

The newly laid pipe shall be tested in valved or plugged sections as determined by the Engineer in the field. Water shall be slowly introduced into the section being tested by means of an approved power-driven high pressure test pump.

The lengths of joint to be used in determining the allowable leakage shall be based on the nominal diameter of the pipe.

All pipe shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing, but in no case less than 150 psi. The pressure for the tests shall be maintained by pumping additional water as required into the pipeline and shall not vary by more than 5 psi for the duration of the test. The test pressure shall be maintained for at least two hours. Temporary plugs and fittings may be required by the Engineer.

The pressure shall be raised to the test pressure required for each section being tested as determined by the Engineer. When the test pressure is reached, the time shall be recorded and the test shall begin. The duration of each pressure test shall be a minimum of two hours. During the test, pressure shall be maintained in the section of pipeline being tested by means of a recirculating by-pass type test pump. Water shall be added in measured amounts from a container of known volume if required to maintain pressure. The addition of excessive amounts of water shall constitute immediate test failure. The Engineer will approve all gauges and test equipment.

If the section shall fail to pass the pressure test, the leakage test, or both, the Contractor shall do everything necessary to locate, uncover, even to the extent of uncovering the entire section, and repair or replace the defective pipe, fitting, or joint, all at no additional cost to the owner and without extension of time for completion of the work.

If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedure exactly for any reason, modification in the procedures shall be made as required or approved, but in any event the Contractor shall be responsible for the ultimate tightness of the line within the above leakage requirements.

The Town, at its own expense, may test the water pipe independent of or in place of the Contractor's test. The Town, or its agent, shall schedule such test so as to minimize any delay to the Contractor. The Contractor is notified that this test may cause delay in his work and he shall not receive reimbursement for costs incurred during a reasonable delay. Should any section of pipe fail, the Contractor shall have no claim for any expenses incurred during the delay required to schedule and complete a new test.

ITEMS 302.12, 303.06, 303.08, 303.10, 303.12, 309, 309.12 and 374.24 (Continued)**Disinfection and Flushing**

After a section of the main has been tested and found acceptable, it shall be flushed free of all the heavily treated water by the Contractor. After completion of the flushing operation, the Contractor shall disinfect the water mains with a solution consisting of 50 ppm of chlorine in accordance with the AWWA C651 Specifications for Disinfecting Water Mains. The preferable point of chlorine application shall be at the source of the water for the section being sterilized. The chlorine solution shall be fed into the pipe through a corporation stop, using a gas chlorinator or a hypochlorinator. This work shall be done with the attendance of a representative of the Wilmington Water and Sewer Department.

The Contractor shall provide caps or plugs at ends of branches of water mains at intersections to allow for disinfection of all portions of newly installed water mains.

The water shall be tested chemically for residual chlorine and bacteriologically for coliform group bacteria. Testing must be done by a Massachusetts State Certified Laboratory and the results of all tests must be submitted to the Wilmington Water and Sewer Department. The Contractor shall be solely responsible for all costs associated by the aforesaid test.

The contact period for the disinfection shall be at least 24 hours and a longer period will be required if tests of residual chlorine show it to be necessary for proper disinfection.

Following chlorination, the mains shall be flushed again with clean water to remove any evidence of contamination, as determined by the bacteriological analysis. Flushing with clean water shall continue until testing shows a residual chlorine concentration of less than 0.2 mg/liter. Water used in disinfecting and flushing pipes shall be disposed of in an approved manner.

Bacteriological sampling and testing shall be done in accordance with AWWA C651 for each main and each branch. Sampling shall be accomplished with sterile bottles treated with sodium thiosulfate as required by Standard Methods for the Examination of Water and Wastewater. No hose or fire hydrants shall be used in the collection of samples. A corporation stop installed on the main, with a removable copper tube gooseneck assembly, is the recommended method.

Testing shall be done by a laboratory approved by the Engineer, in accordance with Standard Methods, and shall show the absence of coliform organisms. A standard plate count may be required at the option of the Engineer.

A report describing amounts of water flushed, amounts of chlorine used and chlorine residuals after the test period must be submitted to the Wilmington Water and Sewer Department. If the initial treatment fails to produce the desired result, the chlorination procedure must be repeated.

For this work, the Contractor shall furnish all equipment, materials, and labor required.

ITEMS 302.12, 303.06, 303.08, 303.10, 303.12, 309, 309.12 and 374.24 (Continued)**METHOD OF MEASUREMENT**

Items 302.12, 303.06, 303.08, 303.10 and 303.12 will be measured for payment by the Foot, in place, along the axis of the pipe, without deduction for the space occupied by valves while excluding the length occupied by fittings. Where two pipes join, measurement will be made to the intersection of the axis.

Item 309. Will be measured for payment by the pound, and the quantity to be paid for shall be the weight stated on the invoice by the supplier, or the manufacturer's rated weight as listed in the catalog, whatever is the least weight.

Anchor harness rods, tie rods and clamps shall be measured under Item 309.

Item 309.12 will be measured for payment by Each, for each mechanical restrained joint installed at fittings, bends, and appurtenances on ductile iron water pipe (rubber gasket).

Item 374.24 will be measured for payment by Foot, in place, along the axis of the pipe, including fittings.

BASIS OF PAYMENT

Items 302.12, 303.06, 303.08, 303.10, and 303.12 will be paid for at the respective contract unit prices per foot for water main of the size shown, which prices shall include all labor, material, tools and equipment and incidental costs required to complete the required works. The unit prices shall include also full compensation for the removal and disposal of existing water pipe and appurtenances encountered during construction, cutting and plugging the existing water pipe, and furnishing all materials, preparation and installation, including excavation, compaction and backfilling of ordinary borrow backfill above initial backfill, water line testing and disinfecting, brass caps and wedges, mechanical joint restraints for Items 303.06, 303.08, 303.10, 303.12, buried pipe identification tape, cement lining, support of excavation, dewatering.

Crushed stone used for pipe bedding in trench sections through rock shall be paid for under Item 156.

Additional excavation to remove unsuitable bottom material for water main bedding, and over 5 feet, will be paid for under Item 142, Class B Trench Excavation.

Rock excavation when encountered in the trenching operation shall be paid for under Item 144 Class B Rock Excavation.

Item 309. Will be paid for at the contract unit price per Pound, which price shall include all labor, material, tools and equipment and incidental costs required to complete the work.

Payment for anchor harness rods, tie rods and clamps shall be at the contract unit price for Item 309, which shall be full compensation for all labor, materials, equipment and tools required to complete this work, and for furnishing and installing anchor rods, ties rods and clamps.

ITEMS 302.12, 303.06, 303.08, 303.10, 303.12, 309, 309.12 and 374.24 (Continued)

Item 309.12 will be paid for the contract unit price per Each for each mechanical restrained joint installed at fittings, bends, and appurtenances on Item 302.12.

Item 374.24 will be paid for at the contract unit price per Foot of casing for water pipe in place, along the axis of the pipe, including fittings, which price shall include all labor, materials, tool and equipment and incidental costs required to complete the required works.

Gravel borrow required for water main bedding and to replace unsuitable bottom material for water main bedding, as shown in the Drawings, shall be paid for under Item 151 Gravel Borrow.

Concrete for thrust blocks shall be paid for under Item 903.

<u>ITEM 350.06</u>	<u>6 INCH GATE AND GATE BOX</u>	<u>EACH</u>
<u>ITEM 350.08</u>	<u>8 INCH GATE AND GATE BOX</u>	<u>EACH</u>
<u>ITEM 350.10</u>	<u>10 INCH GATE AND GATE BOX</u>	<u>EACH</u>
<u>ITEM 350.12</u>	<u>12 INCH GATE AND GATE BOX</u>	<u>EACH</u>

The work under these items shall conform to the relevant provisions of Subsection 301 of the Standard Specifications and the current requirements of the Wilmington Water and Sewer Department.

Items 350.06, 350.08, 350.10, and 350.12 shall consist of furnishing and installing new valve, valve box, and appurtenance equipment, all as indicated in the Drawings.

ITEM 353.1 **GATE AND GATE BOX REMOVED AND DISPOSED** **EACH**

The Contractor shall anticipate removal and disposal of existing gate valves as shown on the plans; however, the Town of Wilmington DPW shall be allowed to remove materials on-site prior to disposal and to assume ownership of these materials if desired.

Existing gate valves on water lines to be abandoned shall be removed and disposed of under this Item.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 353.1 will be measured and paid for at the unit contract bid price per each, which price shall include all labor, materials, tools, and equipment and incidental costs required for removing and disposing of gate valves assembly as specified including excavation, backfilling, and all other work necessary to complete this item.

<u>ITEM 371.08</u>	<u>8 INCH COUPLING</u>	<u>EACH</u>
<u>ITEM 371.10</u>	<u>10 INCH COUPLING</u>	<u>EACH</u>
<u>ITEM 371.12</u>	<u>12 INCH COUPLING</u>	<u>EACH</u>

Couplings for water pipe shall be of a type equal to Smith Blair, Style 441; Dresser, Style 253; or Romac Style 501, or an equal approved by the Wilmington Water and Sewer Department.

Couplings shall be provided with plain, Grade 27, rubber gaskets and with black, steel, track-head bolts with nuts. All couplings and hardware shall be completely wrapped with wax-tape coating system.

METHOD OF MEASUREMENT

Items 371.08, 371.10 and 371.12 will be measured for payment by the Each coupling installed and complete in place.

BASIS OF PAYMENT

Items 371.08, 371.10 and 371.12 will be paid for at the respective contract unit prices per each, which shall include all labor, materials, tools and equipment and incidental costs required to complete the work.

ITEM 374.**ALUMINUM JACKET AND PIPE INSULATION
FOR EXPOSED PIPE****FOOT**

The Contractor shall furnish and install Aluminum Jacket and Insulation for Exposed Pipe for open-air water main installation across the Rt. 38 (Main Street) bridge as indicated on the Plans and as herein specified.

Aluminum jacket and insulation for exposed pipe shall consist of pipe jacketing and insulation as follows:

All bare and polyfilm lined Aluminum Jacketing Insulation Systems system complies with the requirements of ASTM C1729 (Aluminum Jacketing Material Standard) which includes the strength and chemical composition requirements for compliance to ASTM B209 (Aluminum Alloy Standard). or equal.

Polyfilm Moisture Barrier (PFMB) is an engineered three layer coextruded film of polyethylene and Surlyn* polymers with a total film thickness of 3 mils (76 μ m) that is heat laminated in the factory to the interior surface of aluminum jacketing.

The thickness of aluminum jacketing used vary based on the outer diameter of the insulation system per the requirements of ASTM C1729.

The pipe jacketing and insulation shall be installed in accordance with the manufacturer's written literature.

Provide Smooth (Plain Mill) finish with Rigid insulation.

METHOD OF MEASUREMENT

Item 374. will be measured for payment by foot, of pipe jacketing and insulation installed complete in place.

BASIS OF PAYMENT

Item 374. Will be paid for at the contract unit price per foot, which price shall include all labor, material, tools, equipment and incidental costs required to complete the work.

ITEM 375.08
ITEM 375.12**8 INCH INSERTION VALVE AND BOX**
12 INCH INSERTION VALVE AND BOX**EACH**
EACH

The work under these items shall include furnishing and installing a new insertion valve, valve box, and appurtenant materials and equipment, as required and specified herein.

Insertion valves shall have an EPDM-molded resilient wedge seal. The resilient wedge seal will be affixed into a reinforced nylon composite polymer valve cartridge. The entire assembly shall be inert and impervious to corrosion and designed for use in potable water. Insertion valves shall have a stainless steel body with a working pressure of 250 psi. Insertion valve must be capable of working on cast iron or ductile iron pipe. The design will allow the valve to be installed into an existing pressurized pipeline while maintaining constant pressure and service as usual. All insertion valves must be hydrostatically pressure tested to 1.25 times of the system operating pressure (minimum) or 1.5 times of the insertion valves 250 psig maximum pressure rating. The test shall be sustained for a minimum of 15 minutes. Once the pressure test is effectively achieved the insertion valve body must not be moved in accordance with AWWA Standards. If the insertion valve body is moved the pressure test must be completed again. Any movement, repositioning, loosening, and/or re-tightening must be retested before the pipe is tapped.

Traditional line tapping methods shall be used for the installation of all insertion valves to allow removal of a single coupon for system evaluation. Reaming the pipe, complete removal of a section of pipe (top and bottom), or milling a slot in the pipe shall be prohibited.

Gate box shall be as specified under Item 350.

METHOD OF MEASUREMENT

Item 375.08 and Item 375.12 will be measured for payment respectively by the Each insertion valves and gate boxes installed.

BASIS OF PAYMENT

Item 375.08 and Item 375.12 will be paid for at the respective contract unit prices per Each, which prices shall include all labor, equipment, tools, all material, including excavation and backfilling, valve box and cover, and incidental costs required to complete the work.

ITEM 376.**HYDRANT****EACH**

The work under this item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications and the following:

The Contractor shall furnish, install, and test fire hydrants and appurtenant materials and equipment all as indicated on the Plans and as herein specified.

The hydrants shall have two 2½-inch hose connections with National Standard Threading and one 4½-inch steamer nozzle National Standard Threading. The inlet pipe shall be 6 inches with a mechanical joint connection. The hydrants are to be two-piece barrel type with flange and rod at ground line to have a breakable coupling at this point and designed so that the hydrant may be extended at the ground flange eliminating any need for excavating to install extension or replacement. In addition, the hydrants shall have O-ring seals stuffing box, assuring a dry-top hydrant and all internal operating parts, the main valve, the main valve seal, drain valve mechanism, operating rod, etc., shall be removable without the necessity of excavating. The main valve seat shall be made of bronze and shall screw into a set ring or sub-seat, which shall also be made of bronze. Valve shall open left (counter-clockwise). Depth of earth cover over the main line shall be normally 5 feet.

All hydrants shall be one of the following or approved equal: American Darling B-62-B-5; Mueller Super Centurion 250; or U.S. Pipe Metropolitan M94. The Town of Wilmington is standardized on these hydrants. Pressure ratings shall not be less than 150 psi. Hydrant connections are to be restrained for the full length of the pipe from the main to the hydrant.

All hydrant sections to be set below ground, after being thoroughly cleaned, shall be painted with two coats of asphaltum varnish. Hydrant sections set aboveground shall be painted with two coats of paint. The Wilmington Water and Sewer Department requires hydrants to be painted red, with silver caps and bonnets.

Hydrants shall be set plumb. The hydrant connecting pipe shall have at least the same depth of cover as the distribution main. The hydrants shall be set upon a slab of stone or concrete not less than 4 inches thick and 15 inches square. The side of the hydrant opposite the pipe connection shall be firmly wedged against the vertical face of the trench with a concrete thrust block, paid for under Item 903, as indicated on the drawings. Not less than 3.5 cubic feet of crushed stone shall be placed around the base of each hydrant to 6 inches above the drain holes.

The length of the hydrant barrel shall be such that when installed with the proper depth of cover on the branch pipeline, the hydrant will be set with the normal ground line of the barrel within 3 inches of the actual finished ground surface.

Hydrants that are installed but not operating shall be covered to indicate they are not functional. Contractor shall remove cover when the hydrant becomes functional.

ITEM 376. (Continued)**METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

Item 376. will be measured and paid for at the Contract unit price per each, which price shall include full compensation for furnishing all labor, materials, tools, and equipment necessary and for furnishing, installing and setting hydrants as specified including testing, excavation, crushed stone for drainage at hydrant base, backfilling, disposal of surplus material, and all other work necessary for a complete hydrant.

Anchors and tie rods will be paid for under Item 309.

Concrete for thrust blocks will be paid for under Item 903.

ITEM 377. HYDRANT REMOVED AND DISPOSED EACH

The work under this item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications and the following:

Construction Methods

The Contractor shall coordinate the work with the Town. The Contractor shall give at least 48 hours written notice to the Fire Department and the Department of Public Works prior to removing any hydrant.

The Contractor shall anticipate removal and disposal of existing hydrants designated as R&D on the plans; however, the Town of Wilmington DPW shall be allowed to remove materials on-site prior to disposal and to assume ownership of these materials if desired. Existing hydrants on water lines to be abandoned shall be removed and disposed of under this Item.

Hydrants that are taken out of service shall be covered to indicate they are not functional until the hydrants are removed by the Contractor.

The contractor shall coordinate with the relevant authorities to depressurize the water main on Main St. while performing the work. During excavation, existing gate valves shall be restrained to prevent any movement. After the removal of hydrants, existing gate valves shall be turned to a closed position. Following the removal of hydrants, the contractor shall install a cap and thrust block.

METHOD OF MEASUREMENT

Item 377. Will be measured for payment by Each, hydrant removed and disposed.

ITEM 377. (Continued)**BASIS OF PAYMENT**

Item 377. will be paid for at the contract bid price per each, which price shall be full compensation for each hydrant assembly removed and disposed. The contract unit price shall include full compensation for furnishing all labor, materials, tools, and equipment necessary for removing and disposing of hydrants as specified including excavation, backfilling, and all incidental costs required to complete the work.

ITEM 384.**CURB STOP****EACH**

The work under this Item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications amended and supplemented as follows:

The Contractor shall furnish and install new curb stops on all new service lines. The existing curb stops shall be removed and disposed of by the Contractor as part of the work to be done under this item.

Curb stops shall be of bronze, ball valve type and shall open left. The inlet and outlet shall have compression connections. Curb stops shall be sizes as shown in the Plans.

ITEM 386. **TEMPORARY WATER MAIN BY-PASS SYSTEM** **LUMP SUM**

The Contractor shall furnish, install, chlorinate, maintain and remove bypass and temporary service pipe of the size required to adequately service water customers.

The Contractor shall provide temporary services for the customers whose permanent service line is:

- a. Out of service due to the main pipe to which it is connected to being replaced
- b. Out of service due to the main pipe to which it is connected to being cleaned and cement lined
- c. Out of service due to the main pipe to which it is connected being served only by the main being rehabilitated or replaced, including dead end pipes and pipes ending at division gates.
- d. Out of service for any other reason in connection with work under this contract.
- e. The water main along Main Street shall remain active at all times. Temporary shutdowns shall not exceed 8 hours.

The Contractor shall locate all services to be fed by the by-pass system. Customer's service lines, which will be out of service for a limited period of time, in the opinion of the Engineer, need not be by-passed but all other provisions regarding adequate notice and hours of shut down shall be strictly adhered to.

The Contractor shall submit a plan showing the proposed temporary by-pass system and point of connections for review and approval by the Engineer, the Town Engineer and Town Fire Department.

Materials

All by-pass shall be galvanized steel, H.D.P.E. or polyvinylchloride (PVC) pipe. All plastic pipe or hose shall bear the imprint of the National Sanitary Foundation approval for potable water NSF-PW or shall be capable of meeting the standards established by the NSF for this use. All pipe, valves, temporary hydrants and other appurtenances shall be NSF approved for potable water.

The materials selected shall be adequate to operate at the pressure to which they will be subject to and adequate to withstand whatever forces, such as traffic loading, they will encounter. Joints for all pipes shall be watertight.

The owner reserves the right to reject at any time materials that do not meet the requirements set forth herein.

ITEM 386. (Continued)**Construction Methods**

In general, by-pass piping shall be laid along the side of the roadway adjacent to the curb line or protective barriers at edge of pavement line.

At locations where the pipe is subject to minimal traffic, such as at driveways, the pipe shall be adequately protected by excavating and setting the pipe below grade or "ramping" it with stone dust or other suitable material.

All by-pass pipes that cross handicapped ramps, intersections, or extends around the radius of an intersecting street shall be installed below the surface grade.

Where necessary to feed large services, the Contractor may be required to excavate the sidewalk or other areas adjacent to a building to cut into the existing service or fire pipe. The cost of this work will be included in the bid price for Temporary By-pass Pipe including backfill and paving.

In addition, the Contractor will be required, where necessary, to ramp over all by-pass piping to provide for wheelchair access on affected sidewalks. Ramping shall be in accordance with ADA (Americans with Disabilities Act) and PROWAG (Public Right-of-Way Accessibility Guidelines) regulations.

For all bypass pipe used to feed temporary hydrants, an intermediate main line valve shall be provided after every third hydrant and shall be required on each street regardless of the number of hydrants.

At locations where the pipe is subject to regular traffic, such as where it crosses traveled lanes; the pipe MUST be set below grade and the trench adequately filled to withstand the traffic loads. At such areas all work must be done in accordance with the applicable sections contained herein relating to trench excavation and paving. These requirements shall include, but are not limited to, cutting the pavement neatly to avoid excess damage to existing pavement.

The interior of all by-pass pipe, temporary service pipe and service hoses shall be flushed to remove any dirt or other objects and shall be disinfected in accordance with AWWA C651-86 "AWWA Standard for Disinfecting Water Mains". The appropriate section of the Pressure Testing and Disinfection Report in the Appendix of these specifications shall be completed by the Contractor and approved by both the Town Engineer and Inspector prior to any payments being made for by-pass piping.

At all locations where hydrants are out of service due to work under this contract, the contractor shall provide temporary hydrants. A hydrant being used to feed temporary hydrants must be fed by 6-inch by-pass pipe including whip connections and must be fitted with a valve manufactured for water service that shall be coordinated with the Town Engineer and fire department.

Adequate precautions shall be taken to protect all vehicular and pedestrian traffic from injury due to by-pass piping and temporary service lines. These precautions shall include, but are not limited to "ramping", barricades and other devices.

ITEM 386. (Continued)

All by-pass pipe and service hoses shall be bubble tight at all times. No leakage shall be acceptable.

No by-pass pipe shall remain in place after November first, and none shall be put in service prior to April first.

BASIS OF PAYMENT

Item 386. will be paid for at the contract Lump Sum price, which price shall include all labor, tools and equipment necessary to remove all temporary piping, hydrants, fittings, valves and hoses and incidental costs required to temporarily serve all water customers.

When by-pass is bid under this item, partial payments shall be made in accordance with the following procedure:

- a. Each street being rehabilitated shall be considered one location
- b. The lump-sum price bid shall be divided into segments based upon the proportion of the linear footage of mainline pipe to be relayed as served by the by-pass. (i.e. if the contract contains 10,000 feet of pipe to be relayed, and 1000 feet of pipe is relayed on one street, then the contractor will be paid 10% of the total bid price for by-pass.)
- c. Where the existing main is used for the temporary by-pass, the Contractor will be required to maintain this pipe and the Contractor will be compensated for the proportion of the main replaced as described in item b. above.

This lump sum price shall include developing an approved plan and furnishing all pipe, fittings, temporary hydrants, valves, hoses, stone-dust, cold patch, barricades, temporary meter pit covers, chlorine and other materials necessary to install the by-pass system. This payment shall also include all labor, tools and equipment necessary to adequately temporarily serve all water customers with domestic and fire service lines, including the removal of all meters as required.

ITEM 470.3**HOT MIX ASPHALT BERM,
TYPE A—MODIFIED****FOOT**

The work under this item shall conform to the relevant provisions of Subsection 470 of the Standard Specifications and the following:

Construction Methods

Hot mix asphalt berm, type A—modified, shall be constructed by means of an approved extrusion machine in conformance with the dimensions and at the locations shown on the plans.

Prior to placing the HMA berm, the surface shall be swept clean and RS-1 asphalt emulsion shall be applied to the surface.

METHOD OF MEASUREMENT

Hot mix asphalt berm, type A—modified will be measured for payment by the foot, complete in place, along the front edge of the berm.

BASIS OF PAYMENT

Hot mix asphalt berm, type A—modified, will be paid for at the Contract unit price per foot, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

<u>ITEM 628.305</u>	<u>TEMPORARY IMPACT ATTENUATOR,</u>	<u>EACH</u>
	<u>NON- REDIRECTIVE, TL-3</u>	
<u>ITEM 628.39</u>	<u>TEMPORARY IMPACT ATTENUATOR,</u>	<u>EACH</u>
	<u>BI-DIRECTIONAL, REDIRECTIVE (TL-3)</u>	
<u>ITEM 628.4</u>	<u>TEMPORARY IMPACT ATTENUATOR,</u>	<u>EACH</u>
	<u>REMOVED AND RESET</u>	

Work under Item 628.4 shall conform to the relevant provisions of Subsection 850 of the Standard Specifications and shall consist of maintaining, removing and reinstalling temporary impact attenuators where indicated on the plans or as directed by the Engineer.

Work under Item 628.305 shall conform to the relevant provisions of Subsection 850 of the Standard Specifications and shall consist of furnishing, installing, maintaining and final removal of temporary impact attenuator systems for protection of the ends of temporary barrier and other roadside hazards in work zones. All work shall be in conformance with the specifications of the manufacturer and in close conformance with the locations, lines, and grades shown on the plans.

Work under Item 628.39 shall conform to the relevant provisions of Subsection 628 of the Standard Specifications and shall consist of furnishing, installing, maintaining and final removal of temporary impact attenuator systems for protection of the ends of temporary barrier and other roadside hazards in work zones. All work shall be in conformance with the specifications of the manufacturer and in close conformance with the locations, lines, and grades shown on the plans.

Materials

The Contractor shall supply a temporary impact attenuator that meets the same or higher crash Test Level (TL) as the adjacent temporary barrier, unless otherwise shown on the plans. The temporary attenuator shall be listed on the Department's Qualified Traffic Control Equipment List.

The temporary impact attenuator shall be designed to fit within reasonably close tolerance of the dimensions given on the plans.

The Contractor shall supply shop drawings for the temporary attenuator and for any anchorage system and for any transitions or connections between the temporary attenuator and the adjacent barrier or other roadside hazard.

The side of the temporary attenuator that faces traffic shall include a Type 3 Object Marker that conforms to the language found in Sections 2C.64 and 2C.65 of the Manual on Uniform Traffic Control Devices.

Unless a separate barrier system protects it from opposing traffic, only temporary impact attenuators that are certified for bi-directional use shall be used in medians.

ITEMS 628.305, 628.39 & 628.4 (Continued)**Construction Methods**

Installation means and methods shall be per the manufacturer's specifications and/or drawings. Temporary Impact Attenuators Removed and Reset consists of removing temporary impact attenuators, relocating and reinstalling at a new location per the specifications and recommendations of the manufacturer and as shown on the plans or as directed by the Engineer. Excavation for temporary attenuator foundations and anchorage shall be made to the required depth and to a width that will permit the installation and bracing of forms where necessary. All soft and unsuitable material shall be replaced with compacted gravel borrow.

The Contractor shall supply the Engineer instructions for installation and the manufacturer's recommended routine inspection and maintenance program. The cost of inspection and maintenance of temporary attenuators shall be considered incidental in nature.

Damaged temporary impact attenuators shall be replaced by the Contractor within 24 hours or as directed by the Engineer, at the Contractor's expense. A truck mounted attenuator that meets the same or higher TL, or other means of protecting the damaged temporary impact attenuator, shall be deployed until the repairs or replacement has been completed, at the Contractor's expense.

Method Of Measurement

Items 628.305 and 628.39 will be measured for payment by the Each respective temporary impact attenuator installed, complete in place.

Item 628.4 will be measured for payment by the Each temporary impact attenuator removed and rest..

Basis of Payment

Items 628.305, 628.39 and 628.4 will be paid for at the respective contract unit prices per each, which prices shall include all labor, equipment, and materials for furnishing, foundations and anchorages, installation, maintenance and final removal, and all incidental costs required to complete the work as specified.

ITEM 657.
ITEM 657.5**TEMPORARY FENCE**
TEMPORARY FENCE REMOVED AND RESET**FOOT**
FOOT

The work under these items shall conform to the relevant provisions of Subsection 644 of the Standard Specifications and the following:

The work under these items consists of furnishing, installation, maintenance, removal and resetting of a 6'-0" chain link fence for protection of the construction work zone relative to the MBTA railroad tracks and adjacent properties.

The fence shall be chain link and shall meet the requirements of the Standard Specifications and the Construction Standards, except the material need not be new. Gates shall be used at all locations that are to be opened on a regular basis. The height of the fence shall be 6 feet minimum.

Construction Methods

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. Fence shall meet access license provision by MBTA and or Keolis if used to limit the need for railroad flagging. 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 they anticipate they 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. and Item 657.5 will be measured for payment respectively by foot, of Temporary fence.

BASIS OF PAYMENT

Item 657. will be paid for at the Contract unit price per foot, complete in place, with twenty (20) percent of the bid price held until the fence is removed. Said price shall include all labor, materials, equipment and incidental costs required to complete the work.

Item 657.5 will be paid for at the Contract unit price per foot which price shall include all labor, material, equipment and incidental costs required to remove and reset the chain link fence as required after the initial installation.

The removal and proper disposal of the Temporary Fence when no longer required will be considered incidental.

The Contractor shall replace and/or restore sections of fence damaged due to accidents, vandalism or in any other manner for the duration of the project. Damage due to construction activities or the Contractors negligence shall be replaced at no additional cost to the Department.

<u>ITEM 693.</u>	<u>REMOVE AND STACK BALANCE STONE WALL</u>	<u>FOOT</u>

The work under this item shall conform to the relevant provisions of Subsection 690 of the Standard Specifications and the following.

The work consists of removing and stacking the stones of the balance stone walls at the locations shown on the Plans

Construction Methods

The Contractor shall carefully remove and stack the stones from the balance stone walls at the locations shown on the plans. The final location of the stones shall be as directed in the field by the Engineer with the coordination of the property owner. The Contractor shall notify the property owner 7 days prior to removal of the wall so the owner can document the layout of the stone wall.

The Contractor shall use suitable care during removal and stacking operations to avoid damaging the stones. Stones that are damaged by the Contractor shall be replaced with stones similar in shape and color at no additional cost. Replacement stones shall be approved by the Engineer.

METHOD OF MEASUREMENT

Item 693. will be measured for payment by foot, for the actual length of Balance Stone Walls removed and stacked in accordance with the plans and/or as required by the Engineer. Measurement shall be prior to any stone is removed.

Basis of Payment

Item 693. will be paid for at the Contract unit price per foot, which price shall include all labor, materials, equipment and incidental costs required to complete the work. Payment shall be after the entire stone wall is removed, stacked and all damaged stones are replaced.

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 all 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 consists of furnishing and placing geotextile fabric in accordance with the Standard Specifications, the manufacturer's directions and the details shown on the plans.

Materials

Geotextile fabric for separation (Class 1 or Class 2) shall conform to the requirements of AASHTO M 288 in accordance with Subsection M9.50.0 of the Standard Specifications and shall be one of those included on MassDOT's Qualified Construction Materials List. Geotextile fabric shall be Class 1 or 2 in accordance with the requirements outlined in Table 4 of AASHTO M 288.

Construction Methods

The geotextile fabric shall be installed in accordance with the Construction/Installation Guidelines specified in AASHTO M288 in addition to the following requirements. Geotextile fabric shall be embedded into the embankment as shown on the plans. Fabric shall be overlapped 12 inches minimum.

METHOD OF MEASUREMENT

Geotextile fabric for separation will be measured in square yards, complete in place. Overlapped material will not be included in the measurement.

BASIS OF PAYMENT

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

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

The work under this item shall include furnishing and placement of geotextile fabric for temporary soil protection as shown on the plans and/or as required by the Engineer. All work shall be done in conformance with the applicable sections of the Standard Specifications.

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

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

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

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 698.31 will be measured and paid for at the Contract unit price bid per Square Yard, which prices shall include the fabric, all labor, tools, materials, stone, any necessary incidental items to provide complete in place installation, and removal and disposal of stone and fill. Overlapped matting will not be measured for payment.

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

Schedule of Payment shall be as follows:

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

ITEM 706.1**BRICK WALK REMOVED AND RELAID****SQUARE YARD**

Work under this Item shall conform to the relevant provisions of Subsection 701 of the Standard Specifications and the following:

The work shall include removing and relaying the brick walks as shown on the plans and shall conform to the following.

Construction Methods

The Contractor shall remove and relay the existing brick on a stone dust base at the locations shown on the plans. The Contractor shall exercise extreme care in the removal, storage and relaying of the bricks to avoid breakage. Brick damaged or determined by the Engineer as unsuitable for resetting, shall be replaced by the Contractor at no additional cost.

New brick shall match existing brick size, texture, and color to the extent practicable. The Contractor shall submit proposed brick samples to the Engineer for approval.

Stonedust setting bed shall be 4 inches in depth and meet the following sieve analysis:

<u>Sieve</u>	<u>Percent Finer Than</u>
No. 4	100
No. 8	96
No. 28	61
No. 48	49
No. 100	38
No. 200	23

METHOD OF MEASUREMENT

Brick walk removed and relaid will be measured for payment by square yard, complete in place.

BASIS OF PAYMENT

Brick walk removed and relaid 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 706.7**POROUS STONE PAVING****SQUARE FOOT**

The work under this item consists of constructing porous stone paving at tree pits as shown on the plans and shall conform the following.

Materials

Aggregates shall consist of a combination of course and fine aggregates suitable for proving an ADA compliant surface. Aggregates shall pass a No. 4 sieve and match the manufacturer's recommended mix for this application.

Polyurethane resin shall be clear, flexible and resistant to cracking. Resin shall not be applied when the temperature is below 40° or above 85°.

Stone for the foundation shall meet the material requirements specified for ¾ inch stone in Subsection M2.01.0.

Geotextile fabric for separation shall conform to the requirements of AASHTO M 288 for the intended application in accordance with Subsection M9.50.0 of the Standard Specifications and shall be one of those included on MassDOT's Qualified Construction Materials List.

Application shall be performed by an applicator certified with this product.

Construction Methods

The Contractor shall carefully excavate around the tree to a depth of 8 inches from the sidewalk surface. The Contractor shall place 6 inches of ¾ inch crushed stone on a geotextile fabric. The aggregates for the top course shall be placed to a depth of 2 inches.

The polyurethane resin shall be applied per manufacturer's instructions. The polyurethane resin shall not be applied to the stone within 9 inches of the tree trunk to allow for future growth. The porous stone paving shall be protected from traffic for 24 hours after application is completed.

METHOD OF MEASUREMENT

Item 706.7 will be measured for payment by square foot, complete in place.

BASIS OF PAYMENT

Item 706.7 will be paid at the Contract Unit Price per square foot, complete in place, which price shall include all materials, labor, tools and incidental costs required to complete the work.

ITEM 707.8**STEEL BOLLARD****EACH**

This work shall consist of furnishing and installing bollards at the locations and to the dimensions shown on the plans in accordance with these specifications and/or as required by the Engineer.

All materials shall be in accordance with Sections 700 of the Standard Specifications.

Construction Methods

Bollards shall be galvanized steel tubes 4 inches in diameter and filled with cement concrete. The concrete shall be rounded at the top of the bollard.

Bollards shall be installed plumb in a concrete foundation as detailed.

METHOD OF MEASUREMENT

Item 707.8 will be measured for payment per each, complete in place.

BASIS OF PAYMENT

Item 707.8 will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 720.**REMOVE AND RESET BOULDER****EACH**

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

The work shall include removing and resetting the boulders at the locations shown on the Plans

Construction Methods

The Contractor shall carefully remove and relocate boulders at several locations to new locations as shown on the plans. The final orientation of the boulders shall be as directed in the field by the Engineer. The Contractor shall move boulders that have been reset until the Engineer approves the final orientation.

The Contractor shall use suitable care during removal and resetting operations to avoid damaging the boulders. Boulders that are damaged by the Contractor shall be replaced with boulders similar in shape and color at no additional cost to the property owner. Replacement boulders shall be approved by the Engineer prior to installation.

METHOD OF MEASUREMENT

Item 720. will be measured for payment by Each for the actual number of boulders actually removed and reset in their final location in accordance with the plans and/or as required by the Engineer. Measurement shall be only after the boulder is in its final approved location regardless of the number of times the boulder is moved.

BASIS OF PAYMENT

Item 720. will be paid for at the Contract unit price per each, 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:

Three computer systems and printer system meeting minimum requirements set forth below including installation, maintenance, power, paper, disks, and other supplies shall be provided at the Resident Engineer's Office:

All equipment shall be UL approved and Energy Star compliant.

The Computer System shall meet the following minimum criteria or better:

Processor:	Intel, 3.5 GHz
System Memory (RAM):	12 GB
Hard Drive:	500 GB
Optical Drive:	DVD-RW/DVD+RW/CD-RW/CD+RW
Graphics Card:	8 GB
Network Adapter:	10/100 Mbit/s
USB Ports:	6 USB 3.0 ports
Keyboard:	Generic
Mouse:	Optical mouse with scroll, MS-Mouse compliant
Video/Audio	the computer system shall be capable of allow video calling and recording:
Video camera	shall be High Definition 1080p widescreen capable video calling and recording with built in microphone. The microphone system shall capture natural audio while filtering out background noise.
Audio	shall be stereo multimedia speaker system delivering premium sound.
OS:	Latest Windows Professional with all security updates
Web Browser:	Latest Internet Explorer with all security updates
Applications:	Latest MS Office Professional with all security updates Latest Adobe Acrobat Professional with all security updates Latest Autodesk AutoCAD LT Antivirus software with all current security updates maintained through the life of the contract.
Monitors:	Two 27" LED with Full HD resolution. Max. resolution 1920 x 1080
Flash drives:	2 (two) - 128GB USB 3.0
Internet access:	High Speed (min. 24 mbps) internet access with wireless router.

ITEM 740. (Continued)

The Multifunction Printer System shall meet the following minimum criteria or better:

Color laser printer, fax, scanner, email and copier all in one with the following minimum capabilities:

- Estimated volume 8,000 pages per month
- LCD touch panel display
- 50 page reversing automatic document feeder
- Reduction/enlargement capability
- Ability to copy and print 11" x 17" paper size
- email and network pc connectivity
- Microsoft and Apple compatibility
- ability to overwrite latent images on hard drive
- 600 x 600 dpi capability
- 30 pages per minute print speed (color),
- 4 Paper Trays Standard (RADF) (not including the bypass tray)
- Automatic duplexing
- Finisher with staple functions
- Standard Ethernet. Print Controller
- Scan documents to PDF, PC and USB
- ability to print with authenticated access protection

The Contractor shall supply a maintenance contract for next day service, and all supplies (toner, staples, paper) necessary to meet estimated monthly usage.

The Engineer's Field Office and the equipment included herein including the computer system, and printer shall remain the property of the Contractor at the completion of the project. Disks, flash drives, and card readers with cards shall become the property of the Department.

Compensation for this work will be made at the contract unit price per month which price includes full compensation for all services and equipment, and incidentals necessary to provide equipment, maintenance, insurance as specified and as directed by the Engineer.

ITEM 745.**PEDESTRIAN BUS SHELTER****EACH**

The work under this item shall conform to the relevant provisions of Sections M7 and M8 of the Standard Specifications, the February 2025 MBTA Bus Stop Design Guide accessed at <https://cdn.mbta.com/sites/default/files/2025-02/2025-02-bus-stop-design-guide.pdf>, and the following.

The work under this item consists of installing a pedestrian bus shelter with bench at the MBTA bus stop location indicated in the plans,

Construction Methods

Bus shelters shall be similar to the following models and options from the following manufacturers:

CEMUSA Model 2001

CEMUSA Model Pal-Li

JC Decaux Shelter or approved equal

Bus shelter frame structure footprint dimensions shall be within 3 inches of the dimensions provided in the Typical MBTA Bus Shelter depicted in the MBTA *Bus Stop Design Guide*.

Bus shelter shall be installed with anchor mountings. Bus shelter shall be mounted to a concrete pad. The frame of the bus shelter shall be constructed of aluminum or Schedule 40 steel pipe (2-3/8" O.D. x 0.154" thick wall (60.3mm x 3.9mm). The bus shelter shall have cantilevered side walls such that posts or columns for the shelter are not present along the front side of the shelter facing the street. A bench more than 5 feet in length shall be provided in one corner along the backside of the interior of the bus shelter. The finish shall be factory baked Triglycidyl isocyanurate (TGIC) powder, a polyester coating. Contractor shall provide color samples to the Town prior to purchasing. The bus shelters shall have wall panels made of safety glass.

Bus shelters are to carry a one year manufacturer's limited warranty against defects in materials and workmanship.

METHOD OF MEASUREMENT

Pedestrian Bus Shelters will be measured for payment by each, complete in place including bench.

BASIS OF PAYMENT

Pedestrian Bus Shelters will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work including any bench(es) within the shelter.

Excavation for and construction of the cement concrete pad will be included under the costs of the cement concrete sidewalk, gravel borrow, and unclassified excavation.

ITEM 748.1**EMERGENCY RESPONSE****EACH**

The work under this Item shall conform to the relevant Provisions of Subsection 748 of the Standard Specifications and the following:

Since it may be necessary for the Contractor to respond to emergency situations where immediate response is necessary, the Contractor is required to provide to MassDOT the name(s) and telephone number(s) of a person or persons who can be contacted 24 hours a day for the contract's duration. and who has the authority to provide whatever labor, materials, and equipment that may be necessary to address the emergency.

The Contractor will be notified of emergency work that REQUIRES IMMEDIATE ATTENTION by verbal *and* written/electronic Work Order. The work order will identify the location of the work, the scope of the work and details the Engineer's expectations. The Work Order will also identify lane closure(s) required.

The Contractor will be required to commence this emergency work on site within FOUR hours, unless otherwise directed, after notification by the Department.

If after notification, the Contractor has not started emergency work on site within FOUR hours of the notification, a non-response damages will be assessed to the Contractor. Contract payments will be reduced by \$2500 for each time there is a failure to respond within the specified hours.

This work is intended to be used as a means of providing payment to the Contractor for mobilization costs associated with emergency repairs to areas of deteriorated cement concrete and bituminous concrete overlay in the existing reinforced concrete slab and proposed structure during construction, as directed by the Engineer.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 748.1 will be paid at the Contract unit price per Each for every emergency work order under which the Contractor meets the response requirements outlined.

Payment under this item shall include full compensation for all labor, materials, and equipment required for mobilization to perform emergency repairs.

Materials and labor required for repairs to the existing and new bridge are expected to fall under the Lump Sum Breakdown items provided under Item 995.01 Bridge Structure, Bridge No. W-38-011 (CVE).

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

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

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

SUBMITTALS AND MATERIALS

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

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

Compost shall meet the requirements for M1.06.0: Compost, Type 2, as referenced in the MassDOT- Highway Division Standard Specifications for Highways and Bridges, Division III: Materials Specifications, latest edition.

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

CONSTRUCTION METHODS

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

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

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

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

ITEM 751.7 (Continued)**METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

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

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

Seeding, if utilized, will be compensated for under the appropriate seeding items.

ITEM 755.35**INLAND WETLAND REPLICATION AREA****LUMP SUM**

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

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

Wetland Restoration work shall be as specified and compensated under that item. Construction of tidal wetlands shall be as specified under the appropriate item for tidal wetland mitigation.

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

DESCRIPTION OF WORK

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

Area/s A at Station: **256+50**

Area = **3,510** sf.

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

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

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

SUBMITTALS - DOCUMENTS

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

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

ITEM 755.35 (Continued)

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

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

SUBMITTALS - MATERIAL**Soil and Amendments**

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

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

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

Seed Mix

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

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

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

ITEM 755.35 (Continued)**Plant Certification**

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

Other Material: Submittals shall be per the respective item.

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

Sediment control barriers shall be per Item 767.121.

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

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

Wetland Soil

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

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

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

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

ITEM 755.35 (Continued)

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

Plants

Plant material shall conform to the applicable requirements of Section 771, PLANTING TREES, SHRUBS AND GROUNDCOVER, of the latest edition of the Standard Specifications and as amended below.

Plants shall be native species, not cultivars. To the extent possible, plants shall originate from the applicable EPA Level III Ecoregion.

Plant species and sizes to be included in the Replication Area shall be as specified on the plans.

Requests for substitutions shall be submitted in writing to the Engineer for review by the Wetland Specialist, MassDOT Landscape Architect, and, if required, the relevant regulatory agency at least thirty (30) days prior to planting. All proposed substitutes shall be in conformance with the requirements herein and suitable for the site conditions.

Transplanting and plant material collected from the wild is prohibited unless approved in writing by the Engineer. Plants shall be selected from certified nurseries that have been inspected by state and/or federal agencies.

Seed Mix

Seeding shall conform to the Standard Specifications Section M6, ROADSIDE DEVELOPMENT MATERIALS.

ITEM 755.35 (Continued)**Mix 765.551 Wetland Mix – FACW Meadow Mix**

Botanical Name	Common Name	% PLS by Weight
Grass		
Carex vulpinoidea	Fox Sedge	26.00%
Elymus riparius	Riverbank Wild Rye	23.00%
Carex lurida	Shallow Sedge	17.00%
Carex lupulina	Hop Sedge	8.00%
Scirpus atrovirens	Green Bulrush	3.00%
Juncus effusus	Soft Rush	2.50%
Cinna arundinacea	Sweet Woodreed	2.00%
Carex comosa	Bearded Sedge	2.00%
Glyceria canadensis	Manna Grass	1.00%
Scirpus cyperinus	Woolgrass	1.00%
Juncus tenuis	Path Rush	0.50%
		<u>86.00%</u>
Herb/Forb		
Verbena hastata	Blue Vervain	4.00%
Asclepias incarnata	Swamp Milkweed	2.00%
Aster prenanthoides	Zig Zag Aster	1.00%
Sisyrinchium angustifolium	Narrowleaf blue-eyed grass	1.00%
Eupatorium maculatum	Joe-pye Weed	1.00%
Aster puniceus	Aster - Swamp	1.00%
Aster novae-angliae	New England Aster	1.00%
Vernonia noveboracensis	New York Ironweed	1.00%
Eupatorium perfoliatum	Boneset	1.00%
Aster umbellatus	Flat Topped White Aster	0.50%
Mimulus ringens	Monkey Flower	0.50%
		<u>14.00%</u>
		100.00%

Seeding Rate

Apply this mix at 20 lbs PLS/acre on areas of less than 3:1 slope and 60 lbs PLS on areas of greater than 3:1 slope.

Cover Crop: Add 30 lbs/acre of either grain oats (1 Jan to 31 July) or grain rye (1 Aug to 31 Dec). Cover crop shall be incidental to seeding item.

Fertilizers shall not be used.

ITEM 755.35 (Continued)**Water**

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

Mulch/Topdressing for Seeding

Hydromulch shall be per the manufacturer's recommendations and shall be wood fiber or straw mulch only. Compost topdressing, if used, shall meet the material and submittal requirements of that Item and shall be applied as specified below. Mulch or compost topdressing for seeding shall be incidental to this item.

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

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

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

The Contractor shall use boards, mats, or other approved material as necessary, to protect existing and/or new wetlands from compaction due to heavy foot traffic or if equipment is required to travel over wetland soil. All labor and materials required for protection and preservation of site shall be incidental to this item.

Stockpiling of Soil

Stockpiling of soil, including hydric soil for replication, shall be outside the wetland resource area and at least 100 feet from the edge of the wetland unless approved otherwise by the Engineer. Stockpiled soils shall be securely stabilized and contained. In the event that there is excess borrow, it shall be disposed of under Excavation, Item 120.1.

ITEM 755.35 (Continued)**Sediment Barriers**

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

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

Existing Trees to Remain

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

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

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

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

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

PRE-WETLAND CONSTRUCTION SITE WALK

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

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

ITEM 755.35 (Continued)

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

SOIL WORK

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

Excavation & Grading

When required by permits, the Wetland Specialist shall notify MADEP at least 72 hours prior to excavation.

Excavate replication area as shown on the drawings or to a depth of 12 inches if no depth is shown. Where replication area is adjacent to existing wetland, finish grade of replication shall match existing. Prior to placement of backfill, scarify subgrade to a depth of 4 to 6 inches.

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

Placement of Wetland Soil

Following excavation and scarification and grading of sub-grade, and after the sub-grade elevations are approved by the Wetland Specialist, suitable soil previously removed or manufactured soil shall be spread over the proposed wetland areas as shown on the plans and as directed by the Wetland Specialist.

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

Final Grading

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

ITEM 755.35 (Continued)

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

Installation of Monitoring Wells

For wetlands over 1000 square feet, monitoring wells shall be installed in locations as shown on the Plans. Monitoring wells shall include data loggers. Data shall be collected by the Wetland Specialist and submitted with Monitoring Reports and as required by applicable permits. Wells shall be installed immediately following completion of construction of the wetland.

RESTORING VEGETATION**Incorporation of Coarse Woody Material**

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

Planting

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

Planting Season shall be May 15-June 15 and September 1-November 1 unless approved following written request from the Contractor.

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

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

ITEM 755.35 (Continued)**Seeding**

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

- Hand broadcast seed and straw mulch.
- Seeding with hydromulch per the Standard Specifications and per the manufacturer's directions.
- Hand broadcast seed with compost topdressing pneumatically applied at the same time to ensure light cover of soil topdressing over seed.

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

PLANT ESTABLISHMENT AND INVASIVE MANAGEMENT

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

Seeding that fails to established shall be over-seeded as required by the Engineer. Excessive weed growth shall be pulled out by the roots or, with approval from the Engineer, cut prior to over-seeding. Weed control is incidental to this item.

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

- If chemical treatment of invasive plants is necessary, the strategy for treatment shall be as determined under Item 102.3 Invasive Plant Management Strategy. That strategy shall be coordinated with the Wetland Specialist and all applicable permits and permitting agencies. Chemical application under 102.33 Invasive Plant Management On-site shall be compensated under that item and shall be for the duration of the contract only.
- The strategy for chemical and/or manual removal shall be as directed by the Wetland Specialist, shall continue for the duration of the monitoring period, and shall be incidental to this item.

CONDITIONAL ACCEPTANCE OF WORK

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

ITEM 755.35 (Continued)

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

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

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

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

Wetland Specialist shall be compensated under Item 755.75.

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

REQUEST FOR CERTIFICATE OF COMPLIANCE

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

The Request for Certificate of Compliance shall include the following:

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

ITEM 755.35 (Continued)

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

- Other documents as required.

FINAL ACCEPTANCE OF WORK

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

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

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

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

Wetland Specialist shall be compensated under Item 755.75.

MONITORING REPORTS FOR REGULATORY COMPLIANCE

Post wetland construction Monitoring Reports shall be completed and submitted by the Wetland Specialist as specified and compensated under Item 755.76 Wetland Monitoring Reports.

ITEM 755.35 (Continued)

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

- Hydrology is functioning as intended.
- Seeded species are establishing well and cover 100 percent of the area, excluding areas of open water areas or planned bare soil.
- No sediments have entered into wetland.
- Adjacent slopes are stabilized with desirable vegetation.
- All planted species (if included) are living and establishing well.
- There are no visible invasive plants.

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

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

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

Payment shall be as follows:

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

Excavation will be paid under Item 120.1

Compost Topdressing will be paid under Item 751.7 unless used in conjunction with seeding.

Sediment Barrier will be paid under Item 767.121

Wetland Specialist will be paid under Item 755.75

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

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

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

The work under this item shall include all labor and furnishing of materials to complete the work specified herein to protect and restore existing inland wetland areas that will be temporarily impacted as shown on the drawings and as required by the Engineer.

Inland Wetland Replication work shall be as specified and compensated under that item. Tidal wetland mitigation shall be as specified under the appropriate item for tidal wetlands.

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

All work shall be in coordination with an approved Wetland Specialist. Wetland Specialist qualifications and requirements shall be per Item 755.75, Wetland Specialist.

SUBMITTALS – DOCUMENTS

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

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

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

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

ASSOCIATED ITEMS AND MATERIALS**Seed Mix**

Required submittals include:

- Certificate of Materials from the supplier shall be submitted and approved 30 days prior to ordering seed. Seed species listed on the certificate shall include ecotype region (i.e., *Asclepias incarnata*, PA Ecotype).
- Seed tag from the bag of seed used shall be submitted to the Engineer at the time of seeding. Seed tag shall include ecotype region and species, guaranteed percentages of purity, weed content and germination of the seed, and the net weight. Seed tag shall match the Certificate of Materials, include the name of the supplier, and date material was sent.

ITEM 755.45 (Continued)

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

Seed mix shall be:

Mix 765.551 Wetland Mix – FACW Meadow Mix

<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS</u> <u>By Weight</u>
Grass	Fox Sedge	26.00%
Elymus riparius	Riverbank Wild Rye	23.00%
Carex lurida	Shallow Sedge	17.00%
Carex lupulina	Hop Sedge	8.00%
Scirpus atrovirens	Green Bulrush	3.00%
Juncus effusus	Soft Rush	2.50%
Cinna arundinacea	Sweet Woodreed	2.00%
Carex comosa	Bearded Sedge	2.00%
Glyceria canadensis	Manna Grass	1.00%
Scirpus cyperinus	Woolgrass	1.00%
Juncus tenuis	Path Rush	0.50%
		<u>86.00%</u>
Herb/Forb		
Verbena hastata	Blue Vervain	4.00%
Asclepias incarnata	Swamp Milkweed	2.00%
Aster prenanthoides	Zig Zag Aster	1.00%
Sisyrinchium angustifolium	Narrowleaf blue-eyed grass	1.00%
Eupatorium maculatum	Joe-pye Weed	1.00%
Aster puniceus	Aster - Swamp	1.00%
Aster novae-angliae	New England Aster	1.00%
Vernonia noveboracensis	New York Ironweed	1.00%
Eupatorium perfoliatum	Boneset	1.00%
Aster umbellatus	Flat Topped White Aster	0.50%
Mimulus ringens	Monkey Flower	0.50%
		<u>14.00%</u>
		100.00%

ITEM 755.45 (Continued)**Seeding Rate**

Apply this mix at 20 lbs PLS/acre on areas of less than 3:1 slope and 60 lbs PLS on areas of greater than 3:1 slope.

Fertilizers shall not be used.

Straw mulch or hydromulch shall be per Section M6 of the Standard Specifications.

CONSTRUCTION METHODS & SEQUENCE**Site Protection Prior to Impacts**

Prior to any land work, as part of the initial site-walk, the Wetland Specialist shall photo-document the site and provide a summary report of existing conditions as outlined under Item 755.75 Wetland Specialist.

Restoration Upon Completion of Roadway Construction Work**Sediment Barriers**

If required for sediment control during Restoration work (i.e, tilling is required to restore soil), sediment barriers shall be installed along the downslope perimeter of the Restoration Area beginning and ending in the surrounding upland so that no disturbed soil can enter adjacent wetlands or waters. Sediment barriers shall be in place and approved by the Engineer prior to any soil disturbance. No work shall take place outside the barriers.

Removal of Fill and Grading

Fill and temporary separation fabric or mats shall be removed and disposed of as specified under the respective items.

If required, grades shall be restored to pre-construction elevations as shown in the baseline survey or as required by the Engineer and Wetland Specialist to restore hydrologic functions. Final elevations shall be approved by the Engineer prior to soil preparation and seeding. Grading shall be incidental to this item.

Following approval of grading to elevations required, soil shall be prepared and seeded as follows.

Soil Scarification

Compacted soil shall be scarified with equipment approved by the Engineer. Upon approval of soil scarification, the area shall **be seeded with mulch** as specified below. Seeding shall immediately follow soil preparation.

ITEM 755.45 (Continued)**Seeding with Mulch**

Upon approval of prepared soil, area shall be seeded. Seeding shall be hand broadcast with straw mulch applied per the Standard Specifications and per the manufacturer's directions. Hydromulch shall be straw or wood fiber only and shall be per the manufacturer's recommendations.

Seed tags shall be submitted at time of seeding.

SEED ESTABLISHMENT

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

CONDITIONAL ACCEPTANCE OF WORK

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

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

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

- The target elevations have been restored per the survey or adjusted per the Engineer. Areas that are too high or too low should be identified along with suggested corrective measures.
- Soil compaction has been mitigated.
- Soils are stabilized and there is no sediment in the wetland and no channeling of slopes.
- Hydrology meets performance standards and has been adequately restored.
- Specified seed mix has been seeded and seeded species in the wetland and adjacent upland show signs of good germination and healthy growth.
- Planted woody and herbaceous species (if included) meet specifications and are establishing well.
- There are no invasive plants visible in the restored wetland area.
- Silt fence and non-biodegradable sediment barrier materials have been removed.

ITEM 755.45 (Continued)

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

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

FINAL ACCEPTANCE OF WORK

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

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

- Hydrology is functioning as intended.
- The desired seeded species are establishing well and cover 100 percent of the restoration area, excluding areas of open water, large boulders or planned bare soil.
- No sediments have entered the wetland.
- Adjacent slopes are stabilized with desirable vegetation.
- Planted woody and herbaceous species (if included) meet specifications and are establishing well.
- There are no visible invasive plants.

If the restoration work is not approved, MassDOT will issue a rejection letter requiring corrective action. All costs associated with corrective measures and plant replacement shall be incidental to this item with no additional compensation. Work not approved shall be addressed by the Contractor at no extra cost.

MONITORING REPORTS FOR REGULATORY COMPLIANCE

Post wetland construction Monitoring Reports shall be completed and submitted by the Wetland Specialist as specified and compensated under Item 755.76 Wetland Monitoring Reports.

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

- Hydrology is functioning as intended, relative to the preexisting condition of the restored wetland.
- Seeded species are establishing well and cover 100 percent of the area, excluding areas of open water areas or planned bare soil.
- No sediments have entered into wetland.
- Adjacent slopes are stabilized with desirable vegetation.
- All planted species (if included) are living and establishing well.
- There are no visible invasive plants.

ITEM 755.45 (Continued)

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

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 755.45 will be paid for at the Contract unit price per Square Yard, which price shall include all labor, materials, compost and amendments, seed, mulch, equipment, submittals, maintenance, grading, and incidental costs necessary to complete the work as required.

Payment shall be as follows:

- 50% upon completion of soil preparation and seeding
- 25% upon Conditional Acceptance
- 25% upon Final Acceptance or approval of the Engineer

Excavation of temporary fill will be paid under Item 120.1

Sediment Control Barrier will be paid under Item 767.121

Wetland Specialist will be paid under Item 755.75

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

ITEM 755.75**WETLAND SPECIALIST****HOOR**

Work under this Item shall be for services of a Wetland Scientist, Wetland Ecologist, Restoration Ecologist, or other professional with similar qualifications hereafter referred to as the “Wetland Specialist.”

“Wetland Mitigation” shall be used herein for applicable wetland work. For this project, applicable wetland work is for: **Item 755.35 Inland Wetland Replication Area, Item 755.45 Wetland Restoration, Item 983.6 Streambed Restoration, and Item 120.01 Excavation in Flood Compensation Area for protection and restoration of vegetation.**

The Wetland Specialist shall demonstrate knowledge and expertise to coordinate and oversee all work associated with the Wetland Mitigation and Streambed Restoration as defined herein, as shown on the Plans, as required by permits, and as specified under the relevant Wetland Mitigation and Streambed Restoration items.

Regulatory monitoring reports following Final Acceptance of the Wetland Mitigation shall be per Item 755.76, Wetland Monitoring Reports.

For all onsite work, the Wetland Specialist shall sign in and sign out with the Engineer.

The Wetland Specialist shall not be from the same company as the company responsible for planting, seeding, and/or maintaining the wetland.

QUALIFICATIONS

The Wetland Specialist shall have a minimum of five (5) years of experience with construction and monitoring of wetland mitigation areas similar in size, type, and complexity to the Contract mitigation. When required by permits, at least ten (10) years of experience may be required. The Wetland Specialist shall be thoroughly versed in the Commonwealth of Massachusetts Wetlands Protection Act (MGL C.131, s.40), U.S. Army Corps of Engineers New England District Compensatory Mitigation Guidance, and all other relevant regulations of the Massachusetts Department of Environmental Protection and the U.S. Army Corps of Engineers New England District.

SUBMITTALS - QUALIFICATION

Within sixty (60) days following the Notice to Proceed, the Contractor shall provide proof of qualifications for the Wetland Specialist to the Engineer for approval. Submittals shall include, but not be limited to, the following:

- Resume of the individual on-site implementing the Wetland Specialist work. If the Wetland Specialist changes over the course of the project, the new individual shall submit resume and qualifications for approval 30 days prior to doing any work on-site.
- Resume of any personnel working on-site in place of the Wetland Specialist. Individual shall be approved prior to work on-site.
- Narrative describing the company, its expertise, technical qualifications and experience with wetland construction.

ITEM 755.75 (Continued)

- At least three (3) references from prior work of a similar nature completed in the last five (5) years and by the individuals who will perform the work. Provide contact information for each reference including address, phone number and email.
- A summary of each reference project including nature of the work, project size, dates, and period of construction and monitoring, methodologies used, and summary of success (or not) in terms of meeting performance objectives. Summary shall include a minimum of one before and one after photo for each project.

SUBMITTALS – DOCUMENTATION AND REPORTS**Wetland Construction Oversight**

Wetland Specialist shall provide documentation of pre-existing conditions and wetland construction as specified below and as part of fulfilling the Scope of Work described below. Documentation shall include photos that are clear and legible. Photos are incidental to this item.

- ***Site Walk Prior to Disturbance and Construction of Wetlands:*** Provide brief assessment with photos, including documentation of the existing wetlands to be impacted (both permanent and temporary) and streambed to be impacted, proposed wetland replication area, and reference/model wetland areas (typically an adjacent undisturbed wetland or the existing wetland to be impacted). Photos of existing wetlands that will be temporarily impacted shall include a view from at least 3 angles.
- ***Excavation and Grading:*** Documentation shall include minimum of two photos of the excavated wetland and streambed and two photos after final grading prior to planting and seeding. For restoration areas, photos shall show soil preparation (i.e, tilling and grading), if applicable.
- ***Approval of Subgrades:*** The Wetland Specialist shall inspect the sub-grade of the wetland replication area and streambed restoration areas to ensure that proper hydrology is likely to be established and shall provide the Engineer with written confirmation and photographs upon completion of subgrade excavation work. Written confirmation shall include recommended field adjustments, based on field observations, to achieve the desired hydrology and designed wetland system.
- ***Planting and Seeding:*** Provide assessment and photos of vegetation upon completion of planting and seeding work.
- ***Data logger output from Monitoring Wells*** shall be submitted with reports, if applicable and requested.

Wetland construction documentation and reports shall be submitted with Request for Conditional Acceptance and for the Order of Conditions, Water Quality Certifications, and other regulatory permits as required.

ITEM 755.75 (Continued)**Requests for Acceptance of Work & Regulatory Compliance**

The Wetland Specialist shall submit the following documents if and as specified herein and under Item the relevant Wetland Mitigation items:

- Request for Conditional Acceptance.
- Request for Certificate of Compliance (Partial or Full) when applicable.
- Request for Final Acceptance.

SCOPE OF WORK

In the event of discrepancies with the applicable permits, the Wetland Specialist shall submit a Request for Information (RFI) to the Engineer.

General

The Wetland Specialist shall be responsible for the following:

- Review and have a comprehensive knowledge of the environmental permits relevant to the specific mitigation work being done so as to ensure compliance throughout the duration of the contract.
- Identify and inform the Contractor and Engineer of unique site conditions which may require adjustments to the schedule, design, or construction methods. For example, wildlife nesting, illegal dumping, or rare species.
- Identify and inform the Contractor and Engineer of any sediment or erosion control problems observed within mitigation areas.
- Advise so as to avoid impacts to adjacent areas and regulated wetland resources.
- Participate in necessary meetings as required by permits and when requested by the Engineer.

Inspections & Construction Oversight

The Wetland Specialist shall be responsible for, but not limited to, the following:

- Pre-Construction Site Walk
 - Following surveying, flagging, and staking of all relevant boundaries and elevations by the Contractor, the Wetland Specialist shall walk the site with the Engineer and the Contractor to review existing and proposed conditions, recommend changes if necessary, and approve the following: location and boundaries of the Mitigation Area, target elevations and grades, location of tree protection associated with the Mitigation Area, and final layout and limits of clearing for access route.
 - Select and mark snags, logs, and woody material to be retained for placement in the Wetland Mitigation, as appropriate.
 - Note invasive plants in and adjacent to Wetland Mitigation.
 - Provide summary report if and as specified under Wetland Mitigation items.

ITEM 755.75 (Continued)

- Excavation, Soil Placement, Grading for Replication Areas
 - Approve excavated depth and grading for appropriate wetland hydrology, subsoil preparation, and finished grade of placed wetland soil.
 - Adjust grades as required and approve microtopography. If grades need to be adjusted, submit an RFI to the Engineer.
 - If requested by the Engineer, the Wetland Specialist shall inspect stockpiled wetland soil for moisture content and signs of undesirable weeds.
- Soil Protection and Restoration Measures for Restoration Areas
 - Review and approve methods of soil protection and restoration if required.
 - Confirm decompaction will adequately restore appropriate wetland hydrology. If decompaction measures need to be adjusted, submit an RFI to the Engineer.
- Re-vegetation of Mitigation Area
 - Placement of woody material to be re-used.
 - Verify seed used complies with specifications and site conditions, determine limits for wetland seeding based on elevations, approve seeding and mulching methods, and collect seed tags to submit with Request for Conditional Acceptance.
 - Review planting methods (if applicable) prior to installation and oversee layout of wetland plants.
- Streambed Restoration
 - Ensure on-site oversight during construction, and assistance during streambed restoration construction to ensure the restoration is constructed as shown on the Plans, as required by these Special Provisions and in accordance with permit requirements.

Conditional Acceptance

Upon completion of construction of the wetland, as part of the Request for Conditional Acceptance, the Wetland Specialist shall provide a brief narrative demonstrating that the wetland construction work was done according to plans (or how modified) and meets the conditions required for acceptance as specified under the Wetland Mitigation items. Submittal shall include a report and photo documentation of pre-construction conditions, construction work, seeding, planting, and other work as specified under the Wetland Mitigation items. Photos of completed Wetland Restoration areas shall include the same views as the pre-construction reference photos.

Upon receipt of a Request for Conditional Acceptance, the Engineer, the Wetland Specialist and regulatory representative (if required) shall assess the Wetland Mitigation and surrounding area to ensure that it meets the conditions specified under the Wetland Mitigation items.

Upon approval, MassDOT will issue a letter of Conditional Acceptance. If the Wetland Mitigation work is not approved, MassDOT will issue a rejection letter requiring corrective action. The Wetland Specialist shall recommend corrective actions.

ITEM 755.75 (Continued)**Request for Certificate of Compliance**

If required, a Request for Certificate of Compliance shall be prepared and submitted to the Engineer immediately following Conditional Acceptance. Request shall be as specified under the relevant Wetland Mitigation items.

Request for Final Acceptance

Following one full growing season, the Wetland Specialist shall provide a brief narrative of the status of the Wetland Mitigation to be submitted with the Request for Final Acceptance.

Upon receipt of the Request, the Engineer, the Wetland Specialist and regulatory representative (if required) shall assess the Wetland Mitigation and surrounding area to ensure that it meets the conditions specified under the relevant Wetland Mitigation items.

If the Wetland Mitigation is not approved, MassDOT will issue a rejection letter requiring corrective action. The Wetland Specialist shall recommend corrective actions.

METHOD OF MEASUREMENT

Item 755.75 Wetland Specialist shall be measured per hour for on-site service provided by the Wetland Specialist.

Work shall include all inspections, photos, submittals, and associated tasks for construction and restoration oversight, narratives for Conditional and Final Acceptance, Request for Certificate of Compliance (Partial or Full) if required, documentation required for permits, and all other work specified above. Payment shall not include travel time or time spent off-site on reports. Decimal Pay Limits will be 0.25 hours.

BASIS OF PAYMENT

Item 755.75 Wetland Specialist shall be paid at the Contractor bid price for each hour, or fraction thereof, spent on-site to perform the work as described above. Reports and photo documentation are required for payment.

Post wetland construction reports shall be per Item 755.76, Wetland Monitoring Reports.

ITEM 755.76**WETLAND MONITORING REPORTS****LUMP SUM**

Work under this item shall be for the submittal of Wetland Monitoring Reports following the completion of wetland construction and shall include all inspections, photos, and other work required to complete those reports as specified herein.

“Wetland Mitigation” shall be used herein for applicable wetland work, whether Wetland Replication (creation of a new wetland) and/or Wetland Restoration (restoration after temporary impacts).

The Contractor shall retain the services of a Wetland Scientist, Wetland Ecologist, Restoration Ecologist, or other professional with similar qualifications, hereafter referred to as the “Wetland Specialist,” to complete the Wetland Monitoring reports. Wetland Specialist shall meet requirements specified under Item 755.75 Wetland Specialist.

All on-site Wetland Specialist services required to complete the construction and revegetation of the wetland replication, including preparation and submission of monitoring reports during construction, shall be per Item 755.75 Wetland Specialist.

SCOPE OF WORK**Post-Construction Wetland Monitoring Reports**

Final Acceptance of the wetland construction work as specified under item 755.35 and 755.45 shall initiate the beginning of the Monitoring Period.

Inspections and reports shall be performed to ensure compliance with mitigation requirements defined under the relevant Wetland Mitigation items and with all applicable environmental permits. Monitoring reports shall cover the following:

- Identification of all plant species present
- Percent cover for each plant species and overall percent surface area cover by indigenous wetland plant species for replication area and upland
- Description of the viability, health, and vigor of installed plants as well as volunteer plant species within the replication areas
- Description of remedial measures taken to ensure criteria are met
- Depth to apparent water table and/or depth of surface inundation, both as measured from the soil surface and data loggers, as appropriate.
- A conclusion regarding the success of the wetland mitigation area relative to the performance standards at 310 CMR 10.55(4)(b) (unless varied), the design plans, and performance criteria established by MADEP in the variance conditions (when applicable), and the reference wetland.
- Recommendation for a corrective plan of action if needed.

ITEM 755.76 (Continued)

Reports shall be submitted to the Engineer as a digital copy in Portable Document Format (PDF) unless otherwise requested. Hard copies shall be provided as requested by the Engineer. All reports shall be marked with the applicable permit numbers and identifying information as required in the permits. Reports shall include photo documentation of the wetland/s being monitored and shall include a minimum of 3 views from different orientations. Views shall be labeled.

Spring Reports, when required, shall be submitted to the Engineer by July 1 for dispersal to the appropriate permitting agencies.

End of Year Reports (which may serve as the Fall Report) shall be based on inspections that occur prior to October 15th. Reports shall be submitted to the Engineer no later than November 1 of each year.

Monitoring Reports shall be as follows for 2 years:

- *MassDEP: 2 Reports - (1 end of year, so be submitted no later than January 15th each year).*
- *ACOE: 2 Reports (1 end of year).*
- *Conservation Commission: 2 Reports (1 end of year).*

BASIS OF PAYMENT AND METHOD OF MEASUREMENT

Item 755.76 Wetland Monitoring Reports and associated inspections shall be at the Contract unit price per Lump Sum and shall include all labor, materials, equipment, and all incidental costs required to complete the work. Lump Sum will be paid in equal installments of the Lump Sum divided by the number of reports submitted. Payment shall be upon submittal and acceptance of each report, based on the following schedule:

- Year 1 = **1 end of the year report**
- Year 2 = **1 end of the year report**

ITEM 756. NPDES STORM WATER POLLUTION PREVENTION PLAN LUMP SUM

This Item addresses the preparation and implementation of a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit (CGP) issued by the U.S. Environmental Protection Agency (EPA).

Pursuant to the Federal Clean Water Act, construction activities which disturb one acre or more are required to apply to the EPA for coverage under the NPDES General Permit for Storm Water Discharges from Construction Activities. The Contractor shall be fully responsible for compliance with the most recently issued CGP and any subsequent revisions. Should a fine or damages be assessed against it, or MassDOT, as a result of a local, state, or federal enforcement action due to non-compliance with the CGP, the Contractor shall take full responsibility.

The NPDES CGP requires the submission of a Notice of Intent (NOI) to the EPA prior to the start of construction (defined as any activity which disturbs land, including clearing and grubbing). There is a fourteen (14) day review period commencing from the date on which EPA enters the Notice into their database. Based on the review of the NOI, EPA may require additional information, including but not limited to, the submission of the Storm Water Pollution Prevention Plan (SWPPP) for review. Work may not commence on the project until final authorization has been granted by EPA. Any additional time required by EPA for review of submittals will not constitute a basis for claim of delay.

In addition, if the project discharges to an Outstanding Resource Water, vernal pool, or is within a coastal ACEC as identified by the Massachusetts Department of Environmental Protection (DEP), a separate notification to DEP is required. DEP may also require submission of the Storm Water Pollution Prevention Plan for review and approval. Filing fees associated with the notification to DEP and, if required, the SWPPP filing to DEP shall be paid by the Contractor.

The CGP also requires the preparation and implementation of a SWPPP in accordance with the afore-mentioned statutes and regulations. The Plan will include the CGP conditions and detailed descriptions of controls of erosion and sedimentation to be implemented during construction. The contractor shall prepare the SWPPP and update it as necessary. The Contractor shall submit the Plan to the Engineer for approval at least four (4) weeks prior to any site activities. It is the responsibility of the Contractor to comply with the CGP conditions and the conditions of any state Wetlands Protection Act Order, Water Quality Certification, Corps of Engineers Section 404 Permit and other environmental permits applicable to the project and to include in the SWPPP the methods and means necessary to comply with applicable conditions of said permits.

It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA CGP, provide all information required, and obtain any and all certifications as required by the CGP. Any amendments to the SWPPP required by site conditions, schedule changes, revised work, regulations, construction methodologies, and the like are the responsibility of the Contractor. Amendments will require the approval of the Engineer prior to implementation.

ITEM 756. (Continued)

In addition to the CGP requirements for inspections, MassDOT requires inspection of all erosion controls and site conditions on a weekly basis. Inspections are also required at portions of sites that discharge to sediment or nutrient impaired or high quality waters per the CGP when each incidence of rainfall exceeding 0.25 inches in twenty-four hours or after snowmelt discharge from a storm event that produces 3.25 inches or more of snow within twenty-four hours occurs. The CGP requires that inspections be performed by a qualified individual as outlined in the CGP. MassDOT requires proof of completion of a 4 hour minimum sedimentation and erosion control training class current to the latest CGP. This individual can be, but not limited to, someone that is either a certified inspector, certified professional, or certified storm water inspector. The documentation shall be included as an appendix in the SWPPP. The inspector's qualifications shall be submitted to the Engineer for approval prior to beginning any work. This individual shall be on-site during construction to perform these inspections. In addition, if the Engineer determines at any time that the inspector's performance is inadequate, the Contractor shall provide an alternate inspector. Written weekly inspection forms, storm event inspection forms, and Monthly Summary Reports must be completed and provided to the Engineer. Monthly Summary Reports must include a summary of construction activities undertaken during the reporting period, general site conditions, erosion control maintenance and corrective actions taken, the anticipated schedule of construction activities for the next reporting period, any SWPPP amendments, and representative photographs.

The Contractor is responsible for preparation of the Plan, all SWPPP certifications, inspections, reports and any and all corrective actions necessary to comply with the provisions of the CGP. The Standard Specifications require adequate erosion control for the duration of the Contract. All control measures must be properly selected, installed, and maintained in accordance with manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or is no longer adequate, it is the responsibility of the Contractor to replace or modify the control for site conditions at no additional cost to the Department. Contractor must maintain all control measures and other protective measures in effective operating conditions and shall consider replacement of erosion controls for each construction season.

The work under this item shall also include the preparation, submission and implementation of a Flood Contingency Plan. The plan shall address the potential need for the temporary relocation of construction and auxiliary equipment situated within the 1% annual chance of flooding zone to designated upland locations above the Base Flood Elevation during flood events. The Flood Contingency Plan shall address any additional MassDEP-required information requirements, as applicable. The Flood Contingency Plan shall be submitted to the Engineer for review and approval at the same time as the SWPPP.

This Item addresses acceptable completion of the SWPPP, any revisions/amendments required during construction, preparation of monthly reports and Flood Contingency Plan. In addition, any erosion controls beyond those specified in bid items which are selected by the Contractor to facilitate and/or address the Contractor's schedule, methods and prosecution of the work shall be considered incidental to this item.

ITEM 756. (Continued)

The CGP provides specific requirements for temporary and final stabilization. This shall be incorporated into the project schedule. The permit defines specific deadline requirements for Initial Stabilization (“immediately”, i.e., no later than the end of the next work day following the day when earth-disturbing activities have temporarily or permanently ceased) and for Complete Stabilization Activities (no later than 14 calendar days after the initiation of stabilization). Stabilization criteria for vegetative and non-vegetative measures are provided in the CGP.

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved, as well as removal and proper disposal of all construction materials, waste and waste handling devices, removal of all equipment and construction vehicles, removal of all temporary stormwater controls, etc. Approval of final stabilization by the Engineer and confirmation of submission of the NOT will be required prior to submission of the Resident Engineer’s Final Estimate. The permittee shall use EPA’s website to prepare and submit the NOT.

BASIS OF PAYMENT

Item 756. will be paid for at the Contract unit price Lump Sum, which price shall include all labor, materials, equipment, SWPPP & Flood Contingency Plan preparation, revisions/addenda during construction, monthly reports, filing fees, and all incidental costs required to complete the work.

Payment of 50% of the Lump Sum price of this item will be made upon acceptance of the NPDES Stormwater Pollution Prevention Plan & Flood Contingency Plan.

Payment of 40% of the Lump Sum price of this item will be will be paid in equal monthly installments distributed across the time remaining in the accepted baseline schedule until substantial completion.

The remaining 10% of the Lump Sum price of this Item will be paid following accepted submission of a Notice of Termination (NOT) when final stabilization has been achieved.

ITEM 758.1**INFILTRATION BASIN****LUMP SUM**

This work under this item shall conform to the relevant provisions of Section 120, Section 144, Section 150, Section 751, the contract plans and the following:

The work shall consist of creating an infiltration basin conforming with the requirements of the Massachusetts D.E.P. Massachusetts Stormwater Handbook, as shown on the plans.

Construction Sequence

1. The Contractor shall stake out the infiltration basin area boundaries in the field. The location of the staked out area shall first be approved by the Engineer prior to excavation of the site.
2. Install sediment control barrier measures as shown in the plans.
3. Remove trees within the boundaries of the approved staked out excavation area. Excavate existing topsoil and stockpile in upland area for reuse in basin.
4. Excavate subsoil within the infiltration area to the depth indicated in the contract plans. The Contractor shall promptly notify the Engineer if groundwater or clay is encountered during excavation. No heavy equipment shall be allowed within the limits of the floor of the infiltration basin. Infiltration area floor shall be smooth and free of all sharp objects includes glass, metal shards and nails, stones, rocks, sticks, root or debris of any kind.
5. Construct spillway as shown on the plans. Spillway shall be Modified Rock Fill as per M2.02.4.
6. Scarify areas where emankment fill is to be placed.
7. Fill materials shall be placed in layers with a maximum thickness of 8 inches prior to compaction.
8. Compact fill in accordance with Section 150.
9. Install 4" of Loam for roadsides in accordance with Item 751.
10. Seed basin bottom with Wetland Seasonally Flooded Mix Item 765.554. Seed side slopes with Native Short Grassland Seed Mix Item 765.411. Apply Compost Blanket in accordance with Item 751.7 to seeded areas. Paid under seeding items.

ITEM 758.1 (Continued)**Schedule of Quantities**

Within ten (10) days of after Notice to Proceed, the Contractor shall submit for approval by the Engineer, a schedule of quantities and price for the infiltration basin as Lump Sum. The Lump Sum quantity will include the complete installation of Infiltration Basin such as cleaning and grubbing, excavation, fine grading, loam borrow, and spillway modified rockfill to complete the installation. The cost for labor and materials for any item not listed shall be considered incidental to these Items and no further compensation will be allowed for this work. Outlet piping and flared end sections shall be measured for payment under the applicable pay items for these components.

Basis of Payment

Item 758.1 Infiltration Basin will be paid for at the contract unit price per lump sum at the proposed location and shall include all work described herein and full compensation for all labor, materials, unclassified excavations, equipment and incidentals necessary to complete the work. Work for native seed mixes on basin side slopes and bottom shall be paid for under the following items:

- Native Seeding and Establishment Item 765.635,
- Wetland Seasonally Flooded Mix Item 765.554,
- Native Short Grassland Seed Mix Item 765.411,
- Compost Blanket Item 751.7

Sediment Forebay Pavers will be paid under Item 988.01.

Costs for outlet piping and flared end sections shall be paid under the applicable pay items for these components.

ITEM 765.21 ANNUAL COVER CROP FOR NATIVE SEEDING POUND

Work under this item shall be in according with Subsection 765 of the Standard Specifications and the following.

DESCRIPTION

Work consists of furnishing and applying the appropriate annual grass to be seeded as a cover crop in conjunction with upland native seeding and at the rate specified herein.

A cover crop shall be used for following conditions:

- when specified under Application Rate for the permanent native upland seed mix
- for slopes 2:1 or steeper and an annual is not already specified as part of the permanent mix
- when seeding out of season and the native seed mix does not already specify an annual
- as required to prevent erosion until the permanent seed establishes.

A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

Annual rye (*Lolium multiflorum*) will not be accepted as an annual cover crop.

Using annual rye or exceeding the application rate such that a dense stand of annual grasses prevents germination of the native grasses will require mowing of annual grasses. In this instance, mowing of cover crop will be incidental to this item.

Seed and Application Rate

Add 30 pounds/acre of the following seed based on seeding season:

<i>Avena sativa</i> (Grain Oats):	1 January to 31 July
<i>Cecale cereale</i> (Grain Rye):	1 August to 31 December

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Annual Cover Crop will be measured for payment per pound of seed per pound of seed, complete in place.

Annual Cover Crop will be paid at the contract unit price per pound upon approval of seed bag tags or other documentation of correct application rate and species, and upon acceptance of a satisfactory stand of annual grasses three weeks following seeding.

Application and care of cover crop will be paid for separately under Item 765.635 Native Seeding and Establishment

<u>ITEM 765.411</u>	<u>SHORT GRASSLAND SEED MIX</u>	<u>POUND</u>
<u>ITEM 765.451</u>	<u>PART SHADE ROADSIDE SEED MIX</u>	<u>POUND</u>
<u>ITEM 765.554</u>	<u>WETLAND SEED – SEASONALLY FLOODED MIX</u>	<u>POUND</u>

Work under this item shall consist of furnishing the mix(es) specified below in the required quantity.

SUBMITTALS

- 1) Pre-Verification of Seed Availability. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species in the required quantities and for the anticipated date of seeding. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Species not expected to be available should be noted and substitutions recommended.
- 2) Final Verification of Seed Availability. No earlier than 21 days prior to ordering, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species and in the required quantities. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section. Substitutions or changes in the mix at this time must be approved by MassDOT Landscape Design Section.
- 3) Seed Worksheet provided herein shall be submitted to the Engineer prior to ordering seed to determine the number of pounds of Pure Live Seed required.
- 4) Seed Tags. The contractor shall submit original seed tags from each bag of seed used on the project or ensure that each tag is photo documented by the Engineer while on the unopened bag.

Number of tags submitted must correspond to number of bags delivered.

Species listed on the seed tag shall match the Final Verification of Seed Availability (Submittal #2) unless approved otherwise. Tag must include: variety and species name; lot number; purity; percentage of inert matter; percentage of weeds, noxious seeds, and other crop seeds; germination, dormant or hard seed; total viability; origin of seed; germination test date, net weight, and name and address of seller. The origin of seed must be listed on the seed tag for all species in the mix to provide verification of original (generation 0) seed source. The smallest known geographic area (township, county, ecotype region, etc.) shall be listed. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

ITEMS 765.411, 765.451 & 765.554 (Continued)

- 5) Verification of Seed Delivery. Prior to payment, contractor shall submit the Seed Delivery Verification form contained within the contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this contract. The bill of lading must include variety and species name, lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section
- 6) Seed Sample. If requested or if seed is from a previously opened bag, the contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

The appropriate seeding seasons are:

Spring: April 15 - May 15

Fall: October 1 - December 15 for dormant seeding

PERMANENT SEED MIX(ES)**Calculating Pure Live Seed (PLS)**

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed). For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy, it is calculated to be $90\% \times [78 + 10 + 2]\% = 81\%$ PLS.

Therefore, each pound of PLS would need $1 \text{ pound} / 0.81 = 1.2$ pounds of seed with a 90% purity and 90% total germination

Seed Mix(es) shall be as specified below. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

ITEMS 765.411, 765.451 & 765.554 (Continued)

765.411 Short Grassland Seed Mix shall be applied in upland areas at roadsides, side slopes of the infiltration basin, and upland areas surrounding the wetland replication area.

765.411 Short Grassland Seed Mix

	<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS by Weight</u>
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%

Seeding Rate: 15.0 lbs PLS/Acre

ITEMS 765.411, 765.451 & 765.554 (Continued)

765.451 Part Shade Roadside Seed Mix shall be applied in upland areas at roadsides that are shaded by surrounding trees.

765.451 Part Shade Roadside Seed Mix

	<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS by Weight</u>
Grass			
	Festuca rubra	Creeping Red Fescue	25.70%
	Elymus virginicus	Virginia Wild Rye	24.00%
	Schizachyrium scoparium	Little Blue Stem	22.50%
	Panicum virgatum	Switch Grass	10.00%
	Panicum clandestinum 'Tioga'	Deer Tongue 'Tioga'	7.00%
	Carex vulpinoidea	Fox Sedge	2.00%
	Agrostis perennans	Upland Bentgrass	2.00%
	Juncus effusus	Soft Rush	0.20%
			93.40%
Herb/Forb			
	Chamaecrista fasciculata	Partridge Pea	3.00%
	Penstemon digitalis	Beard-tongue	1.00%
	Zizia aurea	Golden Alexanders	0.30%
	Desmodium canadense	Showy Tick Trefoil	0.30%
	Solidago bicolor	White Goldenrod	0.20%
	Solidago caesia	Woodland Goldenrod	0.20%
	Rudbeckia hirta-VT ecotype	Black-eyed Susan-VT ecotype	0.20%
	Aster novae-angliae	New England Aster	0.20%
	Solidago odora	Licorice Scented Goldenrod	0.20%
	Aster divaricatus	White Wood Aster	0.20%
	Heliopsis helianthoides	Ox-Eye Sunflower	0.20%
	Pycnanthemum tenuifolium	Slender Mountain Mint	0.20%
	Monarda fistulosa	Wild Bergamot	0.10%
	Eupatorium perfoliatum	Boneset	0.10%
	Aster lateriflorus	Calico Aster	0.10%
	Oenothera fruticosa var.	Sundrops	0.10%
			6.60%
			100.00%

Seeding Rate: 15.0

ITEMS 765.411, 765.451 & 765.554 (Continued)

765.554 Wetland Seed – Seasonally Flooded Mix shall be applied in the bottom of the infiltration basin and in the flood compensation area.

765.554 Wetland Seed – Seasonally Flooded Mix

		<u>% PLS</u> <u>By</u> <u>Weight</u>
<u>Botanical Name</u>	<u>Common Name</u>	
Grass		
Elymus riparius	Riverbank Wild Rye	20.00%
Andropogon gerardii NY Eco	Big Bluestem NY Eco	12.00%
Carex lupulina	Hop Sedge	10.00%
Panicum clandestinum 'Tioga'	Deer Tongue 'Tioga'	10.00%
Carex vulpinoidea	Fox Sedge	10.00%
Carex scoparia	Broom sedge	8.00%
Sorghastrum nutans NY Eco	Indiangrass NY Ecotype	8.00%
Panicum virgatum	Switch Grass	8.00%
Juncus effusus	Soft Rush	2.00%
Juncus tenuis	Path Rush	1.00%
		<u>89.00%</u>
Herb/Forb		
Verbena hastata	Blue Vervain	4.00%
Desmodium canadense	Showy Tick Trefoil	2.00%
Eupatorium maculatum	Joe-pye Weed	1.00%
Asclepias incarnata	Swamp Milkweed	1.00%
Aster novae-angliae	New England Aster	1.00%
Eupatorium perfoliatum	Boneset	0.70%
Helenium autumnale	Common Sneezeweed	0.50%
Aster puniceus	Aster - Swamp	0.50%
Mimulus ringens	Monkey Flower	0.20%
Vernonia noveboracensis	New York Ironweed	0.10%
		<u>11.00%</u>
		100.00%

ITEMS 765.411, 765.451 & 765.554 (Continued)**Seeding Rate:**

Species ecotype shall be as native to New England region as possible. Apply this mix at 20 lbs PLS/acre.

In addition, apply 30 pounds of cover crop (grain oats or grain rye) as appropriate to the season.

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).

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

765.411 Short Grassland Mix, 765.451 Part Shade Roadside Mix and 765.554 Wetland – Seasonally Flooded Mix will be measured for payment by the pound of Pure Live Seed delivered and complete in place.

765.411 Short Grassland Mix, 765.451 Part Shade Roadside Mix and 765.554 Wetland – Seasonally Flooded Mix will be paid at the contract unit price per pound of Pure Live Seed delivered upon approval of all Seed Submittal Documentation. Overseeding required to correct poor germination or establishment shall be incidental to the item.

Cover crop not included as part of the permanent mix composition will be paid for under Item 765.21, Annual Cover Crop.

Application and care of native seed mix will be paid for separately under Item 735.635 Native Seeding and Establishment.

ITEMS 765.411, 765.451 & 765.554 (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 RequiredCalculated Quantity for Pure Live Seed (PLS¹):_____
Total Pounds PLS**Engineer: Verification at Time of Application**Number pounds delivered to site²: _____ Date(s): _____

Actual Seed Bag Tag/s Received or photo documented by Engineer: _____

¹ PLS=% pure seed x % viable seed (total germination, hard seed, and dormant seed).²Quantity delivered should match pounds **Total Pounds PLS** and **Verification of Seed Delivery**.
Pounds should be shown on each Seed Tag.

ITEMS 765.411, 765.451 & 765.554 (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 is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%.

Seeding season for cover crops shall be grain oats January 1 – July 31 and grain rye August 1 – December 1.

MATERIAL AND SUBMITTALS

Seed Mixes and Submittals shall be per the item(s) for permanent and annual (cover crop) seed mixes.

Compost Blanket, if used, shall meet the material and submittal requirements for that item.

Hydromulch shall be wood fiber or straw applied per the Standard Specifications and at the rates specified below and per the manufacturer.

A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of hydromulch, tackifier, and seed, per 100 gallons of water and as applicable to products used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above.

Fertilizer

No fertilizers shall be applied.

ITEM 765.635 (Continued)**Water**

Water, including hose and all other watering equipment required for the work, shall be furnished by the Contractor to the site at no additional cost. Water shall be suitable for irrigation and free from ingredients harmful to plant life. All plants injured or work damaged due to the lack of water or the use of too much water shall be the Contractor's responsibility to correct.

SEEDING

Hand broadcast method shall be used for all areas smaller than half an acre and when specified on the plans for areas over half an acre. Include note for manual broadcast on plans.

Seeding shall occur within 72 hours of placement of loam and final grading or the Contractor shall propose a reasonable, alternative schedule that shall be approved by the Engineer.

Surface Preparation

No seeding or soil preparation shall be done if soils are muddy or dry and compacted. Bare soils shall be raked to remove large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Ruts and depressions shall be filled with additional loam or compost and the soil shall be re-graded to a relatively smooth finish corresponding to the required grades.

When seeding over existing or compacted soil or soil that has sat bare for more than 30 days, surface will be prepared by tilling or raking to a minimum depth of 2 inches prior to seeding and prior to Compost Blanket application (when applied).

Surface preparation shall be compensated for under for loam placement or topsoil rehandled and spread as appropriate to the project.

Jute or coir mesh, when specified in the contract, shall be placed after seeding and per the Standard Specifications and the manufacturer's instruction.

Surface preparation shall be approved by the Engineer prior to seeding.

Seeding over Various Substrates

Loam: Seeding shall occur within 72 hours of loam placement to prevent loss of topsoil. Seed shall be manually broadcast for areas less than half an acre (each area, not cumulative area) and when specified on the plans. Broadcasting shall be immediately followed by hydromulching as specified below. When not specified on the plans, larger areas may be hydroseeded as specified below.

Compost Blanket: Compost Blanket shall be applied as specified under that item. Seed should be hand broadcast at the same time as compost application to ensure a thin cover of compost over seed.

ITEM 765.635 (Continued)

When seeding is done after application of Compost Blanket the rate shall be increased by 50%. If the Compost Blanket is applied after December 1, seed shall be broadcast or hydroseeding over the compost in the Spring and the rate increased by 50% specified under Seed Application.

Compost Mulch over Modified Rock: Compost Mulch and seed shall be applied as specified under that item. No hydromulch is required.

Cover Crop

Cover crop shall be used when seeding out of season, when specified with the permanent native seed mix under that item, and as required to prevent erosion until the permanent seed establishes. A cover crop should not be used with a steep slope mix or other permanent mix which already contains either cereal rye or oats in the composition of the mix. A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

Seed Application

All seed shall be mulched as specified herein.

Seed application shall be by broadcast seeding or by hydroseeding as described below.

Broadcast Seeding

Seed shall be broadcast spread using a cyclone or whirlwind seeder or hand broadcast. Small or light-seeded species such as bluestem may be mixed with approved filler to achieve an even distribution. Seed shall not be broadcast when wind velocities are greater than 15 mph.

Broadcast seeding shall be undertaken in two separate passes at ninety degrees to each other. One-half the seeding rate shall be applied in each direction (horizontally and vertically). To ensure seed to soil contact with broadcasting of seed, seeding shall be followed by rolling or tracking with equipment approved by the Engineer.

Broadcast seed shall be mulched with weed-free straw mulch unless seeding is done as part of Compost Blanket in which case it shall be as specified above under seeding with Compost Blanket application. Hydromulching shall be as specified under Hydromulching.

Hydroseeding and Hydromulching

Hydroseed and mulching shall be per the manufacturer's directions and as follows.

Hydroseeding shall only be used for sites over half an acre in size or with permission of the Engineer.

ITEM 765.635 (Continued)

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

A 2-step process shall be used for seeding in conjunction with hydromulch. Seed shall be applied with 500 lbs/acre of hydromulch in the first pass. A second pass with 1,000 lbs/ acre of hydromulch shall be applied in a second pass. Each pass shall be applied in a different direction.

Once the seed has been added to the tank mixture a one-hour time limit is set for spreading the mixture on the soil. Once the one hour has passed the excess mixture must be discarded.

For broadcast seeding, hydromulch shall be applied immediately following seeding at a rate of 1,000 lbs/acre. Tank shall be cleaned from any previous hydroseeding.

CARE DURING GERMINATION AND ESTABLISHMENT

Contractor shall care for seeded areas as necessary for successful germination. Care will include watering and weed control as necessary to achieve establishment of the specified seeded species after one growing season as specified below.

The contractor shall maintain the stand of grasses to ensure healthy growth of the seeded species. Work shall include mowing or weed-whacking for weed control, watering if necessary, and removal of invasive plants.

Watering shall be sufficient to achieve soil moisture to a depth of 2 inches or more and such moisture is uniform. Method of watering shall not erode or damage soil or grassed surfaces.

General Weed Control: Unless otherwise directed, mowing shall be as specified under Mowing for Weed Control for seed establishment. Weeds shall be mowed prior to weeds setting seed (by the end of July unless otherwise approved).

Control of Invasive and Aggressive Weeds: Invasive and aggressive weeds, including but not limited to mugwort, ragweed, knapweed, foxtail, crabgrass, and chicory must be cut or treated prior to going to seed. Herbicide treatment must be coordinated with MassDOT. Undesired species (such as chicory) introduced due to use of incorrect seed mix shall be removed at the Contractor's expense.

MOWING FOR WEED CONTROL

Mowing for weed control shall be completed after weeds have sprouted and show leaf and bud growth, but prior to setting seed, generally between July 7th and August 1st, unless directed otherwise by the MassDOT Landscape Architect and the Engineer.

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.

ITEM 765.635 (Continued)

Contractor shall give 48-hour notice prior to mowing work. Mowing shall only occur in dry sunny weather. Litter pickup should occur prior to mowing in all areas. If required, cut grass shall be raked and removed. Litter pickup and raking and removal of grass shall be incidental to the work.

Mowing equipment shall be approved by the Engineer prior to work.

OVER-SEEDING

Areas of bare ground greater than 2-3 feet in diameter shall be over-seeded with the specified mix during the appropriate season for seeding. Where required for overseeding mowing shall be as close to the soil as possible. Soil that is compacted shall be raked or otherwise roughened prior to over-seeding.

Over-seeding rates and methods shall those specified above under Materials and Methods. Following over-seeding, soil shall be lightly tamped to ensure seed to soil contact and areas shall be mulched with straw mulch and watered with a fine mist to moisten soil to a depth of at least 2 inches.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

DETERMINING SATISFACTORY GRASS ESTABLISHMENT

A well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species (not the cover crop) will be visible. Generally:

- A minimum of 75% coverage by the specified permanent seeded species after one growing season. Of that percentage, generally, depending on the mix species:
 - At least 3 types of the permanent seeded grass species shall be visible.
 - At least 3 species of wildflowers shall be visible.
- There will be no significant gaps or bare soil (generally 2-3 feet in diameter or greater).
- There will be no more than 25% coverage by weed species.
- All soil shall be stabilized and there shall be no channeling or erosion.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (i.e., clover) due to failure to clean the hydroseeding tank or using incorrect mix.

Invasive and aggressive weeds (such as mugwort, ragweed, knapweed, and chicory) must be cut or treated prior to going to seed for Interim Acceptance. Herbicide treatment must be coordinated with MassDOT.

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 time of inspection shall be accepted for Interim Acceptance payment.

Final Acceptance of Establishment shall be given upon satisfactory Establishment as described above.

If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Native Seeding and Establishment will be measured for payment by the square yard, complete in place.

Native Seeding and Establishment will be paid at the Contract unit price by the square yard upon Conditional, Interim, and Final Acceptances as described above. This price shall include all submittals, seeding, rolling to ensure seed-to-soil contact, weed control other than mowing, water, over-seeding, labor, materials, equipment, and all incidental costs required to complete the work of establishing a satisfactory stand of grass.

Native seed and cover crop mixes shall be compensated under the respective items.

Site preparation, including raking, tilling, removal of debris and stones, and other work to the prepare site for seeding shall be compensated under loam placement or topsoil rehandled and spread as relevant to the project. If used, Compost Blanket shall be compensated under the respective item.

Mowing for weed control will be incidental to this item.

Schedule of payment shall be as follows:

30% upon Conditional Acceptance

20% upon Interim Acceptance of Care, except this amount will be reduced to zero and final payment will be reduced accordingly when areas requiring weed control are not mowed as specified in the Interim Acceptance criteria.

50% upon Final Acceptance of Establishment

ITEM 767.121**SEDIMENT CONTROL BARRIER****FOOT**

The work under this item shall conform to the relevant provisions of Subsections 670, 751 and 767 of the Standard Specifications and shall include the furnishing and placement of a sediment control barrier. Sediment control barrier shall be installed prior to disturbing upslope soil.

The purpose of the sediment control barrier is to slow runoff velocity and filter suspended sediments from storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent upgradient water or water off road surfaces from flowing into a work zone. Contractor shall be responsible for ensuring that barriers fulfill the intent of adequately controlling siltation and runoff.

Twelve-inch diameter (after installation) compost filter tubes with biodegradable natural fabric (i.e., cotton, jute, burlap) are intended to be the primary sedimentation control barrier. Photo-biodegradable fabric shall not be used.

For small areas of disturbance with minimal slope and slope length, the Engineer may approve the following sediment control methods:

- 9-inch compost filter tubes
- Straw bales which shall be trenched

No straw wattles may be used. Additional compost filter tubes (adding depth or height) shall be used at specific locations of concentrated flow such as at gully points, steep slopes, or identified failure points in the sediment capture line.

When required by permits, additional sediment barrier shall be stored on-site for emergency use and replacement for the duration of the contract.

Where shown on the plans or when required by permits, sedimentation fence shall be used in addition to compost filter tubes and straw bales and shall be compensated under that item.

Sediment control barriers shall be installed in the approximate location as shown on the plans and as required so that no excavated or disturbed soil can enter mitigation areas or adjacent wetlands or waterways. If necessary to accommodate field conditions and to maximize effectiveness, barrier locations may be shifted with approval from the Engineer. Barriers shall be in place prior to excavation work. No work shall take place outside the barriers.

MATERIALS AND CONSTRUCTION

Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans and adjust placement to ensure that the placement will provide maximum effectiveness.

Barriers shall be staked, trenched, and/or wedged as specified herein and according to the Manufacturer's instructions. Barriers shall be securely in contact with existing soil such that there is no flow beneath the barrier.

ITEM 767.121 (Continued)**Compost Filter Tube**

Compost material inside the filter tube shall meet M1.06.0, except for the following: no peat, manure or bio-solids shall be used; no kiln-dried wood or construction debris shall be allowed; material shall pass through a 2-inch sieve; and the C:N ratio shall be disregarded.

Outer tube fabric shall be made of 100% biodegradable materials (i.e., cotton, hemp or jute) and shall have a knitted mesh with openings that allow for sufficient water flow and effective sediment capture.

Tubes shall be tamped, but not trenched, to ensure good contact with soil. When reinforcement is necessary, tubes shall be stacked as shown on the detail plans.

Straw Bales

Straw bales shall be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

Bales should be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. All bales should be either wire-bound or string-tied. Straw bales should be installed so that bindings are oriented around the sides (rather than along the tops and bottoms) of the bales in order to prevent deterioration of the bindings.

The barrier should be entrenched and backfilled. A trench should be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. The trench must be deep enough to remove all grass and other material which might allow underflow. After the bales are staked and chinked (filled by wedging), the excavated soil should be backfilled against the barrier. Backfill soil should conform to the ground level on the downhill side and should be built up to 4 inches against the uphill side of the barrier.

Each bale should be securely anchored by at least 2 stakes or re-bars driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together. Stakes or re-bars should be driven deep enough into the ground to securely anchor the bales. For safety reasons, stakes should not extend above the bales but should be driven in flush with the top of the bale.

The gaps between the bales should be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency. Wedging must be done carefully in order not to separate the bales.

When used in a swale, the barrier should be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the barrier but not around it.

ITEM 767.121 (Continued)**Sedimentation Fence**

Materials and Installation shall be per Section 670.40 and 670.60 of the Standard Specifications and the following:

Sedimentation fence shall only be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

When used with compost filter tubes, the tube shall be placed on a minimum of 8 inches of folded fabric on the upslope side of the fence. Fabric does not need to be trenched.

When used with straw bales, an 8-inch deep and 4-inch wide trench or V-trench shall be dug on the upslope side of the fence line. One foot of fabric shall be placed in the bottom of the trench followed by backfilling with compacted earth or gravel. Stakes shall be on the down slope side of the trench and shall be spaced such that the fence remains vertical and effective.

Width of fabric shall be sufficient to provide a 36-inch high barrier after fabric is folded or trenched. Sagging fabric will require additional staking or other anchoring.

MAINTENANCE

Maintenance of the sediment control barrier shall be per Section 670.60 of the Standard Specifications or per the Stormwater Pollution Prevention Plan (SWPPP), whichever is more restrictive.

The contractor shall inspect the sediment barrier in accordance with relevant permits. At a minimum, barriers shall be inspected at least once every 7 calendar days and after a rain event resulting in 0.25 inches or more of rainfall. Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively for all phases of the Contract.

Barriers that decompose such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost within the fabric tube is sufficiently intact (despite fabric decay) and continues to provide effective water and sediment control, barrier does not necessarily require replacement.

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed, as required, when construction work is complete and upslope areas have been permanently stabilized and after receiving permission to do so from the Engineer.

Regardless of site context, nonbiodegradable material and components of the sediment barriers, including photo-biodegradable fabric, plastic netting, nylon twine, and sedimentation fence, shall be removed and disposed off-site by the Contractor.

ITEM 767.121 (Continued)

For naturalized areas, biodegradable, natural fabric and material may be left in place to decompose on-site. In urban, residential, or other locations where aesthetics is a concern, the following shall apply:

- Compost filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (as would be done with a soil amendment or mulch). No more than a 2-inch depth shall be left on soil substrate.
- Straw bales shall be removed and disposed off-site by the Contractor. Areas of trenching shall be raked smooth and disturbed soils stabilized with a seed mix matching adjacent seeding or existing grasses (i.e., lawn or native grass mix).
- Sedimentation fence, stakes, and other debris shall be removed and disposed off-site. Site shall be restored to a neat and clean condition.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.121 will be measured and paid for at the contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

Additional barrier, such as double or triple stacking of compost filter tubes, will be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damaged by construction activities shall be repaired or replaced as directed by the Engineer at the Contractor's expense.

Sedimentation fence used in conjunction with compost filter will be measured and paid for separately under Standard Item 697, Sedimentation Fence.

ITEM 767.122**SEDIMENT BARRIER - COIR LOG****FOOT**

The work under this item shall conform to the relevant provisions of Subsections 101, 120, 170, and 751 of the Standard Specifications and the following:

Sediment Barrier - Coir Log shall be used in wet locations where the barrier will not require removal; when barrier is placed immediately adjacent to existing wetlands; as a check dam in swales; in locations as shown on the Drawings; and/or in locations required by the Engineer.

Permits, Codes and Regulations: The Contractor shall comply with all rules, regulations, laws and ordinances of the City/Town and State, and all other authorities having jurisdiction over the Project site. All labor, materials, equipment, and services necessary to make the work comply with such requirements shall be provided by the Contractor without additional cost to the Department.

MATERIALS

Coir Log: Coir Log shall be biodegradable coir fiber cylindrical bundles. Inner core shall be 100 percent unsorted, well-cleaned, coir fiber uniformly distributed along the length of the log. The stuffed density of the coir fiber shall be a minimum of 9 pounds per cubic foot.

Outer netting shall be constructed from a minimum 3-ply high strength coir bristle twine. The netting shall have 2-inch by 2-inch rhombic openings with hand-knotted junctions. The average breaking strength of the coir twine shall be a minimum of 80 pounds. Production tolerance for all the above parameters shall not exceed plus or minus 10 percent.

Coir log diameter shall be sized as shown on the drawings. Typical lengths are supplied in 10 foot or 20-foot increments. Coir logs or coir netting may not be cut to decrease length and shall maintain the physical properties as supplied by the Manufacturer.

Notched Wood Stakes: Stakes shall be oak or southern pine with dimensions as shown on the Drawings. Stakes shall be free from knots and other defects which would cause splitting and shall have a downward-angled notch as shown in the drawing.

Coconut Fiber Cord: Coconut fiber cord shall be two-ply braided cord with a breaking strength of 80 pounds, minimum 0.25-inch diameter.

Delivery, Storage and Handling: Protect materials from deterioration during delivery and while stored at site.

CONSTRUCTION METHODS

General: Prior to initial placement of the coir log sediment barrier, the Contractor and the Engineer shall review locations specified on the plans and adjust placement, if required, to ensure that the coir log positioning and configuration will provide maximum sediment capture. Coir log sediment barrier(s) shall be in place prior to excavation work and no work shall take place outside the coir log barrier(s).

ITEM 767.122 (Continued)

Installation: Coir logs shall be staked and secured as shown on the Drawings, as specified herein, and/or as recommended by the Manufacturer. The Contractor shall remove all underlying vegetation or debris to ensure that each coir log is securely in contact with soil, such that there is no flow beneath the log.

When used as a check dam barrier in a swale, the coir log shall be centered in the low point of the swale, perpendicular to the flow, with ends extending upslope. The log check dam barrier shall extend such that the log top elevation at the center of the swale is lower than the lowest elevation at the end log, to ensure that sediment-laden runoff will flow either through or over the coir log but not around it. The coir log check dam barrier shall have length such that no seams occur in the swale.

Notched wood stakes shall be driven parallel on both sides of the coir log at a typical spacing of 5 feet on center, unless site conditions warrant a closer spacing distance to ensure logs are firmly secured to the underlying soil. Stakes shall not extend more than 1 foot beyond the top of the log. Coir twine shall lash the logs to notched stakes in a cross-lashing fashion between stakes, throughout the length of the log barrier.

When utilizing multiple logs for sediment control, each coir log shall be laced together end-to-end (creating a seam) with coir twine to create a continuous length. End-to-end lacing may be completed before or after placement, to facilitate handling.

Maintenance: Maintenance of the coir log sediment barrier shall be per the Stormwater Pollution Prevention Plan (SWPPP).

The contractor shall inspect the sediment barrier in accordance with relevant permits. At a minimum, barriers shall be inspected at least once every 7 calendar days and after a rain event resulting in 0.25 inches or more of rainfall. The Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively for all phases of the Contract. Under no condition shall sediment be allowed to accumulate more than 4 inches above the original ground line.

If a breach or other failure of the barrier occurs, the barrier shall be immediately restored. Repair shall include replacement of entire defective segments or for short breaches, revetment with additional coir logs, set directly adjacent to the downslope side of the breach. Revetment coir logs must overlap breach by a minimum of 2 feet on each side. The Engineer must approve breach repair means and methods as well as outcome.

If the coir log sediment barrier is damaged by equipment or undergoes a significant washout or other major failure, the Contractor shall replace the component in its entirety, at the discretion and approval of the Engineer. Any delay in maintaining the barrier shall be cause to immediately suspend the work as provided for in Subsection 8.09: Delay and Suspension of Work.

Disposition/Removal: For naturalized areas, coir logs and wooden stakes may be left in place to decompose on-site. For areas where, in the determination of the Engineer, aesthetics are a concern, logs, errant coir fiber material, and stakes may require removal.

ITEM 767.122 (Continued)**METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

Item 767.122 will be measured for payment by the FOOT, complete in place and will be paid for at the Contract unit price per FOOT, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

No separate payment will be made for coir log(s) follow-up maintenance and repairs, or disposal (if required), but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 767.9**JUTE MESH****SQUARE YARD**

The work under this item shall conform to the relevant provisions of Section 700 of the Standard Specifications and the following.

The work under this item shall consist of furnishing and installing jute mesh fabric to prevent soil erosion. Jute mesh shall be placed over all areas of exposed soil in locations shown on the plans or as required by the Engineer.

MATERIALS

Jute netting or similar material shall be new, unused, undyed, and unbleached 100% biodegradable yarn (no polypropylene) and of uniform plain weave. The materials should weigh approximately 1.0 (+/- 5%) pounds per linear yard (assuming a 4-foot width).

Shall meet the following minimum requirements:

Open Area:	70-75%
Mesh Size:	approximately 1/2 inch with an open area of 60-65%.
Roll Weight:	approximately 1.0 (+/- 5%) pounds per linear yard
Warp Ends:	78 per linear yard
Weft Ends:	41 per linear yard
Recommended flow:	6 fps (1.8 m/s)
Functional Longevity:	6-9 months

Anchoring devices shall be 11-gauge steel staples 6-inch minimum length. In loose soils the length of the staples shall be 9-inches.

For areas that will be routinely mowed anchoring devices shall consist of minimum 8" wooden stakes. Longer stakes shall be used where loose soils or other conditions obligate, as required by the Engineer.

CONSTRUCTION METHODS

Area shall be seeded prior to installation of jute netting.

Installation shall be such as to ensure continuous contact with soil without folds or wrinkles. Jute netting shall be laid such that upslope fabric is placed over lower slope fabric by a minimum of 3 feet. Adjoining rolls shall be overlapped a minimum 6 inches. The netting shall extend beyond at least 1 foot beyond the edge of the seeded area.

The Contractor shall bury the ends of the jute netting 6-8 inches in anchor trenches at top and bottom of slopes.

Jute netting shall be anchored in place with vertically driven metal staples. The staples shall be driven in until their tops are flush with the soil. Staples shall be placed at 12-inch intervals along the top of a slope and in staggered courses along the face of the slope to achieve a minimum of 3 staples per square yard, or at manufacturer's recommendations for the given site conditions.

ITEM 767.9 (Continued)

Contractor shall reseed all trenched and otherwise disturbed areas with specified seed mix. The Contractor shall maintain the jute netting and make satisfactory repairs of any areas damaged until acceptance of seed establishment.

METHOD OF MEASUREMENT

Jute Mesh will be measured by the number of Square Yards complete in place, including anchoring, as measured across the surface of grade and does not include buried or overlapped portions. The quantity measured for payment shall not exceed that shown on the plans or as directed by the Engineer.

Mesh that becomes loose or that is not otherwise functioning to stabilize soil shall be repaired and new or additional jute matting installed as required at the Contractor's expense. Soil erosion shall be repaired, and area shall be raked and reseeded with the original specified mix as required by the Engineer at the Contractors expense.

BASIS OF PAYMENT

Item 767.9 will be paid for at the contract unit price per Square Yard, which price shall include all labor, materials, equipment, trenching, placing, and stapling of jute fabric, reseeding of trenched and disturbed areas, and all incidental costs required to complete the work.

<u>ITEM 775.141</u>	<u>LINDEN - AMERICAN - REDMOND 2-2.5 INCH CALIPER</u>	<u>EACH</u>
<u>ITEM 776.524</u>	<u>MAPLE - RED - ARMSTRONG 2-2.5 INCH CALIPER</u>	<u>EACH</u>
<u>ITEM 776.543</u>	<u>MAPLE - RED - 'OCTOBER GLORY' 2-2.5 INCH CALIPER</u>	<u>EACH</u>
<u>ITEM 777.136</u>	<u>OAK - PIN 1-1.5 INCH CALIPER</u>	<u>EACH</u>
<u>ITEM 777.231</u>	<u>OAK - SCARLET 1-1.5 INCH CALIPER</u>	<u>EACH</u>
<u>ITEM 777.242</u>	<u>OAK - SCARLET 2-2.5 INCH CALIPER</u>	<u>EACH</u>
<u>ITEM 778.425</u>	<u>CRABAPPLE - IVORY SPEAR 1.5 - 2 INCH CALIPER</u>	<u>EACH</u>
<u>ITEM 783.053</u>	<u>SHAD TREE- SERVICEBERRY 4-5 FEET MULTI-STEMMED</u>	<u>EACH</u>
<u>ITEM 783.337</u>	<u>TULIP TREE 1-1.5 INCH CALIPER</u>	<u>EACH</u>
<u>ITEM 783.441</u>	<u>TULIP TREE 2-2.5 INCH CALIPER</u>	<u>EACH</u>
<u>ITEM 789.333</u>	<u>BAYBERRY SHRUB - NORTHERN 2-3 FEET/ #3</u>	<u>EACH</u>
<u>ITEM 790.633</u>	<u>DOGWOOD - REDOSIER 2-3 FEET/ #3</u>	<u>EACH</u>
<u>ITEM 790.721</u>	<u>DOGWOOD - GRAY 2-3 FEET / #3</u>	<u>EACH</u>
<u>ITEM 794.332</u>	<u>SUMAC SHRUB - FRAGRANT 2-3 FEET / #3</u>	<u>EACH</u>
<u>ITEM 794.803</u>	<u>SWEETFERN #1</u>	<u>EACH</u>
<u>ITEM 795.011</u>	<u>VIBURNUM - NORTHERN ARROWWOOD 2-3 FEET/#3</u>	<u>EACH</u>
<u>ITEM 795.012</u>	<u>VIBURNUM - ARROWWOOD 2-3 FEET / #3</u>	<u>EACH</u>
<u>ITEM 796.447</u>	<u>LITTLE BLUESTEM - THE BLUES 1 GALLON</u>	<u>EACH</u>
<u>ITEM 796.457</u>	<u>SWITCH GRASS - CLOUD NINE 1 GALLON</u>	<u>EACH</u>
<u>ITEM 796.459</u>	<u>SWITCH GRASS - SHENANDOAH 1 GALLON</u>	<u>EACH</u>

The work under these items shall conform to the relevant provisions of Subsection 771, PLANTING TREES, SHRUBS AND GROUND COVER, of the latest edition of the Standard Specifications.

Plant locations shown on the plans are schematic. Plants shall be located as directed by the MassDOT Landscape Architect or the Landscape Architect for the Designer of Record.

Planting

As shown in the Details, soil shall be carefully removed to expose the root flare of all B&B and container plants. Container plants shall be scored and girdled roots shall be teased out and pruned as necessary.

Plants planted incorrectly (too deep, girdled roots, root balls not scored) shall be deemed unacceptable for payment. The problem shall be remediated, and the plants re-planted to the satisfaction of the Landscape Architect. Plants with root systems that cannot be untangled or that require such severe pruning that the plant is compromised shall be rejected on site and replaced at the contractor's expense.

Plants shall be watered prior to backfilling of planting pits and again after backfilling.

Watering

Watering shall meet the requirements for the MassDOT Standard Specifications. In addition, a Watering Log (See Document A00811) and (available online: [Watering Log for MassDOT Plantings](#)) shall be submitted to the Engineer at the end of each week or as requested by the Engineer. Watering and submitting of the weekly Watering Log shall commence immediately following planting and shall continue until the end of the plant warranty. The Engineer shall be notified prior to watering.

ITEMS 775.141 through 796.459 (Continued)

Failure to submit the watering log and/or notify the Engineer will result in deductions or non-payment for plants at the Interim and Final Acceptance inspections. This may include rejection of plants that have healthy foliage at the time of inspection but have been compromised (root system loss) due to lack of water during establishment.

Acceptance of Planting and Plant Establishment

Inspections and acceptance of planting and plant establishment shall be as follows:

Conditional Acceptance

Following planting, the Contractor shall request an inspection for Conditional Acceptance of the plants and planting beds. The Engineer, the MassDOT Landscape Architect, and the Contractor shall inspect the plants, planting methods, and planting beds. Approval of plants and planting shall mark the beginning of the Plant Establishment Period and the one-year warranty period. Plants shall be watered and cared for as specified in the MassDOT Standard Specifications.

Interim Acceptance

Following Conditional Acceptance, plants and planting beds shall be cared for as specified in the standard specifications. Plants shall show healthy growth per the Standard Specifications. All weeds shall be removed (including roots) or, if approved by the Landscape Architect, weed-whacked. Watering log submissions shall be submitted and reviewed.

Plants that are dead or that fail to show healthy growth will not be approved for Interim Acceptance. As determined by the Engineer, those plants shall be immediately replaced, or shall be deducted from the contract and there shall be no further payments made.

Inspections for Interim Acceptance shall be conducted by the Contractor, the Engineer, and the MassDOT Landscape Architect and shall be according to the following schedule:

Spring Planting: Plants and planting beds shall be inspected following the first full growing season (June – August) after planting.

Fall Planting: Plants and planting beds shall be inspected the following spring (April– June) for Spring Interim Acceptance. Plants and planting beds shall be inspected again at the end of the growing season for Fall Interim Acceptance. This inspection shall take place between August 15 - September 10 or as otherwise determined by the Engineer, in order to allow for place replacements.

Final Acceptance: One year following Conditional Acceptance (end of the plant warranty period), plants shall be inspected by the Contractor, MassDOT Landscape Architect and the Engineer. Plants shall show healthy growth meeting the MassDOT Standard Specifications and planting beds shall be free of weeds. Formal planting beds shall be weed-free (no roots) and have a neat appearance.

No payment will be made for plants that are dead or that fail to show healthy growth.

ITEMS 775.141 through 796.459 (Continued)**Payment Schedule**

Upon approval of plants at each inspection, payment shall be as follows:

Spring Planting:

- 40% upon Conditional Acceptance
- 40% upon Interim Acceptance which will include submission and approval of watering logs
- 20% upon Final Acceptance

Fall Planting:

- 35% upon Conditional Acceptance
- 10% upon Spring Interim Acceptance
- 35% upon Fall Interim Acceptance which will include submission and approval of watering logs
- 20% upon Final Acceptance

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

The quantity of trees, shrubs, vines, grasses and ground cover plants measured will be paid for at the contract unit prices per each for planting of the types, species and sizes called for in the bid schedule. The unit price per planting item shall include furnishing and delivering all plants, furnishing and delivering prepared backfill soil, mulch, fertilizer, excavation for plant pits, backfilling, planting, pruning, guying and staking, mulching, weeding, watering, cleanup, plant establishment work and care including replacements, and for all labor, equipment, tools and incidentals necessary to complete the work prescribed in this section.

<u>ITEM 801.412</u>	<u>4 INCH ELECTRICAL CONDUIT - TYPE NM (12 BANK)</u>	<u>FOOT</u>
<u>ITEM 801.414</u>	<u>4 INCH ELECTRICAL CONDUIT - TYPE NM (14 BANK)</u>	<u>FOOT</u>
<u>ITEM 801.416</u>	<u>4 INCH ELECTRICAL CONDUIT - TYPE NM (16 BANK)</u>	<u>FOOT</u>

The work under these items shall conform to the relevant provisions of Subsection 801 of the Standard Specifications and the following:

DESCRIPTION

The work to be done under these items shall consist of constructing telephone duct banks of the type and size indicated on the plans. The trenches shall be excavated to the width and depth shown on the plans. All construction of duct banks including trench, excavation, and backfill shall conform to Verizon details and specifications. The Contractor shall coordinate with Verizon to have a representative from Verizon inspect all Telephone conduit installed.

MATERIALS

PVC conduits shall be Schedule 40 in accordance with Materials Section M5 of the standard specifications.

Concrete encasement shall be 4,000 psi, 3/8 inch, 660 cement concrete in accordance with Materials Section M4 of the Standard Specifications.

CONSTRUCTION METHODS

All trench excavation activities shall comply with all appropriate OSHA standards.

Duct bank shall have 6 inch orange warning tape installed above the concrete encasement as shown on the plans.

For all conduits encased in concrete, use plastic spacers to maintain conduit spacing. Spacers shall meet Verizon specifications for design and spacing. Conduits shall be blown clean using compressed air. Run mandrel thru each conduit to confirm viable pathway.

Woven polyester mule tape with minimum strength of 2500 lb tensile strength to be installed within each conduit.

Additional depth required for construction below drainage and gas mains, as required, is incidental to the work under this item

Verizon shall be responsible for breaking into existing manholes to complete installation of conduit duct banks at existing manholes. The Contractor shall complete duct bank construction to within 10 feet of the existing manholes and coordinate with Verizon accordingly.

Where PVC conduit transitions from below ground to above ground, the Contractor shall use PVC sweeps at these transitions.

ITEMS 801.412, 801.414 & 801.416 (Continued)**METHOD OF MEASUREMENT**

Items 801.412, 801.414, and 801.416 will be measured as per Subsection 801.80.

Items 801.412, 801.414, and 801.416 will be measured for payment by the FOOT of duct bank installed, approved, and maintained in place. No separate measurement shall be made for any sweeps required where PVC conduit transitions from below ground to above ground.

BASIS OF PAYMENT

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Items 801.412, 801.414, and 801.416 will be paid for as per Subsection 801.81.

Items 801.412, 801.414, and 801.416 will be paid for at the respective Contract unit bid prices per FOOT and shall be compensation for all labor equipment and materials required to complete the work specified above, including, but not limited to, excavation, backfill, conduit, mule tape, warning tape, spacers, concrete encasement and any PVC sweeps required.

<u>ITEM 810.1</u>	<u>FIRE ALARM CABLE REMOVED AND DISCARDED</u>	<u>FOOT</u>

Work under the above items shall be performed according to the provisions of Section 800 supplemented by the following:

An abandoned municipal fire alarm cable runs along Route 38. This cable shall be removed and discarded by the Contractor between Church Street and Utility Pole #58, and between Utility Pole #49 and Breed Avenue. Utility poles #106 to #103, #12-83 to #80, #58 to #49, #42 to #37, #12-35 to #32, and #28 to #11A and the fire alarm cable between them are to be retained.

The work shall include the removal and discarding of the existing fire alarm cable as shown on the plans. The work shall also include poles to be R&R as indicated on the plans. All work shall be performed by persons properly licensed to perform such work on public utility poles.

The Contractor shall make all arrangements for the work with the Wilmington Fire Department, Fire Alarm Division, before beginning the work.

The Fire Department will disconnect the existing alarm. After the alarm has been disconnected, the Contractor will remove and discard the existing fire alarm cable. The Contractor shall coordinate the termination of the fire alarm cable at the last pole within the project limits with Wilmington Fire Department.

Removal and proper disposal of any splice boxes mounted on the poles shall be considered part of the work of this section.

METHOD OF MEASUREMENT

Item 810.1 will be measured for payment by foot, measurement shall be the length of cable removed between poles.

BASIS OF PAYMENT

Item 810.1 will be paid for at the contract unit price per foot, which price shall include all labor, materials, tools, equipment and incidental costs required to complete the work.

ITEM 811.38 **ELECTRIC HANDHOLE REMOVED AND RESET** **EACH**

Work under this Item shall conform to the relevant provisions of Section 800 of the Standard Specifications and the following:

The work shall include the dismantling, removal, transporting and resetting of existing electric handholes and frame and covers at the following location shown on the plan:

- Route 38 (Main Street) at Route 129 (Lowell Street) Intersection

The remaining hole shall be backfilled with compacted ordinary borrow and the ground surface restored or replaced in kind to match adjacent surface materials.

The Contractor shall exercise particular care in the dismantling, removal, transporting and resetting of the existing handhole designated to be reused. Any structure that is damaged through carelessness or lack of protection by the Contractor shall be replaced at the Contractor's expense.

Electric handhole removed and reset shall include the furnishing and installation of grounding rods and reconnecting and rewiring the lead-in cable to existing pull box. Grounding rods shall be 3/4" x 10'-0" long, copper clad type. Connections to ground rods are to be made using bare tinned copper stranded ground electrode conductors exothermically welded to ground rod. Mechanical connectors are not to be used.

METHOD OF MEASUREMENT

Item 811.38 will be measured for payment by each hand hole or pull box removed and reset by the Contractor.

BASIS OF PAYMENT

Item 811.38 will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 811.391 ELECTRIC HANDHOLE REMOVED AND DISCARDED EACH

The work under this Item shall conform to the relevant provisions of Section 800 of the Standard Specifications and the following:

The work shall include removing (if called out to do so) existing hand holes and pull boxes at the intersections of Main Street at Church Street and at Burlington Avenue. The Contractor shall dispose the hand holes / pull boxes at their own expense. Materials and labor related to excavation of backfilling of the removed hand holes / pull boxes will be incidental to the cost of Item 811.391.

METHOD OF MEASUREMENT

Item 811.391 will be measured for payment by each hand hole and pull box removed and discarded by the Contractor.

BASIS OF PAYMENT

Item 811.391 will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 813.811**PRIVATE TELECOMMUNICATION SERVICE
RISER RELOCATION****EACH**

The work under this item shall conform to the relevant provisions of Subsections 801 and 813 of the Standard Specifications and the following:

The work shall consist of the removal and relocation of service risers attached to a utility pole for cable/fiber optic service through underground conduit.

The Contractor shall notify the respective utility company immediately following the Notice to Proceed from MassDOT to generate an agreement for each Service Riser requiring relocation.

If it is determined that Verizon will not do the Conduit work, the existing underground conduit shall be excavated and exposed for a necessary distance to allow for the re-alignment of the conduit to the relocated pole as determined by the local utility company servicing the property. The existing galvanized riser and sweep at the base of pole shall be removed by Verizon, after their new cable has been installed and other materials required for the relocation including any additional conduit. Split duct conduit may be required for this work and will be incidental to Item 813.811 if available. This work is applicable at pole 59, 12-38A, and as directed by the Engineer.

The work shall include all excavation and backfill, compaction, new conduit, and materials, concrete encasement or any other requirements in accordance with the respective utility company, local codes and guidelines.

The work associated with disconnecting cable/fiber optic service and reconnecting cable/fiber optic service to the utility's lines is the responsibility of the Contractor to coordinate with Verizon or Comcast and shall be performed at a time convenient to the property owners or tenants occupying the building. The actual time of day or evening for the disconnecting and reconnecting shall be agreed upon between the Engineer, Verizon or Comcast, and the property owner/tenant during construction. A representative from the contractor shall be notified when this work is performed. No additional compensation shall be given for this work outside of normal work hours if necessary.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 813.811 will be measured and paid for as per Subsections 801.80, 801.81 and the following:

The Work includes coordination for the installation of EHH/PB, and conduit with Sweeps, Pull ropes, and Caps. The unit price will include also Coordination to Interrupt the Service and Coordination with the Owner and the utility owner, Split duct, Steel Sweeps, caps, and concrete encasement (if necessary).

Any work with contract Items such as 3"/4" conduit and EHH/ Pull Boxes will be measured for payment under Items 804.3, 811.22, and 811.31.

Some private underground service relocations for the communication line will be performed entirely by the communication company and not measured for payment under this Item.

ITEM 813.812**ELECTRIC SERVICE RISER RELOCATION****EACH**

The work under this item shall conform to the relevant provisions of Subsection 813 of the Standard Specifications and the following:

The work shall include the removal and relocation of electric service risers attached to utility poles supplying secondary and or primary electrical service through underground conduit.

The Contractor shall notify the respective utility company immediately following the Notice to Proceed from MassDOT to generate a Work Order for each Electric Service Riser requiring relocation.

The existing underground conduit shall be excavated and exposed for a necessary distance to allow for the re-alignment of the conduit to the relocated pole as determined by the local utility company servicing the property. The existing galvanized riser and sweep at the base of pole shall be removed and become the property of the contractor to dispose of in accordance with all applicable regulations. This service shall include the first 10' of the riser on the described utility pole, the sweep, a coil of wire acceptable to the local utility company and all other materials required for the relocation including any additional conduit.

The work shall include all excavation and backfill, compaction, new riser, new conduit, new wire, new handholds if required, and materials, concrete encasement or any other requirements in accordance with the latest edition of the National Electrical Code, the respective utility company, local codes and guidelines.

The work associated with disconnecting power and reconnecting power to the utilities secondary and primary power lines is the responsibility of the Contractor to coordinate with the local utility company and shall be performed at a time convenient to the property owners or tenants occupying the building. The actual time of day or evening for the disconnecting and reconnecting will be agreed upon between the Engineer, the local power company servicing this location and the property owner/tenant during construction. A representative from the contractor shall be present when this work is performed. No additional compensation shall be given for this work outside of normal work hours if necessary.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 813.812 will be measured and paid for as per Subsections 813.80, 813.81 and the following:

The unit price shall include all labor, materials, tools, equipment and incidental costs required to complete the work. The work associated with the removal of utility poles and the transfer of the Utilities overhead primary and secondary wiring shall be the responsibility of the respective utility companies and shall not be paid for under this item.

Work under this Items do not include work at existing traffic signal reconstruction items.

<u>ITEM 815.1</u>	<u>TRAFFIC CONTROL SIGNAL LOCATION NO. 1</u>	<u>LUMP SUM</u>
<u>ITEM 816.02</u>	<u>TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 2</u>	<u>LUMP SUM</u>
<u>ITEM 816.03</u>	<u>TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 3</u>	<u>LUMP SUM</u>
<u>ITEM 816.04</u>	<u>TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 4</u>	<u>LUMP SUM</u>

Work under these items shall conform to the relevant provisions of Section 800, "Traffic Control Devices" of the MassDOT Standard Specifications for Highway and Bridges, the 2009 Manual on Uniform Traffic Control Devices (MUTCD), and the following special provisions.

TRAFFIC CONTROL SIGNAL LOCATIONS

Loc. No. 1 [815.1]: Main Street (Route 38) at Cross Street at Butters Row

TRAFFIC CONTROL RECONSTRUCTION LOCATIONS:

Loc. No. 2 [816.02]: Main Street (Route 38) at MBTA Parking Lot

Loc. No. 3 [816.03]: Main Street (Route 38) at Church Street at Burlington Avenue (Route 62)

Loc. No. 4 [816.04]: Main Street (Route 38) at Lowell Street (Route 129)

SCOPE OF TRAFFIC SIGNAL WORK

Traffic signal work consists of permanent improvements at each of the above locations. The work required at each location are shown on the applicable signal plans. Traffic Control Signal includes the installation of new signal system at the location where none previously existed. The work includes furnishing and installing all necessary equipment, wiring, and components as per MassDOT standards. Traffic Control Reconstruction includes upgrading, modifying, or replacing existing traffic signal equipment, as shown on the plans.

GENERAL REQUIREMENTS

A list of the major traffic signal items required at each location is included on the Plans.

All traffic signal equipment furnished shall comply with the MassDOT Qualified Traffic Control Equipment (QTCE) List unless otherwise approved by the Engineer. Equipment not on the list shall otherwise be rejected.

Within 30 days following Notice to Proceed, the Contractor shall submit a list of equipment and manufacturer's equipment specifications they propose to install to the Engineer in accordance with the relevant provisions of Section 815.20. No equipment or accessories will be accepted unless type tested and approved by the MassDOT - Highway Division prior to the date of proposal.

No work on the signals 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 shall 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.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)

The Contractor shall deliver to the Engineer a certificate of compliance with the manufacturer for all materials purchased from the manufacturer.

The Contractor's attention is directed to a rule of the Board of State Examiners of Electricians which states that the installation of wiring in ducts by Contractors in construction of State Highways will not be permitted unless installed by licensed electricians. The installation of the duct work can be performed by skilled laborers. All electrical work performed in association with the traffic signals and roadway improvements, whether on State, Municipal, County or Private property, on this contract shall be by licensed electricians holding a "Certificate B". Additionally, the foreman shall be certified as an International Municipal Signal Association (IMSA) Traffic Signal Technician, Level 1 at a minimum. Any Electrical Contractor performing work on roadways or signals under the jurisdiction of the Town of Wilmington must be on the MassDOT Approved Contractor List and also have International Municipal Signal Association (IMSA) Certification as a Traffic Signal Electrician Level II.

Coordination shall occur with the Massachusetts Bay Transit Authority (MBTA) regarding work that occurs for Item 816.02 (Main Street (Route 38) at MBTA Parking Lot), including but not limited to retiming and rewiring of the interconnect cable between this location and the intersection of Route 38 at Route 62.

SIGNAL INTERCONNECTION

Installation of interconnect cable wiring shall be conducted to maintain the existing interconnection between the coordinated intersections of Route 38 with the MBTA parking lot and with Route 62. The proposed interconnection cable shall be installed prior to removal of the existing interconnection cable to maintain communication between the existing controllers. The type of cable shall be replaced in kind with the existing interconnect cable.

SERVICE CONNECTIONS

As soon as notice to proceed with construction is given, the electrical contractor shall submit a request to the servicing utility company for electrical service on behalf of the MassDOT.

Service connections shown on the plans are approximate only. The Contractor shall determine exact locations from the servicing utility, arrange to complete the service connections, and be responsible for all charges incidental thereto.

A 100-ampere meter socket approved by the servicing utility company shall be furnished and installed on the side of the control cabinet by the serving utility company.

A 3" PVC Conduit shall be installed from the controller cabinet to the utility pole and/or electric manhole, which will supply electrical service to the controller cabinet. This conduit shall be encased in concrete where crossing roadways and/or driveways.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)

The Contractor shall furnish and install, or cause to be installed, all service equipment to the satisfaction of the electric utility company. It shall also be the Contractor's responsibility to pay all charges to the utility company for performing the work previously described.

No direct reimbursement will be made under this contract to the Contractor for payment made to electric company, it being understood that full compensation for any payment made by the Contractor to the utility company will be included in the contract prices bid.

Grounding Cable – Grounding cable shall be bare copper No. 8 AWG wires.

TESTING OF GROUNDING SYSTEM

The Contractor shall perform testing of the equipment grounding system in the presence of the Engineer in accordance with the MassDOT Standard Specifications.

CABINET POWER SUPPLY

A power supply shall be supplied and installed in the TS 2 cabinet. At a minimum, the power supply shall meet all requirements of Paragraph 5.3.5 of the NEMA TS 2 Standard. The unit shall be AC line powered and provide regulated DC power, unregulated AC power, a line frequency reference for the rack mounted loop amplifiers, bus interface units, load switches and other auxiliary cabinet equipment as required.

The power supply shall be either shelf mounted or installed as part of the loop detector rack assembly.

The unit shall contain four LED indicators on the front panel to indicate the four outputs:

1. + 12 VDC $\pm$ 1 VDC @ 2.0 amps,
2. + 24 VDC $\pm$ VDC @ 2.0 amps,
3. 12 VAC @ 250 milliamps, and
4. 60 Hz line frequency reference.

A test point terminal shall also be located on the unit's front panel for + 24 VDC and logic ground testing.

SIGNAL HEADS

Signal heads shall be rigid mounted on mast arms, with the bottom of all signals at the same height. All traffic signal lenses shall be 12" in diameter unless otherwise noted on the plans. Louvered backplates shall be 5" and provided on all signal heads where noted on the plans. All signal heads shall be equipped with light emitting diode (L.E.D.) 12" modules as noted on the plans.

Signal heads shall be made of aluminum. Signal heads shall be installed with cut tunnel visors unless otherwise noted on the plans.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)**Red, Yellow, and Green LED Vehicle Signal Modules**

The LED module shall be an approved item from MassDOT's Traffic Control Devices Approved Equipment List. See "Traffic Signal Controls" under "Qualified Construction Materials" on the Department website:

<https://www.mass.gov/info-details/section-815-traffic-control-signals>

If the LED module conforms to the latest ITE performance specifications and is Energy Star compliant, it may be submitted for approval to be placed on the Traffic Control Devices Approved Equipment List. See the above list link for instructions.

To prevent the LED module warranty from being voided, the connecting leads on the module shall not be cut. The original LED module leads shall be connected to the signal head terminal block as continuous wire without splices.

The LED signal module will be replaced or repaired by the manufacturer if it exhibits one of the following:

- A failure due to workmanship or material defects within the first 60 months of field operation.
- A greater than 40 percent light output degradation or a fall below the minimum intensity levels (as defined by the latest ITE performance specifications) within the first 36 months of field operation.

ACCESSIBLE PEDESTRIAN SIGNALS

Accessible Pedestrian Signal (APS) system shall be provided at the locations specified. The system shall provide a vibro-tactile ADA compliant 2" pushbutton with a raised directional arrow and audible sounds during the walk cycle. The pushbutton shall be accompanied with a R10-3e sign mounted above the pushbutton per the APS system manufacturer's recommendation; the costs of furnishing and installation of R10-3e signs shall be considered incidental to the cost of the traffic signal system.

Where the two APS are separated by 10 feet or more, the audible walk indication shall be a percussive tone; where the distance between two APS is less than 10 feet, a speech walk message shall be used for the audible walk indication. A locator tone shall be provided during the pedestrian clearance and Don't Walk phases. Sounds will be emitted from inside a unit via a weatherproof speaker mounted behind the pedestrian sign. All audible tone duration and volume shall be set in accordance with the latest MUTCD requirements.

The accessible pedestrian signal shall consist of a pedestrian pushbutton unit, control unit, and pedestrian pole unit. The APS system to be used shall be on the MassDOT QTCE List.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)**PEDESTRIAN HEADS**

Pedestrian head indications shall be illuminated L.E.D. type displaying the graphical symbols of a walking person and/or upraised hand and countdown timers. All LED indications on the pedestrian signal shall have an automatic dimming circuit for night illumination to reduce long-term degradation to the LEDs. Pedestrian heads shall be made of aluminum.

Each visual pedestrian indication shall be complemented by a time display indication. Each time display indication shall be self-programming and microprocessor based, with red LEDs used in the display. The time display will countdown the amount of time remaining in each Flashing Don't Walk time interval for viewing by the ambulatory public.

PEDESTRIAN PUSH BUTTONS

Pedestrian push button shall be a part of the APS system with a minimum 2" diameter and a raised directional arrow meeting all requirements of the ADA. The force required to activate the controls shall be no greater than 5 lbs.

Pedestrian push buttons shall be located as close as practicable to the temporary curb ramp serving the controlled crossing and shall permit operation from a clear ground space.

A mounting height of 42 inches above the finish sidewalk grade shall be used for pedestrian push buttons.

Where necessary, the Contractor shall provide extension bracket mounted on the signal poles such that the pedestrian pushbutton detector shall be located within 10 inches from the back of accessible ramp level landing. The extension bracket including pushbutton and signs shall not encroach into level landing resulting level landing area smaller than 4 feet by 4 feet. The bracket extension shall provide the provision of mounting pushbutton and 9 inch by 15 inch sign required per ADA and MUTCD guidelines. The bracket extension shall be installed per manufacturer's recommendation and the length of the extension shall be field verified and adjusted as needed. If the final installed location of pushbutton and sign is located outside of the specified range, the Contractor shall be responsible for reinstalling the bracket extension with pushbutton at the specified location at no additional cost to the State. The final location shall be subject to the approval by the Engineer.

EMERGENCY VEHICLE PREEMPTION

The emergency vehicle preemption control system shall consist of a data-encoded phase selector to be installed within the traffic control cabinet. This unit will serve to validate, identify, classify and record the signal from the optical detectors located on support structures at the intersection. Upon receiving a valid signal from the detector, the phase selector shall generate a preempt call to the controller initiating a preemption operation as shown on the plans.

The Contractor shall install a confirmation strobe at the traffic signal location as shown on the plans.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)

The following description of work specifies the responsibilities involved in the installation of an optical Emergency Vehicle Preemption system.

The Contractor is required to supply material and labor, required or shown, for the complete installation of optical preemption equipment including optical detectors, cable, interfacing equipment to the local controller, making electrical connections and all required incidentals.

Prior to ordering, the Contractor shall coordinate with the Town of Wilmington to ensure that the new pre-emption equipment is compatible with the Town's existing pre-emption equipment.

The following are the optical requirements of the emergency preemption system:

The Contractor shall arrange for a trained representative of the manufacturer of the optical energy preemption equipment to perform the following field supervision and turn-on services.

The representative shall initiate documentation for As-Built drawings.

The representative shall demonstrate the system and instruct the drivers of fire-fighting vehicles in the operation of the system. Any operation problems occurring within the next 30 days shall be corrected by the Contractor or by a Field Service Representative if the Contractor cannot do so.

The performance of these field supervision and turn-on services shall be included in this item. Preemption System design and Documentation shall include the following:

Provide the controller manufacturer, Engineer, and Owner with electrical diagrams.

The installer shall install the equipment consistent with the preemption equipment, the manufacturer's recommended installation procedures and electrical diagrams in a neat and workmanlike manner.

The preemption equipment manufacturer shall be responsible for operational checkouts of the specified preemption functions prior to final acceptance and approval.

Operating checkouts includes the following:

- Verifying that the priority system timing and range are properly set.
- Preemption equipment warranties are put into effect.
- Signal Timing and Sequence under Preemption Control. See preemption data as shown on the Traffic Signal Plan(s).

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.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)

Load switch indicator lights shall be LED-type and wired on the input side of the device.

Note: The controller cabinet assembly shall be initially supplied with a full compliment of load switches to accommodate each available position of the backpanel.

FLASHING OPERATION

The controller shall be equipped with a separate emergency flashing mechanism capable of providing flashing operation at the rate of 50 to 60 flashes per minute. This mechanism shall be so wired and so mounted within the cabinet that it will continue to cause the signals to flash even when the basic controller is removed from the cabinet.

Flashing operations and transition requirements shall be in accordance with Section 4D.28 thru 4D.31 of the MUTCD and shall be as shown on the Plans. Flashing yellow arrow operations shall be in conformance with Sections 4D.18 and 4D.20 of the MUTCD.

FLASHER

Flashers shall comply with Subsection 6.3.3 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 RELAYS

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.

Note: The controller cabinet assembly shall be initially supplied with a full complement of flash transfer relays to accommodate each available position of the backpanel.

TRAFFIC CONTROLLER CABINET

The controller cabinets shall conform to the NEMA TS 2 Type 1 Standards, Section 7.

The controller cabinet shall be made of aluminum.

Note: The control cabinet shall be initially wired with a "D" harness. All wires for this harness shall be properly terminated on the backpanel.

The cabinet shall also be wired with a normally closed switch connected to a user defined input to the controller for remote monitoring of the control cabinets' door open status. The controller cabinet shall also be supplied with a Manual Police Button to manually control the operations of the traffic signal via the Police Door Access Panel.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)

Controller cabinet foundations shall not obstruct a sidewalk or crosswalk so that passage by physically challenged persons is impaired.

The following requirements are applicable to each signalized location and are designed for effective use of a laptop computer in conjunction with traffic signal controllers. These requirements are also designed to permit all engineers, electricians and technicians (including those who are disabled but ambulatory) to work in the cabinet in a safe, effective and comfortable manner. To this extent, the following meets applicable ADA requirements.

1. Furnish and install one slide-out/slide-in shelf or swing-out/swing-in shelf appropriate for the size and load of a laptop computer. This moveable shelf shall support the bottom of the laptop computer at a height between 3'-4" and 3'-8" above finished grade in front of the cabinet.
2. Both the firmware and software version in each timer unit shall be the same throughout the project, and 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 date is later.
3. The contractor shall furnish one cable with each new timer unit to connect a controller timing mechanism 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 serial port found on laptop computers, usually DB9. This cable shall be wired to provide serial RS232C 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 the traffic signal work, and no additional payment shall be made for the work described above.

CABINET DOOR STICKER

The Contractor shall supply and install a laminated door sticker on each proposed cabinet. This sticker shall be permanently affixed to the upper left hand side of the interior main cabinet door. The sticker shall contain, at a minimum, the following:

- Vehicle detection information including detector channel assignment, phase assigned, approach and termination points.
- Network communications information including IP address, subnet mask and MAC address.

Per approach preemption information including channel, approach/direction and termination points.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)**TRAFFIC SIGNAL CONTROLLER**

The controller unit shall be a keyboard-entry menu-driven unit conforms to the Standard Specifications, with internal time base coordination, emergency preemption, and programmatic capability. The controller shall also be complete with a module for closed loop system functions.

Controllers shall conform to Section 3, Controller Units of NEMA No. TS 2, Traffic Controller Assemblies. The controller unit shall meet all applicable requirements of the NEA Standard Publication No. TS 2 Type 1 and the Department's 2025 Standard Specifications and supplemental specifications. Controllers shall utilize an input/output interface conforming to Section 3.3.1 of the NEMA TS 2 Standard for all input/output functions with the backpanel terminals and facilities, the malfunction management unit, detector rack assemblies and auxiliary devices.

The controller shall be complete with a module, including modem card and physical connector to support future closed loop communication.

BUS INTERFACE UNITS

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.

At a minimum the BIU shall perform the interface function between Port 1 at the controller unit, the malfunction management unit, loop detector rack assembly, and the backpanel terminal and facilities. The cabinets shall be supplied with the appropriate number of BIUs required to provide an operating traffic control signal according to the plans and these specifications.

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.

MALFUNCTION MANAGEMENT UNITS

The malfunction management units (MMU) shall comply with Section 4 of the NEMA TS 2 standard. The MMU shall be capable of operating as either a Type 16 with 16 channels (8 vehicle, 4 pedestrian, 4 overlap) or a Type 12 with 12 channels (8 vehicle, 4 overlap). The MMU's supplied shall be configured to operate as Type 16 units.

The MMU's in either the Type 16 or Type 12 configuration shall be capable of operating in a NEMA TS 2 Type 2 cabinet, a NEMA TS 2 Type 1 cabinet, or a NEMA TS 1 cabinet without loss of functionality. The MMU shall be connected directly to the controller unit to support enhanced MMU monitoring of controller operations.

MMU must be compatible with Flashing Yellow Arrow (FYA).

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)**VIDEO VEHICLE DETECTION**

This specification sets forth the minimum requirements for a system that detects vehicles on a roadway using only video images of vehicle traffic. The system shall be installed by technicians that have been trained and certified by the manufacturer.

The video detection system at each intersection where video detection is proposed in the plans shall consist of: one video camera per approaching intersection leg, as specified in the plans, each with a video detection processor (VDP); a cabinet interface (ICC) which mounts in a standard detector rack or as a stand-alone shelf mount unit; and a pointing device.

The video detection system shall be able to detect vehicles in multiple lanes. Detection zones shall be defined using only an on-board video menu and a pointing device to place the zones on a video image. Video detection system shall have the specified number of detection zones at each of the following locations:

- Ten (10) detection zones at the intersection of Main Street (Route 38) at Church Street and Burlington Avenue (Route 62)
- Five (5) detection zones at the intersection of Main Street (Route 38) at Cross Street and Butters Row

The VDP shall be capable of storing up to three different detection zone patterns.

The VDP shall detect vehicles in real time as they travel across each detector zone.

When a vehicle is detected crossing a detection zone, confirmation of detection is with a distinct visual indication on the video overlay.

The VDP shall be capable of providing 2 channels of vehicle presence detection per system.

The VDP shall provide dynamic zone reconfiguration (DZR).

The cable to be used between the VDP and the ICC in the traffic cabinet shall be three (3) twisted pairs and conform to IMSA Specification No. 39-2. The cable shall be a continuous unbroken run from the VDP to the ICC. The cable, and installation tools shall be approved by the supplier of the video detection system, and the manufacturer's instructions must be followed to ensure proper connection.

The video detection system shall be installed by certified factory installers and as recommended by the supplier and documented in installation materials provided by the supplier. Proof of factory certification shall be provided.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)**GLOBAL POSITIONING SYSTEM CLOCK SYNCHRONIZATION**

The work under this item consists of furnishing and installing a complete Global Positioning System (GPS) to provide time reference and to synchronize the controller clocks at each traffic signal location. The system shall provide for clock synchronization reference between the controllers at the intersection of Main Street with Cross Street at Butters Row and the intersection of Main Street with Lowell Street (Route 129).

GPS time reference receivers shall be installed at each cabinet by a trained representative of the manufacturer at a location determined by the representative. The Contractor shall coordinate with the manufacturer's representative for this installation.

The Contractor shall supply all other material and labor required for the complete installation of the GPS system including the interfacing equipment to the local controllers, electrical connections and all required incidentals.

VEHICLE LOOP DETECTORS AND AMPLIFIERS

The loop detector amplifiers shall be supplied as two or four-channel rack mounted units with programmable delay and extension timing, however, all delay and extension programming shall be completed internally in the controller unit.

A chart shall be permanently affixed to the controller cabinet door, which labels each amplifier channel. The chart shall indicate the detector number, street name, approach direction, lane assignment, corresponding phase and terminal number for each amplifier channel.

The detector lead-in cables shall also be similarly labeled, both in the controller cabinet and in the pull box containing the detector lead-in splice. This labeling and attachment shall be of durable materials such as brass or plastic, attached by wire or plastic ties. Adhesive attachment of the label shall not be acceptable.

All control cabinets shall be supplied with the number of rack mounted loop amplifiers as noted in the major items list on the plan sheets.

Wire loop detectors shall be installed in the roadway for vehicle detection. In advance of the loop detector installation, the Contractor shall mark, on site, the loop detectors with any changes required by field conditions such as manholes. The loop detector layout shall be inspected and approved by the Engineer before the loop detectors are installed.

Loop wire shall be encased in a protected plastic tubing of PVC or polyethylene plastic, IMSA 51-5, 1/4-inch outside diameter, and the wire may have cross-linked polyethylene insulation or it may have THHN/THWN insulation.

The heat source for soldering shall be electrical, not exceeding 30W capacity.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)

Splicing insulator shall be an approved re-enterable body splice kit with a non-hardening sealing compound compatible with the wire insulation.

Splice and Connection: Splicing and connection shall be made in the pull box nearest the roadway loop sensor. All loops included in a detector group as shown on the plans shall be spliced in a single pull box. Each lead and lead-in connector shall be stripped back and spliced using a pressure type wire connector applied with a crimping tool. Multiple loop sensors shall be identified as detailed on the plans.

Lead-in splicing shall be staggered to prevent contact with each other. Each crimped splice shall be soldered and insulated. The insulation material shall be heat-shrunked polyolefin. The shielded lead-in cable outer jacket and shield shall be stripped back sufficiently to ensure that the shield cannot come into contact with the spliced conductors. Follow the instructions of the manufacturer when installing the re-enterable splice kit.

NOTE WELL: The above splice shall be done on the day of the loop wire installation to prevent the entrance of any moisture into the plastic tubing.

The lead-in conductors shall be connected to the appropriate terminals in the controller cabinet, by using crimped and soldered terminal ends. The heat source for soldering shall be electrical not exceeding 30W capacity.

Any traffic signal equipment or detection loops damaged during work shall be replaced in-kind. Temporary detection is to be provided throughout work until loop detectors are restored to be operating.

TESTING OF LOOPS

The test procedure shall be performed in the presence of the Engineer before and after the loop sensor is sealed in the pavement as stipulated in subsection 815.66. The cost of equipment, labor, and materials to perform such testing and similar re- testing following repairs, replacement, or adjustment of any detector within the project area shall be included in the price bid for the traffic control signal items.

After installation of wire loop sensors in the roadway and installation of shielded lead-in connecting the loop sensors to the controller cabinet, each loop sensor and lead-in combination shall be tested (at the controller cabinet) for proper installation. The resistance from lead to lead of the same loop shall not exceed three (3) ohms per one thousand (1000) feet as measured by a high quality meter suitable for measurements of low resistance in the range of 1 to 6 ohms.

A megohm meter test at 500 volts DC shall be made between the two leads of a loop/lead-in combination temporarily spliced together, but otherwise disconnected from all terminals, and the shield drain wire and the earth ground connection. These resistances shall be at least one hundred (100) megohms.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)

A megohm meter test at 500 volts DC shall be made between lead-in shield and the earth ground rod. This resistance shall be at least one hundred (100) megohms.

The meter used for these tests shall be checked for calibration each day of use by using a resistor block of $\pm 5\%$ resistors simulating loads of 1 megohm, 20 megohm and 100 megohms. The observed meter reading shall be $+10\%$ of the nominal resistor load.

Item 816.03 – Prior to installing loop detectors on the approach of Kiernan Avenue, the Contractor shall locate in the field any equipment comprising of the existing connection of the loop detectors on or previously on Kiernan Avenue to the control cabinet. This existing connection shall be used in connecting the new loop detectors on the Kiernan Avenue approach.

SPARE EQUIPMENT

The Contractor shall provide the following spare signal equipment in the proposed traffic signal controller cabinet listed below:

- Two (2) Bus Interface Units (BIU's)
- Two (2) Type C, 2-Channel Card Rack Loop Detector Amplifiers or Two (2) Video Detection Processor Cards

SURGE SUPPRESSION

Each cabinet shall have each input and output surge protected except signal outputs from cabinet load switches. (The load switches act as surge suppressors.)

The surge protector must be electrically connected to the nearest grounded metal structure or nearest ground rod.

Surge protection for power service shall conform to the NEMA TS-2 standard. The product complies when a lab report summary from an independent test laboratory stating the product passes the current NEMA TS-2 (5.4.2.4) specification is submitted with the shop drawings.

Surge protection for all loop, pedestrian button, and pre-emption connections shall have peak surge current protection of at least 10kA with a response time of less than 5 nanoseconds. The product complies when a lab report summary from an independent test laboratory stating the product passes this specification is submitted with the shop drawings.

Units shall be plug mounted in the controller cabinet.

Units shall be unconditionally warranted for at least 5 years.

Manufacturers without publicly advertised 5 year warranties must provide written confirmation that they will warranty the surge suppression unit for five years and this documentation is to be provided with the shop drawing submission.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)

POSTS AND BASES

A traffic signal post shall be a one-piece aluminum (single post + base) construction painted black. Signal base foundations shall not obstruct a sidewalk or crosswalk so that passage by physically challenged persons is impaired and installation shall be in compliance with ADA/AAB standards.

MAST ARM POLES AND FOUNDATIONS

Mast arm poles and foundations shall be fabricated and constructed in conformance with the MassDOT Standard Drawings.

All mast arm poles shall be Type II galvanized steel monolevers with shoe bases, unless otherwise directed. Acceptance of Type II mast arm poles shall be contingent upon review and approval of the shop drawings submitted by the Contractor. Longhand design calculations shall be submitted for all Type II Mast Arms.

The Contractor is responsible for both the design and construction of all traffic signal mast arm foundations. The Contractor shall be required to provide, at his own expense, a foundation design by a Massachusetts Registered Professional Engineer in accordance with the latest edition of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and detailed similarly to the Plans. Boring logs have been included in the plan set in the Contract Documents for the Contractor's information. The need for additional borings is at the discretion of the Contractor. The cost of additional borings shall be included in the cost of the foundation design. The Contractor shall submit all calculations, designs, and details in the form of a shop drawing in accordance with Article V. No work shall be performed until approved shop drawings have been returned to the Contractor.

Drilled shaft excavation for the installation of the mast arm foundations shall conform to the guidelines and specifications stated in Subsection 945. The diameter of each of the shaft excavations shall correspond to the foundation diameters stated for each mast arm location in the signal plans. The following table provides information on the proposed mast arms and foundations:

Item 815.1	Mast Arm	Boring No.	Wind Zone*	Soil Type	Fdn. Depth	Diameter
STA. 240+99.39 LT	35'	B-1	130 mph	Wet sand (dense)	12'-6"	3'-6"
STA. 241+36.46 RT	25'	B-3	130 mph	Wet sand (dense)	16'-0"	3'-6"
STA. 241+98.91 RT	35'	B-4	130 mph	Wet sand (dense)	12'-6"	3'-6"
STA. 241+82.57 LT	25'	B-2	130 mph	Wet sand (dense)	10'-0"	3'-6"

* Although the wind zone per 2015 *Overhead Signal Structure & Foundation* is 110 mph, the design speed used is listed in this table

Note: Drilling for the pier foundations is anticipated to encounter cobbles and boulders.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)**SPAN WIRE ASSEMBLY, AND STRAIN POLES**

The strain poles and span wire assemblies shall conform to the relevant provisions of Subsection 815 of the Standard Specifications, the Overhead Signal Structure & Foundation Standard Drawings, and shall be constructed of galvanized steel without a transformer base.

Strain Pole and Span Wire Assemblies shall consist of galvanized steel strain poles, span wires, Compression fittings, tether wires, clamps, pole caps, wire entrances, disconnect hangers, signal head hanging devices, signal cable hanging device, sign hanging devices when specified and all necessary miscellaneous materials to form a complete span wire assembly.

The Contractor shall determine the need for guy anchors for the poles. Guy anchors that may be required shall be installed in accordance with the following:

- Contact Area of Anchor:
- Normal soil conditions: 192 sq. in. minimum
- Sandy or marshy conditions: 300 sq. in. minimum
- Minimum depth of anchor hole: 5.5 feet.
- Anchor rod: 5/8" x 7', double eye.
- Eye shall project above grade 4" to 6."
- Dig channel for rod to line up guy.
- Fit anchor in hole with anchor rod laying in channel.
- Tamp crushed stone or coarse gravel between anchor face and undisturbed earth.
- Backfill all removed earth, compacted in 1-foot layers.

The Contractor is to perform soil analysis and loading design of the pole. Guy wires and anchors shall be considered incidental to the cost of this item (816.02 if used).

All shop drawings and calculations for strain poles shall bear the seal of a Massachusetts Registered Professional Engineer.

Shop drawings and longhand calculations shall be submitted for approval for wood strain poles, soil analysis, designs.

The design includes a Span Wire Assembly with Tether Wire.

Span Wire Assemblies shall conform to the requirements as shown on the Overhead Signal Structure & Foundation Standard Drawings.

The complete strain poles and span wire assembly shall be designed and constructed in accordance with the applicable requirements of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals (currently approved edition) for a wind speed of 110 mph. Only those strain poles which are included in the latest "Approved Equipment List" will be used for this project.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)

Vertical mounting brackets of the type regularly supplied by the manufacturer and conforming to applicable provision of Section 815 of the Standard Specifications shall be used for the attachment of signal heads to the span wires.

All shop drawings and calculations for strain poles and their associated foundations shall bear the seal of a Massachusetts Registered Professional Engineer.

Shop drawings and longhand calculations, including for strain pole foundation design, shall be submitted for approval by the Engineer. Shoe bases shall be provided. The cost of the span wire assembly and strain pole shall be included in the lump sum price bid for Item 816.02.

STRAIN POLE FOUNDATIONS

The Contractor's attention is directed to the fact that core footings shall be provided for the span wire strain poles.

Drilled shaft excavation for the installation of the span pole foundations shall conform to the guidelines and specifications stated in Subsection 945. The diameter of each of the shaft excavations shall correspond to the foundation diameters stated for each span pole location in the signal plans.

For estimating and bidding purposes, the Contractor shall use the core footing design as shown on contract plans. This foundation design is based on calculated moments and Foundation Design Chart of the Department's span wire assembly and Mast Arm standard drawings. The table below summarizes the information from the record borings taken during MassDOT Project #118604. The record boring locations and logs for BB-11 and BB-12 are shown in the Appendix of these specifications.

Item 816.02	Boring No.	Soil Type	Foundation Depth	Foundation Diameter
STA. 20+32.84 RT	BB-11	Dry, loose sand	14'-0"	4'-0"
STA. 12+21.37 LT	BB-12	Dry, loose sand	14'-0"	4'-0"

Note: Drilling for the pier foundations is anticipated to encounter cobbles and boulders.

The cost of constructing foundations for span wire strain poles, shall be considered included in the Lump Sum price of Item 816.02

Strain pole foundations shall not obstruct a sidewalk or crosswalk so that passage by physically-challenged persons would be impaired.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)**CEMENT CONCRETE FOUNDATIONS**

Foundations for Signal Posts, Mast Arm Poles, Strain Poles and Controller Cabinets foundations shall be constructed using 4000 psi, $\frac{3}{4}$ inch, 565 Cement Concrete Masonry conforming to the relevant provisions of Section M4 of the Standard Specifications and the following:

1. Reinforcing steel shall be ASTM A-615, Grade 60.
2. The top forming of cast-in-place units shall extend downward for a minimum of 24" on the side of any foundation. The lower portions of all foundations shall be placed directly against undisturbed earth. No forms or reinforcing for foundations for mast arm poles, span wire strain poles and control cabinets shall be set nor shall concrete be placed until the excavation has been inspected by the Engineer and his approval to proceed has been given.

Foundations shall not obstruct a sidewalk or crosswalk so that passage by physically challenged persons is impaired and so a clear width of 4 feet is provided.

FINAL INSPECTIONS

Upon completion of all work, the Contractor shall request a final inspection and test of signal equipment at least thirty days prior to the inspection date. The testing date shall be established with mutual agreement among the Contractor, MassDOT, the Town of Wilmington, and the Engineer. The testing results shall be recorded per the format of the MassDOT Final Inspection Form: Traffic Control Signals. Electrical tests and pre-emption tests shall be conducted by the Contractor, in the presence of the Engineer and the Wilmington Fire Department. The Contractor shall supply all necessary testing materials and labor for all tests and re-tests. The Contractor shall record the results of all tests and submit them to the Engineer for approval.

The Engineer, upon receipt of test result records, shall prepare a punchlist of any outstanding items required to provide a functional and fully operational traffic signal. The punchlist shall be distributed to the Contractor to address outstanding issues.

PROVISION OF AS-BUILT DRAWINGS

The Contractor shall cooperate with MassDOT and maintain a set of drawings on which shall be recorded accurately, as the work progresses, the actual "as-built" locations and dimensions of all their work, indicating thereon all variations from the Contract Drawings. This record of "as-built" conditions shall include the work of all subcontractors.

Prior to final acceptance of the work, all "as-built" data shall be transferred to electronic drawings in AutoCAD format. The record drawings will be completed by the Contractor and submitted to the Engineer for review. The Engineer shall revise the drawings to correct all comments and observations made by the Engineer during the Final Inspection. The Engineer shall provide MassDOT and the Town of Wilmington with a PDF copy of the As-Built plans for each signalized intersection location, stamped and signed by a Professional Engineer registered in Massachusetts.

ITEMS 815.1, 816.02, 816.03 & 816.04 (Continued)**BASIS OF PAYMENT**

Items 815.1, 816.02, 816.03, and 816.04 will be paid for at the Contract lump sum prices, which price shall include all labor, material, equipment and incidental costs required to complete the work to provide a working traffic control signal system at each location. The work shall include maintenance of the existing traffic signal system until the new equipment is operational and accepted by MassDOT.

No separate payment will be made for dismantling, loading, transporting, and stacking of the traffic control signal equipment as designated above, the excavation and disposal of the existing foundations, the supplying and replacing of compacted gravel backfill and restoration or replacement, in kind, of the area where foundations and posts are removed, but all costs in connection therewith shall be included in the Contract unit price bid for Items 815.1, 816.02, 816.03, and 816.04.

Conduit shall be paid separately under Item 804.3, 3 Inch Electrical Conduit, Type NM Plastic (UL).

Pull boxes shall be paid separately under Item 811.31 Pull Box 12 x 12 Inches – SD2.031. Breaking into existing pull boxes and/or pulling wiring through existing pull boxes shall be considered incidental to the cost of Items 815.1, 816.02, 816.03, and 816.04.

<u>ITEM 816.81</u>	<u>TEMPORARY TRAFFIC CONTROL SIGNAL</u>	<u>LUMP SUM</u>
<u>ITEM 816.82</u>	<u>TEMPORARY TRAFFIC CONTROL SIGNAL</u> <u>LOCATION 2</u>	<u>LUMP SUM</u>

Work under these items shall conform to the relevant provisions of Section 800, "Traffic Control Devices" of the MassDOT Standard Specifications for Highway and Bridges, the 2009 Manual on Uniform Traffic Control Devices (MUTCD), and the following:

TEMPORARY TRAFFIC CONTROL SIGNAL LOCATIONS:

Loc. No. 1 [816.81]: Maple Meadow Brook Bridge Replacement
Loc. No. 2 [816.82]: Culvert Replacement south of Dublin Avenue

SCOPE OF TEMPORARY TRAFFIC SIGNAL WORK

The work shall include the furnishing and/or installation of part or all of the following items: portable traffic signal system; including traffic signal trailers and housings, traffic signal controller, emergency vehicle preemption, video detection, all cable and wiring, pedestrian accommodation systems and all other equipment, materials, power connections and incidental costs necessary to provide complete, fully operational temporary traffic control signal system as specified herein.

GENERAL REQUIREMENTS

A list of the major traffic signal items required at each location is included on the Plans.

All traffic signal equipment shall comply with the MassDOT Qualified Traffic Control Equipment List unless otherwise approved by the Engineer.

Within 30 days following Notice to Proceed, the Contractor shall submit a list of equipment and manufacturer's equipment specifications they propose to install for the temporary traffic signal system to the Engineer in accordance with the relevant provisions of Section 815.20. No equipment or accessories will be accepted unless type tested and approved by the MassDOT - Highway Division prior to the date of proposal.

No work on the temporary traffic control signals 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 shall 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 Contractor shall deliver to the Engineer a certificate of compliance with the manufacturer for all materials purchased from the manufacturer.

ITEMS 816.81 & 816.82 (Continued)

The Contractor's attention is directed to a rule of the Board of State Examiners of Electricians which states that the installation of wiring in ducts by Contractors in construction of State Highways will not be permitted unless installed by licensed electricians. The installation of the duct work can be performed by skilled laborers. All electrical work performed in association with the traffic signals and roadway improvements, whether on State, Municipal, County or Private property, on this contract shall be by licensed electricians holding a "Certificate B". Additionally, the foreman shall be certified as an International Municipal Signal Association (IMSA) Traffic Signal Technician, Level 1 at a minimum. Any Electrical Contractor performing work on roadways or signals under the jurisdiction of the Town of Wilmington must be on the MassDOT Approved Contractor List and also have International Municipal Signal Association (IMSA) Certification as a Traffic Signal Electrician Level II.

TEMPORARY PORTABLE SIGNAL TRAILERS

Temporary portable signal trailers shall conform to the MassDOT Qualified Traffic Control Equipment (QTCE) list, Section 850. Shop drawings of the equipment and proposed signal head and equipment mountings shall be provided to, and approved by, the Engineer prior to implementation of any temporary traffic signal setups.

SERVICE CONNECTIONS AND POWER SUPPLIES

As soon as notice to proceed with construction is given, the electrical contractor shall submit a request to the servicing utility company for electrical service for use for temporary traffic signal systems on behalf of the MassDOT.

Service connections shown on the plans are approximate only. The Contractor shall determine the exact locations from the servicing utility, arrange to complete the service connections, and be responsible for all charges incidental thereto. The Contractor shall also determine the method by which components of the temporary signal systems will be energized and shall provide additional power sources where appropriate, including but not limited to solar panels, backup battery packs, or generators. Solar panels, backup battery packs, or generators may be provided for portable signal trailers if a direct electric connection is unable to be made.

SIGNAL HEADS

Signal heads for locations with temporary traffic signals shall be mounted on portable signal trailers. All traffic signal lenses shall be 12" in diameter unless otherwise noted on the plans. Louvered backplates shall be 5" and provided on all signal heads where noted on the plans. All signal heads shall be equipped with light emitting diode (L.E.D.) 12" modules as noted on the plans.

Signal heads shall be made of aluminum. Signal heads shall be installed with cut tunnel visors unless otherwise noted on the plans.

ITEMS 816.81 & 816.82 (Continued)**Red, Yellow, and Green LED Vehicle Signal Modules**

The LED module shall be an approved item from MassDOT's Traffic Control Devices Approved Equipment List. See "Traffic Signal Controls" under "Qualified Construction Materials" on the Department website:

<https://www.mass.gov/info-details/section-815-traffic-control-signals>

If the LED module conforms to the latest ITE performance specifications and is Energy Star compliant, it may be submitted for approval to be placed on the Traffic Control Devices Approved Equipment List. See the above list link for instructions.

To prevent the LED module warranty from being voided, the connecting leads on the module shall not be cut. The original LED module leads shall be connected to the signal head terminal block as continuous wire without splices.

The LED signal module will be replaced or repaired by the manufacturer if it exhibits one of the following:

- A failure due to workmanship or material defects within the first 60 months of field operation.
- A greater than 40 percent light output degradation or a fall below the minimum intensity levels (as defined by the latest ITE performance specifications) within the first 36 months of field operation.

ACCESSIBLE PEDESTRIAN SIGNALS

Accessible Pedestrian Signal (APS) system shall be provided at the locations specified. The system shall provide a vibro-tactile ADA compliant 2" pushbutton with a raised directional arrow and audible sounds during the walk cycle. The pushbutton shall be accompanied with a R10-3e sign mounted above the pushbutton per the APS system manufacturer's recommendation; the costs of furnishing and installation of R10-3e signs shall be considered incidental to the cost of the traffic signal system.

Where the two APS are separated by 10 feet or more, the audible walk indication shall be a percussive tone; where the distance between two APS is less than 10 feet, a speech walk message shall be used for the audible walk indication. A locator tone shall be provided during the pedestrian clearance and Don't Walk phases. Sounds will be emitted from inside a unit via a weatherproof speaker mounted behind the pedestrian sign. All audible tone duration and volume shall be set in accordance with the latest MUTCD requirements.

The accessible pedestrian signal shall consist of a pedestrian pushbutton unit, control unit, and pedestrian pole unit. The APS system to be used shall be on the MassDOT QTCE List.

ITEMS 816.81 & 816.82 (Continued)**PEDESTRIAN HEADS**

Pedestrian head indications shall be illuminated L.E.D. type displaying the graphical symbols of a walking person and/or upraised hand and countdown timers. All LED indications on the pedestrian signal shall have an automatic dimming circuit for night illumination to reduce long-term degradation to the LEDs. Pedestrian heads shall be made of aluminum.

Each visual pedestrian indication shall be complemented by a time display indication. Each time display indication shall be self-programming and microprocessor based, with red LEDs used in the display. The time display will countdown the amount of time remaining in each Flashing Don't Walk time interval for viewing by the ambulatory public.

PEDESTRIAN PUSH BUTTONS

Pedestrian push button shall be a part of the APS system with a minimum 2" diameter and a raised directional arrow meeting all requirements of the ADA. The force required to activate the controls shall be no greater than 5 lbs.

Pedestrian push buttons shall be located as close as practicable to the temporary curb ramp serving the controlled crossing and shall permit operation from a clear ground space.

A mounting height of 42 inches above the adjacent level walkway grade shall be used for pedestrian push buttons.

Where necessary, the Contractor shall provide extension bracket mounted on the signal poles such that the pedestrian pushbutton detector shall be located within 10 inches from the back of accessible ramp level landing. The extension bracket including pushbutton and signs shall not encroach into level landing resulting level landing area smaller than 4 feet by 4 feet. The bracket extension shall provide the provision of mounting pushbutton and 9 inch by 15 inch sign required per ADA and MUTCD guidelines. The bracket extension shall be installed per manufacturer's recommendation and the length of the extension shall be field verified and adjusted as needed. If the final installed location of pushbutton and sign is located outside of the specified range, the Contractor shall be responsible for reinstalling the bracket extension with pushbutton at the specified location at no additional cost to the State. The final location shall be subject to the approval by the Engineer.

EMERGENCY VEHICLE PREEMPTION

The emergency vehicle preemption control system shall consist of a data-encoded phase selector to be installed as part of the temporary traffic signal control system. This unit will serve to validate, identify, classify and record the signal from the optical detectors located on support structures at the intersection. Upon receiving a valid signal from the detector, the phase selector shall generate a preempt call to the controller initiating a preemption operation as shown on the plans.

The Contractor shall install a confirmation strobe at the traffic signal location as shown on the plans.

ITEMS 816.81 & 816.82 (Continued)

The following description of work specifies the responsibilities involved in the installation of an optical Emergency Vehicle Preemption system.

The Contractor is required to supply material and labor, required or shown, for the complete installation of optical preemption equipment including optical detectors, cable, interfacing equipment to the local controller, making electrical connections and all required incidentals.

Prior to ordering, the Contractor shall coordinate with the Town of Wilmington to ensure that the new pre-emption equipment is compatible with the Town's existing pre-emption equipment.

The following are the optical requirements of the emergency preemption system:

The Contractor shall arrange for a trained representative of the manufacturer of the optical energy preemption equipment to perform the following field supervision and turn-on services.

The representative shall demonstrate the system and instruct the drivers of fire-fighting vehicles in the operation of the system. Any operation problems occurring within the next 30 days shall be corrected by the Contractor or by a Field Service Representative if the Contractor cannot do so.

The performance of these field supervision and turn-on services shall be included in this item. Preemption System design and Documentation shall include the following:

Provide the controller manufacturer, Engineer, and Owner with electrical diagrams.

The installer shall install the equipment consistent with the preemption equipment, the manufacturer's recommended installation procedures and electrical diagrams in a neat and workmanlike manner.

The preemption equipment manufacturer shall be responsible for operational checkouts of the specified preemption functions prior to final acceptance and approval.

Operating checkouts includes the following:

- Verifying that the priority system timing and range are properly set.
- Preemption equipment warranties are put into effect.
- Signal Timing and Sequence under Preemption Control. See preemption data as shown on the Construction Signal Timing Plan(s).

FLASHING OPERATION

The controller shall be equipped with a separate emergency flashing mechanism capable of providing flashing operation at the rate of 50 to 60 flashes per minute. This mechanism shall be implemented so that it will continue to cause the signals to flash even when the basic controller is removed.

ITEMS 816.81 & 816.82 (Continued)

Flashing operations and transition requirements shall be in accordance with Section 4D.28 thru 4D.31 of the MUTCD and shall be as shown on the Plans. Flashing yellow arrow operations shall be in conformance with Sections 4D.18 and 4D.20 of the MUTCD.

FLASHER

Flashers, shall comply with Subsection 6.3.3 of the NEMA TS 2 Standard and be equipped with two output indicator lights which will show flashing power out to the temporary signal assembly.

FLASH TRANSFER RELAYS

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.

TRAFFIC SIGNAL CONTROLLER

The controller unit shall be a keyboard-entry menu-driven unit conforms to the Standard Specifications, with internal time base coordination, emergency preemption, and programmatic capability. The controller shall also be complete with a module for closed loop system functions.

Controllers shall conform to Section 3, Controller Units of NEMA No. TS 2, Traffic Controller Assemblies. The controller unit shall meet all applicable requirements of the NEA Standard Publication No. TS 2 Type 1 and the Department's 2025 Standard Specifications and supplemental specifications. Controllers shall utilize an input/output interface conforming to Section 3.3.1 of the NEMA TS 2 Standard for all input/output functions with the backpanel terminals and facilities, the malfunction management unit, detector rack assemblies and auxiliary devices.

The controller shall be complete with a module, including modem card and physical connector to support future closed loop communication.

BUS INTERFACE UNITS

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.

At a minimum the BIU shall perform the interface function between Port 1 at the controller unit, the malfunction management unit, loop detector rack assembly, and the backpanel terminal and facilities. The temporary signal systems shall be supplied with the appropriate number of BIUs required to provide an operating traffic control signal according to the plans and these specifications.

ITEMS 816.81 & 816.82 (Continued)

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.

MALFUNCTION MANAGEMENT UNITS

The malfunction management units (MMU) shall comply with Section 4 of the NEMA TS 2 standard. The MMU shall be capable of operating as either a Type 16 with 16 channels (8 vehicle, 4 pedestrian, 4 overlap) or a Type 12 with 12 channels (8 vehicle, 4 overlap). The MMU's supplied shall be configured to operate as Type 16 units.

The MMU shall be connected directly to the controller unit to support enhanced MMU monitoring of controller operations.

MMU must be compatible with Flashing Yellow Arrow (FYA).

VIDEO VEHICLE DETECTION

This specification sets forth the minimum requirements for a system that detects vehicles on a roadway using only video images of vehicle traffic. The system shall be installed by technicians that have been trained and certified by the manufacturer.

The video detection system at each intersection where video detection is proposed in the plans shall consist of: one video camera per approaching intersection leg, as specified in the plans, each with a video detection processor (VDP); an interface which mounts in a standard detector rack or as a stand-alone shelf mount unit; and a pointing device.

The video detection system shall be able to detect vehicles in multiple lanes. Detection zones shall be defined using only an on-board video menu and a pointing device to place the zones on a video image. Video detection system shall have the specified number of detection zones at each of the following locations:

- Three (3) detection zones at Main Street (Route 38) at Maple Meadow Brook
- Three (3) detection zones at Main Street (Route 38) at Culvert at Dublin Ave

The VDP shall be capable of storing up to three different detection zone patterns.

The VDP shall detect vehicles in real time as they travel across each detector zone.

When a vehicle is detected crossing a detection zone, confirmation of detection is with a distinct visual indication on the video overlay.

The VDP shall be capable of providing 2 channels of vehicle presence detection per system.

The VDP shall provide dynamic zone reconfiguration (DZR).

ITEMS 816.81 & 816.82 (Continued)

The cable to be used between the VDP and the controller-connecting interface shall be three (3) twisted pairs and conform to IMSA Specification No. 39-2. The cable shall be a continuous unbroken run from the VDP to the ICC. The cable, and installation tools shall be approved by the supplier of the video detection system, and the manufacturer's instructions must be followed to ensure proper connection.

The video detection system shall be installed by certified factory installers and as recommended by the supplier and documented in installation materials provided by the supplier. Proof of factory certification shall be provided.

The supplier shall maintain an adequate inventory of parts to support maintenance and repair of the video detection system. These parts shall be available for delivery within 30 days of placement of an acceptable order at the supplier's then current pricing and terms of sale for said parts. The supplier shall maintain an ongoing program of technical support for the video detection system. This technical support shall be available via telephone, or via personnel sent to the installation site upon placement of an acceptable order at the supplier's then current pricing and terms of sale for on-site technical support services.

SPARE EQUIPMENT

The Contractor shall provide the following spare signal equipment for each of the temporary traffic signal controllers, equipment listed below:

- Two (2) Bus Interface Units (BIU's)
- Two (2) Type C, 2-Channel Card Rack Two (2) Video Detection Processor Cards

SURGE SUPPRESSION

Each temporary signal control system shall have each input and output surge protected except signal outputs from load switches. (The load switches act as surge suppressors.)

The surge protector must be electrically connected to the nearest grounded metal structure or nearest ground rod.

Surge protection for power service shall conform to the NEMA TS-2 standard. The product complies when a lab report summary from an independent test laboratory stating the product passes the current NEMA TS-2 (5.4.2.4) specification is submitted with the shop drawings.

Surge protection for all loop, pedestrian button, and pre-emption connections shall have peak surge current protection of at least 10kA with a response time of less than 5 nanoseconds. The product complies when a lab report summary from an independent test laboratory stating the product passes this specification is submitted with the shop drawings.

ITEMS 816.81 & 816.82 (Continued)**BASIS OF PAYMENT**

Items 816.81 and 816.82 will be paid for at the Contract lump sum prices, which prices shall include all labor, material, equipment and incidental costs required to complete the work to provide a working traffic control signal system at the specified location. Installation of service connections, conduit, alternate power sources such as generators or solar panels, and wiring shall be considered incidental to Items 816.81 and 816.82.

All additional materials and labor necessary to complete the work will be incidental to the construction and be included in the lump sum prices.

ITEM 816.83 TEMPORARY TRAFFIC SIGNAL RECONSTRUCTION - LUMP SUM
RETIMING LOCAL SIGNALS

The work shall consist of temporary retiming seven (7) signalized intersections in concurrence with the implementation of the temporary traffic signals under Items 816.81 and 816.82, and in the site-specific staged traffic management plans depicted on Sheets 186-200 of the Plans. The traffic signals to be retimed shall be determined by the direction of the Engineer, MassDOT, and the Town of Wilmington during construction. These signalized intersections are anticipated to be affected by traffic diverting from Route 38 during construction of the culvert near Dublin Avenue or the construction of the bridge over Maple Meadow Brook:

- Middlesex Avenue at Wildwood Street
- Middlesex Avenue at Federal Street
- Woburn Street at Lowell Street
- Woburn Street at Concord Street
- Woburn Street at West Street
- Main Street (Route 38) at Church Street/Burlington Avenue (Route 62)
- Main Street (Route 38) at Lowell Street (Route 129)

The traffic signals shall be retimed per direction from the Engineer using timings provided by the Engineer, for the duration of the detour routes covering the affected traffic signals. Existing timings shall be restored following completion of the construction of the culvert near Dublin Avenue or the construction of the bridge over Maple Meadow Brook. The Engineer will provide temporary traffic signal timings for each intersection in advance of implementation of the associated detour routes.

Construction Methods

Existing signal installations shall be maintained in operation throughout the construction period unless directed for retiming per review of the traffic data monitoring program under Item 871.9. If an existing signal is to be turned off temporarily to allow for controller changes, a police detail shall be used to control traffic at the intersection until stop-and-go operation is restored. The Contractor shall minimize the amount of time that traffic control equipment is not operational and actively controlling traffic at any given intersection, and the Contractor shall plan for and schedule the work accordingly. Unless called out to be adjusted in the Plans, existing signal equipment and settings shall be retained.

Documentation

Before implementation of the detour route, the Contractor shall record the existing traffic signal timings, phase/ring progression, and timing patterns and provide copies of the timing settings to the Town of Wilmington and MassDOT. The Contractor shall restore these existing traffic signal timings following completion of the detour route.

ITEM 816.83 (Continued)**BASIS OF PAYMENT**

Item 816.83 will be paid for at the Contract lump sum price, which price shall include all labor, material, equipment and incidental costs required to complete the work to provide a working traffic control signal system at all locations determined to require retiming during the ramp closures. It is assumed that seven (7) signalized intersections will require one set of temporary retimings and one restoration to original traffic signal timings, and that the two listed intersections on Route 38 will each require a total of four (4) retimings to the temporary timings depicted on Sheets 186-200 in the Plans and a subsequent retiming to existing conditions or to that of the next construction stage.

ITEM 821.72**LIGHT POLE AND LUMINAIRE
REMOVED AND STACKED****EACH**

This work under this item shall include removing and returning, to the owner: poles, bases and luminaires at the locations shown on the plans in accordance with the relevant provisions of Subsections 801, 813, 820 of the Standard Specifications and the following:

Construction Methods

The Contractor shall coordinate the removal of the existing light poles with the owner(s).

All repairs, new conduit, wire and wiring required to provide a functioning lighting system upstream and downstream of the removed light fixtures shall be furnished under this item. Materials and products furnished shall be designed for the intended use, shall meet all requirements of the latest edition of the National Electric Code and all local codes.

The work shall also include the complete removal and repairs associated with the removal of existing foundations.

Light poles, bases, and foundations that are damaged by the Contractor's operations shall be replaced with new products of the same model and type at no additional cost.

METHOD OF MEASUREMENT

Item 821.72 will be measured for payment per each light pole and luminaire removed and returned to the property owner's designated location on site.

BASIS OF PAYMENT

Item 821.72 will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 825.101 RRFB (2-POST ASSEMBLY SYSTEM – AC-POWERED) EACH

This work under this item shall conform to the relevant provisions of Subsection 825 of the Standard Specifications, the Plans, and MassDOT's Standard Drawing Number 825.0.1 Rectangular Rapid Flashing Beacon, and the following:

The work shall include furnishing and installing AC-powered, pedestrian actuated, rectangular rapid flashing beacon (RRFB) system at the locations shown in the plans. RRFBs are intended to provide supplemental warning to approaching vehicles of the potential for pedestrians to be crossing in an adjacent crosswalk.

Materials

An RRFB system shall, at a minimum, consist of the following items:

- (2) concrete foundations;
- (2) 15' traffic signal posts and pedestals;
- (2) APS pushbutton systems;
- (4) dual rectangular yellow LED beacons in NEMA enclosures;
- (2) 9"x12" R10-25 (PUSH BUTTON TO TURN ON WARNING LIGHTS) signs;
- (4) 30"x30" W11-2 warning signs;
- (2) 24"x12" W16-7PR and (2) 24"x12" W16-7PL (Diagonal Downward Arrow) signs;
- (1) Service Connection;
- (2) Meter socket
- (2) NEMA Type 3R or higher enclosures to house:
 - Electrical components, including wiring and solid-state circuit boards;
 - On-board user interface;
 - Frequency hopping spread spectrum (or other alternate FCC approved) wireless activation unit with a minimum 150' range; and

All mounting and supporting hardware and wiring necessary to complete a working system.

RRFB controller and LED beacons, APS pushbutton systems, and traffic signal posts and pedestals shall be listed on the MassDOT Qualified Traffic Control Equipment List.

The Contractor shall supply cement concrete foundations per the Plans.

The Contractor shall supply Schedule 80 aluminum signal posts with a brushed or spun finish and square, pedestal aluminum bases with a natural finish unless otherwise shown in the Plans or Special Provisions.

Each Light Bar shall have a pair of yellow beacons facing one or both directions of traffic, as shown in the Plans.

All sign designs shall conform to the MUTCD. Sign panel information, including dimensions, shall be per the Plans.

ITEM 825.101 (Continued)

R10-25 signs may be integrated into the APS pushbutton system as a single unit or mounted separately on Type A aluminum.

The warning signs (MUTCD code W11-2, W11-15, or S1-1 signs – see Plans for sign type), and the diagonal downward arrow sign (W16-7P) signs shall be on Type A substrate, conforming to 828.42: Panels. The sign sheeting shall be fluorescent yellow-green, conforming to ASTM D4956 Type IX.

Each assembly shall be rated for wind speeds of up to 90 mph. Any proprietary software required for the programming and/or operation of the system during its lifetime shall be included at no additional cost

Prior to the Notice to Proceed the Contractor shall submit shop drawings for the RRFB system, including cutsheets for all components to show conformance with M10.05.1, M10.09.1, and M10.11.0 and these specifications.

All RRFB components shall include a minimum 1-year manufacturer's replacement warranty for manufacturing or installation defects starting at the date of acceptance by the Engineer. A battery shall be considered defective should it not retain 80% of its original capacity within the warranty period.

Construction Methods

No work shall commence until the shop drawings are approved.

Layout and design of the RRFB system shall conform to the plans.
RRFBs shall be installed on new foundations at the locations as shown in the Plans. Bases shall be secured to the foundation in accordance with the manufacturer's specifications.

All systems shall be installed per the manufacturer's instructions.

The location and orientation of the system shall be per the Plans.

The arrow on each APS pushbutton shall be aligned parallel to the direction of travel of the crosswalk.

The Light Bar(s) shall be oriented towards the incoming lane(s).

Conduit installations shall be per Subsection 801.60. Pull box installations shall be per Subsection 801.61.

Foundation installations shall be per Subsection 801.62. The top of the foundation shall be ¼" to 1" above the sidewalk and chamfered at 45 degrees. Gaps between the sidewalk and foundation shall be no larger than 1/4" and grouted with performed joint filler.

ITEM 825.101 (Continued)

The Contractor shall provide extension bracket mounted on the signal posts such that the pedestrian pushbutton detector shall be located within the 10 inches from the back of accessible ramp level landing. The extension bracket including pushbutton and signs shall not encroach into level landing resulting in a level landing area smaller than 4 feet by 5 feet. The bracket extension shall provide the provision of mounting pushbutton and 9 inch by 15 inch sign required per ADA and MUTCD guidelines. The bracket extension shall be installed per manufacturer's recommendation and the length of the extension shall be field verified and adjusted as needed. If the final installed location of pushbutton and sign is located outside of the specified range, the Contractor shall be responsible for reinstalling the bracket extension with pushbutton at the specified location at no additional cost to the state. The final location shall be approved by the Engineer.

Equipment grounding shall be per Subsections 813.61 and 813.62.

Service connection shall be per Subsection 813.63. Contractor shall be required to pay all costs associated with the utility connection until final acceptance of the system. Upon acceptance, the contractor shall notify the Framingham Department of Public Works in writing with the account number and meter number in order to transfer payment of the account.

The Contractor shall diagnose and replace any part of the pedestrian activated warning system that is found to be defective in workmanship, material, or manner of functioning within six months of final acceptance by the Engineer. This requirement does not supersede the one-year warranty period on materials specified in Subsection 815.20.

All RRFB equipment including, but not limited to, signal pole/posts, bases, pushbutton saddles, and control cabinets shall be painted black.

SYSTEM OPERATION**APS Pushbuttons**

APS Pushbuttons shall actuate the RRFB system. Upon actuation, an audible speech message shall be broadcast from each pushbutton in the system that says, "Warning lights are flashing," shall be stated twice. This message shall be repeated upon each actuation. No other messages shall be allowed.

Each APS pushbutton shall have a tactile arrow. The tactile arrow shall be oriented to point in the direction of the crosswalk.

While the system is in dark mode, the APS Pushbuttons shall broadcast a locator tone. The locator tone shall have a duration of 0.15 seconds or less and shall repeat at 1-second intervals at all times that the system is in dark mode. The locator tone shall be set 2 to 5 dBA above ambient sound, shall automatically adjust intensity, but cap at a maximum volume of 100 dBA.

APS Pushbuttons shall have all other vibrotactile and percussive indications disabled.

ITEM 825.101 (Continued)**Light Bar**

The Light Bar shall remain dark until actuated.

Upon actuation, all Light Bars in the system shall be activated simultaneously for a predetermined repeating flash sequence. The flashing rate shall be 75 flashing sequences per minute.

The left and right yellow beacons shall operate using the following sequence:

1. The yellow beacon on the left-hand side shall be illuminated for approximately 50 milliseconds.
2. Both yellow beacons shall be dark for approximately 50 milliseconds.
3. The yellow beacon on the right-hand side shall be illuminated for approximately 50 milliseconds.
4. Both yellow beacons shall be dark for approximately 50 milliseconds.
5. The yellow beacon on the left-hand side shall be illuminated for approximately 50 milliseconds.
6. Both yellow beacons shall be dark for approximately 50 milliseconds.
7. The yellow beacon on the right-hand side shall be illuminated for approximately 50 milliseconds.
8. Both yellow beacons shall be dark for approximately 50 milliseconds.
9. Both yellow beacons shall be illuminated for approximately 50 milliseconds.
10. Both yellow beacons shall be dark for approximately 50 milliseconds.
11. Both yellow beacons shall be illuminated for approximately 50 milliseconds.
12. Both yellow beacons shall be dark for approximately 250 milliseconds.

The flash rate of each individual RRFB indication, as applied over the full flashing sequence, shall not be more than 5 flashes per second, to avoid frequencies that might cause seizures.

The sequence shall then be repeated until the duration time has been met and then all yellow beacons shall return to dark mode simultaneously. The duration time shall be per the Plans.

The predetermined repeating flash sequence shall be immediately initiated every time a pushbutton detector is actuated. If the RRFBs are already flashing and an actuation is received, it shall restart the duration time. There shall be no delay time programmed between actuations.

Service Connection

As soon as notice to proceed with construction is given, the electrical contractor shall submit a request to the servicing utility company for electrical service on behalf of the MassDOT.

ITEM 825.101 (Continued)

Service connections shown on the plans are approximate only. The Contractor shall determine exact locations from the servicing utility, arrange to complete the service connections, and be responsible for all charges incidental thereto.

A 100-ampere meter socket approved by the servicing utility company shall be furnished and installed on the side of the control cabinet by the serving utility company.

A 3" PVC Conduit shall be installed from the controller cabinet to the utility pole and/or electric manhole, which will supply electrical service to the RRFB system. This conduit shall be encased in concrete where crossing roadways and/or driveways.

The Contractor shall furnish and install, or cause to be installed, all service equipment to the satisfaction of the electric utility company. It shall also be the Contractor's responsibility to pay all charges to the utility company for performing the work previously described.

No direct reimbursement will be made under this contract to the Contractor for payment made to electric company, it being understood that full compensation for any payment made by the Contractor to the utility company will be included in the contract prices bid. Grounding Cable – Grounding cable shall be bare copper No. 8 AWG wires.

METHOD OF MEASUREMENT

Item 825.101 will be measured by Each, as a single system, 2-Post Assembly, furnished and installed, complete in place.

BASIS OF PAYMENT

Item 825.101 will be paid for at the contract price per each. Any additional wiring, mounting equipment, or other materials or labor required to for an operating system per the Plans and Specifications shall be considered as incidental to the construction and be included in this contract bid price.

Conduit shall be paid for separately under Item 804.3. Pull boxes shall be paid for separately under Item 811.31.

<u>ITEM 831.11</u>	<u>ROADSIDE GUIDE SIGN (MA-D1-XX) - ALUMINUM PANEL (TYPE A)</u>	<u>SQUARE FOOT</u>

The work under this Item shall conform to the relevant provisions of Subsection 828 of the Standard Specifications and the following:

The work shall consist of fabricating and installing new 0.250 inch thick Type A (sheet) aluminum signs as indicated on the plans or as directed by the Engineer. Signs shall be installed on new support posts.

METHOD OF MEASUREMENT

Item 831.11 will be measured for payment by the Square Foot of guide sign panel installed, complete in place.

BASIS OF PAYMENT

Item 831.11 will be paid for at the Contract unit bid price per Square Foot, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work. Item 831.11 includes providing new brackets and other hardware required to install signs onto new sign supports.

New sign supports shall be paid for under Item 841.11.

<u>ITEM 841.11</u>	<u>SUPPORT FOR GUIDE SIGN (MA-D1-XX) - 5 INCH TUBULAR - STEEL</u>	<u>EACH</u>

The work under this Item shall conform to the relevant provisions of Subsection 840 of the Standard Specifications and the following:

The work shall consist of fabricating and installing new 5 inch tubular sign supports with breakaway slip bases in 4000 PSI concrete foundations as indicated on the plans or as directed by the Engineer.

METHOD OF MEASUREMENT

Item 841.11 will be measured for payment by the each support post installed, complete in place.

BASIS OF PAYMENT

Item 841.11 will be paid for at the Contract unit bid price per Each, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

New sign panels shall be paid for under Item 831.11

ITEM 851.91**TEMPORARY SPEED HUMP****EACH**

Temporary Speed Hump shall conform to the relevant provisions of Subsection 850 of the Standard Specifications, Chapter 16 of the MassDOT Project Development and Design Guide (PDDG) and the following:

Description & Construction Methods

This work shall consist of implementing temporary speed humps at locations identified by the Engineer, MassDOT, and the Town of Wilmington during construction. The Contractor shall provide shop drawings for review and approval by the Engineer. Temporary Speed Humps shall not be implemented until approved by the Engineer.

METHOD OF MEASUREMENT

Item 851.91 will be measured for payment by the Each, the number of temporary speed humps actively deployed on roadways at the locations that have been identified by the Engineer, MassDOT, and the Town of Wilmington during construction. Relocation or replacement of a given temporary speed hump shall not be measured separately.

BASIS OF PAYMENT

Item 851.91 will be paid for at the contract unit price per each temporary speed hump actually implemented, which price shall include all labor, material, equipment, removing and resetting, and incidental costs required to complete the work to provide a functional speed hump with traffic calming effects.

ITEM 852.11
ITEM 852.12**TEMPORARY PEDESTRIAN BARRICADE**
TEMPORARY PEDESTRIAN CURB RAMP**FOOT**
EACH**Description**

Work under these items consist of furnishing, deploying, maintaining in proper operating conditions, and removing temporary pedestrian barricades and temporary pedestrian ramps as part of a Temporary Pedestrian Access Route (TPAR) in order to guide pedestrians around a fully- or partially-closed sidewalk. These devices are intended to prevent pedestrians from entering the work area and to prevent pedestrians from inadvertently entering the vehicle travel lane by providing visual and physical separation between each space.

Materials

The Temporary Pedestrian Barricade shall have a continuous bottom rail or edge no more than two (2) inches above the ground and eight (8) inches in height (minimum) to accommodate cane users, have a smooth and continuous hand railing along the top edge no less than 32 inches above the ground and not obstruct or project into the pedestrian path of travel. Barricade walls shall be nearly vertical and generally within the same plane.

If exposed to traffic, Temporary Pedestrian Barricades shall be crashworthy.

The Temporary Pedestrian Curb Ramp shall provide a 48 inch minimum width, with a firm, stable, and non-slip surface. Protective edging with a two (2) inch minimum height shall be installed when the curb ramp or landing platform has a vertical drop of six (6) inches or greater.

The Temporary Pedestrian Curb Ramp walkway and landing area surface shall be of a solid, continuous, contrasting color abutting up to the existing sidewalk.

If a Temporary Pedestrian Curb Ramp leads to a crosswalk, a detectable warning pad must be used at the base of the ramp; if it leads to a protected path that does not conflict with vehicular traffic then a detectable pad shall not be used.

Construction Methods

The Temporary Pedestrian Barricade shall be placed in an area that will provide pedestrians with a TPAR on a smooth, continuous hard surface for its entirety. The geometry and alignment of the facility shall meet the applicable requirements of the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities” and the Massachusetts Architectural Access Board.

The recommended width of the TPAR is 60 inches, but if constraints exist a minimum clear width of 48 inches shall be provided along its entirety. If a 60 inch width cannot be accommodated in full, a 60 inch by 60 inch passing space shall be provided every 200 feet or less along the TPAR. Turning areas shall be 60 inches by 60 inches minimum.

ITEMS 852.11 & 852.12 (Continued)

Lateral joints between any surfaces shall not exceed 0.5 inches. Lateral edges may be vertical up to 0.25 inches high and shall be beveled at 1V:2H between 0.25 inches and 0.5 inches.

The TPAR shall be kept clear of debris, snow, and ice and the Temporary Pedestrian Barricades and Temporary Pedestrian Curb Ramps shall not obstruct drainage.

Removal and/or resetting of Temporary Pedestrian Barricades and Temporary Pedestrian Curb Ramps shall be considered incidental.

COMPENSATION

Payment for Temporary Pedestrian Barricades will be made at the contract price per foot installed in place, including all incidental items. This price shall include the cost of furnishing, installing, resetting, removal, and maintaining in good working condition.

Payment for Temporary Pedestrian Curb Ramps will be made at the contract price per each unit installed in place, including all incidental items. This price shall include the cost of furnishing, installing, resetting, removal, and maintaining in good working condition.

<u>ITEM 853.331</u>	<u>TEMPORARY BARRIER – LIMITED DEFLECTION (TL-3) REMOVED AND RESET</u>	<u>FOOT</u>

Work under this item shall conform to the relevant provisions of Subsection 850 and the following:

The work shall consist of removing, transporting and resetting limited-deflection temporary barrier (TL-3) systems from alignments established along the roadway to new alignments in accordance with the details shown on the plans, as required by the construction and staged construction operations and as required by the Engineer for the channelization of traffic and/or work zone protection.

The work shall also include furnishing and installing all hardware and associated materials per the details and/or manufacturer's specifications. The work shall also include necessary patches and repairs caused by the limited deflection temporary barrier system for the damaged pavement surfaces or any adjacent longitudinal barrier once the system has been removed.

Limited deflection temporary barrier (TL-3) systems shall be removed from existing locations and reset in accordance to the construction methods stated in the respective barrier items.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 853.331 will be measured and paid for at the contract unit price per foot, in place which shall provide full compensation for removing, relocating, resetting, realigning, transporting and maintaining the limited deflection temporary barrier (TL-3) system. The contractor will be paid for this item only one time the limited deflection barrier is relocated either to a new work zone, or to off-season storage, and back to the project from storage. The Contractor will not be separately compensated for any work necessary to maintain or re-align units or replace damaged units. No payment will be made for removing and resetting barriers for the purpose of gaining access to the construction work zone. No payment will be made for removing, relocating and resetting any barriers moved for the convenience of the Contractor.

For temporary barrier systems that require anchorage systems, the cost of furnishing, installing and removing the anchorage and hardware and the restoration of pavement surfaces or adjacent barrier systems to facilitate anchorage shall be considered incidental to the cost of this Item.

ITEM 853.9 **PORTABLE SPEED FEEDBACK DISPLAY TRAILER** **MONTH**

The work under this item shall conform to the relevant provisions of Subsection 850 of the Standard Specifications and the following:

Description and Construction Methods

The speed feedback trailer shall have a Radar Speed Display Sign with 20 Watt Solar Panel or larger. The battery shall be a user-replaceable battery rated at 30 AH or higher. The manufacturer shall conform to one of the models listed on the MassDOT Qualified Traffic Control Equipment list for Speed Display Signs.

The Speed Feedback Display Trailer shall have the words “YOUR SPEED” in black letters and a white background. The sheeting shall meet the requirements of the Standard Specifications.

The digital display shall consist of amber LEDs and shall be capable of displaying 2-digits. The display shall be capable of displaying a “SLOW DOWN” message using a 3-inch letter height, if the detected speed is more than 10 MPH above the posted speed limit. The speed shall be displayed in 1 MPH increments.

All materials furnished, assembled, installed and used in the fabrication and erection of the Speed Feedback Display Trailer shall be installed per the manufacturer’s instructions and as directed by the Engineer. Materials not specifically covered in these specifications shall be in accordance with the current, accepted standards of the National Electric Manufacturers Association (NEMA), the Underwriters Laboratories (UL), the National Electric Code (NEC) and the American Society for Testing and Materials (ASTM).

The Contractor shall orient the fixtures in such a manner as to optimize viewing and detection angles using the manufacturer’s recommendations for installation instructions.

The Contractor shall conduct approved stand-alone, system performance tests of the equipment implemented. The tests shall, as a minimum, satisfactorily exercise all stand-alone functional requirements of the field equipment.

The setup and programming of the speed feedback sign shall be completed and coordinated by the Contractor. The display options shall be coordinated with the Wilmington DPW Highway division. The Contractor shall provide training to the Wilmington DPW Highway division and the Wilmington Police Department on the use and functionalities of the Speed Feedback Display Trailer. The training shall consist of hands-on training using installed system equipment. The cost of the coordinating and training shall be considered incidental to the Speed Feedback Display Trailer.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 853.9 will be measured and paid for by the number of months in which each trailer is implemented and active, which price shall include all labor, materials including signage, equipment, wiring, and incidental costs required to complete the work and provide, deploy, maintain, and remove the trailer.

ITEM 859.1 **REFLECTORIZED DRUMS WITH SEQUENTIAL** **DAY**
FLASHING WARNING LIGHTS

The work under this Item shall conform the relevant provisions of Subsection 850 of the Standard Specifications and the following:

Work under this item consists of furnishing, installing, maintaining in proper operating conditions, and removing reflectorized drums, and any necessary ballast, equipped with sequential flashing warning lights.

MATERIALS

Reflectorized drums shall be listed on the MassDOT Qualified Traffic Control Equipment List. Reflective sheeting on drums shall meet or exceed ASTM D4956 Type VIII. All drums shall be maintained in a satisfactory manner including the removal of oils, dirt, and debris that may cause reduced retroreflectivity.

The Contractor shall use one of the following sequential flashing warning light systems unless otherwise approved by the Engineer:

1. Empco-Lite LWCS.
2. pi-Lit® Sequential Barricade-Style Lamp; or
3. Unipart Dorman SynchroGUIDE.

Sequential flashing warning lights shall be secured to reflectorized drums per the light manufacturer's specifications.

CONSTRUCTION METHODS

The first ten (10) drums in any merging or shifting taper as designated in the Temporary Traffic Control Plan shall be equipped with sequential flashing warning lights. These lights shall be operating, at a minimum, between dusk and dawn when the taper is deployed.

The successive flashing of the sequential warning lights shall occur from the upstream end of the merging or shifting taper to the downstream end of the taper in order to identify the desired vehicle path. Each warning light in the sequence shall be flashed at a rate of not less than 55, nor more than 75 times per minute.

Warning lights shall be powered off when drums are not deployed in a taper.

METHOD OF MEASUREMENT

A group of ten (10) reflectorized drums with sequential flashing warning lights is considered one (1) unit and will be measured by the day. Each period of up to 24 hours during which this unit is in use will be measured as one day regardless of the number of times that the drums are positioned, repositioned, removed, or returned to service.

ITEM 859.1 (Continued)

BASIS OF PAYMENT

Reflectorized Drums with Sequential Flashing Warning Lights will be paid for at the contract unit price per day, which shall include full compensation for furnishing, positioning, repositioning, and removing the group of ten (10) drums as directed by the Engineer.

ITEM 864.1**COLORIZED PAVEMENT MARKINGS****SQUARE FOOT**

This work under this item shall consist of furnishing and applying the colorized red or green pavement markings at the locations as shown on the Plans and/or as directed by the Engineer and shall conform to Subsection 860 of the Standard Specifications. Glass or reflective beads shall not be incorporated into the pavement markings.

Materials

Colorized Pavement Markings are composed of Epoxy, Methyl Methacrylate (MMA), or Preformed Thermoplastic Materials.

The initial daytime chromaticity coordinates for colorized pavement shall fall within the area created by the following coordinates for each of green and red:

Initial Daytime Chromaticity Coordinates (Corner Points) for Green Colorized Pavement Markings				
	1	2	3	4
x	0.230	0.266	0.367	0.367
y	0.714	0.460	0.480	0.583
Initial Daytime Chromaticity Coordinates (Corner Points) for Red Colorized Pavement Markings				
	1	2	3	4
x	0.420	0.450	0.560	0.540
y	0.330	0.380	0.370	0.320

The surface of the Colorized Pavement Markings shall provide a minimum skid resistance value of 55 British Pendulum Number (BPN) when tested in accordance with ASTM E303.

The Contractor shall provide a Certificate of Compliance verifying the product supplied meets the specified daytime chromaticity requirements and friction requirements prior to installation.

Construction Methods

The Contractor shall supply Shop Drawings to the Engineer for approval a minimum of 30 days in advance of installation. Shop Drawings shall include the product manufacturer's instructions, material safety data sheets (MSDS) for all components including any primers and sealers, and all tools, equipment, and procedures to be used for the installation. No work shall commence until the Shop Drawings have been approved.

It shall be the responsibility of the Contractor to prepare the surface prior to the installation of any Colorized Pavement Markings. Any joints or cracks in the pavement shall be pre-treated per the manufacturer's recommendation. The surface shall be clean and dry prior to installation of the system. If additional surface preparation is recommended by the manufacturer, such as the installation of a primer or preheating, it shall be completed per the manufacturer's specifications. All surface preparation shall be considered incidental to the cost of the item.

ITEM 864.1 (Continued)

Any existing pavement markings that conflict with the Colorized Pavement Markings shall be removed by the Contractor in advance of installation; installation of colorized pavement over pavement markings shall not be allowed. All existing pavement markings that are to remain, castings, curbs, and rumble strips within the vicinity of the colorized pavement application shall be covered and protected by the Contractor. Existing pavement markings damaged by the Colorized Pavement Markings installation shall be removed and replaced by the Contractor at no additional cost.

The Contractor shall follow all installation instructions from the manufacturer, including allowable ranges of temperature and humidity for installation, unless otherwise approved by the Engineer.

Upon completion of installation, a sealer shall be applied if recommended by the manufacturer. The sealer shall be installed per the manufacturer's specification. The application of a sealer shall be considered incidental to the cost of the item.

The Contractor shall maintain protection of the Colorized Pavement Markings installation from vehicle and foot traffic throughout the minimum cure time recommended by the manufacturer.

METHOD OF MEASUREMENT

Item 864.1 will be measured for payment by the SQUARE FOOT, of colorized pavement markings applied complete in place.

BASIS OF PAYMENT

Item 864.1 will be paid for at the contract unit price per SQUARE FOOT installed. The contract prices shall include all material, labor, equipment, and all incidental costs required to complete the work.

<u>ITEM 866.062</u>	<u>6 INCH REFL. WHITE LINE</u>	<u>FOOT</u>
	<u>(ALL WEATHER THERMO.) (RECESSED)</u>	
<u>ITEM 867.062</u>	<u>6 INCH REFLECTORIZED YELLOW LINE</u>	<u>FOOT</u>
	<u>(ALL WEATHER THERMO.) (RECESSED)</u>	

The work under these items shall conform to the relevant provisions of Subsection 860 of the Standard Specifications, and the following:

The Thermoplastic to be used shall be All Weather Thermoplastic with Intermix by 3M. A 3M technical representative must be onsite for the initial installation of the Thermoplastic. Groove preparation and thermoplastic installation shall be done in strict accordance with the manufacturer's requirements. All equipment shall be thoroughly cleaned prior to the melting of All Weather Thermoplastic. There shall be no mixing of regular and All Weather Thermoplastic material in the Contractor's equipment.

The thermoplastic shall be installed into a 7 inch +/- ½ inch wide by 150 mils +/- 5mils deep recessed grooves. The grooves shall be cut using a Diamond Head Saw Blade to produce a smooth surface at the bottom of the groove according to the manufacturers specification. All grooves shall be cleaned with a high pressure air stream prior to the installation of the thermoplastic material. When water has been used to cool the saw blades during the grooving operation, the contractor shall allow the pavement to dry for 24 hours prior to the application of the markings. Immediately prior to the application of the pavement markings the groove shall be cleaned with high-pressure air blast. Final thickness of the installed thermoplastic shall be 90 mils.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Items 866.062 and 867.062 will be measured and paid for at the respective contract unit prices per linear foot for lines completely installed in place. These unit prices will be full compensation for all labor, material and equipment required to fully recess the all-weather thermoplastic pavement markings per manufacturer's specifications. Any layout or removal of existing pavement markings shall be considered incidental to these items.

The locations where recessed thermoplastic pavement markings are to be installed include all markings as determined in the field and as directed by the Engineer. Minimum marking length will be in increments of no less than ¼ mile.

<u>ITEM 868.06</u>	<u>6 INCH REFLECTORIZED WHITE LINE (EPOXY)</u>	<u>FOOT</u>
<u>ITEM 868.12</u>	<u>12 INCH REFLECTORIZED WHITE LINE (EPOXY)</u>	<u>FOOT</u>
<u>ITEM 869.06</u>	<u>6 INCH REFLECTORIZED YELLOW LINE (EPOXY)</u>	<u>FOOT</u>

Work under these items cover white and yellow epoxy reflectorized pavement striping material that is sprayed onto the pavement. As work incidental to these items the Contractor shall furnish to the Department one portable spectrophotometer and one replacement calibration standard with the Department taking ownership of these pieces of equipment. The spectrophotometer shall be delivered to the Research and Materials headquarters at the beginning of line striping work. Following a surface application of glass beads and upon drying, the resultant marking is a reflectorized stripe of specified thickness and width, that is capable of resisting deformation by traffic. Work under these items shall conform to the relevant provisions of Section 860 of the Standard Specifications and the following:

MATERIAL REQUIREMENTS

A. Regular-dry epoxy markings shall be one of the following products, or approved equivalent:

BRAND NAME	SUPPLIER/LOCATION
Epoplex LS50	Epoplex - Stonhard Inc. Maple Shade, NJ
Hotline TM 8212 (Part A White) Hotline TM 8213 (part A Yellow) Hotline TM 8214 (Part B Hardener or Converter)	Baltimore Paint and Chemical Co. Division of Sherwin-Williams Baltimore, MD Edison, NJ
Lumiline, Lumiline II	Accent Stripe, Inc. Orchard Park, NY
Poly-Carb Mark 55.3	Poly-Carb Inc. Solon, OH
Super Lifeline II, III	Linear Dynamics Ball Ground, GA
Thermopoxy Series 100 Part A (Series 101 White) Part A (Series 102 Yellow) Part B (Series 103)	Technical Coatings Corp. Alpharetta, GA

ITEMS 868.06, 868.12 & 869.06 (Continued)**B. Epoxy Material****1. Composition.**

The epoxy resin composition shall be specifically formulated for use as a pavement marking material and for hot-spray application at elevated temperatures. The type and amounts of epoxy resins and curing agents shall be at the option of the manufacturer, providing the other composition and physical requirements of this specification are met.

The epoxy marking material shall be two-component (Part A and Part B), 100% solids type system formulated and designed to provide a simple volumetric mixing ratio (e.g. two volumes of Part A to one volume of Part B).

The epoxy marking material shall be supplied as either a regular-dry or a slow-dry material. Regular-dry may be used for all marking patterns. Slow-dry material is intended for marking hatchlines, edgelines, and other marking patterns located out of the general path of traffic.

All acceptances of uninstalled epoxy marking material shall expire six (6) months after the date of manufacture.

Part A of both white and yellow shall conform to the following requirements:

PERCENT BY WEIGHT OF PART A .

WHITE	Pigment - 18 Minimum, Titanium Dioxide (ASTM D476, Type II) Epoxy Resin - 75 to 82
YELLOW	Pigment - 18 Minimum, Titanium Dioxide (ASTM D476, Type II) 5 Minimum, Organic Yellow, Epoxy Resin – 73 to 77

The entire pigment composition shall consist of either titanium dioxide or titanium dioxide and organic yellow. No extender pigments are permitted. Yellow pigment shall be lead-free.

The epoxy content of the epoxy resin in Part A will be tested in accordance with ASTM D 1652 and calculated as the weight per epoxy equivalent (WPE) for both white and yellow. The epoxy content will be determined on a pigment free basis. The epoxy content (WPE) shall meet a target value provided by the manufacturer and approved by the Department. A ± 50 tolerance will be applied to the target value to establish the acceptance range.

The amine value of Part B shall be tested in accordance with ASTM D2074(2) to determine its total amine value. The total amine shall meet a target value provided by the manufacturer and approved by the Department. A ± 50 tolerance will be applied to the target value to establish the acceptance range. The manufacturer may specify an alternate test method for determining the amine value subject to the approval of the Department.

ITEMS 868.06, 868.12 & 869.06 (Continued)**2. Physical Properties of Mixed Components (Part A and Part B).**

Unless otherwise noted, all samples are to be prepared tested at an ambient temperature of $73 \pm 3^{\circ}\text{F}$.

a. Color.

Yellowness Index (ASTM D-1925).

- Cure 72 hours after sample preparation
- Take yellow index reading, XYZ C/2°, following 72 hour cure and preceding QUV
- Maximum index before QUV: 8.0
- Place sample in QUV for 72 hours
- Maximum index after QUV: 20

Typical White Standard

X78.5

Y81.1

Z90.4

Y14.7

Typical Yellow Standard

X52.7

Y 48.1

Z7.6

b. Directional Reflectance.

The white epoxy composition (without glass spheres) shall have a daylight directional reflectance of not less than 84% relative to a magnesium oxide standard when tested in accordance with ASTM E1347.

The yellow epoxy composition (without glass spheres) shall have a daylight directional reflectance of not less than 55 % relative to a magnesium oxide standard when tested in accordance with ASTM E 1347.

c. Drying Time (Laboratory).

When tested in accordance with ASTM D711 as modified below, regular-dry epoxy marking material shall reach a no-pick-up time in 30 minutes or less. Under these same test conditions, slow-dry epoxy marking material shall reach a no-pick-up time in 60 minutes or less. A Bird Applicator or other suitable instrument shall be used to spread a nominal 15 ± 1 mil thick wet film. Reflective glass spheres shall be immediately dropped onto the epoxy film at a rate of 18 pounds per gallon.

d. Drying Time (Field).

When installed at 77°F at the specified wet film thickness and reflectorized with glass spheres, regular-dry and slow-dry epoxy markings shall reach a no-track condition in approximately 30 minutes, and 60 minutes, respectively.

Dry to "no-tracking" shall be considered as the condition where no visual deposition of the epoxy marking to the pavement surface is observed when viewed from a distance of 50 feet, after a passenger car is passed over the line.

ITEMS 868.06, 868.12 & 869.06 (Continued)**e. Hardness.**

The epoxy composition when tested in accordance with ASTM D2240 shall have a Shore D hardness of between 75 and 100. Samples shall be allowed to cure for not less than 72 hours nor more than 96 hours prior to testing.

f. Infrared Spectrophotometer Analysis (ASTM D2621).

Samples of Part A and Part B shall be analyzed by infrared spectrography. The spectrum of each component shall be a reasonable match to the spectrum of the original formulation accepted by the Department.

C. Reflective Glass Spheres.

Reflective glass spheres for drop-on application shall conform to the following requirements:

The glass spheres shall be colorless, clean, transparent, free from milkiness or excessive air bubbles, and essentially clean from surface scarring or scratching. They shall be spherical in shape and at least 80 % of the glass beads shall be true spheres when tested in accordance with ASTM D-1155, Procedure A. The refractive index of the spheres shall be a minimum of 1.5 as determined by the liquid immersion method at 77°F.

The silica content of the glass spheres shall not be less than 60 % .

The glass spheres shall have the following gradation when tested in accordance with ASTM D-1214.

DOUBLE DROP METHOD**TYPE I**

<u>Sieve Opening</u>	<u>% Retained</u>
No. 10	0
No. 12	0 - 5
No. 14	5 - 20
No. 16	40 - 80
No. 18	10 - 40
No. 20	0 - 5
Pan	0 - 2

TYPE II

<u>Sieve Opening</u>	<u>% Retained</u>
No. 20	0 - 5
No. 30	5 - 20
No. 50	30 - 50
No. 80	9 - 32
No. 100	0 - 5
Pan	0 - 2

The glass spheres, Type I, shall be coated with a silane-type adherence coating to enhance embedding in and adherence to the applied binder film. The coated beads shall emit a yellow-green fluorescence when tested by the Danayl Chloride test procedure. The Type II glass spheres shall be treated with a moisture-proof coating. The beads shall show no tendency to adsorb moisture in storage and shall remain free of clusters and lumps. The beads shall flow freely from the dispensing equipment at any time when surface and atmospheric conditions are satisfactory for marking operations. The moisture-resistance of the glass spheres shall be determined on the basis of the following test:

ITEMS 868.06, 868.12 & 869.06 (Continued)

Place one kilogram of spheres in a washed cotton bag having a thread count of approximately 52 per square inch (warp and woof) and immerse the bag in a container of water for 30 seconds. Remove the bag and force excess water from the sample by squeezing the bag. Suspend and allow to drain for two hours at room temperature ($73 \pm 2^{\circ}\text{F}$). Then mix the sample in the bag by shaking thoroughly. Pour the sample slowly into a clean, dry glass funnel having a stem 4 inches in length, with a 0.4 inch inside diameter stem entrance opening and a minimum exit opening of 0.25 inches. The entire sample shall flow freely through the funnel without stoppage. When first introduced into the funnel, if the spheres clog, it is permissible to lightly tap the funnel to initiate the flow.

Reflective glass spheres may be accepted at the job site on the basis of the manufacturer's certification, or they may be submitted to the Research and Materials Laboratory for testing.

D. Packaging and Shipment.

Epoxy pavement marking materials shall be shipped to the job site in strong, substantial containers. Individual containers shall be plainly marked with the following information:

1. Name of Product
2. Item Number
3. Lot Number
4. Batch Number
5. Test Number
6. Date of Manufacture
7. Date of Expiration of Acceptance (6 months from date of manufacture)
8. The Statement (as appropriate): "Part A - Contains Pigment and Epoxy Resin," or "Part B - Contains Catalyst"
9. Quantity
10. Mixing Proportions, Application Temperature and Instructions
11. Safety Information
12. Manufacturer's Name and Address

Reflective glass spheres shall be shipped in moisture resistant bags. Each bag shall be marked with the name and address of the manufacturer and the name and net weight of the material.

EQUIPMENT AND APPLICATION REQUIREMENTS**E. Striping Equipment**

The equipment shall have a system capable of spraying the epoxy paint in the manufacturer's recommended proportions and be mounted on a truck of sufficient size and stability, and with an adequate power source to produce lines of uniform dimension and prevent application failure. It shall be capable of placing stripes on the left and right sides and of placing two intermittent lines simultaneously. It shall also be capable of applying glass beads at the rate of 25 pounds per gallon. All guns must be in full view of the operator at all times. The equipment shall be provided with a metering device to

ITEMS 868.06, 868.12 & 869.06 (Continued)

register the accumulated installed footage for each gun each day. Each vehicle shall include at least one operator who shall be a technical expert in equipment operations and epoxy application techniques.

Equipment shall have such a design that the pressure gauges for each proportioning pump are constantly visible to the operator at all times during its operation so that any fluctuation and pressure difference can be addressed immediately.

F. Surface Preparation

The pavement surface on which the epoxy paint material is placed shall be clean and dry. Existing traffic markings shall be removed by blasting or grinding. The curing compound on Portland cement concrete shall also be removed. Existing markings shall be removed so that at least 95% of the underlying pavement is visible. The abrasive material shall be removed from the pavement surface before the pavement is opened to uncontrolled traffic flow.

G. Application**1. Epoxy**

The epoxy paint markings shall have a thickness of 25 mils $\pm$ 1 mil, calculated without drop-on glass beads. All markings shall have uniform thickness with a uniform distribution of glass beads throughout the line width. The width of lines shall be as specified with a tolerance of 0.25 inches. Markings shall have sharp edges and cutoff at the ends.

2. Glass Beads

The glass beads shall be applied by the double drop method, which requires that Type I and Type II reflective glass spheres be injected into or dropped onto the liquid epoxy marking. Each type shall be applied simultaneously, at a minimum rate of 10 to 13 pounds per gallon of resin with a minimum total application of 25 pounds per gallon. Type I beads shall be applied first, immediately followed by Type II beads. The beads shall adhere to the cured epoxy or all marking operations shall cease until corrections are made.

3. Temperature Limitations

During marking operations, the pavement surface where the epoxy is to be placed shall have a minimum temperature of 40° F and the air temperature shall be at least 35° F. The pavement surface temperature, and the air temperature shall be determined at the start of each day of marking operation and at any time deemed necessary by the Engineer. The spraying temperatures shall be in accordance with the manufacturer's recommendations.

4. Application Rates

Application rates will be checked by the Engineer at convenient intervals by comparing tallies of materials used to the length of lines placed. For initial application and occasionally during the course of work, the Engineer may also check application to a pre-weighed sheet specifically placed for test purposes. Drop-on spheres shall not be applied in this test.

ITEMS 868.06, 868.12 & 869.06 (Continued)**5. Protecting Newly installed Markings**

Newly installed markings shall be protected from tracking during the setting period by one or more of the following methods:

- 1) Cone off wet lines from traffic
- 2) Use a convoy of moving vehicles to prevent traffic from crossing wet lines
- 3) Saturate lines with glass beads to prevent tracking.

PORTABLE SPECTROPHOTOMETER FOR MEASURING COLOR SPECIFICATION**Use**

Perform objective color measurements of road signs, pavement markings, barricades, and other traffic safety devices for the purpose of acceptance, approval or maintenance.

Measurement Parameters

Geometry: The spectrophotometer shall have a measurement geometry of 45° circumferential (illumination) and 0° (observation).

Spectral Range: The instrument shall have a spectral range of 400 to 700 nm.

Spectral Interval: The instrument shall have a spectral interval output of 20 nm. The internal computation spectral interval shall be 5nm.

Photometric Range: The instrument shall have a photometric range of 0 to 100% with a resolution of 0.01.

Standards: The instrument shall conform to the following standards:

DIN 5033, 5036, 6174

ISO 7724

ASTM D2244, E308, E313, E1164

Calibration

Calibration Standards: The instrument shall be supplied with one durable white traceable calibration standard. The instrument shall also be supplied with one black and one green durable calibration standards.

ITEMS 868.06, 868.12 & 869.06 (Continued)**Construction:**

Basic Construction: The instrument shall be rigidly constructed to maintain a fixed geometry and must not contain any foldable or collapsible parts.

Illumination: the instrument shall utilize an LED lamp system for sample illumination.

This lamp system shall consist of 30 individual LED's. There shall be 3 LED's per color oriented at 120 degrees from each other to provide accurate light control and a larger sample port size.

The illumination system shall not raise the temperature of the sample being measured either during a single measurement or during multiple, repeated measurements.

Dimensions: The instrument's physical dimensions shall be 3.75 inches wide, 3.5 inches tall and 7 inches long. The instrument shall weigh 32 ounces.

Power Source: The instrument shall be powered by four AA size alkaline, NiCd or MH batteries. The instrument shall be capable of taking at least 5000 measurements on one set of fully charged batteries.

Use and Control

Display: The instrument shall use a 2.4 x 1.2 inch liquid crystal display, 126 x 64 pixels.

Illuminants: The instrument shall be able to measure samples with type A, C, D65, F2, F7, and F11 illuminants.

Observers: The instrument shall be able to measure samples with 2° and 10° observer.

Display Modes: The instrument shall be capable of operating in several different modes including:

- Absolute color data
- Pass/Fail
- Color difference
- Metamerism
- Spectral Curve

Color Systems: The instrument shall be capable of measuring and displaying color data with different color systems including:

- Yxy
- CIELab
- CEILCh/H
- Lab(h)
- FMC2
- XYZ
- RxRyRz

ITEMS 868.06, 868.12 & 869.06 (Continued)

Indices: The instrument shall be capable of measuring and displaying different color indices including:

- YIE313
- YID1925
- WIE313
- CIE
- Berger
- Color Strength
- Opacity
- Metamerism MI

Color Differences: The instrument shall be able to measure and display color differences including:

- Delta E*
- Delta E(h) Delta E_{FM}C2
- Delta E₉₄
- Delta E_{CMC}

Data Storage: The instrument shall utilize internal, memory for storing measurement data. The instrument shall be capable of storing approximately 1000 samples. In addition, the instrument shall be capable of storing approximately 200 standards. A 15-year lithium battery shall independently power the data memory.

Data Output: The instrument shall be equipped with a data port to allow for data output directly to a printer or Windows™ applications.

Equipment

The instrument shall be equipped complete with a users manual, batteries, carrying case, black calibration standard, white calibration standard, green calibration standard, sample area locator, PC interface cable with adapter, wrist strap, and a color theory guide.

The Contractor shall obtain portable spectrophotometer NIST-traceable calibration standards from the Manufacturer.

METHOD OF MEASUREMENT

Items 868.06, 868.12, 869.06 will be measured in accordance with subsection 860.80.

BASIS OF PAYMENT

Items 868.06, 868.12, 869.06 will be paid for at the respective Contract unit prices under each item based on the measurements as determined by the Engineer, which prices shall include all labor, materials, equipment and incidental costs required to complete the work.

No separate payment will be made for measuring the pavement marking performance, but all costs in connection therewith shall be included in the Contract unit price bid for the respective item.

ITEM 871.9 MOTORIZE TRAFFIC DATA MONITORING PROGRAM LUMP SUM

The work under this item shall conform to the relevant provisions of Subsection 871 of the Standard Specifications and the following:

The contractor's traffic signal technician shall monitor motor vehicle traffic volumes at the intersections listed under Item 816.83 using portable traffic data collection devices, and provide recommendations for mitigative retiming and/or temporary lane reconfigurations based on the results of the contractor's review of traffic operations during construction. Data shall be collected one month prior to implementation of the work zone setups for the construction of the culvert near Dublin Avenue or the construction of the bridge over Maple Meadow Brook, and collected two weeks following implementation of the temporary traffic signals at these locations. The contractor's traffic signal technician shall provide a traffic monitoring plan prior to the start of construction outlining intended study locations and methodology.

BASIS OF PAYMENT

Item 871.9 will be paid for at the Contract unit price per Lump Sum, which price shall include all labor including design efforts and agency coordination efforts, materials, documentation including distributed reports and plans, equipment including traffic monitoring devices, data processing, and incidental costs required to complete the work throughout the project duration.

ITEM 874.**STREET NAME SIGN****EACH**

The work under this item shall conform to the relevant provisions of Subsection 828 regarding Street Name Signs (standard item 874) and the following:

Construction Methods and Materials

Street Name Signs mounted to strain poles shall be mounted using steel band equipment per Section 815 of MassDOT's Qualified Traffic Control Equipment (QTCE) list. The bottom of the street name sign shall be secured with a metal brace that extends at least halfway along the bottom of the sign and shall also be mounted using steel band equipment per Section 815 of MassDOT's Qualified Traffic Control Equipment (QTCE) list. The Street Name Sign shall be mounted such that one vertical edge of the sign is flush along the strain pole.

The Contractor shall supply shop drawings of mountings for Street Name Signs proposed to be attached to strain poles and mountings for signs proposed to be suspended from mast arms for review by the Engineer. Overhead-mounted signage shall not be installed until approval of shop drawings by the Engineer.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT.

Item 874. will be measured for payment by each sign installed, in place, as determined by actual count.

Each Street Name Sign shall be considered as one unit. The mounting hardware for Street Name Signs which are attached to strain poles shall be considered incidental to Item 816.02. The mounting hardware for Street Name Signs which are suspended from mast arms shall be considered incidental to Item 815.1. P-5 breakaway post assemblies for signs shall be furnished under Item 847.1.

ITEM 874.2**TRAFFIC SIGN REMOVED AND RESET****EACH**

The work under this Item shall conform to the relevant provisions of Subsection 840 of the Standard Specifications and the following:

The work consists of removing and resetting the existing street, warning, regulatory and miscellaneous signs and their supports to new locations as shown on the Plans or as required by the Engineer.

The Contractor shall replace at his own expense, all sign panels and supports that are damaged or lost either directly or indirectly as a result of his actions.

Materials

Materials for traffic signs and miscellaneous signs removed and reset shall be the existing signs. If in the opinion of the Engineer, the existing sign panel is unsuitable for reuse, a new sign panel of a size and composition equal to the existing sign panel, shall be furnished, as required by the Engineer.

Construction Method

The sign shall be mounted in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and the 1990 Standard Drawings for Signs and Supports.

When the visibility of the relocated sign panels is obstructed by trees and other vegetation, the Contractor shall clear the obstruction for proper sight distance. All clearing shall be done within the roadway layout, as approved by the Engineer.

Sign panels to be removed and reset shall be cleaned before being reset.

Damage during removal or resetting to any sign panel designated for reuse by the Engineer shall be repaired or replaced by the Contractor at his own expense.

Any excavation made for removal of the existing sign or foundation and any resulting depression shall be backfilled with selected excavated material and the surface restored to match the adjacent materials.

The Contractor shall furnish and install all necessary mounting fixtures (nuts, bolts and other miscellaneous items) required to complete the work.

METHOD OF MEASUREMENT

Item 874.2 will be measured for payment by Each traffic sign removed and reset, as complete units, in place.

BASIS OF PAYMENT

Item 874.2 will be paid for at the contract unit price per each, which price shall include all labor, tools, materials, equipment and incidental costs required to complete the work including excavation and backfill, involved in removing and resetting signs, removal of the existing sign or foundation and surface restoration. The price shall also include all necessary mounting fixtures (nuts, bolts and other miscellaneous items) to complete the work.

If required by the Engineer, new sign posts for Traffic Signs will be paid for separately under Item 847.1.

If required by the Engineer, new Traffic Sign panels shall be furnished, installed and paid for under Item 832.

The cost of any work or materials required, due to the Contractor's negligence, shall be borne by the Contractor.

<u>ITEM 874.41</u>	<u>TRAFFIC SIGN REMOVED AND DISCARDED</u>	<u>EACH</u>

The work under this item consists of dismantling, removing, and discarding existing warning and regulatory sign panels and guide signs, including their supports and all mounting hardware, designated to be removed and discarded on the plans or as required by the Engineer.

Construction Methods

Signs and attached hardware shall be carefully removed from their supports. The supports and existing foundations shall be completely removed and the holes backfilled with gravel borrow. The surface shall be patched with a material to match the existing ground or as required by the Engineer

The Contractor shall backfill all holes resulting from removal of existing signs and their foundations with compacted gravel and restore the area to match the existing conditions of adjacent areas.

If signs are attached to existing light poles, utility poles or traffic poles, only the sign and attached hardware shall be removed and discarded.

The existing signs shall not be removed without the prior approval of the Engineer.

METHOD OF MEASUREMENT

Item 874.41 will be measured for payment by the Each traffic sign removed and discarded,. One unit shall include the sign panel, sign post(s), appurtenances, and foundation(s).

BASIS OF PAYMENT

Item 874.41 be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

Backfilling and removed sign area restoration and foundation shall be considered incidental to the cost of this item.

ITEM 945.1
ITEM 948.6
ITEM 948.61

DRILLED MICROPILE
MICROPILE VERIFICATION LOAD TEST
MICROPILE PROOF LOAD TEST

FOOT
EACH
EACH

The work under these items shall conform to the relevant provision of the Standard Specifications and 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.).

New “mill secondary” steel pipe/casing will not be accepted regardless if they are accompanied by coupon test results.

ITEMS 945.1, 948.6 & 948.61 (Continued)

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 945.1, 948.6 & 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. 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		≥ 2500 psi
7 days		For information only
28 days		≥ 5000 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 945.1, 948.6 & 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 945.1, 948.6 & 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 945.1, 948.6 & 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 945.1, 948.6 & 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 945.1, 948.6 & 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 945.1, 948.6 & 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 945.1, 948.6 & 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.

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.

ITEMS 945.1, 948.6 & 948.61 (Continued)

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.

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.

ITEMS 945.1, 948.6 & 948.61 (Continued)

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 $\pm 10\%$ 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 945.1, 948.6 & 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		≥ 2500 psi
7 days		For information only
28 days		≥ 5000 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 945.1, 948.6 & 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		≥ 2500 psi
7 days		For information only
28 days		≥ 5000 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 945.1, 948.6 & 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 945.1, 948.6 & 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.

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:

ITEMS 945.1, 948.6 & 948.61 (Continued)

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 945.1, 948.6 & 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 945.1, 948.6 & 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:

ITEMS 945.1, 948.6 & 948.61 (Continued)

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
		0.80 FDL	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

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.

ITEMS 945.1, 948.6 & 948.61 (Continued)**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

Drilled Micropiles will be paid for at the contract unit price per Foot.

Micropile Verification Load Test and Micropile Proof Load Test will be measured for payment per Each.

BASIS OF PAYMENT

Drilled Micropiles will be paid at the contract unit price per Foot, complete in place and accepted. Payment for drilled micropiles 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.

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 945.1, 948.6 & 948.61 (Continued)

Micropile Verification Load Test and Micropile Proof Load Test will be paid at the contract unit price per each completed and accepted test, for which payment 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. This payment 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 incorporate 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.

ITEM 950.5**TEMPORARY EARTH SUPPORT SYSTEM****LUMP SUM**

The work under this Item shall conform to the relevant provisions of Subsections 140 and 950 of the Standard Specifications, and the following:

The Contractor shall furnish, install, maintain, and remove a temporary earth support system and all associated other work to be used in the construction of gravity retaining wall. The temporary earth support system shall be designed and constructed as required to allow the construction of proposed structures and shall prevent damage to, or undermining of, the sides of excavations, roadways, driveways, and portions of existing structures to remain.

The temporary earth support system shall either consist of sheet piling or soldier piling and lagging, or any other system, which is approved by the Engineer. Depending on the excavation scheme, it may be a combination of steel sheeting, soldier pile & lagging system or another retaining system. In selecting steel sheeting, consideration should be given to the presence of a cobble layer at the site, potentially making the driving difficult. It is the Contractor's responsibility to coordinate with DigSafe for any underground utilities before driving temporary earth support system. The Contractor will relocate any underground utilities to construct temporary earth support system.

The temporary earth support system at locations shown on the plans shall be fully designed by the Contractor to carry all the applicable AASHTO loads. It shall be designed in accordance with the AASHTO Guide Design Specifications for Bridge Temporary Works, 2nd Edition, 2017, and all interims published as of the bid opening date.

The Contractor is responsible for determining all geotechnical criteria associated with the temporary earth support system including, but not limited to, lateral earth pressures, live load surcharge, surcharge due to construction equipment operation, surcharge due to temporary traffic barriers and/or surcharge due to material storage near the top of excavation. Maximum design stresses in steel members shall not exceed 125% of the allowable basic stresses specified in the current specifications of the American Institute of Steel Construction. The design shall provide for all anticipated load conditions that may occur during the entire construction period. The minimum factor of safety for each of the design conditions shall be 1.50.

The temporary earth support system must be designed and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. Complete detailed drawings and calculations shall be submitted to the Engineer for approval. Detailed drawings shall include all materials, sizes of members, connections, methods and sequence of installation. Any earth support system located along the roadway approaches and adjacent to concrete barriers shall be designed for a vehicular impact load equivalent to the Test Level, MASH TL-3 assuming the concrete barrier to impact the support system. Written approval must be obtained prior to installation of temporary earth support system. Furnishing such plans and calculations shall not relieve the Contractor of sole responsibility for safety of the public, personnel, equipment, and structures, as well as successful project completion.

The temporary earth support system that protrudes into the soil that supports the bridge structure shall be left in place, and no additional payment will be made for the temporary earth support system left in place. Supporting soil shall be defined as all soil directly below the pile cap contained within a series of planes that originate at the perimeter of the bottom of the pile cap and project down and away from the pile cap at an angle of 45 degrees from the horizontal.

ITEM 950.5 (Continued)

BASIS OF PAYMENT

Item 950.5 will be paid for at the Contract Lump Sum Price; which price shall be considered full compensation for all labor, equipment, materials, tools, design, submittals, and incidental costs required to complete work.

Payment shall be made based upon the following percentages: 10% upon approval of design, 60% upon completion of installation, and 30% upon removal or cut down.

<u>ITEM 953.1</u>	<u>TEMPORARY SUPPORT OF EXCAVATION - BRIDGE NO. W-38-011</u>	<u>LUMP SUM</u>

<u>ITEM 953.31</u>	<u>EXCAVATION SUPPORT SYSTEM FOR SPECIAL DRAINAGE STRUCTURE NO. 1</u>	<u>LUMP SUM</u>

The work under these items shall conform to the relevant provisions of Subsections 140 and 950 of Standard Specifications and the following:

The Contractor shall furnish, install, maintain, relocate if necessary, and remove or cut-off a temporary support of the excavation system and all associated other work to be used in demolition and construction of abutment and wingwalls for Bridge No. W-38-011, provide necessary support of the excavation system for the temporary pedestrian bridge adjacent to Bridge No. W-38-011, and provide temporary support of excavation for Special Drainage Structure No. 1 as required based upon the actual site conditions, for the protection of adjacent utilities, the proposed demolition of the existing culvert, wingwall, and headwall, and the construction of the proposed box culvert, headwalls, wingwalls, and utility relocations. The Contractor shall design this excavation support system and shall be configured to serve the intended purpose during all stages of construction without the need for reinstallation or major modifications. The Contractor shall coordinate with the utility companies on the placement of temporary support for utility trenching and shall determine, in coordination with the utility companies, whether temporary steel plating is required to facilitate the utility relocations shown on the Plans. The maximum depth of excavation below existing ground is approximately 15 feet at the proposed wingwalls. Additionally, it must prevent damage to or undermining of the sides of excavations, roadways, driveways, and portions of existing structures to remain and/or be maintained.

All permanent and temporary support of excavation that protrudes into the soil that supports the structure shall be left in place. Supporting soil shall be defined as all soil directly below the footing contained within a series of planes that originate at the perimeter of the bottom of the footing and project down and away from the footing at an angle of 45 deg. from the horizontal.

The excavation support system shall consist of sheet piling, soldier piling and lagging, braced excavation, concrete blocks or any other system that satisfies the design criteria contained herein. The excavation support system must be capable of supporting all loads applied throughout the construction, including active soil pressure and highway surcharge. The excavation support system shall be designed to allow for a 2-foot depth of over-excavation. The selection of the system for Item 953.31 should take into account the high bedrock elevation and the likely variation of the top of bedrock.

All material used for the excavation support system shall be sound and free from strength impairing defects. Steel sheeting (if used) shall conform to the applicable requirements of Section 950.

Any utility relocation required to accommodate the installation of the excavation support system will need to be coordinated with the utility company.

ITEMS 953.1 & 953.31 (Continued)

The Contractor shall make his/her own evaluation of existing site conditions and facilities, and shall design and construct the proposed temporary support of excavation system at Bridge No. W-38-011 and for Special Drainage Structure No. 1 to be compatible with the Contractor's means and methods of construction including Bridge Demolition, Bridge Excavation and Bridge Construction.

The design of the temporary support of excavation system shall conform to industry standards and all OSHA requirements. The Contractor shall determine the final location and design of the support of excavation system to provide necessary clearance for demolition and construction. The temporary support of excavation system at locations on the plans shall be fully designed by the Contractor to carry all applicable AASHTO loads. It shall be designed in accordance with the AASHTO Guide Design Specifications for Bridge Temporary Works, 2nd Edition 2017, and all interims published as of the bid opening date. The support system shall be designed to prevent damage resulting from loss of ground and lateral movement and settlement of the ground and ground surface behind the wall.

The Contractor is responsible for determining all geotechnical criteria associated with the temporary support of excavation system including, but not limited to, lateral earth pressures, live load surcharge, surcharge due to construction equipment operation, surcharge due to temporary traffic barriers, and/or surcharge due to material storage near the top of excavation. Maximum design stresses in steel members shall not exceed 125% of the allowable basic stresses specified in the current specifications of the American Institute of Steel Construction. The design shall provide for all anticipated load conditions that may occur during the entire construction period. The minimum factor of safety for each of the design conditions shall be 1.50.

The temporary support of excavation system must be designed and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. Complete detailed drawings and calculations shall be submitted to the Engineer for approval. Written approval must be obtained prior to installation of temporary support of excavation system. Furnishing such plans and calculations shall not relieve the Contractor of sole responsibility for safety of the public, personnel, equipment, and structures, as well as successful completion of the project.

The pumping of water and the treatment of the water for sediment is not included in this item. This activity for the Special Drainage Structure No. 1 is paid for under the Item 991.21. The cofferdams for Bridge No. W-38-011 is paid under 990.1 and 990.2.

BASIS OF PAYMENT

Item 953.1 and Item 953.31 will be paid for at the respective Contract Lump Sum Prices; which prices shall be considered full compensation for all labor, equipment, materials, tools, design, submittals, and incidental costs required to complete the work.

ITEM 953.1 & 953.31 (Continued)

The cost of furnishing, placing, maintaining, resetting, and removing steel plating necessary for utility coordination shall be considered incidental to the work of the respective contract items. No separate payment will be made. The Contractor shall be responsible for coordinating with the affected utility owners and for all labor, materials, and equipment required for the placement, removal, and reinstallation of steel plating as necessary to maintain safe conditions and utility operations.

Payment shall be made based upon the following percentages: 10% upon approval of design, 60% upon completion of installation, and 30% upon removal or cut down.

ITEM 953.12**TEMPORARY STABILIZATION OF EXISTING
MASONRY ABUTMENTS****LUMP SUM**

The work under this item shall conform to the relevant provisions of Subsections 120, 140 and 950 of Standard Specifications and the following:

The Contractor shall furnish, install, maintain, and remove a temporary stabilization system for the existing masonry abutments during staged construction. The temporary stabilization system shall be designed and constructed as required to allow the safe removal of the existing masonry for the staged construction limits shown, while maintaining the integrity of the portion of the existing masonry to support the existing bridge and traffic during Stage 1 as shown on the Plans.

The temporary stabilization systems may differ at the South Abutment relative to the North Abutment due to the varied conditions of the existing masonry abutments, their exposure, and overall size. The temporary stabilization systems shall either consist of rock anchors/tie backs and walers, shotcrete, or any other system, which is approved by the Engineer. The approximate layout of the temporary stabilization systems should be assumed based on the approximate limits of the existing masonry abutments shown on the Plans. The dimensions shown on the Plans for the existing masonry abutments are estimated from original design drawings and are not guaranteed. The Contractor shall determine and establish all dimensions necessary to complete the work under this item through field measurements and survey and is therefore responsible for the determining the overall limits of the existing masonry abutments to be stabilized.

The Contractor shall make their own evaluation of existing site conditions and facilities and shall design and construct the proposed temporary stabilization systems at both abutments to be compatible with the Contractor's means and methods of construction including Bridge Demolition, Bridge Excavation and Bridge Construction.

The design of the temporary stabilization systems shall conform to industry standards and all OSHA requirements. The Contractor shall determine the final location and design of the temporary stabilization systems to provide necessary clearance for demolition and construction. The temporary stabilization systems shall be fully designed by the Contractor to carry all applicable AASHTO loads. It shall be designed in accordance with the AASHTO Guide Design Specifications for Bridge Temporary Works, 2nd Edition 2017, and all interims published as of the bid opening date. The stabilization systems shall be designed to prevent damage resulting from loss of ground and lateral movement and settlement of the ground and ground surface behind the wall.

The Contractor is responsible for determining all geotechnical criteria associated with the temporary stabilization systems including, but not limited to, lateral earth pressures, live load surcharge, surcharge due to construction equipment operation, surcharge due to temporary traffic barriers, and/or surcharge due to material storage near the top of excavation. Maximum design stresses in steel members shall not exceed 125% of the allowable basic stresses specified in the current specifications of the American Institute of Steel Construction. The design shall provide for all anticipated load conditions that may occur during the entire construction period. The minimum factor of safety for each of the design conditions shall be 1.50.

ITEM 953.12 (Continued)

The temporary stabilization systems must be designed and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. Complete detailed drawings and calculations shall be submitted to the Engineer for approval. Written approval must be obtained prior to the installation of the temporary stabilization systems. Furnishing such plans and calculations shall not relieve the Contractor of sole responsibility for safety of the public, personnel, equipment, and structures, as well as successful project completion.

The Contractor is advised that the project Section 401 Water Quality Certification and Army Corps of Engineers Massachusetts General Permit Approval may include certain Time of Year restrictions on for work immediately adjacent to the Maple Meadow Brook. They may also contain other applicable conditions. It is the Contractor's responsibility to review these approvals and incorporate relevant conditions into the Contractor's plans, schedules, and other documents relating to this task.

BASIS OF PAYMENT

Item 953.12 "Temporary Stabilization of Existing Masonry Abutments" will be paid for at the contract price of Lump Sum, which shall include full compensation for the Contractor's design and plans of the temporary stabilization systems at both the South and North abutments, all equipment, materials, tools and labor necessary for the installation, maintenance, removal and disposal of the materials used for the system.

ITEM 983.6**STREAMBED RESTORATION****LUMP SUM**

This work shall consist of removing, stockpiling, and replacing riverbed material in the proposed bridge replacement within the channel excavation portion as shown on the plans in the limits of work. The streambed restoration shall replicate the existing natural channel bed outside the work area in terms of material, roughness, shape, profile, and appearance. The ultimate product will, to the extent possible, replicate the function and appearance of the natural stream channel, as illustrated by photo-documentation herein (Figures A & B - Maple Meadow Brook and Figure C- Special Drainage Structure No.1 conveying Unnamed Intermittent Stream).

The Contractor shall ensure all required equipment is available on-site to complete the work in this manner. The streambed restoration is required to comply with environmental permits issued for the project. Wetland Specialist shall be used herein for applicable streambed restoration work (see Item 755.75 Wetland Specialist). Wetland Specialist will attend a pre-construction meeting and will provide an on-site oversight during construction, and assistance during streambed restoration construction to ensure the restoration is constructed as shown on the Plans, as required by these Special Provisions and in accordance with permit requirements.

At least 30 days prior to the commencement of construction, the Contractor shall coordinate with the Wetland Specialist to set up an initial (virtual or in person) meeting with Contractor and Resident Engineer. At this meeting, the Wetland Specialist will provide an overview of the restoration work. The Contractor should be prepared to discuss the anticipated means, methods, and schedule.

Process Approval:

In lieu of a mockup, the Contractor shall schedule an onsite meeting to discuss the streambed restoration with the Wetland Specialist and respective parties from MassDOT. The Wetland Specialist shall be onsite during initial streambed restoration. The Contractor shall provide the Wetland Specialist adequate access to observe, direct, and inspect the channel restoration work throughout the duration of the removal, stockpile, and reinstallation of the existing streambed material. If material is being brought to the site for streambed restoration, the Contractor shall provide the Wetland Specialist with photographs to see the material.

MATERIAL

The streambed material excavated from the existing streambed shall be removed and stockpiled to facilitate reinstallation and replication of the natural streambed. The excavated streambed material shall also be reused to fill the voids in the proposed riprap placed below the top streambed restoration layer.

In the event that the excavated material is not suitable or there is not enough suitable material available, additional streambed restoration material shall be locally sourced that matches the composition of the existing native riverbed. The median grain size (D50) ranges from 0.11 in SS1 to 1.72 in SS2. The average grain size across the 2 samples is 0.92 mm (coarse sand) in the areas of the channel to be impacted by the proposed work on the substructure.

ITEM 983.6 (Continued)

Note that the streambed located downstream of the bridge contains a higher proportion of larger sediment fragments as compared to the upstream portion. The downstream area also contained a small percentage of coarse gravel fragments, while the upstream reach did not, and thus a small percentage of coarse gravel is desired downstream of the bridge to replicate the natural conditions in the areas of the riverbed to be restored. The following gradation developed using the results of the grain size analysis performed in the areas to be impacted by the proposed work in the river shall be used as a guide.

Stream Bed Material Gradation:

Particle	Percent (%) Composition
Boulder	0
Cobble (maximum 2-3 inches in size)	0
Coarse Gravel	13
Fine Gravel	7
Coarse Sand	12
Medium Sand	24
Fine Sand	29
Fines	15

The streambed material shall be approved by the Resident Engineer and the Wetland Specialist prior to use.

Related Items

Crushed Stone. Shall conform to the requirements of Item 156.1 Crushed Stone for Slope Treatment and shall be paid for under that item.

Riprap Stone shall conform to the requirements of Item 983. and shall be paid for under that item.

CONSTRUCTION**Channel**

The streambed material shall be reinstalled over riprap, as depicted on the plans, to an average thickness of 1.5 feet, with variations in thickness as necessary to replicate existing channel conditions. The initial placement of streambed material shall fill the voids in the underlying riprap. Fill voids by shaking stone with the teeth of an excavator bucket, hand tamping with metal tamping rods, and by spraying water to settle fines between large stones. Plate compactors shall not be used. The purpose of filling the voids is to prevent subsurface flow where surface water disappears into large voids between the stone fill below the channel bed surface during low flow conditions. The final streambed shape and appearance shall be finalized in the field as directed by the Wetland Specialist .

ITEM 983.6 (Continued)

Reinstallation of the stockpiled streambed material shall be placed on top of the riprap to restore streambed habitat and fish passage. The streambed materials shall be installed during normal low water conditions behind cofferdams in accordance with the environmental permits.

Completion

Once all material has been placed in the stream channel and approved by the Wetland Specialist and Resident Engineer, the Contractor shall remove the cofferdams in such a way as to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment.

The final streambed shall maintain the general configuration of the existing streambed bedform and there shall be minimal subsurface flow upon final inspection by the Resident Engineer and Wetland Specialist. The project must be passable by fish and other aquatic organisms following construction.

The streambed restoration to be measured for payment will be the complete and accepted work for restoration of the streambed within the limits shown on the Plans as approved by the Resident Engineer and Wetland Specialist.

BASIS OF PAYMENT

Item 983.6 will be paid for on a lump sum basis. Payment will be full compensation for excavating, stockpiling, transporting, and placing the material specified and for furnishing all labor, tools, equipment, testing, and incidentals necessary to complete the work.

ITEM 983.6 (Continued)

FIGURES



Figure A: View of the riverbed from the upstream side of the bridge (Maple Meadow Brook)



Figure B: Overview of the riverbed from the downstream side of the bridge (Maple Meadow Brook)

ITEM 983.6 (Continued)



Figure C: Overview of the streambed at the Special Drainage Structure No. 1

ITEM 988.01**SEDIMENT FOREBAY PAVERS****SQUARE FOOT**

The work under this item shall conform to the relevant provisions of Subsections 501 and 983 of the Standard Specifications.

The purpose of this item is to provide a level protective surface over crushed stone bedding foundation and geotextile fabric for separation to facilitate in maintenance of the pretreatment sedimentation forebay.

Construction Materials and Methods

The work shall include the construction to the line and grade of a level sedimentation forebay protective bottom surface conforming to the size and dimensions shown on the Contract Drawings and the following:

Material may either be new or reused granite curb or edging. Each piece of granite curb or edging shall have a minimum length of eighteen (18) inches, minimum width of four (4) inches and minimum depth of four (4) inches. Granite curb or edging shall be placed in an offset tile pattern with one (1) inch spacing on all sides.

Reused granite curb or edging shall include removal, temporary storage, protection, cutting, removal and disposal of all foreign matter and installation.

The layout patterns of the new or reused curb or edging shall be pre-approved by the Engineer.

METHOD OF MEASUREMENT

Item 988.01 will be measured for payment by the SQUARE FOOT of sediment forebay pavers installed, complete in place.

BASIS OF PAYMENT

Item 988.01 will be paid for at the Contract unit price per SQUARE FOOT, which price shall include all labor, equipment, materials, and all incidental costs required to complete the work.

Excavation when required to construct the sediment forebay paving will be included in Item 758.1 Infiltration Basin lump sum. Crushed stone bedding will be paid for separately by the cubic yard under Item 156. Geotextile Fabric for Separation will be paid for separately by the square yard under Item 698.3.

ITEM 990.1
ITEM 990.2**COFFERDAM STRUCTURE NO. 1**
COFFERDAM STRUCTURE NO. 2**LUMP SUM**
LUMP SUM

The work under these items shall conform to the relevant provisions of Subsections 140, 901 and 950 of the Standard Specifications and the following:

The work under these items consists of constructing the cofferdams for the limits need to perform the demolition/construction work shown on the plans, including tremie concrete seals, control of water for cofferdams, rock excavation and excavation within the cofferdam.

Item 990.1 Cofferdam Structure No. 1 shall include the limits required for the removal of existing North Abutment and construction of proposed North pile cap and wingwalls.

Item 990.2 Cofferdam Structure No. 2 shall include the limits required for the removal of existing South Abutment and construction of proposed South pile cap and wingwalls.

The Contractor shall design a cofferdam and prepare plans and drawings, including sheeting, bracing, soldier piles, lagging, tremie seal and all related work. The Contractor's design shall be based on the data furnished on the Contract Drawings and Specifications and shall be field verified by the Contractor.

The procedures and calculations of Contractor's cofferdam plan shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts and submitted to the Engineer for approval. All construction activities shall be performed as per the approved plan. The plan shall also include the procedure for partial removal of the cofferdam at Contractor's cost and responsibility.

Cofferdams shall include all sheeting, bracing, soldier piles, lagging, connections, tremie concrete placement, control of water and other excavation support and controls as necessary to provide for excavation support, and dry construction of concrete footings and piers. It shall also include any rock excavation required in order to construct cofferdams. Two (2) cofferdams are required.

Actual field conditions at these cofferdam locations may vary due to normal hydraulic variations in the mudline. The Contractor shall determine the actual elevations of the mudline and confirm the limits of cofferdams prior to cofferdam construction in the field.

Any alternative structures or details designed by the Contractor shall conform to the requirements of the Standards and be subject to the following additional requirements: The Contractor shall submit complete design calculations and drawings of the alternative(s) for review and approval by the Engineer prior to cofferdam construction. Alternative designs shall conform to (or exceed) the requirements and criteria shown on the plans. The alternative design drawings shall include a sequenced description of the construction activities required for the complete cofferdam installation, associated construction work within the cofferdam, and removal of cofferdam. All alternative design calculations and drawings shall be stamped and signed by Professional Engineer registered in the Commonwealth of Massachusetts.

ITEMS 990.1 & 990.2 (Continued)**Materials**

All cofferdam materials shall conform to the relevant sections of the Standard Specifications.

MASS POUR CONCRETE

The 4,000 psi, 1-1/2 inch, 565 Mass Pour Cement Concrete shall be used as a seal at the cofferdams required to demolish the existing abutments and construct the proposed abutments within the limits shown on the Plans. The 4,000 psi, 1-1/2 inch, 565 Mass Pour Cement Concrete must form a water tight seal below the proposed footings. Contractor may use approved bonding agents or sealants required to make water tight seal. The Mass Pour Cement Concrete shall conform with Subsection 901 of the MassDOT Standard Specifications.

Placing Concrete Under Water

The tremie seal shall be placed under water as currently designed. The method and equipment to be used shall be reviewed and approved by the Engineer before work has begun.

Concrete deposited under water shall be carefully placed by the tremie method in a compound mass in its final position and shall not be disturbed after being deposited. Special care must be taken to maintain still water at the point of deposit. No concrete shall be placed in running water and all form work designed to retain concrete under water shall be watertight. The consistency of the concrete shall be carefully regulated and special care shall be taken to prevent segregation of the materials. The concrete shall be distributed uniformly over the entire area between forms in order to maintain a level surface.

Submittals

1. Mass concrete mix designs, with pertinent data pertaining to each ingredient, shall be submitted to the Engineer for review and approval. Mix designs shall be verified by laboratory testing data. Final approval of the actual mix design shall be required by the Engineer prior to placing any concrete.
2. A sketch of the proposed placement limits and volumes. Also, submit a procedure for testing a seal to the Engineer for approval.
3. Detailed plan indicating how temperature differential restrictions will be achieved.

CONTROL OF WATER

The work to be performed shall include all pumping, sandbagging, filter bags, and other measures for water control to accomplish the demolition of the existing abutments and construction of the new pile caps and wingwalls within the limits of the Maple Meadow Brook. Work shall consist of dewatering the cofferdams and excavation support to facilitate the demolition of the existing abutments and construction of the new pile caps and wingwalls.

ITEMS 990.1 & 990.2 (Continued)

Water shall be discharged as specified in the environmental permits obtained for this project and in compliance with the NPDES permit program. No direct discharge shall be allowed into the Maple Meadow Brook during the dewatering operations. All the laitance and scale shall be removed so that sound, durable concrete is exposed to the area on which the construction is to be based and shall be leveled off and prepared in accordance with the requirements for construction joints.

The systems must ensure that all concrete comprising the bridge structure and foundations are placed and cured in the dry as shown on the plans, or as directed by the Engineer. The Contractor shall be prepared to furnish a groundwater control system for construction operations at the bottom of excavation level, as well as a surface water collection and disposal system in accordance with the provisions contained herein.

It is the responsibility of the Contractor to determine the need and extent of dewatering required, sedimentation and dewatering techniques and controls and submit method and materials he/she proposes to use for approval by the Engineer.

Plans and calculations for the sandbagging and other water control measures shall be developed by the Contractor. These plans and calculations shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts and shall be submitted for the approval prior to the start of construction.

The Contractor shall prepare a Construction Dewatering Plan, specifying dewatering and appropriate treatment techniques that shall be prepared or approved by the Licensed Site Professional and that shall be submitted for approval by the Engineer and the Massachusetts Environmental Protection Agency.

The Contractor shall prepare the applicable NPDES Permit application and conduct testing of groundwater and surface water to be included in the Permit application. If applicable, a Notice of Intent for coverage under the general permit shall be filed with the United States Environmental Protection Agency (EPA)/MA DEP in accordance with the NPDES permit program. If the NPDES Construction Dewatering General Permit or Remediation General Permit do not apply, the contractor shall either contain and transport off-site the construction dewatering discharges or shall obtain U.S. EPA and MA DEP approval for the discharges by filing the Construction Dewatering Plan and an Individual Permit. Contractor is advised that the timeframe for approval of an Individual Permit may be 6 months or more.

All dewatering discharges will be monitored and treated, in accordance with the U.S. Environmental Protection Agency National Pollutant Discharge Elimination System permit program and the MA DEP surface water quality regulations. The Contractor shall conduct the effluent testing and reporting required under the NPDES Permit and submit a copy of the monthly reports to the Engineer. The area used for dewatering will be of sufficient size to accommodate the volume of dredged material prior to transport to the disposal facility.

ITEMS 990.1 & 990.2 (Continued)

All dewatering and related earthwork shall be conducted in such a manner as to prevent siltation or contamination of the river.

The pumping discharge shall not be allowed to enter directly into the water resource areas from the work areas and shall be pumped to a temporary stilling basin or other appropriate treatment or containment device prior to discharging. The criteria that shall be implemented for the control of water must meet the following:

1. Treatment will be performed to comply with the applicable NPDES effluent limitations. The enclosure shall be adequately sized and designed to achieve adequate water quality treatment/sedimentation trapping and prevent overtopping from dewatering and to provide the required filtering or containment.
2. The outlet from the containment structure shall not cause erosion of the surrounding area. An approved method of controlling erosion, such as an erosion control blanket, stone, etc. shall be used at the outlet.
3. Impacts from dewatering will be minimized by designing support walls for minimal leakage, covering trucks, barges and stockpiles during rain events and land contouring to limit surface runoff from leaving the dewatering site.
4. Dewatering will not take place within wetland or water resource areas.
5. Dewatered dredged material will be transported to the disposal site in accordance with local, state, and federal regulations.

The control of water containment structure shall be maintained as follows:

1. Inspect at least twice daily during dewatering operations.
2. Repair any damage immediately.
3. Clean containment structure daily. Remove any debris immediately.
4. Remove sediments when accumulated deposits reach a depth of 6 inches

The Contractor shall inspect the outlet daily and maintain the erosion controls at the outfall. Placement of the dewatering stilling structure will be specified in the dewatering plan and will be submitted for approval by the Engineer.

Pumping shall be conducted in a manner which will not adversely affect the freshly placed concrete within the excavation.

The Contractor shall provide and maintain pumps, pipes and other devices to promptly and continually remove and dispose of water from the excavation areas. The size and configuration of pumps and pipes shall be selected by the Contractor.

The Contractor is advised that the effectiveness of the water control method used will vary based on the field conditions and the time at which the actual excavation work is being performed. The Engineer has the right to order the Contractor to stop all excavation operations when in his judgment the Contractor's water control operations are failing to produce adequate results or are posing a threat to the environment.

ITEMS 990.1 & 990.2 (Continued)**BASIS OF PAYMENT**

Item 990.1 and Item 990.2 will be paid for at the respective Contract lump sum prices, which prices shall constitute full compensation for all materials, tools, equipment, design, submittals, and all labor including but not limited to, constructing, excavating, maintaining, abandoning, removing cofferdams, and all incidental items required to complete the work.

Payment for all water control work, including design for the dewatering and treatment operations, used to maintain a water free excavation for construction of the proposed piers, shall include all labor, tools and equipment materials and installation, piping, pumping, maintenance, subsequent removal of related materials and equipment all as outlined above; and restoration of site shall be included in the cost of these items. This work will include preparation of the Construction Dewatering Plan. Control of water for cofferdam structures is included under items 990.1, and 990.2.

Upon installation of the Cofferdam, 75 percent of the Contract unit price Lump Sum will be paid and the remaining 25 percent will be paid after removal to the proposed cutoff elevations.

ITEM 991.1 CONTROL OF WATER – STRUCTURE NO. W-38-011(CVE) LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsections 140 and 950 of the Standard Specifications and the following:

The work shall include designing, furnishing, installing, operating and removing all temporary water control systems, dewatering systems, and diversions systems needed to perform the proposed bridge and channel work at the bridge location. The water control and dewatering required for the installation of the proposed cofferdams will be inclusive of Items 990.1 and 990.2.

The Contractor shall be prepared to furnish a groundwater control system for construction operations at the bottom of excavation level, as well as a surface water collection and disposal system in accordance with the provisions contained herein.

The Contractor may elect to use a water diversion system consisting of sandbags with polyethylene sheets for control of seepage. It is the intent of the water diversion system to maintain water level represented by the 2-year flood elevation within a restricted waterway channel. The Contractor may elect to use alternate methods of water diversion subject to prior approval of the Engineer and conformance to project design and permitting requirements, and in coordination with proposed bridge erection methodology. There may be further restrictions on the time when work can be performed in the waterway. It is suggested that the work shall be done during the low flow period. Reference is made to the Water Quality Certification and ACOE 404 Massachusetts General Permit for period of work restrictions and other requirements.

The Contractor shall prepare working drawings in which the materials and methods of control of water are shown for approval by the Engineer. The working drawings shall be submitted for the proposed type of water diversion system, dewatering systems, arrangement, location and depths of system components, the method of disposal of pumped water, and a description of equipment and instrumentation to be used. Design computations shall be submitted for all parts of the water control system as applicable. The working drawings shall be stamped, signed and certified by a Professional Engineer registered in the Commonwealth of Massachusetts. Approval of the working drawings does not relieve the Contractor of the responsibility of providing for the safety of the work and the successful completion of the project.

The dewatering system shall reduce the hydrostatic pressure and lower the groundwater levels a minimum of 12 inches below the bottom of excavation elevations indicated on the Plans. All concrete work shall be done in the dry. The dewatering system shall prevent heaving of the bottom of the excavation, and shall not result in damage to adjacent properties, structures, utilities, and other work. Acceptable dewatering methods include sump pumping, single or multiple stage well point systems, educator and ejector type systems, deep wells or combinations thereof. Temporary surface water control measures shall be provided to prevent surface water from entering the excavation. A sufficient number of pumps with adequate capacity shall be provided at the site. Provisions shall be made for having backup power generation and groundwater control system components available for maintaining continuous operations should failure of the primary equipment occur.

ITEM 991.1 (Continued)

Dewatering procedures that cause or threaten to cause damage to new or existing construction shall be modified by the Contractor at no additional expense to the Department.

The dewatering system shall be installed, maintained, and removed in such a manner as to prevent movement, settlement, loss of ground or damage to new and existing structures.

Collection and disposal of groundwater discharge shall be performed, in accordance with all Federal, State, and local codes, rules and regulations. Sedimentation control shall be used to segregate silt from the groundwater that is recharged into the river outside of the limits of excavation in compliance with all environmental regulations specified in the Water Quality Certification and ACOE 404 permits. Pumped groundwater shall not be discharged directly into the waterway or into the roadway Right-of-Way.

Measures shall be taken to control the discharge of pollutants into the water resource area, including but not limited to the following:

- Rigorous management of construction operations involving potentially hazardous material, such as refueling and maintenance of construction equipment
- Formulation of contingency plans to control accidental spillage from potentially hazardous materials
- Locating construction staging areas outside of the waterway buffer zones
- Scheduling of work within the waterway to avoid periods of high flood and forecasted storm events
- Installation and continuous maintenance of staked hay bales, staked compost filter tubes, and filter fence to prevent sediment migration into adjacent waterway resource areas. Placement of erosion controls shall be shown on the plans, as specified herein, or as directed by the Engineer, so as to provide maximum control of project related sediment mobilization. Additional erosion control measures shall be employed as necessary to prevent erosion and sedimentation of the stream bed. These measures shall be maintained for the duration of the contract.

After the removal of systems, the site locations shall be restored to their original condition.

The Contractor is advised that the project Section 401 Water Quality Certification and Army Corps of Engineers Massachusetts General Permit Approval may include certain Time of Year restrictions on driving of piles, earthwork, and other activities. They may also contain other applicable conditions. It is the Contractor's responsibility to review these approvals and incorporate relevant conditions into the Contractor's plans, schedules, and other documents relating to this task.

ITEM 991.1 (Continued)**BASIS OF PAYMENT**

The Item 991.1 “Control of Water for Structure No. W-38-011” will be paid in the unit of Lump Sum at the Contract Bid Price, which shall include full compensation for the design of the water control schemes, all equipment, materials, tools and labor necessary for the installation, maintenance, removal and disposal of the materials used for water control including all cost associated with obtaining the necessary permits.

The Engineer shall make partial payments in proportion as the foundation work progresses with the final 10 percent (10%) paid upon the satisfactory removal of the entire water control system from the site after it is no longer required, and site restored to its original condition.

ITEM 991.21**CONTROL OF WATER – SPECIAL DRAINAGE
STRUCTURE NO. 1****LUMP SUM**

The work under this Item shall conform to the relevant provisions of Subsections 140 and 950 of the Standard Specifications and the following:

The work shall include designing, furnishing, installing, operating and removing all temporary water control systems and dewatering systems needed during the installation of the precast concrete box culvert sections and wingwalls as required by the Engineer.

The Contractor shall be prepared to furnish a groundwater control system for construction operations at the bottom of excavation level, as well as a surface water collection and disposal system in accordance with the provisions contained herein.

The Contractor may elect to use a water diversion system consisting of sandbags with polyethylene sheets for control of seepage. It is the intent of the water diversion system to maintain water level represented by the 2-year flood elevation within a restricted waterway channel. The Contractor may elect to use alternate methods of water diversion subject to prior approval of the Engineer and conformance to project design and permitting requirements, and in coordination with proposed bridge erection methodology. There may be further restrictions on the time when work can be performed in the waterway. Reference is made to the Water Quality Certification and Individual ACOE 404 permits for period of work restrictions and other requirements.

The Contractor shall prepare working drawings in which the materials and methods of control of water are shown for approval by the Engineer. The working drawings shall be submitted for the proposed type of dewatering systems, arrangement, location and depths of system components, the method of disposal of pumped water, and a description of equipment and instrumentation to be used. Design computations shall be submitted for all parts of the dewatering system as applicable. The working drawings shall be certified by a Professional Engineer registered in the Commonwealth of Massachusetts. Approval of the working drawing does not relieve the Contractor of the responsibility of providing for the safety of the work and the successful completion of the project.

The Contractor shall submit a plan for management of surface and groundwater flow and potential sedimentation thereof during the installation period to the Engineer and Wilmington Conservation Commission for approval prior to any work. Contractor to control surface and groundwater through the duration of the project including the stabilization period after completion of construction activities and as per the Wilmington Conservation Commission.

The dewatering system shall reduce the hydrostatic pressure and lower the groundwater levels a minimum of 12 inches below the bottom of excavation elevations indicated on the Plans. All concrete work shall be done in the dry. The dewatering system shall prevent heaving of the bottom of the excavation, and shall not result in damage to adjacent properties, structures, utilities, and other work. Acceptable dewatering methods include sump pumping, single or multiple stage well point systems, eductor and ejector type systems, deep wells or combinations thereof. Temporary surface water control measures shall be provided to prevent surface water from entering the excavation. A sufficient number of pumps with adequate capacity shall be provided at the site. Provisions shall be made for having backup power generation and groundwater control system components available for maintaining continuous operations should failure of the primary equipment occur.

ITEM 991.21 (Continued)

Dewatering procedures that cause or threaten to cause damage to new or existing construction shall be modified by the Contractor at no additional expense to the Department.

The dewatering system shall be installed, maintained, and removed in such a manner as to prevent movement, settlement, loss of ground or damage to new and existing structures.

Collection and disposal of groundwater discharge shall be performed, in accordance with all Federal, State, and local codes, rules and regulations. Sedimentation control shall be used to segregate silt from the groundwater that is recharged into the river outside of the limits of excavation in compliance with all environmental regulations specified in the Water Quality Certification and Individual ACOE 404 permits. Pumped groundwater shall not be discharged directly into the waterway or into the roadway Right-of-Way.

Measures shall be taken to control the discharge of pollutants into the water resource area, including but not limited to the following:

- Rigorous management of construction operations involving potentially hazardous material, such as refueling and maintenance of construction equipment
- Formulation of contingency plans to control accidental spillage from potentially hazardous materials
- Locating construction staging areas outside of the waterway buffer zones
- Scheduling of work within the waterway to avoid periods of high flood and forecasted storm events
- Installation and continuous maintenance of staked hay bales and filter fenced to prevent sediment migration into adjacent waterway resource areas. Placement of erosion controls shall be shown on the plans, as specified herein, or as directed by the Engineer, so as to provide maximum control of project related sediment mobilization. Additional erosion control measures shall be employed as necessary to prevent erosion and sedimentation of the stream bed. These measures shall be maintained for the duration of the contract.

After the removal of systems, the site locations shall be restored to their original condition.

The Contractor is advised that the project Section 401 Water Quality Certification and Army Corps of Engineers Massachusetts General Permit Approval may include certain Time of Year restrictions on driving of piles, earthwork, and other activities. They may also contain other applicable conditions. It is the Contractor's responsibility to review these approvals and incorporate relevant conditions into the Contractor's plans, schedules, and other documents relating to this task.

ITEM 991.21 (Continued)**BASIS OF PAYMENT**

Items 991.21 will be paid for at the Contract LUMP SUM price; which price shall be full compensation for the design of the water control systems, all labor, materials, equipment, transportation, additional site testing, maintenance, removal and disposal of materials and structures, and other incidental costs required to complete the work. The Engineer shall make partial payments in proportion as the work progresses, with the final 10 percent (10%) paid upon the satisfactory removal of the entire water control system from the site after it is no longer required, and the site restored to its original condition.

ITEM 993.2**TEMPORARY PEDESTRIAN BRIDGE****LUMP SUM**

The work under this Item shall consist of furnishing all materials, tools, equipment and labor necessary to complete the superstructure, substructure and foundations of a Temporary Pedestrian Bridge as shown on the plans; to maintain a pedestrian walkway during the demolition and construction of the vehicular bridge. The work also includes the removal of the Temporary Pedestrian Bridge, including abutments, after they are no longer required.

The Contractor will be responsible for the design and procurement of the Temporary Bridge superstructure in accordance with the loading requirements shown on the Plans. The pile caps and micropile foundations have been designed using assumed loadings from the same criteria and maximum reactions have been provided on Plans. If the reactions from the superstructure exceed those values, then the Contractor is responsible for the re-design of the substructure and foundation elements as part of this item. It is also the Contractor's responsibility to provide the connection details for the superstructure to the substructure.

The Contractor shall not disturb Maple Meadow Brook during the installation and/or removal of the temporary bridge. During installation or removal of the temporary bridge, if any item or material enters the channel, the Contractor is responsible for its immediate retrieval and removal.

The Contractor shall be responsible for all required site preparation, excavation, installation, erection and complete removal of the temporary bridge structure including the concrete substructure necessary for the support of the Temporary Pedestrian Bridge.

The temporary pedestrian bridge shall be supported on drilled micropiles with a concrete pile cap. The micropiles shall be paid under 945.1. Any excavation required before placing the substructure shall be paid under Item 140. "Bridge Excavation" and Item 144. "Class B Rock Excavation". Any gravel borrow required for the backfilling of the temporary bridge shall be paid under Item 151.2 "Gravel Borrow for Backfilling Structures and Pipes". The temporary support of excavation shall be paid under Item 953.1 "Temporary Support of Excavation".

The Contractor shall be responsible for protecting the existing utilities that pass over and/or under from any damage. There will be a temporary 4" diameter steel gas line attached to the superstructure of the Temporary Pedestrian Bridge during Stage 1 construction and demolition. This temporary pipe shall comply with the standards and requirements of the utility owner. Contractor shall coordinate with the utility owner and the provider of the prefabricated pedestrian bridge superstructure accordingly.

Design Criteria

The temporary bridge must be able to support pedestrian live loads, wind load according to AASHTO, as well as the H5 vehicle. The bridge and approach walkway shall have a walkway width of 5 feet minimum and have handrails and chain link fencing along both sides of the approach walkway and bridge. The 5-foot temporary walkways to the temporary bridge must meet AAB/ADA rules, regulations, and standards as indicated on the Plans. There will be a passing space of at least 60 inches x 60 inches on the approaches at both ends of the bridge. The bridge walkway shall also be coated with a non-slip surface. The temporary foundations, abutments, shall be located and constructed as shown on the Contract Plans. The Contractor shall select and design the system for the proposed temporary bridge superstructure.

ITEM 993.2 (Continued)

The temporary bridge superstructure shall be designed by the Contractor in accordance with the latest edition of the LRFD AASHTO LRFD Bridge Design Specifications, and the latest edition of the AASHTO Guide Specification for the Design of Pedestrian Bridges, including vibration evaluation. The design live load shall be 90 pounds/ft². The temporary bridge and the temporary approach walkways shall meet the handicapped access requirements set forth in 28 CFR Part 35, the regulations promulgated for the American with Disabilities Act of 1990; 49 CFR Part 27, and the Rules and Regulations of the Massachusetts Architectural Access Board.

The temporary abutments will be founded on micropiles, as shown in the Plans. The Contractor is responsible for the prefabrication, design, and detailing of the superstructure. The temporary bridge substructure and foundation shown in the Plans are based on the maximum reactions shown in the Plans, assumed superstructure depth, and typical bearing/anchorage approach for the superstructure to the abutment. These assumptions will be reviewed and confirmed during the shop drawing review process for the temporary pedestrian bridge superstructure, as adjustments may be required based on the proposed temporary bridge superstructure.

A prefabricated panelized bridge constructed to meet the design criteria above and on the Plans will be acceptable. The bearing system, including attachment methods to the substructure, shall be inclusive to the prefabricated superstructure. Such bridges are manufactured by the following or approved equal:

<u>Acrow Corp.</u>	<u>Mabey Bridge & Shore, Inc.</u>	<u>Continental Bridge</u>
181 New Rd Parsippany, NJ 07054 1-973-244-0080	6770 Dorsey Rd. Elkridge, MD 21075 1-800-956-2239	8301 State Highway 29 North Alexandria, VA 56308 1-800-328-2047

If a prefabricated panelized structure is used, the Contractor shall employ a manufacturer's technical representative to advise and assist the Contractor during the transport, assembly, erection, and dismantling phases of the temporary panelized bridge.

Submittals

The Contractor shall submit to the Engineer, at a minimum, the following information prior to the start of construction:

1. Working Drawings and Design Calculations of the temporary bridge superstructure and substructure, which shall illustrate the work to be performed, shall be developed specifically for this project and site conditions and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. It shall be the responsibility of the Contractor that all components used in the construction of the superstructure and substructures of the Temporary Pedestrian Bridge fit together properly. The Contractor's Engineer shall perform all necessary detailing associated with the preparation of the Working Drawings, which shall also include details of all connections, brackets and fasteners. The bearing system, including attachment methods to the substructure, shall be inclusive to the superstructure.

ITEM 993.2 (Continued)

2. Erection Procedures in conformance with Subsection 960.61D of the Standard Specifications stamped by a Professional Engineer registered in the Commonwealth of Massachusetts, for conformance to the Contract Documents, prior to construction of the structure.
3. Demolition Plan for the removal of the Temporary Pedestrian Bridge, including both abutments, after the bridge is no longer required. The Demolition Plan shall also be submitted for review and approval in accordance with Section 112 of the Standard Specifications. The plan shall be prepared and stamped by a Registered Professional Engineer licensed in the Commonwealth of Massachusetts.

Materials

All structural Steel shall conform to AASHTO M270 Grade 50. All exterior surfaces of structural steel components shall be coated with an epoxy zinc-rich primer followed by two coats of a two-component, self-priming, and chemically cured, catalyzed coal tar epoxy protective coating. Structural composite lumber and sawn lumber shall comply and conform to the requirements of ASTM D-5456 and AASHTO M168, respectively. The minimum thickness of the structural composite lumber shall be $\frac{3}{4}$ inch. Chain link fencing shall conform to the requirements of M8.09.0 of the Standard Specifications. The material used for the non-slip surface on the temporary bridge walkway shall be approved by the Engineer.

Fabrication

All work including fabrication and shop connections shall be in accordance with AASHTO. Prequalified and certified welders shall perform all welding.

BASIS OF PAYMENT

Item 993.2 will be paid for at the Contract Lump Sum price for Temporary Pedestrian Bridge, which price shall include the cost of design, materials, tools, equipment, labor, erection, demolition, incidentals and continuous maintenance is to be paid for on a lump sum basis for the complete installation and subsequent complete removal of the temporary panelized bridge superstructure. The cost includes all elements of the temporary bridge as shown on the Contract Plans and in these Special Provisions required to construct, maintain and remove the temporary pedestrian bridge.

Payment of 75% of the lump sum bid price of this item will be made upon complete installation to the satisfaction and approval of the Engineer. The remaining 25% of the lump sum bid price of this Item will be paid following proper complete removal, as determined by the Engineer, of the temporary bridge from the project.

The schedule on the proposal form applies only to Temporary Pedestrian Bridge. Payment for similar materials and construction at locations other than at this temporary pedestrian bridge structure shall not be included under this Item. Sub-Item numbering is presented for information only in coordination with MassDOT Standard Nomenclature.

ITEM 993.2 (Continued)**ITEM 993.2 - TEMPORARY PEDESTRIAN BRIDGE STRUCTURE**

<u>Sub-Item</u>	<u>Description</u>	<u>Qty.</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Total</u>
904.3	5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE	6	CY		
910.1	STEEL REINFORCEMENT FOR STRUCTURES – EPOXY COATED	210	LB		
993.21	TEMPORARY PEDESTRIAN BRIDGE UNIT	1	EA		
993.22	REMOVAL OF TEMPORARY PEDESTRIAN BRIDGE UNIT	1	EA		
TOTAL LUMP SUM FOR ITEM 993.2 =					

Within 10 days after notice to proceed, the Contractor shall submit on his/her proposal form a schedule of unit prices for the major component Sub-Items that make up Item 993.2 as well as his/her total Lump Sum cost for the temporary pedestrian bridge structure.

ITEM 994.01**TEMPORARY PROTECTIVE SHIELDING**
BRIDGE NO. W-38-011 (CVE)**LUMP SUM**

The work under this Item shall consist of designing, furnishing, erecting, maintaining, removing, and disposing of temporary protective shielding to protect Maple Meadow Brook from falling debris.

Prior to the start of demolition, the Contractor shall be required to submit the details of the temporary shielding to the Engineer 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 shielding to conform to all Federal, State and Local laws and regulations and the requirements contained in the Contract Documents. The protection shielding shall be designed by a Professional Engineer registered in the Commonwealth of Massachusetts. The drawings and calculations shall bear his/her seal when they are submitted to the Engineer. Written approval must be obtained prior to erection of the protection shielding.

The 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. The design of the shielding for deck removal shall also include a complete description of the equipment and construction methods proposed for the deck removal and also the maximum size of deck area being excavated. The shielding shall also be designed to withstand the maximum size of deck area excavated should it fall inadvertently. The design height of fall shall be shown in the Contractor's submission.

The shielding shall extend the full length of the bridge span and a sufficient distance above and beyond the deck overhang at the fascia to protect the waterway below. All spaces along the perimeter of the shielding and at the seams shall be sealed to prevent dust and debris from escaping and falling into the Maple Meadow Brook.

The shielding shall be maintained and remain in place until the deck demolition is complete. Shielding shall be removed only upon approval of the Engineer. After completion, the shielding shall be removed and disposed of properly. All materials used in the shielding system shall be the property of the Contractor and shall be completely removed from the site at the completion of the project.

BASIS OF PAYMENT

Item 994.01 will be paid for at the Contract Lump Sum price for Protective Shielding, which price shall include full compensation for the design of the shielding scheme, all equipment, materials, tools and labor necessary for the installation, maintenance, operation, removal and disposal of the protective shielding. Payment of 75% of the Lump Sum Bid Price of this Item will be paid upon complete installation and approval by the Engineer. It will be further divided 50% after completion of complete installation and 25% after approval by the Engineer. The remaining 25% of the Lump Sum Bid Price of this Item will be paid following complete removal and disposal of the shielding from the project.

ITEM 995.01 BRIDGE STRUCTURE, BRIDGE NO. W-38-011 (CVE) LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsection 995 of the Standard Specifications and the specific requirements stipulated below for the component parts of this Item. For those component parts where no specific requirement is stipulated, the Standard Specifications shall apply except for payment.

Work under this Item shall include all materials, equipment and labor needed to construct the following:

- Precast three-sided frame unit
- Precast pedestal walls
- Galvanized steel for utility supports
- Cast-in-place concrete safety curbs and sidewalks
- Membrane waterproofing for bridge deck
- Cast-in-place concrete frame footings and wingwall footings
- Cast-in-place headwalls and wingwall coping
- Precast wingwall stems
- Precast approach slabs
- Steel reinforcement
- Precast highway guardrail transitions
- S3-MTL4 bridge railings
- Damp-proofing

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 for which they are a part.

Please note there are seasonal restrictions for the proposed gas line work between April 15 and November 1, and advanced coordination with National Grid for this work is required.

The work to be done under these headings shall conform to the relevant provisions of Section 901, supplemented and amended as follows:

All concrete shall be placed in the dry.

All concrete shall be 5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE.

Included in the work are the furnishing and installing of preformed fillers and other items incidental to the furnishing and placing of concrete. All other work covered in the Schedule of Basis for Partial Payments or for which payment is not provided elsewhere in the contract shall be considered as included in the unit price per cubic yard of concrete, as stated by the Contractor and approved by the Engineer, in the respective "Basis for Partial Payment".

ITEM 995.01 (Continued)**HOT DIP GALVANIZED COATING FOR NEW STRUCTURAL STEEL****A. GENERAL**

Fabricated steel shall be galvanized as indicated on the plans. All fabrication shall be completed prior to surface preparation and the application of any coating.

The faying surfaces of all field bolted connections shall be coated based on the design of the connection. Class B connections shall be masked prior to galvanizing to allow for application of an approved class B slip coefficient primer. After galvanizing the masked surface will be cleaned in accordance with SSPC-SP11 and coated with the approved zinc rich primer. A galvanized connection will result in a faying surface meeting a class C slip coefficient.

When grinding, drilling or any other operation produces steel turnings, filings, shavings, etc. the contractor shall completely clean all areas of all accumulation prior to the end of the work shift.

Locations of field applied studs shall require masking or removal of galvanizing and paint prior to welding.

The Engineer shall provisionally accept the shop coated items before shipment to the jobsite but final acceptance of the coating system will occur after erection of the coated items, and after all required repairs and coating application has been completed.

The contractor shall be responsible for failure and damage of all applied coating. Failures include but are not limited to, visible corrosion, blistering, checking, cracking, or delamination (peeling) and loss of gloss and color of the coating system. Damage includes but is not limited to damage from installation or from external agents, such as scraping, vandalism, debris impacts, and collisions. The extent and method of repair must be approved by the Engineer.

B. GALVANIZING

The following shall be hot dipped galvanized in accordance with Section M7 of these Specifications:

1. Members identified on the contract documents.
2. Utility supports that are composed of non-weathering steel.

Galvanized members requiring shop fabrication and assembly shall be cut, welded, and/or drilled prior to galvanizing. Bearing members to be milled shall be galvanized prior to milling. A thin layer of a rust inhibitor shall be applied to the milled surface. Material to be painted shall not be quenched after galvanizing.

Where material is required to be welded after galvanizing, the steel shall be masked 3 inches on each side of the weld center line. Prior to field welding the masked surface shall be cleaned in accordance with SSPC-SP11. After welding the area shall be repaired in accordance with ASTM A780 "Repair of Hot Dip Galvanizing" section 4.2.2, "Paints Containing Zinc Dust" and Annex 2. Repair paint shall meet M7.04.11 and application shall be in accordance with the manufacturer's recommendations.

ITEM 995.01 (Continued)

Damaged galvanized surfaces shall be repaired in accordance with ASTM A780 “Repair of Hot Dip Galvanizing” section 4.2.2 Paints Containing Zinc Dust “High Zinc Dust Content”. The paint shall be applied to achieve a minimum dry film thickness of 3 mils and not more than 5 mils.

Repair paint shall meet M7.04.11 and application shall be in accordance with the manufacturer’s recommendations.

The contractor shall provide protection of the adjacent coating in areas that will be field welded. After welding, the weld areas shall be prepared in accordance with SSPC-SP-11.

ITEM 995.01 (Continued)**PRECAST HIGHWAY GUARDRAIL TRANSITION****PRECAST APPROACH SLAB****PRECAST THREE-SIDED FRAME UNIT****PRECAST PEDESTAL WALLS****PRECAST WINGWALL STEMS****A. General.**

The work under these Headings consists of fabricating, transporting and installing precast highway guardrail transitions, precast approach slabs, precast three sided frame units, precast pedestal walls, precast stem walls, and includes all necessary labor, materials, and equipment to complete the work as shown on the Plans. The work shall conform with the MassDOT Standard, Supplemental, and Interim Specifications and the requirements of the current AASHTO LRFD Bridge Construction Specifications, supplemented by the current relevant provisions of the latest edition of PCI MNL-116 (The Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products), except as noted herein.

QUALITY ASSURANCE**A. General.**

Quality Assurance includes all the planned and systematic actions necessary to provide confidence that a product or facility will perform satisfactorily in service. It is an all-encompassing term that includes Quality Control (performed by the Fabricator) and Acceptance (performed by MassDOT). Quality Control is the system used by the Contractor and Fabricator to monitor and assess their production processes at the plant facility and installation activities at the project site to ensure that the final product will meet the specified level of quality. Acceptance includes all factors used by MassDOT to determine the corresponding value for the product. MassDOT Acceptance inspection at the plant facility is intended as a means of evaluation of compliance with contract requirements. Contractor and Fabricator Quality Control activities and MassDOT Acceptance activities shall remain independent from one another. MassDOT Acceptance activities shall not replace Fabricator Quality Control activities.

B. Fabricator Quality Control.

Quality Control shall be performed by the Fabricator to ensure that the product is fabricated in conformance with the specifications herein. The Fabricator shall maintain a Quality Control system to monitor, assess, and adjust placement and fabrication processes to ensure the Precast Concrete Bridge Element(s) meet the specified level of quality, through sufficient Quality Control sampling, testing, inspection, and corrective action (where required). The Fabricator's Quality Control system shall address all key activities during the placement and fabrication and shall be performed in conformance with the Fabricator's NPCA or PCI Certification. Quality Control documentation shall meet the requirements of the *Fabricator Quality Control – Documentation* section below. Upon request, Fabricator Quality Control documentation shall be provided to the MassDOT Plant Inspector.

1. Plant.

Prior to the fabrication of Precast Concrete Bridge Elements, the Fabricator's precast concrete plant shall obtain the following:

- (a) Certification by the National Precast Concrete Association (NPCA) Plant Certification Program or Precast/Prestressed Concrete Institute (PCI) Plant Certification Program, for the applicable types of Precast Concrete Bridge Element(s) being fabricated
- (b) MassDOT Prequalification
- (c) MassDOT Mix Design Approval

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All concrete for a given Precast Concrete Bridge Element shall be produced by a single company and plant, unless otherwise approved by the Engineer.

2. Personnel.

The Fabricator shall provide adequate training for all QC personnel in accordance with NPCA or PCI certification. There shall be sufficient personnel trained and certified to perform the tests listed under Subsection M4.02.13, Part D. At a minimum, the Fabricator's Quality Control Personnel shall maintain the following qualifications and certifications:

- (a) QC Manager with an active NETTCP Field Technician or ACI Concrete Field Testing Technician – Grade I certification or higher, and a minimum of 4 years continuous experience in the manufacture of Precast Concrete Bridge Elements for state transportation departments. The QC Manager shall be on site while the batch plant is producing and placing concrete for MassDOT projects.
- (b) A Technician/Inspector having the Precast/Prestressed Concrete Institute (PCI) Technician/Inspector Level I or NorthEast Transportation Training and Certification Program (NETTCP) Precast Concrete Inspector, or higher.

The Contractor shall submit to the Engineer a copy of the Fabricator's Quality Control Personnel required qualifications, as specified above.

3. Laboratory.

The Fabricator shall provide a room of sufficient size to house all equipment and to adequately perform all testing. The room shall have either a separate moisture storage room or curing box for concrete cylinders, and it shall be thermostatically controlled to maintain temperatures consistent with AASHTO T 23. It shall include a desk and file cabinet for proper record keeping, and have good lighting and ventilation. This room shall be kept for testing and quality control and not used for any other purpose. An additional desk and file cabinet shall be provided for exclusive use of the Engineer. No exception from these requirements will be allowed without the express written permission of the Engineer.

4. Testing Equipment.

At a minimum, the Fabricator's plant facility shall have the following testing equipment:

- (a) Air Content Meter Type A or B: AASHTO T 152
- (b) Air Content Meter Volumetric Method: AASHTO T 196 (Required for Lightweight Concrete)
- (c) Slump Cone: AASHTO T 119
- (d) Cylinder Molds AASHTO M 205
- (e) Concrete Testing Machine: AASHTO T 22
- (f) Screening Sieve: AASHTO T 27, AASHTO T 11
- (g) Curing Box: AASHTO T 23
- (h) Spread Test Base Plate for Self-Consolidating Concrete (SCC): ASTM C1611
- (i) All other equipment prescribed by AASHTO and ASTM standards for the tests to be performed by the Fabricator as specified

5. Inspection.

Quality Control personnel shall monitor and inspect the fabrication of each Precast Concrete Bridge Element. Quality Control personnel shall report all inspection activities on Quality Control Inspection Reports and non-conformances on Non-Conformance Reports (NCRs) throughout the entire fabrication process, as specified herein.

ITEM 995.01 (Continued)**6. Temperature Monitoring.**

At a minimum, the Fabricator shall monitor, record, and report the temperatures of the form, ambient temperatures surrounding the concrete, and temperatures of the concrete continuously, without interruption as specified below:

- (a) Prior to placement of concrete to verify that $T_i \geq 50^\circ\text{F}$.
- (b) Immediately after placement to verify that $T_i \geq 50^\circ\text{F}$ is maintained.
- (c) Throughout the entire duration of the curing cycle, at regular intervals not to exceed one hour until 100% Design Strength (f'_c) is attained and concrete has cooled to within 40°F of the ambient temperature surrounding the Precast Concrete Bridge Element.

At a minimum, the temperature measuring devices shall record and report the temperature of the concrete to the nearest 2°F . At least two temperature sensors (thermocouples) shall be positioned to record the maximum and minimum anticipated concrete temperatures. The anticipated minimum temperature shall be measured with one or more thermocouples at a distance no greater than 2 inches from the surface of the thinnest section. The anticipated maximum temperature shall be measured with one or more thermocouples at the center of the thickest section. Proposed temperature measurement locations shall be submitted to the Engineer for approval. Temperature recording devices shall be located within the curing enclosure and calibrated as required by PCI MNL-116 Section 4.18.4. Maximum heat increase and cool down rates shall comply with PCI MNL-116, Section 4.19. The Contractor shall furnish temperature logs recorded at a minimum frequency of once per hour to the Inspector as required, with each post-pour QC inspection report.

7. Sampling and Testing.

At a minimum, the Fabricator shall perform random Quality Control sampling and testing as specified in *Table 1: Quality Control Sampling and Testing*. The Fabricator shall perform additional Quality Control sampling and testing on concrete that has been retempered with admixtures or hold-back water during fabrication. Test Specimens shall conform to the requirements of Section M4.02.13 of the MassDOT Standard and Supplemental Specifications and AASHTO R 60, with the exception of the Stripping (80% f'_c) set of cylinders. Stripping (80 % f'_c) cylinders shall be cured in the same location and environment as the Precast Bridge Elements they represent. If approved by the Engineer, compressive strength cylinder match curing equipment, that maintains the same concrete conditions that the corresponding Precast Bridge Element is exposed to, may be utilized in lieu of Stripping (80 % f'_c) field cured cylinders, with the use of thermocouples, controllers, and heaters.

ITEM 995.01 (Continued)**Table 1: Quality Control Sampling and Testing**

Quality Characteristic	Test Method	Sample Size	Specification Limit	Lot Size ^(c)	Sublot Size ^(d)	Frequency	Point of Sampling
Slump (in.) ^(a)	AASHTO T 119	Per AASHTO	≤ 8 in. or as approved by the Engineer	Total Quantity of Concrete (cy) produced on a Contract, per Type of Element fabricated, per Mix Design	20 cy	One (1) per Sublot or fraction thereof	Point of Discharge
Air Content (%)	AASHTO T 152	Per AASHTO	$5\% \leq \% \leq 8\%$				
Temperature (°F)	AASHTO T 309	Per AASHTO	$50^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 90^{\circ}\text{F}$				
Compressive Strength (psi)	AASHTO T 22	Stripping Cylinders: One (1) set of Three (3) 4 x 8 in.	$\geq 80\% f'_c$ at Stripping				
		7-day Cylinders: One (1) set of Three (3) 4 x 8 in.	For Information at 7 days				
		28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	$\geq 100\% f'_c$ at 28 days				
		56-day Cylinders: One (1) set of Three (3) 4 x 8 in.	$\geq 100\% f'_c$ at 56 days ^(b)				

Notes:

- (a) Self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.
- (b) 56-day Compressive Strength test specimens shall require testing only when 28-day Compressive Strength test specimens have failed to meet Design Strength (f'_c).
- (c) Lot shall be defined as a specific quantity of material from a single source, produced or placed by the same controlled process.
- (d) Sublot shall be defined as an equal division or part of a Lot from which a sample of material is obtained in order to assess the Quality Characteristics of the Lot.

ITEM 995.01 (Continued)**8. Certificate of Compliance.**

The Fabricator shall provide a Certificate of Compliance in accordance with Standard Specifications, Division I, Section 6.01, stating that QC test cylinders have achieved the design strength, f'_c . A Certificate of Compliance shall accompany each shipment and shall be presented to the MassDOT Resident Engineer or designee upon delivery to the site.

9. Documentation.

At a minimum, the Fabricator shall maintain a filing system for the following QC records and documentation. All QC records and documentation shall be made available to MassDOT upon the request of the Department.

- (a) Current MassDOT Approved Mix Design Sheet(s) and Approval Letter(s)
- (b) PCI or NPCA Certification
- (c) Current Qualifications and Certifications for QC Manager(s) and QC Technician(s)
- (d) Most current set of Approved Shop Drawings
- (e) Approved Placement, Finishing and Curing Plan
- (f) Approved Dunnage Plan
- (g) Fabricator Certificate of Compliance for each fabricated Precast Concrete Bridge Element
- (h) Admixture Manufacturer's Certification of Compliance for each approved Admixture
- (i) Completed QC Inspection Report for each fabricated Precast Concrete Bridge Element
- (j) Identification Number for each fabricated Precast Concrete Bridge Element
- (k) Time and date of casting of each fabricated Precast Concrete Bridge Element
- (l) Date of stripping of each fabricated Precast Concrete Bridge Element
- (m) Batch Ticket Printout reporting the quantity of concrete produced for each batch of concrete produced
- (n) Concrete temperature records for each Precast Concrete Bridge Element fabricated
- (o) QC Test Report Forms for each subplot of concrete produced
- (p) Non-Conformance Reports (NCRs)
- (q) Documentation of Repairs (if applicable)

C. Acceptance.

MassDOT will perform Acceptance inspection, sampling, and testing during fabrication and installation, to evaluate the quality and degree of compliance of the fabricated Precast Concrete Bridge Element to MassDOT specifications. Additionally, MassDOT Inspectors will monitor the Fabricator's Quality Control activities to ensure the Fabricator is properly administering Quality Control in conformance with the Fabricator's NPCA or PCI Certification. Acceptance inspection and test results not meeting MassDOT specifications will result in Non-conformance Reports (NCR) being issued by MassDOT to the Fabricator or Contractor for corrective action. Final Acceptance for the fabricated Precast Concrete Bridge Elements shall be determined by MassDOT.

1. Inspection.

A MassDOT MassDOT Inspector will be assigned to perform Acceptance activities during fabrication, which includes the inspection of the materials, work procedures, and Precast Concrete Bridge Elements. At least seven (7) days prior to the scheduled start of fabrication, the Fabricator shall contact the MassDOT Research and Materials Section (RMS) to provide notice of the scheduled fabrication start date. The Fabricator shall complete the following activities prior to notifying MassDOT RMS of the scheduled start date:

ITEM 995.01 (Continued)

- (a) Receive approval for all submitted Fabricator cement concrete mix designs from the MassDOT Research and Materials Section for the current year, as specified under the *Mix Design* section and *Table 3: Trial Batch Sampling Testing for New Mix Designs*. Self-consolidating concrete shall meet the requirements of M4.02.17.
- (b) Receive approval for the submitted Fabricator Placement, Finishing, and Curing Plan from the MassDOT Research and Materials Section, as specified under the *Placement, Finishing, and Curing Plan* section.
- (c) Receive Engineer of Record approved shop drawings from the MassDOT Research and Materials Section as specified under the *Shop Drawings* section.
- (d) Participate in the pre-production meeting, as described under the *Pre-Production Meeting* section (if required).

Prior to the start of fabrication, the Fabricator shall review the fabrication schedule with the MassDOT Inspector. Fabrication shall only proceed when:

- (a) The QC Inspector and MassDOT Inspector are present to inspect the Precast Concrete Bridge Element(s) being fabricated.
- (b) The QC Manager is present at the Fabricator's plant.

The Fabricator shall grant access to all required areas of the Fabricator's plant to the MassDOT Inspector, during the hours of fabrication. Fabrication without MassDOT Inspector access to required areas is prohibited, and will result in the rejection of the fabricated Precast Concrete Bridge Element(s).

Additionally, the MassDOT Inspector will monitor the adequacy of the Fabricator's Quality Control activities. MassDOT Inspector Acceptance activities performed at the Fabricator's plant shall remain independent from the Fabricator, and does not replace the Fabricator's required Quality Control activities.

2. Sampling and Testing.

At a minimum, the MassDOT Inspector will perform random Acceptance sampling and testing for each Sublot of concrete produced as specified in *Table 2: Acceptance Sampling and Testing*. The MassDOT Inspector will also perform Acceptance sampling and testing on concrete that has been retempered with admixtures or hold-back water during production. Test Specimens will conform to the requirements of Section M4.02.13 of the MassDOT Standard and Supplemental Specifications and AASHTO R 60.

ITEM 995.01 (Continued)**Table 2: Acceptance Sampling and Testing**

Quality Characteristic	Test Method	Sample Size	Specification Limit	Lot Size ^(c)	Sublot Size ^(d)	Frequency	Point of Sampling
Slump (in.) ^(a)	AASHTO T 119	Per AASHTO	≤ 8 in. or as approved by the Engineer	Total Quantity of Concrete (cy) produced on a Contract, per Type of Element fabricated, per Mix Design	20 cy	One (1) per Sublot or fraction thereof	Point of Discharge
Air Content (%)	AASHTO T 152	Per AASHTO	$5\% \leq \% \leq 8\%$				
Temperature (°F)	AASHTO T 309	Per AASHTO	$50^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 90^{\circ}\text{F}$				
Compressive Strength (psi)	AASHTO T 22 AASHTO T 23	7-day Cylinders: One (1) set of Three (3) 4 x 8 in.	For Information at 7 days				
		28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	$\geq 100\% f'_c$ at 28 days				
		56-day Cylinders: One (1) set of Three (3) 4 x 8 in.	$\geq 100\% f'_c$ at 56 days ^(b)				

Notes:

- (a) Self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.
- (b) 56-day Compressive Strength test specimens shall require testing only when 28-day Compressive Strength test specimens have failed to meet Design Strength (f'_c).
- (c) Lot shall be defined as a specific quantity of material from a single source, produced or placed by the same controlled process.
- (d) Sublot shall be defined as an equal division or part of a Lot from which a sample of material is obtained in order to assess the Quality Characteristics of the Lot.

ITEM 995.01 (Continued)**MATERIALS****A. Materials.**

Materials shall meet the following specifications (if applicable):

General	M4.00.00
Portland Cement	M4.01.0
Blended Hydraulic Cements	M4.01.1
Fly Ash	M4.01.2
Cement Concrete	M4.02.00
Cement	M4.02.01
Cement Mortar	M4.02.15
Aggregates	M4.02.02
Lightweight Aggregates	M4.02.03
Water	M4.02.04
Cement Concrete Additives	M4.02.05
Proportioning	M4.02.06
Mixing and Delivery	M4.02.10
Test Specimens	M4.02.13
Mortar for Filling Keyways	M4.04.0
Slag	AASHTO M 302
High Performance Cement Concrete	M4.06.1
Self-Consolidating Concrete (SCC)	M4.02.17
Controlled Density Fill – Non-Excavatable	M4.08.0
Reinforcing Bars	M8.01.0
Epoxy Coated Reinforcing Bars	M8.01.7
Galvanized Reinforcing Bars	M8.01.8
Welded Wire Reinforcement	M8.01.2
Mechanical Reinforcing Bar Splicer	M8.01.9
Lifting Devices	PCI MNL-116
Corrugated Metal Pipe	AASHTO M 36

1. Cement Concrete Mix Design.

The cement concrete shall be comprised of specified proportions of water and MassDOT approved aggregates, cement, supplementary cementitious materials (SCMs), and admixtures to form a homogenous composition. Cement concrete for Precast Concrete Bridge Elements shall meet the requirements of M4.06.1 High Performance Cement Concrete, with the exception that the “Total Cementitious Content” specified shall be considered the “Maximum Allowable Cementitious Content”. When used, self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.

Prior to production of cement concrete, the Fabricator shall report and submit all proposed mix design formulations and its constituent materials onto the MassDOT Cement Concrete Mix Design Sheet to the MassDOT Research and Materials Section for review and approval. All mix design yields shall be designed for 1.0 cubic yards of concrete, with an allowable tolerance of +/- 1.0 %. All liquids incorporated into the proposed mix design(s) shall include both water and admixtures in the liquid mass calculation.

During production of cement concrete, the Fabricator shall not alter the previously approved mix design formulation or its constituent materials. Proposed alterations in source, type, batch quantity, or gradation to any of the constituent materials of the previously approved mix design formulation shall require a new MassDOT Mix Design Sheet submission to the MassDOT Research and materials Section for review and approval. Fabrication shall not occur without prior MassDOT mix design approval.

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The Fabricator shall notify MassDOT RMS to schedule trial batch testing for the new mix design(s). Trial batch testing shall meet the following requirements:

- (a) Performed by a qualified laboratory and/or AASHTO accredited laboratory.
- (b) Performed and/or sampled in the presence of a MassDOT Inspector.
- (c) Meet the requirements as specified in *Table 3: Trial Batch Sampling Testing for New Mix Designs*. Self-consolidating concrete (SCC) shall meet M4.02.17.

Failure to perform all of the required trial batch testing or provide MassDOT RMS trial batch test results within the Specification Limits (as specified in Table 3) will result in the disqualification of the Fabricator's proposed mix design(s).

Table 3: Trial Batch Sampling and Testing for New Mix Designs

Quality Characteristic	Test Method	Sample Size	Specification Limit	Performed By
Slump ^(a)	AASHTO T 119	Per AASHTO	Max. 8 inches or as approved by the Engineer	Quality Control
Air Content (AC)	AASHTO T 152	Per AASHTO	$5\% \leq AC \leq 8\%$	Quality Control
Temperature (°F)	AASHTO T 309	Per AASHTO	$50^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 90^{\circ}\text{F}$	Quality Control
Compressive Strength ^(b)	AASHTO T 22 AASHTO T 23	28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	Lab Mixed $f'_{cr} = 1.3 f'_c$ at 28 days Batch Mixed $f'_{cr} = 1.2 f'_c$ at 28 days	MassDOT
Alkali-Silica Reaction (ASR) ^(d)	ASTM C 1567	Per ASTM	M4.02.00	Quality Control
Resistance to Chloride Ion Penetration Chloride Ion Penetration ^(e)	AASHTO T 358 ^(f)	28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	Resistivity $\geq 21 \text{ k}\Omega\text{-cm}$ at 28 days	MassDOT
Freeze/Thaw Durability ^(c)	AASHTO T 161 (Procedure A)	Per AASHTO	Relative Dynamic Modulus of Elasticity after 300 cycles $\geq 80\%$	Quality Control

Notes:

- (a) Self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.
- (b) Trial batch compressive strength testing shall be performed by MassDOT. Laboratory mixed trial batch compressive strength results shall achieve 130% Design Strength (f'_c). Batch-mixed trial batch compressive results shall achieve 120% f'_c . Acceptance will be based on compressive strength testing performed by MassDOT.
- (c) If an AASHTO accredited laboratory is preparing the trial batch test specimens, MassDOT Acceptance presence is not required. If the Fabricator is preparing the trial batch test specimens, MassDOT Acceptance presence is required during trial batch test specimen preparation.

ITEM 995.01 (Continued)

- (d) Alkali Silica Reaction (ASR) testing shall meet the requirements of M4.02.00. Independent laboratories performing ASR testing shall be listed on the MassDOT Quality Construction Materials List (QCML).
- (e) Calcium nitrite shall be removed from mix designs containing the admixture and replaced by an equivalent quantity of water when preparing Chloride Ion Penetration resistance trial batch test specimens.
- (f) The Wenner probe tip spacing "a" shall be 1.5.

2. 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.

3. Grout.

Grout used for shear keys, vertical adjustment assembly voids, and hand holes shall be in accordance with M4.04.0.

4. Reinforcement.

All reinforcing steel shall be coated Grade 60 unless otherwise noted on the plans. Mechanical reinforcing bar splicers shall be epoxy coated.

5. 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.

6. Corrugated Metal Pipe.

Corrugated Metal Pipe to be used for forming voids as specified on the plans shall be fabricated from steel and shall have a protective metallic coating of zinc (galvanizing).

CONSTRUCTION METHODS – PLANT FABRICATION**A. Shop Drawings.**

Prior to performing any work under this Section, the Contractor shall receive approval for all shop drawings for the Precast Concrete Bridge Element being worked on and any special Contract requirements, provided that a complete shop drawing package is provided. The Contractor shall not order materials or begin work before receiving approved shop drawings. MassDOT will reject Precast Concrete Bridge Elements that deviate from the approved drawings or are fabricated prior to receiving written approval of the shop drawings. The Contractor shall bear full responsibility and costs for all materials ordered or work performed prior to the approval of the shop drawings or written authorization from MassDOT.

Contractor shall submit scaled shop drawings to the Engineer of Record for review and approval. Upon approval, the Engineer of Record will forward two (2) sets of scaled, full size (minimum 24x36") paper copies of the Approved (or Approved As Noted) shop drawings to the MassDOT Director of Research and Materials. Calculations are not to be included in any submittal to the Research and Materials Section. An approval stamp shall appear on every shop drawing sheet. Wet-stamping or wet-signing is not required, provided that the stamp and reviewer name are legible. The Fabricator's name and address shall appear on each sheet.

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Resubmittal of “Approved as Noted” shop drawings is not necessary for minor revisions, provided that the correction can be clearly understood and is unambiguous without possibility of misinterpretation. Shop drawings with questions or comments that require a response and/or additional information from the Fabricator must be resubmitted.

Detailed shop drawings shall be prepared in accordance with the relevant provisions of Subsection 5.02 and shall, at a minimum, contain the following:

- (a) Number and type and/or piece mark of the precast concrete bridge element including overall length, width and height.
- (b) Skew angle.
- (c) Location, size and geometry of all steel reinforcement, including mechanical reinforcing bar splicers to be used for connecting Precast Concrete Bridge Elements together in the field.
- (d) Location and details of all inserts, anchors, Vertical Adjustment Assemblies, and any other items required to be cast into the Precast Concrete Bridge Elements (whether detailed on the plans by the Engineer of Record or provided for the Contractor's convenience). Precast Concrete Bridge Elements shall not be fired or drilled into for attachment purposes. All hardware shall be galvanized except as noted.
- (e) Locations and details of the lifting devices, including supporting calculations, type and amount of any additional reinforcing required for lifting. The Fabricator shall design all lifting devices based on the no cracking criteria in Chapter 8 of the PCI Design Handbook (7th edition).
- (f) The minimum compressive strength required prior to handling the precast concrete bridge element.

The shop drawings shall not include procedures for placement, finishing, and curing of concrete. These details shall be included in the Placement, Finishing and Curing Plan that is to be submitted to MassDOT Research and Materials Section as described under *Placement, Finishing, and Curing Plan*.

B. Fabrication.

All Precast Concrete Bridge Elements shall be fabricated in accordance with the latest edition of PCI MNL-116 as modified herein.

C. Placement, Finishing and Curing Plan.

At least 30 days prior to start of fabrication, the Contractor shall submit the Fabricator's proposed Placement, Finishing and Curing Plan to the Engineer for approval by MassDOT Research and Materials Section. This shall be an independent submittal, separate from the fabrication shop drawings. The Placement, Finishing and Curing Plan shall include the following:

- (a) Method of Mixing
- (b) Method of Placement
- (c) Method of Consolidation
- (d) Method of Finishing
- (e) Method of Initial Curing
- (f) Method of Intermediate Curing
- (g) Method of Final Curing
- (h) Moisture Retention Materials and Equipment (water spray equipment, saturated covers, sheet materials, liquid membrane-forming compounds, accelerated curing equipment, etc.)
- (i) Cylinder Curing Methods, Location, and Environmental Control (temperature, humidity, etc.)
- (j) Temperature Monitoring, Recording, and Reporting

ITEM 995.01 (Continued)**D. Dunnage Plan Shop Drawings.**

At least 30 days prior to the start of fabrication, the Contractor shall submit proposed Dunnage Plan Shop Drawings to the Engineer of Record for review and approval. This shall be an independent submittal, separate from the fabrication shop drawings. Upon approval, the Engineer of Record will forward two (2) sets of scaled, full size (minimum 24"x36") paper copies of the Approved (or Approved As Noted) Dunnage Plan to the MassDOT Director of Research and Materials. Calculations are not to be included in any submittal to the Research and Materials Section. The Dunnage Plan shall include the following:

- (a) Proposed layout of the Precast Concrete Bridge Elements for storage in yard and during shipping
- (b) Support and blocking point locations
- (c) Support and blocking materials

E. Box Culverts, Three-Sided Frames and Arches. *(delete this section if your project does not use these precast concrete bridge elements)*

The Contractor shall submit design computations for the box culvert, rigid frame or arch bridge elements to the Engineer for review and approval. The computations shall be prepared in accordance with the latest AASHTO LRFD Bridge Design Specifications, the 2013 MassDOT LRFD Bridge Design Manual, and the Plans using English units and HL-93 live loading. The design computations shall consider all Strength, Extreme Event and Service Limit States as are appropriate for each stage of fabrication, shipment, construction, and for the final in-service condition. Design computations and shop drawings shall be prepared and stamped by a Professional Engineer licensed to practice in the Commonwealth of Massachusetts. The shop drawings shall be prepared and submitted in accordance with the section, Drawings, above.

The frame dimensions provided on the plans are shown to establish the size of the proposed opening. The width and thickness of each frame unit may vary depending upon the manufacturer's specifications provided that the opening size is maintained. The Contractor shall be responsible for modifying the dimensions of the frame bridge elements to compensate for elastic shortening, shrinkage, grade corrections, and other phenomena that make in-process fabricating dimensions different from those shown on the drawings. Approval of the shop drawings shall not relieve the Contractor from responsibility for the correctness of the dimensions shown.

1. Joints.

The precast reinforced concrete three-sided frame shall be produced with grout-filled keyways per the details on the plans, the manufacturer's recommendations, and as approved by the Engineer. The ends shall be manufactured such that when the sections are laid together they will make a continuous line of frames with a smooth interior surface free of appreciable irregularities, and in compliance with the permissible variations.

2. Marking.

The following information shall be clearly marked on the interior of each frame by indentation, waterproof paint, or other approved means:

- (a) Frame span and rise
- (b) Date of manufacture and lot number
- (c) Name and trademark of the manufacturer

ITEM 995.01 (Continued)**F. 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 Section *Quality Assurance – Precast Concrete, C. Acceptance, A. Inspection*), 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.

G. Reinforcement.

The reinforcing bars shall be installed in accordance with Section 901.62 of the Supplemental 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.

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.

H. Tolerances.

Fabrication shall comply with tolerances specified on the plans. Tolerances for steel reinforcement placement shall be in accordance with 901.62. In the absence of specifications on the plans, tolerances shall comply with the latest version of the PCI MNL 135, Precast Tolerance Manual.

I. 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. Any defects or damage of more than "Category 2, Minor Defects" made to the concrete, due to form work, stripping or handling, shall be subject to repair or rejection, as defined in the *Repairs and Replacement* section. 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.

J. Mixing of Concrete.

The concrete shall be proportioned and mixed in conformance with the Fabricator's MassDOT approved mix design and M4.02.10 Mixing and Delivery. Fabrication shall not occur without prior MassDOT mix design approval. The Fabricator shall provide copies of batch tickets to the MassDOT Plant Inspector. The MassDOT Plant Inspector will verify if the batch ticket quantities are within the tolerances of the Fabricator's MassDOT approved mix design.

ITEM 995.01 (Continued)**K. Placement of Concrete.**

Prior to the placement of concrete, the temperature of the forms shall be greater than or equal to 50°F. Quality Control inspection shall be performed by the Fabricator as specified in the *Fabricator Quality Control* section. Placement of the concrete shall not proceed until the MassDOT Plant Inspector is present to perform inspection and begin monitoring Fabricator Quality Control inspection activities, and is in compliance with specifications. The MassDOT Plant Inspector shall inspect and accept the placement of the reinforcing steel prior to the placement of concrete into the forms. The Fabricator shall verify all materials and equipment required for protecting and curing the concrete are readily available and meet the requirements of the *Final Curing Methods* section below. All items encased in the concrete shall be accurately placed in the position shown on the Plans and firmly held during the placing and setting of the concrete. Clearance from the forms shall be maintained by supports, spacers, or hangers and shall be of approved shape and dimension.

During placement, the concrete shall maintain a concrete temperature range between 50°F and 90°F. The Fabricator shall minimize the time to concrete placement (measured from start of mixing to completion of placement). In no event shall time to placement exceed 90 minutes. The Fabricator shall perform additional Quality Control sampling and testing on concrete that has been retempered with admixtures or hold-back water during the placement of the concrete as specified in the *Fabricator Quality Control* section above. Delays or shutdowns of over 30 minutes shall not be allowed during the continuous filling of individual forms.

L. Consolidation of Concrete.

Suitable means shall be used for placing concrete to prevent segregation or displacement of reinforcing steel or forms. The concrete shall be thoroughly consolidated by external or internal vibrators or a combination of both. Vibrators shall not be used to move concrete within the forms. Vibrators shall be used as specified in 901.63C and as directed by the Engineer. Concrete shall be placed and consolidated in a way that minimizes the presence of surface voids or bug holes on the formed surfaces. When used, self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.

M. Finishing of Concrete.

The finish of the Precast Concrete Bridge Elements shall be as indicated on the plans. Where Precast Concrete Bridge Elements have keyways for grout or closure pours, the surfaces of these shear keys shall be abrasive blasted prior to shipment. The Fabricator may utilize a surface retarder with water blast, sandblast, or a combination of both to achieve the desired keyway finish. At a minimum, the profile of the keyway surfaces shall be similar to that of 60 grit sand paper. The exposed reinforcing steel in the precast slab 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 Fabricator shall permanently mark each precast concrete bridge element with its type and/or piece mark, date of casting, and supplier identification either by stamp markings in fresh concrete, waterproof paint, or other approved means on a surface that will not be exposed after assembly.

N. Exposed Surfaces of Precast Concrete Bridge Elements.

As soon as conditions permit, before the concrete has fully hardened, all dirt, laitance, and loose aggregate shall be removed from the exposed concrete surfaces. Contractor shall not allow foot traffic on the uncured concrete until it has reached sufficient strength to prevent damage.

O. Exposed Surfaces of Closure Pour Shear Keys.

The closure pour shear key cast in the sides of the beam flanges shall have an exposed aggregate finish. The closure pour reinforcing steel and its coating shall not be damaged by the process for creating the exposed aggregate surface. Fabricator may utilize a surface retarder with water blast, abrasive blast, or a combination of both to achieve the desired shear key finish. The abrasive blast shall use oil free compressed air. The profile of the shear key surfaces shall be similar to that of 60 grit sand paper.

ITEM 995.01 (Continued)**P. Initial Curing Methods.**

After the placement of concrete and prior to concrete finishing, the Fabricator shall initiate initial curing methods when the concrete surface begins to dry, to reduce moisture loss from the surface. Application of one or more of the following initial curing methods shall occur immediately after the bleed water sheen has disappeared.

1. Fogging.

Fogging nozzles shall atomize water into a fog-like mist. The fog spray shall be directed and remain visibly suspended above the concrete surface, to increase the humidity of the air and reduce the rate of evaporation. Water from fogging shall not be worked into the surface during finishing operations and shall be removed or allowed to evaporate prior to finishing.

2. Liquid-applied Evaporation Reducers

Evaporation reducers shall be sprayed onto the freshly placed concrete surface to produce an effective monomolecular film that reduces the risk of plastic-shrinkage cracking and rate of evaporation of the bleed water from the concrete surface. Evaporation reducers shall be applied in accordance with manufacturer's recommendations.

Q. Intermediate Curing Methods.

The Fabricator shall initiate intermediate curing methods if concrete finishing has taken place prior to the concrete reaching final set. The freshly finished concrete surface shall be protected from moisture loss, by the continuation of initial curing methods (fogging and evaporation reducers) until final curing methods are applied or by the use of liquid membrane-forming curing compounds (see *Liquid Membrane-Forming Compounds for Curing* section).

R. Final Curing Methods.

The Fabricator shall initiate and apply final curing methods to the concrete immediately after the following conditions are met:

- (a) Completion of concrete finishing
- (b) Final set of concrete
- (c) Concrete has hardened sufficiently enough to prevent surface damage

During fabrication of Precast Concrete Bridge Elements, the Fabricator shall maintain the required concrete temperature ranges throughout the entire duration of the final curing method cycle as specified herein. Controlled and gradual termination of the final curing method shall occur after all specified conditions are met. The concrete temperature shall be reduced at a rate not to exceed 36°F per hour until the concrete temperature is within 20°F of the ambient temperature outside of the final curing method enclosure. The Fabricator shall maintain a minimum concrete temperature of 40°F until 100% f'c is attained (see *Handling and Storage* section below).

1. Water Spray Curing.

All exposed concrete surfaces shall remain moist with a continuous fine spray of water throughout the entire duration of the final curing method cycle (see *Table 4: Final Curing Method Cycle for Water Spray*).

ITEM 995.01 (Continued)**Table 4: Final Curing Method Cycle for Water Spray**

Sustained Concrete Temperature	Final Curing Method Cycle Duration	Compressive Strength
$50^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 90^{\circ}\text{F}$	$\geq$ Five (5) days	$\geq 80\% f'_c$

2. Saturated

Covers for Curing.

All exposed concrete surfaces shall remain moist with a continuous application of saturated covers throughout the entire duration of the final curing method cycle (see *Table 5: Final Curing Method Cycle for Saturated Covers*). Saturated covers shall be allowed to dry thoroughly before removal to provide uniform, slow drying of the concrete surface.

Table 5: Final Curing Method Cycle for Saturated Covers

Sustained Concrete Temperature	Final Curing Method Cycle Duration	Compressive Strength
$50^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 90^{\circ}\text{F}$	$\geq$ Three (3) days	$\geq 80\% f'_c$

Saturated covers, mats, and other

such as burlap, cotton coverings of absorbent

materials shall meet the requirements of AASHTO M 182, Class 3. Saturated covers shall be in good condition, free from holes, tears, or other defects that would render it unsuitable for curing concrete. Saturated covers shall be dried to prevent mildew when storing. Prior to application, saturated covers shall be thoroughly rinsed in water and free of harmful substances that are deleterious or cause discoloration to the concrete. Saturated covers shall have sufficient thickness and proper positioning onto the concrete surface to maximize moisture retention.

Saturated covers shall contain a sufficient amount of moisture to prevent moisture loss from the surface of the concrete. Saturated covers shall be kept continuously moist so that a film of water remains on the concrete surface throughout the entire duration of the final curing method cycle. The Fabricator shall not permit the saturated covers to dry and absorb water from the concrete. Use of polyethylene film (see *Polyethylene Film* section) may be applied over the saturated cover to potentially decrease the need for continuous watering.

3. Sheet Materials for Curing.

All exposed concrete surfaces shall remain moist with a continuous application of curing sheet materials throughout the entire duration of the final curing method cycle (see *Table 6: Final Curing Method Cycle for Curing Sheet Materials*).

Table 6: Final Curing Method Cycle for Sheet Materials

Sustained Concrete Temperature	Final Curing Method Cycle Duration	Compressive Strength
$50^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 90^{\circ}\text{F}$	$\geq$ Three (3) days	$\geq 80\% f'_c$

Sheet Materials used for curing, such as polyethylene film, white burlap-polyethylene sheeting, and reinforced paper shall meet the requirements of ASTM C171 and the specifications herein. Sheet materials shall inhibit moisture loss and reduce temperature rise in concrete exposed to radiation from the sun during the final curing method cycle. Adjoining covers shall overlap not less than 12 inches. All edges of the covers shall be secured to maintain a moist environment.

ITEM 995.01 (Continued)**Polyethylene Film.**

Polyethylene film shall meet the requirements of ASTM C171, consist of a single sheet manufactured from polyethylene resins, be free of visible defects, and have a uniform appearance. Careful considerations shall be taken by the Fabricator to prevent the film from tearing during storage and application, so as to not disrupt the continuity of the film (polyethylene film reinforced with glass or other fibers is more durable and less likely to be torn). The Fabricator shall monitor the application of the film to prevent uneven spots from appearing (mottling) on the concrete surface, due to variations in temperature, moisture content, or both. The Fabricator shall prevent mottling from occurring on the concrete surface by applying additional water under the film or applying a combination of polyethylene film bonded to absorbent fabric to the concrete surface to retain and evenly distribute the moisture.

Immediately following final finishing, polyethylene film shall be placed over the surface of the fresh concrete surface, so as to not damage the surface of the concrete and shall be placed and weighted so that it remains in contact with the concrete throughout the entire duration of the final curing method cycle. The film shall extend beyond the edges of the concrete surface. The film shall be placed flat on the concrete surface, avoiding wrinkles, to minimize mottling. Edges of adjacent polyethylene film shall overlap a minimum of 6 inches and be tightly sealed with the use of sand, wood planks, pressure-sensitive tape, mastic, or glue to maintain close contact with the concrete surface, retain moisture, and prevent the formation of air pockets throughout the entire duration of the final curing method cycle.

White Burlap-Polyethylene Sheeting

White burlap-polyethylene sheeting shall meet the requirements of ASTM C171, be securely bonded to the burlap so to avoid separation of the materials during handling and curing of the concrete, and be applied in the same manner as the polyethylene film.

Reinforced Impervious Paper.

Reinforced impervious paper shall meet the requirements of ASTM C171, consist of two sheets of kraft paper cemented together with a bituminous adhesive and reinforced with embedded cords or strands of fiber running in both directions, and be white in color. Reinforced impervious paper shall be treated to prevent tearing when wetted and dried.

Reinforced impervious paper can be reused so long as it is effective in retaining moisture on the concrete surface. The Fabricator shall visually inspect the reinforced impervious paper for all holes, tears, and pin holes from deterioration of the paper through repeated use by holding the paper up to the light. The paper shall be discarded and prohibited from use when the moisture is no longer retained.

After the concrete has hardened sufficiently to prevent surface damage, the concrete surface shall be thoroughly wetted prior to the application of the reinforced impervious paper, and be applied in the same manner as the polyethylene film.

4. Liquid Membrane-Forming Compounds for Curing.

All exposed concrete surfaces shall remain moist with a continuous application of liquid membrane-forming compounds throughout the entire duration of the final curing method cycle (see *Table 7: Final Curing Method Cycle for Liquid Membrane-Forming Compounds*).

ITEM 995.01 (Continued)**Table 7: Final Curing Method Cycle for Liquid Membrane-Forming Compounds**

Sustained Concrete Temperature	Final Curing Method Cycle Duration	Compressive Strength
50°F ≤ °F ≤ 90°F	≥ Seven (7) days	≥ 80% f _c

Liquid membrane-forming compounds shall meet the requirements of ASTM C 1315, Type I, Class A and shall exhibit specific properties, such as alkali resistance, acid resistance, adhesion-promoting quality, and resistance to degradation by ultraviolet light, in addition to moisture-retention capabilities. Liquid membrane-forming compounds shall consist of waxes, resins, chlorinated rubber, or other materials to reduce evaporation of moisture from concrete. Liquid membrane-forming compounds shall be applied in accordance with the manufacturer's recommendations.

Liquid membrane-forming compounds shall be applied immediately after the disappearance of the surface water sheen following final finishing. All exposed surfaces shall be wetted immediately after form removal and kept moist to prevent absorption of the compound, allowing the curing membrane to remain on the concrete surface for proper membrane moisture retention. The concrete shall reach a uniformly damp appearance with no free water on the surface prior to the application of the compound.

If patching or finishing repairs are to be performed prior to the application of the compound, the Precast Concrete Bridge Element shall be covered temporarily with saturated covers until the repairs are completed and the compound is applied. Only areas being repaired shall be uncovered during this period. While the saturated covers are removed to facilitate the patching process, the work shall continue uninterrupted. If for any reason the work is interrupted, saturated covers shall be placed onto the uncovered concrete surface, until the work continues and is completed, at which time the curing compound shall be applied to the repaired area.

Careful considerations shall be made by the Fabricator 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. Under such conditions, the application of liquid membrane-forming compounds to the concrete surface shall be delayed, in order to prevent bleed water from being sealed below the concrete surface and avert map cracking of the membrane films, reduction in moisture-retention capability, and reapplication of the compound. To diagnose and prevent this condition, the Fabricator shall 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.

The compound shall be applied in two applications at right angles to each other to ensure uniform and more complete coverage. On very deeply textured surfaces, the surface area to be treated shall be at least twice the surface area of a troweled or floated surface. In such cases, two separate applications may be needed, each at 200 ft²/gal., with the first being allowed to become tacky before the second is applied.

The curing compound shall be applied by power sprayer, using appropriate wands and nozzles with pressures between 25 and 100 psi. For very small areas such as repairs, the compound shall be applied with a wide, soft-bristled brush or paint roller. The compound shall be stirred or agitated before use and applied uniformly in accordance with the manufacturer's recommended rate. The Fabricator shall verify the application rates are in accordance with the manufacturer's recommended rate.

When the concrete surface is to receive paint, finishes, or toppings that require positive bond to the concrete, it is critical that the curing procedures and subsequent coatings, finishes, or toppings be compatible to achieve the necessary bond.

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After the termination of the final curing method cycle has occurred, liquid membrane-forming compounds shall be removed by blast-cleaning from any concrete surface that is to receive paint, finishes, plastic concrete from secondary pour, grout, or any other toppings that require bonding to the concrete surface. These surfaces shall be further blast-cleaned to remove the cement matrix down to exposed aggregate to ensure proper bonding to the material. The method used to remove the curing compound shall not damage the reinforcement and coating. Compounds are prohibited on any concrete surface that will have a penetrating or coating type treatment such as a sealer, stain, or waterproofing membrane applied to it.

5. Accelerated Curing.

Accelerated curing shall use live steam or radiant heat with moisture in accordance with PCI MNL-116 as modified herein. The concrete temperature shall meet the maximum heat increase and cool down rates as specified herein. Concrete temperature monitoring shall meet the requirements of the *Temperature Monitoring* section. Excessive and fluctuating rates of heating and cooling shall be prohibited. The concrete temperature shall not exceed 158°F at any time. The Fabricator shall meet the following accelerated curing sequencing and requirements.

Initial Delay Period.

The initial delay period shall be defined as the duration immediately following the placement of the concrete and the attainment of initial set of the concrete. The Fabricator shall determine the time of initial set in accordance with AASHTO T 197 specifications. Throughout the entire duration of the preset period, initial curing shall be implemented. The temperature increase period (see *Temperature Increase Period* section) shall not occur until initial set of the concrete is attained. During the initial delay period, the concrete temperature shall meet the following requirements:

- i. Concrete temperature rate of increase shall not exceed 10°F per hour.
- ii. Total concrete temperature increase shall not exceed 40°F higher than the placement concrete temperature or 100°F, whichever is less

Temperature Increase Period.

The temperature increase period shall be defined as the duration immediately following the completion of the initial delay period (after initial set) and immediately prior to the start of the constant maximum temperature period. Application of steam to the enclosure shall not occur until the initial delay period is complete. After the initial delay period is complete, all exposed concrete surfaces shall be cured in a moist environment where the concrete temperature increases at a rate not to exceed 36°F per hour.

Constant Maximum Temperature Period.

The constant maximum temperature period shall be defined as the duration immediately following the completion of the temperature increase period and immediately prior to the start of the temperature decrease period. After the temperature increase period is complete, all exposed concrete surfaces shall be cured in a moist environment at a controlled and constant elevated temperature throughout the entire duration of the constant maximum temperature period. Termination of the constant maximum temperature period and the start of the termination decrease period shall occur after all specified conditions are met (see *Table 8: Constant Maximum Temperature Period*).

ITEM 995.01 (Continued)**Table 8: Constant Maximum Temperature Period**

	Sustained Concrete Temperature	Constant Maximum Temperature Period	Compressive Strength	
Temperature Period.	$120^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 158^{\circ}\text{F}$	$6 \text{ hrs} \leq \text{Time} \leq 48 \text{ hrs}$	$\geq 80\% f'_c$	Decrease
After the				constant

maximum temperature period is complete, the concrete temperature shall be cured in a moist environment at a controlled and reduced rate not to exceed 36°F per hour until the concrete temperature is within 20°F of the ambient temperature outside of the curing enclosure.

S. Stripping.

The Fabricator shall not strip forms or handle the Precast Concrete Bridge Element until Quality Control compressive strength cylinders attain a minimum compressive strength of 80% Design Strength (f'_c) or the value indicated on the approved drawings has been achieved. After removal from the form, all exposed concrete surfaces shall continue to be cured in conformance with the *Final Curing Methods* sections until completion.

T. Handling and Storage of Precast Concrete Bridge Elements.

Precast Concrete Bridge Elements may be exposed to temperatures below freezing (32°F) when the chosen curing cycle has been completed, provided that the following conditions are met:

- Precast Concrete Bridge Elements are protected from precipitation with polyethylene curing covers until 100% f'_c is attained
- Precast Concrete Bridge Elements maintain a minimum concrete temperature of 40°F until 100% f'_c is attained

Precast Concrete Bridge Elements damaged during handling and storage will be repaired or replaced at MassDOT's direction at no cost to MassDOT. Precast Concrete Bridge Elements shall be lifted at the designated points by approved lifting devices embedded in the concrete and in accordance with proper lifting and handling procedures. Storage areas shall be smooth and well compacted to prevent damage due to differential settlement. Precast Concrete Bridge Elements shall be supported on the ground by means of continuous blocking, in accordance with the approved dunnage plan.

Precast Concrete Bridge Elements shall be loaded on a trailer with blocking as described above, in accordance with the approved dunnage plan. Shock-absorbing cushioning material shall be used at all bearing points during transportation of the Precast Concrete Bridge Elements. Blocking shall be provided at all locations of tie-down straps. Precast Concrete Bridge Elements stored prior to shipment shall be inspected by the Contractor prior to being delivered to the site to identify damage that would be cause for repair or rejection.

U. Repairs and Replacement.

In the event defects are identified, they shall be classified in the following categories and a non-conformance report (NCR) shall be filed if required. The NCR shall be submitted to MassDOT for review. Defects in all categories shall be documented by plant Quality Control personnel and made available to MassDOT upon request. Any required repairs shall utilize materials listed on the MassDOT QCML.

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Where noted, defects shall be repaired according to the PCI Northeast Region Guidelines for Resolution of Non-Conformances in Precast Concrete Bridge Elements, Report Number PCINE-18-RNPCBE. Please note that reference to PCINE-18-RNPCBE is made for repair details only. In the case of conflicts with this Special Provision, this Special Provision shall govern.

1. Category 1, Surface Defects.

Category 1 defects do not need to be repaired, and an NCR does not need to be filed. Surface defects are defined as the following:

- (a) Surface voids or bug holes that are less than 5/8-inch in diameter and less than 1/4-inch deep, except when classified as Category 4
- (b) Cracks less than or equal to 0.006 inches wide
- (c) Cracks less than or equal to 0.125 inches wide on surfaces that will receive a field-cast concrete overlay

2. Category 2, Minor Defects.

Category 2 defects shall be repaired, but an NCR does not need to be filed. Minor defects are defined as the following:

- (a) Spalls, honeycombing, surface voids that are less than 2 inches deep and have no dimension greater than 12 inches
- (b) Cracks less than or equal to 0.016 inches that will not receive a concrete overlay
- (c) Broken or spalled corners that will be covered by field-cast concrete

Minor defects shall be repaired according to PCINE-18-RNPCBE. Cracks shall be sealed according to the PCI Repair Procedure #14 in PCINE-18-RNPCBE.

3. Category 3, Major Defects.

For Category 3 defects, the Fabricator shall prepare an NCR that documents the defect and describes the proposed repair procedure. The NCR shall be submitted to MassDOT for approval prior to performing the repair. Major defects are defined as the following:

- (a) Spalls, honeycombing and surface voids that are deeper than 2 inches or have any dimension greater than 12 inches, when measured along a straight line
- (b) Concentrated area of defects consisting of four or more Category 2 Defects within a 4-square foot area.
- (c) Exposed reinforcing steel
- (d) Cracks greater than 0.016 inches and less than or equal to 0.060 inches in width that will not receive a concrete overlay
- (e) Bearing area spalls with dimensions not exceeding 3 inches
- (f) Cracks, spalls and honeycombing that will be encased in cast in place concrete need not be repaired, but the limits and location of the defects shall be documented with an NCR

Upon MassDOT approval, defects and cracks shall be repaired according to PCINE-18-RNPCBE and this specification. All repairs shall be completed at the expense of the Contractor.

4. Category 4, Rejectable Defects.

Rejectable defects as determined by the MassDOT Inspector, RMS, and Engineer may be cause for rejection. Fabricator may submit an NCR with a proposed repair procedure, requesting approval. Some rejectable defects are defined as the following:

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- (a) Surface defects on more than 5% of the surface area which will be exposed to view after installation
- (b) Minor defects that in total make up more than 5% of the surface area of the unit
- (c) Cracks greater than 0.060 inches in width except as noted in Category 1
- (d) Elements fabricated outside of the specified tolerances
- (e) MassDOT compressive strength testing that does not meet the specified Design Strength, f'_c .

V. Loading.

Prior to the Fabricator loading the Precast Bridge Element on to the truck for shipping, the Fabricator shall provide the MassDOT Plant Inspector and RMS a minimum seven (7) days' notice of the Fabricator's intent to load the Precast Bridge Element. Inspection by the MassDOT Plant Inspector shall take place while the element is still on dunnage in the yard. The element shall not be loaded onto the truck until the MassDOT Plant Inspector has performed the inspection.

W. Shipping.

Prior to shipment, the Fabricator shall perform the following actions and provide the required documentation to the MassDOT Plant Inspector:

- (a) Precast Concrete Bridge Elements shall remain at the Fabricator's plant for a minimum of 7 days after cast date.
- (b) QC Inspection Reports shall be signed by the Quality Control Manager and provided to the MassDOT Plant Inspector.
- (c) QC Compressive Strength Test Report Forms attaining Design Strength, f'_c for the Precast Concrete Bridge Element's representative Sublot shall be generated by the Fabricator and provided to the MassDOT Plant Inspector.
- (d) Certificate of Compliance shall be generated by the Fabricator as described under the Fabricator Quality Control section and provided to the MassDOT Plant Inspector.
- (e) All MassDOT RMS approved Corrective Actions submitted on the Non-Conformance Reports (NCR), shall be verified to have been completed by the MassDOT Plant Inspector and Quality Control Manager.
- (f) All NCRs shall be signed off by the Quality Control Manager, MassDOT Inspector and MassDOT RMS.

X. Delivery.

Upon Delivery, the following documentation shall be provided to 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.

The Contractor shall inspect Precast Concrete Bridge Elements upon receipt at the site. Precast Concrete Bridge Elements damaged during delivery shall be repaired or replaced at MassDOT's direction at no cost to MassDOT.

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 Precast Concrete Bridge Elements shall have knowledge of and follow the approved Erection Procedure and Quality Control Plan for Precast Concrete Bridge Element 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 Precast Concrete Bridge Element's representative subplot.
- (b) Certificate of Compliance generated by the Fabricator as described under the Fabricator Quality Control section.
- (c) QC Inspection Reports signed by the Quality Control Manager.

Field construction staff shall verify that the Resident Engineer has accepted all Precast Concrete Bridge Elements prior to installation.

B. Erection Procedure 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:

1. Erection Procedure

The Erection Procedure shall be prepared to conform to the requirements of 960.61, Erection and the applicable sections in Chapter 8 of the PCI Design Handbook (seventh 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.
- (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 Density Fill – Non-Excavatable to the limits as shown on the plans. Add additional grout ports in the footings to facilitate the bedding process if required.

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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.

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 on full size 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.

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- (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.
- (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.

C. Survey and Layout.

Working points, working lines, and benchmark elevations shall be established prior to placement of all elements. The Contractor is responsible for field survey as necessary to complete the work. MassDOT reserves the right to perform additional independent survey. If discrepancies are found, the Contractor may be required to verify previous survey data.

D. Preparation of Closure Pour Keyways.

Immediately prior to erecting the Precast Concrete Bridge Elements, the closure pour shear keys 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 and precast concrete using a high-pressure water blast. The 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 shear keys shall be wetted so that the surfaces shall have a Saturated Surface Dry (SSD) condition for at least 24 hours prior to the placement of the closure pour concrete.

E. Erection.

The elements shall be placed in the sequence and according to the methods outlined in the Erection Procedure 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.

Suitable spreaders shall be used during lifting so that only a vertical pull will be made on the lifting device. A non-vertical lifting force may be permitted if prior written approval is given by the Engineer. 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.

Precast components shall be pre-bed with non-shrink grout thicker than shim stacks prior to placing other precast elements on top of them.

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. Box Culverts, Three-Sided Frames and Arches.**

Backfilling operations shall not begin until the following checks have been made:

- (a) The frame to footing key joints are grouted as shown on the plans;
- (b) The joints between exterior frame bridge elements and wingwall stems are complete as shown on the plans;
- (c) All joint seals are properly placed.

Backfill shall be paid for under separate items. The backfilling procedures shall be in accordance with Sections 120, 150, and 170 of the Standard Specifications and Supplemental Specifications modified as follows:

- (a) Fill shall be placed and compacted in layers not exceeding one foot in depth;
- (b) Dumping of fill shall not be allowed any nearer to the structure than 3.25 feet from a vertical plane extending from the back of the footing;
- (c) Backfill shall be placed as symmetrically as possible around the structure with differential depths of backfill on each side of the structure not exceeding 1.5 feet with respect to each other;
- (d) Compaction shall be achieved using hand compaction equipment for all fill within one foot of the structure;
- (e) The bare structure shall not be crossed by any equipment heavier than that specified by the frame manufacturer. All damage resulting from equipment damage shall be rectified to the satisfaction of the Engineer at no cost to the Department;
- (f) Construction equipment will not be permitted atop an uncompleted structure;
- (g) Construction equipment whose weight exceeds the design capacity shall not be permitted atop the completed structure under any circumstances;
- (h) The use of vibratory rollers for compaction purposes will not be permitted.

A representative of the manufacturer shall be on site at the commencement of the installation, at no cost to the Department, to assist the Contractor. The representative shall offer advisory assistance only and shall not supplant the Contractor's representative, or the Engineer.

G. 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 Cement Mortar (M4.02.15) or grout.

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.

COMPENSATION**A. Basis of Payment.**

The furnishing, fabricating, and erecting of all Precast Concrete Bridge Elements for the structure shall be paid for at the contract unit price EACH under the Lump Sum Item 995., complete in place.

ITEM 995.01 (Continued)**B. Payment Items.**

Precast Highway Guardrail Transition	EA
Precast Approach Slab	EA
Precast Three-Sided Frame Unit	EA
Precast Pedestal Wall	EA
Precast Wingwall Stem	EA

SCHEDULE OF BASIS FOR PARTIAL PAYMENT

10 days after notice to proceed, the Contractor shall submit on his/her proposal form a schedule of unit prices for the major component Sub-Items that make up Item 995.01 as well as his/her total bridge structure Lump Sum cost for Bridge Structure No. W-38-011 (CVE). 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. The schedule on the proposal form applies only to the Bridge Structure No. W-38-011 (CVE). Payment for similar materials and construction at locations other than at this bridge structure shall not be included under this Item. Sub-Item numbering is presented for information only in coordination with MassDOT Standard Nomenclature.

ITEM NO. 995.01 BRIDGE STRUCTURE NO. W-38-011 (CVE)

<u>Sub-Item</u>	<u>Description</u>	<u>Qty.</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Total</u>
904.3	5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE	110	CY		
904.31	PRECAST HIGHWAY GUARDRAIL TRANSITION	4	EA		
904.33	PRECAST APPROACH SLAB	12	EA		
904.34	PRECAST THREE-SIDED FRAME UNIT	9	EA		
904.35	PRECAST WINGWALL STEMS	4	EA		
904.36	PRECAST PEDESTAL WALLS	8	EA		
910.1	STEEL REINFORCEMENT FOR STRUCTURES – EPOXY COATED	10,030	LB		
960.1	STRUCTURAL STEEL – COATED STEEL	1,350	LB		
965.	MEMBRANE WATERPROOFING FOR BRIDGE DECKS	900	SF		
970.	DAMP-PROOFING	1,800	SF		
975.1	METAL BRIDGE RAILING (3 RAIL), STEEL (TYPE S3-MTL4)	70	FT		
TOTAL LUMP SUM FOR ITEM 995.01 =					

ITEM 996.01**WALL STRUCTURE, WALL NO. 1****LUMP SUM**

The work under this Item shall conform to the relevant provisions of Subsection 995 of the Standard Specifications and the specific requirements stipulated below for the component parts of this Item. For those component parts where no specific requirement is stipulated, the Standard Specifications shall apply except for payment.

Work under this Item shall include all materials, equipment and labor needed to construct the following for Wall Structure, Wall No. 1:

- Cast-in-place concrete gravity retaining walls, and all the steel reinforcement for these items;
- Damp-proofing;
- All items included hereinafter under Basis for Partial Payments.

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of this wall structure or which may be incidental to its construction and are not specifically included for payment under another Item shall be considered incidental to the work performed under this Item and shall be included in the unit price of the component of which they are part.

The work to be done under these headings shall conform to the relevant provisions of Section 901, supplemented and amended as follows:
All concrete shall be placed in the dry.

All concrete shall be 5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRET.

Included in the work are the furnishing and installing of preformed fillers and other items incidental to the furnishing and placing of concrete. All other work covered in the Schedule of Basis for Partial Payments or for which payment is not provided elsewhere in the contract shall be considered as included in the unit price per cubic yard of concrete, as stated by the Contractor and approved by the Engineer, in the respective "Basis for Partial Payment".

The work under this Item does not include the various classes of excavation, gravel borrow for backfilling structures and pipes, or crushed stone. Any temporary support of excavation required to construct the proposed retaining walls shall be paid under Item 950.5. Locations of the temporary excavation support shall be approved by the Engineer.

SCHEDULE OF BASIS FOR PARTIAL PAYMENTS

Within 10 days after notice to proceed, the Contractor shall submit on his/her proposal form a schedule of unit prices for the major component Sub-Items that make up Item 996.01 as well as his/her total wall structure Lump Sum cost for the wall no. 1. The wall structure Lump Sum breakdown quantities provided in the proposal form are estimated and not guaranteed. The total of all partial payments to the Contractor shall equal the Lump Sum contract price regardless of the accuracy of the quantities furnished by the Engineer for the individual wall components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 996.01 and no further compensation will be allowed.

ITEM 996.01 (Continued)

The schedule on the proposal form applies on to Wall No. 1. Payment for similar materials and construction at locations other than at this wall structure shall not be included under this item. Sub-item numbering is presented for information only in coordination with MassDOT Standard Nomenclature.

Item 996.01 Wall Structure, Wall No.1

Sub-Item	Description	Quantity	Unit	Unit Price	Amount
904.3	5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE	290	CY		
910.1	Steel Reinforcement for Structures – Epoxy Coated	13,000	LB		
970.	Damp-proofing	1570	SF		

Total Cost of Item 996.01 = _____

ITEM 997.01**SPECIAL DRAINAGE STRUCTURE NO. 1****LUMP SUM**

The work under this Item shall conform to the relevant provisions of Subsection 995 of the Standard Specifications and the specific requirements stipulated below for the component parts of this Item. For those component parts where no specific requirement is stipulated, the Standard Specifications shall apply except for payment.

Work under this Item shall include all materials, equipment and labor needed to construct the following:

- Cast-in-place concrete headwalls and wingwalls
- Steel reinforcement
- 4'-0" W x 3'-0" H precast concrete box culvert at approximately Sta. 217+87
- Natural Streambed Material
- Damp-proofing

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of this culvert 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 for which they are a part.

Work shall include removal and disposal of existing culvert and existing headwalls, installing new culvert and new headwall. Removal and disposal of existing culvert & headwalls shall be paid under Items 141 & 144.

Existing utility locations shall be verified in the field prior to starting this work. The Contractor shall provide the Engineer with a plan showing existing utility locations and elevations prior to undertaking this work.

The Contractor shall dig test pits to verify the dimensions of the existing culvert prior to ordering the material. All costs shall be incidental and be paid for under the lump sum price.

The Contractor is responsible for accommodating the proposed utility work for the gas line and the water line to be placed below the drainage structure as shown on the Plans. The Contractor shall coordinate all work activity with the respective utility owners and shall adhere to the utility owner's standards for the work to be performed.

Excavation and shoring for trench excavation required for the gas relocation on each side of the culvert shall be coordinated with the gas company, performed a day in advance, and plated to allow the gas company to install the gas sleeve with the new plastic gas line and fittings.

All work associated with steel plating required for this coordination shall be performed in accordance with Item 953.1. All costs shall be considered incidental and included in the respective lump sum items.

ITEM 997.01 (Continued)

The work to be done under these headings shall conform to the relevant provisions of Section 901, supplemented and amended as follows:

All concrete shall be placed in the dry.

All concrete shall be 5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRET.

Included in the work are the furnishing and installing of preformed fillers and other items incidental to the furnishing and placing of concrete. All other work covered in the Schedule of Basis for Partial Payments or for which payment is not provided elsewhere in the contract shall be considered as included in the unit price per cubic yard of concrete, as stated by the Contractor and approved by the Engineer, in the respective "Basis for Partial Payment".

NATURAL STREAMBED MATERIAL

The work under this heading shall consist of installation of natural streambed material within the bottom of the culvert to provide a natural streambed for aquatic organisms. The natural streambed construction material is to be placed within the bottom 12" of the culvert with baffles on each end, as depicted on the plans.

The intent of this item is to ensure a natural streambed within the culvert, to provide fisheries and wildlife habitat enhancement as part of the wetland replication area and natural wetlands. The natural streambed material shall be comprised of the stones 4 inches and under, that shall meet the following gradation:

Sieve opening	Percent by Mass Passing Through
4"	95
2"	55 – 65
3/4"	30 – 45
#4	0 – 5

Partially angular rock is preferred over round and shall be able to lock together to prevent movement during high flows. Crushed Stone will not be accepted for any components. The inlet/outlet elevations of the proposed culvert shall match the proposed plans.

ITEM 997.01 (Continued)**PRECAST BOX CULVERT****A. General.**

The work under this Heading consists of fabricating, transporting and installing the precast box culvert, and includes all necessary labor, materials, and equipment to complete the work as shown on the Plans. The work shall conform with the MassDOT Standard, Supplemental, and Interim Specifications and the requirements of the current AASHTO LRFD Bridge Construction Specifications, supplemented by the current relevant provisions of the latest edition of PCI MNL-116 (The Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products), except as noted herein.

QUALITY ASSURANCE**A. General.**

Quality Assurance includes all the planned and systematic actions necessary to provide confidence that a product or facility will perform satisfactorily in service. It is an all-encompassing term that includes Quality Control (performed by the Fabricator) and Acceptance (performed by MassDOT). Quality Control is the system used by the Contractor and Fabricator to monitor and assess their production processes at the plant facility and installation activities at the project site to ensure that the final product will meet the specified level of quality. Acceptance includes all factors used by MassDOT to determine the corresponding value for the product. MassDOT Acceptance inspection at the plant facility is intended as a means of evaluation of compliance with contract requirements. Contractor and Fabricator Quality Control activities and MassDOT Acceptance activities shall remain independent from one another. MassDOT Acceptance activities shall not replace Fabricator Quality Control activities.

B. Fabricator Quality Control.

Quality Control shall be performed by the Fabricator to ensure that the product is fabricated in conformance with the specifications herein. The Fabricator shall maintain a Quality Control system to monitor, assess, and adjust placement and fabrication processes to ensure the Precast Concrete Bridge Element(s) meet the specified level of quality, through sufficient Quality Control sampling, testing, inspection, and corrective action (where required). The Fabricator's Quality Control system shall address all key activities during the placement and fabrication and shall be performed in conformance with the Fabricator's NPCA or PCI Certification. Quality Control documentation shall meet the requirements of the *Fabricator Quality Control – Documentation* section below. Upon request, Fabricator Quality Control documentation shall be provided to the MassDOT Plant Inspector.

3. Plant.

Prior to the fabrication of Precast Concrete Bridge Elements, the Fabricator's precast concrete plant shall obtain the following:

- (a) Certification by the National Precast Concrete Association (NPCA) Plant Certification Program or Precast/Prestressed Concrete Institute (PCI) Plant Certification Program, for the applicable types of Precast Concrete Bridge Element(s) being fabricated
- (b) MassDOT Prequalification
- (c) MassDOT Mix Design Approval

ITEM 997.01 (Continued)

All concrete for a given Precast Concrete Bridge Element shall be produced by a single company and plant, unless otherwise approved by the Engineer.

4. Personnel.

The Fabricator shall provide adequate training for all QC personnel in accordance with NPCA or PCI certification. There shall be sufficient personnel trained and certified to perform the tests listed under Subsection M4.02.13, Part D. At a minimum, the Fabricator's Quality Control Personnel shall maintain the following qualifications and certifications:

- (a) QC Manager with an active NETTCP Field Technician or ACI Concrete Field Testing Technician – Grade I certification or higher, and a minimum of 4 years continuous experience in the manufacture of Precast Concrete Bridge Elements for state transportation departments. The QC Manager shall be on site while the batch plant is producing and placing concrete for MassDOT projects.
- (b) A Technician/Inspector having the Precast/Prestressed Concrete Institute (PCI) Technician/Inspector Level I or NorthEast Transportation Training and Certification Program (NETTCP) Precast Concrete Inspector, or higher.

The Contractor shall submit to the Engineer a copy of the Fabricator's Quality Control Personnel required qualifications, as specified above.

5. Laboratory.

The Fabricator shall provide a room of sufficient size to house all equipment and to adequately perform all testing. The room shall have either a separate moisture storage room or curing box for concrete cylinders, and it shall be thermostatically controlled to maintain temperatures consistent with AASHTO T 23. It shall include a desk and file cabinet for proper record keeping, and have good lighting and ventilation. This room shall be kept for testing and quality control and not used for any other purpose. An additional desk and file cabinet shall be provided for exclusive use of the Engineer. No exception from these requirements will be allowed without the express written permission of the Engineer.

6. Testing Equipment.

At a minimum, the Fabricator's plant facility shall have the following testing equipment:

- (a) Air Content Meter Type A or B: AASHTO T 152
- (b) Air Content Meter Volumetric Method: AASHTO T 196 (Required for Lightweight Concrete)
- (c) Slump Cone: AASHTO T 119
- (d) Cylinder Molds AASHTO M 205
- (e) Concrete Testing Machine: AASHTO T 22
- (f) Screening Sieve: AASHTO T 27, AASHTO T 11
- (g) Curing Box: AASHTO T 23
- (h) Spread Test Base Plate for Self-Consolidating Concrete (SCC): ASTM C1611
- (i) All other equipment prescribed by AASHTO and ASTM standards for the tests to be performed by the Fabricator as specified

7. Inspection.

Quality Control personnel shall monitor and inspect the fabrication of each Precast Concrete Bridge Element. Quality Control personnel shall report all inspection activities on Quality Control Inspection Reports and non-conformances on Non-Conformance Reports (NCRs) throughout the entire fabrication process, as specified herein.

ITEM 997.01 (Continued)**8. Temperature Monitoring.**

At a minimum, the Fabricator shall monitor, record, and report the temperatures of the form, ambient temperatures surrounding the concrete, and temperatures of the concrete continuously, without interruption as specified below:

- (a) Prior to placement of concrete to verify that $T_i \geq 50^\circ\text{F}$.
- (b) Immediately after placement to verify that $T_i \geq 50^\circ\text{F}$ is maintained.
- (c) Throughout the entire duration of the curing cycle, at regular intervals not to exceed one hour until 100% Design Strength (f'_c) is attained and concrete has cooled to within 40°F of the ambient temperature surrounding the Precast Concrete Bridge Element.

At a minimum, the temperature measuring devices shall record and report the temperature of the concrete to the nearest 2°F . At least two temperature sensors (thermocouples) shall be positioned to record the maximum and minimum anticipated concrete temperatures. The anticipated minimum temperature shall be measured with one or more thermocouples at a distance no greater than 2 inches from the surface of the thinnest section. The anticipated maximum temperature shall be measured with one or more thermocouples at the center of the thickest section. Proposed temperature measurement locations shall be submitted to the Engineer for approval. Temperature recording devices shall be located within the curing enclosure and calibrated as required by PCI MNL-116 Section 4.18.4. Maximum heat increase and cool down rates shall comply with PCI MNL-116, Section 4.19. The Contractor shall furnish temperature logs recorded at a minimum frequency of once per hour to the Inspector as required, with each post-pour QC inspection report.

9. Sampling and Testing.

At a minimum, the Fabricator shall perform random Quality Control sampling and testing as specified in *Table 1: Quality Control Sampling and Testing*. The Fabricator shall perform additional Quality Control sampling and testing on concrete that has been retempered with admixtures or hold-back water during fabrication. Test Specimens shall conform to the requirements of Section M4.02.13 of the MassDOT Standard and Supplemental Specifications and AASHTO R 60, with the exception of the Stripping (80% f'_c) set of cylinders. Stripping (80 % f'_c) cylinders shall be cured in the same location and environment as the Precast Bridge Elements they represent. If approved by the Engineer, compressive strength cylinder match curing equipment, that maintains the same concrete conditions that the corresponding Precast Bridge Element is exposed to, may be utilized in lieu of Stripping (80 % f'_c) field cured cylinders, with the use of thermocouples, controllers, and heaters.

ITEM 997.01 (Continued)**Table 1: Quality Control Sampling and Testing**

Quality Characteristic	Test Method	Sample Size	Specification Limit	Lot Size ^(c)	Sublot Size ^(d)	Frequency	Point of Sampling
Slump (in.) ^(a)	AASHTO T 119	Per AASHTO	≤ 8 in. or as approved by the Engineer	Total Quantity of Concrete (cy) produced on a Contract, per Type of Element fabricated, per Mix Design	20 cy	One (1) per Sublot or fraction thereof	Point of Discharge
Air Content (%)	AASHTO T 152	Per AASHTO	$5\% \leq \% \leq 8\%$				
Temperature (°F)	AASHTO T 309	Per AASHTO	$50^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 90^{\circ}\text{F}$				
Compressive Strength (psi)	AASHTO T 22	Stripping Cylinders: One (1) set of Three (3) 4 x 8 in.	$\geq 80\% f'_c$ at Stripping				
		7-day Cylinders: One (1) set of Three (3) 4 x 8 in.	For Information at 7 days				
		28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	$\geq 100\% f'_c$ at 28 days				
		56-day Cylinders: One (1) set of Three (3) 4 x 8 in.	$\geq 100\% f'_c$ at 56 days ^(b)				

Notes:

- (e) Self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.
- (f) 56-day Compressive Strength test specimens shall require testing only when 28-day Compressive Strength test specimens have failed to meet Design Strength (f'_c).
- (g) Lot shall be defined as a specific quantity of material from a single source, produced or placed by the same controlled process.
- (h) Sublot shall be defined as an equal division or part of a Lot from which a sample of material is obtained in order to assess the Quality Characteristics of the Lot.

ITEM 997.01 (Continued)**10. Certificate of Compliance.**

The Fabricator shall provide a Certificate of Compliance in accordance with Standard Specifications, Division I, Section 6.01, stating that QC test cylinders have achieved the design strength, f'_c . A Certificate of Compliance shall accompany each shipment and shall be presented to the MassDOT Resident Engineer or designee upon delivery to the site.

11. Documentation.

At a minimum, the Fabricator shall maintain a filing system for the following QC records and documentation. All QC records and documentation shall be made available to MassDOT upon the request of the Department.

- (r) Current MassDOT Approved Mix Design Sheet(s) and Approval Letter(s)
- (s) PCI or NPCA Certification
- (t) Current Qualifications and Certifications for QC Manager(s) and QC Technician(s)
- (u) Most current set of Approved Shop Drawings
- (v) Approved Placement, Finishing and Curing Plan
- (w) Approved Dunnage Plan
- (x) Fabricator Certificate of Compliance for each fabricated Precast Concrete Bridge Element
- (y) Admixture Manufacturer's Certification of Compliance for each approved Admixture
- (z) Completed QC Inspection Report for each fabricated Precast Concrete Bridge Element
- (aa) Identification Number for each fabricated Precast Concrete Bridge Element
- (bb) Time and date of casting of each fabricated Precast Concrete Bridge Element
- (cc) Date of stripping of each fabricated Precast Concrete Bridge Element
- (dd) Batch Ticket Printout reporting the quantity of concrete produced for each batch of concrete produced
- (ee) Concrete temperature records for each Precast Concrete Bridge Element fabricated
- (ff) QC Test Report Forms for each subplot of concrete produced
- (gg) Non-Conformance Reports (NCRs)
- (hh) Documentation of Repairs (if applicable)

C. Acceptance.

MassDOT will perform Acceptance inspection, sampling, and testing during fabrication and installation, to evaluate the quality and degree of compliance of the fabricated Precast Concrete Bridge Element to MassDOT specifications. Additionally, MassDOT Inspectors will monitor the Fabricator's Quality Control activities to ensure the Fabricator is properly administering Quality Control in conformance with the Fabricator's NPCA or PCI Certification. Acceptance inspection and test results not meeting MassDOT specifications will result in Non-conformance Reports (NCR) being issued by MassDOT to the Fabricator or Contractor for corrective action. Final Acceptance for the fabricated Precast Concrete Bridge Elements shall be determined by MassDOT.

12. Inspection.

A MassDOT MassDOT Inspector will be assigned to perform Acceptance activities during fabrication, which includes the inspection of the materials, work procedures, and Precast Concrete Bridge Elements. At least seven (7) days prior to the scheduled start of fabrication, the Fabricator shall contact the MassDOT Research and Materials Section (RMS) to provide notice of the scheduled fabrication start date. The Fabricator shall complete the following activities prior to notifying MassDOT RMS of the scheduled start date:

ITEM 997.01 (Continued)

- (e) Receive approval for all submitted Fabricator cement concrete mix designs from the MassDOT Research and Materials Section for the current year, as specified under the *Mix Design* section and *Table 3: Trial Batch Sampling Testing for New Mix Designs*. Self-consolidating concrete shall meet the requirements of M4.02.17.
- (f) Receive approval for the submitted Fabricator Placement, Finishing, and Curing Plan from the MassDOT Research and Materials Section, as specified under the *Placement, Finishing, and Curing Plan* section.
- (g) Receive Engineer of Record approved shop drawings from the MassDOT Research and Materials Section as specified under the *Shop Drawings* section.
- (h) Participate in the pre-production meeting, as described under the *Pre-Production Meeting* section (if required).

Prior to the start of fabrication, the Fabricator shall review the fabrication schedule with the MassDOT Inspector. Fabrication shall only proceed when:

- (a) The QC Inspector and MassDOT Inspector are present to inspect the Precast Concrete Bridge Element(s) being fabricated.
- (b) The QC Manager is present at the Fabricator's plant.

The Fabricator shall grant access to all required areas of the Fabricator's plant to the MassDOT Inspector, during the hours of fabrication. Fabrication without MassDOT Inspector access to required areas is prohibited, and will result in the rejection of the fabricated Precast Concrete Bridge Element(s).

Additionally, the MassDOT Inspector will monitor the adequacy of the Fabricator's Quality Control activities. MassDOT Inspector Acceptance activities performed at the Fabricator's plant shall remain independent from the Fabricator, and does not replace the Fabricator's required Quality Control activities.

13. Sampling and Testing.

At a minimum, the MassDOT Inspector will perform random Acceptance sampling and testing for each Sublot of concrete produced as specified in *Table 2: Acceptance Sampling and Testing*. The MassDOT Inspector will also perform Acceptance sampling and testing on concrete that has been retempered with admixtures or hold-back water during production. Test Specimens will conform to the requirements of Section M4.02.13 of the MassDOT Standard and Supplemental Specifications and AASHTO R 60.

ITEM 997.01 (Continued)**Table 2: Acceptance Sampling and Testing**

Quality Characteristic	Test Method	Sample Size	Specification Limit	Lot Size ^(c)	Sublot Size ^(d)	Frequency	Point of Sampling
Slump (in.) ^(a)	AASHTO T 119	Per AASHTO	≤ 8 in. or as approved by the Engineer	Total Quantity of Concrete (cy) produced on a Contract, per Type of Element fabricated, per Mix Design	20 cy	One (1) per Sublot or fraction thereof	Point of Discharge
Air Content (%)	AASHTO T 152	Per AASHTO	$5\% \leq \% \leq 8\%$				
Temperature (°F)	AASHTO T 309	Per AASHTO	$50^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 90^{\circ}\text{F}$				
Compressive Strength (psi)	AASHTO T 22 AASHTO T 23	7-day Cylinders: One (1) set of Three (3) 4 x 8 in.	For Information at 7 days				
		28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	$\geq 100\% f'_c$ at 28 days				
		56-day Cylinders: One (1) set of Three (3) 4 x 8 in.	$\geq 100\% f'_c$ at 56 days ^(b)				

Notes:

- (e) Self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.
- (f) 56-day Compressive Strength test specimens shall require testing only when 28-day Compressive Strength test specimens have failed to meet Design Strength (f'_c).
- (g) Lot shall be defined as a specific quantity of material from a single source, produced or placed by the same controlled process.
- (h) Sublot shall be defined as an equal division or part of a Lot from which a sample of material is obtained in order to assess the Quality Characteristics of the Lot.

ITEM 997.01 (Continued)**MATERIALS****H. Materials.**

Materials shall meet the following specifications (if applicable):

General	M4.00.00
Portland Cement	M4.01.0
Blended Hydraulic Cements	M4.01.1
Fly Ash	M4.01.2
Cement Concrete	M4.02.00
Cement	M4.02.01
Cement Mortar	M4.02.15
Aggregates	M4.02.02
Lightweight Aggregates	M4.02.03
Water	M4.02.04
Cement Concrete Additives	M4.02.05
Proportioning	M4.02.06
Mixing and Delivery	M4.02.10
Test Specimens	M4.02.13
Mortar for Filling Keyways	M4.04.0
Slag	AASHTO M 302
High Performance Cement Concrete	M4.06.1
Self-Consolidating Concrete (SCC)	M4.02.17
Controlled Density Fill – Non-Excavatable	M4.08.0
Reinforcing Bars	M8.01.0
Epoxy Coated Reinforcing Bars	M8.01.7
Galvanized Reinforcing Bars	M8.01.8
Welded Wire Reinforcement	M8.01.2
Mechanical Reinforcing Bar Splicer	M8.01.9
Lifting Devices	PCI MNL-116
Corrugated Metal Pipe	AASHTO M 36

14. Cement Concrete Mix Design.

The cement concrete shall be comprised of specified proportions of water and MassDOT approved aggregates, cement, supplementary cementitious materials (SCMs), and admixtures to form a homogenous composition. Cement concrete for Precast Concrete Bridge Elements shall meet the requirements of M4.06.1 High Performance Cement Concrete, with the exception that the “Total Cementitious Content” specified shall be considered the “Maximum Allowable Cementitious Content”. When used, self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.

Prior to production of cement concrete, the Fabricator shall report and submit all proposed mix design formulations and its constituent materials onto the MassDOT Cement Concrete Mix Design Sheet to the MassDOT Research and Materials Section for review and approval. All mix design yields shall be designed for 1.0 cubic yards of concrete, with an allowable tolerance of +/- 1.0 %. All liquids incorporated into the proposed mix design(s) shall include both water and admixtures in the liquid mass calculation.

During production of cement concrete, the Fabricator shall not alter the previously approved mix design formulation or its constituent materials. Proposed alterations in source, type, batch quantity, or gradation to any of the constituent materials of the previously approved mix design formulation shall require a new MassDOT Mix Design Sheet submission to the MassDOT Research and materials Section for review and approval. Fabrication shall not occur without prior MassDOT mix design approval.

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The Fabricator shall notify MassDOT RMS to schedule trial batch testing for the new mix design(s). Trial batch testing shall meet the following requirements:

- (d) Performed by a qualified laboratory and/or AASHTO accredited laboratory.
- (e) Performed and/or sampled in the presence of a MassDOT Inspector.
- (f) Meet the requirements as specified in *Table 3: Trial Batch Sampling Testing for New Mix Designs*. Self-consolidating concrete (SCC) shall meet M4.02.17.

Failure to perform all of the required trial batch testing or provide MassDOT RMS trial batch test results within the Specification Limits (as specified in Table 3) will result in the disqualification of the Fabricator's proposed mix design(s).

Table 3: Trial Batch Sampling and Testing for New Mix Designs

Quality Characteristic	Test Method	Sample Size	Specification Limit	Performed By
Slump ^(a)	AASHTO T 119	Per AASHTO	Max. 8 inches or as approved by the Engineer	Quality Control
Air Content (AC)	AASHTO T 152	Per AASHTO	$5\% \leq AC \leq 8\%$	Quality Control
Temperature (°F)	AASHTO T 309	Per AASHTO	$50^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 90^{\circ}\text{F}$	Quality Control
Compressive Strength ^(b)	AASHTO T 22 AASHTO T 23	28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	Lab Mixed $f'_{cr} = 1.3 f'_c$ at 28 days Batch Mixed $f'_{cr} = 1.2 f'_c$ at 28 days	MassDOT
Alkali-Silica Reaction (ASR) ^(d)	ASTM C 1567	Per ASTM	M4.02.00	Quality Control
Resistance to Chloride Ion Penetration Chloride Ion Penetration ^(e)	AASHTO T 358 ^(f)	28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	Resistivity $\geq 21 \text{ k}\Omega\text{-cm}$ at 28 days	MassDOT
Freeze/Thaw Durability ^(c)	AASHTO T 161 (Procedure A)	Per AASHTO	Relative Dynamic Modulus of Elasticity after 300 cycles $\geq 80\%$	Quality Control

Notes:

- (g) Self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.
- (h) Trial batch compressive strength testing shall be performed by MassDOT. Laboratory mixed trial batch compressive strength results shall achieve 130% Design Strength (f'_c). Batch-mixed trial batch compressive results shall achieve 120% f'_c . Acceptance will be based on compressive strength testing performed by MassDOT.
- (i) If an AASHTO accredited laboratory is preparing the trial batch test specimens, MassDOT Acceptance presence is not required. If the Fabricator is preparing the trial batch test specimens, MassDOT Acceptance presence is required during trial batch test specimen preparation.

ITEM 997.01 (Continued)

- (j) Alkali Silica Reaction (ASR) testing shall meet the requirements of M4.02.00. Independent laboratories performing ASR testing shall be listed on the MassDOT Quality Construction Materials List (QCML).
- (k) Calcium nitrite shall be removed from mix designs containing the admixture and replaced by an equivalent quantity of water when preparing Chloride Ion Penetration resistance trial batch test specimens.
- (l) The Wenner probe tip spacing "a" shall be 1.5.

15. 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.

16. Grout.

Grout used for shear keys, vertical adjustment assembly voids, and hand holes shall be in accordance with M4.04.0.

17. Reinforcement.

All reinforcing steel shall be coated Grade 60 unless otherwise noted on the plans. Mechanical reinforcing bar splicers shall be epoxy coated.

18. 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.

19. 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**I. Shop Drawings.**

Prior to performing any work under this Section, the Contractor shall receive approval for all shop drawings for the Precast Concrete Bridge Element being worked on and any special Contract requirements, provided that a complete shop drawing package is provided. The Contractor shall not order materials or begin work before receiving approved shop drawings. MassDOT will reject Precast Concrete Bridge Elements that deviate from the approved drawings or are fabricated prior to receiving written approval of the shop drawings. The Contractor shall bear full responsibility and costs for all materials ordered or work performed prior to the approval of the shop drawings or written authorization from MassDOT.

Contractor shall submit scaled shop drawings to the Engineer of Record for review and approval. Upon approval, the Engineer of Record will forward two (2) sets of scaled, full size (minimum 24x36") paper copies of the Approved (or Approved As Noted) shop drawings to the MassDOT Director of Research and Materials. Calculations are not to be included in any submittal to the Research and Materials Section. An approval stamp shall appear on every shop drawing sheet. Wet-stamping or wet-signing is not required, provided that the stamp and reviewer name are legible. The Fabricator's name and address shall appear on each sheet.

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Resubmittal of “Approved as Noted” shop drawings is not necessary for minor revisions, provided that the correction can be clearly understood and is unambiguous without possibility of misinterpretation. Shop drawings with questions or comments that require a response and/or additional information from the Fabricator must be resubmitted.

Detailed shop drawings shall be prepared in accordance with the relevant provisions of Subsection 5.02 and shall, at a minimum, contain the following:

- (g) Number and type and/or piece mark of the precast concrete bridge element including overall length, width and height.
- (h) Skew angle.
- (i) Location, size and geometry of all steel reinforcement, including mechanical reinforcing bar splicers to be used for connecting Precast Concrete Bridge Elements together in the field.
- (j) Location and details of all inserts, anchors, Vertical Adjustment Assemblies, and any other items required to be cast into the Precast Concrete Bridge Elements (whether detailed on the plans by the Engineer of Record or provided for the Contractor's convenience). Precast Concrete Bridge Elements shall not be fired or drilled into for attachment purposes. All hardware shall be galvanized except as noted.
- (k) Locations and details of the lifting devices, including supporting calculations, type and amount of any additional reinforcing required for lifting. The Fabricator shall design all lifting devices based on the no cracking criteria in Chapter 8 of the PCI Design Handbook (7th edition).
- (l) The minimum compressive strength required prior to handling the precast concrete bridge element.

The shop drawings shall not include procedures for placement, finishing, and curing of concrete. These details shall be included in the Placement, Finishing and Curing Plan that is to be submitted to MassDOT Research and Materials Section as described under *Placement, Finishing, and Curing Plan*.

D. Fabrication.

All Precast Concrete Bridge Elements shall be fabricated in accordance with the latest edition of PCI MNL-116 as modified herein.

E. Placement, Finishing and Curing Plan.

At least 30 days prior to start of fabrication, the Contractor shall submit the Fabricator’s proposed Placement, Finishing and Curing Plan to the Engineer for approval by MassDOT Research and Materials Section. This shall be an independent submittal, separate from the fabrication shop drawings. The Placement, Finishing and Curing Plan shall include the following:

- (k) Method of Mixing
- (l) Method of Placement
- (m) Method of Consolidation
- (n) Method of Finishing
- (o) Method of Initial Curing
- (p) Method of Intermediate Curing
- (q) Method of Final Curing
- (r) Moisture Retention Materials and Equipment (water spray equipment, saturated covers, sheet materials, liquid membrane-forming compounds, accelerated curing equipment, etc.)
- (s) Cylinder Curing Methods, Location, and Environmental Control (temperature, humidity, etc.)
- (t) Temperature Monitoring, Recording, and Reporting

ITEM 997.01 (Continued)**F. Dunnage Plan Shop Drawings.**

At least 30 days prior to the start of fabrication, the Contractor shall submit proposed Dunnage Plan Shop Drawings to the Engineer of Record for review and approval. This shall be an independent submittal, separate from the fabrication shop drawings. Upon approval, the Engineer of Record will forward two (2) sets of scaled, full size (minimum 24"x36") paper copies of the Approved (or Approved As Noted) Dunnage Plan to the MassDOT Director of Research and Materials. Calculations are not to be included in any submittal to the Research and Materials Section. The Dunnage Plan shall include the following:

- (d) Proposed layout of the Precast Concrete Bridge Elements for storage in yard and during shipping
- (e) Support and blocking point locations
- (f) Support and blocking materials

G. Box Culverts, Three-Sided Frames and Arches. *(delete this section if your project does not use these precast concrete bridge elements)*

The Contractor shall submit design computations for the box culvert, rigid frame or arch bridge elements to the Engineer for review and approval. The computations shall be prepared in accordance with the latest AASHTO LRFD Bridge Design Specifications, the 2013 MassDOT LRFD Bridge Design Manual, and the Plans using English units and HL-93 live loading. The design computations shall consider all Strength, Extreme Event and Service Limit States as are appropriate for each stage of fabrication, shipment, construction, and for the final in-service condition. Design computations and shop drawings shall be prepared and stamped by a Professional Engineer licensed to practice in the Commonwealth of Massachusetts. The shop drawings shall be prepared and submitted in accordance with the section, Drawings, above.

The frame dimensions provided on the plans are shown to establish the size of the proposed opening. The width and thickness of each frame unit may vary depending upon the manufacturer's specifications provided that the opening size is maintained. The Contractor shall be responsible for modifying the dimensions of the frame bridge elements to compensate for elastic shortening, shrinkage, grade corrections, and other phenomena that make in-process fabricating dimensions different from those shown on the drawings. Approval of the shop drawings shall not relieve the Contractor from responsibility for the correctness of the dimensions shown.

20. Joints.

The precast reinforced concrete three-sided frame shall be produced with grout-filled keyways per the details on the plans, the manufacturer's recommendations, and as approved by the Engineer. The ends shall be manufactured such that when the sections are laid together they will make a continuous line of frames with a smooth interior surface free of appreciable irregularities, and in compliance with the permissible variations.

21. Marking.

The following information shall be clearly marked on the interior of each frame by indentation, waterproof paint, or other approved means:

- (d) Frame span and rise
- (e) Date of manufacture and lot number
- (f) Name and trademark of the manufacturer

ITEM 997.01 (Continued)**H. 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 Section *Quality Assurance – Precast Concrete, C. Acceptance, A. Inspection*), 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.

I. Reinforcement.

The reinforcing bars shall be installed in accordance with Section 901.62 of the Supplemental 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.

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.

J. Tolerances.

Fabrication shall comply with tolerances specified on the plans. Tolerances for steel reinforcement placement shall be in accordance with 901.62. In the absence of specifications on the plans, tolerances shall comply with the latest version of the PCI MNL 135, Precast Tolerance Manual.

K. 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. Any defects or damage of more than “Category 2, Minor Defects” made to the concrete, due to form work, stripping or handling, shall be subject to repair or rejection, as defined in the *Repairs and Replacement* section. 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.

L. Mixing of Concrete.

The concrete shall be proportioned and mixed in conformance with the Fabricator’s MassDOT approved mix design and M4.02.10 Mixing and Delivery. Fabrication shall not occur without prior MassDOT mix design approval. The Fabricator shall provide copies of batch tickets to the MassDOT Plant Inspector. The MassDOT Plant Inspector will verify if the batch ticket quantities are within the tolerances of the Fabricator’s MassDOT approved mix design.

ITEM 997.01 (Continued)**M. Placement of Concrete.**

Prior to the placement of concrete, the temperature of the forms shall be greater than or equal to 50°F. Quality Control inspection shall be performed by the Fabricator as specified in the *Fabricator Quality Control* section. Placement of the concrete shall not proceed until the MassDOT Plant Inspector is present to perform inspection and begin monitoring Fabricator Quality Control inspection activities, and is in compliance with specifications. The MassDOT Plant Inspector shall inspect and accept the placement of the reinforcing steel prior to the placement of concrete into the forms. The Fabricator shall verify all materials and equipment required for protecting and curing the concrete are readily available and meet the requirements of the *Final Curing Methods* section below. All items encased in the concrete shall be accurately placed in the position shown on the Plans and firmly held during the placing and setting of the concrete. Clearance from the forms shall be maintained by supports, spacers, or hangers and shall be of approved shape and dimension.

During placement, the concrete shall maintain a concrete temperature range between 50°F and 90°F. The Fabricator shall minimize the time to concrete placement (measured from start of mixing to completion of placement). In no event shall time to placement exceed 90 minutes. The Fabricator shall perform additional Quality Control sampling and testing on concrete that has been retempered with admixtures or hold-back water during the placement of the concrete as specified in the *Fabricator Quality Control* section above. Delays or shutdowns of over 30 minutes shall not be allowed during the continuous filling of individual forms.

N. Consolidation of Concrete.

Suitable means shall be used for placing concrete to prevent segregation or displacement of reinforcing steel or forms. The concrete shall be thoroughly consolidated by external or internal vibrators or a combination of both. Vibrators shall not be used to move concrete within the forms. Vibrators shall be used as specified in 901.63C and as directed by the Engineer. Concrete shall be placed and consolidated in a way that minimizes the presence of surface voids or bug holes on the formed surfaces. When used, self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.

O. Finishing of Concrete.

The finish of the Precast Concrete Bridge Elements shall be as indicated on the plans. Where Precast Concrete Bridge Elements have keyways for grout or closure pours, the surfaces of these shear keys shall be abrasive blasted prior to shipment. The Fabricator may utilize a surface retarder with water blast, sandblast, or a combination of both to achieve the desired keyway finish. At a minimum, the profile of the keyway surfaces shall be similar to that of 60 grit sand paper. The exposed reinforcing steel in the precast slab 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 Fabricator shall permanently mark each precast concrete bridge element with its type and/or piece mark, date of casting, and supplier identification either by stamp markings in fresh concrete, waterproof paint, or other approved means on a surface that will not be exposed after assembly.

P. Exposed Surfaces of Precast Concrete Bridge Elements.

As soon as conditions permit, before the concrete has fully hardened, all dirt, laitance, and loose aggregate shall be removed from the exposed concrete surfaces. Contractor shall not allow foot traffic on the uncured concrete until it has reached sufficient strength to prevent damage.

Q. Exposed Surfaces of Closure Pour Shear Keys.

The closure pour shear key cast in the sides of the beam flanges shall have an exposed aggregate finish. The closure pour reinforcing steel and its coating shall not be damaged by the process for creating the exposed aggregate surface. Fabricator may utilize a surface retarder with water blast, abrasive blast, or a combination of both to achieve the desired shear key finish. The abrasive blast shall use oil free compressed air. The profile of the shear key surfaces shall be similar to that of 60 grit sand paper.

ITEM 997.01 (Continued)**R. Initial Curing Methods.**

After the placement of concrete and prior to concrete finishing, the Fabricator shall initiate initial curing methods when the concrete surface begins to dry, to reduce moisture loss from the surface. Application of one or more of the following initial curing methods shall occur immediately after the bleed water sheen has disappeared.

22. Fogging.

Fogging nozzles shall atomize water into a fog-like mist. The fog spray shall be directed and remain visibly suspended above the concrete surface, to increase the humidity of the air and reduce the rate of evaporation. Water from fogging shall not be worked into the surface during finishing operations and shall be removed or allowed to evaporate prior to finishing.

23. Liquid-applied Evaporation Reducers

Evaporation reducers shall be sprayed onto the freshly placed concrete surface to produce an effective monomolecular film that reduces the risk of plastic-shrinkage cracking and rate of evaporation of the bleed water from the concrete surface. Evaporation reducers shall be applied in accordance with manufacturer's recommendations.

S. Intermediate Curing Methods.

The Fabricator shall initiate intermediate curing methods if concrete finishing has taken place prior to the concrete reaching final set. The freshly finished concrete surface shall be protected from moisture loss, by the continuation of initial curing methods (fogging and evaporation reducers) until final curing methods are applied or by the use of liquid membrane-forming curing compounds (see *Liquid Membrane-Forming Compounds for Curing* section).

T. Final Curing Methods.

The Fabricator shall initiate and apply final curing methods to the concrete immediately after the following conditions are met:

- (d) Completion of concrete finishing
- (e) Final set of concrete
- (f) Concrete has hardened sufficiently enough to prevent surface damage

During fabrication of Precast Concrete Bridge Elements, the Fabricator shall maintain the required concrete temperature ranges throughout the entire duration of the final curing method cycle as specified herein. Controlled and gradual termination of the final curing method shall occur after all specified conditions are met. The concrete temperature shall be reduced at a rate not to exceed 36°F per hour until the concrete temperature is within 20°F of the ambient temperature outside of the final curing method enclosure. The Fabricator shall maintain a minimum concrete temperature of 40°F until 100% f'c is attained (see *Handling and Storage* section below).

24. Water Spray Curing.

All exposed concrete surfaces shall remain moist with a continuous fine spray of water throughout the entire duration of the final curing method cycle (see *Table 4: Final Curing Method Cycle for Water Spray*).

ITEM 997.01 (Continued)**Table 4: Final Curing Method Cycle for Water Spray**

Sustained Concrete Temperature	Final Curing Method Cycle Duration	Compressive Strength
$50^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 90^{\circ}\text{F}$	$\geq$ Five (5) days	$\geq 80\% f'_c$

25. Saturated

Covers for Curing.

All exposed concrete surfaces shall remain moist with a continuous application of saturated covers throughout the entire duration of the final curing method cycle (see *Table 5: Final Curing Method Cycle for Saturated Covers*). Saturated covers shall be allowed to dry thoroughly before removal to provide uniform, slow drying of the concrete surface.

Table 5: Final Curing Method Cycle for Saturated Covers

Sustained Concrete Temperature	Final Curing Method Cycle Duration	Compressive Strength
$50^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 90^{\circ}\text{F}$	$\geq$ Three (3) days	$\geq 80\% f'_c$

Saturated covers, mats, and other

such as burlap, cotton coverings of absorbent

materials shall meet the requirements of AASHTO M 182, Class 3. Saturated covers shall be in good condition, free from holes, tears, or other defects that would render it unsuitable for curing concrete. Saturated covers shall be dried to prevent mildew when storing. Prior to application, saturated covers shall be thoroughly rinsed in water and free of harmful substances that are deleterious or cause discoloration to the concrete. Saturated covers shall have sufficient thickness and proper positioning onto the concrete surface to maximize moisture retention.

Saturated covers shall contain a sufficient amount of moisture to prevent moisture loss from the surface of the concrete. Saturated covers shall be kept continuously moist so that a film of water remains on the concrete surface throughout the entire duration of the final curing method cycle. The Fabricator shall not permit the saturated covers to dry and absorb water from the concrete. Use of polyethylene film (see *Polyethylene Film* section) may be applied over the saturated cover to potentially decrease the need for continuous watering.

26. Sheet Materials for Curing.

All exposed concrete surfaces shall remain moist with a continuous application of curing sheet materials throughout the entire duration of the final curing method cycle (see *Table 6: Final Curing Method Cycle for Curing Sheet Materials*).

Table 6: Final Curing Method Cycle for Sheet Materials

Sustained Concrete Temperature	Final Curing Method Cycle Duration	Compressive Strength
$50^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 90^{\circ}\text{F}$	$\geq$ Three (3) days	$\geq 80\% f'_c$

Sheet Materials used for curing, such as polyethylene film, white burlap-polyethylene sheeting, and reinforced paper shall meet the requirements of ASTM C171 and the specifications herein. Sheet materials shall inhibit moisture loss and reduce temperature rise in concrete exposed to radiation from the sun during the final curing method cycle. Adjoining covers shall overlap not less than 12 inches. All edges of the covers shall be secured to maintain a moist environment.

ITEM 997.01 (Continued)**Polyethylene Film.**

Polyethylene film shall meet the requirements of ASTM C171, consist of a single sheet manufactured from polyethylene resins, be free of visible defects, and have a uniform appearance. Careful considerations shall be taken by the Fabricator to prevent the film from tearing during storage and application, so as to not disrupt the continuity of the film (polyethylene film reinforced with glass or other fibers is more durable and less likely to be torn). The Fabricator shall monitor the application of the film to prevent uneven spots from appearing (mottling) on the concrete surface, due to variations in temperature, moisture content, or both. The Fabricator shall prevent mottling from occurring on the concrete surface by applying additional water under the film or applying a combination of polyethylene film bonded to absorbent fabric to the concrete surface to retain and evenly distribute the moisture. Immediately following final finishing, polyethylene film shall be placed over the surface of the fresh concrete surface, so as to not damage the surface of the concrete and shall be placed and weighted so that it remains in contact with the concrete throughout the entire duration of the final curing method cycle. The film shall extend beyond the edges of the concrete surface. The film shall be placed flat on the concrete surface, avoiding wrinkles, to minimize mottling. Edges of adjacent polyethylene film shall overlap a minimum of 6 inches and be tightly sealed with the use of sand, wood planks, pressure-sensitive tape, mastic, or glue to maintain close contact with the concrete surface, retain moisture, and prevent the formation of air pockets throughout the entire duration of the final curing method cycle.

White Burlap-Polyethylene Sheeting

White burlap-polyethylene sheeting shall meet the requirements of ASTM C171, be securely bonded to the burlap so to avoid separation of the materials during handling and curing of the concrete, and be applied in the same manner as the polyethylene film.

Reinforced Impervious Paper.

Reinforced impervious paper shall meet the requirements of ASTM C171, consist of two sheets of kraft paper cemented together with a bituminous adhesive and reinforced with embedded cords or strands of fiber running in both directions, and be white in color. Reinforced impervious paper shall be treated to prevent tearing when wetted and dried.

Reinforced impervious paper can be reused so long as it is effective in retaining moisture on the concrete surface. The Fabricator shall visually inspect the reinforced impervious paper for all holes, tears, and pin holes from deterioration of the paper through repeated use by holding the paper up to the light. The paper shall be discarded and prohibited from use when the moisture is no longer retained.

After the concrete has hardened sufficiently to prevent surface damage, the concrete surface shall be thoroughly wetted prior to the application of the reinforced impervious paper, and be applied in the same manner as the polyethylene film.

27. Liquid Membrane-Forming Compounds for Curing.

All exposed concrete surfaces shall remain moist with a continuous application of liquid membrane-forming compounds throughout the entire duration of the final curing method cycle (see *Table 7: Final Curing Method Cycle for Liquid Membrane-Forming Compounds*).

ITEM 997.01 (Continued)**Table 7: Final Curing Method Cycle for Liquid Membrane-Forming Compounds**

Sustained Concrete Temperature	Final Curing Method Cycle Duration	Compressive Strength
50°F ≤ °F ≤ 90°F	≥ Seven (7) days	≥ 80% f _c

Liquid membrane-forming compounds shall meet the requirements of ASTM C 1315, Type I, Class A and shall exhibit specific properties, such as alkali resistance, acid resistance, adhesion-promoting quality, and resistance to degradation by ultraviolet light, in addition to moisture-retention capabilities. Liquid membrane-forming compounds shall consist of waxes, resins, chlorinated rubber, or other materials to reduce evaporation of moisture from concrete. Liquid membrane-forming compounds shall be applied in accordance with the manufacturer's recommendations.

Liquid membrane-forming compounds shall be applied immediately after the disappearance of the surface water sheen following final finishing. All exposed surfaces shall be wetted immediately after form removal and kept moist to prevent absorption of the compound, allowing the curing membrane to remain on the concrete surface for proper membrane moisture retention. The concrete shall reach a uniformly damp appearance with no free water on the surface prior to the application of the compound.

If patching or finishing repairs are to be performed prior to the application of the compound, the Precast Concrete Bridge Element shall be covered temporarily with saturated covers until the repairs are completed and the compound is applied. Only areas being repaired shall be uncovered during this period. While the saturated covers are removed to facilitate the patching process, the work shall continue uninterrupted. If for any reason the work is interrupted, saturated covers shall be placed onto the uncovered concrete surface, until the work continues and is completed, at which time the curing compound shall be applied to the repaired area.

Careful considerations shall be made by the Fabricator 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. Under such conditions, the application of liquid membrane-forming compounds to the concrete surface shall be delayed, in order to prevent bleed water from being sealed below the concrete surface and avert map cracking of the membrane films, reduction in moisture-retention capability, and reapplication of the compound. To diagnose and prevent this condition, the Fabricator shall 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.

The compound shall be applied in two applications at right angles to each other to ensure uniform and more complete coverage. On very deeply textured surfaces, the surface area to be treated shall be at least twice the surface area of a troweled or floated surface. In such cases, two separate applications may be needed, each at 200 ft²/gal., with the first being allowed to become tacky before the second is applied.

The curing compound shall be applied by power sprayer, using appropriate wands and nozzles with pressures between 25 and 100 psi. For very small areas such as repairs, the compound shall be applied with a wide, soft-bristled brush or paint roller. The compound shall be stirred or agitated before use and applied uniformly in accordance with the manufacturer's recommended rate. The Fabricator shall verify the application rates are in accordance with the manufacturer's recommended rate.

When the concrete surface is to receive paint, finishes, or toppings that require positive bond to the concrete, it is critical that the curing procedures and subsequent coatings, finishes, or toppings be compatible to achieve the necessary bond

ITEM 997.01 (Continued)

After the termination of the final curing method cycle has occurred, liquid membrane-forming compounds shall be removed by blast-cleaning from any concrete surface that is to receive paint, finishes, plastic concrete from secondary pour, grout, or any other toppings that require bonding to the concrete surface. These surfaces shall be further blast-cleaned to remove the cement matrix down to exposed aggregate to ensure proper bonding to the material. The method used to remove the curing compound shall not damage the reinforcement and coating. Compounds are prohibited on any concrete surface that will have a penetrating or coating type treatment such as a sealer, stain, or waterproofing membrane applied to it.

28. Accelerated Curing.

Accelerated curing shall use live steam or radiant heat with moisture in accordance with PCI MNL-116 as modified herein. The concrete temperature shall meet the maximum heat increase and cool down rates as specified herein. Concrete temperature monitoring shall meet the requirements of the *Temperature Monitoring* section. Excessive and fluctuating rates of heating and cooling shall be prohibited. The concrete temperature shall not exceed 158°F at any time. The Fabricator shall meet the following accelerated curing sequencing and requirements.

Initial Delay Period.

The initial delay period shall be defined as the duration immediately following the placement of the concrete and the attainment of initial set of the concrete. The Fabricator shall determine the time of initial set in accordance with AASHTO T 197 specifications. Throughout the entire duration of the preset period, initial curing shall be implemented. The temperature increase period (see *Temperature Increase Period* section) shall not occur until initial set of the concrete is attained. During the initial delay period, the concrete temperature shall meet the following requirements:

- iii. Concrete temperature rate of increase shall not exceed 10°F per hour.
- iv. Total concrete temperature increase shall not exceed 40°F higher than the placement concrete temperature or 100°F, whichever is less

Temperature Increase Period.

The temperature increase period shall be defined as the duration immediately following the completion of the initial delay period (after initial set) and immediately prior to the start of the constant maximum temperature period. Application of steam to the enclosure shall not occur until the initial delay period is complete. After the initial delay period is complete, all exposed concrete surfaces shall be cured in a moist environment where the concrete temperature increases at a rate not to exceed 36°F per hour.

Constant Maximum Temperature Period.

The constant maximum temperature period shall be defined as the duration immediately following the completion of the temperature increase period and immediately prior to the start of the temperature decrease period. After the temperature increase period is complete, all exposed concrete surfaces shall be cured in a moist environment at a controlled and constant elevated temperature throughout the entire duration of the constant maximum temperature period. Termination of the constant maximum temperature period and the start of the termination decrease period shall occur after all specified conditions are met (see *Table 8: Constant Maximum Temperature Period*).

ITEM 997.01 (Continued)**Table 8: Constant Maximum Temperature Period**

	Sustained Concrete Temperature	Constant Maximum Temperature Period	Compressive Strength	
Temperature Period.	$120^{\circ}\text{F} \leq ^{\circ}\text{F} \leq 158^{\circ}\text{F}$	$6 \text{ hrs} \leq \text{Time} \leq 48 \text{ hrs}$	$\geq 80\% f'_c$	Decrease
After the				constant

maximum temperature period is complete, the concrete temperature shall be cured in a moist environment at a controlled and reduced rate not to exceed 36°F per hour until the concrete temperature is within 20°F of the ambient temperature outside of the curing enclosure.

U. Stripping.

The Fabricator shall not strip forms or handle the Precast Concrete Bridge Element until Quality Control compressive strength cylinders attain a minimum compressive strength of 80% Design Strength (f'_c) or the value indicated on the approved drawings has been achieved. After removal from the form, all exposed concrete surfaces shall continue to be cured in conformance with the *Final Curing Methods* sections until completion.

V. Handling and Storage of Precast Concrete Bridge Elements.

Precast Concrete Bridge Elements may be exposed to temperatures below freezing (32°F) when the chosen curing cycle has been completed, provided that the following conditions are met:

- (c) Precast Concrete Bridge Elements are protected from precipitation with polyethylene curing covers until 100% f'_c is attained
- (d) Precast Concrete Bridge Elements maintain a minimum concrete temperature of 40°F until 100% f'_c is attained

Precast Concrete Bridge Elements damaged during handling and storage will be repaired or replaced at MassDOT's direction at no cost to MassDOT. Precast Concrete Bridge Elements shall be lifted at the designated points by approved lifting devices embedded in the concrete and in accordance with proper lifting and handling procedures. Storage areas shall be smooth and well compacted to prevent damage due to differential settlement. Precast Concrete Bridge Elements shall be supported on the ground by means of continuous blocking, in accordance with the approved dunnage plan.

Precast Concrete Bridge Elements shall be loaded on a trailer with blocking as described above, in accordance with the approved dunnage plan. Shock-absorbing cushioning material shall be used at all bearing points during transportation of the Precast Concrete Bridge Elements. Blocking shall be provided at all locations of tie-down straps. Precast Concrete Bridge Elements stored prior to shipment shall be inspected by the Contractor prior to being delivered to the site to identify damage that would be cause for repair or rejection.

W. Repairs and Replacement.

In the event defects are identified, they shall be classified in the following categories and a non-conformance report (NCR) shall be filed if required. The NCR shall be submitted to MassDOT for review. Defects in all categories shall be documented by plant Quality Control personnel and made available to MassDOT upon request. Any required repairs shall utilize materials listed on the MassDOT QCML.

ITEM 997.01 (Continued)

Where noted, defects shall be repaired according to the PCI Northeast Region Guidelines for Resolution of Non-Conformances in Precast Concrete Bridge Elements, Report Number PCINE-18-RNPCBE. Please note that reference to PCINE-18-RNPCBE is made for repair details only. In the case of conflicts with this Special Provision, this Special Provision shall govern.

29. Category 1, Surface Defects.

Category 1 defects do not need to be repaired, and an NCR does not need to be filed. Surface defects are defined as the following:

- (d) Surface voids or bug holes that are less than 5/8-inch in diameter and less than 1/4-inch deep, except when classified as Category 4
- (e) Cracks less than or equal to 0.006 inches wide
- (f) Cracks less than or equal to 0.125 inches wide on surfaces that will receive a field-cast concrete overlay

30. Category 2, Minor Defects.

Category 2 defects shall be repaired, but an NCR does not need to be filed. Minor defects are defined as the following:

- (d) Spalls, honeycombing, surface voids that are less than 2 inches deep and have no dimension greater than 12 inches
- (e) Cracks less than or equal to 0.016 inches that will not receive a concrete overlay
- (f) Broken or spalled corners that will be covered by field-cast concrete

Minor defects shall be repaired according to PCINE-18-RNPCBE. Cracks shall be sealed according to the PCI Repair Procedure #14 in PCINE-18-RNPCBE.

31. Category 3, Major Defects.

For Category 3 defects, the Fabricator shall prepare an NCR that documents the defect and describes the proposed repair procedure. The NCR shall be submitted to MassDOT for approval prior to performing the repair. Major defects are defined as the following:

- (g) Spalls, honeycombing and surface voids that are deeper than 2 inches or have any dimension greater than 12 inches, when measured along a straight line
- (h) Concentrated area of defects consisting of four or more Category 2 Defects within a 4-square foot area.
- (i) Exposed reinforcing steel
- (j) Cracks greater than 0.016 inches and less than or equal to 0.060 inches in width that will not receive a concrete overlay
- (k) Bearing area spalls with dimensions not exceeding 3 inches
- (l) Cracks, spalls and honeycombing that will be encased in cast in place concrete need not be repaired, but the limits and location of the defects shall be documented with an NCR

Upon MassDOT approval, defects and cracks shall be repaired according to PCINE-18-RNPCBE and this specification. All repairs shall be completed at the expense of the Contractor.

32. Category 4, Rejectable Defects.

Rejectable defects as determined by the MassDOT Inspector, RMS, and Engineer may be cause for rejection. Fabricator may submit an NCR with a proposed repair procedure, requesting approval. Some rejectable defects are defined as the following:

ITEM 997.01 (Continued)

- (f) Surface defects on more than 5% of the surface area which will be exposed to view after installation
- (g) Minor defects that in total make up more than 5% of the surface area of the unit
- (h) Cracks greater than 0.060 inches in width except as noted in Category 1
- (i) Elements fabricated outside of the specified tolerances
- (j) MassDOT compressive strength testing that does not meet the specified Design Strength, f'_c .

X. Loading.

Prior to the Fabricator loading the Precast Bridge Element on to the truck for shipping, the Fabricator shall provide the MassDOT Plant Inspector and RMS a minimum seven (7) days' notice of the Fabricator's intent to load the Precast Bridge Element. Inspection by the MassDOT Plant Inspector shall take place while the element is still on dunnage in the yard. The element shall not be loaded onto the truck until the MassDOT Plant Inspector has performed the inspection.

Y. Shipping.

Prior to shipment, the Fabricator shall perform the following actions and provide the required documentation to the MassDOT Plant Inspector:

- (g) Precast Concrete Bridge Elements shall remain at the Fabricator's plant for a minimum of 7 days after cast date.
- (h) QC Inspection Reports shall be signed by the Quality Control Manager and provided to the MassDOT Plant Inspector.
- (i) QC Compressive Strength Test Report Forms attaining Design Strength, f'_c for the Precast Concrete Bridge Element's representative Sublot shall be generated by the Fabricator and provided to the MassDOT Plant Inspector.
- (j) Certificate of Compliance shall be generated by the Fabricator as described under the Fabricator Quality Control section and provided to the MassDOT Plant Inspector.
- (k) All MassDOT RMS approved Corrective Actions submitted on the Non-Conformance Reports (NCR), shall be verified to have been completed by the MassDOT Plant Inspector and Quality Control Manager.
- (l) All NCRs shall be signed off by the Quality Control Manager, MassDOT Inspector and MassDOT RMS.

Z. Delivery.

Upon Delivery, the following documentation shall be provided to the MassDOT Resident Engineer or designee:

- (d) QC Compressive Strength Test Report Forms attaining Design Strength, f'_c for the Precast Concrete Bridge Element's representative sublot.
- (e) Certificate of Compliance generated by the Fabricator as described under the Fabricator Quality Control section.
- (f) QC Inspection Reports signed by the Quality Control Manager.

The Contractor shall inspect Precast Concrete Bridge Elements upon receipt at the site. Precast Concrete Bridge Elements damaged during delivery shall be repaired or replaced at MassDOT's direction at no cost to MassDOT.

ITEM 997.01 (Continued)**CONSTRUCTION METHODS – FIELD CONSTRUCTION****J. 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.

Prior to installation, the following documentation shall be reviewed and confirmed by the MassDOT Resident Engineer or designee:

- (d) QC Compressive Strength Test Report Forms attaining Design Strength, f'_c for the Precast Concrete Bridge Element's representative subplot.
- (e) Certificate of Compliance generated by the Fabricator as described under the Fabricator Quality Control section.
- (f) QC Inspection Reports signed by the Quality Control Manager.

Field construction staff shall verify that the Resident Engineer has accepted all Precast Concrete Bridge Elements prior to installation.

AA. Erection 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:

33. Erection Procedure

The Erection Procedure shall be prepared to conform to the requirements of 960.61, Erection and the applicable sections in Chapter 8 of the PCI Design Handbook (seventh edition) for handling, erection, and bracing requirements. At a minimum, the Erection Procedure shall provide:

- (h) Minimum concrete compressive strength for handling the Precast Concrete Bridge Elements.
- (i) Concrete stresses during handling, transport, and erection.
- (j) Crane capacities, pick radii, sling geometry, and lifting hardware.
- (k) Verification that the equipment can handle all pick loads and weights with the required factor of safety.
- (l) Evaluation of construction sequence and evaluation of any geometric conflicts in the lifting of the Precast Concrete Bridge Elements and setting them as shown on the plans.
- (m) Design of crane supports including verification of subgrade for support.
- (n) Location and design of all temporary bracing that will be required during erection.

Non-shrink grout and concrete materials, approved by the Engineer, shall be placed as shown on the plans. Fill joints, keyways, and voids, in strict accordance with the specifications and manufacturer's recommendations and instructions.

For footings, approach slabs and highway guardrail transitions, once these Precast Concrete Bridge Elements have been set to the correct horizontal and vertical alignment, the void between them and the supporting soil shall be filled with Controlled Density Fill – Non-Excavatable to the limits as shown on the plans. Add additional grout ports in the footings to facilitate the bedding process if required.

ITEM 997.01 (Continued)

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.

34. 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 on full size 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:

- (l) 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.
- (m) 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.
- (n) 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.
- (o) 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.

ITEM 997.01 (Continued)

- (p) Details of all equipment that shall be employed for the construction of the bridge.
- (q) Methods of providing temporary support of the elements. Include methods of adjusting and securing the element after placement.
- (r) Vertical Adjustment Assemblies to be used as a means of setting precast concrete footings to the correct elevations.
- (s) 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.
- (t) Methods for curing grout.
- (u) Proposed methods for installing non-shrink grout and the sequence and equipment for the grouting operation.
- (v) 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.

BB. 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.

CC. Preparation of Closure Pour Keyways.

Immediately prior to erecting the Precast Concrete Bridge Elements, the closure pour shear keys 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 and precast concrete using a high-pressure water blast. The 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 shear keys 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.

DD. 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.

Suitable spreaders shall be used during lifting so that only a vertical pull will be made on the lifting device. A non-vertical lifting force may be permitted if prior written approval is given by the Engineer. 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.

Precast components shall be pre-bed with non-shrink grout thicker than shim stacks prior to placing other precast elements on top of them.

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 997.01 (Continued)**EE.Box Culverts, Three-Sided Frames and Arches.**

Backfilling operations shall not begin until the following checks have been made:

- (d) The frame to footing key joints are grouted as shown on the plans;
- (e) The joints between exterior frame bridge elements and wingwall stems are complete as shown on the plans;
- (f) All joint seals are properly placed.

Backfill shall be paid for under separate items. The backfilling procedures shall be in accordance with Sections 120, 150, and 170 of the Standard Specifications and Supplemental Specifications modified as follows:

- (i) Fill shall be placed and compacted in layers not exceeding one foot in depth;
- (j) Dumping of fill shall not be allowed any nearer to the structure than 3.25 feet from a vertical plane extending from the back of the footing;
- (k) Backfill shall be placed as symmetrically as possible around the structure with differential depths of backfill on each side of the structure not exceeding 1.5 feet with respect to each other;
- (l) Compaction shall be achieved using hand compaction equipment for all fill within one foot of the structure;
- (m) The bare structure shall not be crossed by any equipment heavier than that specified by the frame manufacturer. All damage resulting from equipment damage shall be rectified to the satisfaction of the Engineer at no cost to the Department;
- (n) Construction equipment will not be permitted atop an uncompleted structure;
- (o) Construction equipment whose weight exceeds the design capacity shall not be permitted atop the completed structure under any circumstances;
- (p) The use of vibratory rollers for compaction purposes will not be permitted.

A representative of the manufacturer shall be on site at the commencement of the installation, at no cost to the Department, to assist the Contractor. The representative shall offer advisory assistance only and shall not supplant the Contractor's representative, or the Engineer.

FF. 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 Cement Mortar (M4.02.15) or grout.

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.

COMPENSATION**A. Basis of Payment.**

The furnishing, fabricating, and erecting of all Precast Concrete Bridge Elements for the structure shall be paid for at the contract unit price EACH under the Lump Sum Item 995., complete in place.

B. Payment Items.

Precast Box Culvert

EA

ITEM 997.01 (Continued)**BASIS OF PAYMENT**

This Item will be paid for at the contract unit price per lump sum installed and completed in place. The Special Drainage Structure lump sum price shall include full compensation for all labor, materials, tools and equipment, removal, delivery and disposal at an approved landfill, the cost for approvals, testing, transportation, and other incidental expenses necessary to complete this Item.

Excavation required for the gas relocation shall be paid under Item 141. Excavation exceeding a depth of 8 feet will be compensated at 1.5 times the contract unit price.

Schedule of Basis for Partial Payments

Within 10 days after notice to proceed, the Contractor shall submit on his/her proposal form a schedule of unit prices for the major component Sub-Items that make up Item 997.01 as well as his/her total drainage structure Lump Sum cost for the Special Drainage Structure No. 1. The drainage 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 drainage components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 997.01 and no further compensation will be allowed.

The schedule on the proposal form applies only to Special Drainage Structure No. 1. Payment for similar materials and construction at locations other than at this drainage structure shall not be included under this Item. Sub-Item numbering is presented for information only in coordination with MassDOT Standard Nomenclature.

Item 997.01 Special Drainage Structure No. 1

Sub-Item	Description	Quantity	Unit	Unit Price	Amount
904.3	5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE	20	CY		
910.1	Steel Reinforcement for Structures – Epoxy Coated	5150	LB		
916.002	4'x3' Precast Concrete Box Culvert	8	EA		
983.52	Natural Streambed Material	18	CY		
970.	Damp-proofing	925	SF		

Total Cost of Item 997.01 = _____

ITEM 998.101**SPECIALITY SERVICES #1****LUMP SUM**

The work under this item shall conform to the relevant provisions of Subsections 801 and 813 of the Standard Specifications, as shown on the plans, and the following:

This work shall include furnishing and installing conduit and risers for relocating the communication and electric services to #456 Main Street.

Materials

All new conduit and risers required to restore the service connections shall be furnished under this item. Materials and products furnished shall be designed for the intended use, shall meet all requirements of the latest edition of the National Electric Code, all local codes and the utility companies' specifications.

Construction Methods

The Contractor shall install the conduit and risers. Comcast and Verizon will be responsible for pulling their wires and restoring their services.

The existing conduits shall be excavated and exposed for a necessary distance to allow for connecting the new conduit to the existing conduit as shown on the plans. The Contractor shall install new conduit, bends, sweeps, 10 foot galvanized steel riser for electric service, PVC risers for communication services and all incidentals necessary to provide the connection. The communication companies shall install all wiring required to restore the services.

The work shall include all excavation and backfill, compaction, new risers, new conduit, and materials, concrete encasement and any other requirements in accordance with the utility companies' specifications.

The Contractor shall coordinate the work associated with disconnecting and reconnecting the service lines with the utility companies and shall be performed at a time convenient to the property owner and tenants of the building four (4) months in advance. The actual time of day or evening for the disconnecting and reconnecting will be agreed upon between the Engineer, the utility companies and the property owner/tenant during construction. The work may need to be performed on multiple days, nights or weekends to minimize disruption to the owner(s)/tenants. A representative from the Contractor shall be present when this work is performed. No additional compensation shall be given for this work outside of normal work hours if necessary.

BASIS OF PAYMENT

Item 998.101 will be paid for at the Contract unit price per lump sum which price shall include all labor, materials, equipment and incidentals required to complete the work.

The Lump Sum amount includes all fees for the work order for the service connection disconnect/reconnect for Reading Muni Light and any Electrical Inspection.

ITEM 998.102**SPECIALITY SERVICES #2****LUMP SUM**

The work under this item shall conform to the relevant provisions of Subsections 801 and 813 of the Standard Specifications, as shown on the plans, and the following:

The work shall include furnishing and installing conduit, wire and riser for relocating the electric service to the commercial sign located at #474 Main Street.

Materials

The new conduit, wire and riser required to restore the electric service connection shall be furnished under this item. Materials and products furnished shall be designed for the intended use, shall meet all requirements of the latest edition of the National Electric Code, all local codes and the Reading Municipal Light Department (RMLD) specifications found in the Electric Service Requirements Handbook (<https://www.rmlld.com/about-rmlld/pages/electric-service-requirements-handbook>).

Construction Methods

The Contractor shall install the conduit, wire and riser. Reading Municipal Light Department will be responsible for making the final connection from the top of the riser to the power supply. The Contractor shall coordinate the work with the owner(s) and utility company.

The existing conduit shall be excavated and exposed for a necessary distance to allow for connecting the new conduit to the existing conduit as shown on the plans. The Contractor shall install new conduit, bends, sweeps, 10 foot galvanized steel riser and all incidentals necessary to provide the connection. The Contractor shall install all wiring needed for the sign leaving a coil of wire acceptable to RMLD at the top of the riser.

The work shall include all excavation and backfill, compaction, new riser, new conduit, new wire and materials, concrete encasement and any other requirements in accordance with the RMLD specifications.

The Contractor shall coordinate the work associated with disconnecting and reconnecting the power with RMLD and shall be performed at a time convenient to the property owner and tenants of the building. The actual time of day or evening for the disconnecting and reconnecting will be agreed upon between the Engineer, RMLD and the property owner/tenant during construction. A representative from the Contractor shall be present when this work is performed. No additional compensation shall be given for this work outside of normal work hours if necessary.

BASIS OF PAYMENT

Item 998.102 will be paid for at the Contract unit price per lump sum which price shall include all labor, materials, equipment and incidentals required to complete the work.

ITEM 998.103**SPECIALITY SERVICES #3****LUMP SUM**

The work under this item shall conform to the relevant provisions of Sections 801, 813 and 820 of the Standard Specifications and the following:

The work shall include removing existing light poles along the MBTA rider platform and installing new light poles, luminaires and concrete bases at the locations shown on the plans in accordance with the

Construction Methods

The Contractor shall coordinate the removal and replacement of the existing light poles, luminaires, and foundations with MBTA and Keolis. Contractor shall coordinate with the MBTA/Keolis to locate existing underground utilities within the limits of work.

The Contractor shall coordinate with the MBTA to install new light poles and luminaires per the MBTA Lighting Levels and Fixtures Design Directive (<https://www.mbta.com/engineering/directives>)

Placement of electrical conduit and pole foundations shall be reviewed and approved by the MBTA.

The light poles to be replaced are those primarily impacted by the construction of the retaining wall identified on the design plans. The Contractor shall submit a work plan prior to starting this work detailing how lighting will be maintained during the construction of the wall to the Engineer and MBTA.

All new conduit, wire and wiring required to provide a functioning light shall be furnished under this item. Materials and products furnished shall be designed for the intended use, shall meet all requirements of the latest edition of the National Electric Code, all local codes and the owner's specifications.

The new light poles are to be installed on new concrete bases matching existing conditions. The Contractor shall furnish and install new concrete bases if any existing base is damaged. The new bases shall be the same size and type as the existing bases.

Electrical connections and splicing for the new poles will be performed by Keolis. All electrical work needs to be completed by a Massachusetts licensed electrician and inspected by a licensed state inspector prior to the work being accepted.

The Contractor shall provide temporary lighting when the existing lights are not functioning. Light levels for the temporary lights shall match existing light levels.

Light poles, electrical connections, and concrete bases that are damaged by the Contractor's operations shall be replaced with new products at no additional cost.

All materials not being reused shall become the property of the Contractor and properly disposed of away from the project site.

ITEM 998.103 (Continued)

No excavation is permitted within the MBTA platform area unless specifically approved in advance by the MBTA.

BASIS OF PAYMENT

Item 998.103 will be paid for at the Contract unit price per lump sum, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 998.104**SPECIALITY SERVICES #4****LUMP SUM**

The work under this item shall conform to the relevant provisions of Subsections 701 and 901 of the Standard Specifications and the following:

The work shall include the relocation of a gas line, new concrete pad, and bollards for the relocation of the gas meter within the MBTA parcel at approximately STA 212+10 RT.

Materials

Bollards shall be galvanized steel tubes 4 inches in diameter and filled with cement concrete. The concrete shall be rounded at the top of the bollard. The color of the bollard shall be coordinated with the MBTA.

4,000 PSI cement concrete shall be used for the gas pad with reinforcing mesh. Cement concrete gas pad shall be a minimum of 4" thick installed level or per the owner's specifications.

Construction Methods

Training, Insurance, and an Access License with MBTA is necessary for this work, which is considered incidental to other contract Items.

National Grid Gas may be required to obtain an Access license for this work. The Contractor shall coordinate the submission of Access license application to MBTA Realty, so work is planned well in advance.

The Contractor shall construct the pad to the dimensions shown on the plans. National Grid Gas will be responsible for installing the gas meter and service line to the meter.

Keolis will be responsible for installing the connections to the two track heaters.

Bollards shall be set plumb in a concrete foundation as detailed.

This work shall not be performed between October 1 and April 30 so gas service is not interrupted.

Backfill and compaction shall follow National Grid Gas guidelines.

All gas relocation shall follow all local codes and the owner's specifications and be inspected by a licensed State Inspector.

The Contractor shall coordinate the work with National Grid Gas and Keolis. No additional compensation shall be given for this work outside of normal work hours if necessary.

ITEM 998.104 (Continued)

BASIS OF PAYMENT

Item 998.104 will be paid for at the Contract unit price per lump sum which price shall include all labor, materials, equipment and incidentals required to complete the work.

Labor, equipment, and material required by Keolis for the Gas work shall be charged to the MassDOT contractor under a 3rd party agreement. This bill will be reimbursed to the Contractor under Non-bid Item.

ITEM 998.105**SPECIALITY SERVICES #5****LUMP SUM**

The work under this item shall conform to the relevant provisions of Subsections 801 and 813 of the Standard Specifications and the following:

The work shall include furnishing and installing conduit and risers for relocating the electric services to utility pole 98X within the MBTA facility at STA. 213+00 RT

Materials

All new conduits, risers, manholes or handholes, frames and covers required to restore the service connections shall be furnished under this item. Materials and products furnished shall be designed for the intended use, shall meet all requirements of the latest edition of the National Electric Code, all local codes, the utility companies' specifications and requirements from the MBTA.

Construction Methods

Training, Insurance, and an Access License with MBTA is necessary for this work, which is considered incidental to other contract Items. Reading MUNI must obtain an Access license for this work. The Contractor shall coordinate the submission of Access license application to MBTA Realty so work is planned well in advance.

The Contractor shall install the conduit, risers, manholes or handholes, frames and covers per MBTA specifications. The utility company will be responsible for installing the electric meter and service to the overhead connection. Keolis will be responsible for cable splicing, pulling wires, and restoring their services. The Contractor shall coordinate with Keolis to confirm material requirements and arrange for the necessary work within the MBTA property. All material submittals shall be reviewed and approved by the MBTA.

The existing conduits shall be excavated and exposed for a necessary distance to allow for connecting the new conduit to the existing conduit as shown on the plans or directed by the Engineer. The Contractor shall install new conduit, bends, sweeps, 10 foot galvanized steel riser for electric service, and all incidentals necessary to provide the connection.

Reading Municipal Light will install the new pole and replace the transformer, grounding, guying, and equipment with reimbursement under the Force Account Contract. Under this Item, the Contractor will obtain a WO# with RMLP to switch the meter or install a new meter in the new meter socket installed by the Contractor, and disconnect/reconnect only the wire pigtails at the top of the pole. Work under this Item includes payment to RMLP, as well as any fees for State Electrical Inspection/Approval. The Contractor shall provide all wire under this Item, grounding, riser, weatherhead @ 10', enough wired coiled and attached at 10' high.

The work shall include all excavation and backfill, compaction, new risers, new conduit, manholes or handholes, frames & covers, concrete encasement, railroad ballast restoration and any other materials required to meet the requirements in accordance with the utility companies' and the MBTA's specifications.

ITEM 998.105 (Continued)

The Contractor shall coordinate the work associated with disconnecting and reconnecting the service lines with the utility companies and Keolis. The work shall be performed at a time convenient to the operation of the railroad. The actual time of day or evening for the disconnecting and reconnecting will be agreed upon between the Engineer, the utility companies and Keolis during construction. The work may need to be performed on multiple days, nights or weekends to minimize disruption to the MBTA. A representative from the Contractor shall be present when this work is performed. No additional compensation shall be given for this work outside of normal work hours if necessary.

The project requires close coordination with RMLP and MBTA/Keolis forces and shall be performed during non-revenue service hours between 12:30 AM and 4:30 AM.

BASIS OF PAYMENT

Item 998.105 will be paid for at a contract lump sum price, which price shall include all labor, materials, equipment and incidentals required to complete the work.

Payment for Railroad Flagmen required under this Item is reimbursed under Non-Bid Item.

Payment to Keolis through a Third Party Agreement for Splicing and Shut downs, Back up Generator, etc. is reimbursed under Non-Bid item, Specialty Services.

END OF DOCUMENT

DOCUMENT A00802

DETAIL SHEETS

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**THE COMMONWEALTH OF MASSACHUSETTS
MASSACHUSETTS DEPARTMENT OF
TRANSPORTATION 10 PARK PLAZA, BOSTON MA**

-ESTIMATE OF QUANTITIES - DETAIL SHEET-

CITY/TOWN:
Wilmington, MA

YEAR:
2025

STATION:
203+55.00 to 319+20.77

ROAD:
Route 38

Unclassified Excavation:	27,950	CY	Gravel Borrow:	15,700	CY
Class B Trench Excavation:	1,175	CY	Special Borrow:	110	CY
Class A Trench Excavation:	189	CY	Dense Graded Crushed Stone	4,172	CY
Class B Rock Excavation:	475	CY	Bridge Excavation	1,180	CY

PAVEMENT NOTES

PROPOSED FULL DEPTH RECONSTRUCTION/BOX WIDENING OVER 4 FEET WIDE

SURFACE COURSE:	1.75" SUPERPAVE SURFACE COURSE - 12.5 POLYMER (SSC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER 1.75" SUPERPAVE INTERMEDIATE COURSE -12.5 POLYMER (SIC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER
INTERMEDIATE	2.5" SUPERPAVE INTERMEDIATE COURSE -19.0 (SIC- 19.0) COURSE: OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER
BASE COURSE:	4.5" SUPERPAVE BASE COURSE - 37.5 (SBC-37.5) PLACED IN ONE COURSE
SUBBASE:	4" DENSE GRADED CRUSHED STONE FOR SUBBASE (COMPACTED) OVER 8" GRAVEL BORROW (TYPE B) (COMPACTED)

PROPOSED BRIDGE PAVEMENT

SURFACE COURSE: 1.75" SUPERPAVE SURFACE COURSE - 12.5 POLYMER (SSC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER 4.25" SUPERPAVE INTERMEDIATE COURSE -12.5 POLYMER (SIC -12.5 - P) (IN TWO LIFTS)

BASE COURSE: OVER SUPERPAVE BASE COURSE -37.5 (SBC-37.5) (DEPTH VARIES)

PROPOSED PAVEMENT MILLING & RESURFACING

SURFACE: 1.75" SUPERPAVE SURFACE COURSE - 12.5 POLYMER (SSC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER 1.75" SUPERPAVE INTERMEDIATE COURSE- 12.5 POLYMER (SIC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER MILLED SURFACE.

MILLING: 3.5" PAVEMENT FINE MILLING

PROPOSED MILLING & STRUCTURAL OVERLAY

SURFACE: 1.75" SUPERPAVE SURFACE COURSE - 12.5 POLYMER (SSC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER 1.75" SUPERPAVE INTERMEDIATE COURSE -12.5 POLYMER (SIC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER MILLED SURFACE.

MILLING: 3" PAVEMENT FINE MILLING

PROPOSED FULL DEPTH RECONSTRUCTION LESS THAN 4 FEET WIDE

SURFACE: 1.75" SUPERPAVE SURFACE COURSE - 12.5 POLYMER (SSC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER 1.75" SUPERPAVE INTERMEDIATE COURSE -12.5 POLYMER (SIC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER

BASE COURSE: 6" HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE OVER

SUBBASE: 8" GRAVEL BORROW (TYPE B)

PROPOSED TEMPORARY TRENCH PATCHES

SURFACE COURSE: 1.75" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5)
OVER

INTERMEDIATE COURSE: 1.75" SUPERPAVE INTERMEDIATE COURSE -12.5
(SIC-12.5)

BASE COURSE: SUITABLE BACKFILL COMPACTED

PROPOSED PERMANENT TRENCH PATCHES

SURFACE COURSE: 1.75" SUPERPAVE SURFACE COURSE - 12.5 POLYMER
(SSC-12.5-P) OVER ASPHALT EMULSION
FOR TACK COAT (RS-1H) OVER
1.75" SUPERPAVE INTERMEDIATE COURSE -12.5 POLYMER
(SIC-12.5-P) OVER ASPHALT EMULSION FOR
TACK COAT (RS-1H) OVER

INTERMEDIATE COURSE: 2.5" SUPERPAVE INTERMEDIATE COURSE- 19.0 (SIC-19.0)
OVER ASPHALT EMULSION FOR
TACK COAT (RS-1H) OVER

BASE COURSE: SUITABLE BACKFILL COMPACTED

PROPOSED CEMENT CONCRETE WALK/ PEDESTRIAN CURB RAMP

SURFACE: 4" CEMENT CONCRETE AIR ENTRAINED 4000 PSI, 3/4", 610

FOUNDATION: 8" GRAVEL BORROW (TYPE B)

PROPOSED HMA DRIVEWAY

SURFACE: 4" SUPERPAVE (1.5" SUPERPAVE SURFACE COURSE - 9.5
(SSC-9.5) OVER 2.5" SUPERPAVE INTERMEDIATE COURSE
– 12.5 (SIC-12.5))

SUBBASE: 8" GRAVEL BORROW (TYPE B)

PROPOSED HMA WALK SURFACE

SURFACE: 3" SUPERPAVE
 (1.25" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5) OVER
 1.75" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-
 12.5))

SUBBASE: 8" GRAVEL BORROW (TYPE B)

ITEM 101. CLEARING AND GRUBBING

For areas shown on plans

Sta. 207+05	RT	to	Sta. 209+90	RT
210+38	LT		210+58	LT
212+17	RT		217+40	RT
217+50	LT		218+30	LT
236+98	RT		242+32	RT
236+32	LT		238+70	LT
239+00	LT		240+85	LT
40+25	RT		41+85	LT
248+25	LT		250+50	LT
253+95	RT		260+05	RT
270+85	RT		281+14	RT
287+25	LT		292+21	LT
299+00	RT		299+50	RT
302+00	RT		303+50	RT
304+90	LT		306+65	LT
306+05	RT		310+50	RT
310+70	LT		315+85	LT
316+25	LT		317+75	LT

And as directed for clearing trees and limbs to provide
 clearance for UP, guy, and OHW clearances.

ITEM 102.1 TREE TRIMMING

For areas shown on plans

Sta. 212+95	RT	to	Sta. 213+05	RT
214+47	RT		214+52	RT
217+50	LT		218+30	LT
219+80	LT		225+40	LT
236+32	LT		240+80	LT
40+25	RT		41+85	RT
57+83	BOTH		54+00	BOTH

ITEM 102.1 (Continued)

248+30	LT	255+60	LT
266+63	LT	264+02	LT
266+97	LT	269+08	LT
314+90	LT	315+85	LT

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING

Sta. 247+89	RT	Sta. 288+86	RT
221+46	RT	289+63	RT
221+97	RT	289+89	RT
223+76	RT	290+36	RT
224+06	RT	291+90	RT
230+45	RT		
231+00	RT		
247+89	RT	293+43	RT
248+58	RT	295+26	RT
270+71	LT	297+05	RT
270+29	LT	297+57	RT
270+42	RT	(2) 297+76	RT
271+16	LT	298+57	RT
271+48	LT	(2) 299+79	RT
272+78	LT	301+74	LT
273+26	LT	285+69	RT
281+40	RT (2)	293+69	LT
273+70	LT	293+92	LT
282+56	RT	316+23	RT
285+19	RT	316+56	RT
285+97	RT (2)	316+89	RT
286+24	RT (2)		
286+91	RT		
287+39	RT		

ITEM 102.521 TREE AND PLANT PROTECTION FENCE

Sta. 206+22	to	Sta. 206+52	LT
219+85		220+55	LT
220+97		221+74	LT
221+85		222+46	RT
227+13		227+81	LT
231+08		231+79	LT

ITEM 102.521 (Continued)

245+34	247+65 LT
248+35	250+34 LT
296+41	296+78 RT
313+36	314+96 RT
315+40	315+82 RT
316+38	316+99 LT

ITEM 102.531**TREE CARE - PRUNING**

Sta. 258+25 RT

ITEM 103.**TREE REMOVED - DIAMETER UNDER 24 INCHES**

Sta. 41+10 RT
230+44 RT
247+25 LT
248+95 LT
257+37 RT
270+29 LT (2)
313+58 RT
313+92 RT
316+29 LT

ITEM 104.**TREE REMOVED - DIAMETER 24 INCHES AND OVER**

Sta. 256+94 RT
Sta. 257+13 RT
Sta. 258+41 LT
Sta. 314+10 LT

ITEM 120.1 UNCLASSIFIED EXCAVATION

Sta. 213+79	Sta. 226+50
Sta. 253+48	Sta. 253+98
Sta. 40+50	Sta. 41+50 RT
Sta. 233+60	Sta 233+67 LT
Sta. 242+84	Sta. 242+93 LT
Sta. 260+58	Sta. 260+69 RT
Sta 238+50	Sta. 241+50 RT
Sta. 314+00	Sta. 314+85 RT

As directed by the engineer

ITEM 122. PRESPLITTING ROCK

Sta. 306+65 to Sta. 309+40

ITEM 142. CLASS B TRENCH EXCAVATION

6" Pipe for item 302.12
8" Pipe for item 302.12
12" Pipe for item 302.12

12" Pipe

Sta. 270+01	to	Sta. 270+01
285+81		284+58
305+40		305+21

15" Pipe

Sta. 282+91	to	Sta. 281+28
284+58		282+91
299+23		299+24
306+10		306+03
315+11		313+95

18" Pipe

Sta. 281+28 to Sta. 279+17

ITEM 143. CHANNEL EXCAVATION

Special Drainage Structure No. 1 Maple Meadow Brook

ITEM 146. DRAINAGE STRUCTURE REMOVED

211+05.0	Lt.	292+23.0	Rt.
213+69.0	Lt.	293+68.0	Lt.
217+92.0	Lt.	295+23.0	Rt.
221+78.0	Rt.	297+89.0	Lt.
223+15.0	Lt.	298+04.0	Rt.
224+45.0	Lt.	299+84.0	Rt.
233+98.0	Lt.(2)	302+61.0	Lt.
238+40.0	Lt.(2)	304+05.0	Rt.
247+76.0	Lt.	314+64.0	Rt.
249+69.0	Lt.	315+70.0	Rt.
249+69.0	Rt.	317+02.0	Rt.
271+24.0	Lt.	317+17.0	Lt.
287+31.0	Lt.	318+83.0	Lt.

ITEM 151.1 GRAVEL BORROW FOR BRIDGE FOUNDATION

Retaining Wall
MAPLE MEADOW BROOK BRIDGE

ITEM 151.2 GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES

Retaining Wall
MAPLE MEADOW BROOK BRIDGE
Culvert

ITEM 156. CRUSHED STONE

From Item: 201.:
201.7:
201.9:
202.:
202.2:
202.5:
204.

ITEM 201. **CATCH BASIN**

Sta. 209+83	LT	Sta. 316+56	RT
209+83	RT	317+29	RT
210+98	LT	317+29	RT
213+20	RT	212+32	RT
213+47	RT	211+02	RT
214+57	RT	214+57	LT
216+97	RT	212+45	LT
218+20	LT	213+20	LT
218+20	RT	213+69	LT
218+38	LT	216+96	LT
218+47	RT	224+46	LT
219+36	LT	238+04	LT
219+36	RT	237+98	RT
221+32	RT	235+83	RT
227+01	LT	238+35	LT
226+92	RT	240+70	RT
238+33	RT	239+17	LT
235+78	LT	239+23	RT
233+57	LT	254+09	LT
233+62	RT	254+31	LT
240+70	LT	287+05	LT
254+11	RT	287+33	LT
249+57	RT	275+19	RT
245+72	LT	275+19	LT
245+85	RT	274+91	LT
254+31	RT	274+92	RT
256+58	RT	271+91	LT
258+42	RT	273+49	LT
261+09	RT	277+50	LT
263+60	RT	291+52	RT
252+39	RT	291+85	LT
277+50	RT	292+83	LT
269+12	RT	294+88	LT
271+93	RT	298+21	LT
273+49	RT	298+57	LT
292+89	RT	299+85	RT
294+86	RT	299+85	LT
296+74	RT	293+65	LT
298+21	RT	293+90	LT
298+57	RT	294+68	LT
301+68	RT	305+85	LT

ITEM 201. (Continued)

297+90	RT	307+67	LT
303+96	RT	301+79	RT
305+80	RT	309+39	LT
311+07	RT	311+15	LT
314+52	RT	313+38	RT
315+62	RT	296+73	LT
316+45	RT		

Overdepth CBs to be measured and paid based on a standard unit depth of 6.5'

ITEM 201.7 **CATCH BASIN- DOUBLE GRATE**

Sta. 314+27	LT
314+27	RT
312+17	LT
314+53	RT

ITEM 201.9 **CATCH BASIN (6.5 FOOT AND OVER)**

Sta. 231+22	RT	Sta. 287+31	RT
250+88	RT	268+89	RT
248+70	RT	281+24	LT
281+28	RT	279+23	RT
284+64	RT	294+87	LT
285+88	RT	314+06	RT
287+01	RT		

ITEM 202. **MANHOLE**

Sta. 212+44	LT	Sta. 254+20	LT
212+44	RT	254+21	RT
212+34	RT	254+21	LT
209+83	LT	277+47	LT
211+00	LT	285+87	LT
213+20	LT	287+02	LT
213+46	LT	287+31	LT
214+59	LT	272+11	LT
213+67	LT	271+84	LT
217+73	LT	271+84	RT
217+00	RT	273+52	LT
218+19	LT	269+92	RT
218+39	LT	291+85	RT
219+34	LT	292+89	RT
221+32	RT	294+86	RT
226+84	LT	296+73	RT
224+51	LT	298+21	RT
223+27	LT	298+57	RT
238+07	RT	299+85	RT
235+83	RT	301+72	RT
233+64	RT	293+83	LT
238+39	RT	297+93	RT
240+60	RT	305+85	RT
238+63	RT	306+10	RT
254+11	RT	307+68	RT
252+38	RT	311+15	LT
250+88	RT	312+17	LT
249+60	RT	314+52	LT
248+70	RT	315+02	LT
247+77	RT	315+60	LT
245+86	RT	318+57	LT
254+31	RT	318+52	LT
255+38	RT	259+89	RT
256+57	RT	313+63	RT
258+41	RT	313+89	RT
261+09	RT	318+77	LT
263+55	RT		

ITEM 202.2 **MANHOLE (9 TO 14 FOOT DEPTH)**

Sta. 225+97	RT	Sta. 279+22
269+11	LT	305+29
270+01	LT	
274+98	LT	
275+71	LT	
281+24	LT	
282+92	LT	
284+59	LT	
275+23	LT	
274+98	LT	
269+12	RT	
304+02	RT	
305+29	RT	
317+32	LT	
316+48	LT	
270+01	RT	
304+02	RT	
305+29	RT	
317+32	LT	
316+48	LT	

ITEM 202.5 **MANHOLE (5 FT DIAMETER)**

Sta. 238+29	RT	313+13	LT
239+24	RT	314+27	LT
294+11	RT		
304+05	RT		
318+90	LT		

ITEM 203.2 **CURB COVER AND FRAME**

Sta. 234+55	LT
Sta. 274+40	LT

ITEM 203.6 **OUTLET CONTROL STRUCTURE**

Sta. 270+89	RT
305+40	RT
313+80	RT

ITEM 204. GUTTER INLET

PROP. GI (7-24)	PROP. GI (5-05)
PROP. GI (5-50)	PROP. GI (4-12)
PROP. GI (5-22)	PROP. GI (4-08)
PROP. GI (5-20)	PROP. GI (3-23)
PROP. GI (5-17)	PROP. GI (3-19)
PROP. GI (5-14)	PROP. GI (3-17)
PROP. GI (5-08)	PROP. GI (2-23)
PROP. GI (0-01)	

ITEM 205.21 SUBSURFACE INFILTRATION SYSTEM NO. 1

Sta. 270+50

ITEM 205.22 SUBSURFACE INFILTRATION SYSTEM NO. 2

Sta. 314+50

ITEM 220. DRAINAGE STRUCTURE ADJUSTED

Sta. 203+96	RT.	Sta. 212+45	LT.
203+99	LT.	221+32	LT.
205+68	RT.	223+33	RT.
205+88	RT.	224+69	RT.
207+16	LT.	226+20	RT.
211+78	RT.	241+33	LT.
211+86	RT.	303+94	LT.
211+97	RT.	304+74	LT.
212+42	RT.	318+99	RT.

ITEM 220.3 DRAINAGE STRUCTURE CHANGE IN TYPE

Sta. 226+08	LT
247+76	LT
275+71	LT

ITEM 220.5 DRAINAGE STRUCTURE REMODELED

Sta. 207+19	LT
223+20	LT
224+75	RT
299+84.37	RT

ITEM 220.7**SANITARY STRUCTURE ADJUSTED**

Sta. 204+74	LT
224+10	RT
226+70	LT
229+57	LT
232+78	LT
235+64	LT
239+17	LT
242+06	RT
318+84	RT
318+88	LT

ITEM 220.8**SANITARY STRUCTURE REMODELED**

For Contingency

ITEM 227.4**MASONRY PLUG**

Sta. 211+09	Sta. 249+76
212+42	293+68
217+95	294+90
221+33	295+20
221+75	298+09
223+15	302+63
224+50	314+15
234+00	314+73
238+45	317+05
247+70	317+25
249+70	

ITEM 234.12**12 INCH DRAINAGE PIPE - OPTION**

Sta. 223+32.68	RT	to	Sta. 223+26.44	LT
226+19.83	RT		225+97.25	LT
263+54.51	RT		261+08.47	RT
269+10.91	LT		270+00.71	RT
226+84.18	LT		225+97.32	LT
216+97.41	RT		216+99.68	RT
226+92.11	RT		226+84.18	LT
285+85.93	LT		284+58.47	LT
287+01.16	LT		285+85.93	LT
291+84.53	LT		291+84.64	RT
291+84.64	RT		292+88.26	RT
292+88.26	RT		294+10.06	RT
292+82.67	LT		292+88.26	RT
249+60.09	RT		250+87.54	RT

ITEM 234.12 (Continued)

223+32.65	RT	223+26.51	LT
225+97.32	LT	225+55.81	LT
225+55.81	LT	224+50.85	LT
270+00.71	RT	269+90.10	RT
305+83.82	RT	306+09.60	RT
271+82.51	RT	272+10.20	LT
294+10.06	RT	294+85.59	RT
207+20.18	LT	207+17.38	LT
218+38.37	LT	218+39.42	LT
248+69.65	RT	249+60.09	RT
287+30.55	LT	287+01.16	LT
247+76.84	RT	248+69.65	RT
316+55.29	LT	316+47.38	LT
315+61.28	RT	315+59.24	LT
293+82.25	LT	294+10.06	RT
247+76.04	LT	247+76.84	RT
315+06.94	RT	315+10.27	RT
281+23.81	LT	281+23.69	LT
277+49.89	LT	277+47.43	LT
318+48.22	LT	318+52.09	LT
275+70.92	LT	275+71.25	LT
304+00.63	LT	304+02.29	RT
254+10.76	RT	254+20.67	RT
211+00.13	LT	212+44.37	LT
254+08.81	LT	254+20.43	LT
254+30.98	LT	254+20.43	LT
313+12.04	LT	314+26.16	LT
313+63.33	RT	313+89.15	RT

ITEM 234.15**15 INCH DRAINAGE PIPE - OPTION**

Sta. 225+97.25	LT	to	Sta. 225+55.75	LT
224+50.85	LT		223+26.44	LT
225+55.75	LT		224+50.85	LT
274+97.60	LT		275+22.64	LT
284+58.47	LT		282+91.31	LT
275+22.64	LT		275+70.48	LT
282+91.31	LT		281+22.92	LT
252+38.17	RT		252+38.00	LT
224+50.85	LT		223+26.51	LT
250+87.54	RT		252+38.17	RT
296+72.71	RT		297+91.95	RT
298+19.83	RT		298+56.19	RT
298+56.19	RT		299+84.29	RT
297+91.95	RT		298+19.83	RT

ITEM 234.18 18 INCH DRAINAGE PIPE - OPTION

Sta. 218+18.51	LT	to	Sta. 217+91.94	LT
281+22.92	LT		279+22.20	LT
279+22.20	LT		277+46.66	LT
314+51.58	LT		315+00.77	LT
216+99.68	RT		217+72.94	LT
223+26.51	LT		221+31.71	RT
221+31.71	RT		219+34.47	LT
219+34.47	LT		218+39.42	LT
218+39.42	LT		218+18.51	LT
217+72.94	LT		217+83.02	LT
299+84.29	RT		301+71.50	RT
314+26.16	LT		314+51.58	LT
214+58.54	LT		216+99.68	RT
254+20.67	RT		254+20.43	LT

ITEM 234.24 24 INCH DRAINAGE PIPE - OPTION

Sta. 275+70.48	LT	to	Sta. 275+68.35	RT
315+00.77	LT		315+59.24	LT
316+47.38	LT		317+31.19	LT
304+01.52	RT		304+04.15	RT
315+10.27	RT		315+01.54	LT
317+31.96	LT		318+90.39	LT

ITEM 235.15 15 INCH DRAINAGE PIPE FLARED END - OPTION

Sta. 238+16 LT
 305+94 RT

ITEM 238.12 12 INCH DUCTILE IRON PIPE

Sta. 285+90.76	to	285+87.37	Sta. 301+66.80	to	301+71.50
309+38.14		311+13.79	298+20.00		298+19.83

ITEM 238.12 (Continued)

311+13.99	311+13.79	299+84.25	299+84.29
311+06.46	311+13.79	301+66.80	301+71.50
275+18.62	275+22.64	305+78.81	305+83.82
226+18.60	226+07.95	233+62.39	233+64.32
281+27.72	281+27.70	235+83.09	235+83.23
284+68.21	284+63.57	301+78.64	301+71.50
287+33.89	287+29.93	314+52.35	314+51.58
281+30.16	281+23.81	233+56.71	233+64.32
303+95.18	304+04.15	235+78.19	235+83.23
209+83.32	209+83.26	238+04.24	238+07.09
214+57.13	214+58.54	274+90.43	274+97.60
213+19.87	213+19.88	218+19.91	218+18.51
211+02.37	211+00.13	214+56.66	214+58.54
210+98.14	211+00.13	239+17.25	239+24.07
218+19.93	218+18.51	239+22.92	239+24.07
219+36.35	219+34.47	252+38.95	252+38.17
219+36.26	219+34.47	299+84.30	299+84.29
221+32.46	221+31.71	293+64.19	293+82.25
221+32.42	221+31.71	293+89.17	293+82.25
223+20.17	223+26.51	294+66.85	294+86.33
224+45.81	224+50.85	313+38.27	314+05.58
227+00.90	226+84.18	238+33.11	238+28.57
245+71.83	245+86.46	256+57.67	256+57.15
245+84.62	245+86.46	209+83.19	209+83.26
254+11.04	254+10.76	294+87.00	294+86.33
254+30.81	254+30.57	248+63.57	248+69.94
296+72.85	296+72.71	287+03.81	287+00.12
294+84.90	294+85.59	216+95.59	216+99.68
291+51.24	291+84.64	238+34.75	238+38.58
312+16.98	312+16.68	296+72.44	296+72.71
314+26.06	314+26.16	213+20.17	213+19.88
314+51.25	314+51.58	213+46.92	213+46.38
212+32.11	212+33.70	249+56.72	249+60.09
231+21.98	231+21.98	237+97.82	238+07.09
231+22.00	231+21.98	250+79.96	250+87.50
247+77.40	247+76.84	314+00.31	314+04.81
298+20.00	298+19.83	279+27.56	279+22.89
299+84.25	299+84.29		

ITEM 241.36 36 INCH REINFORCED CONCRETE PIPE CLASS III

Sta. 238+47.90 to 238+47.90

ITEM 244.12 12 INCH REINFORCED CONCRETE PIPE CLASS V

Sta. 305+28.59 to	304+04.15	287+03.75 to	287+01.16
305+39.60	305+28.59	287+31.80	287+30.55
209+83.26	211+00.13	294+86.33	294+85.59
213+68.60	213+66.78	212+33.70	212+43.79
218+46.95	218+39.42	270+89.26	271+82.51
233+64.32	235+83.23	240+69.72	240+60.33
235+83.23	238+07.09	248+69.94	248+69.65
240+60.33	239+24.07	275+18.58	275+22.64
245+86.46	247+76.84	274+91.22	274+97.60
261+08.47	259+88.33	287+29.93	287+30.55
258+42.06	258+41.19	273+47.95	273+51.06
271+91.81	271+83.09	273+48.37	273+51.06
277+48.86	277+46.66	297+89.35	297+91.95
307+66.95	306+09.60	271+83.09	270+00.71
305+83.82	305+83.82	238+62.93	238+62.78
298+56.19	298+56.19	317+27.98	317+31.19
298+19.73	298+19.83	314+04.81	314+26.16
292+88.61	292+88.26	313+12.81	313+63.33
311+13.79	312+16.68	226+07.95	225+97.32
312+16.68	313+12.04	279+22.89	279+22.97
212+44.94	212+44.37	307+66.26	307+66.95
231+21.98	233+64.32	239+24.07	238+62.93
259+88.33	258+41.19	287+00.12	287+01.16
298+56.19	298+56.19	240+70.21	240+60.33
281+27.70	281+22.92	318+52.09	318+74.39
284+63.57	284+58.47		
285+87.37	285+85.93	Breed Avenue - (2) 12"	
314+25.94	314+26.16		
271+90.55	271+83.09		

ITEM 244.15 15 INCH REINFORCED CONCRETE PIPE CLASS V

Sta. 306+09.60 to	305+92.90
212+43.79	212+44.37
258+41.19	256+57.15
212+41.96	212+43.79
238+38.58	238+28.57
238+07.09	238+28.57
256+57.15	255+37.54
294+85.59	296+72.71
255+37.54	254+30.57
238+28.57	238+16.47
212+44.37	213+19.88
213+19.88	213+46.38

ITEM 244.18 18 INCH REINFORCED CONCRETE PIPE CLASS V

Sta. 301+71.50	to	304+01.52
254+20.43		254+21.11
254+30.57		254+20.67
254+21.11		253+91.64
277+46.66		275+70.48

ITEM 244.24 24 INCH REINFORCED CONCRETE PIPE CLASS V

Sta. 304+04.15	to	304+47.55

ITEM 258. STONE FOR PIPE ENDS

Sta. 238+18	LT
275+72	RT
238+63	RT
252+38	LT
304+48	RT
Breed Ave	
Breed Ave	
238+48	
217+86	LT
217+87	RT

ITEM 302.12 12 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET)

Sta. 205+47	RT.	to	Sta. 259+21	RT.
270+70	RT.		293+98	RT.
241+85	LT.		241+92	LT.
242+54	RT.		242+54	LT.
306+25	RT.		306+22	RT.

ITEM 303.06 6 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT)

Sta. 205+94	LT.	to	Sta. 206+08	LT.
217+10	LT.		217+17	LT.
220+35	LT.		220+36	LT.
223+83	LT.		223+84	LT.
229+97	RT.		229+97	RT.
233+86	RT.		233+86	RT.
235+11	RT.		235+11	RT.
250+58	RT.		250+58	RT.
274+75	RT.		274+75	RT.
280+95	RT.		280+95	RT.
287+16	RT.		287+16	RT.

ITEM 303.08 8 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT)

Sta. 205+95	LT.	to	Sta. 206+02	RT.
205+73	RT.		205+80	LT.
206+60	RT.		206+67	RT.
209+63	LT.		209+68	RT.
217+14	LT.		217+22	RT.
221+84	LT.		222+06	LT.
226+67	LT.		226+67	LT.

ITEM 303.10 10 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT)

Sta. 305+00	RT.	to	Sta. 306+28	RT.
228+36	LT.		228+08	RT.

ITEM 303.12 12 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET)

Sta. 253+43	RT.	to	Sta. 254+16	RT.
12"x6" tee				
12"x8" tee				
12"x10" tee				
12"x12" tee				
12" 11.25 bend				
12" 22.5 bend				
12" 45 horiz. bend				
12" 45 vert. bend				

ITEM 350.06 6 INCH GATE AND GATE BOX

Sta. 206+06	LT
217+12	LT
220+36	LT
223+84	LT
229+97	RT
233+86	RT
235+11	RT
250+58	RT
274+75	RT
280+95	RT
287+16	RT

ITEM 350.08**8 INCH GATE AND GATE BOX**

Sta. 206+03	RT
206+67	RT
209+68	RT
217+21	LT
222+05	LT
226+66	LT

ITEM 350.10**10 INCH GATE AND GATE BOX**

Sta. 228+35	LT

ITEM 350.12**12 INCH GATE AND GATE BOX**

Sta. 205+55	LT
205+77	RT
206+09	RT
209+63	RT
209+73	RT
217+17	RT
217+26	RT
222+01	LT
222+10	LT
226+62	LT
228+02	RT
228+13	RT
241+86	LT
241+92	LT
242+54	LT
242+60	LT
293+82	RT

ITEM 353.1**GATE BOX REMOVED AND DISPOSED**

Sta. 205+73	LT	Sta. 223+79	LT
205+89	LT	224+96	LT
205+95	LT	225+25	RT
206+17	LT	228+27	LT
206+65	LT	229+82	RT
207+16	LT	235+04	RT
209+61	LT	241+94	RT
217+11	LT	275+27	RT
217+15	LT	281+08	RT
217+18	LT	287+08	RT
220+29	LT		

ITEM 358. GATE BOX ADJUSTED

Sta. 209+63	LT	Sta. 275+27	RT
226+67	LT	293+80	LT
226+67	LT	294+02	RT (2)
229+82	RT	294+17	RT (2)
242+54	RT (2)	303+45	RT (2)
242+52	RT (2)	304+40	LT
259+46	LT	318+96	LT
259+48	LT	319+06	LT (2)
270+35	RT	319+18	LT
270+65	RT		

ITEM 367.08 8 INCH CAST IRON PLUG

Sta. 205+72
209+62
217+15
221+83

ITEM 367.10 10 INCH CAST IRON PLUG

Sta. 226+59
226+64
228+31
270+72

ITEM 367.12 12 INCH CAST IRON PLUG

Sta. 205+62
205+93
206+13
241+94
259+18
270+72

ITEM 371.08 8 INCH COUPLING

Sta. 205+76	RT
205+86	LT
206+60	RT
209+63	LT
217+15	LT
221+84	LT
226+62	LT

ITEM 371.10 **10 INCH COUPLING**

Sta. 228+51 LT
305+00 RT

ITEM 371.12 **12 INCH COUPLING**

Sta. 205+47 LT
241+81 LT
242+54 RT
259+21 RT
270+70 RT
293+94 RT
306+28 RT

ITEM 373.12 **12 INCH WATER PIPE INSULATION**

Sta. 251+05 to Sta. 251+35

ITEM 374. **ALUMINUM JACKET AND PIPE INSULATION FOR EXPOSED PIPE**

Sta. 253+43 to Sta. 254+16

ITEM 374.24 **24 INCH DUCTILE IRON PIPE CASING FOR WATER PIPE**

Sta. 217+81 to Sta. 217+93
275+62 275+79

ITEM 375.08 **8 INCH INSERTION VALVE AND BOX**

Sta. 205+64 LT

ITEM 375.12 **12 INCH INSERTION VALVE AND BOX**

Sta. 204+98 LT
241+39 LT

ITEM 376**HYDRANT**

Sta. 206+09	LT
217+09	LT
220+35	LT
223+84	LT
229+97	RT
233+86	RT
235+11	RT
250+58	RT
274+75	RT
280+95	RT
287+16	RT

ITEM 377**HYDRANT REMOVED AND DISPOSED**

Sta. 206+16	LT
217+08	LT
220+29	LT
223+79	LT
230+03	RT
233+81	RT
235+04	RT
250+51	RT
275+27	RT
281+12	RT
287+08	RT

ITEM 381.3**SERVICE BOX ADJUSTED**

Sta. 207+58	LT
208+27	LT
210+53	LT
214+65	LT
217+49	LT
218+84	LT
226+02	RT
227+53	RT
229+82	RT
233+17	RT
237+01	RT
243+02	RT

ITEM 381.3 (Continued)

247+15	RT
253+19	RT
283+19	RT
283+55	RT
283+80	RT
286+06	RT
288+37	RT
289+31	RT
301+65	RT

ITEM 470.3 **HOT MIX ASPHALT BERM, TYPE A - MODIFIED**

Sta. 228+94	to	Sta. 228+96	LT
229+41		229+45	LT
232+65		232+71	LT
233+01		233+03	LT
233+73		233+74	LT
234+04		234+05	LT
235+96		236+03	LT
236+26		236+28	LT
269+51		269+77	LT
270+02		272+25	LT
272+53		277+71	LT
278+47		279+00	LT
290+50		292+86	LT
293+55		295+55	LT
295+82		296+16	LT
296+55		300+22	LT
300+61		301+84	LT
302+18		303+79	LT
304+84		306+65	LT
309+40		314+36	LT

ITEM 477.2 **MILLED RUMBLE STRIP (TYPE C)**

Sta. 235+70	to	Sta. 306+00

ITEM 482.5**SAWCUTTING ASPHALT PAVEMENT FOR BOX WIDENING**

Sta. 203+55	to	Sta. 205+70	RT
206+06		207+00	LT
295+00		299+25	LT
297+55		303+60	RT
304+80		318+72	LT
319+00		319+20	LT
223+35		226+48	LT
228+54		229+85	LT
226+80		227+55	LT
304+80		312+20	RT

ITEM 506.**GRANITE CURB TYPE VB - STRAIGHT**

Sta. 203+55	to	203+75	RT	Sta. 299+05	to	299+37	RT
204+26		205+45	RT	299+80		300+36	RT
205+94		205+98	RT	300+75		301+33	RT
206+96		211+32	RT	301+76		304+82	RT
211+67		218+75	RT	306+23		306+23	RT
219+21		220+02	RT	306+04		306+02	RT
219+21		220+02	RT	306+28		306+26	RT
220+97		221+43	RT	306+40		306+41	RT
220+97		221+38	RT	306+83		311+12	RT
221+38		221+38	RT	311+66		311+91	RT
221+92		222+75	RT	311+66		311+91	RT
223+29		223+55	RT	312+45		313+45	RT
226+31		226+38	RT	312+45		313+45	RT
226+31		226+38	RT	314+74		314+74	RT
229+15		229+39	RT	314+48		314+61	RT
229+15		229+39	RT	315+47		318+07	RT
229+83		231+95	RT	318+51		319+20	RT
232+36		232+43	RT	205+02		205+16	LT
232+70		232+90	RT	205+29		205+31	LT
233+35		234+42	RT	206+54		207+69	LT
234+76		235+14	RT	208+22		208+35	LT
235+59		236+37	RT	208+73		209+19	LT
236+82		240+75	RT	209+81		211+02	LT
241+45		241+67	RT	210+60		211+06	LT

ITEM 506. (Continued)

242+38	243+03	RT	211+40	212+49	LT
243+39	243+81	RT	212+94	213+13	LT
244+13	244+19	RT	213+68	213+81	LT
244+54	246+01	RT	213+68	213+81	LT
246+51	247+13	RT	214+35	214+78	LT
247+72	247+80	RT	214+35	214+79	LT
247+66	247+66	RT	215+23	215+70	LT
247+66	247+84	RT	215+23	215+70	LT
248+18	248+88	RT	216+15	217+00	LT
249+30	249+79	RT	217+63	218+41	LT
249+48	249+79	RT	218+80	218+90	LT
250+43	250+75	RT	219+27	219+52	LT
250+43	251+57	RT	219+82	220+43	LT
252+02	252+92	RT	221+08	221+84	LT
253+37	260+04	RT	222+28	224+03	LT
270+90	281+60	RT	224+47	225+40	LT
281+91	281+99	RT	225+84	226+42	LT
282+33	282+64	RT	226+54	226+55	LT
282+96	283+50	RT	226+99	227+48	LT
283+82	284+12	RT	228+73	228+90	LT
284+51	284+86	RT	228+72	228+90	LT
285+20	285+90	RT	229+49	230+24	LT
286+28	287+38	RT	230+68	232+63	LT
287+69	287+75	RT	233+07	233+66	LT
288+11	288+47	RT	240+77	241+08	LT
288+89	289+24	RT	241+02	241+07	LT
289+66	289+87	RT	241+07	241+05	LT
290+29	291+51	RT	241+33	241+66	LT
291+94	292+41	RT	242+40	244+64	LT
292+84	293+29	RT	245+18	247+91	LT
293+72	293+99	RT	314+50	315+73	LT
294+54	295+53	RT	316+37	317+69	LT
294+54	294+77	RT	318+02	318+55	LT
295+95	296+07	RT	319+15	319+20	LT
296+49	297+26	RT	293+36	293+45	LT
297+64	298+60	RT			

ITEM 506.1**GRANITE CURB TYPE VB - CURVED**

Sta. 203+74	to	203+81	RT	Sta. 313+99	to	314+34	RT
204+10		204+19	RT	314+26		314+29	RT
205+60		205+94	RT	205+36		205+39	LT
206+86		206+96	RT	206+05		206+33	LT
241+01		241+18	RT	226+55		226+55	LT
241+37		241+45	RT	226+89		226+99	LT
241+92		241+88	RT	227+63		227+68	LT
242+03		242+18	RT	227+82		227+86	LT
252+02		252+92	RT	228+57		228+72	LT
70+21		70+50	RT	228+62		228+73	LT
70+59		70+66	RT	241+03		241+12	LT
70+68		70+71	RT	241+18		241+08	LT
70+87		70+95	RT	241+01		241+02	LT
70+50		71+05	LT	241+66		241+70	LT
70+21		70+50	LT	241+84		242+19	LT
313+59		313+65	RT	293+45		293+62	LT
313+99		314+07	RT	314+80		314+81	RT

ITEM 509.**GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS
- STRAIGHT**

Sta. 204+19	to	204+26	RT	Sta. 289+24	to	289+32	RT
205+45		205+51	RT	289+60		289+66	RT
205+56		205+60	RT	289+87		289+95	RT
219+15		219+21	RT	290+23		290+29	RT
220+02		220+10	RT	291+51		291+60	RT
220+90		220+97	RT	291+88		291+94	RT
227+56		227+62	RT	292+41		292+50	RT
227+67		227+75	RT	292+78		292+84	RT
227+56		227+62	RT	293+29		293+38	RT
227+67		227+75	RT	293+66		293+72	RT
229+39		229+47	RT	293+99		294+08	RT
232+33		232+36	RT	294+47		294+54	RT
232+43		232+47	RT	294+47		294+54	RT
240+75		240+81	RT	295+53		295+62	RT
240+86		240+91	RT	295+88		295+95	RT
242+18		242+25	RT	296+07		296+16	RT
242+30		242+38	RT	296+42		296+49	RT
243+03		243+11	RT	297+26		297+34	RT
243+33		243+39	RT	297+58		297+64	RT
243+81		243+92	RT	298+60		298+67	RT
244+10		244+13	RT	298+97		299+05	RT

ITEM 509. (Continued)

244+19	244+24	RT	299+37	299+44	RT
244+48	244+54	RT	299+72	299+80	RT
246+01	246+15	RT	300+36	300+43	RT
246+45	246+51	RT	300+67	300+75	RT
247+13	247+24	RT	301+33	301+40	RT
247+66	247+73	RT	301+68	301+76	RT
247+80	247+88	RT	311+12	311+13	RT
248+12	248+18	RT	311+91	311+92	RT
248+88	248+96	RT	311+91	312+00	RT
249+24	249+30	RT	312+38	312+45	RT
249+79	249+87	RT	313+45	313+54	RT
249+79	249+87	RT	314+29	314+36	RT
250+37	250+43	RT	314+41	314+48	RT
250+37	250+43	RT	318+07	318+13	RT
251+17	251+25	RT	318+43	318+51	RT
251+45	251+52	RT	205+16	205+21	LT
251+57	251+65	RT	205+31	205+35	LT
251+95	252+02	RT	205+89	205+92	LT
251+95	252+02	RT	205+96	206+05	LT
252+92	253+00	RT	206+47	206+54	LT
252+92	253+00	RT	207+69	207+76	LT
253+31	253+37	RT	208+35	208+44	LT
260+55	260+66	RT	209+19	209+24	LT
270+37	270+39	RT	213+13	213+21	LT
270+84	270+90	RT	213+61	213+68	LT
281+60	281+67	RT	213+81	213+88	LT
281+84	281+91	RT	214+28	214+35	LT
281+99	282+06	RT	214+79	214+85	LT
282+26	282+33	RT	215+15	215+23	LT
282+64	282+70	RT	215+70	215+78	LT
282+88	282+96	RT	226+42	226+45	LT
283+50	283+58	RT	226+53	226+54	LT
283+76	283+82	RT	226+78	226+80	LT
284+12	284+20	RT	227+48	227+54	LT
284+44	284+51	RT	228+90	228+96	LT
284+86	284+94	RT	240+75	240+81	LT
285+14	285+20	RT	241+02	241+07	LT
285+90	285+98	RT	241+27	241+33	LT
286+22	286+28	RT	242+31	242+40	LT
287+38	287+44	RT	244+64	244+67	LT
287+62	287+69	RT	247+91	247+99	LT
287+75	287+81	RT	314+30	314+36	LT
288+03	288+11	RT	314+41	314+50	LT
288+47	288+53	RT	317+69	317+75	LT
288+81	288+89	RT	317+95	318+02	LT

**ITEM 509.1 GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS -
CURVED**

Sta. 203+75	to	203+81	RT	Sta. 212+50	to	212+57	LT
204+11		204+19	RT	212+87		212+94	LT
205+60		205+73	RT	213+13		213+21	LT
206+64		206+74	RT	213+61		213+68	LT
206+79		206+86	RT	213+81		213+88	LT
211+32		211+40	RT	214+28		214+35	LT
211+60		211+67	RT	214+78		214+85	LT
218+75		218+82	RT	215+15		215+23	LT
219+15		219+21	RT	215+71		215+78	LT
220+02		220+10	RT	216+08		216+15	LT
220+90		220+97	RT	217+00		217+08	LT
221+43		221+50	RT	217+12		217+16	LT
221+84		221+92	RT	217+42		217+48	LT
222+75		222+82	RT	217+54		217+61	LT
223+22		223+29	RT	218+41		218+48	LT
229+39		229+47	RT	218+72		218+80	LT
229+77		229+83	RT	218+90		218+97	LT
231+95		232+03	RT	219+19		219+27	LT
232+63		232+70	RT	219+52		219+58	LT
232+91		232+98	RT	219+74		219+82	LT
233+28		233+35	RT	220+43		220+50	LT
234+42		234+49	RT	221+01		221+08	LT
234+69		234+76	RT	221+84		221+90	LT
235+14		235+22	RT	222+20		222+28	LT
235+52		235+59	RT	224+03		224+09	LT
236+37		236+45	RT	224+39		224+47	LT
236+75		236+82	RT	225+40		225+47	LT
237+27		237+35	RT	225+76		225+84	LT
240+91		241+01	RT	226+45		226+56	LT
241+18		241+25	RT	226+56		226+56	LT
241+29		241+37	RT	226+48		226+49	LT
241+88		241+92	RT	226+82		226+89	LT
241+95		242+03	RT	227+59		227+63	LT
260+04		260+11	RT	227+68		227+71	LT
270+39		270+46	RT	227+76		227+82	LT
305+94		306+01	RT	228+89		228+96	LT
306+72		306+83	RT	229+41		229+49	LT
311+13		311+20	RT	230+24		230+32	LT
311+60		311+66	RT	230+62		230+68	LT
311+92		311+99	RT	232+63		232+71	LT
312+39		312+45	RT	233+01		233+07	LT
313+45		313+54	RT	233+66		233+74	LT

ITEM 509.1 (Continued)

314+14	314+22	RT	234+04	234+11	LT
314+61	314+68	RT	235+89	235+97	LT
315+39	315+47	RT	236+27	236+34	LT
205+21	205+25	LT	238+84	238+90	LT
205+32	205+36	LT	239+08	239+16	LT
205+39	205+38	LT	240+87	241+03	LT
206+33	206+42	LT	241+12	241+16	LT
207+76	207+84	LT	241+70	241+74	LT
208+16	208+22	LT	241+77	241+84	LT
208+44	208+50	LT	242+19	242+26	LT
208+66	208+73	LT	244+67	244+75	LT
209+24	209+35	LT	245+11	245+18	LT
209+39	209+43	LT	315+73	315+82	LT
209+67	209+69	LT	316+29	316+36	LT
209+73	209+81	LT	318+55	318+62	LT
211+02	211+10	LT	319+05	319+15	LT
211+06	211+10	LT	237+27	237+35	RT
211+34	211+40	LT			

ITEM 514. GRANITE CURB INLET - STRAIGHT

Sta. 209+83	24.5	LT	Sta. 249+56	15.8	RT
210+98	17.2	LT	235+76	14.6	LT
214+57	14.7	LT	233+55	14.3	LT
216+97	21.7	RT	271+93	14.7	RT
218+20	16.0	RT	273+49	14.4	RT
218+20	15.2	LT	277+50	14.9	RT
218+38	14.6	LT	233+60	15.2	RT
218+47	15.1	RT	292+89	14.7	RT
219+36	15.0	LT	294+86	14.8	RT
219+36	15.0	RT	296+74	14.9	RT
221+32	15.0	RT	297+90	15.0	LT
214+56	23.0	RT	298+21	15.0	RT
227+01	20.7	LT	298+57	15.1	RT
238+33	15.1	RT	301+68	14.9	LT
240+70	19.6	RT	303+96	15.0	RT
245+72	14.8	LT	305+80	14.8	RT
245+85	14.7	RT	311+07	14.8	RT
252+39	14.9	RT	314+52	15.1	LT
254+02	14.8	RT	315+53	14.8	RT
254+31	14.7	RT	316+56	15.0	RT
256+58	14.7	RT	316+56	14.7	LT
258+42	14.7	RT	317+29	14.8	RT
213+20	23.0	RT	212+32	23.3	RT
213+46	23.0	RT	209+83	23.3	RT

ITEM 580.**CURB REMOVED AND RESET**

Sta. 203+55	to	205+40	RT	Sta. 222+34	to	224+05	LT
205+02		205+31	LT	223+21		223+50	RT
206+54		207+89	LT	224+36		225+48	LT
208+22		208+48	LT	225+76		226+17	LT
208+63		208+94	LT	226+34		226+51	LT
209+19		209+42	LT	226+54		226+55	LT
209+66		211+08	LT	226+78		226+82	LT
211+36		212+55	LT	226+85		227+56	LT
212+99		213+19	LT	227+60		227+70	LT
213+63		213+86	LT	227+75		227+87	LT
214+40		214+48	LT	228+59		228+93	LT
214+86		215+10	LT	313+93		314+41	RT
215+65		215+74	LT	313+93		314+43	RT
216+10		217+11	LT	315+80		316+65	RT
217+59		218+46	LT	316+84		318+12	RT
218+75		218+95	LT	318+42		319+20	RT
219+24		219+56	LT	55+90		56+30	RT
219+76		220+41	LT	56+50		57+24	RT
221+92		222+74	RT	55+90		57+36	LT
220+53		220+60	LT	221+51		221+56	RT
220+90		220+98	LT	221+78		221+84	RT
222+82		222+90	RT	260+66		261+38	RT
223+15		223+18	RT	269+51		270+33	RT
221+04		221+88	LT				

ITEM 594.**CURB REMOVED AND DISCARDED**

Sta. 313+91	to	313+92	RT	Sta. 222+82	to	222+90	RT
313+92		314+16	RT	223+15		223+18	RT
314+16		314+41	RT	205+23		205+36	LT
314+43		314+44	RT	206+06.2		206+50.8	LT
313+93		314+02	RT	205+53.0		205+93.0	RT
220+76		220+95	LT	206+64.1		206+80.6	RT
220+53		220+60	LT	226+40.9		226+55.5	LT
220+90		220+98	LT	226+82.0		227+00.6	LT
221+51		221+56	RT	227+59.1		227+87.2	LT
221+78		221+84	RT	228+59.9		228+78.2	LT

ITEM 596.**CURB CORNER REMOVED AND DISCARDED**

<u>Start</u>	<u>End</u>
Church St.	Lowell St.
Lowell St.	Cross.
Cross St.	Eames St.
Eames St.	Old Main
St. (South) Old Main St. (South)	Breed Ave.

ITEM 620.12**GUARDRAIL TL-2 (SINGLE FACED)**

Sta. 205+63	to	Sta. 205+92	RT
206+12		206+21	LT
206+84		209+09	RT
236+36		238+83	LT
239+16		240+69	LT
241+39		56+57	- Butters Row
248+24		253+53	LT
253+24		253+58	RT
254+23		255+50	LT
260+14		261+38	LT
274+80		276+14	RT
316+37		317+79	LT

ITEM 620.131**GUARDRAIL DEEP POST (SINGLE FACED)**

Sta. 217+77	to	Sta. 217+96	LT & RT
237+26		240+91	RT
253+99		257+92	RT
260+78		261+38	RT

ITEM 620.32**GUARDRAIL - CURVED, TL-2 (SINGLE FACED)**

Sta. 240+91	to	Sta. 241+39	RT

ITEM 627.1**TRAILING ANCHORAGE**

Sta. 206+11	to	Sta. 206+12	LT
206+21		206+22	LT
206+34		206+35	LT
209+00		209+09	RT
217+57		217+68	LT
218+25		218+34	RT

ITEM 627.1 (Continued)

218+46	218+47	LT
236+36	236+45	LT
239+16	239+25	LT
240+86	240+95	LT
248+24	248+33	LT
257+83	257+92	RT
260+14	260+23	LT
276+05	276+14	RT
316+37	316+48	LT

ITEM 627.82 GUARDRAIL TANGENT END TREATMENT, TL-2

Sta. 216+75	RT
218+22	LT
237+62	RT
238+83	LT
240+69	LT
255+50	LT
274+80	RT
317+67	LT

ITEM 628.21 TRANSITION TO NCHRP 350 GUARDRAIL

Sta. 206+84	RT	to	Sta. 207+18	RT

ITEM 628.24 TRANSITION TO BRIDGE RAIL

Sta. 253+20	LT	to	Sta. 253+53	LT
253+90	LT		254+23	LT
253+99	RT		254+34	RT

ITEM 628.312 PERMANENT IMPACT ATTENUATOR, REDIRECTIVE, TL-2

End Sta. 253+58	RT
End Sta. 309+61	RT

ITEM 630. HIGHWAY GUARD REMOVED AND RESET

Sta. 205+65	RT	to	Sta. 205+85	RT
55+90	LT		57+36	LT
55+90	RT		56+09	RT
260+37	LT		261+38	LT
260+69	RT		261+38	RT

ITEM 630.2**HIGHWAY GUARD REMOVED AND DISCARDED**

Sta. 206+17.79	LT	to	Sta. 206+66.02	LT
206+83.70	RT		209+87.62	RT
217+48.46	LT		218+35.72	LT
217+53.22	RT		218+02.54	RT
236+35.61	LT		238+40.43	LT
236+90.08	RT		242+02.03	RT
239+16.16	LT		241+84.55	LT
249+47.43	LT		254+07.74	LT
253+31.44	RT		257+41.22	RT
254+26.25	LT		254+87.97	LT
260+15.99	LT		263+10	LT
260+71.74	RT		263+10	RT
275+45.00	RT		276+07.00	RT
316+32.10	LT		317+78.76	LT
317+97.4	LT		318+52.62	LT
57+36	LT		57+88	LT

ITEM 634.1**THREE BEAM GUARD PANEL**

Sta. 253+58 RT

ITEM 644.196**96 INCH CHAIN LINK FENCE (SPRING TENSION WIRE) VINYL COATED (LINE POST OPTION)**

Sta. 210+58 to Sta. 218+35

ITEM 650.096**96 INCH CHAIN LINK GATE WITH GATE POSTS**

Sta. 211+40 to Sta. 211+60

ITEM 657.**TEMPORARY FENCE**

Sta. 206+98	to	Sta. 212+26
216+32		218+24

ITEM 666.**CHAIN LINK FENCE REMOVED AND RESET**

Sta. 41+47	to	Sta. 41+49	RT
260+00		263+10	LT

ITEM 669. **FENCE REMOVED AND STACKED**

Sta. 287+75	to	Sta. 288+90
285+20		285+97
286+22		286+72
241+58		241+99

ITEM 693. **REMOVE AND STACK BALANCE STONE WALL**

Sta. 282+27	RT	to	Sta. 282+58	RT
282+61	RT		282+70	RT
283+20	RT		283+56	RT
316+44	LT		317+15	LT

ITEM 706.1 **BRICK WALK REMOVED AND RELAID**

Sta. 216+20
243+60

ITEM 706.7 **POROUS STONE PAVING**

Sta. 223+77 RT
224+06 RT

ITEM 711. **BOUND REMOVED AND RESET**

Sta. 206+15 LT
206+50 LT
216+75 LT
280+10 RT
285+19 RT

ITEM 715. **RURAL MAIL BOX REMOVED AND RESET**

Sta. 244+50	RT	Sta. 287+82	RT
246+18	RT	289+22	RT
247+14	RT	290+34	RT
248+11	RT	292+82	RT
248+96	RT	295+92	RT
282+03	RT	297+24	RT
283+49	RT	298+63	RT
284+01	RT	299+77	RT
284+05	RT	300+40	RT
284+79	RT	301+71	RT
286+21	RT	318+24	LT
287+37	RT		

ITEM 720. REMOVE AND RESET BOULDER

Sta. 60+00	to	Sta. 61+25	RT
60+44		60+84	RT
242+36		244+69	LT
245+25		246+80	LT
247+00		248+29	LT
270+91		272+40	RT
290+00		294+00	RT
290+54		292+16	LT
293+37		293+72	LT

ITEM 751.1 LOAM FOR LAWNS

Sta. 217+55	to	Sta. 218+35	RT
313+95		314+84	RT
Wetland Replication			
Compensatory Flood			
Infiltration Area			

ITEM 751.7 COMPOST BLANKET

Sta. 236+28	to	Sta. 238+90	LT
239+08		240+17	LT
237+24		241+04	RT
248+17		253+45	LT
253+99		256+12	LT
217+55		218+35	RT
Wetland Replication			
Compensatory Flood			
Area Infiltration			
Area			

ITEM 765.21 ANNUAL COVER CROP FOR NATIVE SEEDING

Sta. 236+28	to	Sta. 238+90	LT
239+08		240+17	LT
237+20		241+04	RT

ITEM 765.411

SHORT GRASSLAND SEED MIX

Sta. 217+55 to Sta. 218+35 RT
Wetland Replication
Infiltration Area

ITEM 765.451

PART SHADE ROADSIDE SEED MIX

Sta. 236+28	to	Sta. 238+90	LT
239+08		240+17	LT
237+20		241+04	RT
248+17		253+45	LT
253+99		256+12	LT
Compensatory Flood Area			

ITEM 765.554

WETLAND SEED - SEASONALLY FLOODED MIX

Compensatory Flood Infiltration Area

ITEM 765.635

NATIVE SEEDING AND ESTABLISHMENT

Sta. 217+55	to	Sta. 218+35	RT
236+28		238+90	LT
239+08		240+17	LT
237+24		241+04	RT
248+17		253+45	LT
253+99		256+12	LT
Upland at Wet. Rep.			
Compensatory Area			
Infiltration Area			

ITEM 767.121**SEDIMENT CONTROL BARRIER**

Sta. 207+56	RT	to	Sta. 208+48	
211+04	RT		211+40	
211+60	RT		216+47	
216+51	LT		217+14	
216+67	RT		218+88	
217+44	LT		217+89	
217+97	LT		218+47	
235+39	LT		236+01	
236+29	LT		238+89	
237+21	LT		55+69	(BR)
239+08	LT		41+11	(C)
247+50	LT		248+01	
248+06	RT		249+03	
248+15	LT		253+56	
249+20	RT		249+48	
250+76	RT		251+64	
253+28	RT		253+61	
253+79	LT		256+12	
254+22	RT		257+38	
257+55	LT		259+46	
259+16	RT		260+25	
260+00	LT		261+39	
260+54	RT		261+39	
301+36	LT		301+84	
301+70	RT		304+90	
302+21	LT		303+79	
(OM) 71+18	LT		306+86	
Wetland Replication				
Infiltration Area				

ITEM 775.141**LINDEN - AMERICAN - REDMOND 2-2.5 INCH CALIPER**

Sta. 231+51
232+70
244+95

ITEM 776.524**MAPLE - RED- ARMSTRONG 2-2.5 INCH CALIPER**

Sta. 248+24
248+52
248+87

ITEM 776.543 **MAPLE - RED - 'OCTOBER GLORY' 2-2.5 INCH CALIPER**

Sta. 235+29
299+93
300+35
BMP3

ITEM 777.136 **OAK - PIN 1-1.5 INCH CALIPER**

BMP3

ITEM 777.231 **OAK - SCARLET 1-1.5 INCH CALIPER**

Upland at Wetland Replication

ITEM 777.242 **OAK - SCARLET 2-2.5 INCH CALIPER**

Sta. 306+50 (2)

ITEM 778.425 **CRABAPPLE - IVORY SPEAR 1.5 - 2 INCH CALIPER**

Sta. 288+28

ITEM 783.053 **SHAD TREE- SERVICEBERRY 4-5 FEET MULTI-STEMMED**

BMP3
Upland at Wetland Replication

ITEM 783.337 **TULIP TREE 1-1.5 INCH CALIPER**

BMP3
Upland at Wetland Replication

ITEM 783.441 **TULIP TREE 2-2.5 INCH CALIPER**

Sta. 314+09 to Sta. 314+66

ITEM 789.333 **BAYBERRY SHRUB - NORTHERN 2-3 FEET / #3**

BMP3

ITEM 790.633 **DOGWOOD - REDOSIER 2-3 FEET / #3**

BMP3

ITEM 790.721 **DOGWOOD - GRAY 2-3 FEET / #3**

Upland at Wetland Replication

ITEM 794.332 **SUMAC SHRUB - FRAGRANT 2-3 FEET / #3**

Upland at Wetland Replication

ITEM 794.803 **SWEETFERN #1**

Upland at Wetland Replication

ITEM 795.011 **VIBURNUM - NORTHERN ARROWWOOD 2-3 FEET / #3**

BMP3

ITEM 795.012 **VIBURNUM - ARROWWOOD 2-3 FEET / #3**

Upland at Wetland Replication

ITEM 796.447 **LITTLE BLUESTEM - THE BLUES 1 GALLON**

Sta. 233+27 to Sta. 234+02

ITEM 796.457 **SWITCH GRASS - CLOUD NINE 1 GALLON**

Sta. 233+27 to Sta. 234+02

ITEM 796.459 **SWITCH GRASS - SHENANDOAH 1 GALLON**

Sta. 233+27 to Sta. 234+02

ITEM 801.412 **4 INCH ELECTRICAL CONDUIT - TYPE NM (12 BANK)**

Sta. 212+79	to	Sta. 221+93
226+34		230+10
230+22		238+00
241+24		245+69
245+80		253+09
253+09		259+36
259+40		261+20
270+43		274+36

ITEM 801.412 (Continued)

274+42	276+53
61+21	297+22
297+35	304+91
304+28	71+37
312+41	315+47
318+11	321+03

ITEM 801.414 **4 INCH ELECTRICAL CONDUIT - TYPE NM (14 BANK)**

Sta. 238+13 to Sta. 241+24

ITEM 801.416 **4 INCH ELECTRICAL CONDUIT - TYPE NM (16 BANK)**

Sta. 315+52 to Sta. 318+12

ITEM 801.42 **4 INCH ELECTRICAL CONDUIT - TYPE NM (DOUBLE)**

Sta. 241+24	to	Sta. 241+46
241+46		242+29
259+37		259+42
318+13		318+33

ITEM 801.44 **4 INCH ELECTRICAL CONDUIT - TYPE NM (4 BANK)**

Sta. 81+30 to Sta. 315+27

ITEM 804.3 **3 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC -(UL)**

RT 38 (Main Street) at RT 62 (Church
Street/Burlington Avenue) RT 38 (Main
Street) at Cross Street/Butters Row
RRFB Units at STA. 222+44 RRFB Units at STA. 314+39

ITEM 811.22 **ELECTRIC HANDHOLE - SD2.022**

STA. 206+34 LT
STA. 241+30 RT

ITEM 811.31 **PULL BOX 12 X 12 INCHES - SD2.031**

RT 38 (Main Street) at RT 62 (Church Street/Burlington Avenue) RT 38
(Main Street) at Cross Street/Butters Row
RRFB Units at STA. 222+44 RRFB Units at STA. 314+39

ITEM 811.35 **PULL BOX ADJUSTED**

Sta. 204+17 RT

ITEM 811.38 **ELECTRIC HANDHOLE REMOVED AND RESET**

Sta. 228+86 LT

ITEM 811.391 **ELECTRIC HANDHOLE REMOVED AND DISCARDED**

RT 38 (Main Street) at RT 62 (Church Street/Burlington Avenue)

ITEM 813.811 **PRIVATE TELECOMMUNICATION SERVICE RISER
RELOCATION**

Sta. 258+68 LT
282+92 RT and as directed by the Engineer

ITEM 813.812 **ELECTRIC SERVICE RISER RELOCATION**

Sta. 208+75 LT
211+57 LT
289+92 RT and as directed by the Engineer

ITEM 821.72 **LIGHT POLE AND LUMINAIRE REMOVED AND STACKED**

Sta. 284+95 RT

ITEM 825.101 **RRFB (2-POST ASSEMBLY SYSTEM – AC-POWERED)**

Sta. 222+44
314+39

ITEM 866.062**6 INCH REFLECTORIZED WHITE LINE (ALL WEATHER THERMO.) (RECESSED)**

Sta. 200+61.80 to Sta. 262+50.46
269+50.85 319+20.77
Rte 38 at Burlington Ave/Chruch St Rte 38 at Lowell St
Rte 38 at Butters Row
200+61.80 203+37.30
206+82.00 216+50.00
204+00.00
Rte 38 at Burlington Ave/Chruch St Rte 38 at Kirk St
Rte 38 at Dublin Ave
216+25.00 219+25.00
Rte 38 at Kiernan ave Rte 38 at Lowell St Rte 38 at Butters Row Rte
38 at Old Main St Rte 38 at Border Ave Rte 38 at Breed Ave

ITEM 866.106**6 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)**

Butters
Row/Cross St
Eames Street

ITEM 866.112**12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)**

Crosswalks: Church St to Lowell St
Cross St at Butters Row
Old Main St (South) at Route 38
Border Ave
Breed Ave
Sta. 222+43
314+36

Stop Lines: Church St to Lowell St
Lowell St to Eames St
Eames St to Breed Ave

Do Not Block Box: Church St at Route 62

ITEM 867.062 **6 INCH REFLECTORIZED YELLOW LINE (ALL WEATHER THERMO.) (RECESSED)**

Sta. 200+61.80	to	Sta. 262+50.46
269+50.85		319+20.77
200+61.80		203+37.40
Burlington Ave/Church St		
222+62.90		224+88.04
Lowell St		
228+74.00		230+39.12
238+50.00		241+08.55
Rte 38 at Burlington Ave/Church		
St Rte 38 at Lowell St		

ITEM 867.106 **6 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)**

Cross St Butters Row Eames St

ITEM 867.112 **12 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)**

Church St.	to	Lowell St.
Lowell St.	to	Cross St
Lowell St.		
Cross St	to	Eames St

ITEM 868.06 **6 INCH REFLECTORIZED WHITE LINE (EPOXY)**

Burlington Ave

ITEM 868.12 **12 INCH REFLECTORIZED WHITE LINE (EPOXY)**

Burlington Ave

ITEM 869.06 **6 INCH REFLECTORIZED YELLOW LINE (EPOXY)**

Burlington Ave

ITEM 901. **4000 PSI. 1.5 INCH. 565 CEMENT CONCRETE**

Sta. 238+50
275+75
304+00

ITEM 903. 3000 PSI, 1.5 INCH, 470 CEMENT CONCRETE

FOR THRUST BLOCKS AT WATER PIPE TEES AND FITTINGS

<u>TYPE</u>	<u>LENGTH</u> <u>(FT)</u>	<u>WIDTH</u> <u>(FT)</u>	<u>DEPTH</u> <u>(FT)</u>	<u>QTY</u> <u>(EA)</u>
8" x 6" tee	1.33	0.75	1.33	2
12" x 6" tee	1.92	0.75	1.92	9
12" x 8" tee	1.92	0.75	1.92	7
12" x 10" tee	1.92	0.75	1.92	1
12" x 12" tee	1.92	0.75	1.92	2
8" 11.25 bend	0.83	0.5	0.83	1
8" 22.5 bend	0.83	0.5	0.83	1
8" 45 bend	1.17	0.5	1.17	7
10" 22.5 bend	1.17	0.5	1.17	3
10" 45 bend	1.67	0.5	1.67	3
12" 11.25 bend	1.17	0.5	1.17	6
12" 22.5 bend	1.17	0.5	1.17	1
12" 45 bend	1.67	0.5	1.67	16
12" 45 vertical bend	1.67	0.5	1.67	28
8" 45 vertical bend	1.17	0.5	1.17	16
6" 45 vertical bend	1.17	0.5	1.17	24
12" 45 vertical bend at culverts	7	3.5	4.00	4

ITEM 910. STEEL REINFORCEMENT FOR STRUCTURES

Sta. 238+50
 275+75
 304+00

ITEM 983. DUMPED RIPRAP

Sta. 253+80

ITEM 998.101 SPECIALTY SERVICES #1

Sta. 208+18 LT

ITEM 998.102 SPECIALTY SERVICES #2

Sta. 211+07 LT