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COMMONWEALTH OF MASSACHUSETTS

massDOT
Massachusetts Department of Transportation
Highway Division

CONTRACT DOCUMENTS AND SPECIAL PROVISIONS

PROPOSAL NO.	608562-127758
P.V. =	$7,293,000.00
PLANS	YES

FOR

Federal Aid Project No. HSI/HSI(VUS)-003S(762)
Signal and Intersection Improvement on I-93
at Mystic Avenue and McGrath Highway
(Top 200 Crash Location)

in the City of

SOMERVILLE

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

This Proposal to be opened and read: **TUESDAY, SEPTEMBER 17, 2024 at 2:00 P.M.**

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DOCUMENT 00010

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DOCUMENT 00104

NOTICE TO CONTRACTORS

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

TUESDAY, SEPTEMBER 17, 2024 at 2:00 P.M. **
SOMERVILLE
Federal Aid Project No. HSI/HSI(VUS)-003S(762)
Signal and Intersection Improvement on I-93
at Mystic Avenue and McGrath Highway
(Top 200 Crash Location)

****Date Subject to Change**

PROJECT VALUE = $7,293,000.00

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

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

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

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

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

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

NOTICE TO CONTRACTORS (Continued)

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

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

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

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

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 $575.00 per ton, Portland cement $425.53 per ton, diesel fuel $2.883 per gallon, and gasoline $2.813 per gallon, and Steel Base Price Index 415.9. MassDOT posts the **Price Adjustments** on their Highway Division's website at
https://www.mass.gov/massdot-contract-price-adjustments

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

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

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

BY: Monica G. Tibbits-Nutt, Secretary and CEO, MassDOT
Jonathan L. Gulliver, Administrator, MassDOT Highway Division
SATURDAY, AUGUST 17, 2024

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DOCUMENT 00210

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

July 1, 1981, updated October 2016

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(2) transactions are recorded as necessary

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

ii. to maintain accountability for assets;

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

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

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

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

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

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

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

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

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

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

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

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

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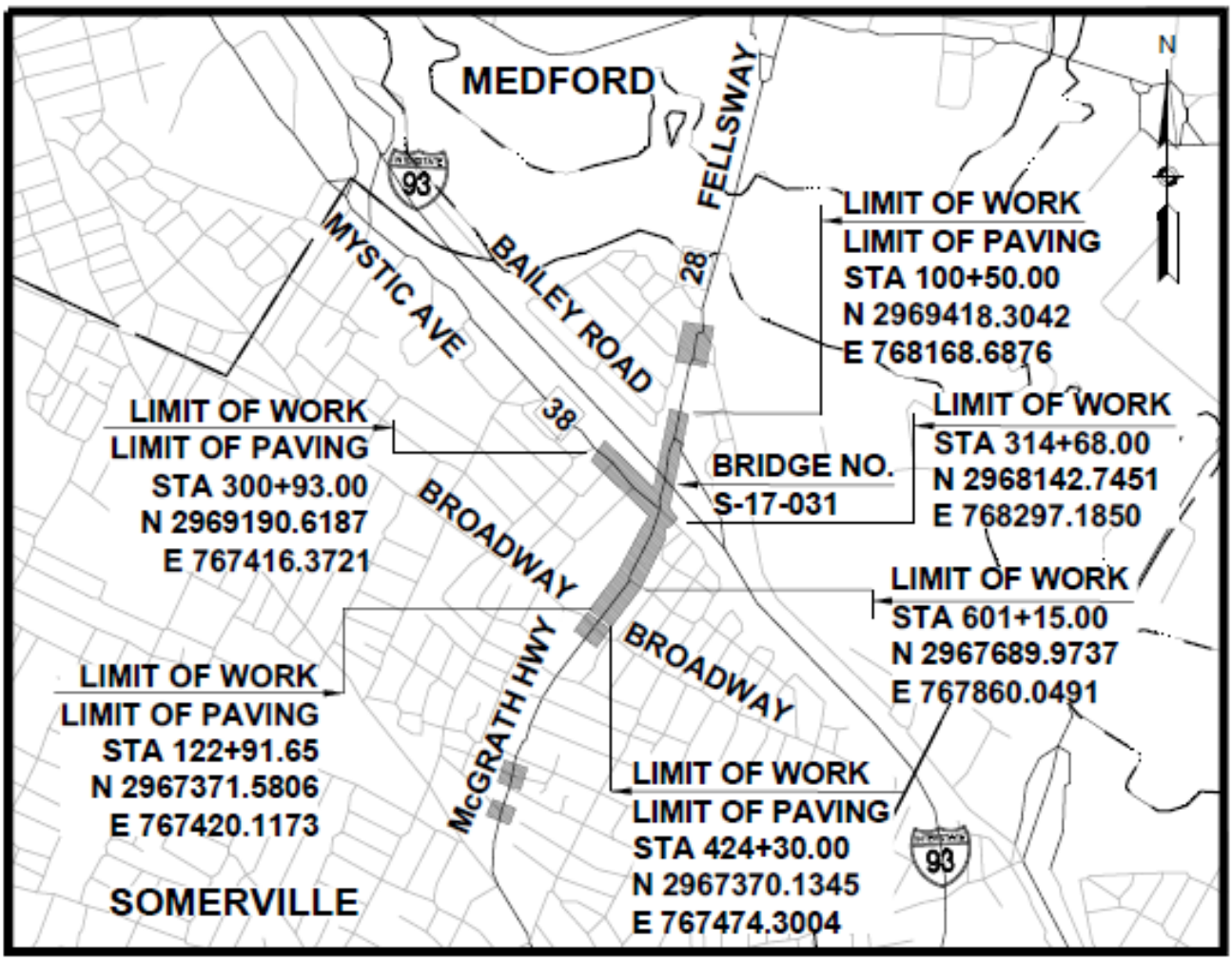
DOCUMENT 00331

LOCUS MAP

SOMERVILLE
Federal Aid Project No. HSI/HSI(VUS)-003S(762)
Signal and Intersection Improvement on I-93
at Mystic Avenue and McGrath Highway
(Top 200 Crash Location)



TOTAL LENGTH OF PROJECT = 3,616.65 FEET = 0.685 MILES
FELLSWAY / McGRATH HIGHWAY (ROUTE 28) = 2,241.65 FEET = 0.424 MILES
MYSTIC AVENUE (ROUTE 38) = 1,375.00 FEET = 0.260 MILES

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DOCUMENT 00439

Final Report ☐

Interim Report ☐

CONTRACTOR PROJECT EVALUATION FORM

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

Date: _____

City/Town: _____ Contractor: _____

Project: _____ Address: _____

F.A. No. _____ Contract Number: _____

Bid Price: _____ Notice to Proceed: _____

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

Date Work Started: _____ Date Work Completed*: _____

Contractor's Superintendent: _____

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

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

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

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

_____ _____

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

_____

Contractor's Signature Acknowledging Report/Date

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

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

_____

_____

CONTRACTOR PROJECT EVALUATION FORM (Continued)

Date: _____ Contract Number:_____

INFORMATION FOR DISTRICT HIGHWAY DIRECTORS RELATING TO PREQUALIFICATION

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

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

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

I recommend a deduction for project completed late:_____

Signed: _____
District Highway Director

EXPLANATION OF RATINGS 1 – 9:_____

WORK NOT COMPLETED WITHIN SPECIFIED TIME: _____

Revised: 04/28/17

*** END OF DOCUMENT ***

DOCUMENT 00440

Final Report ☐

Interim Report ☐

SUBCONTRACTOR PROJECT EVALUATION FORM

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

Date: _____

City/Town: _____ Subcontractor: _____

Project: _____ Address: _____

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

Prime Contractor _____ Current Contract Completion Date: _____

Date Work Started: _____ Date Work Completed*: _____

Subcontractor's Superintendent: _____

Type of Work Performed by Subcontractor: _____

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

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

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

_____ _____

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

_____ _____

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

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

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

_____

_____

Contractor's Comments: _____

_____

SUBCONTRACTOR PROJECT EVALUATION FORM (Continued)

Date: _____ Contract Number:_____

INFORMATION FOR DISTRICT HIGHWAY DIRECTORS RELATING TO PREQUALIFICATION

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

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

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

I recommend a deduction for project completed late:_____

Signed: _____
District Highway Director

EXPLANATION OF RATINGS 1 – 8: _____

WORK NOT COMPLETED WITHIN SPECIFIED TIME: _____

Revised: 04/28/17

*** END OF DOCUMENT ***

DOCUMENT 00710

GENERAL CONTRACT PROVISIONS

Revised: 05/06/24

NOTICE OF AVAILABILITY

The STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES dated 2024, the SUPPLEMENTAL SPECIFICATIONS, the 1996 METRIC CONSTRUCTION AND TRAFFIC STANDARD DETAILS, the 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS; the 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING and the 2017 CONSTRUCTION STANDARD DETAILS are available online at https://www.mass.gov/massdot-highway-division-manuals-and-publications

SPECIAL PROVISIONS FOR RIGHT-TO-KNOW ACT REQUIREMENTS

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

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

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

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

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

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

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

ALTERNATIVE DISPUTE RESOLUTION

Forum, Choice of Law and Mediations:

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

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DOCUMENT 00713

Subsection 701

Cement Concrete Sidewalks, Pedestrian Curb Ramps, and Driveways
and
Guide to the Interim Subsection 701
Cement Concrete Sidewalk Specification

(March 31, 2022)

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SUBSECTION 701: CEMENT CONCRETE SIDEWALKS, PEDESTRIAN CURB RAMPS, AND DRIVEWAYS
Replace this Subsection with the following:

INTERIM SUBSECTION 701: CEMENT CONCRETE SIDEWALKS, PEDESTRIAN CURB RAMPS, AND DRIVEWAYS

DESCRIPTION

701.20: General

This work shall consist of the construction of cement concrete sidewalks, pedestrian curb ramps, and driveways in accordance with the specifications and within the tolerances established on the plans.

MATERIALS

701.30: General

Materials shall meet the requirements specified in the following Subsections of Division III, Materials except as noted herein:

Gravel Borrow, Type b.....M1.03.0
Cement Concrete (≥ 4,000 psi).....M4.02.00
Preformed Expansion Joint Filler.....M9.14.0[1]

[1] Preformed expansion joint filler shall conform to Subsection M9.14.0 or ASTM D8139.

The following best practices may be incorporated into the cement concrete mix design at no additional cost to the Department as identified herein.

A. Combined Aggregate System.

The combined aggregate system for the mix design may be analyzed using the Tarantula Curve, Shilstone Chart, fineness modulus, and coarse aggregate content to enhance the properties of the concrete.

1. Tarantula Curve.

The combined aggregate system for the mix design may be analyzed using the Tarantula Curve to evaluate potential properties of the concrete, including workability, segregation, edge slumping, surface finishing, and cohesion.

Table 701.30-1: Tarantula Curve Particle Size Distribution

Sieve Opening	Percent by Mass Targets (%)		Percent by Mass Retained (%)		
	Passing	Retained			
1-1/2 in.	100	–	–	–	–
1 in.	92	8	0 – 16	–	–
3/4 in.	82	10	0 – 20	–	–
1/2 in.	69	13	4 – 20	–	–
3/8 in.	56	13	4 – 20	–	–
No. 4	43	13	4 – 20	–	–
No. 8	37	6	0 – 12	Coarse Sand 20 – 40	–
No. 16	31	6	0 – 12		–
No. 30	18	13	4 – 20		Fine Sand 24 – 34
No. 50	5	13	4 – 20	–	
No. 100	0	5	0 – 10	–	
No. 200	0	0	0 – 2	–	

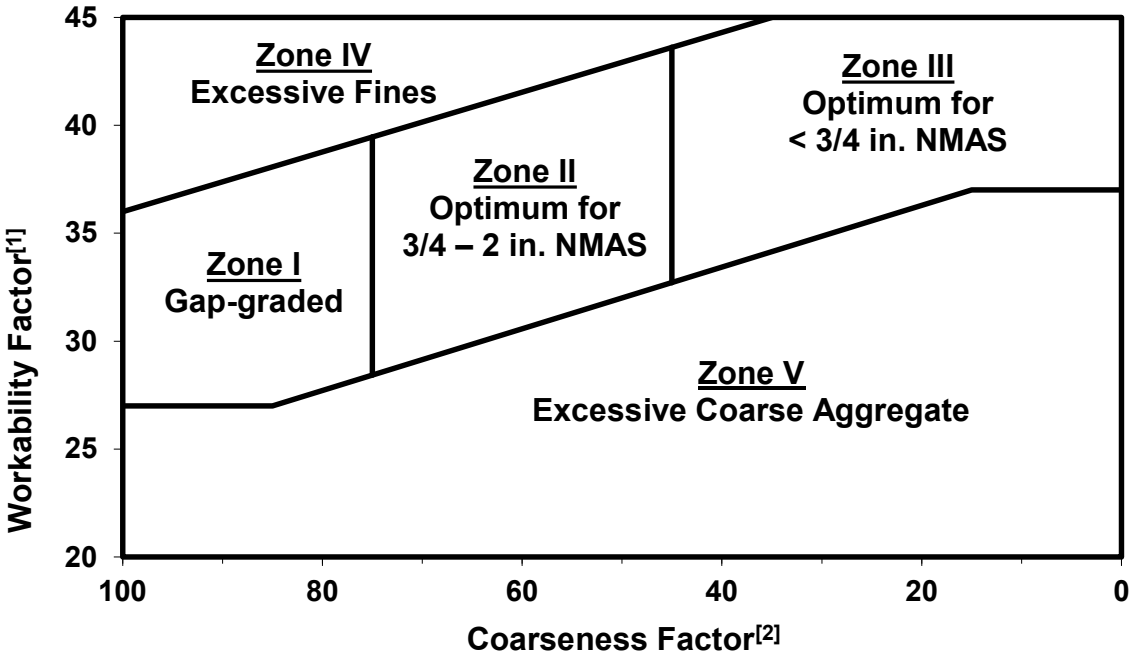
2. Shilstone Workability-Coarseness Chart.

The combined aggregate system for the mix design may be analyzed using the Shilstone Workability-Coarseness Chart, to evaluate potential properties of the concrete, including workability.

Table 701.30-2: Shilstone Workability-Coarseness

Zone	Property	Cause
Zone I	Gap-graded; High potential for segregation during placement and consolidation; Cracking, blistering, spalling, and scaling	Deficiency in intermediate particles; Non-cohesive
Zone II	Optimum mixture for nominal maximum aggregate size from 2 in. – ¾ in.	Optimized workability factor and coarseness factor
Zone III	Optimum mixture for nominal maximum aggregate size < ¾ in.	Optimized workability factor and coarseness factor
Zone IV	Sticky; High potential for segregation during consolidation and finishing; Variable strength, high shrinkage, cracking, curling, spalling, and scaling	Excessive fines
Zone V	Rocky; Lacking plasticity	Excessive amount of coarse and intermediate aggregate

Figure 701.30-1: Shilstone Workability-Coarseness Chart



[1] The workability factor is determined by the equation WF = W + (C - 564) / 38, where WF = workability factor, W = percent passing No. 8 sieve and C = total cementitious materials content.

[2] The coarseness factor is determined by the equation CF = (Q/R) / 100, where CF = coarseness factor, Q = cumulative percent retained on 3/8 in. sieve and R = cumulative percent retained on No. 8 sieve.

3. Fineness Modulus.

The combined aggregate system for the mix design may be analyzed using the fineness modulus, to evaluate potential properties of the concrete, including the fineness or coarseness of the mix design and estimating the design proportions of fine and coarse aggregates. The coarseness of the mix design increases as the fineness modulus increasers. The fineness modulus is determined by calculating the total cumulative percentages by mass retained on each designated sieve and dividing by 100.

4. Coarse Aggregate Content.

The combined aggregate system for the mix design may be analyzed using the coarse aggregate content. The coarse aggregate content is determined by calculating the total cumulative percentages by mass retained on the No. 4 sieve.

B. Paste System.

The quality of the paste system is determined by the water-cementitious ratio, air content, cementitious materials, and chemical admixtures incorporated into the mix design.

1. Water-Cementitious Ratio.

The water-cementitious ratio for the mix design may be analyzed to evaluate potential properties of the concrete, including strength, concrete and reinforcement bonding, and resistance to freezing, thawing, de-icing, sulfate reaction, corrosion of steel reinforcement, drying shrinkage, cracking, and

volume change from wetting and drying. The water-cementitious ratio is determined by calculating the total water content by mass and dividing by the total cement and supplementary cementitious material (SCM) content by mass. The recommended water-cementitious ratio design target is identified in Table 701.30-3. The water-cementitious ratio shall be less than or equal to 0.45.

Table 701.30-3: Freezing, Thawing, and De-icing Resistance

Exposure Class	Severity	Condition	Water-Cementitious Ratio Requirement
F3	Very Severe	Exposed to freezing and thawing cycles and accumulation of snow, ice, and de-icing chemicals; Frequent exposure to water	≤ 0.45

2. Air Content.

The air content for the mix design may be analyzed to evaluate potential properties of the concrete, including strength and resistance to freezing, thawing, de-icing, and sulfate reaction. The recommended air content design targets are identified in Table 701.30-4.

Table 701.30-4: Freezing, Thawing, and De-icing Resistance

Exposure Class	Severity	Condition	Nominal Maximum Aggregate Size (in.)	Air Content Target Recommendation (%)
F3	Very Severe	Exposed to freezing and thawing cycles and accumulation of snow, ice, and de-icing chemicals; Frequent exposure to water	3/8	7.5
			1/2	7.0
			3/4	7.0
			1	6.5
			1 1/2	6.5

3. Cement and Supplementary Cementitious Materials Content.

The cement and supplementary cementitious materials content incorporated into the mix design shall promote quality properties of the cement concrete, including resistance to alkali silica reaction, freezing, thawing, de-icing, and sulfate reaction. Incorporation of supplementary cementitious materials (SCM) in cement concrete may affect workmanship properties, including workability, bleed rate, setting time, and other properties. Adequate adjustments in Contractor workmanship practices, including placement, finishing, curing, and other construction practices shall be required to account for these changes in properties and to prevent scaling due to freezing, thawing, and de-icing cycles. The cement and supplementary cementitious materials content shall meet the design criteria identified in Table 701.30-5.

Table 701.30-5: Alkali Silica Reaction and Freezing, Thawing, and De-icing Resistance[1][2]

Exposure Class	Severity	Condition	Material	Replacement by Weight of Cement (%)
F3	Very Severe	Exposed to freezing and thawing cycles and accumulation of snow, ice, and de-icing chemicals; Frequent exposure to water	Low Alkali Cement (≤ 0.60% Alkalinity)	–
			Blended Hydraulic Cement[3]	–
			Fly Ash (Class F)	15 – 30
			Slag (Grade 100 or 120)	25 – 50
			Silica Fume	5 – 10
			Total SCM	≤ 50
			Total Fly Ash and Silica Fume	≤ 35

[1] Acceptable replacement by weight of cement for alkali silica reaction resistance shall be determined by the alkali silica reaction resistance performance test results and the criteria identified in Table 701.73-1: Minimum Acceptance Sampling and Testing Requirements.

[2] Test results meeting the alkali silica reaction resistance performance criteria of Table 701.30-6: Alternative Performance Evaluation to Alkali Silica Reaction Resistance Design Criteria may supersede the replacement by weight of cement design criteria.

[3] SCMs in blended hydraulic cement shall meet the criteria identified for fly ash, slag, and silica fume.

Table 701.30-6: Alternative Performance Evaluation to Alkali Silica Reaction Resistance Design Criteria

Method	Quality Characteristic	Criteria
C295	Petrographic Examination for Potential Alkali Aggregate Reactive Constituents and Deleterious Materials in Aggregate[1]	–
	Optically Strained, Microfractured or Microcrystalline Quartz (%)	≤ 5.0
	Chert or Chalcedony (%)	≤ 3.0
	Trydimite or Cristobalite (%)	≤ 1.0
	Opal (%)	≤ 0.5
	Natural Volcanic Glass (%)	≤ 3.0
T 380	Alkali Silica Reaction Resistance: Expansion of Miniature Concrete Prisms at 56 days (%)	≤ 0.03[2]

[1] Examination of aggregate shall be performed and reported to identify and quantify potential alkali-aggregate reactive constituents and deleterious materials in aggregate, as defined in ASTM C294 Standard Descriptive Nomenclature for Constituents of Concrete Aggregates and ASTM C295 Standard Guide for Petrographic Examination of Aggregates for Concrete.

[2] 56-day expansion results greater than 0.03 but less than or equal to 0.04 shall be considered non-reactive if the average two-week rate of expansion from day 56 to day 84 is less than or equal to 0.01%, otherwise, expansion results shall be considered reactive.

4. Chemical Admixtures.

Chemical admixtures may be incorporated into the mix design to enhance the properties of the concrete.

Table 701.30-7: Chemical Admixtures

Spec.	Type	Chemical Admixture	Properties
M 194	A	Water-Reducing	Increases Workability and Air Content; Decreases Water Demand (5 – 10%, 3 – 6 in. Slump)
	B	Retarding	Increases Initial and Final Setting Time, Air Content, Long-Term Strength; Offsetting of Accelerating Effect of Hot Weather; Decreases Early-Age Strength
	C	Accelerating	Increases Early-Age Strength; Decreases Initial and Final Setting Time
	D	Water-Reducing and Retarding	Type A and Type B Admixture Properties
	E	Water-Reducing and Accelerating	Type A and Type C Admixture Properties
	F	High Range Water-Reducing	Increases Workability (More Effective than Type A), Air Content, Early-Age Strength, and Ultimate Strength; Decreases Water Demand (12 – 40%, > 6 in. Slump) and Permeability
	G	High Range Water-Reducing and Retarding	Type F and Type B Admixture Properties
	S-SRA	Shrinkage Reducing	Increases Setting Time; Decreases Drying Shrinkage Cracking and Bleed Rate
	S-CRA	Crack Reducing	Decreases Cracking (More Effective than SRAs) and Crack Width
M 154	AEA	Air-Entraining	Increases Cohesion, Workability, Stabilization of Air Bubbles, Resistance to Freezing, Thawing, and De-icing, Resistance to Alkali-Reactive Environment, and Resistance to Sulfate Reaction
M 194[1]	MRWRA	Mid Range Water-Reducing	Type A and Type F Admixture Properties; Increases Workability (Especially Concrete with SCMs); Decreases Water Demand (6 – 12 %, 5 – 8 in. Slump)
C1622	CWA	Cold Weather	Increases Hydration Rate; Decreases Freezing Point of Mixing Water

[1] Mid range water-reducing admixtures (MRWRA) may meet either water-reducing (A) or high range water-reducing (F) admixture criteria.

5. Paste Content.

The paste content for the mix design may be optimized to enhance potential properties of the concrete, including workability, strength, permeability, and resistance to drying shrinkage and cracking and volume change from wetting and drying. The volume of paste should adequately fill the voids and provide sufficient separation between the aggregate particles to promote workability and effective bonding of particles.

Table 701.30-8: Paste Content

Mix Design Characteristic	Recommendation
Volume of Cement Concrete (cf)[1]	27
Paste Content (%)[2]	≤ 28[3]
Paste Content to Aggregate Void Content Ratio[4]	1.25 – 1.75
Excess Volume of Paste for Workability (%)[5]	–

[1] The volume of cement concrete is determined by the following equation, where W = Weight (lbs.), SG = Specific Gravity, D = Density (pcf), and V = Volume (cf).

$V_{CEMENT} = W_{CEMENT} / SG_{CEMENT} * D_{WATER}$

$V_{SCM} = W_{SCM} / SG_{SCM} * D_{WATER}$

$V_{ADMIXTURE} = V_{ADMIXTURE}$ in oz. / 957.5 oz. per cf

$V_{WATER} = V_{WATER}$ in gal. / 7.48 gal. per cf

$V_{COARSE} = W_{COARSE} / SG_{COARSE} * D_{WATER}$

$V_{FINE} = W_{FINE} / SG_{FINE} * D_{WATER}$

$V_{CONCRETE} = V_{CEMENT} + V_{SCM} + V_{ADMIXTURE} + V_{WATER} + V_{COARSE} + V_{FINE} + V_{AIR}$

[2] The paste content by volume of cement concrete is determined by the following equation, where V = Volume (cf) and PC = Paste Content (%).

$V_{PASTE} = V_{CEMENT} + V_{SCM} + V_{ADMIXTURE} + V_{WATER}$

$PC_{CONCRETE} = V_{PASTE} / V_{CONCRETE}$

[3] The cracking tendency of structural concrete is significantly reduced when the paste content by volume is less than or equal to 28 percent.

[4] The paste content to aggregate void content ratio is determined by the following equation, where D = Density (pcf), SG = Specific Gravity, BD = Bulk Density (pcf), VC = Void Content (%), V = Volume (cf), AVC = Aggregate Void Content (%), PC = Paste Content (%), and R = Ratio. Workability increases as the paste content to aggregate void content ratio increases. Decreased paste content to aggregate void content ratios will result in decreased workability, where water-reducing admixtures provide no benefit.

$VC_{COARSE} = SG_{COARSE} * D_{WATER} - BD_{COARSE} / D_{COARSE}$

$VC_{FINE} = SG_{FINE} * D_{WATER} - BD_{FINE} / D_{FINE}$

$VC_{AGGREGATE} = [(V_{COARSE} / (V_{COARSE} + V_{FINE})) * VC_{COARSE} + (V_{FINE} / (V_{COARSE} + V_{FINE})) * VC_{FINE}]$

$AVC_{CONCRETE} = [VC_{AGGREGATE} * ((V_{COARSE} + V_{FINE}) / V_{CONCRETE})]$

$R_{PC\text{-}AVC} = PC_{CONCRETE} / AVC_{CONCRETE}$

[5] The excess paste content for workability is determined by the following equation, where PC = Paste Content (%), AC = Air Content (%), AVC = Aggregate Void Content (%), and EPC = Excess Paste Content for Workability (%).

$EPC_{CONCRETE} = PC_{CONCRETE} + AC_{CONCRETE} - AVC_{CONCRETE}$

C. Initial Curing Materials.

The materials and procedures used for initial curing methods of cement concrete shall meet the Manufacturer's instructions and recommendations and the requirements specified herein.

Cement concrete with a low to negligible bleeding rate, exposure to highly evaporative environments, high content of silica fume, fine cement, or other fine cementitious material, low water to cementitious ratio, high air content, or water-reducing admixtures have an increased susceptibility to surface drying and plastic shrinkage between placement and finishing operations. Initial curing materials and procedures shall be applied immediately after the bleed water sheen has disappeared from the surface of the concrete or the concrete surface exhibits loss of moisture and surface drying, between placement and finishing operations. Initial curing materials shall not be worked into the surface in subsequent finishing operations.

1. Liquid-Applied Evaporation Reducers.

Liquid-applied evaporation reducers used for initial curing methods shall produce an effective monomolecular film over the bleed water layer, to reduce the rate of evaporation of the bleed water from the surface and plastic shrinkage when the evaporation rate equals or exceeds the bleeding rate.

D. Intermediate Curing Materials.

The materials and procedures used for intermediate curing methods of cement concrete shall meet the Manufacturer's instructions and recommendations and the requirements specified herein.

In instances where finishing operations have been completed prior to the concrete achieving final set and the concrete surface exhibits loss of moisture and surface drying, the following curing materials and procedures shall be applied immediately to the concrete surface prior to the application of final curing materials, to prevent the loss of moisture without damaging the concrete surface, until final set of the concrete has been achieved and final curing materials have been applied to the concrete surface.

- 701.30.C.1: Liquid-Applied Evaporation Reducers
- 701.30.E.3.a: Liquid Membrane-Forming Compounds for Curing
- 701.30.E.3.b: Liquid Membrane-Forming Compounds for Curing and Sealing

E. Final Curing Materials.

The materials and procedures used for final curing methods of cement concrete shall meet the Manufacturer's instructions and recommendations and the requirements specified herein.

Curing water shall be free of deleterious impurities, causing staining and deterioration. The potential staining ability of curing water shall be evaluated by means of CRD-C401 (US Army Corps

of Engineers 1975) for instances where curing water quality is questioned. Curing water shall not exceed a temperature differential of more than 20°F from the internal concrete temperature, to prevent cracking due to temperature gradients causing strain that exceeds the strain capacity of concrete. Curing water shall remain above freezing temperatures throughout the duration of the curing cycle.

Final curing materials and procedures shall be applied to the concrete surface immediately after application of initial and intermediate curing materials, finishing operations, and final set of cement concrete, to prevent the loss of moisture and surface drying.

Materials used for final curing methods of cement concrete shall accommodate all exposed cement concrete surfaces with a continuous application of moisture throughout the entire duration of the final curing method cycle and provide controlled and gradual termination of the final curing method cycle.

Final curing materials applied to the concrete shall allow the concrete to mature sufficiently to achieve its designed and desired properties, including strength, volume stability, permeability, durability, and resistance to freezing, thawing, and de-icing cycles. Insufficient application of final curing materials results in decreased strength and durability of the top surface of concrete.

Protection to the concrete surface and curing materials shall be required in instances where adverse weather conditions are present, until curing operations can be initiated without damaging the surface of the concrete.

Final curing materials and procedures shall be applied to the concrete surface throughout the entire duration of the curing cycle and meet minimum sustained temperature, duration, and strength requirements, as specified in applicable Division II: Construction Details and herein. Controlled and gradual termination of the final curing method cycle shall begin only after all specified conditions are met, until the concrete gradually cools to within 20°F of the ambient temperature.

1. Saturated Covers.

Saturated covers used for final curing methods shall meet 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 cement concrete and cementitious materials. 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 cement concrete and cementitious materials. Saturated covers shall have sufficient thickness and proper positioning onto the surface to maximize moisture retention. Saturated covers shall contain a sufficient amount of moisture to prevent moisture loss from the surface of cement concrete and cementitious materials. Saturated covers shall have the ability to retain sufficient moisture from continuous watering so that a film of water remains on the surface of cement concrete and cementitious materials throughout the entire duration of the final curing method cycle. Saturated covers shall not absorb water from cement concrete and cementitious materials. Polyethylene film may be applied over the saturated cover to limit the amount of continuous watering required for sufficient moisture retainage. Saturated covers shall accommodate uniform and slow drying of cement concrete and cementitious materials surfaces immediately prior to removal.

2. Sheet Materials.

Sheet materials, including polyethylene film, white burlap-polyethylene sheeting, and reinforced paper, used for final curing methods shall meet ASTM C171 and the requirements specified 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 sheet materials shall be secured to maintain a moist environment.

a. Polyethylene Film.

Polyethylene film shall be clear, white, or black in color and consist of a single sheet manufactured from polyethylene resins, be free of visible defects, including tears, wrinkles, and discontinuity. The film shall prohibit mottling and uneven spots from appearing on the surface of concrete, due to variations in temperature, moisture content, or both. Application of additional curing water under the film or application of a polyethylene film bonded to absorbent fabric to the concrete surface may be required to prevent mottling and to retain and evenly distribute the moisture. Polyethylene film shall accommodate concrete surfaces with constant contact without damage. The film shall be sufficient in length to extend beyond the edges of the concrete surface. 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.

i. White Polyethylene Film.

White polyethylene film shall minimize heat gain caused by absorption of solar radiation and shall be exclusively used during warm weather applications.

ii. Clear and Black Polyethylene Films.

Clear and black polyethylene films shall inhibit absorption of solar radiation for cold weather applications.

b. White Burlap-Polyethylene Sheeting.

White burlap-polyethylene sheeting shall be securely bonded to the burlap so to avoid separation of the materials during handling and curing of the concrete.

c. Reinforced Impervious Paper.

Reinforced impervious paper shall be white in color, 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. Reinforced impervious paper shall be free of holes, tears, and pin holes from deterioration of the paper through repeated use. Reinforced impervious paper shall be treated to prevent tearing when wetted and dried. Reuse of reinforced impervious paper shall be permitted so long as it is able to retain moisture on the surface of concrete. The paper shall be discarded and prohibited from use when moisture is no longer retained in the material.

3. Liquid Membrane-Forming Compounds.

Compounds shall form a continuous, non-yellowing, and durable film with quality moisture-retention properties. Compounds shall maintain the relative humidity of the concrete surface

above 80% for seven days to sustain cement hydration. Compounds shall not affect the original color of the concrete surface. Compounds shall not degrade due to exposure to ultraviolet light from direct sunlight. Compounds shall meet the local and federal allowable Volatile Organic Compound (VOC) content limits.

White-pigmented compounds shall be used in instances where solar-heat gain is concern to the concrete surface. White-pigmented compounds shall be agitated in the container prior to application to prevent pigment from settling out resulting in non-uniform overage and ineffective curing.

Careful considerations shall be made by the Contractor to determine if the evaporation rate is exceeding the rate of bleeding, thus causing the surface to appear dry even though bleeding is still occurring. To diagnose and prevent this condition, the Contractor may place a transparent plastic sheet over a test area of the uncured and unfinished concrete surface and shall determine if any bleed water accumulates under the plastic. Under such conditions, the application of liquid membrane-forming compounds to the concrete surface shall be delayed to prevent bleed water from being sealed below the concrete surface, map cracking of the membrane films, reduction in moisture-retention capability, and the need for reapplication of the compound.

Prior to use, compounds shall be thoroughly mixed, stirred, and agitated per the Manufacturer's instructions and recommendations.

Compounds shall be applied continuously and uniformly to the surface of the concrete per the Manufacturer's instructions and recommendations. Compounds shall be applied immediately after the disappearance of the surface water sheen following final finishing. Applicating of the compound immediately after final finishing and before all free water on the surface has evaporated will help prevent the formation of cracks. When using compounds to reduce moisture loss from formed surfaces, the exposed surface shall be wetted immediately after form removal and kept moist until the curing compound is applied. The concrete shall be allowed to reach a uniformly damp appearance with no free water on the surface, and then application of the compound shall begin at once. Delayed application will result in surface drying, absorption of the compound into the concrete, and no forming of a continuous membrane.

The concrete surface shall be damp when the compound is applied. Power-driven spray equipment shall be used for uniform application of compounds on large paving projects. Spray nozzles recommended by the compound Manufacturer and use of windshields shall be arranged by the Contractor to prevent wind-blown loss of compound and to ensure proper coverage application rates are achieved. The compound shall be applied by power sprayer, using appropriate wands and nozzles with pressures between 25 and 100 psi. The Contractor shall fill the power sprayer with curing compound from the Manufacturer's original container in the presence of the Engineer. Any dilution as recommended by the Manufacturer shall take place in the presence of the Engineer. For very small areas such as repairs, the compound shall be applied with a wide, soft-bristled brush or paint roller.

The Contractor shall verify the application rate and procedures are in accordance with the Manufacturer's instructions and recommendations. At least one uniform coat shall be applied at a rate of 150 to 200 ft2/gallon. On very deeply textured surfaces, the surface area to be treated shall be at least twice the surface area of the surface. In such cases, two separate applications may be needed, each at 200 ft2/gallon or greater if specified by the Manufacturer to achieve the desired

moisture retention rate, with the first being allowed to become tacky before the second is applied. If two coats are necessary to ensure complete coverage, for effective protection the second coat should be applied at right angles to the first. Complete coverage of the surface shall be attained due to the potential for formation of small pinholes in the membrane, which will result in loss of moisture from the concrete. Compounds shall not sag, run off peaks, or collect in grooves.

Compounds and procedures shall be compatible with concrete surfaces receiving subsequent applications or placements of concrete, overlays, coatings, paints, sealers, finishes or other toppings to ensure acceptable bonding to the concrete. Testing to establish compatibility among the curing compound, subsequent surface treatments, concrete moisture content and the actual finished surface texture of the concrete shall be conducted when compatibility is not known. The compound Manufacturer shall be consulted by the Contractor to determine the compatibility of the application. Compounds shall not be applied to concrete surfaces where bonding of subsequent applications or placements is incompatible or is of concern. The use of wax-based curing compounds shall be prohibited in instances where concrete surfaces are subject to additional toppings and vehicular, pedestrian, or other traffic. Deliberate removal of compounds in the presence of the Engineer and in accordance with Manufacturer's instructions and recommendations shall be conducted as an alternative to compatibility testing, incompatibility, or in instances where bonding is of concern. Bonding of subsequent materials may still be inhibited by the presence of the compound even after the moisture retention characteristics of the compound have diminished.

a. Liquid Membrane-Forming Compounds for Curing.

Liquid membrane-forming compounds for curing shall meet ASTM C309, the Manufacturer's instructions and recommendations, and the requirements specified herein.

Table 701.30-1: Types of Compounds for Curing

Type	Description
Type 1	Clear or translucent without dye
Type 1-D	Clear or translucent with fugitive dye
Type 2	White pigmented

Table 701.30-2: Composition Class of Compounds for Curing

Type	Description
Class A	Unrestricted composition, generally wax-based products
Class B	ASTM D883 resin-based products

b. Liquid Membrane-Forming Compounds for Curing and Sealing.

Liquid membrane-forming compounds for curing and sealing shall meet ASTM C 1315, the Manufacturer's instructions and recommendations, and the requirements specified herein.

In addition to moisture-retention capabilities compounds shall exhibit specific properties, including alkali resistance, acid resistance, adhesion-promoting quality, and resistance to degradation by ultraviolet light.

Table 701.30-3: Types of Compounds for Curing and Sealing

Type	Description
Type I	Clear or translucent
Type II	White pigmented

Table 701.30-4: Class of Compounds for Curing and Sealing

Type	Description
Class A	Non-yellowing

F. Protective Sealing Compounds.

Protective sealing compounds shall maintain valid listing on the Department Qualified Construction Materials List (QCML) and meet AASHTO M 224, NCHRP Report 244 and the requirements specified herein.

Protective sealing compounds shall sufficiently penetrate the concrete to seal the surface pores and fill the capillaries of the concrete by chemically reacting with the concrete and forming a hydrophobic layer. Protective sealing compounds shall limit the penetration of liquids, gases, and harmful substances into hardened concrete, including water, de-icing agents, and carbon dioxide to protect concrete from freezing, thawing, and de-icing cycles, corrosion of reinforcing steel, and acid attack. Protective sealing compounds shall limit the buildup of vapor pressure between the concrete and the applied sealer. Protective sealing compounds shall retard the penetration of harmful substances into hardened concrete. Protective sealing compounds shall maintain their protective properties during environmental exposure to freezing, thawing, and de-icing cycles. Protective sealing compounds shall not reduce the frictional properties of the concrete. Protective sealing compounds shall not affect the original color of the concrete surface if maintaining the original color is desired by the Department. Protective sealers shall meet the local and federal allowable Volatile Organic Compound (VOC) content limits.

Curing methods conforming to Department specifications shall be applied to the concrete prior to the application of protective sealers. Protective sealers shall not be applied to the concrete for a minimum of 28 days after placement and the surface shall be sufficiently prepared, clean, and dry for at least 24 hours with ambient temperatures exceeding 60°F. Protective sealers shall not be applied to concrete placed where freezing, thawing, and de-icing cycles are expected immediately after, due to the retainage of water in the concrete. Periodic re-application shall be required for protective penetrants requiring multiple applications and for concrete surfaces exhibiting wear to ensure long-term protection of the concrete surface.

G. Cold Weather Concreting Materials.

Cold weather concreting shall be defined as the procedures, operations, materials, and equipment required for the mixing, delivery, placement, finishing, curing, and protection of concrete during cold weather conditions, while exposed to air temperatures falling below, or expected to fall below 40°F.

The protection period shall be defined as the minimum duration required to prevent concrete from the negative effects of cold weather exposure. The protection period shall remain in place while

cold weather conditions exist. Controlled and gradual termination of the protection period shall be conducted only after 100% f`c is attained and all specified conditions are met.

The procedures, operations, materials, and equipment selected for cold weather concreting shall adequately maintain specified temperature ranges by addressing all variables, including ambient weather conditions, geometry of the structure, and mix design proportions. Concrete temperatures for cold weather concreting shall meet Table 701.30-5.

Table 701.30-5: Concrete Temperature Requirements for Cold Weather Concreting

Phase	Cold Weather Temperature (°F)	Concrete Temperature (°F)
Mixing	30-39	60-75
	0-30	65-80
	< 0	70-85
Placement	< 40	55-75
Protection Period	< 40	55-75
Termination of Protection Period – Allowable Rate of Decrease in 24 Hours	< 40	≤ 50

Cold weather concreting procedures, operations, materials, and equipment shall be developed and performed to prevent damage to concrete due to freezing at early ages, to ensure that the concrete develops the recommended strength for safe removal of forms, to maintain curing conditions that promote quality strength and durability development, to limit rapid temperature fluctuation, and to provide protection consistent with intended serviceability of the structure. The Contractor shall develop and submit to the Department for review and approval, cold weather concreting procedures for the mixing, delivery, placement, finishing, curing, and protection of concrete during cold weather, including:

- Procedures for protecting the subgrade from frost and the accumulation of ice or snow on reinforcement or forms prior to placement
- Methods and requirements for cold weather protection and temperature control of constituent materials incorporated into the mix design
- Chemical admixtures incorporated into the mix design for cold weather protection and temperature control
- Methods and requirements for cold weather protection and temperature control during mixing, delivery, placement, finishing, curing, and protection period
- Curing methods to be used during and following the protection period
- Types of covering, insulation, heating, or enclosures to be provided
- Methods for verification of in-place strength
- Procedures for measuring and recording concrete temperatures
- Procedures for preventing drying during dry, windy conditions

All procedures, operations, materials, and equipment required for adequate protection and curing shall be present and ready for use prior to concrete production.

1. Insulating Materials.

Insulating materials used for cold weather concreting shall meet the requirements specified herein. The thermal resistance of the proposed insulation system shall be determined to meet the concrete temperature range requirements specified herein. Supplemental heat, including hydronic heating systems, shall be applied in instances where insulating materials cannot achieve the concrete temperature requirements.

2. Heaters.

Heaters used for cold weather concreting including direct fired, indirect fired, and hydronic heaters shall meet ANSI A10.10 carbon monoxide limits, safety regulations for ventilation, and the stability, operation, fueling, and maintenance of heaters and the requirements specified herein.

a. Direct Fired Heaters.

Direct fired heaters generate heat to an enclosed space through the combustion of fossil fuels, including oil, kerosene, propane, gasoline, and natural gas. Hot air comprised of carbon dioxide and carbon monoxide combustion products, is discharged into the enclosed space. Direct fired heaters shall be prohibited from heating the air directly surrounding the concrete surface due to calcium carbonate formation interfering with the hydration reaction, from the reaction between the carbon dioxide generated from the combustion of fossil fuels and the calcium hydroxide on the surface of freshly placed concrete, resulting in a soft, chalky, and nondurable concrete surface. Direct fired heaters shall only be used on concrete surfaces protected from fossil fuel combustion products.

b. Indirect Fired Heaters.

Indirect fired heaters generate heat to an enclosed space through the combustion of fossil fuels, including oil, kerosene, propane, gasoline, and natural gas. The carbon dioxide and carbon monoxide combustion products are expelled through venting, resulting in clean heated air discharged into the enclosed space. Indirect fired heaters are suitable for heating the air directly surrounding the concrete surface.

c. Hydronic Heaters.

Hydronic heaters generate heat to an enclosed space through the circulation of the heat-transfer fluid in a closed system of pipes or hoses. The heat-transfer fluid is comprised of a propylene glycol water solution and is heated through the combustion of fossil fuels, including diesel fuel and kerosene. The combustion of fossil fuel occurs outside of the enclosed space and does not expose the concrete surface to the deleterious effects of carbon dioxide.

After the concrete placement achieves final set, polyethylene film or other suitable material shall sufficiently serve as a vapor barrier. The heat-transfer hoses shall be placed on top of the vapor barrier and covered with insulating materials meeting 701.30.G.1. Hydronic heaters shall be used to thaw or preheat subgrades prior to concrete placement and provide supplementary heat to insulating materials. Hydronic heaters shall provide an even distribution of heat to prevent curling and cracking induced by temperature gradients within concrete.

3. Enclosures.

Enclosures shall be made of wood, canvas tarpaulins, polyethylene film, or prefabricated rigid plastic. Enclosures shall be airtight, block wind, prevent admittance of cold air, conserve heat, and withstand wind and snow loads. Enclosures shall provide adequate headroom for craftsmen and sufficient space between the concrete and the enclosure to permit free circulation of warm air. Supplementary heat shall be supplied to enclosures by hydronic heaters, live steam, hot forced air, or indirect fired combustion heaters. Icing along the perimeter of the enclosure shall be prevented when live steam is utilized. Heaters and ducts shall be positioned to prevent the hot, dry air from overheating or drying the concrete surface. Insulating materials meeting 701.30.G.1 shall be applied as a vapor barrier to the concrete surface immediate after final set is attained.

H. Hot Weather Concreting Materials.

Hot weather concreting shall be defined as the procedures, operations, materials, and equipment required for the mixing, delivery, placement, finishing, bleed water evaporation, curing, and protection of concrete during hot weather conditions, while exposed to air temperatures exceeding, or expected to exceed 80°F; concrete temperatures approaching, or expected to approach 90°F; evaporation rates of surface water approaching, or expected to approach the bleeding rate of the concrete; high solar radiation; low relative humidity; and high wind speed.

The protection period shall be defined as the minimum duration required to prevent concrete from the negative effects of hot weather exposure, including the acceleration of rate of moisture loss and rate of cement hydration, difficulties in curing, increased concrete temperature, increased water demand, accelerated slump loss, increased rate of setting, increased tendency for plastic shrinkage and thermal cracking, increased potential for cold joints, and difficulties in controlling entrained air content. The protection period shall remain in place while hot weather conditions exist. Controlled and gradual termination of the protection period shall be conducted when conditions permit. The allowable rate of temperature decrease shall not exceed 5°F per hour and meet the allowable rate of temperature decrease specified in 701.30.G: Cold Weather Concreting Materials.

The procedures, operations, materials, and equipment selected for hot weather concreting shall adequately maintain specified temperature ranges and evaporation rates by addressing all variables, including ambient weather conditions, geometry of the structure, and mix design proportions. Initial materials meeting 701.30.C: Initial Curing Materials shall be applied to the concrete surface while the concrete and air temperatures, relative humidity of the air, and the wind speed have the capacity to evaporate free water from the fresh concrete surface at a rate that is equal to or greater than bleeding rate of the concrete. The evaporation rate of surface water shall be determined by the following equation:

$$E = (T_c^{2.5} - r * T_a^{2.5})(1 + 0.4V) \times 10^{-6}$$

where E = evaporation rate of water-covered surface ($lb/ft^2/hr$), T_c = concrete temperature of the evaporating surface (°F), r = relative humidity of air surrounding the evaporating surface (%), T_a = temperature of the air surrounding the evaporative surface (°F), and V = average wind speed 20 inches above the evaporating surface. The air surrounding the evaporating surface shall be defined as the air approximately 4 to 6 feet above the evaporating surface on the windward side and shielded from the sun's rays.

Hot weather concreting procedures, operations, materials, and equipment shall be developed and performed to prevent damage to concrete and promote long-term durability. The Contractor shall develop and submit to the Department for review and approval, hot weather concreting procedures for the mixing, delivery, placement, finishing, curing, and protection of concrete during hot weather, including:

- Procedures for preparing the subgrade prior to placement
- Methods and requirements for hot weather protection and temperature control of constituent materials incorporated into the mix design
- Chemical admixtures incorporated into the mix design for hot weather protection and temperature control
- Methods and requirements for hot weather protection and temperature control during mixing, delivery, placement, finishing, curing, and protection period
- Initial curing methods to be used to reduce surface evaporation
- Curing methods to be used during and following the protection period
- Types of covering, insulation, cooling, or enclosures to be provided
- Evaporation rate and bleeding rate of concrete calculations
- Procedures for measuring and recording concrete temperatures
- Procedures for preventing drying during dry, windy conditions

All procedures, operations, materials, and equipment required for adequate protection and curing shall be present and ready for use prior to concrete production.

CONSTRUCTION METHODS

701.40: Pre-Placement

A. Excavation.

Excavation of the area shall be in accordance with the applicable portions of Subsection 120: Excavation.

B. Subgrade and Subbase.

The subgrade for the sidewalks and driveways shall be shaped parallel to the proposed surface of the sidewalks and driveways and thoroughly compacted. All depressions in the subgrade shall be filled with suitable material and again compacted until the surface is smooth and hard. Prior to the placement of the subbase, the Contractor shall inspect the prepared subgrade to ensure that it is in conformance with the required grade and cross-section. Subgrade shall be fine graded to meet the applicable requirements of Subsection 170: Grading.

After the subgrade has been prepared, a gravel subbase shall be placed upon it. After being compacted thoroughly, the subbase shall be at least 8 inches thick and parallel to the proposed surface of the sidewalk. Prior to the placement of the cement concrete, the Contractor shall inspect the prepared subbase material to ensure that it is in conformance with the required grade and cross-section. Subbase material that is not in accordance with the plans or specifications shall be reworked or replaced to meet the applicable requirements of Subsection 170: Grading before the start of cement concrete placement. When placing cement concrete, the compacted subbase shall not be frozen or have standing water.

C. Forms.

Side forms and transverse forms shall be smooth, free from warp, of sufficient strength to resist springing out of shape, of a depth to conform to the thickness of the proposed sidewalk or pedestrian curb ramp and of a type satisfactory to the Engineer.

All mortar or dirt from previously used forms shall be completely removed prior to use. The forms shall be well staked and thoroughly graded and set to the established lines with their upper edge conforming to the grade of the finished sidewalk or pedestrian curb ramp which shall have sufficient pitch to the roadside edge to provide for surface drainage.

All pedestrian curb ramp joints and transition sections which define grade changes shall be formed staked and checked for dimension, grade and slope conformance prior to placing cement concrete.

All forms shall be oiled before placing concrete.

701.41: Placement

The concrete shall be placed in alternate slabs 30 ft long except as otherwise ordered. The slabs shall be separated by transverse preformed expansion joint filler ½ in. thick.

Preformed expansion joint filler shall be placed adjacent to or around existing structures as directed.

Detectable warning panels conforming to the plans shall be securely incorporated into the work by means acceptable to the Engineer.

On the foundation as specified above, the concrete shall be placed in such quantity that after being thoroughly consolidated in place it shall be 4 in. deep. At driveways, the sidewalks shall be 6 in. deep.

In conveying the concrete from the place of mixing to the place of deposit, the operation shall be conducted in such a manner that no mortar will be lost, and the concrete shall be so handled that the concrete will be of uniform composition throughout, showing neither excess nor lack of mortar in any one place.

The surface of all concrete sidewalks shall be uniformly scored into block units of areas not more than 36 ft². The depth of the scoring shall be at least ½ in. deep and no more than ½ in. wide.

701.42: Initial Curing

In instances where the bleed water sheen has disappeared from the surface of the concrete or the concrete surface exhibits loss of moisture and surface drying between placement and finishing operations, the Contractor shall apply one of the following initial curing materials and procedures meeting 701.30.C: Initial Curing Materials until finishing operations occur.

- 701.30.C.1: Liquid-Applied Evaporation Reducers

Initial curing materials shall not be worked into the surface in subsequent finishing operations.

701.43: Finishing

The finishing of concrete surface shall be done by experienced and competent cement finishers. No finishing operation shall be performed while free water is present. Finishing operations shall be delayed until all bleed water and water sheen has left the surface and the concrete has started to stiffen. After water sheen has disappeared, edging operations, where required, shall be completed. After edging and joining operations, the surface shall be floated. Magnesium floats shall be used for all finishing operations. If necessary tooled joints and edges shall be rerun before and after floating to maintain uniformity. After floating, the surface shall be brushed by drawing a soft-bristled push broom with a long handle over the surface of the concrete to produce a nonslip surface.

701.44: Intermediate Curing

In instances where finishing operations have been completed prior to the concrete achieving final set and the concrete surface exhibits loss of moisture and surface drying, the Contractor shall apply one of the following intermediate curing materials and procedures meeting 701.30.D: Intermediate Curing Materials immediately to the concrete surface prior to the application of final curing materials, to prevent the loss of moisture without damaging the concrete surface, until final set of the concrete has been achieved and final curing materials have been applied to the concrete surface.

- 701.30.C.1: Liquid-Applied Evaporation Reducers
- 701.30.E.3.a: Liquid Membrane-Forming Compounds for Curing
- 701.30.E.3.b: Liquid Membrane-Forming Compounds for Curing and Sealing

701.45: Final Curing

The Contractor shall apply one of the following final curing materials and procedures meeting 701.30.E: Final Curing Materials to the concrete surface immediately after application of initial and intermediate curing materials, finishing operations, and final set of cement concrete, to prevent the loss of moisture and surface drying.

- 701.30.E.1: Saturated Covers
- 701.30.E.2: Sheet Materials
- 701.30.E.3.a: Liquid Membrane-Forming Compounds for Curing
- 701.30.E.3.b: Liquid Membrane-Forming Compounds for Curing and Sealing

The Contractor shall apply final curing materials and procedures to the concrete surface throughout the entire duration of the curing cycle and meet minimum sustained temperature, duration, and strength requirements, as specified in in Table 701.45-1. Controlled and gradual termination of the curing cycle shall begin after all specified conditions are met.

Table 701.45-1: Termination of Curing Cycle

Sustained Concrete Temperature	Final Curing Cycle Duration	Compressive Strength[1]
50°F ≤ °F ≤ 90°F	≥ Seven (7) days	≥ 70% f'_c

[1] Compressive strength cylinders for termination of curing cycle shall be cast and field cured with the same environmental conditions that the sidewalk is subjected to throughout the entire duration of the final curing cycle, per 701.73: Acceptance Sampling and Testing.

701.46: Protective Sealing

The Contractor shall apply sealing materials and procedures meeting 701.30.F: Protective Sealing Compounds only if one or more of the following final curing materials and procedures were applied:

- 701.30.E.1: Saturated Covers
- 701.30.E.2: Sheet Materials
- 701.30.E.3.a: Liquid Membrane-Forming Compounds for Curing

Protective sealing compounds shall not be applied to concrete surfaces applied with a final curing material and procedure meeting 701.30.E.3.b: Liquid Membrane-Forming Compounds for Curing and Sealing.

701.47: Cold Weather Concreting

The Contractor shall conduct cold weather concreting procedures, operations, materials, and equipment required for the mixing, delivery, placement, finishing, curing, and protection of concrete, while surfaces are exposed to air temperatures falling below, or expected to fall below 40°F in accordance with 701.30.G: Cold Weather Concreting Materials. All procedures, operations, materials, and equipment required for adequate protection and curing shall be present and ready for use prior to concrete production.

701.48: Hot Weather Concreting

The Contractor shall conduct hot weather concreting procedures, operations, materials, and equipment required for the mixing, delivery, placement, finishing, curing, and protection of concrete, while surfaces are exposed to air temperatures exceeding, or expected to exceed 80°F; concrete temperatures approaching, or expected to approach 90°F; evaporation rates of surface water approaching, or expected to approach the bleeding rate of the concrete; high solar radiation; low relative humidity; and high wind speed in accordance with 701.30.H: Hot Weather Concreting Materials. All procedures, operations, materials, and equipment required for adequate protection and curing shall be present and ready for use prior to concrete production

CONTRACTOR QUALITY CONTROL

701.60: General

The Contractor shall provide adequate Quality Control (QC) to ensure that all materials and workmanship conform with the specification requirements. The Contractor shall perform QC activities as outlined further below.

701.61: Contractor Quality Control Plan

The Contractor shall provide and maintain a Quality Control Plan (QC Plan). The QC Plan should sufficiently document the QC processes of all Contractor parties (i.e. Prime Contractor, Subcontractors, Producers) performing work required under this specification.

701.62: Production Personnel

A. Foreman.

A foreman shall be present throughout the entire duration of the construction operation with at least one of the following personnel certifications.

- NRMCA Concrete Exterior Finisher Certification
- ACI Concrete Flatwork Technician and Flatwork Finisher

The foreman is responsible for the oversight of the construction operation per the requirements specified in Table 701.62-1.

Table 701.62-1: Minimum Foreman Activities

Operation	Foreman	Activity
Oversight	One (1)	Review and compare batch ticket quantities and sources to approved mix design
		Monitors conformance to AASHTO M 157 Standard Specification for Ready-Mixed Concrete
		Monitors conformance to Department specifications
		Monitors Production Personnel activities
		Verifies proper equipment is on hand prior to start of construction
		Monitors equipment, environmental conditions, materials, and workmanship
		Prohibits the use of prohibited equipment and practices
		Acknowledges sampling, testing, and inspection results

B. Operators.

Concrete sidewalk shall be constructed by sufficiently staffed, trained, experienced, and qualified equipment operators and craftsmen, who are presently involved in sidewalk construction, throughout the entire duration of the construction operation, per the requirements specified in Table 701.62-2.

Table 701.62-2: Minimum Operator Activities

Operation	Operators[1]	Activity
701.40: Pre-Placement	Two (2)	Apply sufficient base compaction
		Moisten sub-base, free of standing water
		Secure forms, straight and level
		Mark expansion locations
		Prohibited Practices: Placement on frozen sub-grade
701.41: Placement (Concrete Discharging)	Two (2)	Direct concrete trucks
		Handle chute discharge and truck movement
		Assist in preparing concrete for testing
		Direct trucks to washout area
		Provide general help
		Prohibited Practices: Adding constituent materials not in conformance with AASHTO M 157 or without Department consent
701.41: Placement	Two (2)	Localize placement to minimize moving material
		Level concrete in front of the screed
		Operate come-alongs or flat headed shovel to move concrete in form
		Consolidate concrete along form edge to avoid honeycombing
		Operate screed over top of forms in sawing action for surface leveling
		Operate magnesium bull float to push coarse aggregate below the surface and fill in the low spots or depressions
		Prohibited Practices: Toothed raking, dragging of internal vibrator, and internal vibrator to move concrete; steel troweling or floating
701.42: Initial Curing	Apply an initial curing material and procedure per 701.42	
	One (1)	701.30.C.1: Liquid-Applied Evaporation Reducers
701.43: Finishing	Two (2)	Permit bleed water to dissipate and concrete to set
		Operate a hose drag or squeegee to remove water from the surface
		Check surface for flatness, fill/cut as necessary
		Finish surface with magnesium float
		Apply pulled broom finish at proper time to acceptable texture
		Clean broom when excessive mortar adheres
		Remove excess water from broom before use
		Finish edges and joints
		Finish well formed, properly spaced joints to sufficient depth
		Prohibited Practices: Steel troweling or floating; adding water to the surface; excessive working of surface; pushing broom across surface

[1] Recommended number of operators.

Table 701.62-2: Minimum Operator Activities (Continued)

Operation	Operators[1]	Activity
701.44: Intermediate Curing	If applicable, apply an intermediate curing material and procedure per 701.44	
	One (1)	701.30.C.1: Liquid-Applied Evaporation Reducers
	One (1)	701.30.E.3.a: Liquid Membrane-Forming Compounds
	One (1)	701.30.E.3.b: Liquid Membrane-Forming Compounds for Curing and Sealing
701.45: Final Curing	Apply a final curing material and procedure meeting 701.45	
	Four (4)	701.30.E.1: Saturated Covers
	Four (4)	701.30.E.2: Sheet Materials
	One (1)	701.30.E.3.a: Liquid Membrane-Forming Compounds
	One (1)	701.30.E.3.b: Liquid Membrane-Forming Compounds for Curing and Sealing
701.46: Protective Sealing	One (1)	If applicable, apply a protective sealing material and procedure per 701.46
701.47: Cold Weather Concreting	Four (4)	If applicable, apply cold weather concreting materials and procedures per 701.47 and the Department approved Contractor cold weather concreting plan
701.48: Hot Weather Concreting	Four (4)	If applicable, apply hot weather concreting materials and procedures per 701.48 and the Department approved Contractor hot weather concreting plan

[1] Recommended number of operators.

701.63: Quality Control Inspection

Quality Control inspection shall be performed and reported on inspection report forms by qualified Quality Control Technicians, to confirm conformance to specifications and to visually inspect equipment, environmental conditions, materials, and workmanship. Quality Control Technicians shall obtain at least one of the following personnel certifications.

- NRMCA Concrete Exterior Finisher Certification
- ACI Concrete Flatwork Technician and Flatwork Finisher

Quality Control inspection report forms shall be completed by the Contractor and submitted to the Department for review.

DEPARTMENT ACCEPTANCE

701.70: General

Acceptance shall be performed by the Department, including consultants under direct contract with the Department independent of the Contractor, to evaluate the degree of compliance with contract requirements, to monitor each Contractor entity's Quality Control activities, to determine the

corresponding value for a given product, and to determine the acceptability of all material produced and placed.

701.71: Acceptance of Contractor Quality Control Plan

The Department will review the Contractor Quality Control Plan. Department approval shall be subject to conformance with the requirements specified herein.

701.72: Acceptance Inspection

Acceptance inspection will be performed and reported by qualified Department (or designee) Acceptance Technicians, to confirm conformance to specifications and to visually inspect equipment, environmental conditions, materials, and workmanship.

701.73: Acceptance Sampling and Testing

Acceptance sampling and testing will be performed and reported by qualified Department (or designee) Acceptance Technicians, to provide quality characteristic data used for Department Acceptance determination, per the requirements specified herein.

Table 701.73-1: Minimum Acceptance Sampling and Testing Requirements

Property	Method	Quality Characteristic	Sublot Size	Minimum Test Frequency	Point of Sampling	Criteria
Uniformity	T 119	Slump Allowable Tolerance (in.)[1]	100 cy	1 per Sublot	Point of Discharge	Target ± 1.5
Workability	T 119	Segregation Resistance[2]	100 cy	1 per Sublot	Point of Discharge	Pass
Thermal	T 309	Concrete Temperature (°F)	100 cy	1 per Sublot	Point of Discharge	50 – 90
Strength	T 22	Compressive Strength at 7 Days for Curing Termination (psi)[3]	100 cy	1 per Sublot	Point of Discharge	≥ 70% f'_c
		Compressive Strength at 28 Days (psi)[3]	100 cy	1 per Sublot	Point of Discharge	≥ 100% f'_c
		Compressive Strength at 56 Days (psi)[3][4]	100 cy	1 per Sublot	Point of Discharge	≥ 100% f'_c
Durability	T 121 T 152 T 196	Freezing and Thawing Resistance: Air Content (%)	100 cy	1 per Sublot	Point of Discharge	5.5 – 8.5
	T 303 or C1567	Alkali Silica Reaction Resistance: Expansion at 14 Days (%)	–	1 per Annual Mix Design Submission Cycle	–	≤ 0.08

[1] Test result and the Producer's mix design target shall be within the specified allowable tolerances. Slump shall be reported on the Producer's mix design batch ticket for each delivery.

[2] Testing for segregation resistance shall be performed while the concrete is being discharged and during AASHTO T 119 Standard Method of Test for Slump of Hydraulic Cement Concrete. Visual signs of segregation include coarse particles advancing in front of or behind the fine particles and mortar and a tendency for coarse aggregate to separate from the mortar, particularly when the mixture is being consolidated.

[3] Three (3) 4 x 8 in. compressive strength cylinders shall be cast and tested for each age per sublot.

[4] Testing only required if compressive strength results at 28 days do not conform with specifications.

COMPENSATION

701.80: Method of Measurement

Cement Concrete Sidewalks, Pedestrian Curb Ramps, and Driveways will be measured in square yards.

Excavation will be measured by the cubic yard as specified in 120.80: Method of Measurement.

Gravel Borrow will be measured by the cubic yard as specified in 150.80: Method of Measurement.

Fine grading and compacting will be measured by the square yard as specified in 170.88: Method of Measurement.

701.81: Basis of Payment

Cement Concrete Sidewalk, Cement Concrete Pedestrian Curb Ramp, and Cement Concrete Driveway will be paid for at the contract unit price per square yard complete in place, including detectable warning panels and all incidental materials, labor, and equipment necessary to complete the work to the satisfaction of the Engineer.

Gravel will be paid for at the contract unit price per cubic yard under Item 151: Gravel Borrow.

Fine grading and compacting will be paid for at the contract unit price per square yard under Item 170: Fine Grading and Compacting – Subgrade Areas.

Excavation will be paid for at the contract unit price per cubic yard under the excavation items.

701.82: Payment Items

701.	Cement Concrete Sidewalk	Square Yard
701.1	Cement Concrete Sidewalk Driveways	Square Yard
701.2	Cement Concrete Pedestrian Curb Ramp	Square Yard

GUIDE TO THE INTERIM SUBSECTION 701 CEMENT CONCRETE SIDEWALK SPECIFICATION

MATERIALS ACTIVITIES

Section	Activity	
701.30.A	**Combined Aggregate System**	
701.30.A.1	The mix design's combined aggregate system should meet Table 701.30-1: Tarantula Curve Particle Size Distribution.	Recommendation
701.30.A.2	The mix design's combined aggregate system should meet Table 701.30-2 / Figure 701.30-1: Shilstone Workability-Coarseness.	Recommendation
701.30.A.3	The mix design's combined aggregate system should be analyzed using the Fineness Modulus.	Recommendation
701.30.A.4	The mix design's combined aggregate system should be analyzed using the Coarse Aggregate Content.	Recommendation
701.30.B	**Paste System**	
701.30.B.1	The mix design's Water-Cementitious Ratio should be ≤ 0.40 (Table 701.30-3: Freezing, Thawing, and De-icing Resistance).	Recommendation
701.30.B.1	The mix design's Water-Cementitious Ratio shall be ≤ 0.45 (Table 701.30-3: Freezing, Thawing, and De-icing Resistance).	Required
701.30.B.2	The mix design's Air Content should approach the recommended Air Content Targets identified in Table 701.30-4: Freezing, Thawing, and De-icing Resistance.	Recommendation
701.30.B.3	The mix design's Cement and Supplementary Cementitious Materials (SCM) Content shall meet Table 701.30-5: Alkali Silica Reaction and Freezing, Thawing, and De-icing Resistance requirements.	Requirement
701.30.B.3	Test results meeting Table 701.30-6: Alternative Performance Evaluation to Alkali Silica Reaction Resistance requirements may be used in lieu of the mix design requirements identified in Table 701.30-5: Alkali Silica Reaction and Freezing, Thawing, and De-icing Resistance requirements.	Optional
701.30.B.4	The mix design should incorporate Chemical Admixtures identified in Table 701.30-7: Chemical Admixtures to enhance the properties of the concrete.	Recommendation
701.30.B.5	The mix design's Paste Content should approach the recommended targets identified in Table 701.30-8: Paste Content.	Recommendation

701.73	Acceptance Sampling and Testing	
T 119	The Slump shall meet Table 701.71-1: Minimum Acceptance Sampling and Testing Requirements (± 1.5 from Slump Target identified by the Concrete Producer on the Batch Ticket).	Requirement
T 119	The Segregation Resistance shall meet Table 701.71-1: Minimum Acceptance Sampling and Testing Requirements.	Requirement
T 309	The Concrete Temperature shall meet Table 701.71-1: Minimum Acceptance Sampling and Testing Requirements.	Requirement
T 22	The Compressive Strength (7, 28, and 56 days) shall meet Table 701.71-1: Minimum Acceptance Sampling and Testing Requirements.	Requirement
T 121 T 152 T 196	The Air Content shall meet Table 701.71-1: Minimum Acceptance Sampling and Testing Requirements (5.5 – 8.5%).	Requirement
T 303 or C1567	The resistance to Alkali Silica Reaction shall meet Table 701.71-1: Minimum Acceptance Sampling and Testing Requirements (One per year for mix design verification).	Requirement

CONTRACTOR ACTIVITIES

Section	Activity	
701.40	Pre-Placement	
	The Contractor should have a minimum of two (2) Operators.	Recommendation
	The Contractor shall apply sufficient base compaction.	Requirement
	The Contractor shall moisten sub-base, free of standing water.	Requirement
	The Contractor shall secure forms, straight and level.	Requirement
	The Contractor shall mark expansion locations.	Requirement
	The Contractor shall be prohibited from performing the following practices: Placement on frozen sub-grade.	Requirement
701.41	Placement (Concrete Discharging)	
	The Contractor should have a minimum of two (2) Operators.	Recommendation
	The Contractor shall direct concrete trucks.	Requirement
	The Contractor shall handle chute discharge and truck movement.	Requirement
	The Contractor shall assist in preparing concrete for testing.	Requirement
	The Contractor shall direct trucks to washout area.	Requirement
	The Contractor shall provide general help.	Requirement

	The Contractor / Concrete Producer shall be prohibited from performing the following practices: Adding constituent materials not in conformance with AASHTO M 157 or without Department consent.	Requirement
701.41	**Placement**	
	The Contractor should have a minimum of two (2) Operators.	Recommendation
	The Contractor shall localize placement to minimize moving material.	Requirement
	The Contractor shall level concrete in front of the screed.	Requirement
	The Contractor shall operate come-alongs or flat headed shovel to move concrete in form.	Requirement
	The Contractor shall consolidate concrete along form edge to avoid honeycombing.	Requirement
	The Contractor shall operate screed over top of forms in sawing action for surface leveling.	Requirement
	The Contractor shall operate magnesium bull float to push coarse aggregate below the surface and fill in the low spots or depressions.	Requirement
	The Contractor shall be prohibited from performing the following practices: Toothed raking, dragging of internal vibrator, and internal vibrator to move concrete; steel troweling or floating.	Requirement
701.42	**Initial Curing (When Applicable)**	
	The Contractor should have a minimum of one (1) Operator.	Recommendation
	The Contractor shall apply 701.30.C.1: Liquid-Applied Evaporation Reducers when applicable.	Required when applicable
701.43	**Finishing**	
	The Contractor should have a minimum of two (2) Operators.	Recommendation
	The Contractor shall permit bleed water to dissipate and concrete to set.	Requirement
	The Contractor shall operate a hose drag or squeegee to remove water from the surface.	Requirement
	The Contractor shall check surface for flatness, fill/cut as necessary.	Requirement
	The Contractor shall finish surface with magnesium float.	Requirement
	The Contractor shall apply pulled broom finish at proper time to acceptable texture.	Requirement
	The Contractor shall clean broom when excessive mortar adheres.	Requirement
	The Contractor shall remove excess water from broom before use.	Requirement

	The Contractor shall finish edges and joints.	Requirement
	The Contractor shall finish well formed, properly spaced joints to sufficient depth.	Requirement
	The Contractor shall be prohibited from performing the following practices: Steel troweling or floating; adding water to the surface; excessive working of surface; pushing broom across surface.	Requirement
701.44	**Intermediate Curing (When Applicable, Apply One of the Methods)**	
	The Contractor should have a minimum of one (1) Operator.	Recommendation
	The Contractor shall apply 701.30.C.1: Liquid-Applied Evaporation Reducers when applicable and if selected.	Required when applicable
	The Contractor shall apply 701.30.E.3.a: Liquid Membrane-Forming Compounds when applicable and if selected.	Required when applicable
	The Contractor shall apply 701.30.E.3.b: Liquid Membrane-Forming Compounds for Curing and Sealing when applicable and if selected.	Required when applicable
701.45	**Final Curing (Apply One of the Methods)**	
	The Contractor should meet the minimum number of operators identified in Table 701.62-2: Minimum Operator Activities.	Recommendation
	The Contractor shall apply 701.30.E.1: Saturated Covers if selected.	Requirement
	The Contractor shall apply 701.30.E.2: Sheet Materials if selected.	Requirement
	The Contractor shall apply 701.30.E.3.a: Liquid Membrane-Forming Compounds if selected.	Requirement
	The Contractor shall apply 701.30.E.3.b: Liquid Membrane-Forming Compounds for Curing and Sealing if selected.	Requirement
701.46	**Protective Sealing (If Required)**	
	The Contractor should have a minimum of one (1) Operator.	Recommendation
	The Contractor shall apply 701.30.F: Protective Sealing Compounds at least 28 days after placement. Application of 701.30.F: Protective Sealing Compounds is **NOT REQUIRED IF 701.30.E.3.b: Liquid Membrane-Forming Compounds for Curing and Sealing was applied**.	Required if 701.30.E.3.b Curing and Sealing Compound was Not Applied
701.47	**Cold Weather Concreting (When Applicable)**	
	The Contractor should have a minimum of four (4) Operators.	Recommendation
	The Contractor shall submit a Cold Weather Concreting Plan meeting 701.47.	Required when applicable

	The Contractor shall apply cold weather concreting materials and procedures meeting 701.47 and the Department approved Contractor cold weather concreting plan.	Required when applicable
701.48	**Hot Weather Concreting (When Applicable)**	
	The Contractor should have a minimum of four (4) Operators.	Recommendation
	The Contractor shall submit a Hot Weather Concreting Plan meeting 701.48.	Required when applicable
	The Contractor shall apply hot weather concreting materials and procedures meeting 701.47 and the Department approved Contractor hot weather concreting plan.	Required when applicable
701.61	**Contractor Quality Control Plan**	
	The Contractor shall prepare and submit a Quality Control Plan (QC Plan) to the Department for review.	Requirement
701.62	**Production Personnel**	
701.62.A	Foreman	
	The Contractor shall have a minimum of One (1) Foreman.	Requirement
	A Foreman shall be present throughout the entire duration of the construction operation with at least one of the following personnel certifications. • NRMCA Concrete Exterior Finisher Certification • ACI Concrete Flatwork Technician and Flatwork Finisher	Requirement
	The Contractor's Foreman shall review and compare batch ticket quantities and sources to approved mix design.	Requirement
	The Contractor's Foreman shall monitor conformance to AASHTO M 157 Standard Specification for Ready-Mixed Concrete.	Requirement
	The Contractor's Foreman shall monitor conformance to Department specifications.	Requirement
	The Contractor's Foreman shall monitor Production Personnel activities.	Requirement
	The Contractor's Foreman shall verify that proper equipment is on hand prior to start of construction.	Requirement
	The Contractor's Foreman shall monitors equipment, environmental conditions, materials, and workmanship.	Requirement
	The Contractor's Foreman shall prohibit the use of prohibited equipment and practices.	Requirement
	The Contractor's Foreman shall acknowledge sampling, testing, and inspection results.	Requirement

701.62.B	**Operators**	
	Concrete sidewalk shall be constructed by sufficiently staffed, trained, experienced, and qualified equipment operators and craftsmen, who are presently involved in sidewalk construction, throughout the entire duration of the construction operation, per the requirements specified in Sections 701.40 to 701.48.	Requirement
701.63	**Quality Control Inspection**	
	Quality Control inspection shall be performed and reported on inspection report forms by qualified Quality Control Technicians, to confirm conformance to specifications and to visually inspect equipment, environmental conditions, materials, and workmanship. Quality Control Technicians shall obtain at least one of the following personnel certifications. • NRMCA Concrete Exterior Finisher Certification • ACI Concrete Flatwork Technician and Flatwork Finisher Quality Control inspection report forms shall be completed by the Contractor and submitted to the Department for review	Requirement

DOCUMENT 00715

SUPPLEMENTAL SPECIFICATIONS

JUNE 30, 2024

The 2024 *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 4: SCOPE OF WORK

Subsection 4.06: Increased or Decreased Contract Quantities
Replace the second paragraph with the following.

Where the actual quantity of a pay item varies by more than 25% above or below the estimated quantity stated in the Contract, an equitable adjustment in the Contract Price for that pay item shall be negotiated upon demand of either party regardless of the cause of the variation in quantity. A demand for an equitable adjustment must be submitted to the other party within 30 days after beginning the work of the affected item that is greater than 25% above the bid quantity or within 30 days after completing the work when the actual quantity is 25% less than the bid quantity.

DIVISION II

CONSTRUCTION DETAILS

DIVISION II: Construction Details
Replace M4.02.15 Cement Mortar with M4.04.0 Grout, Mortar, and Concrete Products where encountered, including in Subsections 230.40, 485.40, 501.40, 685.40, 940.40A and 983.40.

SECTION 100: EARTHWORK, GRADING, DEMOLITION, RODENT CONTROL AND BORINGS

SUBSECTION 150: EMBANKMENT

Subsection 150.62: Embankment Construction with Materials Other Than Rock
Replace the fourth paragraph with the following.

The embankment materials shall be compacted to not less than 95% of the maximum dry density of the embankment material as determined by AASHTO T 99, Method C. If required, a correction for oversized particles shall be in accordance with Annex A of AASHTO T 99. If the material retained on the ¾-in. sieve is 30% or more of the total sample, this test shall not apply and the material shall be compacted to the target density. The target density shall be established by determining the number of passes of a roller required to produce a constant and uniform density, after conducting a series of tests using either AASHTO T 310, *In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)*, AASHTO T 191, *Density of Soil In-Place by the Sand-Cone Method*, or *ASTM D 8167 Standard Test Method for In-Place Bulk Density of Soil and Soil-Aggregate by a Low-Activity Nuclear Method (Shallow Depth)*. The Contractor shall, without additional compensation, employ whatever measures may be necessary to adjust the natural water content of the suitable embankment material to permit the placement and compaction as hereinbefore specified.

SUBSECTION 160: CONTROLLED LOW-STRENGTH MATERIAL

Subsection 160: Controlled Low-Strength Material
Add this new subsection.

DESCRIPTION

160.20: General

Controlled Low-Strength Material shall be installed in accordance with the relevant provisions of Subsection 150: Embankment, Section 901: Cement Concrete and in accordance with the procedures described herein.

Controlled Low Strength Materials (CLSM) shall be a self-compacting, self-leveling, flowable, excavatable or non-excavatable, low strength, rigid setting, and unshrinkable material, used as an alternative to compacted granular fills, including backfill, structural fill, utility fill, pavement base, subgrade, subbase, base course, conduit bedding, erosion control, and void filling.

MATERIALS

160.40: General

Material for controlled low-strength material shall meet the requirement specified of M4.08.0 Controlled Low-Strength Material. The material shall be specified by the Engineer as one of the following types;

CLSM – Manual Excavatable (≤100 psi)

CLSM – Mechanical Excavatable (101-300 psi)
CLSM – Structural Non Excavatable (> 300 psi)

Permeability testing as specified in Table M4.08.0-2 shall be required when the material is placed outside of roadway areas or footings for concrete structures, or as directed by the Engineer.

CONSTRUCTION METHODS

160.60: General

The Contractor shall submit a placement plan for Controlled Low-Strength Material (CLSM). The plan shall include the type of CLSM, detailed descriptions of methods used for placing and containing the controlled density fill and the set time to strength.

The Contractor shall remove all debris prior to placing the fill. Fill shall not be placed against any structural elements or utilities unless approved by the Engineer.

CLSM shall be poured in lifts not exceeding 4 feet to insure stability under the fluid effects of the pour. Care shall be taken to ensure the integrity of the forms or other means of supporting the material until the material sets up.

COMPENSATION

160.80: Method of Measurement

Controlled Low-Strength Material shall be measured by the cubic yard in place to the neat lines established on the plans or specified by the Engineer. When backfilling pipes the horizontal neat lines shall be not greater than 3.0 ft. greater than the rated inside diameter of the pipe and vertically from the top of the crushed stone foundation material, if any, or 6 in. below the pipe invert whichever is less to the specified top elevation. A deduction shall be made for the volume of the pipe or conduit encased.

160.81: Basis of Payment

Payment under this item shall constitute full compensation for the placement, testing, and all material, equipment and labor to complete the work.

160.82: Payment Items

160.1	Controlled Low-Strength Material - Manual Excavatable (≤ 100 PSI)	Cubic Yard
160.2	Controlled Low-Strength Material – Mechanical Excavatable (101-300 PSI)	Cubic Yard
160.3	Controlled Low-Strength Material (>300 PSI)	Cubic Yard

SECTION 200: DRAINAGE

SUBSECTION 201: BASINS, MANHOLES AND INLETS

Subsection 201.40: General
Replace "Cement Mortar ..... M4.02.15" with "Mortar ..... M4.04.0".

SECTION 400: SUB-BASE, BASE COURSES, SHOULDERS, PAVEMENTS AND BERMS

SUBSECTION 401: GRAVEL SUB-BASE

Subsection 401.60: Gravel Sub-base
Replace the last sentence of the first paragraph with the following.

The specific density of the Gravel Sub-base shall be maintained by determining the number of passes of a roller required to produce a constant and uniform density, after conducting a series of tests using a nuclear device or the sand/volume method in accordance with AASHTO T310, AASHTO T 191, or ASTM D 8167.

SUBSECTION 402: DENSE GRADED CRUSHED STONE FOR SUB-BASE

Subsection 402.61: Spreading and Compacting
Replace the last sentence of the first paragraph with the following.

The specified density of the Dense Graded Crushed Stone shall be maintained by determining the number of passes of a roller are required to produce a constant and uniform density, after conducting a series of tests using a nuclear device or the sand/volume method in accordance with AASHTO T310, AASHTO T 191, or ASTM D 8167.

SUBSECTION 403: RECLAIMED PAVEMENT FOR BASE COURSE AND/OR SUB-BASE

Subsection 403.64: Compaction and Dust Control
Replace the second paragraph with the following.

The reclaimed base course shall be tested for compaction and smoothness and accuracy of grade in accordance with the applicable provisions of 401.60: Gravel Sub-base. The required density shall be measured by using a nuclear device or the sand/volume method in accordance with AASHTO T310, AASHTO T 191, or ASTM D 8167. If any portions are found to be unacceptable by the Engineer, such portions shall be reprocessed, regraded, and recompacted until the required smoothness and accuracy are obtained.

SUBSECTION 404: RECLAIMED PAVEMENT BORROW MATERIAL

Subsection 404.60: General
Replace the second sentence with the following.

The specified density of the Reclaimed Pavement Borrow Material shall be maintained by determining the number of passes of a roller that are required to produce a constant and uniform density, after conducting a series of tests using a nuclear device or the sand/volume method in accordance with AASHTO T310, AASHTO T 191, or ASTM D 8167

SUBSECTION 450: HOT MIX ASPHALT PAVEMENT

Subsection 450.40: General
Add the following paragraph to the end of this subsection.

Prior to placing hot mix asphalt the contractor shall provide notice to the Engineer at least 48 hours in advance of the work. The notice shall include the anticipated schedule, HMA tonnage, the type of mix, the mix provider and plant location.

SUBSECTION 460: HOT MIX ASPHALT PAVEMENT FOR LOCAL ROADS

Subsection 460.40: General
Add the following paragraph to the end of this subsection.

Prior to placing hot mix asphalt the contractor shall provide notice to the Engineer at least 48 hours in advance of the work. The notice shall include the anticipated schedule, HMA tonnage, the type of mix, the mix provider and plant location.

SUBSECTION 466: STRESS ABSORBING MEMBRANE & STRESS ABSORBING MEMBRANE INTERLAYER

Subsection 466.40: General
Replace this subsection with the following.

Prior to placing stress absorbing membrane the contractor shall provide notice to the Engineer at least 48 hours in advance of the work. The notice shall include the anticipated schedule, tonnage, the type of mix, the mix provider and plant location. Stress absorbing membrane and stress absorbing membrane interlayer shall be constructed as specified herein.

SUBSECTION 470: HOT MIX ASPHALT PAVEMENT BERM

Subsection 470.40: General
Replace this subsection with the following.

Prior to placing hot mix asphalt the contractor shall provide notice to the Engineer at least 48 hours in advance of the work. The notice shall include the anticipated schedule, HMA tonnage, the type of mix, the mix provider and plant location. The Contractor shall obtain HMA berm material of the type specified.

SUBSECTION 472: TEMPORARY ASPHALT PATCHING

Subsection 472.40: General
Add the following paragraph to the beginning of this subsection.

Prior to placing hot mix asphalt the contractor shall provide notice to the Engineer at least 48 hours in advance of the work. The notice shall include the anticipated schedule, HMA tonnage, the type of mix, the mix provider and plant location.

SUBSECTION 486: ULTRATHIN BONDED OVERLAY

Subsection 486.40: General
Add the following paragraph to the end of this subsection.

Prior to placing ultrathin bonded overlay the contractor shall provide notice to the Engineer at least 48 hours in advance of the work. The notice shall include the anticipated schedule, tonnage, the type of mix, the mix provider and plant location.

SECTION 600: HIGHWAY GUARD, FENCES AND WALLS

SUBSECTION 690: WALLS REMOVED AND RESET

Subsection 403.64: General
Replace the last sentence with the following.

Mortar shall meet the requirement of M4.04.0: Grout, Mortar, and Concrete Products.

SECTION 700: INCIDENTAL WORK

SUBSECTION 702: HOT MIX ASPHALT SIDEWALKS AND DRIVEWAYS

Subsection 702.40: General
Add the following paragraph to the end of this subsection.

Prior to placing hot mix asphalt the contractor shall provide notice to the Engineer at least 48 hours in advance of the work. The notice shall include the anticipated schedule, HMA tonnage, the type of mix, the mix provider and plant location.

SECTION 800: TRAFFIC CONTROL DEVICES

SUBSECTION 825: RECTANGULAR RAPID FLASHING BEACONS

Subsection 825: Rectangular Rapid Flashing Beacons
Add this new subsection.

DESCRIPTION

825.20: General

This work shall consist of furnishing and installing a solar-powered, actuated, Rectangular Rapid Flashing Beacon (RRFB) system at the location(s) shown in the Plans.

MATERIALS

825.40: General

Rectangular Rapid-Flashing Beacons shall meet the requirements specified in the following Subsections of Division III, Materials:

Cement Concrete.....M4.02.00
Signal Posts and Bases.....M10.05.1
APS Pushbuttons.....M10.09.1
RRFB Assemblies.....M10.11.0

An RRFB system shall include the following items (quantities shown in the Major Items List found in the Plans):

- Cement Concrete Foundation
- Signal Post and Pedestal Base
- APS Pushbutton
- Light Bar
- Signage
- Enclosure for Controller, Activation Unit, and Battery System
- Solar Panel
- All mounting and supporting hardware and wiring necessary to complete a working system

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.

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.

An R10-25 sign, conforming to the MUTCD, shall be mounted above the APS Pushbutton on a Type A substrate or may be integral to the button assembly.

The solar panel and battery system may be integrated into a single unit or housed separately, per the manufacturer's design. These may also be co-housed with the Light Bar and/or the Controller and Activation Unit.

The solar panel and battery system shall be sized appropriately to accommodate 300 actuations per day, 365 days a year, for the duration of the repeating flashing sequence shown in the Plans. The sizing calculations shall be based upon solar and temperature conditions for a typical December-January in Massachusetts. The system shall have a minimum autonomy of 5 days.

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.

825.41: Shop Drawings

Within 30 days from 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, M10.09.1, and M10.11.0 and these specifications.

Shop drawings shall include all solar and battery sizing calculations. These calculations shall have Contractor- or manufacturer-supplied, site-specific shading factors applied.

825.42: Material Warranties

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

825.60: General

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).

Solar panels shall be oriented to maximize sunlight gain.

SYSTEM OPERATION

825.70: 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.

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.

825.71: 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:

A. The yellow beacon on the left-hand side shall be illuminated for approximately 50 milliseconds.
B. Both yellow beacons shall be dark for approximately 50 milliseconds.
C. The yellow beacon on the right-hand side shall be illuminated for approximately 50 milliseconds.
D. Both yellow beacons shall be dark for approximately 50 milliseconds.
E. The yellow beacon on the left-hand side shall be illuminated for approximately 50 milliseconds.
F. Both yellow beacons shall be dark for approximately 50 milliseconds.
G. The yellow beacon on the right-hand side shall be illuminated for approximately 50 milliseconds.
H. Both yellow beacons shall be dark for approximately 50 milliseconds.
I. Both yellow beacons shall be illuminated for approximately 50 milliseconds.
J. Both yellow beacons shall be dark for approximately 50 milliseconds.
K. Both yellow beacons shall be illuminated for approximately 50 milliseconds.
L. 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.

COMPENSATION

825.80: Method of Measurement

RRFBs will be measured as a single system, 2-Post Assembly or 3-Post Assembly, furnished and installed.

825.81: Basis of Payment

The work will be paid for at the contract price each under the respective item for a 2-Post Assembly System or 3-Post Assembly System. 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 the contract price.

825.82: Payment Item

825.2	RRFB (2-Post Assembly System)	Each
825.3	RRFB (3-Post Assembly System)	Each

SECTION 900: STRUCTURES

Subsection 922: Elastomeric Bearing Pads
Add this new subsection.

SUBSECTION 922: ELASTOMERIC BEARING PADS

DESCRIPTION

922.20: General

This specification consists of the construction requirements for elastomeric bearing pads. Elastomeric bearing pads shall consist of plain or laminated bearings consisting of layers of elastomers restrained at their interfaces by bonded steel laminates.

MATERIALS

922.40: General

Elastomeric bearing pads shall meet the following requirements:

Elastomeric Bearing Pads M9.14.5

Anchor bolts.....M8.01.5

CONSTRUCTION METHODS

922.50: Submittals

The Contractor shall submit the following to the Engineer for approval:

1. Prior to fabrication:
    a. Written notification 30 days prior to the start of bearing production. The notification shall include the contract number, quantity, type, and size of bearing being produced, manufacturer's name, and the name of the independent testing lab.
    b. Shop drawings for approval in accordance with Subsection 5.02, 14 days prior to the start of bearing production.
2. At the time of bearing pad delivery:
    a. A certificate of compliance (COC) certifying that the elastomeric bearing pads meet the requirements of the contract specifications. The COC shall be accompanied by:
        - A mill certificate for steel laminates used in bearings, where applicable.
        - Fabricator QC test reports.
    b. Independent test results as required under Subsection 922.62.

922.51: Fabricators

Fabricators shall be in accordance with Subsection M9.14.5D.

922.52: Fabrication

Fabrication shall be in accordance with Subsection M9.14.5E.

In addition to the number of bearing pads required for the contract the Contractor shall order additional bearing pads as defined in Subsection M9.14.5G, in order to allow the Engineer to randomly select a bearing pad for testing in accordance with 922.72.

922.53: Packaging, Handling, & Storage

The bearing pads shall be packaged, handled, and stored in accordance with Subsection M9.14.5F.

All bearing devices and components shall be stored on the project in an area that provides protection from environmental and physical damage. When installed, bearings shall be clean and free of all foreign substances.

922.54 Installation

Bearing pads shall be installed only on concrete bridge seat bearing areas that have been prepared in accordance with Subsection 901.65A(3).

Bearing pads shall be installed by qualified personnel to the positions, elevations, and slopes shown on the plans and to the dimensions and offsets prescribed by the manufacturer. The bearing pads shall be adjusted, as necessary, to take into account the ambient temperature at installation and future movements of the bridge due to temperature changes, release of falsework, and shortening due to post-tensioning.

Elastomeric bearings shall be placed directly on the concrete surface provided that it is flat within the bearing area to within a tolerance of 0.005 times the smallest nominal dimension of the bearing as measured by a

straight edge from peak to valley. Bearings shall be placed on surfaces that do not deviate from the specified bridge seat slope in any direction by more than 0.01 rad.

Any bearing areas that exceed these tolerances shall be brought into compliance by grouting or use of shims as directed by the Engineer before the weight of the structure acts on the bearing.

Bearings that have an internal tapered load plates shall be marked with an arrow that points up-station in order to properly align the slope of the internal tapered load plate with the centerline of the bridge.

Sole plates that sit on the bearing shall not be welded to the beam flange in the field unless at least 1.5 in. of the steel exists between the weld and the elastomer. In no case shall the elastomer or the bond be subjected to temperatures higher than 400°F.

No beams shall be erected until the bearings have been accepted by the Engineer.

CONTRACTOR QUALITY CONTROL

922.60: General

The Contractor shall provide a Quality Control System (QC System) to ensure that all materials and workmanship meet the required specifications.

922.61: Quality Control Inspection

The Contractor shall perform QC inspection of all work items addressed under this specification. Inspection activities during placement may be performed by qualified production personnel. The Contractor's QC personnel shall have overall responsibility for the QC inspection. The Contractor shall not rely on the results of the Engineer's Acceptance inspection for QC purposes. The Engineer shall be provided with the opportunity to monitor and witness all QC inspections.

QC inspection activities must address the following three primary components:

a. Materials
b. Environmental Conditions
c. Workmanship

The minimum frequency of QC inspection activity shall be in accordance with the requirements below.

Table 922.61-1 - Minimum QC Inspection of Elastomeric Bearing Pads

Inspection Component	Inspection Attribute	Minimum Inspection Frequency	Point of Inspection	Inspection Method
Materials	Bearing Pad	Each Delivery	Bearing Pad	Check COC
	Geometry and Surface	Each Bearing Pad	Bearing Pad Surface	Visual Check & Check Measurement
Environmental Conditions	Temperature of Air	1 per Day	At Project Site	Check Measurement
Workmanship	Bridge Seat	Each Bearing Location	Bearing Pad Location	Visual Check
	Elevation	Each Bearing Pad	Bearing Pad Location	Check Measurement
	Orientation	Each Bearing Pad	Bearing Pad Location	Check Measurement

922.62: Quality Control Sampling and Testing Requirements

The Contractor shall have each Lot of bearing pads sampled and tested in accordance with Subsection M9.14.5G. This shall include both QC and compliant independent laboratory test results.

DEPARTMENT ACCEPTANCE

922.70: General

The Department shall sample and test bearing pads as part of its Acceptance activities. Independent testing shall also be used to supplement its testing.

922.71: Acceptance Inspection

The Engineer will perform Acceptance inspection to ensure that materials and completed work are in conformance with the contract requirements. Acceptance inspection is intended to visually assess the quality of each Lot produced and placed and will address only the inspection components of materials and workmanship in support of the Department's final Acceptance determination. All Acceptance inspection activities by the Department will be performed independent of the Contractor's QC inspection.

Table 922.71-1 – Department Acceptance Inspection of Elastomeric Bearing Pads

Inspection Component	Inspection Attribute	Minimum Inspection Frequency	Point of Inspection	Inspection Method
Materials	Bearing Pad	1 Per Bearing Pad	Bearing Pad Surface	Check COC
	Geometry and Surface	1 Per Bearing Pad	Bearing Pad Surface	Visual Check & Check Measurement
Workmanship	Elevation	1 per Bearing Pad	Bearing Pad Location	Check Measurement
	Orientation	1 per Bearing Pad	Bearing Pad Location	Check Measurement

922.72: Acceptance Sampling and Testing Requirements

For Acceptance samples taken by the Engineer at the project, the sampling rate shall be in accordance with Subsection M9.14.5G. Bearing pads shall be tested by the Department in accordance with Table M9.14.5-1.

922.73: Lot Acceptance Determination Based on Inspection Results

The Engineer's Acceptance inspection results will be used in the final Acceptance determination for all Lots. Prior to final Acceptance of each Lot produced and placed, the Engineer will evaluate all Acceptance inspection information for the Lot. The materials and product workmanship for the completed work will be evaluated for conformance with the plans and the requirements specified in Subsections 922.60, 922.61, and 922.62.

When the Acceptance information identifies deficiencies in either material quality or product workmanship, the location will be isolated and further evaluated by the Engineer through additional Acceptance inspection. Depending upon the findings of the additional Acceptance inspection activity, the Engineer will determine the disposition of the nonconforming work in accordance with Division I, Subsection 5.03, Conformity with Plans and Specifications.

922.74: Lot Acceptance Determination Based on Testing Data

Prior to final Acceptance of each Lot, the Engineer will evaluate all available QC, independent, and Acceptance testing data for the Lot to determine conformance with the minimum requirements in Subsection M9.14.5G and Table M9.14.5-1.

If a test result does not meet the minimum requirement, the Contractor and Engineer will further assess the quality to determine whether the material can remain in place.

If the Engineer's assessment determines that the material quality is not sufficient to permit the bearing pad to remain in place, the pad shall be removed and replaced. When a nonconforming bearing pad is corrected or replaced, the Engineer will perform Acceptance testing of the replacement bearing pad and evaluate the test results for conformance with the minimum requirements.

922.75: Final Lot Acceptance Determination

For each Lot produced and placed, the Engineer will evaluate all Acceptance inspection and testing data for the Lot. The final review and visual inspection shall be conducted jointly by the Contractor and Engineer. Any items that do not meet the requirements of the specifications and plans shall be addressed at this time, at no additional cost to the Department.

After each Lot is complete, including any corrective action, the Engineer will perform a final evaluation of all Acceptance data for the Lot. The Engineer will accept the Lot if the evaluation of all inspection and testing data for the Lot is in conformance with this specification and the contract documents.

When the above requirements have been met, the Engineer will accept all completed bearing pads.

COMPENSATION

922.80: Method of Measurement

Laminated Elastomeric Bearing Pads will be measured by each pad installed. Plain Elastomeric Bearing Pads will be measured by the square foot installed. The measured quantities do not include the additional bearings required for conformance and destructive testing.

922.81: Basis of Payment

Payment under this item shall be at the contract unit price. This price will include all materials, equipment, tools and labor, additional bearing pads for testing and all required testing necessary to complete the work.

922.82: Payment Items

921.	Laminated Elastomeric Bearing Pad with Anchor Bolts	Each
922.	Laminated Elastomeric Bearing Pad without Anchor Bolts	Each
923.	Laminated Sliding Elastomeric Bearing Pad with Anchor Bolts	Each
933.	Plain Elastomeric Bearing Pad	Square Foot

SECTION 970: DAMP-PROOFING

Subsection 970.30: General
Add the following material to this subsection.

Mortar..... M4.04.0

Subsection 970.40: General
Replace the second sentence in the second paragraph with the following.

All holes in concrete surfaces shall be satisfactorily filled with mortar before damp-proofing is applied.

SUBSECTION 983: REVETMENT

Subsection 983.64 Special Slope Paving Under Bridges
Replace the last sentence under B. Quarry Stone or Precast Concrete Blocks. with the following.

Mortar shall then be placed in the joints to the top of the paved surface.

Subsection 983.65 Channel Paving and Grouted Channel Paving
Replace the last sentence with the following.

The grout shall conform to M4.04.0: Grout, Mortar, and Concrete Products.

DIVISION III

MATERIALS SPECIFICATIONS

SECTION M4: CEMENT AND CEMENT CONCRETE MATERIALS

Subsection M4.02.00 Cement Concrete

Add the following to the end of this subsection.

Alkali Silica Reactivity - Resistant Portland Cement Concrete

All cement concrete and precast/prestressed concrete products shall be alkali silica reactivity-resistant. Proportion Portland cement concrete mixes to include materials that meet either the aggregate requirement or Alkali-Silica Reactivity (ASR) mitigation criteria listed below. Provide cement mill test reports from certified laboratories that show the materials' source, composition and the cement alkali content expressed as sodium oxide equivalent(s) not to exceed 1.4%. Certified test reports according to test procedures as specified in Table A will be required to be submitted with the trial batch submission to RMS for approval every year or whenever the source of material is changed.

Select non-reactive aggregates that meet all the criteria of Table M4.02.00-2. Mitigate the mix as described below when nonreactive aggregates are unavailable. If non-reactive aggregates are used for portland cement concrete mix, 15% by weight of the cementitious content shall be fly ash meeting AASHTO M 295, Type F.

Select a material or a combination of materials that meet the criteria shown in Table M4.02.00-3 to mitigate ASR when concrete mixes must be proportioned with reactive aggregates. Perform verification test according to AASHTO T 303 and ASTM C295 to determine the effectiveness of the resulting mix design against ASR. Use the same proportion of cement and pozzolan for each test mixture as that proposed for the actual mix design. Provide the Department with certified documentation of the mixtures' effectiveness to control ASR.

Table M4.02.00-2: Tests and Criteria for Proposed Aggregates

Procedure	Description	Limits
AASHTO T 303: Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali-Silica Reaction	Mean mortar bar expansion at 14 days. Perform a polynomial fit (1) of 4, 7, 11, and 14 days to determine reliability of results	0.08% maximum metamorphic aggregate; 0.10% maximum all other aggregates. Repeat AASHTO T 303 if r^2 is less than 0.95.
ASTM C295: Petrographic Examination of Aggregates for Concrete	Optically strained, microfractured, or microcrystalline quartz	5.0% maximum (2)
	Chert or chalcedony	3.0% maximum (2)
	Tridymite or cristobolite	1.0% maximum (2)
	Opal	0.5% maximum (2)
	Natural volcanic glass	3.0% maximum (2)

(1) Use a second order polynomial of $\%Exp = A^o + A^1 SQRT(t) + A^2t$. See publication SD92-04-F.
(2) Based on the total aggregate sample.

Table M4.02.00-3: Mitigation Methods for ASR in Portland Cement Concrete

Material	Specification	Cementitious Material Percentage (1)
Low alkali cement (2)	AASHTO M 85	100%
Fly ash - Class F	AASHTO M 295	15% minimum to 30% (4) maximum
Silica Fume (5)	AASHTO M 307	6% ± 1% (6)
Slag Grade 100 and 120	AASHTO M 302	25% minimum to 50% maximum

(1) Measure this minimum content of cementitious material as percent by weight of cement plus pozzolan.
(2) This single criterion is not effective in all cases in remediating ASR. Low alkali cement (0.60% maximum (3)) must be used in combination with other pozzolanic materials in Table B.
(3) Na_2O equivalent = $\%Na_2O + 0.658\ (\%K_2O)$
(4) Fly ash, Type F, shall replace 15% by weight of the design cement content, and any additional fly ash will be considered as fine aggregate.
(5) Silica fume shall only be used in silica fume cement concrete.
(6) The total amount of Type F fly ash and silica fume shall constitute 20% by weight of the design cement content, and any additional fly ash shall be considered as fine aggregate.

Subsection M4.02.15 Cement Mortar
Delete this subsection.

Subsection M4.04.0: Grout, Mortar and Concrete Products
Replace this subection with the following.

M4.04.0: Grout, Mortar, and Concrete Products

Grout, cementitious mortar, and concrete products shall be packaged, dry, and preblended with preformulated constituent materials (excluding mixing water) to produce a material with acceptable quality characteristics and material properties, including time of set, compressive strength, flexural strength, slant shear bond strength, resistance to alkali silica reaction, freezing/thawing, and de-icing cycles, shrinkage, expansion, and sulfate reaction.

Mortar products shall be defined as products containing aggregate of which less than 5% by mass of the total mixture is retained on the 3/8 in. sieve. Mortar products for concrete repairs shall be used only on repair depths of 2 in. or less. Concrete products shall be defined as products containing aggregate of which 5% or more by mass of the total mixture is retained on the 3/8 in. sieve. Concrete products for concrete repairs shall be used only on repair depths greater than 2 in.

The aggregate sources included in the prepackaged product or extended into the product shall meet Section M4.02.02: Aggregates. Grout, cementitious mortar, and concrete products shall only be applied per the requirements provided on the product's technical data sheet. Grout, cementitious mortar, and concrete products shall maintain valid listing on the MassDOT Qualified Construction Materials List (QCML). Grout, cementitious mortar, and concrete products shall meet requirements specified herein.

A. Technical Data Sheet.

The Manufacturer shall submit the product's technical data sheet to the Department for review. At a minimum, the product's technical data sheets shall include:

(a) Product Name
(b) Manufacturer, including address and contact information
(c) Packaging
(d) Yield
(e) Product Description, including an overview of the product and its intended application(s) and use(s).
(f) Technical Data, including quality characteristics and corresponding performance criteria with the AASHTO and/or ASTM standard test methods identified.

(g) Recommended Equipment
(h) Instructions, including surface preparation, mixing, forming, placing, finishing, curing, and protection from adverse conditions, such as precipitation, cold conditions, and hot conditions.
(i) Limitations
(j) Storage and Shelf Life
(k) Safety

B. Mix Design Formulation.

Products that are extended with aggregate not included in the original product packaging shall be formulated per the product's technical data sheet and evaluated through Department mix design evaluation and verification testing. Producers shall report and submit proposed mix design formulations onto the Department issued mix design sheet. The Producer shall select an AASHTO accredited independent laboratory to conduct verification testing. The sampling and testing conducted by the independent laboratory shall be witnessed by the Department.

C. Product Verification Testing.

Verification test results shall be within the limits specified herein.

M4.04.1: Conventional Grout, Cementitious Mortar, and Concrete Products

Conventional grout, cementitious mortar, and concrete products shall meet the requirements of Section M4: Cement and Cement Concrete Materials, performance criteria of the product's technical data sheet, and the requirements specified herein.

M4.04.2: Rapid Hardening Cementitious Mortar and Concrete Products

Rapid hardening cementitious mortar and concrete products shall meet the requirements and performance criteria of the product's technical data sheet, ASTM C928 Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs, and Table M4.04.2-2.

Table M4.04.2-1: Types of Rapid Hardening Cementitious Products for Concrete Repairs

Type	Description	Application
R1	General Rapid Hardening	Vertical and Overhead Repairs
R2	Medium Rapid Hardening	Vertical and Overhead Repairs
R3	Very Rapid Hardening	Horizontal, Vertical, and Overhead Repairs

Table M4.04.2-2: Verification Testing Requirements

Property	Method	Quality Characteristic		Limits					
				R1		R2		R3	
				Min.	Max.	Min.	Max.	Min.	Max.
Setting	T 197	Initial Set (min.)		Technical Data Sheet					
		Final Set (min.)		Technical Data Sheet					
Strength	T 97[1]	Flexural Strength (psi)	24 Hours	–	–	–	–	650	–
			7 Days	–	–	–	–	–	–
Durability	T 358	Surface Chloride Ion Penetration Resistance (kΩ-cm)	28 Days	21	–	21	–	21	–
	T 161 (A)	Relative Durability Factor		90	–	90	–	90	–
		Mass Loss (%)		–	6.0	–	6.0	–	6.0
[1] Not applicable to vertical and overhead repair applications.									

M4.04.3: Mortar Products for Unit Masonry

Mortar products for unit masonry shall meet the requirements and performance criteria of the product's technical data sheet and Type M specified in ASTM C270 Standard Specification for Mortar for Unit Masonry. Field proportioned cement mortar for laying brick and block shall be composed of 1 part Portland cement and 2 parts of fine aggregate by volume with a sufficient amount of water to form a workable mixture, while still achieving the properties specified herein.

M4.04.4: Grout Products for Unit Masonry

Grout products for unit masonry shall meet the requirements and performance criteria of the product's technical data sheet and ASTM C476 Standard Specification for Grout for Masonry.

M4.04.5: Non-Shrink Grout Products

Non-shrink grout products are intended for use under applied load, including supporting a structure, transfer medium between load-bearing members, shear keys, and other non-shrink applications, where a change in height below initial placement height is to be avoided. Non-shrink grout products shall meet the requirements and performance criteria of the product's technical data sheet and ASTM C1107 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

SECTION M5: PIPE, CULVERT SECTIONS AND CONDUIT

Subsection M5.01.0: Joint Material for Pipe
Replace M4.02.15 Cement Mortar with M4.04.0 Grout, Mortar, and Concrete Products in paragraph B.

SECTION M8: METALS AND RELATED MATERIALS

Subsection M8.18.1: Traffic Signal Supports
Delete the heading Posts and the two paragraphs under it. Delete the heading Bases and the three paragraphs under it.

SECTION M9: MISELLANEOUS MATERIALS

Subsection M9.14.5: Elastomeric Bridge Bearing Pads
Replace this subsection with the following:

M9.14.5: Elastomeric Bearing Pads

A. General Requirements

Elastomeric bearing pads shall be plain or laminated. They shall meet the applicable requirements of AASHTO M 251, the MassDOT Bridge Manual, and the AASHTO LRFD Bridge Design and Construction Specifications. The type of bearing will be specified on the plans.

Laminated elastomeric bearing pads consist of layers of elastomers restrained at their interfaces by bonded metal laminates.

B. Material Requirements

Plain elastomeric bearing pads shall consist of elastomer.

Laminated elastomeric bearing pad shall consist of:

- Elastomer
- Internal Steel Laminates
- Tapered Internal Load Plates (if used)

The components of the elastomeric bearing pad shall conform to AASHTO M 251 and the following:

- The elastomer compound shall be 100% virgin neoprene and classified as being of low-temperature grade 3.
- The steel laminates shall meet the requirements of ASTM A 1011 Grade 36 or higher

C. Material Qualification

Elastomeric bearing pads shall be approved on a project basis. The Contractor shall furnish to the Research and Materials Section certified independent test reports demonstrating conformance. All testing shall be performed by the same independent lab in accordance with Subsection M9.14.5G.

D. Fabricators

Bearing shall be fabricated by a fabricator listed on the MassDOT Qualified Construction Materials List (QCML).

E. Fabrication

Fabrication shall not begin until the shop drawings have been approved and the Department has an inspector at the fabricator's facility.

The shop drawings shall specify bearing dimensions as shown on the plans and, where applicable, shall include:

- Elastomer thickness and edge cover,
- Number and thickness of steel reinforcing laminates,
- Dimensions of load plates (if any),
- Design shear modulus of the elastomer shall be as shown on the Plans.

Plain elastomeric bearing pads shall be fabricated and tested in accordance with the "Method A" design outlined in the AASHTO LRFD Bridge Design Specifications.

Laminated elastomeric bearing pads shall be fabricated and tested in accordance with the "Method B" design outlined in the AASHTO LRFD Bridge Design Specifications.

The manufacturer shall designate the bearings in each Lot, as described in Subsection M9.14.5G, and certify that each bearing in the Lot was manufactured in a reasonably continuous manner from the same batch of elastomer and cured under the same conditions. In addition, the manufacturer shall certify that each bearing in the Lot satisfies the requirements of this specification, AASHTO M 251, the AASHTO LRFD Bridge Construction Specifications, and the contract plans and documents.

The tolerances on the overall dimensions for the bearings shall be according to Table 2 of AASHTO M 251, except that the tolerance on the overall vertical dimension shall be limited to 0, +1/8" regardless of the design thickness.

All steel included in the final bearing product must conform to Buy America Requirements.

F. Packaging, Handling, & Storage

The bearing pads shall be packaged, handled, and stored as specified below:

Prior to shipment from the point of manufacture, bearings shall be packaged in such a manner to ensure that during shipment and storage the bearings will be protected against damage from handling, weather, or any normal hazard. Each completed bearing shall have its components clearly identified, be securely bolted, strapped, or otherwise fastened to prevent any relative movement, and be marked on it top as to location and orientation in each structure in the project in conformity with the contract documents.

Each elastomeric bearing shall be marked in indelible ink or flexible paint. The marking shall consist of the order number, lot number, bearing identification number, and elastomer type and grade per AASHTO M 251. For bearing pads fabricated with a tapered internal load plate, a 1/32" deep direction arrow shall be inscribed into the bearing which will allow the bearing to be aligned with the up-station direction. All marks shall be permanent and be visible after the bearing is installed.

G. Testing Requirements

Quality Control System

Fabricators shall perform Quality Control (QC) testing in accordance with their quality system. QC test reports shall accompany the bearing pads when delivered to the project.

Acceptance System

MassDOT will evaluate the fabricator's quality system and QC test reports. It will also perform its own testing and verify the independent laboratory's test reports, if applicable.

Lot Sizes

Sampling of bearing pads for testing shall be random and performed on a Lot basis. A Lot of bearings shall be a group of 100 or fewer bearings that are:

- For a single contract,
- Cured under the same conditions,
- The same size and configuration,
- Manufactured in a reasonably continuous manner from the same batch of elastomer.

Testing of Plain Bearings

Testing Laboratory

Plain elastomeric bearing pads shall be tested by both an independent laboratory and MassDOT:

- Independent testing shall be performed by a nationally recognized third-party laboratory approved by the Research & Materials Section.
- Acceptance testing shall be performed by the Research and Materials.

Sampling Frequency

Each Lot of plain bearings shall be randomly sampled for testing. The Contractor shall ensure that the fabricator produces the additional bearings required for testing.

Samples for independent testing shall be selected by the fabricator. The sampling rate for the independent

testing shall be as follows:

- Lot sizes less than 10 bearings – One full-size bearing per Lot.
- Lot sizes greater than or equal to 10 bearings – Two full-size bearings per lot.

Samples for Acceptance testing shall be selected by the Engineer. The sampling rate for Acceptance testing shall be one bearing pad per lot.

Testing Requirements

The laboratory shall test the bearings in accordance with Sections 8 and 9 of AASHTO M 251 as specified below:

1. Dimensions per Section 8.4.
2. Elastomer per Section 8.6.
    - The hardness, tensile strength, and ultimate elongation shall be in accordance with Table 1 of AASHTO M 251.
3. Test procedures per Section 8.9.
    - Heat resistance per Section 8.9.3.

Testing of Laminated Bearings

Testing Laboratory

Laminated elastomeric bearing pads shall be tested by both an independent laboratory and MassDOT:

- Independent testing shall be performed by a nationally recognized third-party laboratory approved by the Research & Materials Section.
- Acceptance testing shall be performed by the Research and Materials.

Sampling Frequency

Each Lot of laminated bearings shall be randomly sampled for testing. The Contractor shall ensure that the fabricator produces the additional bearings required for testing.

Samples for independent testing shall be selected by the fabricator. The sampling rate for the independent testing shall be as follows:

- Lot sizes less than 10 bearings – One full-size bearing per Lot.
- Lots sizes greater than or equal to 10 bearings:
    - One full-size bearing per every twenty per lot, or a minimum of two bearings.
    - The number of laminated bearings to sample shall be determined by taking the Lot size divided by 20. If the integer part of this calculation is 0 or 1, then two bearings shall be sampled. For example, if the lot size is 58 laminated bearings, two bearings shall be sampled; if the lot size is 65, three bearings shall be sampled; and if the lot size is 22, two bearings shall be sampled.

Samples for Acceptance testing shall be selected by the Engineer. The sampling rate for Acceptance testing shall be one bearing pad per lot.

Testing Requirements

Testing of the bearings shall be in accordance with Sections 8 and 9 of AASHTO M 251 as specified below:

1. Dimensions per Section 8.4.
2. Elastomer per Section 8.6.
    - The hardness, tensile strength, and ultimate elongation shall be in accordance with Table 1 of AASHTO M 251.
3. Compressive strain at the maximum design dead plus live service compressive load per Section 8.8.1.1.

- The compressive deflection, as determined per Section 9.1., between the two loadings for each bearing tested shall not exceed 10%.

4. Bond via Compressive Load per Section 8.8.2.2.
5. Shear Modulus of the elastomer per Section 8.8.3.
   - Shear modulus shall meet the requirements on the plans.
6. Test procedures per Section 8.9.
   a. Additional Low Temperature Shear Modulus testing per Section 8.9.1.
   b. Heat resistance per Section 8.9.3.
   c. Compression set per Section 8.9.4.
   d. Creep per Section 8.9.5.
      - The percent creep shall be less than 35%.
   e. Long Term Compression per Section 8.9.6.

Table M9.14.5-1: Department Acceptance Testing of Elastomeric Bearing Pads

Quality Characteristic	**Test Method**	**Requirement**
Hardness	ASTM D2240	From Independent Test Results ± 5 Pts
Tensile Strength	ASTM D412	≥ 2250 psi
Ultimate Elongation	ASTM D412	Minimum Elongation Based on Durometer according to AASHTO M 251 Table 1
Shear Modulus (see Note 1)	ASTM D4014	Specified Value ± 15%
After Heat Aging for 70 Hours at 100°C (Maximum Change from Unaged Testing)		
Hardness	ASTM D573	Hardness + 15 Pts
Tensile Strength	ASTM D573	Tensile Strength - 15%
Ultimate Elongation	ASTM D573	Ultimate Elongation - 40%
Note 1: Test is only required for laminated elastomeric bearing pads.		

SECTION M10: TRAFFIC CONTROL DEVICES

Subsection M10.05.0: Traffic Signal Structures (General)
Add this new subsection.

M10.05.0: Traffic Signal Structures (General)

The bases of all Traffic Signal Structures shall be supplied with a bonding lug.

Subsection M10.05.1: Signal Posts and Bases
Add this new subsection.

M10.05.1: Signal Posts and Bases

All Signal Posts shall be one-piece 4-in. diameter, Schedule 40 or Schedule 80, and machine-threaded.

Signal Posts may be fabricated from aluminum with a brushed or spun finish or from steel with a galvanized finish.

The interior of Signal Posts shall be coated as specified in Underwriters Laboratories UL-6 for enameled conduit, or aluminum conduit conforming to M5.07.1: Electrical Conduit-Rigid Metallic (Type RM), Paragraph C.

Signal Posts Bases shall be fabricated to accept the threads from the Signal Post and locked into place with set screws.

Signal Post Bases shall be fabricated from aluminum with a natural or anodized finish or galvanized cast iron.

Signal Post Bases shall be square or octagonal.

Signal Posts and Bases conform to Table M10.05.1-1.

Table M10.05.1-1: Signal Post and Base Material Requirements

Component	Material	Specification
Signal Post	Aluminum	6063-T6 (ASTM B221, B429 or B241)
Signal Post	Steel	ASTM A53, Grade A or B
Signal Post Base	Aluminum	356.0-T6 (ASTM B26, B108)
Signal Post Base	Cast Iron	AASHTO M 105

Subsection M10.11.0: RRFB Assemblies
Add this new subsection.

M10.11.0: RRFB Assemblies

Rectangular Rapid Flashing Beacon (RRFB) Assemblies shall consist of a Light Bar and an enclosure for the Controller and Activation Unit.

Light Bar

The Light Bar shall consist of two rapidly-flashed rectangular-shaped yellow indications, each with an LED-array based pulsing light source. The size of each RRFB indication shall conform to the Construction Standard Details.

The light intensity of the yellow indications during daytime conditions shall meet the minimum specifications for Class 1 yellow peak luminous intensity in the publication "Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles J595," 2005, Society of Automotive Engineers (SAE). A photocell or equivalent device shall be included to reduce the brilliance of the LED beacons during nighttime conditions.

Controller and Activation Unit

The enclosure for the Controller and Activation Unit shall be NEMA rated for outdoor use and protection against rain and sleet.

The Controller and Activation Unit shall be powered by a DC battery/solar array system or a 120 VAC service connection.

The Controller and Activation Unit shall be actuated by a pedestrian pushbutton, a passive pedestrian detection device, or both.

Communications between multiple units within the same system shall be via a 900MHz or 2.4 GHz frequency hopping spread spectrum with a minimum range of 200 ft. Multiple channels shall be available to prevent cross-communication between multiple systems located close to each other.

The Controller shall be programmable via an on-board user interface or a no-fee wireless (Wi-Fi, Bluetooth®, etc.) connection and application.

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END OF SUPPLEMENTAL SPECIFICATIONS

DOCUMENT 00719

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

SPECIAL PROVISIONS FOR PARTICIPATION BY DISADVANTAGED BUSINESS ENTERPRISES

(IMPLEMENTING TITLE 49 OF THE CODE OF FEDERAL REGULATIONS, PART 26)

Section: Page 00719-

POLICY

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

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

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

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

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

1. DEFINITIONS

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

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

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

"Contract" shall mean the Contract for work between the Contractor and MassDOT.

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

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

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

(a) that is at least fifty-one (51%) percent owned by one or more individuals who are both socially and economically disadvantaged, or, in the case of any corporation, in which at least fifty-one (51%) percent of the stock is owned by one or more such individuals; and

(b) where the management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

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

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

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

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

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

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

(a) To be a regular dealer, the firm must be an established, regular business that engages, as its principal business, and under its own name, in the purchase and sale of the products in question.

(b) A person may be a regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business as provided above if the person both owns and operates distribution equipment for the products. Any supplementing of regular dealers' own distribution equipment shall be by long term lease agreement and not on an ad hoc or contract by contract basis.

(c) Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not regular dealers within the meaning of this definition.

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

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

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

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

(a) Individuals found by SDO to be socially and economically disadvantaged individuals on a case by case basis.

(b) Individuals in the following groups, members of which are rebuttably presumed to be socially and economically disadvantaged:

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

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

2. DBE PARTICIPATION

a. Goal

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

☒ Design-Bid-Build Projects: DBE Participation Goal **15 %**
(*One half of this goal shall be met in the form of Subcontractor construction activity*)

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

b. Bidders List

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

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

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

3. CONTRACTOR ASSURANCES

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

4. REQUIRED SUBCONTRACT PROVISIONS

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

5. ELIGIBILITY OF DBES

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

a. Massachusetts DBE Directory

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

Contractors are encouraged to make use of the DBE Directory maintained by SDO on the Internet. This listing is updated daily and may be accessed at the SDO's website at:
https://www.diversitycertification.mass.gov/BusinessDirectory/BusinessDirectorySearch.aspx

b. DBE Certification

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

c. Joint Venture Approval

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

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

6. COUNTING DBE PARTICIPATION TOWARDS DBE PARTICIPATION GOALS

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

a. Commercially Useful Function

(1) In general, a DBE performs a commercially useful function when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. With respect to materials and supplies used on the Contract, the DBE must be responsible for negotiating price, determining quality and quantity, ordering the material, installing (where applicable) and paying for the material itself.

(2) To determine whether a DBE is performing a commercially useful function, MassDOT will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the Contract is commensurate with the work it is actually performing and the DBE credit claimed for its performance of the work, and other relevant factors.

(3) A DBE does not perform a commercially useful function if its role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of DBE participation. In determining whether a DBE is such an extra participant, MassDOT will examine similar transactions, particularly those in which DBEs do not participate.

b. Counting Participation Toward The Contract Participation Goal

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

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

(2) MassDOT will count the entire amount of fees or commissions charged by a DBE firm for providing bona fide services, such as professional, technical, consultant, or managerial services, or for providing bonds or insurance specifically required for the performance of a U.S. DOT assisted Contract, toward DBE participation goals, provided it is determined that the fee is reasonable and not excessive as compared with fees customarily allowed for similar services.

(3) When a DBE performs as a participant in a joint venture, MassDOT will count toward DBE participation goals a portion of the total dollar value of the contract that is equal to the distinct, clearly defined portion of the work of the Contract that the DBE performs with its own forces.

(4) MassDOT will use the following factors in determining whether a DBE trucking company is performing a commercially useful function:

(i) the DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract; there cannot be a contrived arrangement for the purpose of meeting DBE participation goals.

(ii) the DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the Contract.

(iii) the Contractor will receive DBE credit for the total value of the transportation services the DBE provides on the Contract using trucks owned, insured, and operated by the DBE itself and using drivers the DBE employs alone.

(iv) the DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The Contractor who has a contract with a DBE who leases trucks from another DBE will receive credit for the total value of the transportation services of the lease.

(v) the DBE may also lease trucks from a non-DBE firm, including an owner-operator. The Contractor who has a Contract with a DBE who leases trucks from a non-DBE is entitled to credit for the total value of the transportation services provided by non-DBE lessees not to the exceed the value of transportation services provided by DBE-owned trucks on the Contract. Additional participation by non-DBE lessees receives credit only for the fee or commission it receives as a result of the lease arrangement, fee or commission it receives as a result of the lease arrangement. The DBE does not receive credit for the total value of the transportation services provided by the lessee, since these services are not provided by a DBE.

(vi) the lease must indicate that the DBE has exclusive use of, and control over, the truck. This does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the name and identification number of the DBE.

(5) MassDOT will count the Prime Contractor's expenditures with DBEs for materials or supplies toward DBE participation goals as follows:

(i) if the materials or supplies are obtained from a DBE manufacturer, as defined in Section 1 above, MassDOT will count one hundred (100%) percent of the cost of the materials or supplies toward DBE participation goals, provided the DBE meets the other requirements of the regulations.

(ii) if the materials or supplies are purchased from a DBE regular dealer, as defined in Section 1 above, MassDOT will count sixty (60%) percent of the cost of the materials or supplies toward the Contract participation goal, provided the DBE meets the other requirements of the regulations.

(iii) for materials or supplies purchased from a DBE which is neither a manufacturer nor a regular dealer, MassDOT will count the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site toward the Contract participation goal, provided that MassDOT determines the fees to be reasonable and not excessive as compared with fees customarily allowed for similar services; the cost of the materials and supplies themselves will not be counted; and provided the DBE meets the other requirements of the regulations.

c. Joint Check Policy

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

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

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

Other factors MassDOT may consider:

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

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

d. Joint Check Procedure(s)

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

7. AWARD DOCUMENTATION AND PROCEDURES

a. The two lowest bidders/the two bidders with the lowest price per quality score point, shall submit, by the close of business on the third (3rd) business day after the bid opening, a completed Schedule of Participation by DBEs (Document B00853) which shall list:

(1) The full company name, address and telephone number of each DBE with whom the bidder intends to make a commitment.

(2) The contract item(s), by number(s) and quantity(ies), if applicable, or specific description of other business activity to be performed by each DBE as set forth in the Letters of Intent. The Bidder shall list only firms which have the capacity to perform, manage and supervise the work proposed in accordance with the requirements of 49 CFR Part 26 and Section **6.b** of these Special Provisions.

(3) The total dollar amount to be paid to each DBE. (Bidders are cautioned that at least one half of the participation goal must be met with construction activity work.)

(4) The total dollar amount to be paid to each DBE that is eligible for credit toward the DBE participation goal under the counting rules set out in Section **6.b**.

(5) The total creditable DBE participation as a percentage of the total bid price.

b. All firms listed on the Schedule must be currently certified.

c. The two lowest bidders/the two bidders with the lowest price per quality score point, shall each submit, with their Schedules of Participation, fully completed, signed Letters of Intent (Document B00854) from each of the DBEs listed on the Schedule. The Letters of Intent shall be in the form attached and shall identify specifically the contract activity the DBE proposes to perform, expressed as contract item number, if applicable, description of the activity, NAICS code, quantity, unit price and total price. In the event of discrepancy between the Schedule and the Letter of Intent, the Letter of Intent shall govern.

d. Evidence of good faith efforts will be evaluated by MassDOT in the selection of the lowest responsible bidder.

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

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

f. If MassDOT finds that the percentage of DBE participation submitted by the bidder on its Schedule does not meet the Contract participation goal, or that Schedule and Letters of Intent were not timely filed, and that the bidder has not demonstrated good faith efforts to comply with these requirements, it shall propose that the bidder be declared ineligible for award. In that case, the bidder may request administrative reconsideration. Such requests must be sent in writing within three (3) calendar days of receiving notice of proposed ineligibility to: The Office of the General Counsel, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA, 02116.

g. If, after administrative reconsideration, MassDOT finds that the bidder has not shown that sufficient good faith efforts were made to comply with the requirements of these Special Provisions, it shall reject the bidder's proposal and may retain the proposal guaranty.

h. Actions which constitute evidence of good faith efforts to meet a DBE participation goal include, but are not limited to, the following examples, which are set forth in 49 CFR Part 26, Appendix A:

(1) Soliciting through all reasonable and available means (e.g., attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified DBEs who have the capability to perform the work of the Contract. The bidder must solicit this interest within sufficient time to allow the DBEs to respond to the solicitation. The bidder must determine with certainty if the DBEs are interested by taking appropriate steps to follow up initial solicitations.

(2) Selecting portions of the work to be performed by DBEs in order to increase the likelihood that the DBE participation goal will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the Prime Contractor might otherwise prefer to perform these work items with its own forces.

(3) Providing interested DBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

(4) Negotiating in good faith with interested DBEs. It is the bidder's responsibility to make a portion of the work available to DBE Subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE Subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone number of DBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBEs to perform the work.

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

(5) Not rejecting DBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. Contractors should be careful of adding additional requirements of performance that would in effect limit participation by DBEs or any small business. The Contractor's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. nonunion employee status) are not legitimate causes for the rejection or non-solicitation of bids in the Contractor's efforts to meet the Contract participation goal.

(6) Making efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or contractor.

(7) Making efforts to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.

(8) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; local, state, and federal minority/women business assistance offices; and other organizations as allowed on a case by case basis to provide assistance in the recruitment and placement of DBEs.

8. COMPLIANCE

a. All activity performed by a DBE for credit toward the Contract participation goal must be performed, managed and supervised by the DBE in accordance with all commercially useful function requirements of 49 CFR Part 26. The Prime Contractor shall not enter into, or condone, any other arrangement.

b. The Prime Contractor shall not perform with its own organization, or assign to any other business, an activity designated for the DBE(s) named on the Schedule(s) submitted by the Prime Contractor under Section 7 or under paragraph **8.f** of this section, without the approval of MassDOT in accordance with the requirements of paragraphs **8.f** and **8.j** of this section.

c. MassDOT may suspend payment for any activity that was not performed by the DBE to whom the activity was committed on the approved Schedule of Participation, or that was not performed in accordance with the requirements of Section 6.

d. MassDOT retains the right to approve or disapprove of any or all Subcontractors. Requests by the Prime Contractor for approval of participation by a DBE Subcontractor for credit toward the Contract participation goal must include, in addition to any other requirements for Subcontractor approval, the following:

(1) A copy of the proposed subcontract. The subcontract must be for at least the dollar amount, and for the work described, in the Bidder's Schedule of Participation.

(2) A resume stating the qualifications and experience of the DBE Superintendent and/or foreperson who will supervise the on-site work. A new resume will be required for any change in supervisory personnel during the progress of the work.

(3) A Schedule of Operations indicating when the DBE is expected to perform the work.

(4) A list of (1) equipment owned by the DBE to be used on the Project, and (2) equipment to be leased by the DBE for use on the Project.

(5) A list of: (1) all projects (public and private) which the DBE is currently performing; (2) all projects (public and private) to which the DBE is committed; and (3) all projects (public and private) to which the DBE intends to make a commitment. For each Contract, list the contracting organization, the name and telephone number of a contact person for the contracting organization, the dollar value of the work, a description of the work, and the DBE's work schedule for each project.

e. If, pursuant to the Subcontractor approval process, MassDOT finds that a DBE Subcontractor does not have sufficient experience or resources to perform, manage and supervise work of the kind proposed in accordance with the requirements of 49 CFR Part 26, approval of the DBE Subcontractor may be denied. In the event of such denial, the Prime Contractor shall proceed in accordance with the requirements paragraphs **8.f** and **8.j** of this section.

f. If, for reasons beyond its control, the Prime Contractor cannot comply with its DBE participation commitment in accordance with the Schedule of Participation submitted under Section 7, the Prime Contractor shall submit to MassDOT the reasons for its inability to comply with its obligations and shall submit, and request approval for, a revised Schedule of Participation. If approved by MassDOT, the revised Schedule shall govern the Prime Contractor's performance in meeting its obligations under these Special Provisions.

g. A Prime Contractor's compliance with the participation goal in Section 2 shall be determined by reference to the established percentage of the total contract price, provided, however, that no decrease in the dollar amount of a bidder's commitment to any DBE shall be allowed without the approval of MassDOT.

h. If the contract amount is increased, the Prime Contractor may be required to submit a revised Schedule of Participation in accordance with paragraphs **8.f** and **8.j** of this section.

i. In the event of the decertification of a DBE scheduled to participate on the Contract for credit toward the participation goal, but not under subcontract, the Contractor shall proceed in accordance with paragraphs **8.f** and **8.j** of this section.

j. The Prime Contractor shall notify MassDOT immediately of any facts that come to its attention indicating that it may or will be unable to comply with any aspect of its DBE obligation under this Contract.

k. Any notice required by these Special Provisions shall be given in writing to: (1) the Resident Engineer; (2) the District designated Compliance Officer; and (3) the DBE Liaison Officer, MassDOT Office of Civil Rights, 10 Park Plaza, – 3rd Floor - West, Boston, MA, 02116 and cc'd to the Deputy Chief of External Programs.

l. The Prime Contractor and its Subcontractors shall comply with MassDOT's Electronic Reporting System Requirements (MassDOT Document 00821) and submit all information required by MassDOT related to the DBE Special Provisions through the Equitable Business Opportunity Solution ("EBO"). MassDOT reserves the right to request reports in the format it deems necessary anytime during the performance of the Contract.

m. Termination of DBE by Prime Contractor

(1) A Prime Contractor shall not terminate a DBE Subcontractor or an approved substitute DBE firm without the prior written consent of MassDOT. This includes, but is not limited to, instances in which a Prime Contractor seeks to perform work originally designated for a DBE Subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm.

(2) MassDOT may provide such written consent only if MassDOT agrees, for reasons stated in its concurrence document, that the Prime Contractor has good cause to terminate the DBE firm.

(3) For purposes of this paragraph, good cause includes the following circumstances:

(i) The DBE Subcontractor fails or refuses to execute a written contract;

(ii) The DBE Subcontractor fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Good cause, however, does not exist if the failure or refusal of the DBE Subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the Prime Contractor;

(iii) The DBE Subcontractor fails or refuses to meet the Prime Contractor's reasonable, nondiscriminatory bond requirements.

(iv) The DBE Subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness;

(v) The DBE Subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant 2 CFR Parts 180, 215 and 1,200 or applicable State law;

(vi) (vii) MassDOT has determined that the listed DBE Subcontractor is not a responsible contractor;

(vii) The listed DBE Subcontractor voluntarily withdraws from the Project and provides written notice of its withdrawal;

(viii) The listed DBE is ineligible to receive DBE credit for the type of work required;

(ix) A DBE owner dies or becomes disabled with the result that the listed DBE Contractor is unable to complete its work on the Contract;

(x) Other documented good cause that MassDOT determines compels the termination of the DBE Subcontractor. Good cause, however, does not exist if the Prime Contractor seeks to terminate a DBE it relied upon to obtain the Contract so that the Prime Contractor can self-perform the DBE work or substitute another DBE or non-DBE Contractor after Contract Award.

(4) Before transmitting to MassDOT a request to terminate and/or substitute a DBE Subcontractor, the Prime Contractor must give notice in writing to the DBE Subcontractor, with a copy to MassDOT, of its intent to request to terminate and/or substitute, and the reason for the request.

(5) The Prime Contractor must give the DBE five (5) business days to respond to the Prime Contractor's notice. The DBE must advise MassDOT and the Contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why MassDOT should not approve the Prime Contractor's action. If required in a particular case as a matter of public necessity (e.g., safety), MassDOT may provide a response period shorter than five (5) business days.

(6) In addition to post-award terminations, the provisions of this section apply to pre-award deletions of or substitutions for DBE firms.

n. Prompt Payment.

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

9. SANCTIONS

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

a. Retain, in connection with final acceptance and final payment processing, an amount determined by multiplying the total contract amount by the percentage in Section 2, less the amount paid to approved DBE(s) for work performed under the Contract in accordance with the provisions of Section 8.

b. Suspend, terminate or cancel this Contract, in whole or in part, and call upon the Prime Contractor's surety to perform all terms and conditions in the Contract.

c. In accordance with 720 CMR 5.05(1)(f), modify or revoke the Prime Contractor's Prequalification status or recommend that the Prime Contractor not receive award of a pending Contract. The Prime Contractor may appeal the determination of the Prequalification Committee in accordance with the provisions of 720 CMR 5.06.

d. Initiate debarment proceedings pursuant to M.G.L. c. 29 §29F and, as applicable, 2 CFR Parts 180, 215 and 1,200.

e. Refer the matter to the Massachusetts Attorney General for review and prosecution, if appropriate, of any false claim or pursuant to M.G.L. c. 12, §§ 5A to 5O (the Massachusetts False Claim Act).

f. Refer the matter to the U.S. DOT's Office of the Inspector General or other agencies for prosecution under Title 18, U.S.C. § 1001, 49 CFR Parts 29 and 31, and other applicable laws and regulations.

10. FURTHER INFORMATION; ENFORCEMENT, COOPERATION AND CONFIDENTIALITY.

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

(1) If you are a firm that does not meet the eligibility criteria of 49 CFR, Parts 26.61 to 26.73 ("subpart D"), that attempts to participate in a DOT- assisted program as a DBE on the basis of false, fraudulent, or deceitful statements or representations or under circumstances indicating a serious lack of business integrity or honesty, MassDOT or FHWA may initiate suspension or debarment proceedings against you under 49 CFR Part 29.

(2) If you are a firm that, in order to meet DBE Contract participation goals or other DBE Program requirements, uses or attempts to use, on the basis of false, fraudulent or deceitful statements or representations or under circumstances indicating a serious lack of business integrity or honesty, another firm that does not meet the eligibility criteria of subpart D, FHWA may initiate suspension or debarment proceedings against you under 49 CFR Part 29.

(3) In a suspension or debarment proceeding brought either under subparagraph a.(1) or b.(2) of this section, the concerned operating administration may consider the fact that a purported DBE has been certified by a recipient. Such certification does not preclude FHWA from determining that the purported DBE, or another firm that has used or attempted to use it to meet DBE participation goals, should be suspended or debarred.

(4) FHWA may take enforcement action under 49 CFR Part 31, Program Fraud and Civil Remedies, against any participant in the DBE Program whose conduct is subject to such action under 49 CFR Part 31.

(5) FHWA may refer to the Department of Justice, for prosecution under 18 U.S.C. 1001 or other applicable provisions of law, any person who makes a false or fraudulent statement in connection with participation of a DBE in any DOT-assisted program or otherwise violates applicable Federal statutes.

b. Pursuant to 49 CFR Part 26.109, the rules governing information, confidentiality, cooperation, and intimidation or retaliation are as follows:

(1) Availability of records.

(i) In responding to requests for information concerning any aspect of the DBE Program, FHWA complies with provisions of the Federal Freedom of Information and Privacy Acts (5 U.S.C. 552 and 552a). FHWA may make available to the public any information concerning the DBE Program release of which is not prohibited by Federal law.

(ii) MassDOT shall safeguard from disclosure to unauthorized persons information that may reasonably be considered as confidential business information, consistent with Federal and Massachusetts General Law (M.G.L. c. 66, § 10, M.G.L. c. 4, §7 (26), 950 CMR 32.00).

(2) Confidentiality of information on complainants. Notwithstanding the provisions of subparagraph b.(1) of this section, the identity of complainants shall be kept confidential, at their election. If such confidentiality will hinder the investigation, proceeding or hearing, or result in a denial of appropriate administrative due process to other parties, the complainant must be advised for the purpose of waiving the privilege. Complainants are advised that, in some circumstances, failure to waive the privilege may result in the closure of the investigation or dismissal of the proceeding or hearing.

(3) Cooperation. All participants in FHWA's DBE Program (including, but not limited to, recipients, DBE firms and applicants for DBE certification, complainants and appellants, and Contractors using DBE firms to meet Contract participation goals) are required to cooperate fully and promptly with U.S. DOT and recipient compliance reviews, certification reviews, investigations, and other requests for information. Failure to do so shall be a ground for appropriate action against the party involved (e.g., with respect to recipients, a finding of noncompliance; with respect to DBE firms, denial of certification or removal of eligibility and/or suspension and debarment; with respect to a complainant or appellant, dismissal of the complaint or appeal; with respect to a Contractor which uses DBE firms to meet participation goals, findings of non-responsibility for future Contracts and/or suspension and debarment).

(4) Intimidation and retaliation. No recipient, Contractor, or any other participant in the program, may intimidate, threaten, coerce, or discriminate against any individual or firm for the purpose of interfering with any right or privilege secured by this part or because the individual or firm has made a complaint, testified, assisted, or participated in any manner in an investigation, proceeding, or hearing under this part. If any recipient or contractor violates this prohibition, that entity is in noncompliance with this 49 CFR Part 26.

11. LIST OF ADDITIONAL DOCUMENTS.

a. The following documents shall be completed and signed by the bidder and designated DBEs in accordance with Section 7 - Award Documentation and Procedures. These documents must be returned by the bidder to MassDOT's Bid Document Distribution Center:

- □ Schedule of DBE Participation (Document B00853)
- □ Letter of Intent (Document B00854)
- □ DBE Joint Check Arrangement Approval Form (Document B00855), if Contractor and DBE plan, or if DBE is required to use a Joint Check

b. The following document shall be signed and returned by Contractor and Subcontractors/DBEs to the MassDOT District Office overseeing the Project, as applicable:

- □ Contractor/Subcontractor Certification Form (Document No. 00859) (a checklist of other documents to be included with every subcontract (DBEs and non-DBEs alike)).

c. The following document shall be provided to MassDOT's Office of Civil Rights and Prequalification Office at least fourteen (14) business days before the bid opening date, if applicable:

- □ Affidavit of DBE/Non-DBE Joint Venture (Document B00856)

d. The following document shall be provided to MassDOT's District Office of Civil Rights within 30 calendar days after the work of the DBE is completed, or no later than 30 calendar days after the work of the DBE is on a completed and processed CQE. This document shall be completed and submitted by the Prime Contractor:

- □ Certificate of Completion by a Minority/Women or Disadvantaged Business Enterprise (M/W/DBE) (Form No. CSD-100)

*** END OF DOCUMENT ***

DOCUMENT 00760

FHWA-1273 – Revised October 23, 2023

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. GENERAL

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6. Training and Promotion:

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

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

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

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

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

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

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

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

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

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

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

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

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

10. Assurances Required:

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

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

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

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

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

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

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

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

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

III. NONSEGREGATED FACILITIES

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

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

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

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

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

1. Minimum wages (29 CFR 5.5)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2. Withholding (29 CFR 5.5)

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

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

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

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

(2) A contracting agency for its reprocurement costs;

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

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

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

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

3. Records and certified payrolls (29 CFR 5.5)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

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

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

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

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

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

3. Withholding for unpaid wages and liquidated damages

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

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

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

(2) A contracting agency for its reprocurement costs;

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

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

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

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

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

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

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

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

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

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

VI. SUBLETTING OR ASSIGNING THE CONTRACT

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

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

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

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

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

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

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

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

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

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

VII. SAFETY: ACCIDENT PREVENTION

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

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

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

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

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

* * * * *

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

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

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

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

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

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

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

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

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

* * * * *

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

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

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

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

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

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

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

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

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

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

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

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

* * * * *

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

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

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

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

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

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

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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

August 21, 2024

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

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

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

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

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

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

Base Prices and Period Prices are defined as follows:

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

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

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

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

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

Period Prices are determined as follows:

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

Example of a Period Price Calculation:

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

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

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

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

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

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

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

End of example.

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

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

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

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

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

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

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

TABLE

Steel Type		Price per Pound
1	ASTM A615/A615M Grade 60 (AASHTO M31 Grade 60 or 420) Reinforcing Steel	$0.64
2	ASTM A27 (AASHTO M103) Steel Castings, H-Pile Points & Pipe Pile Shoes (See Note (8) below.)	$0.88
3	ASTM A668 / A668M (AASHTO M102) Steel Forgings	$0.88
4	ASTM A108 (AASHTO M169) Steel Forgings for Shear Studs	$0.91
5	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Plate	$0.98
6	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Shapes	$0.90
7	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Plate	$0.98
8	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Shapes	$0.90
9	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Plate	$1.02
10	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Shapes	$0.91
11	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W 345W Structural Steel Plate	$1.02
12	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W or 345W Structural Steel Shapes	$0.91
13	ASTM A709/A709M Grade HPS 50W / AASHTO M270M/M270 Grade HPS 50W or 345W Structural Steel Plate	$1.06
14	ASTM A709/A709M Grade HPS 70W / AASHTO M270M/M270 Grade HPS 70W or 485W Structural Steel Plate	$1.13
15	ASTM A514/A514M-05 Grade HPS 100W / AASHTO M270M/M270 Grade HPS 100W or 690W Structural Steel Plate	$1.74
16	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Plate	$1.02
17	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Shapes	$0.91
18	ASTM A276 Type 316 Stainless Steel	$5.18
19	ASTM A240 Type 316 Stainless Steel	$5.18
20	ASTM A148 Grade 80/50 Steel Castings (See Note (8) below.)	$1.79
21	ASTM A53 Grade B Structural Steel Pipe	$1.13
22	ASTM A500 Grades A, B, 36 & 50 Structural Steel Pipe	$1.13
23	ASTM A252, Grades 240 (36 KSI) & 414 (60 KSI) Pipe Pile	$0.89
24	ASTM 252, Grade 2 Permanent Steel Casing	$0.89
25	ASTM A36 (AASHTO M183) for H-piles, steel supports and sign supports	$0.96
26	ASTM A328 / A328M, Grade 50 (AASHTO M202) Steel Sheetpiling	$1.71
27	ASTM A572 / A572M, Grade 50 Sheetpiling	$1.71
28	ASTM A36/36M, Grade 50	$0.98
29	ASTM A570, Grade 50	$0.96
30	ASTM A572 (AASHTO M223), Grade 50 H-Piles	$0.98
31	ASTM A1085 Grade A (50 KSI) Steel Hollow Structural Sections (HSS), heat-treated per ASTM A1085 Supplement S1	$1.13
32	AREA 140 LB Rail and Track Accessories	$0.59

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

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DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

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

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

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

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

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

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

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

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

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

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DOCUMENT 00820

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

I. Definitions

For purposes of this contract,

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

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

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

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

II. Equal Opportunity, Non-Discrimination and Affirmative Action

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

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

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

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

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

III. Minority and Women Workforce Participation

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

IV. Liaison Committee

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

V. Reports and Records

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

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

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

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

VI. Access to Work Site

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

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

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

VIII. Sanctions

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

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

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

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

IX. Severability

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

X. Contractor's Certification

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

XI. Subcontractor Requirements

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

Rev'd 03/07/14

*** END OF DOCUMENT ***

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DOCUMENT 00821

ELECTRONIC REPORTING REQUIREMENTS
CIVIL RIGHTS PROGRAMS AND CERTIFIED PAYROLL

Implemented on March 2, 2009 Revised June 04, 2019

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

Contractor and Sub-Contractor EBO User Certification

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

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

Vetting of Firms and Designated Firm Individuals

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

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

Interim Reporting Requirements

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

*** END OF DOCUMENT ***

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DOCUMENT 00859

CONTRACTOR/SUBCONTRACTOR CERTIFICATION FORM ‡

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

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

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

Contract No: 127758 **Project No.** 608562 **Federal Aid No.:** HSI/HSI(VUS)-003S(762)

Location: SOMERVILLE

Project Description: Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)

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

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

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

Document #

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

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

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

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

Document #

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

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

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

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

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

PART 2

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

1. This company recognizes that if this is a Federal-Aid Project, then this Contract is covered by the equal employment opportunity laws administered and enforced by the United States Department of Labor ("USDOL"), Office of Federal Contract Compliance Programs ('OFCCP"). By signing below, we acknowledge that this company has certain reporting obligations to the OFCCP, as specified by 41 CFR Part 60-4.2.
2. This company further acknowledges that any contractor with fifty (50) or more employees on a Federal-aid Contract with a value of fifty-thousand ($50,000) dollars or more must annually file an EEO-1 Report (SF 100) to the EEOC, Joint Reporting Committee, on or before September 30th, each year, as specified by 41 CFR Part 60-1.7a.
3. For more information regarding the federal reporting requirements, please contact the USDOL, OFCCP Regional Office, at 1-646-264-3170 or EEO-1, Joint Reporting Committee at 1-866-286-6440. You may also find guidance at: http://www.dol.gov/ofccp/TAguides/consttag.pdf or http://www.wdol.gov/dba.aspx#0.
4. This company ☐ has, ☐ has not, participated in a previous contract or subcontract subject to the Equal Opportunity clauses set forth in 41 CFR Part 60-4 and Executive Order 11246, and where required, has filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance Programs or the EEO Commission all reports due under the applicable filing requirements.
5. This company is in full compliance with applicable Federal and Commonwealth of Massachusetts laws, rules, and regulations and is not currently debarred or disqualified from bidding on or participating in construction contracts in any jurisdiction of the United States. See : https://www.mass.gov/service-details/contractors-and-vendors-suspended-or-debarred-by-massdot
6. This company is properly registered and in good standing with the Office of the Secretary of the Commonwealth.

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

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

_____
(Print Name and Title)

_____
(Authorized Signature)

_____
(Date)

Rev'd 09/02/22

*** END OF DOCUMENT ***

DOCUMENT 00860

COMMONWEALTH OF MASSACHUSETTS PUBLIC EMPLOYMENT LAWS

Revised February 20, 2019

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

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

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

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

The Prevailing Wage Rate generally includes the following:

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

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

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

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

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

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

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

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

STATEMENT OF COMPLIANCE

Date: _____

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

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

_____
(Contractor or Subcontractor)

on the _____
(MassDOT Project Location and Contract Number)

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

Signature _____

Title _____

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

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

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

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

*** END OF DOCUMENT ***

DOCUMENT 00861

STATE PREVAILING WAGE RATES

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MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

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

Prevailing Wage Rates

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

LAUREN JONES
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: MassDOT Highway Division

Contract Number: 127758 **City/Town:** SOMERVILLE

Description of Work: SOMERVILLE – HSI/HSI(VUS)-003S(762) Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location) (608562) $7,293,000.00

Job Location: SOMERVILLE - I-93 at Mystic Avenue and McGrath Hwy

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

• The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, the awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. The updated wage schedule must be provided to all contractors, including general and sub-contractors, working on the construction project.

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

• This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.

• An Awarding Authority must request an updated wage schedule if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.

• The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or a sub-contractor.

• Apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentices must keep their apprentice identification card on their persons during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DAS regardless of whether they are registered with another federal, state, local, or private agency must be paid the journeyworker's rate.**

• Every contractor or subcontractor working on the construction project must submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. For a sample payroll reporting form go to http://www.mass.gov/dols/pw.

• Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.

• Contractors must obtain the wage schedules from awarding authorities. Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

• Employees not receiving the prevailing wage rate set forth on the wage schedule may file a complaint with the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

Issue Date: 08/19/2024 **Wage Request Number:** 20240819-022

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2024	$41.05	$14.91	$18.67	$0.00	$74.63
	12/01/2024	$41.05	$14.91	$20.17	$0.00	$76.13
	06/01/2025	$42.05	$14.91	$20.17	$0.00	$77.13
	08/01/2025	$42.05	$15.41	$20.17	$0.00	$77.63
	12/01/2025	$42.05	$15.41	$21.78	$0.00	$79.24
	06/01/2026	$43.05	$15.41	$21.78	$0.00	$80.24
	08/01/2026	$43.05	$15.91	$21.78	$0.00	$80.74
	12/01/2026	$43.05	$15.91	$23.52	$0.00	$82.48
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2024	$40.88	$14.91	$18.67	$0.00	$74.46
	12/01/2024	$40.88	$14.91	$20.17	$0.00	$75.96
	06/01/2025	$41.12	$14.91	$20.17	$0.00	$76.20
	08/01/2025	$41.12	$15.41	$20.17	$0.00	$76.70
	12/01/2025	$41.12	$15.41	$21.78	$0.00	$78.31
	06/01/2026	$43.12	$15.41	$21.78	$0.00	$80.31
	08/01/2026	$43.12	$15.91	$21.78	$0.00	$80.81
	12/01/2026	$43.12	$15.91	$23.52	$0.00	$82.55
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2024	$41.24	$14.91	$18.67	$0.00	$74.82
	12/01/2024	$41.24	$14.91	$20.17	$0.00	$76.32
	06/01/2025	$42.24	$14.91	$20.17	$0.00	$77.32
	08/01/2025	$42.24	$15.41	$20.17	$0.00	$77.82
	12/01/2025	$42.24	$15.41	$21.78	$0.00	$79.43
	06/01/2026	$43.24	$15.41	$21.78	$0.00	$80.43
	08/01/2026	$43.24	$15.91	$21.78	$0.00	$80.93
	12/01/2026	$43.24	$15.91	$23.52	$0.00	$82.67
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 1*	06/01/2024	$46.13	$9.65	$18.40	$0.00	$74.18
	12/01/2024	$47.60	$9.65	$18.40	$0.00	$75.65
	06/01/2025	$49.10	$9.65	$18.40	$0.00	$77.15
	12/01/2025	$50.60	$9.65	$18.40	$0.00	$78.65
	06/01/2026	$51.40	$9.65	$18.40	$0.00	$79.45
	12/01/2026	$53.65	$9.65	$18.40	$0.00	$81.70
	06/01/2027	$55.25	$9.65	$18.40	$0.00	$83.30
	12/01/2027	$56.85	$9.65	$18.40	$0.00	$84.90
	06/01/2028	$58.53	$9.65	$18.40	$0.00	$86.58
	12/01/2028	$60.20	$9.65	$18.40	$0.00	$88.25
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$46.23	$9.65	$18.40	$0.00	$74.28
	12/01/2024	$47.70	$9.65	$18.40	$0.00	$75.75
	06/01/2025	$49.20	$9.65	$18.40	$0.00	$77.25
	12/01/2025	$50.70	$9.65	$18.40	$0.00	$78.75
	06/01/2026	$52.25	$9.65	$18.40	$0.00	$80.30
	12/01/2026	$53.75	$9.65	$18.40	$0.00	$81.80
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	06/01/2024	$41.80	$14.50	$11.05	$0.00	$67.35
	12/01/2024	$42.80	$14.50	$11.05	$0.00	$68.35
	06/01/2025	$43.80	$14.50	$11.05	$0.00	$69.35
	12/01/2025	$44.80	$14.50	$11.05	$0.00	$70.35
ASPHALT RAKER *LABORERS - ZONE 1*	06/01/2024	$45.63	$9.65	$18.40	$0.00	$73.68
	12/01/2024	$47.10	$9.65	$18.40	$0.00	$75.15
	06/01/2025	$48.60	$9.65	$18.40	$0.00	$76.65
	12/01/2025	$50.10	$9.65	$18.40	$0.00	$78.15
	06/01/2026	$51.65	$9.65	$18.40	$0.00	$79.70
	12/01/2026	$53.15	$9.65	$18.40	$0.00	$81.20
	06/01/2027	$54.75	$9.65	$18.40	$0.00	$82.80
	12/01/2027	$56.35	$9.65	$18.40	$0.00	$84.40
	06/01/2028	$58.03	$9.65	$18.40	$0.00	$86.08
	12/01/2028	$59.70	$9.65	$18.40	$0.00	$87.75
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$45.73	$9.65	$18.40	$0.00	$73.78
	12/01/2024	$47.20	$9.65	$18.40	$0.00	$75.25
	06/01/2025	$48.70	$9.65	$18.40	$0.00	$76.75
	12/01/2025	$50.20	$9.65	$18.40	$0.00	$78.25
	06/01/2026	$51.75	$9.65	$18.40	$0.00	$79.80
	12/01/2026	$53.25	$9.65	$18.40	$0.00	$81.30
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$56.03	$15.30	$16.40	$0.00	$87.73
	12/01/2024	$57.48	$15.30	$16.40	$0.00	$89.18
	06/01/2025	$58.78	$15.30	$16.40	$0.00	$90.48
	12/01/2025	$60.23	$15.30	$16.40	$0.00	$91.93
	06/01/2026	$61.53	$15.30	$16.40	$0.00	$93.23
	12/01/2026	$62.98	$15.30	$16.40	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$56.03	$15.30	$16.40	$0.00	$87.73
	12/01/2024	$57.48	$15.30	$16.40	$0.00	$89.18
	06/01/2025	$58.78	$15.30	$16.40	$0.00	$90.48
	12/01/2025	$60.23	$15.30	$16.40	$0.00	$91.93
	06/01/2026	$61.53	$15.30	$16.40	$0.00	$93.23
	12/01/2026	$62.98	$15.30	$16.40	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 1*	06/01/2024	$45.63	$9.65	$18.40	$0.00	$73.68
	12/01/2024	$47.10	$9.65	$18.40	$0.00	$75.15
	06/01/2025	$48.60	$9.65	$18.40	$0.00	$76.65
	12/01/2025	$50.10	$9.65	$18.40	$0.00	$78.15
	06/01/2026	$51.65	$9.65	$18.40	$0.00	$79.70
	12/01/2026	$53.15	$9.65	$18.40	$0.00	$81.20
	06/01/2027	$54.75	$9.65	$18.40	$0.00	$82.80
	12/01/2027	$56.35	$9.65	$18.40	$0.00	$84.40
	06/01/2028	$58.03	$9.65	$18.40	$0.00	$86.08
	12/01/2028	$59.70	$9.65	$18.40	$0.00	$87.75

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 1*	06/01/2024	$46.13	$9.65	$18.40	$0.00	$74.18
	12/01/2024	$47.60	$9.65	$18.40	$0.00	$75.65
	06/01/2025	$49.10	$9.65	$18.40	$0.00	$77.15
	12/01/2025	$50.60	$9.65	$18.40	$0.00	$78.65
	06/01/2026	$51.40	$9.65	$18.40	$0.00	$79.45
	12/01/2026	$53.65	$9.65	$18.40	$0.00	$81.70
	06/01/2027	$55.25	$9.65	$18.40	$0.00	$83.30
	12/01/2027	$56.85	$9.65	$18.40	$0.00	$84.90
	06/01/2028	$58.53	$9.65	$18.40	$0.00	$86.58
	12/01/2028	$60.20	$9.65	$18.40	$0.00	$88.25
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$46.23	$9.65	$18.40	$0.00	$74.28
	12/01/2024	$47.70	$9.65	$18.40	$0.00	$75.75
	06/01/2025	$49.20	$9.65	$18.40	$0.00	$77.25
	12/01/2025	$50.70	$9.65	$18.40	$0.00	$78.75
	06/01/2026	$52.25	$9.65	$18.40	$0.00	$80.30
	12/01/2026	$53.75	$9.65	$18.40	$0.00	$81.80
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2024	$48.12	$7.07	$20.60	$0.00	$75.79

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2024

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

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (BOSTON)*	08/01/2024	$64.50	$11.49	$23.59	$0.00	$99.58
	02/01/2025	$65.80	$11.49	$23.59	$0.00	$100.88
	08/01/2025	$67.95	$11.49	$23.59	$0.00	$103.03
	02/01/2026	$69.30	$11.49	$23.59	$0.00	$104.38
	08/01/2026	$71.50	$11.49	$23.59	$0.00	$106.58
	02/01/2027	$72.90	$11.49	$23.59	$0.00	$107.98

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.25	$11.49	$23.59	$0.00	$67.33
2	60	$38.70	$11.49	$23.59	$0.00	$73.78
3	70	$45.15	$11.49	$23.59	$0.00	$80.23
4	80	$51.60	$11.49	$23.59	$0.00	$86.68
5	90	$58.05	$11.49	$23.59	$0.00	$93.13

Effective Date - 02/01/2025

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

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2024	$46.63	$9.65	$18.22	$0.00	$74.50
	12/01/2024	$48.10	$9.65	$18.22	$0.00	$75.97
	06/01/2025	$49.60	$9.65	$18.22	$0.00	$77.47
	12/01/2025	$51.10	$9.65	$18.22	$0.00	$78.97
	06/01/2026	$52.65	$9.65	$18.22	$0.00	$80.52
	12/01/2026	$54.15	$9.65	$18.22	$0.00	$82.02
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2024	$45.48	$9.65	$18.22	$0.00	$73.35
	12/01/2024	$46.95	$9.65	$18.22	$0.00	$74.82
	06/01/2025	$48.45	$9.65	$18.22	$0.00	$76.32
	12/01/2025	$49.95	$9.65	$18.22	$0.00	$77.82
	06/01/2026	$51.50	$9.65	$18.22	$0.00	$79.37
	12/01/2026	$53.00	$9.65	$18.22	$0.00	$80.87
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2024	$45.81	$9.65	$18.22	$0.00	$73.68
	12/01/2024	$47.28	$9.65	$18.22	$0.00	$75.15
	06/01/2025	$48.78	$9.65	$18.22	$0.00	$76.65
	12/01/2025	$50.28	$9.65	$18.22	$0.00	$78.15
	06/01/2026	$51.83	$9.65	$18.22	$0.00	$79.70
	12/01/2026	$53.33	$9.65	$18.22	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 1*	06/01/2024	$45.63	$9.65	$18.40	$0.00	$73.68
	12/01/2024	$47.10	$9.65	$18.40	$0.00	$75.15
	06/01/2025	$48.60	$9.65	$18.40	$0.00	$76.65
	12/01/2025	$50.10	$9.65	$18.40	$0.00	$78.15
	06/01/2026	$51.65	$9.65	$18.40	$0.00	$79.70
	12/01/2026	$53.15	$9.65	$18.40	$0.00	$81.20
	06/01/2027	$54.75	$9.65	$18.40	$0.00	$82.80
	12/01/2027	$56.35	$9.65	$18.40	$0.00	$84.40
	06/01/2028	$58.03	$9.65	$18.40	$0.00	$86.08
	12/01/2028	$59.70	$9.65	$18.40	$0.00	$87.75
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 1 (Metro Boston)*	03/01/2024	$57.46	$9.83	$19.97	$0.00	$87.26
	09/01/2024	$58.96	$9.83	$19.97	$0.00	$88.76
	03/01/2025	$60.46	$9.83	$19.97	$0.00	$90.26
	09/01/2025	$61.96	$9.83	$19.97	$0.00	$91.76
	03/01/2026	$63.46	$9.83	$19.97	$0.00	$93.26
	09/01/2026	$64.96	$9.83	$19.97	$0.00	$94.76
	03/01/2027	$66.46	$9.83	$19.97	$0.00	$96.26

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER - Zone 1 Metro Boston*

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$25.86	$9.83	$1.73	$0.00	$37.42
2	45	$25.86	$9.83	$1.73	$0.00	$37.42
3	55	$31.60	$9.83	$3.40	$0.00	$44.83
4	55	$31.60	$9.83	$3.40	$0.00	$44.83
5	70	$40.22	$9.83	$16.51	$0.00	$66.56
6	70	$40.22	$9.83	$16.51	$0.00	$66.56
7	80	$45.97	$9.83	$18.24	$0.00	$74.04
8	80	$45.97	$9.83	$18.24	$0.00	$74.04

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$26.53	$9.83	$1.73	$0.00	$38.09
2	45	$26.53	$9.83	$1.73	$0.00	$38.09
3	55	$32.43	$9.83	$3.40	$0.00	$45.66
4	55	$32.43	$9.83	$3.40	$0.00	$45.66
5	70	$41.27	$9.83	$16.51	$0.00	$67.61
6	70	$41.27	$9.83	$16.51	$0.00	$67.61
7	80	$47.17	$9.83	$18.24	$0.00	$75.24
8	80	$47.17	$9.83	$18.24	$0.00	$75.24

Notes:

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME *CARPENTERS -ZONE 1 (Wood Frame)*	04/01/2024	$36.94	$7.56	$9.47	$0.00	$53.97
	10/01/2024	$37.74	$7.56	$9.47	$0.00	$54.77
	04/01/2025	$38.54	$7.56	$9.47	$0.00	$55.57
	10/01/2025	$39.34	$7.56	$9.47	$0.00	$56.37
	04/01/2026	$40.14	$7.56	$9.47	$0.00	$57.17
	10/01/2026	$40.94	$7.56	$9.47	$0.00	$57.97
	04/01/2027	$41.74	$7.56	$9.47	$0.00	$58.77

All Aspects of New Wood Frame Work

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER (Wood Frame) - Zone 1*

Effective Date - 04/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.47	$7.56	$0.00	$0.00	$26.03
2	50	$18.47	$7.56	$0.00	$0.00	$26.03
3	55	$20.32	$7.56	$2.00	$0.00	$29.88
4	55	$20.32	$7.56	$2.00	$0.00	$29.88
5	70	$25.86	$7.56	$7.47	$0.00	$40.89
6	70	$25.86	$7.56	$7.47	$0.00	$40.89
7	80	$29.55	$7.56	$8.47	$0.00	$45.58
8	80	$29.55	$7.56	$8.47	$0.00	$45.58

Effective Date - 10/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.87	$7.56	$0.00	$0.00	$26.43
2	50	$18.87	$7.56	$0.00	$0.00	$26.43
3	55	$20.76	$7.56	$2.00	$0.00	$30.32
4	55	$20.76	$7.56	$2.00	$0.00	$30.32
5	70	$26.42	$7.56	$7.47	$0.00	$41.45
6	70	$26.42	$7.56	$7.47	$0.00	$41.45
7	80	$30.19	$7.56	$8.47	$0.00	$46.22
8	80	$30.19	$7.56	$8.47	$0.00	$46.22

Notes:

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (BOSTON)*	01/01/2024	$49.33	$13.00	$23.57	$1.30	$87.20

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

Effective Date - 01/01/2024

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

Notes:

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

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 1*	06/01/2024	$45.63	$9.65	$18.40	$0.00	$73.68
	12/01/2024	$47.10	$9.65	$18.40	$0.00	$75.15
	06/01/2025	$48.60	$9.65	$18.40	$0.00	$76.65
	12/01/2025	$50.10	$9.65	$18.40	$0.00	$78.15
	06/01/2026	$51.65	$9.65	$18.40	$0.00	$79.70
	12/01/2026	$53.15	$9.65	$18.40	$0.00	$81.20
	06/01/2027	$54.75	$9.65	$18.40	$0.00	$82.80
	12/01/2027	$56.35	$9.65	$18.40	$0.00	$84.40
	06/01/2028	$58.03	$9.65	$18.40	$0.00	$86.08
	12/01/2028	$59.70	$9.65	$18.40	$0.00	$87.75
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$57.15	$15.30	$16.40	$0.00	$88.85
	12/01/2024	$58.63	$15.30	$16.40	$0.00	$90.33
	06/01/2025	$59.96	$15.30	$16.40	$0.00	$91.66
	12/01/2025	$61.43	$15.30	$16.40	$0.00	$93.13
	06/01/2026	$62.76	$15.30	$16.40	$0.00	$94.46
	12/01/2026	$64.24	$15.30	$16.40	$0.00	$95.94
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$36.17	$15.30	$16.40	$0.00	$67.87
	12/01/2024	$37.12	$15.30	$16.40	$0.00	$68.82
	06/01/2025	$37.97	$15.30	$16.40	$0.00	$69.67
	12/01/2025	$38.92	$15.30	$16.40	$0.00	$70.62
	06/01/2026	$39.78	$15.30	$16.40	$0.00	$71.48
	12/01/2026	$40.73	$15.30	$16.40	$0.00	$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 1*	07/01/2024	$57.26	$9.95	$23.95	$0.00	$91.16
	01/01/2025	$58.46	$9.95	$23.95	$0.00	$92.36

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2024

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

Effective Date - 01/01/2025

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

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 1*	12/01/2023	$44.48	$9.65	$18.07	$0.00	$72.20
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 1*	12/01/2023	$45.48	$9.65	$18.07	$0.00	$73.20
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 1*	12/01/2023	$45.23	$9.65	$18.07	$0.00	$72.95
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 1*	12/01/2023	$45.48	$9.65	$18.07	$0.00	$73.20
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 1*	12/01/2023	$45.23	$9.65	$18.07	$0.00	$72.95
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 1*	12/01/2023	$44.48	$9.65	$18.07	$0.00	$72.20
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 103*	03/01/2024	$61.86	$13.00	$22.21	$0.00	$97.07
	09/01/2024	$63.78	$13.00	$22.26	$0.00	$99.04
	03/01/2025	$64.98	$13.00	$22.30	$0.00	$100.28
	09/01/2025	$66.89	$13.00	$22.36	$0.00	$102.25
	03/01/2026	$68.09	$13.00	$22.39	$0.00	$103.48
	09/01/2026	$70.00	$13.00	$22.45	$0.00	$105.45
	03/01/2027	$71.19	$13.00	$22.49	$0.00	$106.68
	09/01/2027	$73.11	$13.00	$22.54	$0.00	$108.65
	03/01/2028	$74.31	$13.00	$22.58	$0.00	$109.89

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 103*

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$24.74	$13.00	$0.74	$0.00	$38.48
2	40	$24.74	$13.00	$0.74	$0.00	$38.48
3	45	$27.84	$13.00	$16.67	$0.00	$57.51
4	45	$27.84	$13.00	$16.67	$0.00	$57.51
5	50	$30.93	$13.00	$17.17	$0.00	$61.10
6	55	$34.02	$13.00	$17.67	$0.00	$64.69
7	60	$37.12	$13.00	$18.17	$0.00	$68.29
8	65	$40.21	$13.00	$18.68	$0.00	$71.89
9	70	$43.30	$13.00	$19.18	$0.00	$75.48
10	75	$46.40	$13.00	$19.69	$0.00	$79.09

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$25.51	$13.00	$0.77	$0.00	$39.28
2	40	$25.51	$13.00	$0.77	$0.00	$39.28
3	45	$28.70	$13.00	$16.69	$0.00	$58.39
4	45	$28.70	$13.00	$16.69	$0.00	$58.39
5	50	$31.89	$13.00	$17.20	$0.00	$62.09
6	55	$35.08	$13.00	$17.70	$0.00	$65.78
7	60	$38.27	$13.00	$18.21	$0.00	$69.48
8	65	$41.46	$13.00	$18.71	$0.00	$73.17
9	70	$44.65	$13.00	$19.22	$0.00	$76.87
10	75	$47.84	$13.00	$19.74	$0.00	$80.58

Notes: :
App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*

Effective Date - 01/01/2022

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

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

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$45.73	$9.65	$18.40	$0.00	$73.78
	12/01/2024	$47.20	$9.65	$18.40	$0.00	$75.25
	06/01/2025	$48.70	$9.65	$18.40	$0.00	$76.75
	12/01/2025	$50.20	$9.65	$18.40	$0.00	$78.25
	06/01/2026	$51.75	$9.65	$18.40	$0.00	$79.80
	12/01/2026	$53.25	$9.65	$18.40	$0.00	$81.30
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2024	$50.79	$15.00	$16.40	$0.00	$82.19
	11/01/2024	$52.08	$15.00	$16.40	$0.00	$83.48
	05/01/2025	$53.52	$15.00	$16.40	$0.00	$84.92
	11/01/2025	$54.81	$15.00	$16.40	$0.00	$86.21
	05/01/2026	$56.25	$15.00	$16.40	$0.00	$87.65
	11/01/2026	$57.54	$15.00	$16.40	$0.00	$88.94
	05/01/2027	$58.97	$15.00	$16.40	$0.00	$90.37
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2024	$52.37	$15.00	$16.40	$0.00	$83.77
	11/01/2024	$53.67	$15.00	$16.40	$0.00	$85.07
	05/01/2025	$55.12	$15.00	$16.40	$0.00	$86.52
	11/01/2025	$56.42	$15.00	$16.40	$0.00	$87.82
	05/01/2026	$57.87	$15.00	$16.40	$0.00	$89.27
	11/01/2026	$59.17	$15.00	$16.40	$0.00	$90.57
	05/01/2027	$60.62	$15.00	$16.40	$0.00	$92.02
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2024	$24.91	$15.00	$16.40	$0.00	$56.31
	11/01/2024	$25.67	$15.00	$16.40	$0.00	$57.07
	05/01/2025	$26.52	$15.00	$16.40	$0.00	$57.92
	11/01/2025	$27.28	$15.00	$16.40	$0.00	$58.68
	05/01/2026	$28.13	$15.00	$16.40	$0.00	$59.53
	11/01/2026	$28.89	$15.00	$16.40	$0.00	$60.29
	05/01/2027	$29.74	$15.00	$16.40	$0.00	$61.14
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 103*	03/01/2024	$61.86	$13.00	$22.21	$0.00	$97.07
	09/01/2024	$63.78	$13.00	$22.26	$0.00	$99.04
	03/01/2025	$64.98	$13.00	$22.30	$0.00	$100.28
	09/01/2025	$66.89	$13.00	$22.36	$0.00	$102.25
	03/01/2026	$68.09	$13.00	$22.39	$0.00	$103.48
	09/01/2026	$70.00	$13.00	$22.45	$0.00	$105.45
	03/01/2027	$71.19	$13.00	$22.49	$0.00	$106.68
	09/01/2027	$73.11	$13.00	$22.54	$0.00	$108.65
	03/01/2028	$74.31	$13.00	$22.58	$0.00	$109.89
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING*ELECTRICIANS LOCAL 103*	03/01/2024	$49.49	$13.00	$20.19	$0.00	$82.68
	09/01/2024	$51.02	$13.00	$20.24	$0.00	$84.26
	03/01/2025	$51.98	$13.00	$20.27	$0.00	$85.25
	09/01/2025	$53.51	$13.00	$20.32	$0.00	$86.83
	03/01/2026	$54.47	$13.00	$20.34	$0.00	$87.81
	09/01/2026	$56.00	$13.00	$20.39	$0.00	$89.39
	03/01/2027	$56.95	$13.00	$20.42	$0.00	$90.37
	09/01/2027	$58.49	$13.00	$20.46	$0.00	$91.95
	03/01/2028	$59.45	$13.00	$20.49	$0.00	$92.94
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$45.23	$15.30	$16.40	$0.00	$76.93
	12/01/2024	$46.41	$15.30	$16.40	$0.00	$78.11
	06/01/2025	$47.47	$15.30	$16.40	$0.00	$79.17
	12/01/2025	$48.64	$15.30	$16.40	$0.00	$80.34
	06/01/2026	$49.70	$15.30	$16.40	$0.00	$81.40
	12/01/2026	$50.88	$15.30	$16.40	$0.00	$82.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$27.01	$9.65	$18.40	$0.00	$55.06
	12/01/2024	$27.01	$9.65	$18.40	$0.00	$55.06
	06/01/2025	$28.09	$9.65	$18.40	$0.00	$56.14
	12/01/2025	$28.09	$9.65	$18.40	$0.00	$56.14
	06/01/2026	$29.21	$9.65	$18.40	$0.00	$57.26
	12/01/2026	$29.21	$9.65	$18.40	$0.00	$57.26
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	03/01/2024	$54.73	$8.83	$20.27	$0.00	$83.83
	09/01/2024	$56.23	$8.83	$20.27	$0.00	$85.33
	03/01/2025	$57.73	$8.83	$20.27	$0.00	$86.83
	09/01/2025	$59.23	$8.83	$20.27	$0.00	$88.33
	03/01/2026	$60.73	$8.83	$20.27	$0.00	$89.83
	09/01/2026	$62.23	$8.83	$20.27	$0.00	$91.33
	03/01/2027	$63.73	$8.83	$20.27	$0.00	$92.83

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$24.63	$8.83	$1.76	$0.00	$35.22
2	45	$24.63	$8.83	$1.76	$0.00	$35.22
3	55	$30.10	$8.83	$3.52	$0.00	$42.45
4	55	$30.10	$8.83	$3.52	$0.00	$42.45
5	70	$38.31	$8.83	$16.75	$0.00	$63.89
6	70	$38.31	$8.83	$16.75	$0.00	$63.89
7	80	$43.78	$8.83	$18.51	$0.00	$71.12
8	80	$43.78	$8.83	$18.51	$0.00	$71.12

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$25.30	$8.83	$1.76	$0.00	$35.89
2	45	$25.30	$8.83	$1.76	$0.00	$35.89
3	55	$30.93	$8.83	$3.52	$0.00	$43.28
4	55	$30.93	$8.83	$3.52	$0.00	$43.28
5	70	$39.36	$8.83	$16.75	$0.00	$64.94
6	70	$39.36	$8.83	$16.75	$0.00	$64.94
7	80	$44.98	$8.83	$18.51	$0.00	$72.32
8	80	$44.98	$8.83	$18.51	$0.00	$72.32

Notes: Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$56.03	$15.30	$16.40	$0.00	$87.73
	12/01/2024	$57.48	$15.30	$16.40	$0.00	$89.18
	06/01/2025	$58.78	$15.30	$16.40	$0.00	$90.48
	12/01/2025	$60.23	$15.30	$16.40	$0.00	$91.93
	06/01/2026	$61.53	$15.30	$16.40	$0.00	$93.23
	12/01/2026	$62.98	$15.30	$16.40	$0.00	$94.68

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$36.17	$15.30	$16.40	$0.00	$67.87
	12/01/2024	$37.12	$15.30	$16.40	$0.00	$68.82
	06/01/2025	$37.97	$15.30	$16.40	$0.00	$69.67
	12/01/2025	$38.92	$15.30	$16.40	$0.00	$70.62
	06/01/2026	$39.78	$15.30	$16.40	$0.00	$71.48
	12/01/2026	$40.73	$15.30	$16.40	$0.00	$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 1)*	07/01/2024	$52.55	$9.95	$23.95	$0.00	$86.45
	01/01/2025	$53.75	$9.95	$23.95	$0.00	$87.65

Apprentice - *GLAZIER - Local 35 Zone 1*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.28	$9.95	$0.00	$0.00	$36.23
2	55	$28.90	$9.95	$6.66	$0.00	$45.51
3	60	$31.53	$9.95	$7.26	$0.00	$48.74
4	65	$34.16	$9.95	$7.87	$0.00	$51.98
5	70	$36.79	$9.95	$20.32	$0.00	$67.06
6	75	$39.41	$9.95	$20.93	$0.00	$70.29
7	80	$42.04	$9.95	$21.53	$0.00	$73.52
8	90	$47.30	$9.95	$22.74	$0.00	$79.99

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.88	$9.95	$0.00	$0.00	$36.83
2	55	$29.56	$9.95	$6.66	$0.00	$46.17
3	60	$32.25	$9.95	$7.26	$0.00	$49.46
4	65	$34.94	$9.95	$7.87	$0.00	$52.76
5	70	$37.63	$9.95	$20.32	$0.00	$67.90
6	75	$40.31	$9.95	$20.93	$0.00	$71.19
7	80	$43.00	$9.95	$21.53	$0.00	$74.48
8	90	$48.38	$9.95	$22.74	$0.00	$81.07

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$56.03	$15.30	$16.40	$0.00	$87.73
	12/01/2024	$57.48	$15.30	$16.40	$0.00	$89.18
	06/01/2025	$58.78	$15.30	$16.40	$0.00	$90.48
	12/01/2025	$60.23	$15.30	$16.40	$0.00	$91.93
	06/01/2026	$61.53	$15.30	$16.40	$0.00	$93.23
	12/01/2026	$62.98	$15.30	$16.40	$0.00	$94.68

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$30.82	$15.30	$0.00	$0.00	$46.12
2	60	$33.62	$15.30	$16.40	$0.00	$65.32
3	65	$36.42	$15.30	$16.40	$0.00	$68.12
4	70	$39.22	$15.30	$16.40	$0.00	$70.92
5	75	$42.02	$15.30	$16.40	$0.00	$73.72
6	80	$44.82	$15.30	$16.40	$0.00	$76.52
7	85	$47.63	$15.30	$16.40	$0.00	$79.33
8	90	$50.43	$15.30	$16.40	$0.00	$82.13

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$31.61	$0.00	$0.00	$0.00	$31.61
2	60	$34.49	$15.30	$16.40	$0.00	$66.19
3	65	$37.36	$15.30	$16.40	$0.00	$69.06
4	70	$40.24	$15.30	$16.40	$0.00	$71.94
5	75	$43.11	$15.30	$16.40	$0.00	$74.81
6	80	$45.98	$15.30	$16.40	$0.00	$77.68
7	85	$48.86	$15.30	$16.40	$0.00	$80.56
8	90	$51.73	$15.30	$16.40	$0.00	$83.43

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2024	$58.97	$14.59	$27.50	$2.98	$104.04
	02/01/2025	$60.72	$14.59	$27.50	$2.98	$105.79
	08/01/2025	$62.57	$14.59	$27.50	$2.98	$107.64
	02/01/2026	$64.52	$14.59	$27.50	$2.98	$109.59
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 103*	03/01/2024	$61.86	$13.00	$22.21	$0.00	$97.07
	09/01/2024	$63.78	$13.00	$22.26	$0.00	$99.04
	03/01/2025	$64.98	$13.00	$22.30	$0.00	$100.28
	09/01/2025	$66.89	$13.00	$22.36	$0.00	$102.25
	03/01/2026	$68.09	$13.00	$22.39	$0.00	$103.48
	09/01/2026	$70.00	$13.00	$22.45	$0.00	$105.45
	03/01/2027	$71.19	$13.00	$22.49	$0.00	$106.68
	09/01/2027	$73.11	$13.00	$22.54	$0.00	$108.65
	03/01/2028	$74.31	$13.00	$22.58	$0.00	$109.89
For apprentice rates see "Apprentice- ELECTRICIAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2024	$58.97	$14.59	$27.50	$2.98	$104.04
	02/01/2025	$60.72	$14.59	$27.50	$2.98	$105.79
	08/01/2025	$62.57	$14.59	$27.50	$2.98	$107.64
	02/01/2026	$64.52	$14.59	$27.50	$2.98	$109.59
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PIPEFITTERS LOCAL 537*	03/01/2024	$65.28	$12.70	$21.80	$0.00	$99.78
	09/01/2024	$67.08	$12.70	$21.80	$0.00	$101.58
	03/01/2025	$68.88	$12.70	$21.80	$0.00	$103.38
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PIPEFITTERS LOCAL 537*	03/01/2024	$65.28	$12.70	$21.80	$0.00	$99.78
	09/01/2024	$67.08	$12.70	$21.80	$0.00	$101.58
	03/01/2025	$68.88	$12.70	$21.80	$0.00	$103.38
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 1*	06/01/2024	$46.13	$9.65	$18.40	$0.00	$74.18
	12/01/2024	$47.60	$9.65	$18.40	$0.00	$75.65
	06/01/2025	$49.10	$9.65	$18.40	$0.00	$77.15
	12/01/2025	$50.60	$9.65	$18.40	$0.00	$78.65
	06/01/2026	$51.40	$9.65	$18.40	$0.00	$79.45
	12/01/2026	$53.65	$9.65	$18.40	$0.00	$81.70
	06/01/2027	$55.25	$9.65	$18.40	$0.00	$83.30
	12/01/2027	$56.85	$9.65	$18.40	$0.00	$84.90
	06/01/2028	$58.53	$9.65	$18.40	$0.00	$86.58
	12/01/2028	$60.20	$9.65	$18.40	$0.00	$88.25
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$46.23	$9.65	$18.40	$0.00	$74.28
	12/01/2024	$47.70	$9.65	$18.40	$0.00	$75.75
	06/01/2025	$49.20	$9.65	$18.40	$0.00	$77.25
	12/01/2025	$50.70	$9.65	$18.40	$0.00	$78.75
	06/01/2026	$52.25	$9.65	$18.40	$0.00	$80.30
	12/01/2026	$53.75	$9.65	$18.40	$0.00	$81.80
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	09/01/2023	$53.50	$14.75	$19.61	$0.00	$87.86
	09/01/2024	$56.92	$14.75	$19.61	$0.00	$91.28
	09/01/2025	$60.34	$14.75	$19.61	$0.00	$94.70
	09/01/2026	$63.76	$14.75	$19.61	$0.00	$98.12

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 09/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.75	$14.75	$14.32	$0.00	$55.82
2	60	$32.10	$14.75	$15.37	$0.00	$62.22
3	70	$37.45	$14.75	$16.43	$0.00	$68.63
4	80	$42.80	$14.75	$17.49	$0.00	$75.04

Effective Date - 09/01/2024

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

Notes:
Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

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

Apprentice - *IRONWORKER - Local 7 Boston*

Effective Date - 03/16/2024

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

Notes:

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 1*	06/01/2024	$45.63	$9.65	$18.40	$0.00	$73.68
	12/01/2024	$47.10	$9.65	$18.40	$0.00	$75.15
	06/01/2025	$48.60	$9.65	$18.40	$0.00	$76.65
	12/01/2025	$50.10	$9.65	$18.40	$0.00	$78.15
	06/01/2026	$51.65	$9.65	$18.40	$0.00	$79.70
	12/01/2026	$53.15	$9.65	$18.40	$0.00	$81.20
	06/01/2027	$54.75	$9.65	$18.40	$0.00	$82.80
	12/01/2027	$56.35	$9.65	$18.40	$0.00	$84.40
	06/01/2028	$58.03	$9.65	$18.40	$0.00	$86.08
	12/01/2028	$59.70	$9.65	$18.40	$0.00	$87.75
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 1*	06/01/2024	$45.38	$9.65	$18.40	$0.00	$73.43
	12/01/2024	$46.85	$9.65	$18.40	$0.00	$74.90
	06/01/2025	$48.35	$9.65	$18.40	$0.00	$76.40
	12/01/2025	$49.85	$9.65	$18.40	$0.00	$77.90
	06/01/2026	$51.40	$9.65	$18.40	$0.00	$79.45
	12/01/2026	$52.90	$9.65	$18.40	$0.00	$80.95
	06/01/2027	$54.50	$9.65	$18.40	$0.00	$82.55
	12/01/2027	$56.10	$9.65	$18.40	$0.00	$84.15
	06/01/2028	$57.78	$9.65	$18.40	$0.00	$85.83
	12/01/2028	$59.45	$9.65	$18.40	$0.00	$87.50

Apprentice - *LABORER - Zone 1*

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$27.23	$9.65	$18.40	$0.00	$55.28
2	70	$31.77	$9.65	$18.40	$0.00	$59.82
3	80	$36.30	$9.65	$18.40	$0.00	$64.35
4	90	$40.84	$9.65	$18.40	$0.00	$68.89

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$28.11	$9.65	$18.40	$0.00	$56.16
2	70	$32.80	$9.65	$18.40	$0.00	$60.85
3	80	$37.48	$9.65	$18.40	$0.00	$65.53
4	90	$42.17	$9.65	$18.40	$0.00	$70.22

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$45.48	$9.65	$18.40	$0.00	$73.53
	12/01/2024	$46.95	$9.65	$18.40	$0.00	$75.00
	06/01/2025	$48.45	$9.65	$18.40	$0.00	$76.50
	12/01/2025	$49.95	$9.65	$18.40	$0.00	$78.00
	06/01/2026	$51.50	$9.65	$18.40	$0.00	$79.55
	12/01/2026	$53.00	$9.65	$18.40	$0.00	$81.05

Apprentice - *LABORER (Heavy & Highway) - Zone 1*

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$27.29	$9.65	$18.40	$0.00	$55.34
2	70	$31.84	$9.65	$18.40	$0.00	$59.89
3	80	$36.38	$9.65	$18.40	$0.00	$64.43
4	90	$40.93	$9.65	$18.40	$0.00	$68.98

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$28.17	$9.65	$18.40	$0.00	$56.22
2	70	$32.87	$9.65	$18.40	$0.00	$60.92
3	80	$37.56	$9.65	$18.40	$0.00	$65.61
4	90	$42.26	$9.65	$18.40	$0.00	$70.31

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER *LABORERS - ZONE 1*	06/01/2024	$45.38	$9.65	$18.40	$0.00	$73.43
	12/01/2024	$46.85	$9.65	$18.40	$0.00	$74.90
	06/01/2025	$48.35	$9.65	$18.40	$0.00	$76.40
	12/01/2025	$49.85	$9.65	$18.40	$0.00	$77.90
	06/01/2026	$51.40	$9.65	$18.40	$0.00	$79.45
	12/01/2026	$52.90	$9.65	$18.40	$0.00	$80.95
	06/01/2027	$54.50	$9.65	$18.40	$0.00	$82.55
	12/01/2027	$56.10	$9.65	$18.40	$0.00	$84.15
	06/01/2028	$57.78	$9.65	$18.40	$0.00	$85.83
	12/01/2028	$59.45	$9.65	$18.40	$0.00	$87.50

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 1*	06/01/2024	$45.38	$9.65	$18.40	$0.00	$73.43
	12/01/2024	$46.85	$9.65	$18.40	$0.00	$74.90
	06/01/2025	$48.35	$9.65	$18.40	$0.00	$76.40
	12/01/2025	$49.85	$9.65	$18.40	$0.00	$77.90
	06/01/2026	$51.40	$9.65	$18.40	$0.00	$79.45
	12/01/2026	$52.90	$9.65	$18.40	$0.00	$80.95
	06/01/2027	$54.50	$9.65	$18.40	$0.00	$82.55
	12/01/2027	$56.10	$9.65	$18.40	$0.00	$84.15
	06/01/2028	$57.78	$9.65	$18.40	$0.00	$85.83
	12/01/2028	$59.45	$9.65	$18.40	$0.00	$87.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 1*	12/01/2023	$44.48	$9.65	$18.07	$0.00	$72.20
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 1*	06/01/2024	$45.63	$9.65	$18.40	$0.00	$73.68
	12/01/2024	$47.10	$9.65	$18.40	$0.00	$75.15
	06/01/2025	$48.60	$9.65	$18.40	$0.00	$76.65
	12/01/2025	$50.10	$9.65	$18.40	$0.00	$78.15
	06/01/2026	$51.65	$9.65	$18.40	$0.00	$79.70
	12/01/2026	$53.15	$9.65	$18.40	$0.00	$81.20
	06/01/2027	$54.75	$9.65	$18.40	$0.00	$82.80
	12/01/2027	$56.35	$9.65	$18.40	$0.00	$84.40
	06/01/2028	$58.03	$9.65	$18.40	$0.00	$86.08
	12/01/2028	$59.70	$9.65	$18.40	$0.00	$87.75
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$45.73	$9.65	$18.40	$0.00	$73.78
	12/01/2024	$47.20	$9.65	$18.40	$0.00	$75.25
	06/01/2025	$48.70	$9.65	$18.40	$0.00	$76.75
	12/01/2025	$50.20	$9.65	$18.40	$0.00	$78.25
	06/01/2026	$51.75	$9.65	$18.40	$0.00	$79.80
	12/01/2026	$53.25	$9.65	$18.40	$0.00	$81.30
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 1*	06/01/2024	$45.38	$9.65	$18.40	$0.00	$73.43
	12/01/2024	$46.85	$9.65	$18.40	$0.00	$74.90
	06/01/2025	$48.35	$9.65	$18.40	$0.00	$76.40
	12/01/2025	$49.85	$9.65	$18.40	$0.00	$77.90
	06/01/2026	$51.40	$9.65	$18.40	$0.00	$79.45
	12/01/2026	$52.90	$9.65	$18.40	$0.00	$80.95
	06/01/2027	$54.50	$9.65	$18.40	$0.00	$82.55
	12/01/2027	$56.10	$9.65	$18.40	$0.00	$84.15
	06/01/2028	$57.78	$9.65	$18.40	$0.00	$85.83
	12/01/2028	$59.45	$9.65	$18.40	$0.00	$87.50
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: TREE REMOVER *LABORERS - ZONE 1*	06/01/2024	$45.38	$9.65	$18.40	$0.00	$73.43
	12/01/2024	$46.85	$9.65	$18.40	$0.00	$74.90
	06/01/2025	$48.35	$9.65	$18.40	$0.00	$76.40
	12/01/2025	$49.85	$9.65	$18.40	$0.00	$77.90
	06/01/2026	$51.40	$9.65	$18.40	$0.00	$79.45
	12/01/2026	$52.90	$9.65	$18.40	$0.00	$80.95
	06/01/2027	$54.50	$9.65	$18.40	$0.00	$82.55
	12/01/2027	$56.10	$9.65	$18.40	$0.00	$84.15
	06/01/2028	$57.78	$9.65	$18.40	$0.00	$85.83
	12/01/2028	$59.45	$9.65	$18.40	$0.00	$87.50
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 1*	06/01/2024	$45.63	$9.65	$18.40	$0.00	$73.68
	12/01/2024	$47.10	$9.65	$18.40	$0.00	$75.15
	06/01/2025	$48.60	$9.65	$18.40	$0.00	$76.65
	12/01/2025	$50.10	$9.65	$18.40	$0.00	$78.15
	06/01/2026	$51.65	$9.65	$18.40	$0.00	$79.70
	12/01/2026	$53.15	$9.65	$18.40	$0.00	$81.20
	06/01/2027	$54.75	$9.65	$18.40	$0.00	$82.80
	12/01/2027	$56.35	$9.65	$18.40	$0.00	$84.40
	06/01/2028	$58.03	$9.65	$18.40	$0.00	$86.08
	12/01/2028	$59.70	$9.65	$18.40	$0.00	$87.75
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$45.73	$9.65	$18.40	$0.00	$73.78
	12/01/2024	$47.20	$9.65	$18.40	$0.00	$75.25
	06/01/2025	$48.70	$9.65	$18.40	$0.00	$76.75
	12/01/2025	$50.20	$9.65	$18.40	$0.00	$78.25
	06/01/2026	$51.75	$9.65	$18.40	$0.00	$79.80
	12/01/2026	$53.25	$9.65	$18.40	$0.00	$81.30
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2024	$49.32	$11.49	$21.62	$0.00	$82.43
	02/01/2025	$50.36	$11.49	$21.62	$0.00	$83.47
	08/01/2025	$52.08	$11.49	$21.62	$0.00	$85.19
	02/01/2026	$53.16	$11.49	$21.62	$0.00	$86.27
	08/01/2026	$54.92	$11.49	$21.62	$0.00	$88.03
	02/01/2027	$56.04	$11.49	$21.62	$0.00	$89.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.66	$11.49	$21.62	$0.00	$57.77
2	60	$29.59	$11.49	$21.62	$0.00	$62.70
3	70	$34.52	$11.49	$21.62	$0.00	$67.63
4	80	$39.46	$11.49	$21.62	$0.00	$72.57
5	90	$44.39	$11.49	$21.62	$0.00	$77.50

Effective Date - 02/01/2025

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

Notes:

Apprentice to Journeyworker Ratio:1:3

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.26	$11.49	$23.56	$0.00	$67.31
2	60	$38.71	$11.49	$23.56	$0.00	$73.76
3	70	$45.16	$11.49	$23.56	$0.00	$80.21
4	80	$51.62	$11.49	$23.56	$0.00	$86.67
5	90	$58.07	$11.49	$23.56	$0.00	$93.12

Effective Date - 02/01/2025

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

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 1) *MILLWRIGHTS LOCAL 1121 - Zone 1*	01/01/2024	$48.03	$10.08	$21.72	$0.00	$79.83
	01/06/2025	$50.53	$10.08	$21.72	$0.00	$82.33
	01/05/2026	$53.03	$10.08	$21.72	$0.00	$84.83

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MILLWRIGHT - Local 1121 Zone 1*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$26.42	$10.08	$5.64	$0.00	$42.14
2	65	$31.22	$10.08	$6.66	$0.00	$47.96
3	75	$36.02	$10.08	$19.16	$0.00	$65.26
4	85	$40.83	$10.08	$20.18	$0.00	$71.09

Effective Date - 01/06/2025

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

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension, but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

MORTAR MIXER *LABORERS - ZONE 1*	06/01/2024	$45.63	$9.65	$18.40	$0.00	$73.68
	12/01/2024	$47.10	$9.65	$18.40	$0.00	$75.15
	06/01/2025	$48.60	$9.65	$18.40	$0.00	$76.65
	12/01/2025	$50.10	$9.65	$18.40	$0.00	$78.15
	06/01/2026	$51.65	$9.65	$18.40	$0.00	$79.70
	12/01/2026	$53.15	$9.65	$18.40	$0.00	$81.20
	06/01/2027	$54.75	$9.65	$18.40	$0.00	$82.80
	12/01/2027	$56.35	$9.65	$18.40	$0.00	$84.40
	06/01/2028	$58.03	$9.65	$18.40	$0.00	$86.08
	12/01/2028	$59.70	$9.65	$18.40	$0.00	$87.75
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$24.71	$15.30	$16.40	$0.00	$56.41
	12/01/2024	$25.37	$15.30	$16.40	$0.00	$57.07
	06/01/2025	$25.97	$15.30	$16.40	$0.00	$57.67
	12/01/2025	$26.63	$15.30	$16.40	$0.00	$58.33
	06/01/2026	$27.22	$15.30	$16.40	$0.00	$58.92
	12/01/2026	$27.89	$15.30	$16.40	$0.00	$59.59
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$30.28	$15.30	$16.40	$0.00	$61.98
	12/01/2024	$31.08	$15.30	$16.40	$0.00	$62.78
	06/01/2025	$31.80	$15.30	$16.40	$0.00	$63.50
	12/01/2025	$32.60	$15.30	$16.40	$0.00	$64.30
	06/01/2026	$33.32	$15.30	$16.40	$0.00	$65.02
	12/01/2026	$34.12	$15.30	$16.40	$0.00	$65.82
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 1*	07/01/2024	$57.26	$9.95	$23.95	$0.00	$91.16
	01/01/2025	$58.46	$9.95	$23.95	$0.00	$92.36

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2024

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

Effective Date - 01/01/2025

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

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 1*	07/01/2024	$53.95	$9.95	$23.95	$0.00	$87.85
	01/01/2025	$55.15	$9.95	$23.95	$0.00	$89.05

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 1 - Spray/Sandblast - New*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.98	$9.95	$0.00	$0.00	$36.93
2	55	$29.67	$9.95	$6.66	$0.00	$46.28
3	60	$32.37	$9.95	$7.26	$0.00	$49.58
4	65	$35.07	$9.95	$7.87	$0.00	$52.89
5	70	$37.77	$9.95	$20.32	$0.00	$68.04
6	75	$40.46	$9.95	$20.93	$0.00	$71.34
7	80	$43.16	$9.95	$21.53	$0.00	$74.64
8	90	$48.56	$9.95	$22.74	$0.00	$81.25

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.58	$9.95	$0.00	$0.00	$37.53
2	55	$30.33	$9.95	$6.66	$0.00	$46.94
3	60	$33.09	$9.95	$7.26	$0.00	$50.30
4	65	$35.85	$9.95	$7.87	$0.00	$53.67
5	70	$38.61	$9.95	$20.32	$0.00	$68.88
6	75	$41.36	$9.95	$20.93	$0.00	$72.24
7	80	$44.12	$9.95	$21.53	$0.00	$75.60
8	90	$49.64	$9.95	$22.74	$0.00	$82.33

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 1*	07/01/2024	$52.01	$9.95	$23.95	$0.00	$85.91
	01/01/2025	$53.21	$9.95	$23.95	$0.00	$87.11

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 1 - Spray/Sandblast - Repaint*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.01	$9.95	$0.00	$0.00	$35.96
2	55	$28.61	$9.95	$6.66	$0.00	$45.22
3	60	$31.21	$9.95	$7.26	$0.00	$48.42
4	65	$33.81	$9.95	$7.87	$0.00	$51.63
5	70	$36.41	$9.95	$20.32	$0.00	$66.68
6	75	$39.01	$9.95	$20.93	$0.00	$69.89
7	80	$41.61	$9.95	$21.53	$0.00	$73.09
8	90	$46.81	$9.95	$22.74	$0.00	$79.50

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.61	$9.95	$0.00	$0.00	$36.56
2	55	$29.27	$9.95	$6.66	$0.00	$45.88
3	60	$31.93	$9.95	$7.26	$0.00	$49.14
4	65	$34.59	$9.95	$7.87	$0.00	$52.41
5	70	$37.25	$9.95	$20.32	$0.00	$67.52
6	75	$39.91	$9.95	$20.93	$0.00	$70.79
7	80	$42.57	$9.95	$21.53	$0.00	$74.05
8	90	$47.89	$9.95	$22.74	$0.00	$80.58

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	07/01/2024	$52.55	$9.95	$23.95	$0.00	$86.45
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 1*	01/01/2025	$53.75	$9.95	$23.95	$0.00	$87.65

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER - Local 35 Zone 1 - BRUSH NEW*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.28	$9.95	$0.00	$0.00	$36.23
2	55	$28.90	$9.95	$6.66	$0.00	$45.51
3	60	$31.53	$9.95	$7.26	$0.00	$48.74
4	65	$34.16	$9.95	$7.87	$0.00	$51.98
5	70	$36.79	$9.95	$20.32	$0.00	$67.06
6	75	$39.41	$9.95	$20.93	$0.00	$70.29
7	80	$42.04	$9.95	$21.53	$0.00	$73.52
8	90	$47.30	$9.95	$22.74	$0.00	$79.99

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.88	$9.95	$0.00	$0.00	$36.83
2	55	$29.56	$9.95	$6.66	$0.00	$46.17
3	60	$32.25	$9.95	$7.26	$0.00	$49.46
4	65	$34.94	$9.95	$7.87	$0.00	$52.76
5	70	$37.63	$9.95	$20.32	$0.00	$67.90
6	75	$40.31	$9.95	$20.93	$0.00	$71.19
7	80	$43.00	$9.95	$21.53	$0.00	$74.48
8	90	$48.38	$9.95	$22.74	$0.00	$81.07

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 1*	07/01/2024	$50.61	$9.95	$23.95	$0.00	$84.51
	01/01/2025	$51.81	$9.95	$23.95	$0.00	$85.71

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 1 - BRUSH REPAINT*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.31	$9.95	$0.00	$0.00	$35.26
2	55	$27.84	$9.95	$6.66	$0.00	$44.45
3	60	$30.37	$9.95	$7.26	$0.00	$47.58
4	65	$32.90	$9.95	$7.87	$0.00	$50.72
5	70	$35.43	$9.95	$20.32	$0.00	$65.70
6	75	$37.96	$9.95	$20.93	$0.00	$68.84
7	80	$40.49	$9.95	$21.53	$0.00	$71.97
8	90	$45.55	$9.95	$22.74	$0.00	$78.24

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.91	$9.95	$0.00	$0.00	$35.86
2	55	$28.50	$9.95	$6.66	$0.00	$45.11
3	60	$31.09	$9.95	$7.26	$0.00	$48.30
4	65	$33.68	$9.95	$7.87	$0.00	$51.50
5	70	$36.27	$9.95	$20.32	$0.00	$66.54
6	75	$38.86	$9.95	$20.93	$0.00	$69.74
7	80	$41.45	$9.95	$21.53	$0.00	$72.93
8	90	$46.63	$9.95	$22.74	$0.00	$79.32

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$45.48	$9.65	$18.40	$0.00	$73.53
	12/01/2024	$46.95	$9.65	$18.40	$0.00	$75.00
	06/01/2025	$48.45	$9.65	$18.40	$0.00	$76.50
	12/01/2025	$49.95	$9.65	$18.40	$0.00	$78.00
	06/01/2026	$51.50	$9.65	$18.40	$0.00	$79.55
	12/01/2026	$53.00	$9.65	$18.40	$0.00	$81.05
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2024	$40.88	$14.91	$18.67	$0.00	$74.46
	12/01/2024	$40.88	$14.91	$20.17	$0.00	$75.96
	06/01/2025	$41.88	$14.91	$20.17	$0.00	$76.96
	08/01/2025	$41.88	$15.41	$20.17	$0.00	$77.46
	12/01/2025	$41.88	$15.41	$21.78	$0.00	$79.07
	06/01/2026	$42.88	$15.41	$21.78	$0.00	$80.07
	08/01/2026	$42.88	$15.91	$21.78	$0.00	$80.57
	12/01/2026	$42.88	$15.91	$23.52	$0.00	$82.31
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59

Apprentice - *PILE DRIVER - Local 56 Zone 1*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.54	$9.40	$23.12	$0.00	$57.06
2	60	$29.44	$9.40	$23.12	$0.00	$61.96
3	70	$34.35	$9.40	$23.12	$0.00	$66.87
4	75	$36.80	$9.40	$23.12	$0.00	$69.32
5	80	$39.26	$9.40	$23.12	$0.00	$71.78
6	80	$39.26	$9.40	$23.12	$0.00	$71.78
7	90	$44.16	$9.40	$23.12	$0.00	$76.68
8	90	$44.16	$9.40	$23.12	$0.00	$76.68

Notes:
% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $34.01/ 3&4 $41.46/ 5&6 $62.80/ 7&8 $69.25

Apprentice to Journeyworker Ratio:1:5

PIPEFITTER & STEAMFITTER *PIPEFITTERS LOCAL 537*	03/01/2024	$65.28	$12.70	$21.80	$0.00	$99.78
	09/01/2024	$67.08	$12.70	$21.80	$0.00	$101.58
	03/01/2025	$68.88	$12.70	$21.80	$0.00	$103.38

Apprentice - *PIPEFITTER - Local 537*

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$26.11	$12.70	$9.05	$0.00	$47.86
2	45	$29.38	$12.70	$21.80	$0.00	$63.88
3	60	$39.17	$12.70	$21.80	$0.00	$73.67
4	70	$45.70	$12.70	$21.80	$0.00	$80.20
5	80	$52.22	$12.70	$21.80	$0.00	$86.72

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$26.83	$12.70	$9.05	$0.00	$48.58
2	45	$30.19	$12.70	$21.80	$0.00	$64.69
3	60	$40.25	$12.70	$21.80	$0.00	$74.75
4	70	$46.96	$12.70	$21.80	$0.00	$81.46
5	80	$53.66	$12.70	$21.80	$0.00	$88.16

Notes:
** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.
Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER *LABORERS - ZONE 1*	06/01/2024	$45.63	$9.65	$18.40	$0.00	$73.68
	12/01/2024	$47.10	$9.65	$18.40	$0.00	$75.15
	06/01/2025	$48.60	$9.65	$18.40	$0.00	$76.65
	12/01/2025	$50.10	$9.65	$18.40	$0.00	$78.15
	06/01/2026	$51.65	$9.65	$18.40	$0.00	$79.70
	12/01/2026	$53.15	$9.65	$18.40	$0.00	$81.20
	06/01/2027	$54.75	$9.65	$18.40	$0.00	$82.80
	12/01/2027	$56.35	$9.65	$18.40	$0.00	$84.40
	06/01/2028	$58.03	$9.65	$18.40	$0.00	$86.08
	12/01/2028	$59.70	$9.65	$18.40	$0.00	$87.75
For apprentice rates see "Apprentice- LABORER"						
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$45.73	$9.65	$18.40	$0.00	$73.78
	12/01/2024	$47.20	$9.65	$18.40	$0.00	$75.25
	06/01/2025	$48.70	$9.65	$18.40	$0.00	$76.75
	12/01/2025	$50.20	$9.65	$18.40	$0.00	$78.25
	06/01/2026	$51.75	$9.65	$18.40	$0.00	$79.80
	12/01/2026	$53.25	$9.65	$18.40	$0.00	$81.30
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
PLUMBERS & GASFITTERS *PLUMBERS & GASFITTERS LOCAL 12*	03/03/2024	$67.74	$14.32	$19.11	$0.00	$101.17
	09/01/2024	$69.54	$14.32	$19.11	$0.00	$102.97
	03/02/2025	$71.34	$14.32	$19.11	$0.00	$104.77

Apprentice - *PLUMBER/GASFITTER - Local 12*

Effective Date - 03/03/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$23.71	$14.32	$6.88	$0.00	$44.91
2	40	$27.10	$14.32	$7.82	$0.00	$49.24
3	55	$37.26	$14.32	$10.65	$0.00	$62.23
4	65	$44.03	$14.32	$12.53	$0.00	$70.88
5	75	$50.81	$14.32	$14.41	$0.00	$79.54

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$24.34	$14.32	$6.88	$0.00	$45.54
2	40	$27.82	$14.32	$7.82	$0.00	$49.96
3	55	$38.25	$14.32	$10.65	$0.00	$63.22
4	65	$45.20	$14.32	$12.53	$0.00	$72.05
5	75	$52.16	$14.32	$14.41	$0.00	$80.89

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic$69.00, Step5 with lic$76.87

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.) *PIPEFITTERS LOCAL 537*	03/01/2024	$65.28	$12.70	$21.80	$0.00	$99.78
	09/01/2024	$67.08	$12.70	$21.80	$0.00	$101.58
	03/01/2025	$68.88	$12.70	$21.80	$0.00	$103.38

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 1*	06/01/2024	$45.63	$9.65	$18.40	$0.00	$73.68
	12/01/2024	$47.10	$9.65	$18.40	$0.00	$75.15
	06/01/2025	$48.60	$9.65	$18.40	$0.00	$76.65
	12/01/2025	$50.10	$9.65	$18.40	$0.00	$78.15
	06/01/2026	$51.65	$9.65	$18.40	$0.00	$79.70
	12/01/2026	$53.15	$9.65	$18.40	$0.00	$81.20
	06/01/2027	$54.75	$9.65	$18.40	$0.00	$82.80
	12/01/2027	$56.35	$9.65	$18.40	$0.00	$84.40
	06/01/2028	$58.03	$9.65	$18.40	$0.00	$86.08
	12/01/2028	$59.70	$9.65	$18.40	$0.00	$87.75
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$45.73	$9.65	$18.40	$0.00	$73.78
	12/01/2024	$47.20	$9.65	$18.40	$0.00	$75.25
	06/01/2025	$48.70	$9.65	$18.40	$0.00	$76.75
	12/01/2025	$50.20	$9.65	$18.40	$0.00	$78.25
	06/01/2026	$51.75	$9.65	$18.40	$0.00	$79.80
	12/01/2026	$53.25	$9.65	$18.40	$0.00	$81.30
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWDERMAN & BLASTER *LABORERS - ZONE 1*	06/01/2024	$46.38	$9.65	$18.40	$0.00	$74.43
	12/01/2024	$47.85	$9.65	$18.40	$0.00	$75.90
	06/01/2025	$49.35	$9.65	$18.40	$0.00	$77.40
	12/01/2025	$50.85	$9.65	$18.40	$0.00	$78.90
	06/01/2026	$52.40	$9.65	$18.40	$0.00	$80.45
	12/01/2026	$53.90	$9.65	$18.40	$0.00	$81.95
	06/01/2027	$55.50	$9.65	$18.40	$0.00	$83.55
	12/01/2027	$57.10	$9.65	$18.40	$0.00	$85.15
	06/01/2028	$58.78	$9.65	$18.40	$0.00	$86.83
	12/01/2028	$60.45	$9.65	$18.40	$0.00	$88.50
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$46.48	$9.65	$18.40	$0.00	$74.53
	12/01/2024	$47.95	$9.65	$18.40	$0.00	$76.00
	06/01/2025	$49.45	$9.65	$18.40	$0.00	$77.50
	12/01/2025	$50.95	$9.65	$18.40	$0.00	$79.00
	06/01/2026	$52.50	$9.65	$18.40	$0.00	$80.55
	12/01/2026	$54.00	$9.65	$18.40	$0.00	$82.05
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$56.03	$15.30	$16.40	$0.00	$87.73
	12/01/2024	$57.48	$15.30	$16.40	$0.00	$89.18
	06/01/2025	$58.78	$15.30	$16.40	$0.00	$90.48
	12/01/2025	$60.23	$15.30	$16.40	$0.00	$91.93
	06/01/2026	$61.53	$15.30	$16.40	$0.00	$93.23
	12/01/2026	$62.98	$15.30	$16.40	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$36.17	$15.30	$16.40	$0.00	$67.87
	12/01/2024	$37.12	$15.30	$16.40	$0.00	$68.82
	06/01/2025	$37.97	$15.30	$16.40	$0.00	$69.67
	12/01/2025	$38.92	$15.30	$16.40	$0.00	$70.62
	06/01/2026	$39.78	$15.30	$16.40	$0.00	$71.48
	12/01/2026	$40.73	$15.30	$16.40	$0.00	$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY MIX CONCRETE DRIVERS after 4/30/12 (Drivers Hired After 4/30/2012)*TEAMSTERS 25 (Metro) - Aggregate*	08/01/2022	$30.40	$11.91	$15.25	$0.00	$57.56
READY-MIX CONCRETE DRIVER *TEAMSTERS 25 (Metro) - Aggregate*	08/01/2022	$34.41	$11.91	$15.25	$0.00	$61.57
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 1*	06/01/2024	$45.63	$9.65	$18.40	$0.00	$73.68
	12/01/2024	$47.10	$9.65	$18.40	$0.00	$75.15
	06/01/2025	$48.60	$9.65	$18.40	$0.00	$76.65
	12/01/2025	$50.10	$9.65	$18.40	$0.00	$78.15
	06/01/2026	$51.65	$9.65	$18.40	$0.00	$79.70
	12/01/2026	$53.15	$9.65	$18.40	$0.00	$81.20
	06/01/2027	$54.75	$9.65	$18.40	$0.00	$82.80
	12/01/2027	$56.35	$9.65	$18.40	$0.00	$84.40
	06/01/2028	$58.03	$9.65	$18.40	$0.00	$86.08
	12/01/2028	$59.70	$9.65	$18.40	$0.00	$87.75
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	08/01/2024	$51.53	$12.78	$21.45	$0.00	$85.76
	02/01/2025	$52.78	$12.78	$21.45	$0.00	$87.01
	08/01/2025	$54.28	$12.78	$21.45	$0.00	$88.51
	02/01/2026	$55.53	$12.78	$21.45	$0.00	$89.76

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ROOFER - Local 33*

Effective Date - 08/01/2024

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

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.39	$12.78	$6.21	$0.00	$45.38
2	60	$31.67	$12.78	$21.45	$0.00	$65.90
3	65	$34.31	$12.78	$21.45	$0.00	$68.54
4	75	$39.59	$12.78	$21.45	$0.00	$73.82
5	85	$44.86	$12.78	$21.45	$0.00	$79.09

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

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	08/01/2024	$51.78	$12.78	$21.45	$0.00	$86.01
	02/01/2025	$53.03	$12.78	$21.45	$0.00	$87.26
	08/01/2025	$54.53	$12.78	$21.45	$0.00	$88.76
	02/01/2026	$55.78	$12.78	$21.45	$0.00	$90.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2024	$58.97	$14.59	$27.50	$2.98	$104.04
	02/01/2025	$60.72	$14.59	$27.50	$2.98	$105.79
	08/01/2025	$62.57	$14.59	$27.50	$2.98	$107.64
	02/01/2026	$64.52	$14.59	$27.50	$2.98	$109.59

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$24.77	$14.59	$6.13	$0.00	$45.49
2	42	$24.77	$14.59	$6.13	$0.00	$45.49
3	47	$27.72	$14.59	$12.11	$1.63	$56.05
4	47	$27.72	$14.59	$12.11	$1.63	$56.05
5	52	$30.66	$14.59	$13.09	$1.75	$60.09
6	52	$30.66	$14.59	$13.34	$1.76	$60.35
7	60	$35.38	$14.59	$14.75	$1.94	$66.66
8	65	$38.33	$14.59	$15.73	$2.06	$70.71
9	75	$44.23	$14.59	$17.69	$2.30	$78.81
10	85	$50.12	$14.59	$19.15	$2.52	$86.38

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$25.50	$14.59	$6.13	$0.00	$46.22
2	42	$25.50	$14.59	$6.13	$0.00	$46.22
3	47	$28.54	$14.59	$12.11	$1.66	$56.90
4	47	$28.54	$14.59	$12.11	$1.66	$56.90
5	52	$31.57	$14.59	$13.09	$1.78	$61.03
6	52	$31.57	$14.59	$13.34	$1.79	$61.29
7	60	$36.43	$14.59	$14.75	$1.97	$67.74
8	65	$39.47	$14.59	$15.73	$2.09	$71.88
9	75	$45.54	$14.59	$17.69	$2.33	$80.15
10	85	$51.61	$14.59	$19.15	$2.56	$87.91

Notes:
Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2024	$41.34	$14.91	$18.67	$0.00	$74.92
	12/01/2024	$41.34	$14.91	$20.17	$0.00	$76.42
	06/01/2025	$42.34	$14.91	$20.17	$0.00	$77.42
	08/01/2025	$42.34	$15.41	$20.17	$0.00	$77.92
	12/01/2025	$42.34	$15.41	$21.78	$0.00	$79.53
	06/01/2026	$43.34	$15.41	$21.78	$0.00	$80.53
	08/01/2026	$43.34	$15.91	$21.78	$0.00	$81.03
	12/01/2026	$43.34	$15.91	$23.52	$0.00	$82.77

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2024	$41.63	$14.91	$18.67	$0.00	$75.21
	12/01/2024	$41.63	$14.91	$20.17	$0.00	$76.71
	06/01/2025	$42.63	$14.91	$20.17	$0.00	$77.71
	08/01/2025	$42.63	$15.41	$20.17	$0.00	$78.21
	12/01/2025	$42.63	$15.41	$21.78	$0.00	$79.82
	06/01/2026	$43.63	$15.41	$21.78	$0.00	$80.82
	08/01/2026	$43.63	$15.91	$21.78	$0.00	$81.32
	12/01/2026	$43.63	$15.91	$23.52	$0.00	$83.06
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	03/01/2024	$69.04	$11.51	$23.30	$0.00	$103.85
	10/01/2024	$70.84	$11.51	$23.30	$0.00	$105.65
	03/01/2025	$72.64	$11.51	$23.30	$0.00	$107.45

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

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$24.16	$11.51	$12.90	$0.00	$48.57
2	40	$27.62	$11.51	$13.70	$0.00	$52.83
3	45	$31.07	$11.51	$14.50	$0.00	$57.08
4	50	$34.52	$11.51	$15.30	$0.00	$61.33
5	55	$37.97	$11.51	$16.10	$0.00	$65.58
6	60	$41.42	$11.51	$16.90	$0.00	$69.83
7	65	$44.88	$11.51	$17.70	$0.00	$74.09
8	70	$48.33	$11.51	$18.50	$0.00	$78.34
9	75	$51.78	$11.51	$19.30	$0.00	$82.59
10	80	$55.23	$11.51	$20.10	$0.00	$86.84

Effective Date - 10/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$24.79	$11.51	$12.90	$0.00	$49.20
2	40	$28.34	$11.51	$13.70	$0.00	$53.55
3	45	$31.88	$11.51	$14.50	$0.00	$57.89
4	50	$35.42	$11.51	$15.30	$0.00	$62.23
5	55	$38.96	$11.51	$16.10	$0.00	$66.57
6	60	$42.50	$11.51	$16.90	$0.00	$70.91
7	65	$46.05	$11.51	$17.70	$0.00	$75.26
8	70	$49.59	$11.51	$18.50	$0.00	$79.60
9	75	$53.13	$11.51	$19.30	$0.00	$83.94
10	80	$56.67	$11.51	$20.10	$0.00	$88.28

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

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 103*	03/01/2024	$49.49	$13.00	$20.19	$0.00	$82.68
	09/01/2024	$51.02	$13.00	$20.24	$0.00	$84.26
	03/01/2025	$51.98	$13.00	$20.27	$0.00	$85.25
	09/01/2025	$53.51	$13.00	$20.32	$0.00	$86.83
	03/01/2026	$54.47	$13.00	$20.34	$0.00	$87.81
	09/01/2026	$56.00	$13.00	$20.39	$0.00	$89.39
	03/01/2027	$56.95	$13.00	$20.42	$0.00	$90.37
	09/01/2027	$58.49	$13.00	$20.46	$0.00	$91.95
	03/01/2028	$59.45	$13.00	$20.49	$0.00	$92.94

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 103*

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$22.27	$13.00	$0.67	$0.00	$35.94
2	45	$22.27	$13.00	$0.67	$0.00	$35.94
3	50	$24.75	$13.00	$16.16	$0.00	$53.91
4	50	$24.75	$13.00	$16.16	$0.00	$53.91
5	55	$27.22	$13.00	$16.57	$0.00	$56.79
6	60	$29.69	$13.00	$16.97	$0.00	$59.66
7	65	$32.17	$13.00	$17.38	$0.00	$62.55
8	70	$34.64	$13.00	$17.78	$0.00	$65.42
9	75	$37.12	$13.00	$18.18	$0.00	$68.30
10	80	$39.59	$13.00	$18.58	$0.00	$71.17

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$22.96	$13.00	$0.69	$0.00	$36.65
2	45	$22.96	$13.00	$0.69	$0.00	$36.65
3	50	$25.51	$13.00	$16.16	$0.00	$54.67
4	50	$25.51	$13.00	$16.16	$0.00	$54.67
5	55	$28.06	$13.00	$16.57	$0.00	$57.63
6	60	$30.61	$13.00	$16.97	$0.00	$60.58
7	65	$33.16	$13.00	$17.38	$0.00	$63.54
8	70	$35.71	$13.00	$17.78	$0.00	$66.49
9	75	$38.27	$13.00	$18.18	$0.00	$69.45
10	80	$40.82	$13.00	$18.58	$0.00	$72.40

Notes:

Apprentice to Journeyworker Ratio:1:1

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.72	$11.49	$23.59	$0.00	$66.80
2	60	$38.06	$11.49	$23.59	$0.00	$73.14
3	70	$44.41	$11.49	$23.59	$0.00	$79.49
4	80	$50.75	$11.49	$23.59	$0.00	$85.83
5	90	$57.10	$11.49	$23.59	$0.00	$92.18

Effective Date - 02/01/2025

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

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	06/01/2024	$49.81	$9.65	$18.22	$0.00	$77.68
	12/01/2024	$51.28	$9.65	$18.22	$0.00	$79.15
	06/01/2025	$52.78	$9.65	$18.22	$0.00	$80.65
	12/01/2025	$54.28	$9.65	$18.22	$0.00	$82.15
	06/01/2026	$55.83	$9.65	$18.22	$0.00	$83.70
	12/01/2026	$57.33	$9.65	$18.22	$0.00	$85.20
For apprentice rates see "Apprentice- LABORER"						
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	06/01/2024	$45.60	$9.65	$18.22	$0.00	$73.47
	12/01/2024	$47.07	$9.65	$18.22	$0.00	$74.94
	06/01/2025	$48.57	$9.65	$18.22	$0.00	$76.44
	12/01/2025	$50.07	$9.65	$18.22	$0.00	$77.94
	06/01/2026	$51.62	$9.65	$18.22	$0.00	$79.49
	12/01/2026	$53.12	$9.65	$18.22	$0.00	$80.99
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2024	$45.48	$9.65	$18.22	$0.00	$73.35
	12/01/2024	$46.95	$9.65	$18.22	$0.00	$74.82
	06/01/2025	$48.45	$9.65	$18.22	$0.00	$76.32
	12/01/2025	$49.95	$9.65	$18.22	$0.00	$77.82
	06/01/2026	$51.50	$9.65	$18.22	$0.00	$79.37
	12/01/2026	$53.00	$9.65	$18.22	$0.00	$80.87
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2024	$41.92	$14.91	$18.67	$0.00	$75.50
	12/01/2024	$41.92	$14.91	$20.17	$0.00	$77.00
	06/01/2025	$42.92	$14.91	$20.17	$0.00	$78.00
	08/01/2025	$42.92	$15.41	$20.17	$0.00	$78.50
	12/01/2025	$42.92	$15.41	$21.78	$0.00	$80.11
	06/01/2026	$43.92	$15.41	$21.78	$0.00	$81.11
	08/01/2026	$43.92	$15.91	$21.78	$0.00	$81.61
	12/01/2026	$43.92	$15.91	$23.52	$0.00	$83.35
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	06/01/2024	$57.71	$9.65	$19.00	$0.00	$86.36
	12/01/2024	$59.18	$9.65	$19.00	$0.00	$87.83
	06/01/2025	$60.68	$9.65	$19.00	$0.00	$89.33
	12/01/2025	$62.18	$9.65	$19.00	$0.00	$90.83
	06/01/2026	$63.73	$9.65	$19.00	$0.00	$92.38
	12/01/2026	$65.23	$9.65	$19.00	$0.00	$93.88
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	06/01/2024	$59.71	$9.65	$19.00	$0.00	$88.36
	12/01/2024	$61.18	$9.65	$19.00	$0.00	$89.83
	06/01/2025	$62.68	$9.65	$19.00	$0.00	$91.33
	12/01/2025	$64.18	$9.65	$19.00	$0.00	$92.83
	06/01/2026	$65.73	$9.65	$19.00	$0.00	$94.38
	12/01/2026	$67.23	$9.65	$19.00	$0.00	$95.88
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	06/01/2024	$49.78	$9.65	$19.00	$0.00	$78.43
	12/01/2024	$51.25	$9.65	$19.00	$0.00	$79.90
	06/01/2025	$52.75	$9.65	$19.00	$0.00	$81.40
	12/01/2025	$54.25	$9.65	$19.00	$0.00	$82.90
	06/01/2026	$55.80	$9.65	$19.00	$0.00	$84.45
	12/01/2026	$57.30	$9.65	$19.00	$0.00	$85.95
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	06/01/2024	$51.78	$9.65	$19.00	$0.00	$80.43
	12/01/2024	$53.25	$9.65	$19.00	$0.00	$81.90
	06/01/2025	$54.75	$9.65	$19.00	$0.00	$83.40
	12/01/2025	$56.25	$9.65	$19.00	$0.00	$84.90
	06/01/2026	$57.80	$9.65	$19.00	$0.00	$86.45
	12/01/2026	$59.30	$9.65	$19.00	$0.00	$87.95
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2024	$41.34	$14.91	$18.67	$0.00	$74.92
	12/01/2024	$41.34	$14.91	$20.17	$0.00	$76.42
	06/01/2025	$42.34	$14.91	$20.17	$0.00	$77.42
	08/01/2025	$42.34	$15.41	$20.17	$0.00	$77.92
	12/01/2025	$42.34	$15.41	$21.78	$0.00	$79.53
	06/01/2026	$43.34	$15.41	$21.78	$0.00	$80.53
	08/01/2026	$43.34	$15.91	$21.78	$0.00	$81.03
	12/01/2026	$43.34	$15.91	$23.52	$0.00	$82.77
WAGON DRILL OPERATOR *LABORERS - ZONE 1*	06/01/2024	$45.63	$9.65	$18.40	$0.00	$73.68
	12/01/2024	$47.10	$9.65	$18.40	$0.00	$75.15
	06/01/2025	$48.60	$9.65	$18.40	$0.00	$76.65
	12/01/2025	$50.10	$9.65	$18.40	$0.00	$78.15
	06/01/2026	$51.65	$9.65	$18.40	$0.00	$79.70
	12/01/2026	$53.15	$9.65	$18.40	$0.00	$81.20
	06/01/2027	$54.75	$9.65	$18.40	$0.00	$82.80
	12/01/2027	$56.35	$9.65	$18.40	$0.00	$84.40
	06/01/2028	$58.03	$9.65	$18.40	$0.00	$86.08
	12/01/2028	$59.70	$9.65	$18.40	$0.00	$87.75
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 1 (HEAVY & HIGHWAY)*	06/01/2024	$45.73	$9.65	$18.40	$0.00	$73.78
	12/01/2024	$47.20	$9.65	$18.40	$0.00	$75.25
	06/01/2025	$48.70	$9.65	$18.40	$0.00	$76.75
	12/01/2025	$50.20	$9.65	$18.40	$0.00	$78.25
	06/01/2026	$51.75	$9.65	$18.40	$0.00	$79.80
	12/01/2026	$53.25	$9.65	$18.40	$0.00	$81.30
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$56.03	$15.30	$16.40	$0.00	$87.73
	12/01/2024	$57.48	$15.30	$16.40	$0.00	$89.18
	06/01/2025	$58.78	$15.30	$16.40	$0.00	$90.48
	12/01/2025	$60.23	$15.30	$16.40	$0.00	$91.93
	06/01/2026	$61.53	$15.30	$16.40	$0.00	$93.23
	12/01/2026	$62.98	$15.30	$16.40	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & GASFITTERS LOCAL 12*	03/03/2024	$67.74	$14.32	$19.11	$0.00	$101.17
	09/01/2024	$69.54	$14.32	$19.11	$0.00	$102.97
	03/02/2025	$71.34	$14.32	$19.11	$0.00	$104.77
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
For apprentice rates see "Apprentice- LINEMAN"						

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

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

Effective Date - 08/30/2020

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

Notes:

Apprentice to Journeyworker Ratio:1:2

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Additional Apprentice Information:

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

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

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

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STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)

Revised April 9, 2019

1. As used in these specifications:

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

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

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

   d. "Minority" includes:

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

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

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

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

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

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

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

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

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

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

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

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

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

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

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

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

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

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

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

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

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

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

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

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

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

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

11 The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

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

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

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

APPENDIX A

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

Area covered: Goal for Women apply nationwide

Goals and Timetables

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

APPENDIX B-80

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

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

Economic Areas

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

APPENDIX C

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

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

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

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

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

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

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

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

APPENDIX D

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

PERTINENT NON-DISCRIMINATION AUTHORITIES:

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

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

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

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

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

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

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

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

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

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

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

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

*** END OF DOCUMENT ***

DOCUMENT 00875

TRAINEE SPECIAL PROVISIONS

Revised October, 2016

THE REQUIRED NUMBER OF TRAINEES TO BE TRAINED UNDER THIS CONTRACT WILL BE 2

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

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

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

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

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

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

Reimbursement

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

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

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

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

Payment

Trainees will be paid:

1. Percentage (%) of the journeyworker's rate as provided in the existing programs approved by the Department of Labor or Transportation as of September 15, 1970.

2. For journeyworker programs submitted by the Contractor and approved by Massachusetts Department Of Transportation and the Federal Highway Administration at least 60 percent of the appropriate minimum journeyworker's rate specified in the contract for the first half of the training period, 75 percent for the third quarter if the training period, and 90 percent for the last quarter of the training period.

3. For skilled laborer programs, the minimum starting wage rate of unskilled laborer. At the conclusion of training, he or she will be paid the minimum wage rate of the Classification for programs submitted by the Contractor and approved by the Massachusetts Department Of Transportation and the Federal Highway Administration.

4. For the purposes of meeting the legal requirements of State Prevailing Wage Law, please be advised that no person may be paid the Apprentice wage rate as listed on a MA Prevailing Wage Rates schedule, unless that person and program is registered with the Department of Labor Standards/Division of Apprentice Standards (DLS/DAS). Any person or program not registered with DLS/DAS, regardless of whether or not they are registered with any other federal, state, local, or private entity must be paid the journeyworker’s rate for the trade.

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

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

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

*** END OF DOCUMENT ***

DOCUMENT 00880

Revised January 12, 2022

DEPARTMENT OF LABOR

Employment Standards Administration

MINIMUM WAGES FOR FEDERAL AND FEDERALLY ASSISTED CONTRACTS

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General Decision Number: MA20240021 06/21/2024

Superseded General Decision Number: MA20230021

State: Massachusetts

Construction Type: Highway

County: Middlesex County in Massachusetts.

HIGHWAY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658.

Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $17.20 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 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

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

Modification Number	Publication Date
0	01/05/2024
1	01/19/2024
2	03/22/2024
3	05/31/2024
4	06/21/2024

ELEC0103-007 03/01/2024

	Rates	Fringes
ELECTRICIAN	$ 61.86	36.14

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* ENGI0004-026 06/01/2024

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Group 1	$ 56.03	32.75
Group 2	$ 55.41	32.75

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 03/16/2024

	Rates	Fringes
IRONWORKER (ORNAMENTAL, REINFORCING, AND STRUCTURAL)	$ 54.68	36.48

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 01/01/2024

	Rates	Fringes
PAINTER (Steel)	$ 56.06	35.60

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.

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

https://www.dol.gov/agencies/whd/government-contracts

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

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

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey.

Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

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

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates.

Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

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

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data.

EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

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

State Adopted Rate Identifiers

Classifications listed under the ""SA"" identifier indicate that the prevailing wage rate set by a state (or local) government was 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. 01/03/2024 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:

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

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

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

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

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

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

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

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

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

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

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*** END OF GENERAL DECISION ***

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DOCUMENT A00801

SPECIAL PROVISIONS

SOMERVILLE
Federal Aid Project No. HSI/HSI(VUS)-003S(762)
Signal and Intersection Improvement on I-93
at Mystic Avenue and McGrath Highway

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

SCOPE OF WORK

All work under this Contract shall be done in conformance with the *2024 Standard Specifications for Highways and Bridges*, the *Supplemental Specifications* contained in this book, the *2017 Construction Standard Details*, the *Traffic Management Plans and Detail Drawings*, *MassDOT Work Zone Safety Temporary Traffic Control,* the *1990 Standard Drawings for Signs and Supports*; the *2015 Overhead Signal Structure and Foundation Standard Drawings*, the *2009 Manual on Uniform Traffic Control Devices (MUTCD) with Revisions 1, 2, and 3 and the November 2022 Massachusetts Amendments to the MUTCD*; the *1968 Standard Drawings for Traffic Signals and Highway Lighting; the American Standard for Nursery Stock*; the Plans and these Special Provisions.

The proposed project consists of two corridors: Fellsway / McGrath Highway (Route 28) and Mystic Avenue (Route 38). For Fellsway / McGrath Hwy (Route 28) project limits start near Puritan Road and extend south, across Mystic Avenue (Route 38), onto McGrath Highway and end just shy of Broadway; approximately 2,242 feet (0.42 miles) in Somerville, MA.

For Mystic Avenue (Route 38) the project limits start between Taylor Street and Grant Street and extend south, across Fellsway/McGrath Highway (Route 28) and end at the Kensington crosswalk approximately 1,375 feet (0.26 miles) in Somerville, MA.

The work under this contract consists of traffic signal system upgrades including adaptive traffic signal system along Route 28 (from Grand Union to Medford Street), enhanced mobility for pedestrians and bicyclists, enhanced bicycle facilities including sidewalk level, separated bike lanes and shared use paths.

Traffic signals upgrades will be located at the following intersections:

Fellsway at Grand Union Boulevard/ Middlesex Avenue (Item 816.01)

Mystic Avenue at Wheatland Street/ Auxiliary Connector "E" (Item 816.02)

Fellsway at Mystic Avenue/ McGrath Highway/ U-Turn (Item 816.03)

McGrath Highway at Blakeley Avenue (Item 816.04)

McGrath Highway at Broadway (Item 816.05)

McGrath Highway at Pearl Street (Item 816.06)

McGrath Highway at Medford Street (Item 816.07)

SCOPE OF WORK (Continued)

Additional work includes unclassified excavation, pavement milling, full depth hot mix asphalt pavement, hot mix asphalt sidewalks, hot mix asphalt driveways, granite curb, hot mix asphalt modified berm, highway guard, pavement markings, signs, landscaping and other incidental work.

SUBSECTION 7.05 INSURANCE REQUIREMENTS
B. Public Liability Insurance

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

Paragraphs 1 and 2

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

Paragraph 4

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

CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

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

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

SOIL MANAGEMENT

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.

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.

SITE LIST FOR RELASES OF OIL AND HAZARDOUS MATERIALS

RTN 3-4191, 205 Broadway, Haddad Service Station

- The site is currently vacant. It was occupied by a gasoline station from approximately 1933 to 2012. Prior to approximately 1933 it was residential.
- RTN 3-4191 was assigned to the site in 1992 after contaminated soil was found during the removal of underground storage tanks (USTs).
- Environmental investigations found gasoline constituents in soil and groundwater.
- Response actions on the site consisted of the excavation and removal of contaminated soil and groundwater generated by dewatering during excavation.
- A Permanent Solution with Conditions and an associated Activity and Use Limitation (AUL) were submitted for the site in 2016.
- The AUL places restrictions on potential uses for the 205 Broadway property.
- The boundaries of RTN 3-4191 are slightly larger than the AUL, but do not overlap with the project area.
- The project should not be impacted by RTN 3-4191, but the Contractor must be aware of the presence of an AUL on the 205 Broadway property and must not enter or impact it without the oversight of a Licensed Site Professional (LSP).

RTN 3-15340, 271 Mystic Ave, Somerville Marginal CSO Facility

- The site is located beneath I-93 and is currently occupied by a Massachusetts Water Resources Authority (MWRA) mixed stormwater and sewage treatment facility, along with salt and construction material storage. It was historically a residential and commercial area prior to the construction of I-93 in the early 1960s.
- RTN 3-15340 was assigned to the site in 1997 after site investigations in preparation for construction on the site found elevated levels of polycyclic aromatic hydrocarbons (PAHs) and total petroleum hydrocarbons (TPH) in soil.
- Further investigations determined that PAHs and lead were present in soil at concentrations exceeding applicable regulatory standards, likely due to the presence of urban fill.
- Remediation at the site consisted of the removal of the soil in a lead “hot spot” and the removal of contaminated soil associated with the construction of a new building.
- An A-3 RAO with associated AUL was submitted for the site in 2002.
- The AUL requires that most excavation on the site be performed under the oversight of an LSP.
- RTN 3-15340 should not impact the project, but an LSP should be consulted to ensure that work on the section of Mystic Avenue located near Cummings Street does not impact the RTN 3-15340 AUL in any way.

SITE LIST FOR RELASES OF OIL AND HAZARDOUS MATERIALS (Continued)

RTN 3-15727, 779 McGrath Hwy, Payless Cashways Inc

- The site is currently occupied by a grocery store and a residential development. Prior to 1997 it was used as a lumberyard.
- RTN 3-15727 was assigned to the site in 1997 after an environmental site assessment identified a likely release from a UST on the site.
- Further site investigations found elevated levels of PAHs, extractable petroleum hydrocarbons (EPH), and metals in fill material on the site.
- Remediation at the site consisted of the removal of site USTs and the excavation and removal of some of the impacted soil on-site.
- An A-3 RAO with associated AUL was submitted for the site in 2004.
- The AUL requires that most excavation within its boundaries be performed under the oversight of an LSP.
- There is a small area of overlap between the project and the boundaries of the AUL at the intersection of McGrath Highway and Mystic Avenue, on the property marked on the 25% Design Highway Plans as 771 McGrath Highway. Excavation within this area may encounter contaminated soil. Excavation in this area is likely to be minimal.
- Any work that may impact the Stop & Shop property located at 771 McGrath Highway must be overseen by an LSP.

RTN 3-34457, Middlesex Avenue, Intersection Middlesex Ave & Mystic Ave

- This site is a Utility-Related Abatement Measure (URAM) associated with the installation of an underground electric transmission line through the project area.
- The URAM covers portions of Mystic Avenue, beginning approximately at the intersection of Mystic Avenue and Middlesex Avenue, proceeding northwestward along the northeastern lanes of Mystic Avenue to the vicinity of Ten Hills Road, thence westward beneath I-93 to the main section of Mystic Avenue, and on past the end of work for the project.
- Contamination identified in this area consisted of PAHs and lead, likely due to the presence of urban fill.
- Excavation on the portions of Mystic Avenue paralleling I-93 may encounter contaminated soil. Much of the construction in this area consists of mill and overlay of Mystic Avenue, which should not cause the excavation of contaminated soil. Estimates of contaminated soil volumes should be based on the likely generation of soil other than that associated with the existing road structure, e.g. new full-depth roadway or drainage structures.

PROPRIETARY PRODUCTS

MassDOT has approved the use of the following proprietary products on this contract pursuant to M.G.L. c. 30, § 39M(b):

Item 701.3, Trapezoidal Delineator. Manufacturers: TekWay ADA Dome-Tiles Polymer Concrete Cast-in-place/TekWay Trapezoid Delineators manufactured by StrongGo Industries; or approved equivalent.

Approval letter has been filed with MassDOT.

MASSACHUSETTS WATER RESOURCES AUTHORITY (MWRA) – 8m PERMITS

Contractor shall note that MWRA water and sewer lines are present along portions of Fellsway (Route 28), Mystic Avenue (Route 38) and McGrath Highway (Route 28). MWRA 8m Permit Applications have been submitted and approved. See Documents A00810 & A00811:

- MWRA Sewer: 8m Permit # 23-04-2083M
- MWRA Water: 8m Permit # 3340

The Contractor shall follow 8m permit terms and conditions.

Contractor shall note that 48" MWRA water mains (cast iron, concrete encased cast iron and steel) are present along the portion of proposed work. In addition, 36", 42" and 72" MWRA sewer lines (reinforced concrete) are present along portions of the work.

Per MWRA requirements, the water pipelines must be protected at all times. No construction equipment or materials including cranes, backhoes and other vehicles may be parked, set up, stationed or stored on top of the MWRA's water or sewer mains. All proposed construction operations shall not impart live and dead loads that would adversely impact any of the water or sewer mains.

MWRA infrastructure within the project limits, including manholes and gate boxes, must remain unobstructed.

The Contractor shall be responsible for complying with the requirements of the conditions within the 8m Permits (water and sewer), as required by the MWRA.

The Contractor shall also exercise great care when constructing mast arm foundations, fence foundations, drainage or signal utilities or full depth pavement near or over all mains located within the project limits.

Prior to construction, the Contractor shall prepare a Plan (i.e. Pipe Protection Plan) for review by MWRA. The plan shall include a description and location of the work, the proposed measures to field locate and protect water and sanitary infrastructures that may be impacted by construction, and mitigation measures to avoid and prevent any adverse impacts to the existing infrastructure. The additional work required to protect any water main within the project limits, and prepare the Plan, will be incidental to the overall contract.

MWRA inspectors must examine all water and sewer work. Inspections must be scheduled a minimum of 2 days in advance of the work. The MWRA inspector will bring a new casting for all MWRA structures. The Contractor will install and adjust the MWRA casting to final grade. The MWRA inspector will remove old castings from the site.

The Contractor may be required to prepare a Pipe Protection Plan for approval by the MWRA prior to the start of work. If required by the MWRA, the Contractor shall prepare a written plan to demonstrate to the MWRA the means and methods being employed in the field to protect MWRA's infrastructure and ensure that the water or sewer structures are not damaged by the Contractors' operations or construction equipment accessing the site. The Plan must address the following:

MASSACHUSETTS WATER RESOURCES AUTHORITY (MWRA) – 8m PERMITS
(Continued)

- The plan shall describe the MWRA structures and locations.
- All construction operations, and sources of loading which may impact the pipe. This may include but not be limited to excavation, placement of fill, placement of structures or materials temporarily or permanently within the easement and loading due to materials or equipment crossing the easement. The plan shall include the determination if any anticipated loading will adversely impact the water or sewer main.
- Measures which the Contractor or sub-Contractors shall take to locate, field identify, mitigate potential impacts, and protect the MWRA's main and associated appurtenances and fittings.
- Describe how the area over the easement will be left, if disturbed by the construction operations.
- Describe required monitoring efforts (i.e. vibration analysis, pre and post construction inspections, etc.) by the project of MWRA structures during critical operations which have the potential for damage of MWRA structures.

If the project or actions by the Contractor create any adverse impact on MWRA structures, the Contractor shall be responsible for any repairs, replacements, or liability created associated with the damage to MWRA structures on or off the site.

No separate payment will be made for the development of the Pipe Protection Plan(s) but all costs in connection therewith shall be included in the unit prices bid for the various Contract Items.

ENBRIDGE GAS MAIN

The Contractor shall be aware that Enbridge Gas mains exists within the project limits. The Contractor shall notify Enbridge Gas in advance of any work (including milling and paving) that occurs within ten feet of the existing gas main. The Contractor shall note that drainage structure installation and mast arm foundation installation on Mystic Avenue near Wheatland Street is in close proximity to the existing gas main. The Contractor shall coordinate with Enbridge Gas to ensure adequate support and protection of the gas main during these installations. No separate payment shall be made for coordination with Enbridge Gas, necessary support and/or protection of the existing gas main, but all costs in connection therewith shall be included in the unit process bid for the various Contract Items.

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

WORK SCHEDULE

Work hours shall be as required by MassDOT District 4. No work that will disrupt travel on the existing roadways (lane closures, lane shifts, trenching, etc.) shall be done from 6:00AM to 9:00AM and from 3:00PM to 6:00PM.

No work shall be done on this Contract on Saturdays, Sundays or holidays or on the day before or the day after a long weekend which involves a holiday without prior approval by the Engineer.

Night work may be allowed for select construction activities (utility connections, milling, paving, pavement marking installation, etc.) as approved by the Engineer, MassDOT and the City of Somerville. All equipment and personnel must be removed from the roadway prior to 5:00 AM.

The Contractor may request additional work hours including nights through the MassDOT District Highway Director.

The Somerville Fire Department shall be given 72-hours notice and mandatory 24-hour schedule confirmation to take the hydrant out of service and when the water main is temporarily shut down. No work shall commence without approval of the fire department.

Water main shutdowns will be needed to complete the work of this project. The Contractor will be responsible for the coordination and scheduling of water main shutdowns with the Somerville Water and Sewer Department.

All requests to shut down water service and/or close valves shall be directed to Demetrios G. Vidalis, Water and Sewer Department Director at (617) 625-6600 a minimum of 72-hour notice and mandatory 24-hour in advance of the shutdown. The Somerville Water and Sewer Department will notify the affected property owners. Water service shutdowns may only occur between 7:00 am and 3:00 pm.

RESTRICTED MATERIALS

All new construction materials shall be asbestos-free including any roofing felt, adhesives, waterproofing materials, grout, or sealer that may be used in project construction.

All yellow temporary and permanent pavement markings, including all pavement marking tape, placed as part of this project shall be lead-free.

PROVISIONS FOR TRAVEL AND PROSECUTION OF THE WORK

(Supplementing Subsection 8.03)

Before starting any work under this Contract, the Contractor shall prepare, and submit to the Engineer for approval, a plan (based on the Contract traffic management plans) that indicates the traffic routing proposed by the Contractor during the various stages and time periods of the work and the temporary barricades, signs, drums and other traffic control devices to be employed during each stage and time period of the work to maintain traffic and access to abutting properties.

Particular care shall be taken to establish and maintain methods and procedures that will not create unnecessary or unusual hazards to public safety. Traffic control devices required only during working hour operations shall be removed at the end of each working day.

Signs having messages that are irrelevant to normal traffic conditions shall be removed or properly covered at the end of each work period. Signs shall be kept clean at all times and legends shall be distinctive and unmarred.

PLANS

(Supplementing Subsection 5.02)

The Contractor shall furnish Mylar "AS BUILT" plans of the completed project to the Engineer. These "AS BUILT" plans shall be furnished prior to the date of final acceptance. Full compensation for these plans shall be included in the prices bid for the various Contract Items of work and no additional compensation will be allowed therefore.

The Engineer will make the original drawings available to the Contractor for use in preparing the as-built drawings. However, the Contractor may request a CADD version of the contract drawings as an alternative method for preparing the “AS BUILT” plans. In either case, final “AS BUILT” plans shall contain all information shown on the contract drawings and shall clearly indicate areas where changes were made during construction.

The “AS BUILT” plans shall be titled “AS BUILT” and stamped and dated by a Professional Engineer registered in the Commonwealth of Massachusetts. The Professional Engineer’s stamp is required to certify any changes made to the contract drawings and shall not dictate responsibility for the original design drawings.

The “AS BUILT” plans will provide a record of constructed improvements for future reference, therefore partial plan sets will not be accepted. The Contractor may elect to use a combination of reproducible duplicates of the design drawings and revised CAD drawings to provide a complete set of “AS BUILT” plans.

These plans are separate from those required under the Traffic Signal Provision necessary for Final Inspection of the Signals

SHOP DRAWINGS:

Within 30 days following notice to proceed of the Contract, the Contractor shall submit shop drawings for signal supports, a list of equipment, and manufacturer's equipment specifications to the Engineer in accordance with the relevant provisions of Subsection 815.20.

No work shall be commenced by the Contractor until approval of the shop drawings and manufacturer's data has been received in writing from the Engineer. Approval of these drawings will be general in character and shall not relieve the Contractor from the responsibility of, or the necessity of, furnishing materials and workmanship conforming to the plans and specifications.

The Contractor shall deliver to the Engineer a certificate of compliance with the manufacturer for all materials purchased from the manufacturer.

SUBSECTION 8.03 Prosecution of Work

Add/amend the following at the end of the Section:

The Contractor is hereby notified that winter work is expected for this project and has been considered in setting the completion date for the contract. Items of work that are expected to continue through the winter may include, but are not limited to, the following: Utilities and Signals. If the work to be performed during the winter includes concrete or mortar, the relevant provisions of Section 901.72 shall be followed. Any costs, either direct costs or resulting from inefficiencies, related to continuing work in the winter shall be included in the Contractors' bid and shall not be cause for a claim for a time extension or additional compensation.

COOPERATION OF THE CONTRACTOR

(Supplementing Subsections 5.05 and 5.06)

Agents of various public service agencies, municipal and State Departments, and private site Contractors may be entering on the work site to remove existing utilities, to construct or place new facilities or to make alterations to existing facilities.

The Contractor shall perform the work in cooperation with the various agencies in a manner which causes the least interference with the operations of the aforementioned agencies and shall have no claim for delay which may be due, or result, from said work of these agents.

DRAINAGE

The Contractor shall maintain the drainage system in the Contract area to provide continual drainage of the travel ways and construction areas.

All drainage castings in new pavement areas shall be installed at base or intermediate course grade, as directed by the Engineer, and reset to proposed finish surface grade prior to placement of the pavement surface course.

All proposed pipes and structures being placed where existing pipe, or an existing structure is located, the cost of removing and disposing of the existing pipes and structures will be incidental to the cost of the proposed pipes and structures.

New manholes to be constructed over existing pipes shall include the connecting of the pipe to the structure and the necessary cutting and removal of the existing pipe within the structures. The existing pipe shall be neatly cut to provide a smooth uniform face flush with the inside wall surface of the structure and totally removed or neatly cut longitudinally and partially removed to retain the lower half of the existing pipe barrel to form the required (manhole) shaped invert. This work shall be considered incidental to the cost of the structure.

All pipes and structures installed as part of this Contract shall be left in a clean and operable condition at the completion of the work.

No separate payment will be made for the maintenance of the existing drainage system or for plugging, cutting or capping of pipes, but all costs in connection therewith shall be included in the unit prices bid for the various Contract Items.

DRAINAGE STRUCTURES

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

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

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

TRENCH EXCAVATION AND BACKFILL

The Contractor shall comply with all OSHA requirements for utility trench excavation. In order to retain the existing roadway for maintenance of traffic and to protect/support adjacent existing utilities, the Contractor shall furnish, place and remove temporary shoring, bracing, trench wall stabilization or other support of excavation methods for trench excavation. Deeper utility trenching may require more complex support of excavation that considers pre-dewatering. The Contractor shall prepare and secure all dewatering permits. Excavation support type and toe depth shall be sufficient to control groundwater and maintain sub-grade stability. Support of excavation systems shall be removed after trench backfill is placed.

The Contractor shall accurately locate all utility lines and structures to ensure that the proposed braced excavation system will not interfere with them.

Before starting trench excavation, the Contractor shall prepare and submit to the Engineer for approval, a temporary shoring, bracing, trench wall stabilization or other support of excavation plan. The submittal shall include drawings and calculations for the proposed temporary braced excavation system, stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. The temporary excavation support system shall be designed according to the following criteria:

The braced excavation system shall be designed to resist surcharge live load of at least HS25 truck loading, as well as a provision for additional surcharge due to the temporary precast concrete median barriers.

The Contractor shall make his own evaluation of existing conditions and facilities, and of the effects of the proposed excavation support system and construction methods and shall provide in his design for all loads and methods necessary to permit construction of the proposed utilities while maintaining public safety and protecting completed work (and all third-party property) from damage caused by his operations.

The Contractor should be aware that ledge may be encountered during excavation.

Timber lagging (if used) shall be southern yellow pine, mixed hardwoods or equivalent of Grade 2 or better, having Fb = 1,500 PSI minimum. Install lagging tightly against the soil to minimize loss of ground. If necessary, install the lagging one board at a time as required to minimize loss of ground in any local areas having unstable (ravelling) soil conditions. Immediately backpack the lagging tightly with gravel backfill as required to fill any voids that develop behind the lagging.

No element of the temporary support system shall be spliced unless approved by the Engineer.

The proposed temporary excavation support system must be constructed within the existing Right-of-Way and/or easements. Access to all abutting properties must be maintained.

The Contractor shall accurately locate all utility lines and structures to ensure that the proposed braced excavation system will not interfere with them.

TRENCH EXCAVATION AND BACKFILL (Continued)

Groundwater may be encountered during trench excavation operations. If so, the Contractor shall dewater the trench excavations so that utility installations and backfilling operations can proceed 'in the dry' and excavation sub-grade will remain stable.

Unsuitable or organic material found at the bottom of trench excavation shall be removed as required by the Engineer. The Contractor shall over-excavate soft, organic or otherwise unsuitable soils to a depth of up to eighteen (18) inches, only as required by the Engineer. Unsuitable or organic material removed from bottom of trench excavation shall be replaced with crushed stone, bedding material or ordinary fill to create a firm stable sub-grade acceptable to the Engineer. Utility trench sub-grade shall be observed by the Engineer prior to placement of bedding material.

The Contractor shall backfill utility trenches with suitable material above bedding material, pipe and select material above pipe as shown on the plans, in accordance with the Standard Specifications.

Backfill material shall be placed in eight (8) inch maximum thickness loose lifts and thoroughly compacted. Lifts shall be compacted to at least 95% density between finished elevation and four (4) feet below finished elevation. Lifts shall be compacted to at least 92% density between bottom of trench and four (4) feet below finished elevation. Refer to ASTM D1557.

As required by the Engineer and if large self-propelled vibratory roller is used, lift thickness may be increased to twelve (12) inches.

No separate payment shall be made for support of excavation or dewatering, but all costs in connection therewith shall be included in the various Items bid.

COORDINATION WITH MBTA

Contractor shall note that MBTA bus stops will be affected by construction.

The Contractor shall coordinate with the MBTA (Bus and Green Line Operations) and any major private shuttle services a minimum of 60 days prior to the closure and relocation of the existing bus stops. The Contractor shall coordinate with the MBTA to select temporary bus stop locations. The Contractor shall provide the necessary temporary signs and posts, as directed by the MBTA, to notify bus customers of the new temporary stop locations. This shall also include any signs needed to mark the new temporary bus stop locations.

PUBLIC SAFETY AND CONVENIENCE

(Supplementing Subsection 7.09)

The Contractor shall provide necessary access for fire apparatus and other emergency vehicles through the work zones to abutting properties at all times.

Sweeping and cleaning of surfaces beyond the limits of the project required to clean up material caused by spillage or vehicular tracking during the various phases of the work shall be considered as incidental to the work being performed under the Contract and there will be no additional compensation.

MAINTENANCE OF TRAFFIC SIGNALS

It shall be the responsibility of the Contractor to provide all labor, equipment and material required for the total maintenance and repair of all proposed traffic signal control equipment, including damage by automobile accidents until final completion and acceptance of the project, unless otherwise specified under Subsection 7.17 "Traffic Accommodation: of the Standard Specifications as amended, in which case Subsection 7.17 will govern. These provisions will apply to the signalized locations included as part of this construction Contract from the date of written notice given to the Engineer that the Contractor will work on or adjacent to an existing signal until the date when the Department accepts the complete project. This written notice must be given before the Contractor may proceed with any work on a specified traffic signal location. For the purpose of these Special Provisions, the phrase "Traffic Signal Control Equipment" is intended to include controllers and cabinet assemblies used for traffic control.

The cost of the maintenance of signals shall be deemed to be included in the various traffic signal Contract Items and no additional payments will be made.

Upon notification of an issue by MassDOT or their representative requiring a response by the Contractor, the Contractor shall respond to the notification within 2 hours. Should the Contractor fail to take prompt action within the required response time, MassDOT shall make emergency repairs or cause the same to be made, with the stipulation that the costs for such repairs shall be charged against the Contractor and deducted from moneys due him.

FINE TUNING, ADJUSTMENT, AND TESTING PERIOD

After the Contractor has finished installing the controller and all other associated signal equipment and after the Contractor has set the signal equipment to operate as specified in the Contract documents, the fine tuning, adjusting and testing period shall begin. The Contractor shall advise the Engineer, in writing, of the date of the beginning of the fine tuning and testing period. This period shall not start until the work at the intersection is complete. During this period, the Contractor, under the direction of the Engineer, shall make necessary adjustments and tests to insure safe and efficient operation of the equipment. This period, with the exception of the adaptive system, shall not last for more than 30 days and the Contract completion date has taken this testing period into consideration. No request for final acceptance will be considered until successful completion of the testing period.

The Contractor shall notify the Engineer in writing of the starting date of the fine-tuning period prior to the starting date.

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 City of project, or at minimum, within county, of construction operations.

FINAL INSPECTION AND ACCEPTANCE

Upon successful completion of the 30-day testing period wherein the traffic signal systems have operated for 30 days without failure, the Contractor shall notify the Department. The Engineer will make a final inspection of the installation in the presence of the Department and the Contractor. An inspection check will be made to ensure that all equipment, materials, installations and operations are in accordance with the construction contract, plans and specifications. Items to be checked will include, but not be limited to, traffic signal systems operation, cabinet equipment, and documents (wiring diagrams, as-built plans, instruction manuals, parts list, warranties, etc.)

The Engineer will notify the Contractor in writing of any Items in which the inspection reveals that the work is incomplete, defective, or does not otherwise meet the project specifications. The Contractor shall perform the corrective actions necessary to achieve final acceptance by the Department. These corrective actions shall be done by and at the expense of the Contractor and within 15 days of the date of the inspection report, unless otherwise approved in writing by the Department.

GUARANTEE AFTER FINAL ACCEPTANCE

The Contractor shall diagnose (troubleshoot) the system and replace any part of the traffic signal systems found to be defective in workmanship, material or manner of functioning within six months from date of final acceptance of all the installations under this Contract. This requirement does not affect the one-year warranty period on equipment specified in Subsection 815.20 of the Standard Specifications. Note: some of the equipment installed under this Contract shall have a warranty period beyond one year as noted.

If a unit is found to be defective during the warranty period, it will be the responsibility of the manufacturer and/or representative to assume the cost of shipping the unit to and from the factory, supplying parts and making repairs at no cost to the agencies. During this period the vendor shall provide a unit of the same type to make the intersections operational per the traffic signal timing plan. Each and every piece of equipment shall carry its own individual warranty from the equipment manufacturer and the supplier.

Upon the date of acceptance of the project by the Department, the Contractor shall turn over all guarantees and warranties to the Department.

QUALIFIED ELECTRICANS

Within 10 days after opening of bids, the low bidder shall submit a list of the Journeyman Electricians (Massachusetts License) who will perform the electrical work in this contract.

Also, the low bidder shall submit copies of each Journeyman Electrician's current Massachusetts License to the Engineer.

PROPERTY BOUNDS

The Contractor shall exercise due care when working around all property bounds which are to remain. Should any damage to a bound result from the actions of the Contractor, the bound shall be replaced and/or realigned by the Contractor as directed by the Engineer at no cost to the Owner.

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.

For work not covered by the various bid Items in this Contract, it is the intent to pay for such related work on a time and materials basis as directed by the Engineer. The payment for such work is outlined in the following sections: Payment for Specialty Services

PAYMENT FOR SPECIALTY SERVICES (Eversource Work Order #'s Disconnect / R&R Light Pole / Rewiring)

The Contractor will be paid for the artisans that are not categorized under any pay Items of this contract that are hired by the Contractor as a specialty sub-Contractor crew, or as an individual artisan and are required to remove and reset un-metered street light poles for the Eversource. The Contractor will be paid for the required work that has not been included as incidental to any Contract Bid Item plus ten (10) percent. However, no artisans shall be hired until approved by the Engineer and competitive prices may be required if the Engineer so directs. The Contractor will not bid this Item. If the Engineer has knowledge of source of additional artisans, which are competitive with the Contractor's choice, then the Contractor may be required to investigate and use an alternative choice.

COORDINATION WITH ADJACENT CONSTRUCTION PROJECTS

Contractor shall note that other construction projects may be ongoing during Fellsway / McGrath Highway (Route 28) and Mystic Avenue (Route 38) project. The potential projects include but are not limited to:

- MWRA Project (MassDOT Permit #4-2022-0464)
- MWRA Project. (Upgrade of MWRA CSO facility)
- MassDOT Project File No. 606528 – Bridge Preservation, S-17-031, I-93 NB and SB from Route 28 to Temple Street

The Contractor is responsible for coordinating with MassDOT and the various Contractors to facilitate construction schedules.

HOLIDAY WORK RESTRICTIONS

(Supplementing Subsection 7.09)

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

Below are the holiday work restrictions:

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

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

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

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

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

HOLIDAY WORK RESTRICTIONS (Continued)

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

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

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

Juneteenth
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

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

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

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

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

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

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

NORTHERN LONG-EARED BAT PROTECTION

The U.S. Fish and Wildlife Service (USFWS) has listed the northern long-eared bat (NLEB) as endangered under the Endangered Species Act (ESA) and the following requirements exist to protect the bat and its habitat. This project has been consulted with the USFWS through the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and Federal Transit Administration (FTA) Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat revised February 5, 2018 and amended March 31, 2023.

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 USFWS No Effect Consistency Letter (see **Document A00872**), whereby it was determined that this Project will have "No Effect" to the NLEB. Therefore, the project has completed Section 7 consultation through the Endangered Species Act, and no AMMs apply to the project.

If the project scope changes (i.e., tree clearing, bridge work), additional review is required by the MassDOT Highway Division's Environmental Services Section. Contact MassDOT Environmental Services - Wildlife & Endangered Species Unit Supervisor (David Paulson, david.j.paulson@dot.state.ma.us, 857-262-3378).

NOTICE TO OWNERS OF UTILITIES

(Supplementing Subsection 7.13)

Written notice shall be given by the Contractor to all public service corporations or municipal and State officials owning or having charge of publicly or privately owned utilities at least one week in advance of the commencement of operations that will affect the utilities. The Contractor shall, at the same time, file a copy of such notice with the Engineer.

Before commencing work on service connections, the Contractor shall be responsible for contacting the Electric Company servicing the area to obtain construction requirements, standards, and to give adequate notice of commencement of work. The Contractor's attention is further directed to the requirements of Work in the Immediate Vicinity of Certain Underground Structures and Poles herein included in these Special Provisions.

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

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

Select District 4
Select the City of SOMERVILLE and then locate the utility

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

Notification Of Public Officials

Town officials are shown at website https://www.mass.gov/lists/massachusetts-cities-and-towns and select the required City/Town website.

State Police are shown at website https://www.mass.gov/info-details/massachusetts-state-police-troop-boundaries. Select the area of jurisdiction to find the local station.

The Contractor shall inform the following officials in each area that he is assigned to work in:

Superintendent, Department of Public Works, or Town Engineer. Superintendent, Water Department, Superintendent, Sewer Departments. Police Department, Fire Department, Electric Company, Railroads.

The Contractor shall make his own investigation to assure that no damage to existing structures, rainage lines, traffic signal conduits, and other utilities will occur as a result of construction operations.

NOTICE TO OWNERS OF UTILITIES (Continued)

The following are the names of owners and representatives of the principal utilities affected, but completeness of this list is not guaranteed by the Department:

CITY OF SOMERVILLE

Fire Department 266 Broadway Somerville, MA 02145	Chief Charles Breen Phone:(617) 623-1700
Police Department 220 Washington Street Somerville, MA 02143	Chief Charles Femino Phone:(617) 625-1600
Somerville Electrical Lights & Lines 1 Franey Road Somerville, MA 02145	Mark Lawhorne Phone:(617) 625-6600, ext. 5607 Phone:(617) 666-3311 Email: mlawhorne@somervillema.gov
Engineering Department 1 Franey Road Somerville, MA 02145	Brian Postlewaite Director of Engineering Phone:(617) 625-6600, ext. 5400
Department of Public Works 1 Franey Road Somerville, MA 02145	Jill Lahan DPW Commissioner Phone:(617) 666-3311 Email: jlathan@somervillema.gov
Water/Sewer Department 1 Franey Road Somerville, MA 02145	Demetrios G. Vidalis, PE Director of Water & Sewer Phone:(617) 625-6600

ELECTRIC

Eversource Electric "A" 1165 Massachusetts Avenue Dorchester, MA 02125	Terence Doonan Phone: (617) 541-5714 Email: terence.doonan1@eversource.com

NOTICE TO OWNERS OF UTILITIES (Continued)

TELEPHONE

Verizon
385 Myles Standish Blvd.
Taunton, MA 02780

Karen Mealey
Phone: (774) 409-3160
Email: karen.mealey@verizon.com

GAS

National Grid Gas
40 Sylvan Road
Waltham, MA 02451

Melissa Owens
Phone: (781) 907-2845
Email: melissa.owens@nationalgrid.com

Enbridge
8 Wilson Way
Westwood, MA 02090

Kathy M. Aruda
Phone: (508) 938-7728
Email: kathleen.aruda@enbridge.com

Eversource Gas
157 Cordaville Road, 3113
Southborough, MA 01772

Jeffrey Evans-Mongeon
Phone: (508) 305-6970
Email:jeffrey.evans-mongeon@eversource.com

CABLE

Comcast Cable Corporation
PO Box 6505, 5 Omni Way
Chelmsford, MA 01824

Wendy Brown
Phone: (978) 848-5163
Email: wendy_brown@comcast.com

RCN
956 Massachusetts Avenue
Arlington, MA 02476

Alex Ortiz
Phone: (781) 316-8878
Email: alex.ortiz@rcn.net

Crown Castle
80 Central Street
Boxborough, MA 01719

Mark Bonanno
Phone: (508) 616-7818
Email: mark.bonanno@crowncastle.com

MCI-Verizon Business
P.O. Box 600
Charlton, MA 01507

Stephen Parretti
Phone: (508) 248-1305
Email: stephen.parretti@verizon.com

Eversource Fiber
247 Station Drive, Mail Stop: SUM SE 320
Westwood, MA 02090

Bechir Khoury
Phone: (781) 441-3864
Email: bechir.khoury@eversource.com

Cambridge Network Solutions
35 McGrath Highway
Cambridge, MA 02143

Jeff Harrington
Email: jharrington@cambridgenetsolutions.com

NOTICE TO OWNERS OF UTILITIES (Continued)

WATER

MWRA
2 Griffin Way
Chelsea, MA 02150

Ralph Francesconi
Phone: (617) 461-3573
Email: ralph.francesconi@mwra.com

SEWER

MWRA
2 Griffin Way
Chelsea, MA 02150

Kevin McKenna
Phone: (617) 305-5956
Email: kevin.mckenna@mwra.com

RAILROAD

MBTA Document Control Group
500 Arborway
Boston, MA 02130

Connor Campbell
Email: ccampbell2@mbta.com

PanAm Railways
Iron Horse Park
North Billerica, MA 01862

Ted Krug
Phone: (978) 663-1077
Email: tkrug@CSX.com

OTHER

Zayo Group
2 Royce Lane
Westfield, MA 01886

Richard Moran
Phone: (978) 884-7525
Email: richard.moran@zayo.com

FirstLight
359 Corporate Drive
Portsmouth, NH 03801

Keith Mellor
Email: kmellor@firstlight.net

Lumen
1025 Eldorado Blvd.
Broomfield, CO 80021

Renoy Thomas
Phone: (516) 712-3041
Email: relocations@lumen.com

Verizon Wireless Small Cell
20 Alexander Drive
Wallingford, CT 06492

Liz Glidden
Email: elizabeth.glidden@verizonwireless.com

The Contractor shall make his own investigation to assure that no damage to existing structures, drainage lines, traffic signal conduits, and other utilities will occur as a result of construction operations.

NATIONAL GRID EMERGENCY TELEPHONE NUMBERS

GAS:
Emergency: 1-800-233-5325
New Service: 1- 877-696-4743
Customer Support: 1-800-732-3400

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

EVERSOURCE EMERGENCY TELEPHONE NUMBERS

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

ELECTRIC:
Outage/ Emergency: 800-592-2000 or 844-726-7562
New Service: 1-888-633-3797 (1-888-need pwr)
Customer Support: 1-800-340-9822

WORK IN THE IMMEDIATE VICINITY OF CERTAIN UNDERGROUND STRUCTURES AND UTILITY POLES

For overhead connections, the Electric Company servicing the area will make the connection from the top of the riser on the utility pole to the power source. The Contractor shall supply all labor, materials and equipment to install the service connection, complete in place and in accordance with the Electric Company procedures, from the controller to and including the riser with enough wire coiled above the riser to permit the Electric Company servicing the area to make the final connection.

For underground connections, the Electric Company servicing the area will perform the actual wiring of the service connections from its power source to the sweep at the local controllers, but all steel sweeps, ducts, entrance holes into manholes, patching and all other necessary labor, materials and equipment required to install the electric service, complete in place, shall be furnished by the Contractor.

The Contractor shall pay the Electric Company servicing the area for their services rendered for the connection of overhead and underground service connections.
If a pole needs to be held by the Utility in order to sustain them securely in place during placement of drainage structures and/or pipe, the Contractor will be solely responsible for all costs charged by the Utility owner for this service. All costs in connection shall be included in the unit prices bid for the various drainage Items.

Before starting work at existing manholes, the Contractor shall test for gas and blow out the manholes.

WORK DONE BY OTHERS

Relocation and/or resetting to new grades of private utilities, including utility poles, made necessary by the construction of this project, will be accomplished by the respective utility companies, as noted on the plans.

TEMPORARY ACCESS TO AREA MERCHANTS AND BUSINESSES

(Supplementing Subsections 8.02 and 8.06)

The work is in a predominantly residential section of the City and access to all properties must be maintained at all times.

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

PROTECTION OF UTILITIES AND PROPERTY

(Supplementing Subsection 7.13)

The Contractor, in constructing or installing facilities alongside or near sewers, drains, water or gas pipes, electric or telephone conduits, poles, sidewalks, walls, vaults or other structures shall sustain them securely in place. The Contractor shall coordinate with the officers and agents of the various utility companies and municipal departments to assure that the services of these structures are maintained. The Contractor shall also be responsible for the repair or replacement, at no additional cost to the Owner (Department), of any damage to such structures caused by construction operations. The Contractor is responsible to leave them in the same condition as they existed prior to commencement of the work. In case of damage to utilities, the Contractor shall promptly notify the utility owner and shall, if requested by the Engineer, furnish labor and equipment to work temporarily under the utility owner's direction. Pipes or other structures damaged by the operation of the Contractor may be repaired by the Department or by the utility owner which suffers the loss. The cost of such repairs shall be borne by the Contractor, without compensation therefor.

If during construction there is an existing utility and/ or structure found to be in conflict with the proposed work under this Contract, the Contractor shall protect and maintain the services to the utilities and structures. The Engineer will, as soon as possible identify the utilities to be relocated or other such activities deemed suitable for resolution.

If live service connections are to be interrupted by excavations of any kind, the Contractor shall not break the service until new services are provided. Abandoned services shall be plugged off or otherwise made secure.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all the work involved in protecting or repairing property as specified in this Section, shall be considered included in the prices paid for the various Contract Items of work and no additional compensation will be allowed therefore.

VALUE ENGINEERING CHANGE PROPOSAL

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

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

A. In order to be considered for MassDOT review each VECP shall:

1. Be clearly labeled pursuant to this Subsection;

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

3. The proposed changes to contract Items must:

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

    b. meet applicable safety regulations and codes;

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

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

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

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

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

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

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

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

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

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

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

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

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

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

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

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

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

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

   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) = 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.

COMPLIANCE WITH THE NATIONAL DEFENSE AUTHORIZATION ACT

(Supplementing Subsection 7.01)

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

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

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

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

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

BIDDERS LIST

Pursuant to the provisions of 49 CFR Part 26.11 all official bidders will be required to report the names, addresses and telephone numbers of all firms that submitted bids or quotes in connection with this project. Failure to comply with a written request for this information within 15 business days may result in a recommendation to the Prequalification Committee that prequalification status be suspended until the information is received.

The Department will survey all firms that have submitted bids or quotes during the previous year prior to setting the annual goal and shall request that each firm report its age and gross receipts for the year.

BUILD AMERICA BUY AMERICA PREFERENCE

On Federally-aid projects the Buy America (23.CFR § 635.410) and Build America, Buy America Act (Pub. L. No. 117-58, §§ 70901-52). requires the following,

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

(2) all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation; and

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

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

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

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

SUBSECTION 8.14 UTILITY COORDINATION, DOCUMENTATION, AND MONITORING RESPONSIBILITIES

A. GENERAL

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

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

B. PROJECT UTILITY COORDINATION (PUC) FORM

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

C. INITIATION OF UTILITY WORK

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

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

C.1 - BASELINE SCHEDULE – UTILITY BASIS

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

SUBSECTION 8.14 (Continued)

C.2 – EARLY UTILITY REQUEST – (aka SUBNET SCHEDULE) PRIOR TO THE BASELINE

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

C.3 – PROPOSAL SCHEDULE - CHANGES TO THE PUC FORM

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

D. UTILITY DELAYS

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

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

SUBSECTION 8.14 (Continued)

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

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

E. LOCATION OF UTILITIES

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

F. POST UTILITY SURVEY – NOTIFICATION

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

G. MEETINGS AND COOPERATION WITH UTILITY OWNERS

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

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

H. FORCE ACCOUNT / UTILITY MONITORING REQUIREMENTS

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

I. ACCESS AND INSPECTION

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

SUBSECTION 8.02 SCHEDULE OF OPERATIONS

Replace this subsection with the following:

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

SECTION 722

CONSTRUCTION SCHEDULING

DESCRIPTION

722.20 General

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

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

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

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

SECTION 722 (Continued)

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

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

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

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

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

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

MATERIALS, EQUIPMENT, PERSONNEL

722.40 General

A. Software Requirements (Types A, B and C)

The Contractor shall use Primavera P6 computer scheduling software.

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

SECTION 722 (Continued)

B. Scheduler Requirements

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

CONSTRUCTION METHODS

722.60 General

A. Schedule Planning Session
(Types A, B and C)

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

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

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

SECTION 722 (Continued)

B. Schedule Reviews by the Department (All Types)

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

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

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

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

Each Contract Progress Schedule shall fully conform to these requirements.

A. LOGIC

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

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

B. ACTIVITIES

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

1. NTP
2. Each component of the Work defined by specific activities
3. Detailed activities to satisfy permit requirements
4. Procurement of fabricated materials and equipment with long lead times, including time for review and approval of submittals required before purchasing
5. The preparation and submission of shop drawings, procedures and other required submittals, with a planned duration that is to be demonstrated to the Engineer as reasonable
6. The review and return of shop drawings, procedures and other required submittals, approved or with comments, the duration of which shall be thirty (30) Calendar Days, unless otherwise specified or as approved by the Engineer
7. Interfaces with adjacent work, utility companies, other public agencies, sensitive abutters, and/or any other third-party work affecting the Contract

SECTION 722 (Continued)

8. The Critical Path, clearly defined and organized
9. Float shall be clearly identified
10. Access Restraints – restrictions on access to areas of the Work that are defined by the Department in the bid package, in Subsection 8.06 – Limitations of Operations or elsewhere in the Contract
11. Milestones listed in Subsection 8.03 - Prosecution of Work or elsewhere in the Contract Documents
12. Sub-Contractor approvals at fifteen (15) Calendar Days from submittal to response
13. Full Beneficial Use (FBU) Contract Milestone per the requirements of Subsection 8.03 - Prosecution of Work
14. Contractor's request for validation of FBU (ready to open to traffic)
15. The Department's confirmation of completed work to allow for FBU
16. Substantial Completion Contract Milestone per the requirements of Subsections 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes and 8.03 - Prosecution of Work
17. Contractor's request for validation of Substantial Completion
18. Punchlist Completion Period of at least thirty (30) Calendar Days per the requirements of Subsections 5.11 - Final Acceptance, 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes and 8.03 - Prosecution of Work
19. Contractor confirmation that all punch list work and documentation has been completed
20. Physical Completion of the Work Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
21. Documentation Completion per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
22. Contractor Field Completion Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
23. Utility work to be performed in accordance with the Project Utility Coordination (PUC) Form as provided in Subsection 8.14 - Utilities Coordination, Documentation and Monitoring Responsibilities
24. Traffic work zone set-up and removal, night work and phasing
25. Early Utility Relocation (by others) that has been identified in the Contract
26. Right-of-Way (ROW) takings that have been identified in the Contract
27. Material Certifications
28. Work Breakdown Structure in accordance with the MassDOT-Highway Division Contractor Construction Schedule Toolkit located on the MassDOT-Highway Division website at:

    https://www.mass.gov/info-details/massdot-highway-Contractors-schedule-toolkit
29. For Type A and B Contracts only: All Items to be paid, including all Unit Price and LUMP SUM pay Items, shall be identified by activity. This shall include all non-construction activities such as Engineering work; purchase of permanent materials and equipment, purchase of structural steel stock, equipment procurement, equipment delivery to the site or storage location and the representative amount of overhead/indirect costs that was included in the Contractor's Bid Prices.

SECTION 722 (Continued)

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

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

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

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

F. ACTIVITY DESCRIPTIONS

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

https://www.mass.gov/info-details/massdot-highway-Contractors-schedule-toolkit

G. ACTIVITY IDENTIFICATION NUMBERS

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

H. ACTIVITY CODES

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

SECTION 722 (Continued)

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.

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

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

J. FLOAT

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

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

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

SECTION 722 (Continued)

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.
8. For Type A Schedules, each month, the Contractor will be paid using the Cost-loaded CPM activities for LUMP SUM payment Items. This requirement supersedes any requirements elsewhere in this Contract regarding partial payments of schedule-of- values for all LUMP SUM Items.

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

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

722.62 Submittal Requirements

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

Each monthly Contract Progress Schedule submittal shall be uniquely identified.

SECTION 722 (Continued)

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

a. four (4) compact discs (CD); one (1) each for the Office of Project Controls and Performance Oversight (O-PC&PO), the Boston Construction Section Office, the District Construction Office and the Resident Engineer's Office. Additional copies shall be required if the work is performed in more than one district.

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

A. Narratives

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

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

SECTION 722 (Continued)

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.

B. Bar Charts (Types A, B, C and D)

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

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

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

C. Detailed Activity Schedule Comparisons

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

https://www.mass.gov/info-details/massdot-highway-Contractors-schedule-toolkit

The reports described in Subsections D, E and F below shall be submitted with all of the schedules listed in Subsection722.20 - General:

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

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

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

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

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

SECTION 722 (Continued)

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.

F. Projected Spending Reports (Types B, C and D)

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

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

https://www.mass.gov/info-details/massdot-highway-Contractors-schedule-toolkit

or consult with the District Construction Scheduler.

722.63. Progress Schedule Requirements

A. Baseline Schedule

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

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

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

SECTION 722 (Continued)

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.

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

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

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

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

Any proposed logic changes for in-progress or future activities shall be submitted to the Engineer for approval before being incorporated into a Contract Progress Schedule. The logic changes must be submitted using a Proposal Schedule or a schedule 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.

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

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 bar chart format. The daily activities shall directly correspond to the Contract Progress Schedule activities, with a matching reference to the activity identification number in the Contract Progress Schedule, and may be at a greater level of detail.

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

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

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

722.64 Impacted Schedule Requirements

A. Notice of Delay

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

B. Time Entitlement Analysis

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

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

SECTION 722 (Continued)

TEAs shall be submitted:

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

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

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

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

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

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

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

C. Recovery Schedules

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

SECTION 722 (Continued)

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

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

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

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

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

D. Proposal Schedules

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

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

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

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

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

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

SECTION 722 (Continued)

E. Disputes (Types A, B, C and D)

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

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

COMPENSATION

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

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

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

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

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

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

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

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

SECTION 722 (Continued)

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

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

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

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

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

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

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

722.82 Payment Items

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

ITEM 102.2 TREE TRIMMING LUMP SUMP

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

The work shall include the trimming of low hanging tree limbs in areas adjacent to the proposed shared use path, sidewalk, or roadway, which may conflict with construction operations or the safe passage of vehicles, bicyclists or pedestrians.

Tree trimming shall be done only upon direction by MassDOT and after verification of the location of the back of sidewalk or edge of traveled way and/or restricted visibility.

BASIS OF PAYMENT

Item 102.2, Tree Trimming will be paid at the contract LUMP SUM price, which price shall be full compensation for all labor, materials, equipment and incidental costs required to complete the work.

The method of disposal of all materials will be the responsibility of the Contractor.

All methods of disposal shall be approved by MassDOT and be in compliance with all applicable Federal, State and local ordinances.

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING EACH

The work under this Item shall conform to the relevant provisions of Subsection 771 and shall be for furnishing and installing temporary tree trunk protection and for minor limb pruning or removal of lower tree limbs to prevent injury to the tree from construction equipment and activities.

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

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

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

METHODS OF WORK

Prior to construction activities, the Engineer, the Contractor, the Town Tree Warden, and the Arborist (if included in the contract), shall review trees noted on the plans to be protected. Final decision as to trees armored and/or pruned shall be per the Engineer.

Care shall be taken to avoid damage to the bark during installation and removal of armoring. Trunk armoring shall be replaced and maintained such that it is effective for as long as required and shall be removed immediately upon completion of work activities adjacent to trees.

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

ITEM 102.511 (Continued)

DAMAGES

In the event that trees designated for protection under this Item are damaged, including root damage from unapproved trespassing onto the root zone, the Contractor shall, at his own expense, obtain an Arborist. The Arborist shall be approved by MassDOT.

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

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

Additionally, if the Engineer determines that the damages are such that the tree is sufficiently compromised as to pose a future safety hazard, the tree shall be removed. Tree removal will include cleanup of all wood parts, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.511 will be measured and paid at the contract unit price per EACH. This price shall be full compensation for all labor, equipment, materials, and incidentals for the satisfactory completion of the work and the subsequent removal and satisfactory disposal of the protective materials upon completion of the contract.

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

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

40% of value shall be paid upon installation of trunk armoring and completion of pruning work, if required.

60% shall be paid at the end of construction operations that would damage the tree and after protection materials have been removed and properly disposed of by the Contractor. In the event of repairable damages, payment shall be made after the completion of remediation measures.

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

ITEM 102.522 TREE AND PLANT PROTECTION FENCE – CHAIN LINK FOOT

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

Work under this Item shall consist of furnishing, installing, and maintaining vertical and stable chain link fence for tree and plant protection; removing and resetting fence(s) 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.

Chain link fencing for tree and plant protection shall remain in place for the duration of the construction activities, unless otherwise required by the Engineer.

MATERIALS

Chain link fence for tree and plant protection shall be six (6) foot tall metal chain link, set in metal frame panels on movable core drilled concrete blocks of sufficient size to hold the fence erect. Panels shall be such that they create a barrier to encompass the entire TPPZ or root zone area, to the extent possible.

Unless otherwise indicated, the following types of chain link fence are acceptable:

- New materials or previously used salvaged chain link fencing in good condition, subject to inspection and approval by the Engineer.
- Posts: Galvanized steel pipe of diameter to provide rigidity.
- Fabric: Woven galvanized steel wire mesh. Provide in continuous lengths to be wire tied to fence posts or prefabricated into modular pipe-framed fence panels.

REFERENCES

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

ESTABLISHMENT OF TPPZ

Fencing shall be used for construction areas, staging areas, and stockpile areas as shown on the plans, or as required by the Engineer, to establish the TPPZ.

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 102.522 (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 as shown on the plans and details. The drip Line is defined as the limit of tree canopy.

The Contractor shall not engage in any construction activity within the TPPZ without the approval of the Engineer, including operating, moving or storing equipment; storing supplies or materials; locating temporary facilities including trailers or portable toilets. 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 panels, posts, and anchoring materials, shall be removed and disposed off-site by the Contractor.

REQUIRED WORK WITHIN THE TPPZ

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

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

TREE AND PLANT DAMAGES 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) 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 damage will be assumed. Action shall be taken as specified below.

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

ITEM 102.522 (Continued)

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

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

If the recommendation 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 removal(s) and related activities 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 in the amount based upon industry standards per diameter inch at breast height (DBH) per tree.

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

Item 102.522 Tree and Plant Protection Fence–Chain Link will be measured and paid for payment by the FOOT, complete in place.

This will include all labor, materials, equipment, maintenance, resetting, final removal/disposal of the protective fence(s), damage repair, and all incidental costs required to complete 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 TPPZ fencing.
- Sixty (60) percent of the value payment will be made when TPPZ fencing materials have been removed and disposed off-site.

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

Tree damage 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 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 Sub-Contractors 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)

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 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.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

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

ITEM 180.03 LICENSED SITE PROFESSIONAL SERVICES HOUR

Within limited areas of the project site, soils, sediments and/or groundwater may be contaminated. A Licensed Site Professional (LSP) shall be required to provide the services necessary to comply with the requirements of the MCP. These services may include sampling, analysis and characterization of potentially contaminated media, preparation of Immediate Response Action (IRA) Plans, Utility-Related Abatement Measure (URAM) and Release Abatement Measure (RAM) Plans, Imminent Hazard Evaluations, status reports, transmittal forms, release notification forms, risk assessments, completion statements, and related documents required pursuant to the Massachusetts Contingency Plan (MCP). LSP hours related to the characterization and disposal of contaminated soil and/or sediment are incidental to the disposal Items. An estimate of LSP services to be provided shall be submitted to the Engineer for approval before any LSP activity begins.

The name and qualifications of the LSP and all environmental technicians to be assigned to the project shall be submitted to the Engineer for approval at least four weeks prior to initial site activities. The LSP shall have a current, valid license issued by the Massachusetts Board of Registration of Hazardous Waste Site Cleanup Professionals. The LSP shall have significant experience in the oversight of MCP activities at active construction sites. Qualification packages for the LSP and each technician shall include a resume, all recent work assignments with responsibilities identified (previous 5 years), and applicable training and certifications. A list of all Notices of Noncompliance, Notice of Audit Findings and Enforcement Orders issued by the DEP shall be submitted for all work assignments listed for the LSP and environmental technicians.

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

The Engineer shall be contacted immediately when observations or any field screening results verify contamination requiring further analysis, and/or enhanced management of suspect soil and/or sediment. Any enhanced management of contaminated soil to ensure proper stockpiling and storage is incidental to the LSP Services Item. The LSP shall adequately characterize subsurface conditions prior to backfill in areas where contaminated material has been excavated. The Engineer shall approve the locations of the testing sites prior to the sampling.

ITEM 180.03 (Continued)

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

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

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

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

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

ITEM 180.03 (Continued)

Laboratory Testing in Support of LSP Services

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

In order to maintain compliance with the MCP or other regulatory requirements, the LSP shall request approval from the Engineer to obtain samples from various locations and depths within the project area and to perform laboratory analyses on those samples. The samples shall be delivered to a DEP-certified laboratory using proper chain-of-custody documentation for analyses which, depending upon site conditions and suspected and/or identified contaminants of concern, may include, but are not limited to, metals, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), 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. LSP hours related to soil/sediment disposal (disposal characterization, landfill acceptance, disposal package preparation, etc.) shall be incidental to disposal Items.

The quantity and type of laboratory tests must be approved by the Engineer beforehand. The Contractor will be reimbursed upon satisfactory written evidence of payment. The Contractor may be required to obtain cost estimates from three DEP certified laboratories for the Engineer to choose the service provider. Laboratory testing related to soil/sediment disposal (disposal characterization, landfill acceptance, disposal package preparation, etc.) shall be incidental to disposal Items.

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

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

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

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

Excavation of existing subsurface materials may include the excavation of contaminated soils. The Contractor shall be responsible for the proper coordination of characterization, transport and disposal, recycling or reuse of contaminated soils. Disposal, recycling or reuse will be referred to as "disposal" for the purposes of this specification. However, regardless of the use of the term herein, there will be no compensation under these Items for reuse within the project limits. The Contractor will be responsible for coordinating the activities necessary for characterization, transport and disposal of contaminated soils. Such coordination will include the Engineer and his/her designee overseeing management of contaminated materials. Contaminated soils must be disposed of in a manner appropriate for the soil classification as described below and in accordance with the applicable laws of local, state and federal authorities. The Contractor shall be responsible for identifying disposal facility (ies) licensed to accept the class of contaminated soils to be managed and assure that the facility can accept the anticipated volume of soil contemplated by the project. The Contractor shall be responsible for hiring a Licensed Site Professional (LSP) and all ancillary professional services including laboratories as needed for this work. The Contractor will be responsible for obtaining all permits, approvals, manifests, waste profiles, Bills of Lading, etc. subject to the approval of the Engineer prior to the removal of the contaminated soil from the site. The Contractor and LSP shall prepare and submit to the Engineer for approval all documents required under the Massachusetts Contingency Plan (MCP) and related laws and environmental regulations to conduct characterization, transport, and disposal of contaminated materials.

ITEMS 181.11 thru 181.14 (Continued)

CLASSES OF CONTAMINATED SOILS

The Contractor and its LSP shall determine if soil excavated or soil to be excavated is unregulated soil or contaminated soil as defined in this section. Such materials shall be given a designation for purposes of reuse or disposal based on the criteria of the MCP. Soils and sediments which are not suitable for reuse will be given a designation for purposes of off-site disposal based on the characterization data and disposal facility license requirements. The Classes of Contaminated Soils are defined as follows:

UNREGULATED SOIL consists of soil, fill and dredged material with measured levels of oil and hazardous material (OHM) contamination at concentrations below the applicable Reportable Concentrations (RCs) presented in the MCP. Unregulated soil consists of material which may be reused (or otherwise disposed) as fill within the Commonwealth of Massachusetts subject to the non-degradation criteria of the MCP (310 CMR 40.0032(3), in a restricted manner, such that they are sent to a location with equal or higher concentrations of similar contaminants. Disposal areas include licensed disposal facilities, approved industrial settings in areas which will be capped or covered with pavement or loamed and seeded, and for purposes of this project 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 thru 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 thru 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.

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.

ITEMS 181.11 thru 181.14 (Continued)

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 penalties and/or for fines, as a result of the Contractor's failure to adhere to the regulations, specifications, recognized standard practices, etc., that relate to contaminated material handling, transportation and disposal.

SUBMITTALS

I. Summary of Sampling Results, Classification of Material and Proposed Disposal Option.

The following information, presented in tabular format, 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 base plan 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.

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.

ITEMS 181.11 thru 181.14 (Continued)

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.

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.

ITEMS 181.11 thru 181.14 (Continued)

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 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 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 all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

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

ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS LUMP SUM

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

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

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

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:

454 CMR 28.00 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 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise, Section 7.15 Air Pollution Control Regulations

310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

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

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

BASIS OF PAYMENT

Payment will be at the contract LUMP SUM price for ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS as specified above including all materials, tools, equipment and labor to complete the inspecting and testing of the asbestos suspected material.

All costs in connection with the protection of general public, private property, and all costs associated with the proper inspecting and testing of the material shall be included in the price and no additional compensation will be allowed.

ITEM 182.2 REMOVAL OF ASBESTOS FOOT

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

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

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

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

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

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

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

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

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

454 CMR 28.00 Removal, Containment and Encapsulation of Asbestos

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

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

310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

ITEM 182.2 (Continued)

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

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

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

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

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

NOTIFICATION AND PERMITS

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

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

The Contractor shall also obtain and pay all other applicable asbestos waste transportation and disposal permits, licenses and fees.

ITEM 182.2 (Continued)

STANDARD OPERATING PROCEDURES

The standard operating procedure shall ensure the following:

1. Proper site security including posting of warning signs and restricting access to prevent unauthorized entry into the work spaces.

2. Proper protective clothing and respiratory protection prior to entering the work spaces.

3. Safe work practices including provisions for communications; exclusion of eating, drinking, smoking, or use of procedures or equipment that would in any way reduce the effectiveness of respiratory protection or other Engineering controls.

4. Proper exit practices from the work space though the showering and decontamination facilities.

5. Removing asbestos containing material in ways that minimize release of fibers.

6. Packing, labeling, loading, transporting and disposing of contaminated material in a way that minimizes or prevents exposure and contamination.

7. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.

8. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces and entanglements in loose hoses and equipment.

9. Provisions for effective supervision and OSHA - specified personnel air monitoring for exposure during work.

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.

ITEM 182.2 (Continued)

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.

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

Payment will be at the contract unit price per FOOT for ITEM 182.2 REMOVAL OF ASBESTOS, as specified above including all materials, tools, equipment and labor necessary to complete the work specified above.

All costs in connection with the protection of the general public, private property and all costs associated with the proper disposal of the material removed shall be included in the price and no additional compensation will be allowed.

ITEM 204.11 GUTTER INLET – SPECIAL EACH

The work under this Item shall conform to the relevant provisions of Subsections 201 and 220 of the Standard Specifications and the following:

Precast special gutter inlets shall conform to the details shown on the plan. Special Gutter Inlet is intended to avoid utility conflicts. Contractor to use 6-Inch or 8-Inch heavy duty frames and grates, as required.

METHOD OF MEASUREMENT

Item 204.11, Gutter Inlet – Special will be measured for payment per EACH unit installed complete in place.

BASIS OF PAYMENT

Item 204.11, Gutter Inlet – Special Payment will be paid at the contract unit price per EACH, which price shall be considered full compensation for all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 220.10 MWRA WATER STRUCTURE ADJUSTED EACH

The work under this Item shall conform to the relevant provisions of Section 200 of the Standard Specifications and the following:

The work consists of adjusting MWRA water main structures to final grade. The existing castings shall be replaced with new castings provided by MWRA.

The existing castings shall be stacked and shall become the property of the Contractor and disposed of subject to the regulations and requirements of local authorities governing the disposal of such materials, at no additional compensation.

The new frames and covers shall have an HS20 loading rating and shall conform to AASHTO M306 and ASTM A48 "Standard Specification for Gray Iron Castings". The frames shall have a clear opening of 24 inches and be a minimum of 8 inches in height.

METHOD OF MEASUREMENT

Item 220.10, MWRA Water Structure Adjusted will be measured for payment per EACH unit installed complete in place.

BASIS OF PAYMENT

Item 220.10, MWRA Water Structure Adjusted will be paid at the contract unit price per EACH, which price shall be considered full compensation for all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 222.31 GALVANIZED STEEL 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 consists of furnishing and installing a square or rectangular frame and cover that will be installed over the existing frame and cover for the telephone manholes at station 400+00 LT and 417+02 LT.

The existing manholes align with the proposed curb line and will not be relocated. The curb frame and cover shall be installed over the existing manhole to allow for the manhole to remain in place and still provide for the curb height and a handicap accessible route as shown on the drawings.

MATERIALS

The cover shall be hot dipped galvanized steel and shall provide for pedestrian traffic.

The frame shall be three sided and aligned to avoid the existing manhole cover.

The frame and cover shall be installed as one unit and shall be hinged to allow the cover to open 180 degrees.

The frame and cover shall be a minimum of 6 inches in height to align with the surrounding curb. The length and width of the cover shall be between and 3’ and 4’.

CONSTRUCTION METHODS

The curb frame and cover shall be centered over the existing manhole and installed flush with the surrounding curb and sidewalk.

The curb frame and cover shall be installed according to the manufacturer’s recommendations and approved by the Engineer.

METHOD OF MEASUREMENT

ITEM 222.31, Galvanized Steel Curb Cover and Frame will be measured for payment per EACH unit installed complete in place.

BASIS OF PAYMENT

ITEM 222.31, Galvanized Steel Curb Cover and Frame will be paid at the contract unit price per EACH, which price shall be full compensation for all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 303.06	**6 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT)**	**FOOT**
ITEM 370.2	**10 X 6 INCH TAPPING SLEEVE, VALVE AND BOX**	**EACH**
ITEM 376.2	**HYDRANT REMOVED AND RESET**	**EACH**

The work under these Items shall conform to the relevant provisions of Section 300 of the Standard Specifications and the following:

Water main shutdowns will be needed to complete the work of this project. The Contractor will be responsible for the coordination and scheduling of water main shutdowns with the Somerville Fire Department. The Somerville Fire Department shall be given a minimum of 72-hour notice and mandatory confirmation 24-hour in advance of the shutdown schedule to take the hydrant out of service when the water main is temporarily shut down. No work shall commence without approval of the fire department.

The Contractor will be responsible for the coordination and scheduling of water main shutdowns with the Somerville Water and Sewer Department. All requests to shut down water service and/or close valves shall be directed to Demetrios G Vidalis, PE, Director of Water and Sewer Department at (617) 625-6600. The Somerville Water and Sewer Department shall be given a minimum of 72-hour notice and mandatory confirmation 24-hour in advance of the shutdown. The Somerville Water and Sewer Department will notify the affected property owners. Water service shutdowns may only occur between 7:00 am and 3:00 pm.

The work shall include the furnishing and installation of all materials required to remove and reset existing hydrants; as shown on the plans.

Approval of Materials

The Contractor shall submit the names of the material suppliers, shop drawings and certificates of compliance to the Engineer for approval prior to ordering any materials.

Pipe and Fittings

Pipe sizes 6-inch, 8-inch and 10 inch shall be ductile iron, Class 52, and pipe sizes 12-inch and larger shall be ductile iron Class 50, conforming to ANSI A21.50/AWWA C150 and ANSI A21.51/AWWA C151.

Fittings shall be ductile iron, Class 250 minimum, conforming to applicable ANSI, NEWWA, and AWWA specifications.

Pipe and fittings shall have a cement mortar lining and bituminous seal coat on the inside and a coal tar enamel coat on the outside in accordance with ANSI A21.4 (AWWA C104) and ANSI A21.6 (AWWA C106), as amended, except that the cement mortar lining shall be 1/8-inch in thickness for pipe 2 inches to 12 inches in diameter. Bituminous seal coat shall be a product acceptable to the National Sanitation

Foundation (NSF) for use in potable water and shall be so listed in the most current NSF summary of approved products under ANSI/NSF Standards 61.

Pipe shall be either the rubber-ring type push-on joint or standard restrained mechanical joint pipe.

ITEMS 303.06, 370.2 & 376.2 (Continued)

Rubber gaskets for push-on and mechanical joints shall conform to ANSI A21.11/AWWA C111.

Pipe shall be supplied in lengths not exceeding 20 feet. Each pipe and fitting shall markings casted into the metal in accordance with ANSI A21.10/AWWA C110, including manufacturer's identification, country material was made in, pressure rating, nominal diameter and degrees or fraction of circle (for bends).

Pipe and Fittings Installation

The Contractor shall make all necessary arrangements with the Somerville Water and Sewer and Fire Departments for the necessary shutdowns of service.

The Somerville Water and Sewer Department may establish the time of shutdown to be within the normal daily low demand period.

Care shall be taken in loading, transporting, and unloading to prevent injury to the pipes, fittings or coatings. Pipe and fittings shall not be dropped. All pipe or fittings shall be examined before laying and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the Engineer. Any pipe found to be defective, before or after laying, shall be satisfactorily removed and replaced with sound pipe at no additional cost to the Owner.

All pipe and fittings shall be installed in conformance with AWWA Standard Specifications C600, except as otherwise provided herein. All pipe and fittings shall be sound and clean before laying and shall be laid on a shaped bedding providing uniform, firm support over the entire length of each section barrel. BLOCKING WILL NOT BE PERMITTED. The select bedding material shall be placed and tamped along the sides of the pipe to complete the bedding.

Pipe shall be laid with good alignment and at a uniform 5-foot depth to top of pipe below proposed grade except where extra depth is required to clear other utilities and to connect to existing pipes, valves or fittings. Joint deflection shall not exceed that recommended by the manufacturer. Additional fittings shall be furnished and installed as required to cross existing utilities. Solid sleeves shall be used only where approved by the Engineer.

When pipe laying is stopped for any length of time, including short periods, the open ends of the pipe and fittings shall be closed with a watertight plug or cap as approved by the Engineer.

Necessary pipe cutting shall be accomplished by power saw and shall leave a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a push-on bell shall be beveled to conform to the manufactured spigot end. Cement lining shall be undamaged.

Push-on joints shall be made in strict accordance with the manufacturer's instructions. The rubber gasket shall be inserted in the groove of the bell end of the pipe, the joint surfaces cleaned and lubricated. The plain end of the pipe to be entered shall then be inserted in alignment with the bell of the pipe to which it is to be joined and pushed home with a jack or by other means. After jointing the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.

ITEMS 303.06, 370.2 & 376.2 (Continued)

Mechanical joints shall be installed in accordance with the "Notes of Method of Installation" of ANSI A21.11 and the instructions of the manufacturer. The Contractor shall thoroughly clean the joint surfaces and rubber gasket with soapy water before tightening the bolts. Bolts shall be tight to the specified torques. Extension wrenches or pipe over handle or ordinary ratchet wrench shall not be used to secure greater leverage. All mechanical joints shall use MEGALUG restraining glands.

VALVES

Gate valves shall be resilient wedge vales conforming to AWWA C509 and shall be rated for 200 psi minimum working pressure and shall be shell tested at a minimum of 400 psi. Valves shall be Underwriters Laboratory (UL) and Factory Mutual (FM) approved. Stuffing boxes shall be of the O-ring type. The operating nut shall be standard AWWA 2-inch square. Buried valves shall have mechanical joint ends conforming to AWWA C111. Exposed valves in vaults shall have flanged joints ends conforming to AWWA C111 unless shown as mechanical joints on plans.

All valves shall open left (counter clockwise) as required by the local water and fire departments.

All valves shall be of the iron body type, bronze mounted, double disc parallel seal, non-rising stem type. All ferrous parts of the valves, except finished or bearing surfaces, shall be given two coats of asphalt varnish.

After the valves are assembled and tested, a third coat shall be applied on the exterior.

Valve shall be as manufactured by the Mueller Company, Decatur, Illinois, Darling Valve Co., Williamsport, Penn, or equal.

VALVE BOXES

Valve boxes shall be two-section, cast iron, and heavy pattern adjustable type, with cast iron cover. The upper sections shall have a bottom flange of sufficient bearing area to prevent settling. The bottom section shall enclose the valve stuffing box and operating nut. Boxes shall be of lengths adapted to 5-foot pipe cover or more and have a minimum of 6 inches of overlap in the most extended position. Covers shall have the word "WATER" cast in the top and shall be held in place with bronze bolts.

COUPLINGS

Couplings shall be used to (1) repair split pipe or replace sections of damaged pipe; (2) install or cut-in hydrants or valves into a water main; (3) couple different pipe types; and (4) correct misaligned pipe ends. Couplings shall have a pressure rating of 250 psi or greater. Materials shall be manufactured in accordance with the following:

(1) Center and end rings: ASTM-A536

(2) Gaskets: ASTM D2000

(3) Bolts & Hex Nuts: AWWA C111

Couplings shall be epoxy coated.

ITEMS 303.06, 370.2 & 376.2 (Continued)

PIPE INSULATION

Pipe insulation shall be installed in locations indicated on the plans and when water main cannot be installed with at least 5 feet of cover. Pipe insulation shall be installed with waterproof jacket in accordance with MHD M11.0 and MHD Section 301.60. Insulation thickness shall be as indicated on the plans.

HYDRANT INSTALLATION

New hydrants will be supplied by the Somerville Water and Sewer Department and picked up by the Contractor. Hydrants shall be set at the locations shown on the drawings, or as directed by the Engineer, and bedded on a firm foundation. A drainage pit 2 feet 6 inches in diameter shall be backfilled with crushed stone in conformance to M2.01.1 and satisfactorily compacted. Additional stone shall be brought up and around 6 inches over the drain ports. Each hydrant shall be set in true vertical alignment and properly braced. A concrete thrust block shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Felt roofing paper shall be placed around hydrant elbow before placing concrete. Care shall be taken to ensure that concrete does not plug the drain ports. Hydrant paint shall be touched up as required after installation.

THRUST RESTRAINTS

Thrust restraints shall be installed at all tees, bends, plugs, caps, tapping sleeves and other locations as directed by the Engineer in accordance with the dimensions and details shown on the plans.

Whenever water pipes can be placed against undisturbed earth, concrete thrust blocks may be installed. The back of thrust blocks shall be placed against undisturbed earth and the sides shall be formed. Felt roofing paper shall be placed to protect pipe joints. Concrete shall not be placed over bolts or nuts, or in a manner which prevents the removal of joints.

Concrete shall have a minimum strength Class of 3,000 psi.

PRESSURE TESTING

Pressure testing shall be conducted by a certified independent water testing company after thrust block have cured to the required 3000 psi strength. The Contractor shall provide all necessary equipment and conduct hydrostatic pressure and leakage tests on the new water system installed under the Contract in conformance with AWWA 600, the regulations of the Massachusetts State Board of Health and the following:

Prior to testing, the entire pipe section shall be flushed to remove any rocks or debris which may have inadvertently entered the pipe during construction. The water system shall be subjected to a hydrostatic pressure of 200 psi and this pressure shall be maintained for at least one hour. The leakage test shall be conducted at a pressure of 150 psi and this pressure shall be maintained for at least two hours.

ITEMS 303.06, 370.2 & 376.2 (Continued)

Permitted leakage shall conform to AWWA C600. Leaks exceeding this standard shall be located and all defective pipes, fittings, pipe joints, valves and other material removed and replaced with new material to correct the leak, as directed by the Engineer, at no additional cost to the Owner.

All testing shall be done in a manner which prevents the entrance of contaminated water or pollutants into the existing water system.

DISINFECTION

Before being placed in service, all new water pipe shall be chlorinated in accordance with ANSI/AWWA C651 Standard for Disinfecting Water Mains.

The location of the chlorination and sampling points will be determined by the Engineer in the field. Taps for chlorination and sampling shall be installed by the Contractor. The Contractor shall uncover and backfill the taps as required.

The pipe section being disinfected shall be flushed to remove discolored water and sediment from the pipe. A 25 mg/l chlorine solution in approved dosages shall be inserted through a tap at one end while water is being withdrawn at the other end of the pipe section. The chlorine concentration in the water in the pipe shall be maintained at minimum 25 mg/l available chlorine during filling. To assure that this concentration is maintained, the chlorine residual shall be measured at regular intervals in accordance with procedures described in Standard Methods and AWWA M12, Simplified Procedure for Water Examination, Section K.

During the application of the chlorine, valves shall be manipulated to prevent the treatment dosage from flowing back into the pipe supplying the water. Chlorine application shall not cease until the entire pipe section is filled with chlorine solution. The chlorinated water shall be retained in the pipe for at least a twenty-four-hour period. The treated water shall contain a chlorine residual throughout the length of the pipe section as indicated in AWWA C651.

Following the chlorination period, all treated water shall be flushed from the pipe section and replaced with water from the distribution system. Prior to disposal of treated water, the Contractor shall check with local authorities to determine if the discharge will cause damage to the receiving body or sewer and, if required, the Contractor shall neutralize the chlorinated water in accordance with Appendix B, AWWA C650. Bacteriological sampling and analysis of the replacement water may then be made by the Contractor in full accordance with AWWA Specification C651. A minimum of three samples shall be taken by the Contractor at locations directed by the Engineer along the length of water pipe being chlorinated and sent to a State approved private laboratory for analyses. Water samples shall be taken 24 and 48 hours after chlorination. The Contractor shall re-chlorinate if the samples show presence of Coliform, and the pipe section shall not be placed in service until all of the repeat samples show no presence of Coliform.

ITEMS 303.06, 370.2 & 376.2 (Continued)

Furnish two copies of a Certificate of Disinfection Report to the Engineer.

The Contractor shall pay all costs for all testing, flushing, chlorinating, laboratory analyses, sampling, water supply and municipal charges.

METHOD OF MEASUREMENT

Item 303.06 will be measured for payment per FOOT of pipe installed complete in place.

Items 370.2 & 376.2 will be measured for payment per EACH installed complete in place.

BASIS OF PAYMENT

Item 303.06 will be paid for at the Contract unit price per FOOT, which price shall be considered full compensation for all labor, materials, equipment and incidental costs required to complete the work.

Items 370.2 & 376.2 will be paid for at their respective Contract unit prices per EACH, which prices will be considered full compensation for all labor, materials, equipment and incidental costs required to complete the work.

No separate payment will be made for excavation, concrete, gravel borrow, sand and crushed stone bedding and backfill, insulation, sampling, flushing, testing and disinfection, but all costs in connection therewith will be included in the unit prices for the respective Items.

ITEM 517.02 GRANITE CURB BULLNOSE END EACH

Work under this Item shall conform to the relevant provisions of Subsection 501 of the Standard Specifications and the following:

The work includes the furnishing and constructing of granite curb bullnose ends, as shown on the plans. Bullnose ends shall be 180-degree angle, 18 inches in height and have a radius of 1 foot.

METHOD OF MEASUREMENT

Item 517.02, Granite Curb Bullnose End will be measured for payment per EACH installed complete in place.

BASIS OF PAYMENT

Item 517.02, Granite Curb Bullnose End will be paid at the contract unit price per EACH, which price shall be considered full compensation for all labor, materials, equipment and incidental costs required to complete the work.

ITEM 670.1 FENCE REMOVED AND DISCARDED FOOT

The work under this Item shall conform to the relevant provisions of Subsections 120 and 665 of the Standard Specifications and the following:

Work shall consist of removing and discarding of existing fence as shown on the Plans and as requested by the Engineer. In addition, the work includes the removal of fence posts, foundations and all appurtenances, the whole backfilled with gravel and compacted, and the existing surfaces restored or replaced in kind.

METHOD OF MEASUREMENT

Item 670.1 will be measured for payment per FOOT of fence removed and discarded, with the fence being measured in original position along the top edge of the fence element from center to center of end posts.

BASIS OF PAYMENT

Item 670.1 will be paid at the Contract unit price per FOOT, which price shall be full compensation for all labor, materials, equipment, excavation, disposal of the existing foundations, supplying and placing of gravel backfill, compaction, the restoration or replacement in kind of disturbed surfaces, and all incidental costs required to complete the work.

ITEM 693. QUARRY FACED GRANITE WALL FOOT

Work under this Item shall conform to the relevant provisions of Subsections 685 and 690 of the Standard Specifications and the following:

This work under this Item shall consist of the construction of a Quarry Faced Granite Wall, masonry consisting of shim split or had chiseled granite having straight edges, laid dry as shown on the plans or as required by the Engineer.

Submittals

The Contractor shall submit the following Shop Drawings, samples, and manufacturers information to the Engineer for approval:

A. Manufacturer's information: submit manufacturer's literature, brochures and/or specifications for the following:

1. Granite

B. Shop Drawings:

Submit detailed shop drawings and fabrication details for Granite planter wall. Provide plans, sections, and details as required to completely show materials, layout, jointing, clearances and connections for all Items required for each type of granite installation.

Shop drawings shall include details of each stone piece, cross sections, elevations showing layout of all pieces, sizes, dimensions, finishes, arrangement and provisions for jointing

Shop drawings shall indicate the setting number of each piece, and each piece shall bear the corresponding number in a non-staining paint.

Shop Drawings for Items requiring accurate dimensional relationships to as-built construction, shall be prepared following a review and confirmation of as-built measurements and conditions for areas scheduled to receive site improvements.

C. Samples:

1. Surface Finish and Stone samples: Prior to the submission of any fabricated sample, submit one (1) stone with each type of surface finish and stone color sample for approval by the Engineer. The sample shall be 1 foot square of the specified granite, which shall meet all of the finish requirements as described in the Construction portion of this specification.

   Samples shall fully demonstrate color, shade, veining, texture, range, and dimensional cut.

ITEM 693. (Continued)

Construction Layout and Sample

Contractor shall stake the center line layout of all walls prior to construction for review and approval by the Engineer.

A sample wall shall be constructed with approved materials and method a minimum of (10) Ten Feet in length for review and approval by the Engineer prior to proceeding with the full wall construction.

Materials

Granite for Quarry Face Granite Wall shall be sized as indicated on the Drawings.

Granite shall be 'Old Berkshire Gray'.

Granite shall be quarried from within 500 miles of the project site, and shall be obtained from one of the following sources or approved equivalents:

a. Chelmsford Grey, Fletcher Granite, 1-800-253-8168
b. Chester Gray, Williams Stone Company, East Otis, MA 01029, 800-832-2052, www.WilliamsStone.com
c. Woodbury Gray, Swenson Granite Works, 603-225-4322

Granite shall be standard grade, free of cracks, seams, starts, or other defects which may impair its structural integrity, strength, durability or appearance, and shall be of smooth splitting character. Natural variations characteristic of the deposit will be permitted for granite pieces. Exposed surfaces shall be free from spots, spalls, chips, stains, discoloration, or other defects which would affect its appearance.

All granite for Quarry Face Granite Wall shall be from the same quarry and fabricated by the same fabricator.

INSTALLATION

Erect all stone masonry work in compliance with line and level tolerances indicated on the Drawings.

Lay no exposed unit having chipped edges or face defects. Remove any such unit, if installed, and replace with an undamaged unit, and bear all costs of this Work.

No visible cutting and patching will be accepted in the finished work. Deliver inserts and other anchorage Items required to be cast into concrete.

Provide protection against breakage and weather damage to all stone masonry work.

Take special care to avoid soiling or staining masonry that is to remain exposed in finish work.

ITEM 693. (Continued)

Stonework

Clean stone before setting by scrubbing with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh fillers or abrasives.

Dress joints straight and at 90-degree angle to face unless otherwise shown or required.

Cut stonework to provide uniform joint widths. Cut stonework to allow for uniform 3/8-inch-wide joints, unless otherwise shown on the drawings.

Install stonework using skilled workmen. Stone work shall be installed by a single Contractor or sub-Contractor.

Shaping Stones

Selected stone, roughly shaped to provide suitable exposed faces, shall be used at all angles and ends of walls. All shaping of stones shall be done before the stoned is laid in the wall.

Headers

Headers shall occupy at least ¼ the face area of the wall and shall be evenly distributed. Headers in walls 2 feet or less in thickness shall extend entirely through the wall. Stone shall be shim spilt and will show evidence of shims. Intent is to replicate historic splitting methods as depicted on the details.

Laying Stone

The masonry shall be laid, and face pattern shall be of uniform appearance throughout. The stones shall be uniform in size throughout.

The stones shall be laid on horizontal beds parallel to the natural bed of the stone. Vertical joints shall be broken by at least 6 inches and no vertical joint shall be located directly above or below a header.

Stones shall be dry stack. The wall shall be compactly laid having all interior joints completely filled with suitable stones or spalls.

Cleaning of Work

During the progress of the Work, keep the exposed surfaces of stone masonry clean at all times and protected against damage. As each segment of the new masonry is erected, dry brush the surfaces free of mortar spots and dropping. Remove mortar fins and smears from masonry before tooling joints.

ITEM 693. (Continued)

Final Cleaning

Submit proposed cleaning procedures and cleaning materials to the Engineer for approval before commencing work. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain the Engineer approval of sample cleaning before proceeding with cleaning of masonry. General cleaning shall not commence until the test area has been approved by the Engineer.

All cleaning operations shall g/proceed from the top down.

METHOD OF MEASUREMENT

Item 693.will be measured for payment by the FOOT of granite wall installed, complete in place.

BASIS OF PAYMENT

Item 693. will be paid for at the Contract unit price per FOOT, which price shall be full compensation for all labor, materials, equipment, excavation, backfill, compaction and all incidental costs required to complete the work.

ITEM 697.1 SILT SACK EACH

The work under this Item shall conform to the relevant provisions of Subsections 227 and 670 of the Standard Specifications and the following:

The work under this Item includes the furnishing, installation, maintenance, and removal of a reusable fabric sack to be installed in drainage structures for the protection of wetlands and other resource areas and the prevention of silt and sediment from the construction site from entering the storm water collection system. Devices shall be ACF Environmental (800)-448-3636; Reed & Graham, Inc. Geosynthetics (888)-381-0800; The BMP Store (800)-644-9223; or approved equal.

CONSTRUCTION

Silt sacks shall be installed in retained existing and proposed catch basins and drop inlets within the project limits and as required by the Resident Engineer.

The silt sack shall be as manufactured to fit the opening of the drainage structure under regular flow conditions and shall be mounted under the grate. The insert shall be secured from the surface such that the grate can be removed without the insert discharging into the structure. The filter material shall be installed and maintained in accordance with the manufacturer's written literature and as required 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 Subsection 227 of the Standard Specifications.

COMPENSATION

Silt sacks will be measured and paid at the Contract unit price per EACH, complete in place; which price shall include all labor, materials, equipment and incidental costs required to complete the work. No separate payment will be made for removal and disposal of the sediment from the insert, but all costs in connection therewith shall be included in the Contract unit price.

ITEM 701.3 TRAPEZOIDAL DELINEATOR FOOT

The work under this Items shall conform to the relevant provisions of Subsection 701 of the Standard Specifications and the following:

GENERAL

The work under this Item consists of furnishing and installing polymer-concrete cast-in-place Tactile Warning Delineators embedded to provide separation between pedestrian pathways and same-level-adjacent separated bike lanes as shown on the plans and as required by the Engineer.

References

A. Manufacturer's recommendations
B. 2019 Research Study: Delineator for Separated Bicycle Lanes at Sidewalk Level
C. 2021 Published Paper: Tactile Walking Surface Indicators in the United States and Internationally – Research, Standards, Guidance and Practice

Submittals

A. Product Data: The Contractor shall submit manufacturer's literature describing products, installation procedures and maintenance instructions.
B. Samples for Verification Purposes: The Contractor shall submit 1-2 tile product samples from the manufacturer, minimum 3" x 12" of the kind proposed for use. Samples will be properly labeled and will contain the following information: Contract name, submitted by, date of submittal, manufacturer's name.
C. Shop Drawings: The Contractor shall submit Shop Drawings showing plans of tile placement, including joints and anchors, all materials to be used and an outline of installation procedures.
D. Material Test Reports (ASTM): The Contractor shall submit literature with test data of the proposed product related to test reports from qualified independent testing laboratory indicating that materials proposed for use are following requirements and meet the properties indicated.

Quality Control

A. Contractor shall provide polymer-concrete cast-in-place Trapezoid Tactile Warning Delineator tiles produced by a single manufacture with a minimum experience of 7 years in non-interrupted manufacturing of tactile warning surface indicators (TWSI)

B. Installer's Qualifications: The Contractor shall engage an experienced installer qualified for installation of this type and who has successfully completed detectable warning installations similar in material, design, and extent to that indicated for this project.

C. The Contractor shall have a manufacturer's representative on site for initial installation to ensure that installation methods are acceptable and consistent with manufacturer's recommendations.

ITEMS 701.3 (Continued)

Delivery, Storage And Handling

A. Tiles will be suitably packaged or crated to prevent damage in shipment or handling.

Guarantee And Warranty

A. Polymer concrete cast-in-place Trapezoid Tactile Warning Delineator tiles will be guaranteed against defects in workmanship for a period of five (5) years from date of purchase. All other warranties, as specifically related to issues of handling and installation, will be the responsibility of the installation Contractor.

PRODUCTS

Materials

A. Trapezoid Tactile Warning Delineator tiles will be made of a polymer-concrete
B. Color: Terracotta Red, Natural White, Charcoal Gray, Dark Brown or other color that provides sufficient color contrast with the surrounding surface and other correlating Tactile Walking Surface Indicators (detectable warning surfaces, Tactile direction indicators)
C. the material of the tiles will meet or exceed the following ASTM test criteria using the most current test methods:

Polymer-Concrete Based Tiles	**ASTM test**	**Property Limit**
Compressive Strength	C 39-04	12,500 psi minimum
Tensile Strength	C 496	1,500 minimum
Flexural Ultimate Strength	C 947-03	2,500 minimum
Slip Resistance	C 1028	0.80 minimum
Water Absorption	C 97	Not to exceed 0.25%

A. Cleaning materials used on site will have code acceptable low VOC solvent content and low flammability.
B. Specifications of the concrete, sealants and related materials will be in accordance with the Contract Documents and the guidelines set by their respective manufacturers.

Manufacturers

A. Available manufacturers and models subject to compliance with these Specifications include the following or approved equal:

   Manufacturer Material Model:

   TekWay ADA Dome-Tiles Polymer Concrete Cast-in-place/TekWay Trapezoid Delineators manufactured by StrongGo Industries; or approved equivalent.

ITEMS 701.3 (Continued)

Equipment

A. Contractor shall provide all tools, equipment and services required for the satisfactory installation per manufacturer's instruction as Incidental Work. Equipment, which may be required, includes typical mason's tools, tape measure, a four-foot level with electronic slope readout and a non-marring rubber mallet.

EXECUTION

Preparation

A. During all concrete pouring and tile installation procedures, the Contractor shall ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.

B. The physical characteristics of the concrete will be consistent with these Specifications while maintaining a slump range of 4 inches to 7 inches to permit solid placement of the cast-in-place tactile tile system.

C. The concrete will be poured and finished, true and smooth to the required dimensions and slope prior to tile placement.

Installation

A. Contractor shall not be allowed to install Trapezoid Delineator Tiles until all submittals have been reviewed and approved by the Engineer .

B. The Trapezoid Tactile Warning Delineator tiles shall be installed per manufacturer's instructions.

C. The largest size tile manufactured will be used to minimize the amount of installation-seams. The tiles will be placed in accordance with the drawings. Cutting of the tiles may be required. Tile to tile joints between Trapezoid Tactile Warning Delineator tiles must be laid out by adjoining factory edges.

D. The tiles will be installed into the fresh concrete using a rubber mallet to ensure that there are no voids or air pockets, and the edges of tile are to be flush with the adjacent surface or as the drawings indicate to permit proper water drainage and eliminate tripping hazards between adjacent finishes.

E. While the concrete is workable, a 1/8-inch radius edging tool, (or as specified) will be used to create a finished edge of concrete, and then a steel trowel will be used to finish the concrete around the tile's perimeter.

ITEMS 701.3 (Continued)

Cleaning And Protecting

A. The Contractor shall protect trapezoid tactile warning delineators against damage during construction to comply with tile manufacturer's Specifications.

B. During and after the tile installation and the concrete curing stage, it is imperative that there will be no walking, leaning or external forces placed on the tile and/or to rock the tile, causing a void between the underside of tile and its concrete substrate.

C. The Contractor shall protect trapezoid tactile warning delineators against damage from rolling loads following installation by covering with plywood or hardwood.

D. The Contractor shall clean tiles prior to the date scheduled for inspection and remove protective covering (if applicable).

METHOD OF MEASUREMENT

Item 701.3, Trapezoidal Delineator will be measured for payment per FOOT installed, complete in place. Spaces between the delineator panels for surface drainage, or to accommodate existing utility castings or light poles will be excluded.

BASIS OF PAYMENT

Item 701.3, Trapezoidal Delineator will be paid at the contract unit price per FOOT, which price shall be full compensation for all labor, materials, equipment, and all incidental costs required to complete the work.

Gravel, Fine Grading and Compacting, and Cement Concrete Walk will be paid for separately, under their respective Items.

ITEM 701.4 STAMPED CEMENT CONCRETE SQUARE YARD

The work under this Item shall conform to the relevant provisions of Subsection 701 of the Standard Specifications and the following:

Stamped cement concrete shall consist of integrally colored (i.e., incorporated through-out the mix) and dry-shake colored stamped cement concrete complete in place as shown on the plans.

Prior to ordering materials, the Contractor shall submit pattern samples and color samples of each cement concrete type to the Engineer and the City of Somerville for approval. Samples of other materials to be used and samples for testing shall be submitted as requested by the Engineer.

A 4 foot by 4 foot cured "mock up" of each type of colored concrete pavement shall be constructed for review and approval by the Engineer in consultation with the City of Somerville.

The Contractor shall coordination the location of site amenities proior to the construction of the sidewalk.

Materials

- Concrete mix design shall meet the requirements of Section 701 of the Standard Specifications, ASTM C94, and the following:
- Cement: ASTM C150, type 1, Portland cement gray color.
- Minimum Cement Content: 5 sacks per cubic yard of concrete.
- Slump of concrete shall be consistent throughout Project at 4-inches or less. At no time shall slump exceed 5-inches.
- Do not add calcium chloride to mix as it causes mottling and surface discoloration.
- Supplemental admixtures shall not be used unless approved by manufacturer of color admixture.
- Add air entraining agent to concrete work in amounts of 4-7 percent of total concrete volume, or as otherwise recommended by testing lab.
- Add coloring admixture in quantities recommended by admixture manufacturer to achieve selected color. Add colored admixture to the mix according to manufacturer's written instructions in premeasured bags, not by weight of cement content.
- Coloring agents for the colored and stamped concrete shall all be supplied by the same manufacturer as part of an integrated system.

COLOR ADMIXTURES for integrally colored concrete shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are lime proof and UV resistant. Colored admixture shall conform to the requirements of ACI 303.1, ASTM C979, ASTM C494, and AASHTO M194.

ITEM 701.4 (Continued)

COLOR HARDENERS shall be a heavy-duty grade, UV-stable, dry-shake material for intensely coloring and hardening concrete flatwork. Color hardener shall be a blend of mineral oxide pigments, cement, graded silica aggregates and aluminum oxide, with conditioning agents to improve workability.

RELEASE AGENT: shall be a dry blend of chemical powders and color pigments designed as part of the coloring and patterning system to provide the clean release of the texturing tools form the concrete surface.

CURING COMPOUNDS for Colored Concrete: Curing and sealing compound shall be a ready to use water-based membrane curing compound and sealer designed to increase impact strength of the colored concrete and to repel stains. Curing compound shall comply with ASTM C309, and the slip-resistance requirements of ASTM D-2047, be suitable for exterior use and of same manufacturer as colored admixture, for use with integrally colored concrete.

CONCRETE COLORING SYSTEM COLORS

Color Admixture and Color Hardener for 'Stamped Cement Concrete' shall be a Brick Red, Deep Red, or other dark red color or other medium to dark color as selected by the Engineer and City of Somerville from the manufacturer's standard color range.

Powder Antiquing Release Agent for stamped cement concrete: Colors shall be as selected by Engineer from approved manufacturer's standard colors.

Joint Sealant colors shall match the colored concrete surface.

STAMP/IMPRINTING PATTERNS

Stamp pattern for 'Stamped Cement Concrete' shall be a Used Brick pattern as indicated on the Drawings, or other brick-like pattern as selected by Engineer in consultation with the City of Somerville from the approved manufacturer's standard brick.

INSTALLATION

Subgrade preparation and formwork shall be installed to the lines, grades, and depths indicated on the Drawings and in accordance with Section 701.

Place integrally colored concrete mix according to the Standard Specifications and the requirements of ACI 301, 302, and 304. Minimize handling to prevent segregation. Do not add water to the mix in the field.

After consolidating and screeding, float concrete to the gradients indicated.

Apply dry-shake color hardener prior to the application of the imprinting pattern. Apply at rate recommended by manufacturer, in two or more shakes. Float after each shake, and trowel only after the final color hardener shake.

ITEM 701.4 (Continued)

While concrete is still in a plastic state, apply release agent to the troweled surface, and then the surface shall be uniformly stamped/imprinted, applying the pattern as indicated on the drawings and according to the tool manufacturer's instructions. Provide a uniform pattern and uniform depth of stamping. Touch-up pattern and finish edges with hand tools as necessary.

Immediately after finishing concrete, apply curing and sealing compound for integrally colored concrete according to manufacturer's instructions. Apply curing and sealing compound at consistent time for each pour to maintain close color consistency. Curing compound shall be same color as the colored concrete and supplied by same manufacturer of the colored admixture.

Precautions shall be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 Plastic Shrinkage Cracking published by the National Ready Mixed Concrete Association. Do not cover concrete with plastic sheeting.

Minor variations in appearance of colored concrete, which are similar to natural variations in color and appearance of uncolored concrete, are acceptable.

METHOD OF MEASUREMENT

Item 701.4 will be measured for payment by the SQUARE YARD installed, complete in place.

BASIS OF PAYMENT

Item 701.4 will be paid at the Contract unit price per SQUARE YARD, which price shall be full compensation for all labor, materials, equipment, “mock up”, and all 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:

Two computer systems and a 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 able to perform video calling and recording:
Video camera	shall be High Definition 1080p widescreen capable video calling and recording with built in microphone. The microphone system shall capture natural audio while filtering out background noise.
Audio	shall be stereo multimedia speaker system delivering premium sound.
OS:	Latest Windows Professional with all security updates
Web Browser:	Latest Internet Explorer with all security updates
Applications:	Latest MS Office Professional with all security updates Latest Adobe Acrobat Professional with all security updates Latest Autodesk AutoCAD LT Antivirus software with all current security updates maintained through the life of the contract.
Monitors:	Two 27" LED with Full HD resolution. Max. resolution 1920 x 1080
Flash drives:	2 (two) - 128GB USB 3.0
Internet access:	High Speed (min. 24 mbps) internet access with wireless router.

ITEM 740. (Continued)

The Multifunction Printer System shall meet the following minimum criteria or better:

Color laser printer, fax, scanner, email and copier all in one with the following minimum capabilities:

- Estimated volume 8,000 pages per month
- LCD touch panel display
- 50 page reversing automatic document feeder (RADF)
- Reduction/enlargement capability
- Ability to copy and print 11" x 17" paper size
- email and network pc connectivity
- Microsoft and Apple compatibility
- ability to overwrite latent images on hard drive
- 600 x 600 dpi capability
- 30 pages per minute print speed (color),
- 4 Paper Trays Standard (not including the bypass tray)
- Automatic duplexing
- Finisher with staple functions
- Standard Ethernet. Print Controller
- Scan documents to PDF, PC and USB
- ability to print with authenticated access protection

The Contractor shall supply a maintenance contract for next day service, and all supplies (toner, staples, paper) necessary to meet estimated monthly usage.

The Engineer's Field Office and the equipment included herein including the computer system, and printer shall remain the property of the Contractor at the completion of the project. Disks, flash drives, and card readers with cards shall become the property of the Department.

BASIS OF PAYMENT

Compensation for this work will be made at the contract unit price per MONTH, which price includes full compensation for all services and equipment, and incidentals necessary to provide equipment, maintenance, insurance as specified and as directed by the Engineer.

765.412 SHORT GRASSLAND MIX-SANDY SOIL POUND

Work shall conform to the relevant provisions of Subsections 765 and 767 of the Standard Specifications and the following:

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.

ITEM 765.412 (Continued)

1) Verification of Seed Delivery. Prior to payment, Contractor shall submit the Seed Delivery Verification form contained within the contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this contract. The bill of lading must include variety and species name, lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section

2) Seed Sample. If requested or if seed is from a previously opened bag, the Contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

The appropriate seeding seasons are:

Spring: April 1 - May 15

Fall: October 1 - December 1 for dormant seeding

PERMANENT SEED MIX(ES)

Calculating Pure Live Seed (PLS)

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed). For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy, it is calculated to be 90% x [78 + 10 + 2]% = 81% PLS.

Therefore, each pound of PLS would need 1 pound / 0.81 = 1.2 pounds of seed with a 90% purity and 90% total germination

ITEM 765.412 (Continued)

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.

765.411 Short Grassland Mix-Sandy Soil

	Botanical Name	Common Name	% PLS by Weight
Grass			
	Festuca ovina	Sheep Fescue	55.00%
	Schizachyrium scoparium 'Albany Pine'	Little Bluestem 'Albany Pine'	28.30%
	Elymus virginicus	Virginia Wild Rye	13.00%
	Eragrostis spectabilis 'RI Ecotype'	Purple Lovegrass 'RI Ecotype'	1.00%
			97.30%
Herb/Forb			
	Chamaecrista fasciculata	Partridge Pea	1.00%
	Linum perenne lewisii	Blue Flax	0.80%
	Aster laevis NY Ecotype	Smooth Aster NY Ecotype	0.20%
	Rudbeckia hirta-VT ecotype	Black-eyed Susan-VT ecotype	0.20%
	Achillea millefolium	Common Yarrow	0.10%
	Aster pilosus	Heath Aster	0.10%
	Pycnanthemum tenuifolium	Slender Mountain Mint	0.10%
	Solidago nemoralis	Grey Goldenrod	0.10%
	Asclepias tuberosa	Butterfly Milkweed	0.10%
			2.70%
			100.00%

Seeding Rate: 45.0 lbs PLS/Acre

ITEM 765.412 (Continued)

Application Rate

Grassland Upland Mix**:** 45 lbs./acre PLS. 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

Item 765.412 will be measured for payment per POUND of seed furnished.

BASIS OF PAYMENT

Item 765.412 will be paid at the Contract unit price per POUND, which price shall be full compensation for all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 765.412 (Continued)

NATIVE SEED WORKSHEET

Project Description: _____ Project No: _____

Contractor: _____ Contract No: _____

Seed Mix Number & Description: _____

Contractor: Complete Prior To Ordering

Pounds of Seed Required Per Contract:

_____lbs./acre for _____Acre(s) OR _____ SY

Additional 50% increase if required (out of season or seeding over compost blanket):

_____**lbs. Total Seed Required**

Calculated Quantity for **P**ure **L**ive **S**eed (PLS[1]):

_____ **Total Pounds PLS**

Engineer: Verification at Time of Application

Number pounds delivered to site[2]: _____ Date(s): _____

Actual Seed Bag Tag/s Received or photo documented by Engineer: _____

[1] *PLS=% pure seed x % viable seed (total germination, hard seed, and dormant seed).*
[2]*Quantity delivered should match pounds* ***Total Pounds PLS*** *and* ***Verification of Seed Delivery****. Pounds should be shown on each Seed Tag.*

ITEM 765.412 (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: _____

775.140	**LINDEN - AMERICAN 2-2.5 INCH CALIPER**	**EACH**
776.524	**MAPLE – RED-ARMSTRONG 2-2.5 INCH CALIPER**	**EACH**
777.039	**OAK - NORTHERN RED 2-2.5 INCH CALIPER**	**EACH**
777.351	**OAK – ENGLISH COLUMNAR 2.5 INCH CALIPER**	**EACH**
777.677	**SWEETGUM – SLENDER SILHOUETTE 2.5 INCH CALIPER**	**EACH**
777.829	**BIRCH – HERITAGE CLUMP 2.5 INCH CALIPER**	**EACH**
778.161	**SASSAFRAS 2.5 INCH CALIPER**	**EACH**
783.467	**TUPELO – BLACK 2-2.5 INCH CALIPER**	**EACH**
790.635	**DOGWOOD - REDOSIER ARTIC FIRE 2 – 3 FEET HT**	**EACH**

The work under these Items shall conform to the relevant provisions of Subsection 771, PLANTING TREES, SHRUBS AND GROUNDCOVER, of the Standard Specifications.

As indicated on the plans, plantings are schematic and shall be staked out in the field and confirmed with the MassDOT Landscape Design Section.

ITEM 804.2 2 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC -(UL) FOOT

The work under this Item shall conform to the relevant portions of Subsection 801 of the Standard Specifications and the following:

The work shall include the furnishing and installation 2-inch non-metallic conduit for street lighting systems in accordance with the plans and as requested by the Engineer.

The work shall also include the relocation of existing electric (street lighting) and fire alarm conduit on Mystic Avenue, southeast of Wheatland Street. The relocation of these existing conduits is required to avoid conflict with the proposed traffic signal mast arm foundation.

The work shall also include the relocation of existing electric (street lighting) conduit on McGrath Highway (approximate station 417+65, LT). The relocation of this existing conduit is required to avoid conflict with the proposed drainage structure.

Split-duct conduit may be used to accomplish the existing conduit relocation.

The Contractor shall coordinate the disconnect/reconnection work orders with the respective utility company to achieve the completion of the work. The work shall include any required rewiring needed for disconnect / reconnect work. The Contractor shall coordinate with the Somerville Fire Department for the relocation of existing fire alarm conduit.

The length of conduit estimated under this Item is not guaranteed by the Engineer; it may be increased or decreased by the Engineer depending upon actual conditions encountered as provided for in Section 4.06 of the Standard Specifications.

METHOD OF MEASUREMENT

Item 804.2, 2 Inch Electrical Conduit Type NM - Plastic -(UL) will be measured for payment per FOOT of conduit installed.

BASIS OF PAYMENT

Item 804.2, 2 Inch Electrical Conduit Type NM - Plastic -(UL) will be paid at the Contract unit price per FOOT, which price shall include sawcutting, excavation, ordinary borrow, gravel borrow, metallic warning tape, sand bedding, split conduit, rewiring, and all labor, materials, equipment and incidental costs required to complete the work.

Required Controlled Density Fill-excavatable shall be incidental and will be paid for under this Item.

Permanent hot mix asphalt trench patching will be paid for under Item 451. - HMA for Patching.

Temporary hot mix asphalt trench patching will be paid for under Item 472. – Temporary Asphalt Patching.

ITEM 804.3 3 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC -(UL) FOOT

The work under this Item shall conform to the relevant portions of Subsection 801 of the Standard Specifications and the following:

The work shall include the furnishing and installation 3-inch non-metallic conduit for traffic signal systems in accordance with the plans and as requested by the Engineer.

The length of conduit estimated under this Item is not guaranteed by the Engineer; it may be increased or decreased by the Engineer depending upon actual conditions encountered as provided for in Section 4.06 of the Standard Specifications.

Where new conduits are installed in existing grass areas outside the limits of grading, the work shall include the placement of a minimum of 6 inches of loam and seed to restore the disturbed areas to their original condition. No separate payment will be made for this work, but all costs in connection therewith shall be included in the unit price bid.

Where new conduits are installed in existing sidewalk or paved median areas to remain, the work shall include replacement of the gravel base material and the surface pavement to match preconstruction conditions. No separate payment will be made for this work, but all costs in connection therewith shall be included in the unit price bid.

Where new conduits are installed in existing roadway areas, the work shall include replacement of the gravel base material and the hot mix asphalt required to match preconstruction conditions. No separate payment will be made for the gravel borrow base material, but all costs in connection therewith shall be included in the unit price bid.

MATERIALS

Rigid Plastic Conduit

For the traffic signal system, the conduit material shall be Schedule 80 polyvinyl chloride (PVC) plastic conduit. Control density fill shall be placed above the conduit when the conduit crosses a roadway as shown on the construction details.

Couplings And Fittings

Conduit couplings shall be constructed of polyvinyl chloride rigid plastic formed to fit the outside diameter of the conduit, to be used in conjunction with heavy-bodied solvent cement.

ASTM Specification D2564 Solvent Cements for PVC Plastic Pipe and Fittings

ITEM 804.3 (Continued)

Conduit Duct Bell Ends shall be polyvinyl chloride rigid plastic approved by Underwriter's Laboratories, Inc. for use on thread less rigid plastic conduit, to be used in conjunction with a heavy bodied solvent cement.

Construction Methods

The PVC conduit shall be installed in a trench as described in Section 801.60 of the Standard Specification. Refer to trench details for backfill requirements and warning tape requirements above the PVC conduits.

A ¾-inch polypropylene pull rope shall be installed in all conduits.

Metallic warning tape shall be placed above the duct bank as shown on the Construction Details.

Conduits entering concrete pull boxes/handholes or manholes shall be terminated 2 inches inside the wall of the pull box/handholes or manholes and shall have attached a bell end of the required size, using the solvent cement as called for in the specifications.

All conduit installed in pull boxes/handholes, or manholes shall be installed in knockouts provided in the pull boxes/handholes or manholes. After the conduit has been installed in the pull boxes/handholes or manholes, the open space between the pull boxes/handholes or manhole and the conduit will be sealed with Class B Cement Concrete Masonry. Any conduit installed in such a manner as to block complete access to any other conduit shall be removed and reset.

When more than one conduit is to be installed in one trench, the width of the trench shall be increased by the sum of the outside diameters of the conduits plus 4 inches for each individual conduit.

METHOD OF MEASUREMENT

Item 804.3, 3 Inch Electrical Conduit Type NM - Plastic -(UL) will be measured for payment per FOOT of conduit installed in place.

BASIS OF PAYMENT

Item 804.3, 3 Inch Electrical Conduit Type NM - Plastic -(UL) will be paid at the Contract unit price per FOOT, which price shall be full compensation for all sawcutting, excavation, ordinary borrow, gravel borrow, metallic warning tape, sand bedding, and all labor, materials, equipment and incidental costs required to complete the work.

Required Controlled Density Fill-excavatable shall be incidental and will be paid for under this Item.

Permanent hot mix asphalt trench patching will be paid for under Item 451. - HMA for Patching.

Temporary hot mix asphalt trench patching will be paid for under Item 472. – Temporary Asphalt Patching.

ITEM 811.22	**ELECTRIC HANDHOLE – SD2.022**	**EACH**
ITEM 811.30	**PULL BOX 8 x 23 INCHES – SD2.030**	**EACH**
ITEM 811.31	**PULL BOX 12 x 12 INCHES – SD2.031**	**EACH**

The work under these Items shall conform to the relevant provisions of Subsection 801 of the Standard Specifications and the following:

The work shall include the furnishing and installation of pull boxes, handholes, frames, and covers for the traffic signal systems and street light relocations in accordance with the plans and as directed by the Engineer.

Item 811.22 is for electric handholes associated with Eversource light poles.

Item 811.30 is for pull boxes associated with state owned light poles.

Item 811.31 is for traffic signal system pull boxes.

Pull boxes and handholes associated with the traffic signal system shall have "TRAFFIC" embossed on the cover per MassDOT standards.

Pull boxes and handholes associated with street lighting shall have "LIGHTING" embossed on the cover per MassDOT standards.

METHOD OF MEASUREMENT

Items 811.22, 811.30 and 811.31 will be measured for payment per EACH installed.

BASIS OF PAYMENT

Items 811.22, 811.30 and 811.31 will be paid at the respective Contract unit prices per EACH, which prices shall be full compensation for all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 812.09	**LIGHT STANDARD FOUNDATION PRECAST**	**EACH**

The work under this Item shall conform to the relevant provisions of Section of 800 of the Standard Specifications and the following:

This Item is for light pole foundations associated with state owned street lighting.

The work under this Item shall include the furnishing and installation of new precast light pole foundations at the new light pole location shown on the plans and as required by the Engineer. New foundation dimensions shall match the existing foundation dimensions.

METHOD OF MEASUREMENT

Item 812.09, Light Standard Foundation Precast will be measured for payment per EACH installed.

BASIS OF PAYMENT

Item 812.09, Light Standard Foundation Precast will be paid at the Contract unit price per EACH, which price shall be full compensation for all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 813.792 COMMUNICATION CABLE SYSTEM - FIBER OPTIC CABLE LUMP SUM

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 furnishing and installation of fiber communication cables, removing and discarding existing copper interconnect cables; including wiring, and all other equipment, materials and incidental costs necessary to provide a complete fully and operational communication systems as specified herein and as shown on the plans.

Proposed Fiber Optic Cable

The Contractor shall furnish and install a complete underground fiber communication cable system in proposed/existing conduit. Reference is made to the plans included in the contract documents. The cable runs shall be installed as follows:

Run No. 1 - Along McGrath Highway corridor in existing/proposed conduit, between the traffic controller cabinet Mystic Avenue (Item 816.03) and the traffic controller cabinet at Medford Street (Item 816.07) via the traffic controller cabinets at Blakeley Avenue (Item 816.04), Broadway (Item 816.05), and Pearl Street (Item 816.06).

Run No. 2 - Along Mystic Avenue corridor in proposed conduit, between the traffic controller cabinet McGrath Highway (Item 816.03) and the traffic controller cabinet at Wheatland Street (Item 816.02).

The Contractor shall furnish and install the proposed 24 Strand Single Mode fiber optic cable.

This work shall include properly terminating the new cable on proposed splice panels, properly routing the cable in the cabinets, and performing any additional work necessary to provide a properly installed and operating fiber optic cable system into the proposed traffic signal controller cabinets.

The Contractor shall install a ten (10) foot minimum slack coil of the proposed fiber optic cable inside the proposed controller cabinets. At all times during and after installation, diameter of slack coil shall be maintained at not less than twelve (12) inches.

The fiber optic cable installed under this contract shall be identified with permanently attached plastic labels at each controller cabinet. The labels shall either be embossed or printed with permanent non-fading ink, indicating the name of the intersection that is at the other end of the cable and bearing the legend "TRAFFIC COMMUNICATION CABLE". The tags shall also be labeled with the location of the cable's termination point. The Engineer shall approve the label format and attachment mechanism before label installation.

The Contractor shall test the fiber optic cable prior to installation and again after all splicing and terminations have been completed. Testing shall be performed in the presence of the Engineer.

BASIS OF PAYMENT

The work under Item 813.792 will be paid at the Contract LUMP SUM price, which price shall include all labor, materials, equipment, and incidental costs required to complete the work. No separate payment will be made for the removal and discarding of existing communication cable, and the testing of proposed communication cables but all costs in connection therewith shall be included in the LUMP SUM price for this Item.

ITEM 814. ADAPTIVE TRAFFIC SIGNAL SYSTEM LUMP SUM

The work under this Item shall include furnishing and installation of an adaptive traffic signal system required to interface with the local intersection controllers under Items 816.01 through 816.07 including: software licenses; server; system testing; system training; and all other equipment, materials and incidental costs necessary to provide complete, fully operational adaptive traffic signal system as specific herein and as shown on the plans. Remote system monitoring and control shall be via a cloud-based server. The Contractor shall integrate the proposed adaptive system to be installed under this project into the existing state-wide MassDOT cloud-based adaptive system. The Contractor shall pay all costs and fees associated with integration and maintenance of this adaptive system onto the existing MassDOT cloud server during construction and fine-tuning period. Additionally, the Contractor shall provide all costs to support ongoing access, maintenance and any other incidental fees related to the cloud server to maintain remote system operations for is adaptive system for a period of 36 months from the end of the fine-tuning period. The Adaptive Traffic Signal System shall be of the of the same manufacturer as the traffic signal controller(s) used on the project and the central system traffic control system. The use of an external device to provide adaptive functions shall not be allowed.

Shop Drawings

Within 30 days following execution of the Contract, the Contractor shall submit shop drawings for the adaptive software/licenses and manufacturer's equipment specifications to the Engineer in accordance with the relevant provisions of Section 815.20.

No work shall be commenced by the Contractor until approval of the shop drawings and manufacturer's data has been received in writing from the Engineer. Approval of these drawings will be general in character and shall not relieve the Contractor from the responsibility of, or the necessity of, furnishing materials and workmanship conforming to the plans and specifications.

The Design Consultant shall return the shop drawings within 15 days from the date of receipt from the Engineer.

The Contractor shall deliver to the Engineer a certificate of compliance with the manufacturer for all materials purchased from the manufacturer.

Manufacturer/ Distributor Experience

Prior to any work being done on the project, the Contractor’s equipment Manufacturer/Distributor shall provide documentation to MassDOT on their experience in successfully installing adaptive traffic signal control systems, Ethernet and wireless network communications.

MassDOT reserves the right to reject any Manufacturer/Distributor who, in MassDOT’s judgment, does not adequately demonstrate experience in installing adaptive traffic signal control systems.

ITEM 814. (Continued)

Prior to acceptance of the shop drawings and prior to installation in the street, the Vendor/Manufacturer of the proposed Adaptive Control System shall conduct a demonstration of the system/controller capabilities to meet all of the project requirements. In particular, the Vendor/Manufacturer shall demonstrate the ability of the system to dynamically adjust coordination parameters based on real time traffic data and to be able to collect and process traffic data during a preemption event, adjust coordination parameters based on traffic conditions in place as a result of preempt operation and immediately achieve coordinated operation upon the completion of an emergency vehicle preemption event. The Vendor/Manufacturer shall provide the facility to perform this demonstration within New England.

The Vendor/Manufacturer shall coordinate with MassDOT as to the exact location and time of the demonstration. It is the responsibility of the Vendor/Manufacturer to provide manuals, notes, and other materials for up to eight attendees at the demonstration.

The Vendor/Manufacturer is responsible for providing programming and setting up all equipment necessary for the demonstration.

MassDOT reserves the right to reject any equipment which, in the MassDOT's judgement, does not adequately meet requirements called for in this Contract.

Adaptive Control

The Contractor shall furnish and install an adaptive traffic signal system module as an integral part of the central system software, which shall provide adjustments to traffic signal timing on a cycle-by-cycle basis based on current traffic flow characteristics. The system shall be user programmable to allow for strategies to facilitate balanced traffic flow, progression bandwidth and critical movement modes.

The adaptive system shall allow for end user schedule changes of when the system is active. The use of script-based control shall not be allowed.

The adaptive system shall optimize cycle lengths, splits and offsets on a cycle-by-cycle basis. The system shall utilize vehicle detector data to estimate the degree of saturation and the nominal green time for each phase. These calculations shall be performed at the server level based on detector data obtained from local controllers. The system shall analyze the calculated estimates for all intersections and determine the optimum values for phase allocations and cycle length. Offsets shall be automatically adjusted based on the presence of queueing and platoon arrival distribution.

The system algorithm shall be user programmable to accommodate a variety of traffic scenarios and tested off line prior to field deployment. User defined operations shall be available including a balanced mode which can be selected to minimize overall network delay, progression mode to favor coordinated phase bandwidth or a critical movement mode to accommodate movements or approaches that require special accommodation due to high traffic demand. The system shall not omit any phase that has active vehicle or pedestrian demand present, signal phases shall be serviced in sequence based on demand as shown on the plans.

ITEM 814. (Continued)

The system/local controller firmware shall achieve coordinated operation upon the completion of a preemption event. During the time when preemption is active, the system shall continue to collect traffic data and calculate the appropriate coordination parameters based on traffic conditions. Once preemption operation has been completed the system/controller shall immediately return to normal coordinated operation. The coordination plan in place after a preemption event is completed shall be the appropriate coordination plan as automatically calculated by the system for the traffic conditions resulting from preemption operation.

In the event that communications are lost to an individual intersection or adaptive operation at a specific intersection has failed, the entire subsystem to which the impacted intersection is assigned shall revert to time based coordination back-up mode until the issue can be resolved and the entire subsystem can be restored to stable adaptive operations.

The Contractor shall program the system with varying levels of access privileges for up to 20 users. The Engineer will provide the listing and privileges that will be assigned to each user.

System Expansion

The adaptive system shall have the capability to support 1000 intersections.

Central System

The Contractor shall integrate all intersections included in this project into a central traffic signal control system to be supplied and installed by the Contractor as part of this project. This work shall include integration of all proposed controllers, malfunction management units, and vehicle detection systems with the proposed central traffic signal system. This Item shall include all required creations of system and subsystem level graphics, complete system database programming, intersection graphics development, the system communication programming and configuration set-up, all required system software and all other hardware and software necessary to complete the integration of all traffic signals into the Central Traffic Signal Control System. The system integration shall include the development of a per location electronic file containing digital photographs of the interior of each proposed traffic signal cabinet. These photos, at a minimum, shall include all equipment, along with photos of the back panel, the side panels, and any equipment that is typically hidden from front view. A spreadsheet containing a listing of all in-cabinet equipment including model, software level, serial numbers, communications data including all network settings (IP address & subnet mask) as well as copy of the intersection plan and cabinet wiring diagrams. The Central System shall be of the of the same manufacturer as the traffic signal controller(s) used on the project and the Adaptive system traffic control system. The use of an external device to provide adaptive functions shall not be allowed.

ITEM 814. (Continued)

This Item shall also consist of the creation and configuration of the entire Ethernet based communications network including all Ethernet Switches, Routers, and Modems as described herein. Integration shall be accomplished with minimal interruption to the operation of the local traffic controllers and coordination system. Any required down time of the local traffic controllers and coordination system, or down time of the communication system needed to integrate the proposed system shall be approved by the Engineer in advance. System integration shall include all hardware and software elements of the system. The Contractor shall inform the MassDOT Engineer and the Design Engineer in advance of all ongoing work efforts, schedules and in progress tasks. When appropriate, the MassDOT Engineer and the Design Engineer is to be take part in observing the system integration as it progresses. The work under this Item shall also include management of the existing communication and electrical wiring at the operations center.

The Contractor shall utilize electronic CAD files to produce graphics of all intersections as well as develop system and subsystem maps to include intersections under this contract, as well as all system controller displays, for the purposes of monitoring system status. Graphical displays of the intersection operation status shall include, but not limited to, the following:

- Curb line geometry
- Lane usage
- Approach names
- Pavement markings
- North arrow (facing upward)
- Sub-system name
- Adjacent reference points / businesses
- Intersection operating plan
- System parameter status
- Pre-empt status
- Detector status
- Vehicle and pedestrian display status
- Time and date
- Cabinet door open
- Master Cycle Timer
- Local Cycle Timer
- Active Splits
- Overlap Indications
- Current operating Coordination Plan
- Offset selection
- Plan offset value
- Plan cycle length value
- Time of day outputs

ITEM 814. (Continued)

The system shall automatically and continually monitor system activity and log/report occurrences of intersection alarm conditions. All alarm condition events shall include an alpha-numeric description of the event and the time and date of occurrence.

As a minimum, alarm conditions shall include:

a) cycle, split and offset failures;
b) adaptive system failure;
c) pre-emption;
d) local, remote and conflict flash conditions;
e) power on/off occurrences;
f) local free:
g) two special user defined alarms which, for this project, will include cabinet door open as one user defined alarm.

When a critical alarm condition occurs, the Contractor shall program the system to automatically report the condition via email or text message to selected user defined personnel.

In addition, the Contractor shall be responsible for integrating the following Items into the proposed system:

- Ethernet Switches – these Items include connecting, configuring, and integrating Ethernet Switches into the proposed system.
- Server, Monitor, Keyboard and Mouse – these Items include integrating the Server, Monitor, Keyboard, and Mouse into the proposed system. It also includes all application software installations and configurations on the servers as well as the workstations that must access the servers, workstation configurations required to properly access the servers, all as further described in the Contract documents.

The Contractor shall install, configure, and integrate a virtual private network (VPN) connection that shall provide remote access to the proposed network from any remotely located computer that has Internet access.

The integration work shall be accomplished with minimal interruption to the operation of the existing local controllers and coordinated operation.

The Contractor shall be responsible for a system conversion plan detailing tasks to be performed and estimated downtime of existing system operation due to the change from the existing system to proposed system control. The system conversion plan will be submitted to the Resident and Design Engineer for review and approval.

The Contractor shall inform the Engineer in advance of all on-going work efforts, schedules and in progress tasks. The work under this Item shall also include management and integration of Ethernet switches, routers, modems and the management of proposed communications devices required as part of this project.

ITEM 814. (Continued)

Automatic Traffic Signal Performance Measures (ATSPM)

The Contractor shall configure the system to collect high-resolution data from each system controller. This data will be retrieved and processed on a separate cloud server. Information gathered will automatically generate ATSPM reports based on a user defined schedule. As a minimum, the system will be set up to provide the following reports:

- Approach delay
- Preemption events
- Split Monitor
- Approach Volumes
- Purdue Coordination Diagrams
- Arrivals on Red
- Arrivals on Green
- Phase Termination
- Pedestrian Delay

The ATSPM shall run continuously for a two-week period prior to initiating operation of the adaptive system.

System Testing Requirements

Upon completion of work, tests shall be conducted to ensure that the system integration has been performed properly and all system requirements described and required as part of this project have been met. All tests shall be conducted in accordance with the approved test procedures developed by the Contractor. The Contractor shall submit test procedures and forms for review and approval to the MassDOT Engineer and the Design Engineer. As part of the system integration testing, the Contractor will be required to verify all system and intersection dynamic graphic displays against observed field conditions. This will require that a person be in the field while another person is at central during this central to field verification of graphic displays and logging data to ensure that system what the operator observes at central matches what is actually occurring in the field at each local intersection.

The Contractor shall propose testing plans and submit the test plan(s) and procedures as detailed herein to the Engineer for approval prior to testing. Each of the test plans shall contain the following elements:

- Proposed date, time, and location of the testing
- Names of the Contractor personnel who will be conducting the testing
- Descriptive overview of the proposed test procedure
- List of test equipment required to perform the testing
- Test cases and test logging forms which detail every step of the test procedure:

ITEM 814. (Continued)

Test logging forms shall be presented in tabular format, with separate columns for each of the following:

- Test case description detailing the test step to be performed.
- Expected result
- Actual result
- Pass/fail
- Comments

The Contractor shall supply separate test logging forms at the time of testing for each test plan, and for each device location. The test logging forms shall show the device location, date, and the start and end times of the test.

At the end of each test logging form, there shall be signature and date locations for each of the following:

- Contractor personnel conducting the test
- MassDOT representative witness
- Design Engineer witness

Signatures on the test logging form will signify only that the test was performed and witnessed, not that it passed or failed.

The detailed Test Plans shall be submitted to the MassDOT Engineer and the Design Engineer no later than thirty (30) days prior to the beginning of each test phase.

The Contractor shall have approved test plans prior to submitting a request to schedule the start of any test activities. The Contractor shall notify the MassDOT Engineer and the Design Engineer no less than seven (7) days prior to the beginning of any equipment or systems testing.

Testing shall provide verification and documentation that all requirements included in the Contract Documents are met. The Test Plans shall be developed by the Contractor to provide a mechanism that ensures that all contract requirements have been tested successfully and verified.

If any deviations or changes to the approved Test Plans arise, it shall be resubmitted for review and approval by the MassDOT Engineer and Design Engineer at least fourteen (14) calendar days prior to any planned test activity stage. No tests shall be conducted until the Engineer has approved the test plan.

A summary of all tests shall be produced at the completion of each testing phase of the project to ensure that all requirements defined by the system are satisfied. MassDOT and the Design Engineer reserves the right to examine and test or retest any or all materials furnished by the Contractor for the project to determine if they meet the requirements specified within the Contract Documents.

If the MassDOT decides that any material used in the construction of this project is defective or otherwise unsuitable, and the workmanship does not conform to the requirements of this Contract, the Contractor shall replace such defective parts and material at no cost to the Project.

ITEM 814. (Continued)

The times and dates of the tests shall be approved by the MassDOT Engineer and the Design Engineer. The Contractor shall conduct all tests in the presence of the Engineer. Testing shall take place only on weekdays, which are official working days, unless the MassDOT Engineer and the Design Engineer allows the test to be conducted and/or continued on weekends and non-working days. The Contractor shall make a request in writing at least fourteen (14) days prior to the proposed testing, and schedule tests only if permission is granted by MassDOT in writing.

The Contractor shall be responsible for the conduct and documentation of the results of these tests that will be countersigned by MassDOT Engineer and the Design Engineer at the end of each test. The signature of the Engineers implies only proof of presence. Test results shall be packaged and submitted to the Engineers within one week of test completion. No test phase shall begin until all prior test phases have been completed, and test results have been approved by the Engineers.

The Contractor shall utilize vendor supplied or any test specific software for testing, as needed, at no additional cost.

System Acceptance

System acceptance will be conditional based upon successful system integration of all required elements according to the plans and specifications, the system is fully operational to the satisfaction of the MassDOT Engineer and Design Engineer, testing has been completed, and the system has performed in accordance with the Plans and specifications without any failure throughout the test period. During the test period, the Contractor shall maintain and make available to the MassDOT Engineer and Design Engineer on a daily basis a log of all activities, including significant events, failures, and failure correction actions.

System Training

Under this Item, the Contractor shall provide a minimum of twenty-four (24) hours of personnel training in the use of the adaptive system and software. This training is to be conducted with MassDOT District 4 Traffic. The Contractor is to coordinate with MassDOT District 4 Traffic as to the exact location and time of the training. It is the responsibility of the Contractor to provide training manuals, class notes, and other instructional materials for up to ten (10) attendees at the training session.

No training shall begin unless and until the final inspection process indicates, in the opinion of the MassDOT Engineer and Design Engineer, that the adaptive system is sufficiently complete and operational such that training would be useful at the time.

ITEM 814. (Continued)

Adaptive Signal Maintenance Services

Under this Item the Contactor, through his Vendor, shall provide maintenance services of the Adaptive Signal system for a 3-year period, and any other incidental fees related to the cloud server to maintain remote system operations for this Adaptive Signal system for a period of 36 mouths from the end of the fine-tuning period. This maintenance period shall begin once the project is accepted by MassDOT. The Contractor, at a minimum, shall provide the following tasks:

- Provide software upgrades for the Adaptive Signal system;
- Monitor the Adaptive Signal system for maximum efficiency, and suggest system adjustments;
- Preserve the Adaptive Signal system to operate as designed or when anomalies occur;
- Signal performance measures shall be collected and retained based on a daily time schedule by MassDOT;
- Respond to alarms and communication issues; and
- Provide turning movement counts at all locations

Note: The Contractor shall staff and provide resources to ensure a maximum two (2) hour response time to address signal operational issues identified and communicated by MassDOT throughout the life on the maintenance period.

The Contractor shall be required to keep records of dates when parameter changes are implemented. These records shall be submitted by the Contractor/ Vendor to MassDOT. A written copy shall be transmitted to MassDOT by the first of each month.

Under this Item the Contractor shall also include a $20,000 cost to cover cloud related services and integration.

BASIS OF PAYMENT

The work under Item 814 will be paid at the contract LUMP SUM price, which price shall be full compensation for all labor, material, equipment and incidental costs required to complete the work.

ITEM 816.01	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 1**	**LUMP SUM**
ITEM 816.02	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 2**	**LUMP SUM**
ITEM 816.03	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 3**	**LUMP SUM**
ITEM 816.04	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 4**	**LUMP SUM**
ITEM 816.05	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 5**	**LUMP SUM**
ITEM 816.06	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 6**	**LUMP SUM**
ITEM 816.07	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 7**	**LUMP SUM**

The work under these Items shall conform to the relevant provisions of Section 800 of the Standard Specifications, the 2009 Manual on Uniform Traffic Control Devices (MUTCD) with Revisions 1, 2, and 3 and the November 2022 Massachusetts Amendments to the MUTCD and the following:

The work shall include the furnishing and installation of part or all of the following Items: ATC traffic signal controllers; ATC cabinet assemblies and foundations with concrete pads; controller/cabinet bench testing; single-point vehicle detection systems; software licenses (TSP, adaptive traffic signal operations, vehicle detection); fiber optic patch panels; fiber optic ethernet switches; fiberoptic patch panels; mast arm assemblies with anchor bolts and foundations; signal posts and foundations; vehicle signal heads; non-louver backplates; pedestrian signals with countdown timer units; accessible pedestrian signal (APS) push buttons; service connections; high speed communication connection and modem router; communications devices; wireless communication system; emergency vehicle preemption; all cable and wiring; ground rods, equipment grounding and bonding; and all other equipment, materials and incidental costs necessary to provide complete, fully operational traffic control signal systems as specific herein and as shown on the plans. The locations are as follows:

- Fellsway at Grand Union Boulevard/ Middlesex Avenue (Item 816.01)
- Mystic Avenue at Wheatland Street/ Auxiliary Connector “E” (Item 816.02)
- Fellsway at Mystic Avenue/ McGrath Highway/ U-Turn (Item 816.03)
- McGrath Highway at Blakeley Avenue (Item 816.04)
- McGrath Highway at Broadway (Item 816.05)
- McGrath Highway at Pearl Street (Item 816.06)
- McGrath Highway at Medford Street (Item 816.07)

Lists of the major traffic signal Items required at these locations are included on the plans.

ITEMS 816.01 thru 816.07 (Continued)

Shop Drawings

Within 30 days following execution of the Contract, the Contractor shall submit shop drawings for the signal equipment, a list of equipment, and manufacturer's equipment specifications to the Engineer in accordance with the relevant provisions of Subsection 815.20.

No work shall be commenced by the Contractor until approval of the shop drawings and manufacturer's data has been received in writing from the Engineer. Approval of these drawings will be general in character and shall not relieve the Contractor from the responsibility of, or the necessity of, furnishing materials and workmanship conforming to the plans and specifications.

The Design Consultant shall return the shop drawings within 15 days from the date of receipt from the Engineer.

The Contractor shall deliver to the Engineer a certificate of compliance with the manufacturer for all materials purchased from the manufacturer.

Existing Installations

Under these Items some of the existing signal equipment and conduit shall be retained as indicated on the plans and in accordance with the relevant provisions of Section 815.65.

The existing signal installations to be reconstructed/modified under these Items shall be maintained in operation throughout the construction period and until the modified signals are ready for operation. The Contractor may use temporary supports for signal heads as necessary to allow construction activities.

Any temporary installations shall be in conformance with the MUTCD at all times.

Once construction is completed and the reconstructed signals are in operation, unused Items of the old signals shall be completely removed and stacked as directed by the Engineer in accordance with Section 815.65. Old cable and unusable materials shall be disposed of by the Contractor.

The Contractor shall carefully remove, transport and stack all material that, in the opinion of the Engineer, is salvageable to MassDOT District 4 Maintenance Facility. The Contractor shall coordinate with the Engineer to schedule drop-off time a minimum of 48-hours in advance.

Signal Turn-on

Prior to initial turn-on of the new signals, equipment, signal displays, and vehicle detection as shown on the plans and called for in these special provisions, shall be installed and operable. Applicable signs and pavement makings shall also be in place when the signals are put into operation.

ITEMS 816.01 thru 816.07 (Continued)

Service Connections

Under Items 816.02 and 816.03 the 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.

Service connections under Items 816.01, 816.04, 816.05, 816.06, and 816.07 shall be retained.

High Speed Communication Connection and Modem Router

Under Item 816.03 the Contractor shall make arrangements with the applicable cable network provider via the MassDOT District 4 Office to provide a high-speed communication connection and modem router to the controller cabinet at the intersection of Fellsway at Mystic Avenue/ McGrath Highway/ U-Turn. The network connection shown on the plans is approximate only. The Contractor shall determine the exact location from the servicing network provider, arrange to complete the network connection, and be responsible for all charges incidental thereto.

The Contractor shall coordinate the installation of the high-speed communication connection between the controller cabinet and the network utility source using the proposed signal conduit as shown on the plans and according to specifications of the network provider. Network service components shall be completely separate and isolated from the electrical service for the traffic signal controller cabinet.

The DSL modem router shall be a shelf mounted unit with one static IP address.

It shall be the Contractor's responsibility to connect the modem router for connectivity to the Internet and make operational the Adaptive Traffic Control System as shown on the System Architecture Plan include in the plan set.

Testing of Grounding System

The Contractor shall perform testing of the equipment grounding system in the presence of the Engineer in accordance with MassDOT Standard Specifications.

Flashing Operation

Changes from automatic flashing to stop-and-go operation and from stop-and-go to automatic flashing operation shall occur as set forth in the MUTCD.

Bench Testing

Prior to installation in the street, the Contractor shall perform bench testing of the proposed completed controllers/cabinet assemblies and the proposed controller units in the presence of MassDOT and the Engineer at the Contractors facility prior to installation in the field. Refer to Appendix "A" for the ATC/ATCC test plans to be executed by the Contractor in the presence of the Engineer. Any issues identified during the testing will be successfully mitigated and successfully retested by the Contractor in the presence of MassDOT and the Engineer prior to installation.

ITEMS 816.01 thru 816.07 (Continued)

The Vendor/Manufacturer shall provide this testing facility within New England. In order for the Vendor/Manufacturer's facility to be acceptable for testing, it must be clean, air conditioned/heated, have signal displays and other equipment needed for simultaneous testing of up to five (5) controller units/cabinet assemblies at a time supplied as part of this project.

The Vendor/Manufacturer shall set up the controllers to operate test displays on all field signal circuits used for the signal sequence shown on the plans. The Vendor/Manufacturer shall make available to the Engineer and MassDOT complete and accurate copies of the as-built wiring diagrams for each cabinet assembly prior to inspection. Cabinet wiring diagrams shall depict the complete and actual wiring of the entire cabinet assembly as supplied for each location; the submission of generic wiring diagrams shall not be allowed. In addition, a hard copy of all programming data resident in each of the devices at the time of inspection shall be furnished to the Engineer. The services of a test Engineer shall be made available by the Contractor during the entire test process at no additional cost.

Single-point Video Detection and Monitoring System

The Contractor shall furnish and install single-point video detection and monitoring system (SPVDMS) as specific herein and shown on the plans.

The SPVDMS shall detect vehicles on a roadway by processing images sent from an IP 360-degree camera to an interface unit with detector outputs that can be received by the traffic signal controller. The SPVDMS shall consist of but not limited to the following Items: IP 360-degree camera with fisheye lens, video processor unit, surge suppression, and cables.

No additional hardware, software Items and/or subscription fees/costs shall be needed/allowed to satisfy the requirements as defined in these specifications for the life of the project, and shall meet the following requirements:

1. The SPVDMS shall include all licenses for traffic data collection, data reporting, and unlimited web-based video streaming.
2. The SPVDMS shall stream the detection video camera via the FMU manufacturer's web interface. The use of an external VPN connection shall not be required or allowed.
3. The SPVDMS shall collect all turning movement counts in perpetuity, 24 hours a day 7 days a week, and provide volume occupancy reports as needed.
4. The SPVDMS shall not require the use of a data plan to collect and store traffic data.
5. THE SPVDMS shall not use a web-based configuration software.

The SPVDMS shall allow for the configuration of all settings within the SPVDMS without the need for an outside internet connection.

The SPVDMS shall be supplied with a software client program that will be used to configure all settings. The use of a web-based software shall not be allowed.

The SPVDMS shall include a user configurable object masking system to improve detection, by removing unwanted areas of interest.

ITEMS 816.01 thru 816.07 (Continued)

Components of the SPVDMS shall all be the same make and model. As a minimum, the SPVDMS system shall be supplied and installed with the following functionality:

- Shall be supplied complete with the ability of remotely displaying live video streams all IP video detection units installed at the intersections. The setup of detection zones shall be available via remote access. The system shall log which user made any changes to the detection zone configurations.
- Shall acquire and record phase, channel, detector, pedestrian detector, pre-emption, alarm and overlap statuses at a frequency of no less than 10 times per second including whether a phase is next or has a call for service on it.
- Video detection shall consist of an IP based camera assembly and a digital video detection system. Analog cameras with separate video encoders shall not be allowed.
- Every vehicular approach at every project intersection shall be included in the vehicle detection system, as shown in the Plans.
- Shall be supplied with the ability to automatically collect and process data based on the classification of vehicles.
- Shall provide 24/7 turning movement count reports at no additional cost for the life of the project.
- Shall support local configuration of detection zones and system settings via manufacturer software.
- Shall allow for configuration at the roadside, by a laptop computer connected via ethernet to the Video Processing Unit and Software.
- Shall support the configuration of entries, exits, and turning movements for additional traffic analytics.
- All configuration files shall be stored locally at the traffic control cabinet.
- Installer shall follow all manufacturer written instructions/recommendations and requirements related to the install. Installer shall also submit a list of personnel that will be involved in the installation and provide certification that the technician has received factory approved/authorized training.
- Shall support a minimum of 100 unique video detection zones.
- Shall support real-time detection of vehicles, cyclists, and pedestrians in configurable detection zones per camera.
- Shall support identification of unacceptable video feed, including interrupted video signal.
- Shall support directional detection zones to reduce false detections from objects traveling in other directions.
- Shall support the tracking of vehicles and pedestrians for video analytics applications.

ITEMS 816.01 thru 816.07 (Continued)

Construction Methods

The SPVDMS shall be installed in accordance with the manufacturer's recommendations. Size and locations of the video detection zones shall be positioned/repositioned in the field to provide accurate vehicle detection on each approach as directed by the Engineer/ MassDOT. The SPVDMG shall be programmed by the Contractor to ensure that detection zones are established to cover the approach width and that the detection system is functioning to the satisfaction of MassDOT. Once the new camera(s) is in place and active, the Contractor shall verify that accurate, stable detection is occurring by observing vehicle presence/movement along with the video image on each approach.

The Contractor shall supply and install extension brackets to support proposed the vehicle detection system camera(s).

The extension bracket length and attachment heights shall be verified by the Contractor based on existing grade at the site. The Contractor shall be responsible for selecting the proper length of bracket and achieving the proper orientation of the extension brackets and may be required to field adjust the location of the extension brackets in the presence of the Engineer/ MassDOT to properly align vehicle detection sensors and for strategic placement of any blind spot created by the extension bracket.

The SPVDMS cable shall be supplied and installed per the manufacturer's recommendations.

The Contractor shall be responsible for furnishing all training, labor, materials, cables, connectors, tools, equipment, shipping and incidental Items necessary to complete the installation and make the SPVDMS fully operational.

The Contractor shall install the SPVDMS system software on computers/systems as required by the Engineer to allow visual confirmation of the detection zones as shown on the plans. All equipment shall be installed and wired in a neat and orderly manner in conformance with the manufacturer's instructions. The detector assembly(s) shall be affixed to the support structure in accordance with the manufacturer's instructions to provide the optimal field of detection.

Installation - The manufacturer of the SPVDMS, or their representative, shall design sensor layout, placement and lens size, and supervise the installation and testing of the equipment. The Contractor may be required to adjust and readjust the location of existing and proposed vehicle detection zones in the presence of the Engineer, at no additional cost, to properly set the detection areas. A factory certified representative from the supplier shall be on-site for a minimum of one day.

ITEMS 816.01 thru 816.07 (Continued)

Installation will be considered complete when the Contractor shows the system successfully and consistently places a request to the controller to call and extend the appropriate phase based on a vehicle detected in the detection zone.

The manufacturer shall provide 3 complete sets of maintenance manuals for the installed equipment. These manuals shall have complete set-up, maintenance and troubleshooting procedures presented in an organized format.

Warranty, Maintenance and Support - The traffic cameras shall be warranted by its supplier for a minimum of ten (10) years.

The SPVDMS shall be warranted by its supplier for a minimum of two (2) years.

During the warranty period, the supplier shall provide technical support by telephone during normal business hours and request for support by telephone shall be answered by factory certified personnel within one (1) hour.

During the warranty period, certified personnel from the supplier shall be on site within seventy-two (72) hours if required.

Vehicle Detection Communications Cable

The vehicle detection communications cable shall be supplied and installed per the manufacturer's recommendations.

Vehicle Detection Management System Software Integration

The Contractor shall connect the video detection system to MassDOT existing Vehicle Detection Management System Software. The Contractor shall coordinate with MassDOT and or the Engineer for remote access to the existing Vehicle Detection Management System Software.

Video Detector Unit Assemblies

The video detector assemblies shall conform to ATCC 5301 v02 and ATC/NEMA TS2 Type 1Standards. All vehicle detection and preemption cards shall be mounted either in single, stand-alone detector rack; or installed on the cabinet shelf and shall communicate with the ATC controller providing vehicle detector data. Installing detector cards directly into the traffic controller chassis is not allowed.

ITEMS 816.01 thru 816.07 (Continued)

Wireless Communications System

The Contractor shall supply, install and integrate a wireless communications system as part of the traffic signal control assemblies. This communications system shall consist of integrated flat plate antennas, a DSL modem, network router and a wireless Ethernet radio unit conforming to the specifications listed in the following sections. The antennas shall be located as shown on the plans. The wireless Ethernet radio unit shall contain provisions to link video feeds from the detection cameras, controller and MMU to allow remote computer monitoring and control capabilities.

The radio shall be 5.8 GHz point to multi-point wireless broadband Ethernet system for ITS communications. 5.8 GHz is to be used for broadband connectivity applications. The system shall consist of connectorized radios and/or radios with integrated panel antennas. All radios and antennas shall all be the same as to make and model. The following specifications are the minimum requirements for the 5.8 GHz broadband wireless network.

GENERAL REQUIREMENTS - The 5.8 GHz wireless broadband system shall have the following minimum general operating characteristics:

FREQUENCY	5.2 GHz UNII & 5.8 GHz ISM Dynamic Frequency Selection (DFS)
WIRELESS TECHNOLOGY	E-OFDM and DSSS
OPERATING MODE	Point-to-point, point to multipoint,
RANGE	>20 Miles (LOS)
BANDWIDTH	54 Mbps
SOFTWARE COMPATIBILITY	Must be compatible with5.8 GHz broadband links and CONTROLPAK management software must be used with both systems.
COMPLIANCE	TXDOT and SWRI tested, FCC approved.
WEATHERPROOF OUTDOOR UNIT	IP67 rated and available as connectorized unit (n-male) or with integrated 23 dB panel antenna.
WARRANTY	1 YEAR

ITEMS 816.01 thru 816.07 (Continued)

RADIO SPECIFICATIONS:

Multiple Frequency Bands	5.2 GHz UNII 5.8 GHz ISM Non-overlapping Channels: 40 x 5 MHz 20 x 10 MHz, 10 x 20 MHz, 5 x 40 MHz
Radio Type	E-Orthogonal Frequency Division Multiplexing (E-OFDM)
Standards Compliance	802.3, 802.11i, 802.11a hardware with proprietary bridging extensions
Radio Output Power	Max radio output power 26dB
Date Rate	54 Mbps
Receiver Sensitivity (dBm)	-70 to -93
Modulation	64QAM, 16QAM, QPSK, BPSK
Wireless Operating Modes	Point to Multipoint, Backhaul (point to point), Repeater, and Hotspot
Remote Power System	Power-over-Ethernet remote power to IP67 rated outdoor unit. Input: 100-240 AC, 50-60 Hz, Output: 18V, .4A.
Security	SecureRF architecture – Proprietary channelization and bridge protocol, link authentication, AES-256/WEP 152-bit data encryption options, VPN support for Ethernet tagged frames (802.1q, 802.1p)

Configuration and Management:

Configuration Utility	Must use ControlPAK management software for configuration and diagnostics. One software package must communicate to all different radios within the system including 4.9GHz Broadband and Serial data radios
Software Upgrades	FTP download
Antenna Alignment Tool	Real-time RSSI (signal Strength) monitor, link optimization and throughput maximization utility.
Indoor LED Status Indicator	Indoor remote power indicator.
Real-Time Link Monitoring	Secure Management Interface- Real-time signal strength, authentication data, system uptime, data rate, and channel selection.

ITEMS 816.01 thru 816.07 (Continued)

Mechanical:

Dimensions	305mm x 305mm x 15mmn (Integrated Antenna) 22mm x 18mm x 5 mm (Connectorized)
POE Dimension	3" x 2" x 1.5"

Environmental:

Radio Operating Temperature	-30°C to 60°C. Outdoor units are weather protected (IP67)
Radio Operating Humidity	Max. 95% non-condensing
Outdoor Antenna	-45°C to +60°C
Wind Survivability	125 Mph (201 Km/h)

Compliance and Certification:

EMC	FCC Part 15, Industry Canada RSS-210, Mexico, ETSI
Safety	UL-Canada, USA, CE
Radio	FCC 15.407 (UNII, ISM), Industry Canada RSS-210, ETSI (w/TPC & DFS), MII SRRC, TXDOT and SWRI Tested.

Antenna Specifications:

Integrated Antenna – The 5.8 GHz wireless Ethernet subscriber unit will be available as an integrated outdoor unit with a built-in 23dB panel antenna. The integrated antenna must meet the following specifications:

Frequency Range	5.2 GHz UNII 5.85 GHz ISM
Gain	23 dBi
3 dB Beamwidth	10.5deg/ 50deg
Polarization	Single linear, vertical
Dimensions	305mm x 305mm x 15mm (diamond shape)
VSWR	<1.9:1
Front to Back Ratio	>35dB
Cross Polarization	>24 dB
Power rating	10 Watts
Impedance	50 Ohms
Lightning Protection	DC ground
Weight	1.7lb
Radome	UV stabilized plastic
Wind Survivability	125 Mph (201 kph)
Wind Load	1.23 ft^2
Operating Temp.	-45C to +75C
Weatherproof	IP67 Rating

ITEMS 816.01 thru 816.07 (Continued)

Cable and Connections - Each outdoor broadband unit shall be supplied with Cat 5e outdoor rated cable designed for this type of environment to connect from the POE to the radio.

Advanced Transportation Controllers (ATC)

The controllers shall be shelf-mounted, solid state, menu driven, keyboard units conforming to the ATC 5201 v06.25 Advanced Transportation Controller (ATC) Standard. The controllers shall be supplied with all necessary interfaces needed to support Advanced Transportation Controller Cabinet (ATCC) / Serial Interface Unit (SIU) communications. The controllers shall be supplied with an internal real-time clock/calendar capable of daily, weekly, and yearly events time programming. The controllers shall be designed and supplied to provide the number of phases and sequencing as shown on the plans without any auxiliary equipment. The controllers shall be supplied as follows:

- Contain ATC API operational software conforming to ATC 5401 Standard v02.
- Be configured to operate in an ATCC 5301 v02 cabinet platform.
- Be supplied with the appropriate version of the Linux operating system, Board Support Package (BSP) and internal processing levels necessary to support connected vehicle (CV) as well as local and system operations.
- Shall include all licenses to support CV applications (SPaT) and SPM applications. These licenses shall be included with the controller.
- Shall include all licenses to allow for use of graphical user interface as well as standard display.
- Shall be fully compliant with NTCIP 1201 and 1202 standards.
- Shall support a minimum of 8 vehicle/pedestrian phases and 8 overlaps.
- Include a minimum of 3 High Speed USB 2.0 ports.
- Include a minimum of 3 10/100BaseT, RJ45 Ethernet connector ports.
- Shall be supplied with 2 SDLC ports, at a minimum.
- The SDLC ports shall be fully functional and operate simultaneously with all other ports.
- The SDLC ports shall support the following baud rates:
  - SDLC Port
    - Asynchronous Rates (bps) 1200 / 2400 / 4800 / 9600 / 19.2k / 38.4k / 57.6k / 115.2k / 230.4k
  - SDLC Port (SIU)
    - Synchronous Rates (bps) 153.6k / 614.4k
- All data communication connectors shall be supplied and installed with an outer boot molded cover designed specifically for the connector to ensure physical protection for the connector wire terminations. There shall be no exposed wires visible between the connector and the cable insulated jacket.

ITEMS 816.01 thru 816.07 (Continued)

- Shall contain real-time context sensitive HELP screens.
- Shall include a time-of-day, day-of-week, week-of-year scheduler.
- Shall include dedicated phase detection inputs, pedestrian detection inputs, and system detection inputs.
- Shall be supplied with the ability to provide 12 unique preemption/priority inputs.
- Shall contain the ability to alter the controller unit's internal database using a built-in front panel keyboard, using a computer connected to the controller unit with a USB cable or an Ethernet cable, and remotely using a central management system application. In addition, a remote access system shall be provided using Telnet and/or HTTPS.
- Shall include an internal database which stores all configurable parameters, including but not limited to phase timings, phase sequencing, overlaps, coordination parameters, preemption and priority parameters, time base parameters, communications parameters, detection parameters, flashing operation parameters, and security parameters.
- Shall include detector failure algorithms that initiates user defined actions when user defined criteria are met.
- Shall be supplied with the ability to generate user defined alarms and alerts.
- Shall be supplied with programming documentation fully defining the coding (compiler and C libraries) used to create the ATC controller applications residing in the unit.
- Shall be supplied with the source code used to produce and support the Linux kernel environment (Board Support Package).
- Shall be supplied with a manufactures Software Development tool Kit (SDK) for supplied firmware version to allow for future system modifications/expansions.
- -40ºC to 74ºC operating temperature range
- -40ºC to 85ºC storage temperature range
- 10% to 95% relative humidity (non-condensing)
- 89 VAC to 135 VAC, 60 Hz
- No additional hardware, software Items and/or subscription fees/costs shall be needed/allowed to satisfy the requirements as defined in these specifications
- Meet the functional requirements of the NEMA TS-2, 2016 Standard, including all amendments.
- Shall have connectors for all external input/output functions that are rigidly defined by the ATC, NTCIP and applicable national standards.

ITEMS 816.01 thru 816.07 (Continued)

- Based on application, connectors for external input/output functions shall be identical in quantity, size, type, configuration, and pinout for all manufacturer's units used in the project.
- Shall be supplied with all necessary hardware and software elements needed to fully support Connected Autonomous Vehicle (CAV) operations utilizing dual mode DSRC/5G communications.
- Shall be supplied with all necessary ATC hardware, software elements and instruction procedures needed to facilitate the extraction and processing of the SPM data.
- Support Flashing Yellow Arrow (FYA) and Flashing Red Arrow (FRA) operation with the ability to provide a minimum of 6 flashing pairs.
- Contain the ability to alter the controller unit's internal database using a built-in front panel keyboard, using a computer connected to the controller unit with a USB cable or an Ethernet cable, and remotely using the central management system application.
- Be supplied and installed with the ability to collect, store, and report various measures of effectiveness (MOE's).
- Shall collect and process all 255 high resolution enumerations as defined in the report entitled "Indiana Traffic Signal Hi Resolution Data Enumerations", dated 2019. This data will be processed in the controller and available via download from the controller USB Ethernet port or, if available, via system communications. At a minimum, the controllers shall be set up to provide the following performance reports:
    - Approach delay
    - Preemption events
    - Transit Priority Events
    - Split Monitor
    - Approach Volumes
    - Purdue Coordination Diagrams
    - Arrivals on Red
    - Arrivals on Green
    - Phase Termination
    - Pedestrian Delay
- Shall be able to backup and restore ATC programing data to a USB memory device connected to the front of the controller. No additional software shall be required to perform this function.

ITEMS 816.01 thru 816.07 (Continued)

- Shall be able to upgrade the ATC firmware via USB memory device connected to the front of the controller. No additional software shall be required to perform this function.
- The Contractor at time of submission shall submit from the manufacturer the latest ATC firmware release notes as part of the shop drawing submission.
- The ATC unit shall be supplied with the latest firmware. The use of older firmware shall not be allowed unless directed by the Engineer.
- The controller supplied and installed as part of this project shall be provided with Transit Signal Priority (TSP) operation without the need for additional software, hardware, data key device or any recurring licensing fees. The TSP algorithm shall be fully programmable to extend a phase or reduce a vehicle phase depending on user defined settings. This function shall be available for operation during both coordinated and free operation, and shall include the following:
    - TSP shall support a minimum of six priority routines.
    - The TSP program shall be capable of extending the priority phase green time and truncating the non-priority phase(s) green when a priority call is received by the ATC unit.
    - TSP operation shall not cause the ATC units to skip any phases that have active vehicle/pedestrian demand.
    - Emergency vehicle preemption (EVP) shall override TSP operation.
    - The TSP program shall have the ability to delay and/or extend priority calls.
    - The TSP program shall have the ability to support user defined time periods between servicing valid priority calls.
    - All TSP events shall be logged (time/date stamped) in the ATC unit.
    - The TSP algorithm shall allow for non-TSP phases to be conditionally truncated based on the absence of a concurrent pedestrian service of the non-TSP phase.
    - It shall be possible to user define in the traffic controller a minimum time between responses to priority calls.

TSP Coordinated Operation – Under coordinated operation, the controllers shall modify signal operation to accommodate a priority call. This may include modification to per phase termination points established under normal coordinated control. During a priority event, per phase coordination modes shall remain in effect. Priority and non-priority phase duration shall be user programmable per coordination pattern.

TSP Non-Coordinated (Free operation) – Upon receipt of a valid priority call, the controllers shall either extend the priority phase or reduce the non-priority(s). These settings for the adjusted green times shall be user defined, on a per phase basis, and adjustable on a time-of-day basis.

ITEMS 816.01 thru 816.07 (Continued)

ATC Cabinet (ATCC)

The cabinets shall be a NEMA "P" size (44" W x 26" D x 67" H). The cabinet size and functional requirements shall conform to the NEMA TS2 -2016 Standard, Section 7. The cabinets shall conform to requirements defined in the Advanced Transportation Controller Cabinet (ATCC) 5301 v02 Standard. The cabinet size and functional requirements shall conform to the NEMA TS2 -2016 Standard, Section 7. The cabinets shall have a natural brushed aluminum finish.

The traffic signal control equipment shall be enclosed within a dust and moisture-proof aluminum housing with an auxiliary door in door feature. The door hinge pins shall be made of stainless steel. All cabinets shall be configured to eliminate arc flash. All electrical equipment shall be dead front, no open terminals, busbars, breakers, or exposed terminal strips. All cabinet switches and circuit breakers shall be permanently labeled as to function. The cabinets shall be designed, constructed, and installed with all necessary provisions to comply with the latest NFPA 70E requirements. All electrically live parts over 50 volts shall be covered with Lexan or a suitable physical barrier to eliminate the possibility of arc flash.

The lock for the police door switch compartments shall unlock with a skeleton style (#1) key. The lock for the main door(s) of the cabinet shall unlock with a Corbin #2 key. Two sets of two keys (main door/police door) shall be furnished with each of the cabinets.

The cabinets shall be supplied with a permanent label mounted on the upper portion of the inside front main door which shall contain the name of the cabinet manufacturer, controller manufacturer, model/part number and year/month of assembly.

The cabinets shall be supplied with a GFCI duplex outlet, as well as a multi-outlet strip. All AC+ line cords shall contain a white flexible label with black permanently lettering affixed to the plug end of the cord depicting the device/ assembly that it is connected to, i.e., ATC, FMU, video detection etc.

The cabinets shall be provided with two removable lifting eyes for placing the cabinet on its foundation. Each eye opening shall have a minimum diameter of 0.75 inches. Each lifting eye shall be able to support a weight limit of 1,000 pounds.

The quantity, size and location of the equipment shall correspond to the contract drawings for the ATC Cabinets. All equipment shall be installed with the correct number of mounting screws/mounting support devices. All internal cabinet wiring shall be routed such that there is no conflict for access to cabinet devices or interference with door mechanisms. The AC- buss used for terminating field signal cable shall be installed in a readily accessible location on the interior side wall in the rear of the cabinets in close proximity to the field output terminals (phoenix connectors).

The cabinets shall be equipped by the with an internal cable management system. The cable management system shall be comprised of nonconductive channels designed to facilitate wire and cable routing within an electrical enclosure.

ITEMS 816.01 thru 816.07 (Continued)

All AC line cords used to power used to power various in cabinet devices shall be permanently labelled as to which device it is connected to. This label shall be white in color with black lettering and installed in close proximity to the plug end of the line cord.

All shelving used on the Power and Auxiliary side of the cabinet shall be designed with sufficient strength to fully support a 375 lb weight, the weight of two 12V lead acid batteries, per shelf, without sag or flex in the middle section of the shelf.

Cabinet Configuration – The cabinets shall be supplied with two side-by-side, 19" rack cages which shall extend from the bottom to the top of the cabinets.

The cabinet front left side shall provide for user interface to the in-cabinet equipment including the front panel of the controller, the cabinet status displays and detection system control interfaces. The cabinet rear shall provide access for termination of field cables and shall only be accessed for installation and for cabinet troubleshooting. The left-side rack of the cabinet relative to facing the cabinet from the front, to be referred to as the "Control" side, shall house the control devices such as the Controller, Cabinet Monitor Unit (CMU) and Auxiliary Display Unit (ADU), switch packs and the power distribution panel. As such, this rack shall be referred to as the "Control" side of the cabinet. The right-side rack of the cabinet relative to facing the cabinet from the front, to be referred to as the "Power and Auxiliary" side, shall house the spare card cage assembly, battery back-up devices (if required), communications elements and future ancillary devices.

Cabinet Doors - The NEMA P cabinets shall be supplied with four main doors: two on the front face and two on the back face. Each door shall open independently with an independent center post latching for each of the four doors. The front "control side" door shall be defined as the "primary" door; the remaining three (3) main doors shall be defined as "secondary" doors.
The cabinet main doors shall be provided with a stop to limit door opening to both 90° and 180° ±10°. The door stop bars shall be a captive type mechanism that serves to keep the bars in contact with the cabinet at both stop bar ends and provided with a catch that can be operated when the doors reach these 2 positions and shall hold the doors open securely until released. The cabinets shall be supplied with a three-point draw roller latching system consisting of the following latching points:

a. Center of the cabinet (lock)
b. Top of the cabinet – controlled by door handle
c. Bottom of the cabinet – controlled by door handle

The latching points on the top and bottom of the cabinet doors shall remain in the locked position until the door locks are disengaged. The locking mechanisms shall be equipped with nylon rollers to secure the top and bottom of the doors. The door locking mechanism shall be constructed such that it closes freely without obstruction with any internal cabinet device, shelf, rack system or internal metal support element.

The cabinets shall be supplied with a ¾" diameter shank, stainless steel latching handle for each door. The latching handle shall have a provision for padlocking the door in a closed position. The cabinets shall have a pliable seal composed of caulking compound or mastic installed between the cabinet bases and the concrete foundations and in between the riser base and the cabinet to prevent dust and dirt from entering the cabinets.

ITEMS 816.01 thru 816.07 (Continued)

Extension Bases – The cabinets shall be supplied with a 6" high riser aluminum base that elevates the cabinet above the cabinet foundation. The color and finish of the base shall match the color and finish of the main cabinet is supports.

Internal Cabinet Lighting – The cabinets shall be supplied with white LED light panels which shall automatically illuminate via a door open switch whenever any one of the four main cabinet doors are opened.

The LED panels shall produce a minimum of 1,000 lumens on the Control side of the cabinets and 1,000 lumens on the Power/Auxiliary side of the cabinet and be protected by a clear shatterproof shield. The cabinet shall contain four light panels: two at the top of each rack assembly and two at the underside of the bottom shelf of each rack assembly. There shall be two switches on each of the four main doors. LED light panel mounting brackets shall be installed such that they do not interfere with the unused rack mounting holes which could potentially conflict with the installation of future rack mounted devices. The second door switch shall be used to monitor when the door has been opened. The front control side door monitoring switch shall be connected to one of the door status inputs of the controller. The door monitoring switches for the remaining doors shall be connected to the second door status input to the controller. The door status inputs shall log a report event that one of the doors was opened.

Cabinet Fans – The cabinets shall be provided with thermostatically controlled ventilating fans and throwaway glass fiber air filters. The electric fans shall have ball or roller bearings and shall have a capacity of 100 ft^3 per minute. The fans shall be rated for continuous duty with a minimum service life of 3 years. The fan blades shall be supplied with a safety screen to prevent accident contact with the blades. The ventilating system shall be designed to prevent the entrance of rain, snow, dust, and insects. The fans and vents shall be arranged in such a manner that the air intake is at the cabinet bottoms and the exhaust is at the cabinet tops. The air intake shall be rain tight and covered with a removable glass fiber air filter. The removable air filter shall be firmly held in place with aluminum louvered backing plate such that cracks, and openings are eliminated to ensure that all air is filtered. The cabinets shall contain two fans. The thermostat panel shall be mounted to the top, rear of the cabinet's 19" equipment rack and oriented to be clearly visible allowing user adjustable temperature settings from a minimum of 70°F to 140°F and capable of activating the fans within plus or minus five degrees of the set temperature; the thermostat shall be initially set to 100°F. Any exposed terminals shall be covered to protect a technician's hand. There shall be two intake vents provided with the cabinet, one in each front door.

Cabinet Switches/Manual Control – The cabinets shall be supplied with a single police door panel located in the middle area of the front door on the Power and Auxiliary side. The switches shall be mounted in the police panel and labelled as to function. The three switches shall be supplied as follows:

a. Signal On/Off
b. Signal/Flash
c. Manual/Auto with cord

ITEMS 816.01 thru 816.07 (Continued)

The manual control cord shall be a coiled type, sealed weatherproof covered hand switch extending to six feet when fully stretched. The cord shall be fastened to the cabinet via a compression type connector to provide strain relief for the cord's electrical connections. The police door panel shall be of sufficient size so as to store the manual control cord when panel door is closed. The police signal control button (interval advance) shall not be functional unless the manual / auto switch is in the manual position thus preventing a user to advance the signal displays without an active "manual control enable" controller input being active.

The cabinets shall be supplied with a technician's panel switches integrated into the lower output file rack assembly. This panel shall be supplied with the following switches:

a. Flash/Auto (Allows the controller to cycle while flashing)

b. Signals On/Off (Allows the controller to cycle with signal displays being dark)

c. Stop Time Normal/On (Provides the ability to manually activate a controller stop time input)

Cabinet Power - The main cabinet circuit breaker shall be rated at 30 amps. Circuit breakers shall be approved and listed by the UL. All circuit breakers shall be quick-make, quick-break on either automatic or manual operation. Contacts shall be silver alloy enclosed in an arc quenching chamber. Overload tripping of breakers shall not be influenced by an ambient temperature range of from 0 to +158°F. The electrical current rating shall be stenciled on the support panel adjacent to each fuse and circuit breaker installed within the cabinet.

Pull-Out Drawers – The cabinets shall contain a pull-out drawer, 19" wide with sufficient strength to hold a laptop computer. The cabinets detail included in the contract drawings show the location of the pull-out drawer.

Spare Lateral Rack (SLR) – The cabinets shall be supplied with a Spare Lateral Rack (SLR) (empty cage) assembly. This rack assembly shall not be wired to any cabinet device, but rather used to store spare rack mounted cabinet devices such as switch packs, Serial Interface Units (SIUs), CMUs and phase selectors. This spare rack assembly shall be located at the top of the Power and Auxiliary rack. The rear of the assembly shall contain unterminated edge connectors which shall serve to hold the spare plug-in devices in place during storage.

Electric Meter Trim - The cabinets shall be supplied and installed with an electric service meter socket trim and electrical service disconnect switch mounted on the exterior of the cabinets. The meter and disconnect switch shall be installed centered on the side of the cabinets without doors such that it is not less than 48 inches nor more than 60 inches above final grade. The Contractor shall coordinate with the local electric utility company to determine the appropriate type of electric service meter socket trim and electrical conductors to be used. The line side cable shall be routed external to the cabinet from the ground to a 50 amp disconnect switch, then continuing to the bottom of the electric service meter socket trim, all through rigid steel conduit furnished and installed by the Contractor. The load side cable shall be routed through the cabinets and terminated on the line side of the main cabinet circuit breaker. The cable shall be routed through the interior of the cabinet such that it does not block or enter into available rack space preventing that space from being used either by equipment supplied as part of the project, or future equipment that would be installed in the rack system.

ITEMS 816.01 thru 816.07 (Continued)

The cable shall be routed between the edge of the rack system and the cabinet side wall, along the bottom of the cabinet and below the bottom opening of the doors. Care shall be taken by the Contractor when installing the electric service meter socket trim and electrical service disconnect switch so that there is no damage inflicted on installed devices or the rack system during the installation. All metal shavings produced during the drilling of the access hole for the electric service shall be removed from the cabinet interiors by the Contractor. The Contractor shall install appropriate bushings to all cabinet penetrations. All wiring shall comply with all applicable local electrical codes as well as the National Electric Code.

Back of Door Documentation – The cabinets shall be supplied with a laminated door sticker. This sticker shall be permanently affixed to the inside front control side of the cabinet door. At a minimum, the sticker shall contain the following information:

a. Vehicle and pedestrian detection information including all detector channel assignments, phases assigned, approaches and cabinet termination points.
b. Per approach preemption information including channel, approach/direction and termination points.
c. Field termination chart showing per approach/per phase numbering of all signal circuits.
d. Signal phasing and signal plan with intersection geometry and signal head designations.
e. Any logic statements and text describing signal operation created by the internal logic programming.
f. Time of day and coordination program resident in the controller.

The back of the main front doors shall contain a resealable, heavy-duty opaque plastic envelope with two grommets that provide mounting to two integrated hooks installed on the back side of the front cabinet doors. The heavy-duty plastic envelope will be used to store cabinet wiring diagrams and operations manuals that cannot be accommodated in the pull-out draw storage tray.

Input and Output Channels – The cabinets shall be supplied with 32 output channels and 48 input channels. The input channel rack assemblies shall consist of two (2) 24 channel units.

Output Channel Assignments – The cabinets shall be configured to provide the following output channel assignments:

Channel	Outputs (32 Channel)
Channels 1 – 8	Phases 1 -8
Channels 9 – 12	Flashing Yellow Arrow
Channels 13- 16	Pedestrians
Channels 17 – 20	Overlaps
Channels 21 +	As needed
Channel 32	Confirmation strobe if required

ITEMS 816.01 thru 816.07 (Continued)

Detector Test Switch Panels – The cabinets shall be supplied with a detector test switch panel. There shall be a total of 48 switches to allow for the manual placement of detector calls into the controller. Each switch shall be clearly labelled as to input channel. Each switch position shall correspond to the same controller input; switch one is for controller input channel one, switch two is for controller input channel 2, etc. The detector switch panel shall be comprised of switches that are wired directly to the corresponding input channels on the rack assemblies. Each switch shall be supplied with a red LED indicator to be illuminated whenever a channel input is active via the three-position detector switch. The use of an SIU internal to the detector test switch panel to provide this capability is not allowed. The switches shall be three position type and function as follows:

a. Up Position = Provides a constant call

b. Center Position = Normal operation (Phase receives call from detectors)

c. Down Position = Provides a momentary call

Standard ATC Cabinet Devices - A Cabinet Monitor Unit (CMU) and Auxiliary Display Unit (ADU) shall be supplied and installed in each of the cabinets. The CMU and ADU shall conform to requirements defined in the Advanced Transportation Controller Cabinet (ATCC) 5301 v02 standard. The CMU/ADU units supplied and installed as part of this project shall support 32 channels. All configuration programming shall be resident in a non-volatile Datakey device. Each CMU shall be supplied with a Datakey programmer and associated software. The Datakey programming software shall include a set-up wizard which shall assist the user with the initial set up of the device. The Contractor shall program the Datakey with data entries appropriate for each intersection. All programing resident on the Datakey shall be included in the hardcopy.

A cabinet power supply shall be supplied and installed in the cabinet. The cabinet power supply shall comply with ATCC 5301 v02.

The Contractor shall reconfigure the default username and passwords on all communications / control equipment within the ATC Controllers and Cabinets. This includes but is not limited to the ATC traffic controllers, ATC ancillary equipment, video detection equipment, Ethernet switches, and routers. The new username and passwords shall be created in coordination with the agency IT staff and or as directed by the Engineer; no manufacture default level passwords shall be allowed.

All SDLC cables used to interconnect devices within the cabinet shall be supplied with factory installed protective wire covers to protect the connector side of the cables. The use of Contractor supplied/installed cable protector covers shall not be allowed.

The Contractor shall utilize network communications encryption settings on all forms of wired Ethernet data paths. No “in the clear” communications shall be allowed. At a minimum all wired Ethernet connections shall meet 802.1AE standards. The Contractor shall supply and configure a Cyber Intrusion and Prevention Device (CIPD) in each ATC cabinet. The CIPD shall prevent any unauthorized access / connections to the traffic control system. Upon detection of unauthorized attempts, the CIPD shall notify the agency via SMS message and or email and log the event. The CIPD shall be installed prior to any remote access device.

ITEMS 816.01 thru 816.07 (Continued)

The Contractor shall coordinate with the agencies Information Technology and Operational Technology (IT/OT) staff and or the Engineer for finale configuration of the CIPD. No direct access to the traffic system shall be allowed without the installation of a CIPD and or Router/Firewall.

Cabinet Documentation (Hard copy. Flash Drive)

Under these Items the Contractor shall supply a full set of cabinet wiring diagrams. The wiring diagrams shall depict all of the as-built cabinet wiring routing and terminations. Each in-cabinet device (switches, relays, connectors, surge protection devices, etc.) shall be labeled on the wiring diagram as to the function the device serves.

Three copies of the database programming for all in cabinet devices shall be provided with the cabinet. The database programming sheets shall reflect as-built programming resident in each unit at the time of acceptance. A printout of the databases contained in the controller, CMU, Preemption, Video Detection, or any other equipment shall be provided to the Engineer. The databases shall be provided in both hard copy printouts and on a "thumb drive."

Operating and maintenance manuals for all in-cabinet devices shall be provided in both electronic format as well as hard copy.

Surge Suppression

Electrical filtering/surge protection shall be supplied and installed in each cabinet in accordance with ATCC 5301 v02 requirements and the manufacturer's recommendations. At a minimum, surge suppression shall be provided for incoming electric utility power conductors, all signal control circuits, vehicle detection, pedestrian detection, communications, and preemption system terminations. The use of a single fuse for surge suppression shall not be allowed.

The cabinets shall be electrically bonded and grounded to comply with Section 643, the National Electrical Code (NEC) and the National Electrical Safety Code (NESC), latest versions of each document.

Each in-cabinet current interrupting device (controller unit, flasher, and all other devices) shall be equipped with a suitable radio interference suppressor installed at the input power point. Interference suppressors shall be designed to minimize interference in both broadcast and aircraft frequencies. Suppressors shall be designed for 125 percent of the total connected load and shall meet standards of the UL and the EIA.

ITEMS 816.01 thru 816.07 (Continued)

Spare Traffic Signal Equipment

The Contractor shall furnish and provide the following spare equipment in each of the proposed ATC cabinets:

- A full complement of switch packs. The switch packs shall comply with ATCC 5301 v02.
- A full complement of Serial Interface Units (SIU). The SIUs shall comply with ATCC 5301 v02, plus 2 additional SIU.
- A full complement of flashers. The flashers shall comply with ATCC 5301 v02.
- A full complement of flash transfer relays. The flash transfer relays shall comply with ATCC 5301 v02.
- Thirty-two (32) additional Phoenix connectors.
- One (1) additional CMU USB data key programmer tool with software.
- A second separate GFI protected duplex outlet mounted on the side wall of the cabinets for servicing other devices. The main cabinet circuit breaker shall be rated at 30 amps.
- Two (2) spare service power panel assemblies.

All spare equipment required to be supplied with the cabinets shall be stored in the SLR and any additional spare equipment shall be placed on the Power and Auxiliary side shelves. No spare equipment shall be placed on the interior cabinet foundations.

Fiber Optic Patch Panel

The fiber optic patch panel – 24 position shall be a stand-alone unit manufactured for mounting on wall in the controller cabinet.

The fiber optic patch panel – 24 position shall include and be capable of accommodating a minimum of 24 LC type connector sleeves.

The fiber optic patch panel - 24 position shall include and be capable of terminating up to 24 connectorized pigtails.

The fiber optic patch panel shall incorporate a hinged access door.

The fiber optic patch panel shall be wall mounted as required by the specific location. The patch panel shall be securely fastened in place as recommended by the manufacturer.

ITEMS 816.01 thru 816.07 (Continued)

The fiber optic patch panel – 24 Position shall include a splice tray capable of holding 24 splices, and meet the following requirements:

- Each splice tray shall be capable of holding 24 splices.
- Each splice tray shall incorporate a system to retain and provide strain relief to the fiber optic buffers tubes and connector pigtails.
- Each splice tray shall incorporate grooves where the fiber optic splices can be held in place.
- Each splice tray shall incorporate a clear snap-on lid.

The fiber optic patch panel shall include a restraining system to hold the splice trays securely in place.

The fiber optic patch panel shall incorporate cable guides that maintain fiber strands and fiber buffer tubes bending radius greater than the minimum allowed by the fiber optic cable manufacturer.

The fiber optic patch panel shall include connectorized pigtails to connect the fiber optic cable to the fiber optic patch panel front panel. The connectorized pigtails shall meet the following requirements:

- All fiber optic connectors shall be LC type with a PC (physical contact) 2.5 mm ceramic ferrule.
- The connector mean insertion loss shall be 0.3 dB and maximum 0.5 dB.
- The connector mean return loss shall be less < -59 dB and maximum of < -55 dB.
- All SC connectors shall have a durability rate of less than 0.2 dB change over 500 rematings.
- Connectors shall meet ANSI/TIA EIA-604-3A requirements.
- The fiber optic strand of the connectorized pigtail shall have matching optical properties as the fiber optic strand used on the fiber optic cable.
- The Contractor shall provide factory assembled fiber optic pigtails. Modified fiber optic patch cords will not be accepted.

The fiber optic patch panel shall incorporate a restraining mechanism to hold the fiber optic cable central member and outside jacket.

The fiber optic patch panel shall include all fiber optic patch cords needed to connect the patch panel to cabinet equipment. The patch cords shall be connectorized as needed to properly mate with the patch panel and all cabinet equipment.

Fiber Optic Ethernet Switches

A fiber optic ethernet switch shall be installed in the traffic signal controller cabinets as shown on the plans, and shall comply with the following:

ITEMS 816.01 thru 816.07 (Continued)

A. The Ethernet Switch shall be a fully managed 1 Gbps, Layer 2 device.

B. All accessories, including but not limited to power supplies and SFP modules, shall be manufactured by ethernet switch manufacturer, and shall be intended by the manufacturer to be compatible with the Ethernet Switch.

C. The Ethernet Switch shall include a three (3) year support contract.

D. The Ethernet Switch shall be a self-contained unit capable of 24 hour per day unattended operation.

E. The Ethernet Switch shall be supplied, assembled by the Contractor, configured, and tested by an authorized network installer. The Contractor shall provide credentials of the network installer to the Engineer 30 days prior to the installation of Ethernet Switches for review and approval.

F. The Ethernet Switch shall be managed and hardened, of rugged design and suitable for reliable indoor/outdoor operation. The Ethernet Switch shall be configured for minimum maintenance and need for adjustment after initial set-up. The Ethernet Switch shall be rated by its manufacturer for operation over the temperature range -40C to +70C.

G. All single mode fiber optic ports of Ethernet switches supplied on the project shall be fully compatible with each other, as well as with existing Ethernet switches on adjacent projects, if any, with which they must connect and interoperate. This compatibility shall include, but not be limited to, such characteristics as optical operating wavelength(s), transmit power, receive sensitivity, and operating protocols.

H. The Ethernet Switch shall be designed to operate on a mains voltage of 120 VAC + 20 VAC.

I. The Ethernet Switch shall have dual redundant power supplies. Both power supplies shall be connected to power.

J. All single mode fiber optic ports of Ethernet switches supplied on the project shall provide digital optical monitoring (DOM).

K. The Ethernet Switch shall have a minimum of 8 each 10/100/1000 Mbps copper RJ-45 ports, plus 2 each 10/100/1000 Mbps small form factor pluggable (SFP) slots.

L. The 8 each 10/100/1000 Mbps Ethernet ports shall support the following network standards:

- IEEE.802.3 10 Base-T
- IEEE.802.3u 100 Base-T
- IEEE.802.3ab 1000 Base-T
- IEEE.802.1d Spanning Tree
- IEEE.802.1w Rapid Spanning Tree
- IEEE.802.1q VLAN
- IEEE.802.1p Class of service (CoS)
- Support for IGMP Multicast

ITEMS 818.01 thru 816.07 (Continued)

M. The 2 SFP slots shall be populated with single mode fiber optic small form factor pluggable (SFP) modules. The SFP modules shall meet the following requirements:

- The SFP modules shall be manufactured by the same firm that manufactures the Ethernet Switch.
- The optical emitters shall be laser diode type.
- The SFP modules shall have an operating wavelength of 1310 nm, single mode and/or 1550 nm, single mode. The optical wavelength chosen shall be consistent with and compatible with the optical wavelength chosen for all Ethernet switches with which the Ethernet Switch must communicate optically.
- The SFP modules shall each have an optical power budget that is equal or greater than the actual worst case link optical loss based on an analysis of all 1000 Mbps optical links on the project, plus a safety margin of 4 dB.
- Each SFP module shall accommodate two fiber optic strands.
- The SFP modules shall provide digital optical monitoring (DOM).
- Each SFP module shall have a distance capability as needed to provide stable, reliable communications to the locations shown in the Plans, however the SFP shall have a minimum distance capability of 20 kilometers.

N. Each SFP module shall have LC type fiber optic connectors, or as directed by the Engineer. The single mode fiber optic ports shall support the following network standards:

- IEEE.802.3u 100 Base-FX
- IEEE.802.3z 1000 Base-FX
- IEEE.802.1d Spanning Tree
- IEEE.802.1w Rapid Spanning Tree
- IEEE.802.1q VLAN
- IEEE.802.1p Class of service (CoS)
- Support for IGMP Multicast

O. The Ethernet Switch shall allow for remote configuration and status using web based tools via internet Explorer 6 of higher.

P. LED indicators for each Ethernet ports. Indicators shall be for:

- Power.
- Collisions (1 LED for 10Mb or 100Mb or 1000Mb).
- LK (steady on when twisted pair link is operational).
- RX (Activity, flashing when port is receiving data).

Q. Partitioning enforced after 32 consecutive collisions.

R. Auto-reconnect after one packet of error free transmission.

S. The Ethernet Switch shall have a switching method of store and forward.

ITEMS 816.01 thru 816.07 (Continued)

T. The Ethernet Switch shall support the following protocols:
   - RTP/ID
   - TCP/IP with full multicast support
   - DNS
   - DHCP

U. The Ethernet Switch shall support the following network management protocols:
   - SNMP V2c
   - RMON for Ethernet agent
   - Telnet/TFTP

V. The Ethernet Switch shall be U.L. listed.

W. The Ethernet Switch shall include all Items needed to form a full and complete installation, configuration and testing, including but not limited to furnishing all labor, tools, materials, rack mounting hardware, power supplies, cooling equipment, Ethernet cables, power cables, software, maintenance agreement, SFP modules, documentation, equipment, storage, transportation, and other incidentals necessary to complete the work.

X. The Ethernet Switch shall be designed to be mounted in a standard EIA 19-inch equipment rack.

Y. The Ethernet Switch shall be installed in project field cabinets as shown on the Plans.

Z. The Ethernet Switch shall be connected to other equipment as shown on the plans and as directed by the Engineer.

ITEMS 816.01 thru 816.07 (Continued)

AA. All hardware, cables, and other incidentals needed to install the Ethernet Switch shall be furnished and installed by the Contractor.

BB. The Ethernet Switch shall be fully configured, integrated, and tested by an authorized network installer in order to form a complete, fully functional network system as required in the contract documents.

CC. The Ethernet Switch shall be configured for supporting all Ethernet ready field equipment on separate VLANs, if so directed by the Engineer.

DD. Serial numbers and model numbers of the Ethernet Switch as well as all removable components thereof, shall be permanently engraved on the associated equipment.

EE. The Ethernet Switch shall be configured for auto fail-over such that it will take full advantage of the collapsed ring type fiber optic architecture used on some portions of the project. In the event that a fiber optic link connecting the Ethernet Switch to a collapsed fiber optic ring in the field fails for any reason, the Ethernet Switch shall automatically redirect its communications to the fiber optic port on the Ethernet Switch that feeds the same collapsed ring, but from the opposite direction. The Contractor shall demonstrate that under failed conditions communication is automatically redirected.

FF. The Contractor shall provide an electronic copy as well as four (4) complete sets of operation and maintenance manuals. The manuals shall, as a minimum, include the following:

- Complete and accurate as-built schematic diagrams showing the connections between the Ethernet Switch and all other devices to which it is connected.
- Complete parts list including names of vendors.
- Complete maintenance and trouble-shooting procedures.
- Login information in MS-Excel format.

GG. The Contractor shall provide a network connectivity diagram showing all sites with Ethernet switches on the project.

HH. Thirty (30) days prior to installation, four (4) copies of the Contractors Installation Practices shall be submitted to the Engineer for review and approval. This shall include credentials of authorized network installer, installation methods, list of installation equipment, and test equipment. Quality control procedures shall be detailed as well as procedures for corrective action.

II. All equipment connected to the switch shall be completed in the same configuration for each respectively similar site across the project.

ITEMS 816.01 thru 816.07 (Continued)

Emergency Preemption

The emergency vehicle preemption systems shall be installed in the same cabinets as the controllers.

The emergency vehicle preemption control systems shall consist of a data-encoded phase selectors to be installed within the traffic control cabinets in the detector racks. These units will serve to validate, identify, classify, and record the signal from the optical detectors located on support structures at the intersections. The make and model of the preemption systems shall meet the approval of the City, including coding requirements.

Note: Upon acceptance of the emergency preemption system by MassDOT the City shall be responsible for the maintenance of the system. MassDOT District 4 shall be notified if the City needs to go into the cabinet for preemption maintenance.

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 optical detectors shall be single input, single output units used to control one approach. All traffic signal installations shall be supplied with a minimum of two optical detectors unless otherwise noted in the major Items list.

The phase selectors shall be a rack-mounted plug-in two and/or four channel, dual priority device, as noted on the plans. The phase selectors shall plug into an empty slot in the detector rack. Programming the phase selectors shall be via a PC-based computer utilizing unit specific software. One copy of software on CDs shall be supplied and licensed to the City. A hard copy of final programming data shall be left in the control cabinet. A complete set of interface cables for phase selectors to laptop connection shall be supplied in the cabinets.

The Contractor shall install confirmation strobes at the traffic signal locations as shown on the plans. The confirmation strobes shall serve to validate to the driver of the emergency vehicle that the traffic signal has recognized the preemption call and will initiate the proper preemption sequence. The confirmation strobes shall be a white lens Whelen IS3 series or equivalent.

The Contractor shall be responsible for the proper programming of the phase selectors, orientation of the optical detectors, and all other work necessary to provide a complete and operating emergency vehicle preemption systems. The Contractor may be required to field adjust the location of the optical detectors in the presence of the Engineer to properly detect preemption calls from approaching vehicles. Upon final inspection and testing, any discrepancies or failures to properly preempt the traffic signals will necessitate a complete replacement on any non-compatible equipment.

ITEMS 816.01 thru 816.07 (Continued)

Mast Arms, Poles and Foundations

Mast arm poles shall be fabricated and constructed in conformance with the 2015 *MassDOT Overhead Signal Structure and Foundation Standard Drawings* and as stated below and the mast arm detail shown on sheet 124 of 205 in the Contract Drawings.

Mast arms located at stations 404+50, 305+33, and 309+98 are considered standard per the 2015 MassDOT Overhead Signal Structure and Foundation Standard Drawings. Mast arms located at stations 500+98, 312+22, and 409+62 are considered non-standard. In addition to the requirements of the MassDOT standard drawings, non-standard mast arms shall be designed per the latest edition of the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals.

Acceptance of Type 2 mast arm poles will be contingent upon review and approval of shop drawings submitted by the Contractor. Longhand design calculations shall be submitted by the Contractor with the shop drawings for all Type 2 mast arm poles.

The Contractor shall provide a set of calculations, stamped by a Structural Engineer registered in the Commonwealth of Massachusetts, along with plans and specifications for review by the Engineer.

If ledge or unsuitable soil is encountered (i.e. on which does not apply to the design tables shown in MassDOT's standard drawings), an alternative design shall be provided by the Design Engineer. If utilities or other underground obstructions are encountered, the Contractor shall backfill the area to its original condition until an alternate design has been provided by the Design Engineer and approved by MassDOT.

All mast arm pole foundations shall be cored pier foundations and constructed in conformance with 2015 *MassDOT Overhead Signal Structure and Foundation Standard Drawings* and per Table 2 provided below.

ITEMS 816.01 thru 816.07 (Continued)
TABLE 2

BORING NO.	ARM LENGTH	STA.	OFFSET	SOIL TYPE	FOUND. DIA.	FOUND. DEPTH	VERT. BARS	TIE BARS
Item 816.02 Mystic Avenue at Wheatland Street/ Auxiliary Connector "E"								
B-1A	25'	404+50	19.5' LT	Clay (Stiff)	3'–6"	11'-0"	18-#8	#5@12"
B-2	35'	305+33	27.5' RT	Clay (Soft to Medium)	3'-6"	14'-0"	18-#8	#5@8"
Item 816.03 Fellsway/ Mystic Avenue/ McGrath Highway/ U-Turn								
B-3	30'	500+98	30.0' RT	Wet Sandy (loose)	3'-6"	17'-0"	18-#8	#5@8"
B-6	35'	409+62	19.0' LT	Wet Sandy (loose)	3'-6"	17'-0"	18-#8	#5@8"
B-4	45'	309+98	34.5' RT	Wet Sandy (loose)	4'-0"	18'-6"	18-#9	#5@6"
B-5	35'	312+22	25.0' LT	Wet Sandy (loose)	3'-6"	22'-0"	18-#8	#5@8"

Note: Subsurface data not available at Boring B-2 at depths greater than 6'. If an organic layer is encountered during installation of the drill shaft, the depth of shaft should be increased the same thickness as the organic soil layer, up to 2'. The drill shaft shall not bear directly on organic layer. Notify the Engineer if an organic layer is encountered.

Note Well: It is noted that significant utilities are present in many areas of this project which may require special foundation excavation and installation methods, such as vacuum truck excavation and/or hand digging at the direction of the Engineer. No separate payment shall be made for these activities, but all costs in connection therewith shall be included in the contract lump sum bid prices.

No separate payment will be made for work considered incidental to the excavation, including but not limited to, mast arm foundations, dewatering, etc. but all costs in connection therewith shall be included in the lump sum prices.

Foundations shall not obstruct a sidewalk or crosswalk so that passage by physically challenged persons is not impaired.

Signal Housing Brackets

All signal housing brackets must be installed to manufacturer's specifications and must be properly torqued.

ITEMS 816.01 thru 816.07 (Continued)

Signal Heads

Signal heads mounted on mast arms shall be rigidly attached to the mast arms. All signal heads mounted overhead on mast arms shall be installed, with the bottom of the signals at the same height. All traffic signal lenses shall be 8 inch or 12 inches in diameter as shown on the plans. All signal heads shall be equipped with ball and/or arrow light emitting diode (LED) modules. Five (5) inch non-louvered backplates and tunnel visors shall be provided on all signal heads.

All backplates shall include 3-inch wide, yellow reflective micro-prismatic retroflective sheeting conforming to ASTM D4956 Type VIII or better on the outside edge of the backplates.

Bicycle signal heads and symbols shall meet FHWA's MUTCD - Interim Approval For Optional Use of a Bicycle Signal Face (IA-16) dated December 24, 2013.

Red, Yellow, and Green LED Vehicle Signal Module

All signal and pedestrian displays shall be equipped with LED signal modules. All red, amber, green, and pedestrian signal housings with the exception of optically programmed and fiber optic housings and shall conform to the following where applicable:

- ITE's Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Arrow Traffic Signal Supplement, Dated July 1, 2007
- ITE's Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Circular Signal Supplement, Dated June 27, 2005.
- ITE's Pedestrian and Countdown Signal Modules Compliant to PTCSI - Part 2 Light Emitting Diode (LED), Dated, February 2011
- On the MassDOT Traffic Signal Approved Equipment List

For an LED module to installed on this project, the LED module shall have approval from the MassDOT Traffic Control Products Approved Equipment Committee and be included on the Traffic Control Products List prior to the date of this proposal

To prevent the LED module warranty from being voided, the connecting leads on the module shall not be cut. The original LED module leads shall be connected to the signal head terminal block as continuous wire without splices.

The LED signal module will be replaced or repaired by the manufacturer if it exhibits one of the following:

- A failure due to workmanship or material defects within the first 60 months of field operation.
- A greater than 40 percent light output degradation or a fall below the minimum intensity levels (as defined by the latest ITE performance specifications) within the first 36 months of field operation

ITEMS 816.01 thru 816.07 (Continued)

Pedestrian Heads with Countdown Timers

All pedestrian heads shall be 16-inch, single units, with countdown timers. Pedestrian head indication shall be illuminated L.E.D. type displaying graphical symbols of a walking person and/or upraised hand. The countdown module shall display the number of seconds beginning at the start of the flashing "DON'T "WALK" interval, continue counting down through the flashing "DON'T WALK" interval, and blank out during the steady "DON'T WALK" interval. The countdown module shall be automatically set by the intersection controller based upon the "WALK" and "DON'T WALK" signal intervals only. The countdown module shall continuously monitor the intersection controller for any changes to the pedestrian phase timing and reprogram itself automatically. All LED indications on the pedestrian signal shall have an automatic dimming circuit for night illumination to reduce long-term degradation to the LEDs.

Accessible Pedestrian Signal Pushbuttons

The Accessible Pedestrian Signal (APS) pushbuttons shall provide information in non-visual formats (such as audible tones, speech messages, and/or vibrating surfaces). The APS pushbuttons and shall be compliant with the 2009 MUTCD. At a minimum the APS pushbuttons shall be provide with the following features:

- Pushbutton locator tone
- A visible and audible indicator that the button press has occurred
- A vibro-tactile arrow
- A speech walk message for the "WALKING PERSON" indication

The APS pushbuttons shall provide visually disabled pedestrians with a locator tone that will allow them to find the pushbutton to activate the walk signal. Once the pushbutton call has been placed, the signal will provide both an audible and tactile response during the related "WALK" portion of the cycle. A sunlight visible LED latches "ON" to confirm the button has been pushed.

The audible response shall be a percussion tone, indicating when the phase is started.

Housing and Pushbutton Unit – Shall meet the following minimum requirements:

- Constructed of cast aluminum with a powder coated finish.
- Highly vandal resistant and pressure activated with essentially no moving parts.
- Operating temperature range -34 degrees Celsius to 65 degrees Celsius.
- Operating voltage range 12 to 36 VDC.
- Button cap must be made of solid 316 stainless steel.
- Pushbutton must activate with 5 lbs of force or less.
- Unit must have an LED display to give indication that of pushbutton being pushed.
- Pushbutton must fully operate immediately after being completely immersed in water for 5 minutes (electrical terminals isolated from water).
- Pushbutton must not allow ice to form such that it would impede function of pushbutton or pushbutton cap.
- All switch electronics must be sealed within the housing.
- All sounds shall emanate from the back of the of the APS pushbutton unit via a weatherproof speaker that is protected by a vandal resistant screen.

ITEMS 816.01 thru 816.07 (Continued)

Tactile Arrows and Locator Tones – Shall meet the following minimum requirements:

- APS pushbuttons shall incorporate a locator tone at the pushbutton the locator tone, measured at 3 feet from the APS pushbutton, shall be 2dB minimum and 5dB maximum above ambient noise level in standard operation and shall be responsive to ambient noise level changes. Tones shall consist of multiple frequencies with a dominant component of 880Hz. The duration of the locator tone shall be 0.15s and shall repeat at intervals of 0.15s.

- APS pushbuttons shall be a minimum of 2 inches across in diameter and shall contract visually with their housing and mounting.

- APS pushbuttons shall include a vibro-tactile arrow aligned parallel to the crosswalk direction. The arrow shall be raised 0.03 inches minimum and shall be 1.5 inches minimum in length. The arrow head shall be open at 45 degrees to the shaft and shall be 33 percent of the length of the shaft. Stroke width shall be 10 percent minimum and 15 percent maximum of arrow length. The arrow shall contrast with the background.

- The arrow shall vibrate during the "WALK" portion of the cycle.

Speech Walk Message – The speech walk message shall be audible from the beginning of the associated crosswalk. The speech walk message and associated APS pushbuttons shall be as follows:

ITEM NO.	PEDESTRIAN PUSHBUTTONS	SPEECH WALK MESSAGE
816.01	All	Retain walk messages as currently programmed
816.02	P1-P2	Walk sign is on to cross Wheatland Street
	P3-P4	Walk sign is on to cross Auxiliary Connector
	P5-P8	Walk sign is on to cross Mystic Avenue
816.03	P1-P2, P11-P12, P15-P16, P17-P18, P19-P20, P21-P22, P27-P28	Walk sign is on to Mystic Avenue
	P3-P4, P5-P6, P7-P8, P9-P10, P13-P14	Walk sign is on to Fellsway
	P23-P34, P25-P26	Walk sign is on to McGrath Highway
816.04	P1-P2	Walk sign is on to cross Blakely Avenue
	P3-P6	Walk sign is on to cross McGrath Highway
816.05	All	Retain walk messages as currently programmed
816.06	All	Retain walk messages as currently programmed
817.07	All	Retain walk messages as currently programmed

Mounting Requirements - A maximum mounting height of 42 inches above the finish sidewalk grade shall be used for APS pedestrian pushbuttons.

ITEMS 816.01 thru 816.07 (Continued)

The Contractor is hereby notified that they are ultimately responsible for constructing all pedestrian push button elements (clear ground space, forward and side arm reaches) in strict compliance with the current AAB rules, regulations and standards. The Contractor shall use extension brackets to mount pedestrian pushbuttons to obtain the minimum forward reach or side reach, if approved or directed by MassDOT.

All construction elements in this project associated with pedestrian push buttons are controlled by 521CMR – Rules and Regulations of the Architectural Access Board. Pushbutton Frame Extenders shall be used if approved or directed by the Engineer.

The Contractor shall establish clear ground space at all pedestrian push button locations and shall set arm reach lengths according to the AAB rules (or to the details shown on the plans).

The project has been designed to conform to all AAB rules, and the Engineer is not aware of any required variances for the work presented on the design plans. The Contractor shall notify the Engineer of any project element related to the pedestrian push buttons that will not comply with 521 CMR prior to constructing said pedestrian push button elements.

Installation - The APS pushbuttons shall be installed by Contractor and as recommended by the manufacturer and documented in installation materials provided by the manufacturer. The Contractor shall be responsible for the proper programming of the APS pushbuttons, orientation of the pushbuttons, and all other work necessary to provide a complete and operational APS pushbutton system. The Contractor may be required to adjust volume levels as directed by the Engineer. When the setup is complete and the APS pushbuttons are ready for operation, the values of all parameters that were set during the process shall be delivered to the Engineer in printed and computer-readable form.

Warranty - Each APS pushbutton shall be warranted free from defects in material and workmanship for a period of at least 2 years from the date of installation by the Contractor and acceptance from the owner.

During the warranty period, technical support shall be available from the supplier to the owner via telephone within 4 hours of the time a call is made by a user, and this support shall be available from factory-certified personnel without charge.

Posts and Bases

Signal posts and bases shall be aluminum shafts with cast aluminum transformer bases.

Signal base foundations shall not obstruct a sidewalk or crosswalk so that passage by physically challenged persons is impaired.

ITEMS 816.01 thru 816.07 (Continued)

Mast Arm Sign Support Assembly

Sign brackets for mast arms shall be used in all locations where a sign is to be mounted to the mast arms. Mast arm sign brackets shall consist of a mast arm clamp assembly cast from 356-T6 aluminum alloy or equivalent, vertical support tube extruded from 6063 aluminum or equivalent, stainless-steel bands, clamp hardware, and all miscellaneous materials necessary to fix mount the signs to the mast arms.

Signs shall be bolted through the sign face.

Vertical support tubes shall be of sufficient length to allow mounting of the signs to within 3 inches of the top and bottom of the signs.

Any sign bracket that does not meet MassDOT approval will not be accepted. No separate payment will be made to correct the sign bracket.

Software

All ATC controller, cabinet monitor unit, vehicle detection, and license software shall be supplied with the latest available revision. Any software upgrades released by the manufacturer shall be supplied at no charge to the Owner for a period of five years after acceptance of the traffic signal installations.

Data Base Programming

Each programmable local hardware component (i.e., controllers, cabinet monitor units, vehicle detection, preemption units, communications devices) shall be initially programmed by the Contractor based on information contained on the plans. Electronic copies and three sets of hard copy programming per device shall be supplied by the Contractor.

Manuals and Keys

The Contractor shall supply two (2) copies of operating and maintenance manuals (i.e., controller, malfunction management unit, preemption unit) and two (2) sets of cabinet keys to MassDOT.

Ownership and Maintenance

Upon acceptance of the traffic signal system by MassDOT, the Contractor shall turn over all guarantees and warranties to MassDOT. In turn, MassDOT shall assume ownership and maintenance of the signal systems.

ITEMS 816.01 thru 816.07 (Continued)

BASIS OF PAYMENT

The work under Items 816.01 through 816.07 will be paid for at their respective Contract LUMP SUM prices, which prices shall be full compensation for all labor, material, equipment and incidental costs required to complete the work.

No separate payment will be made for maintenance of existing installations, and the removal and stacking of existing traffic signal equipment, but all costs in connection therewith shall be included in the LUMP SUM prices bid for Items 816.01 through 816.07.

No separate payment will be made for adjusting or readjusting of proposed vehicle detection zones, but all costs in connection therewith shall be included in the LUMP SUM prices bid for Items 816.01 through 816.07.

Conduit will be paid for separately under Item 804.3, 3 Inch Electrical Conduit Type NM Plastic (UL).

Pull boxes will be paid for separately under Item 811.31, Pull Box 12 x 12 Inches – SD2.031.

Handholes will be paid for separately under Item 811.22, Electric Handhole – SD2.022.

ITEM 823.70 HIGHWAY LIGHT POLE AND LUMINAIRE REMOVED AND RESET EACH

Work under this Item shall conform to the relevant provisions of Subsection 820 of the Standard Specifications and the following:

Work under this Item is for MassDOT owned light poles that are fed from a MassDOT Highway Load Center.

No direct communication with Eversource is expected under the work for this Item.

The Contractor shall request a streetlight lock out/tag out from MassDOT District 4 Traffic Section at the Highway Lighting Load Center.

No work may start without approval and all wire, cables, grounding, for one pole at a time.

Wiring will have to be replaced back to splices and no new splices will be allowed without permission.

All work under shall be done under master electrician, certified under Massachusetts.

The Contractor shall also provide the anchor bolt design and the anchor blots for the foundation.

The work also includes the design of the bolt circle and anchor bolts and providing the bolt circle and anchor bolts to the foundation manufacturer.

METHOD OF MEASUREMENT

Item 823.70 will be measured for payment per EACH light pole and luminaire remove and reset, complete.

BASIS OF PAYMENT

Item 823.70 will be paid at the contract unit price per EACH, which price shall be full compensation for all labor, material, equipment, and incidental costs required to complete the work.

Incidental to this Item is temporary lighting for each light out of service per day.

Conduit will be paid for separately under Item 804.2, 2 Inch Electrical Conduit Type NM Plastic (UL).

Pull boxes will be paid for separately under Item 811.30, Pull Box 8 x 23 Inches – SD2.030.

Foundation will be paid for separately under Item 812.09, Light Standard Foundation Precast.

Test pits will be paid for separately under Item 141.1, Test Pits for Exploration.

ITEM 823.701 HIGHWAY LIGHT POLE AND LUMINAIRE REMOVED AND RESET (UN-METERED) EACH

ITEM 823.702 UNDERGROUND DISCONNECT AND RECONNECT EACH

Work under these Items shall conform to the relevant provisions of Subsection 820 of the Standard Specifications and the following:

Work under these Items is for the un-metered street lighting system associated with MassDOT Roadway (formerly DCR roadway) and Somerville (Foss) Park.

The State/Municipality Agreement with Eversource is that Eversource maintains the light pole, lumen, and all wires, and the State/Municipality maintains the conduit, electrical hand holes (EHHs), and light pole foundations and only some electrical manholes (EMH). This is a jointly owned system and Eversource does not remove and reset these light poles by force account. A contract allowance has been established by MassDOT and the Contractor shall be reimbursed based only on the quote provided by Eversource.

The work under these Items shall include obtaining a work order number and price quote for removing and resetting of un-metered street light poles. The Contractor shall act on behalf of the MassDOT billing account to call in work order number request for each light pole relocation, each disconnect/reconnect, and a price quote for Eversource to do this work, for each pole or conduit relocation.

The Contractor shall provide temporary traffic control at the work area, including police details, to support Eversource to enter the electrical manhole (EMH).

The Contractor shall submit the paid invoice for reimbursement for the physical work done by Eversource and that bill will be paid by MassDOT through a Contract Allowance.

METHOD OF MEASUREMENT

Items 823.701 & 823.702 will be measured for payment per EACH Item completed and accepted by the Engineer.

BASIS OF PAYMENT

Items 823.701 & 823.702 will be paid at the contract unit price per EACH complete, which price shall be considered full compensation for all materials, labor, equipment and incidentals required to complete the work.

Payment for these Items includes all coordination with Eversource. Payment for other work necessary under these Items, such as test pits, electrical hand holes (EHHs), conduit, all backfill, and restoration of surfaces, police details and traffic control shall be measured for payment under other Contract Bid Items.

Payment for the removal and resetting of un-metered light poles includes providing a clean hole for the proposed light pole at a location approved by MassDOT, coordinating with Eversource to have them disconnect the light pole power, coordinating with Eversource to have them remove and reset that pole in that clean hole, installation of electrical hand hole (EHH) and conduit (with pull ropes), and a new connection into the electrical manhole (EMH) (with approved Eversource Contractor if necessary), all backfill, and coordination to support Eversource to rewire the relocated the light pole.

ITEMS 823.701 thru 823.702 (Continued)

Payment for disconnect /reconnect shall also include installation of new wiring and breaking into electrical manhole (EMH). No separate payment shall be made for new wiring or breaking into the electric manhole.

Reimbursement for only the written paid invoices from Eversource for the work done by their forces and materials charges under the work order number shall be reimbursed under the Contract Allowance. All other work to complete the pole relocation/rewire, not measured for payment under other contract Items shall be incidental to this Item. Note any conduit required to break into Eversource electrical manholes (EMHs) will require a Eversource approved Contractor.

ITEM 828.2 GROUND MOUNTED SIGN (GF-1) REMOVED AND RESET EACH

Work under this Item shall conform to the relevant provisions of Subsection 828 of the Standard Specifications and the following:

The Contractor shall carefully remove and reset the GF-1 sign (located at STA 105+00 +/-RT, Fellsway), attachment hardware and sign supports on new ground-mounted foundations as shown on the drawings and as directed by the Engineer.

Signs, attachment hardware, and sign supports shall be satisfactorily stored and protected until reset in the proposed work.

Signs, attachment hardware, and sign supports determined to be unsuitable for re-use by the Engineer shall be replaced with new materials at no additional cost to the Owner.

Signs, attachment hardware, and sign supports lost, damaged or otherwise made unsuitable for reuse while being removed, transported, stored, or reset shall be replaced with new materials at no additional cost to the Owner. New attachment hardware shall be furnished and installed as necessary to replace any missing or unusable existing hardware.

Support installations shall conform to MassDOT Standard Drawings for Signs and Supports and applicable AASHTO standards or as directed by the Engineer.

METHOD OF MEASUREMENT

Item 828.2 will be measured for payment per EACH ground-mounted sign removed and reset complete in place.

BASIS OF PAYMENT

Item 828.2 will be paid at the contract unit price per EACH, which price shall include all labor, material, equipment and incidental costs required to complete the work.

Foundation removal, backfill or restoration of the existing surface will be incidental to this Item.

ITEM 829.07 ROADSIDE GUIDE SIGN (MA-D1-7) – ALUMINUM PANEL (TYPE B) SQUARE FOOT

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 aluminum Roadside Guide Signs as per the Plans and specifications.

Legend, border and background of signs furnished under this Item shall be fabricated from Microprismatic reflective sheeting conforming to ASTM D4956 Type VIII or better.

These signs are as follows:

Type B Panels (extruded Aluminum ASTM B221, Alloy 6063-T6, 1/8 inch thick)

- MA-D1-7a
- MA-D1-7b

METHOD OF MEASUREMENT

Item 829.07 will be measured for payment per SQUARE FOOT of signage installed in place.

BASIS OF PAYMENT

Item 829.07 will be paid at the contract unit price per SQUARE FOOT of signs installed, which price shall constitute full payment for all labor, material, equipment and incidental costs required to complete the work.

ITEM 844.201 SUPPORTS FOR GUIDE SIGN (MA-D1-7A) STEEL EACH
ITEM 844.202 SUPPORTS FOR GUIDE SIGN (MA-D1-7B) STEEL EACH

The work under these Items shall conform to the relevant provisions of Subsection 840 of the Standard Specifications and the following:

The work under this Item shall consist of fabricating and installing twin dual steel beams as noted below, with breakaway support posts in 4000 psi concrete foundations for extruded (Type B) aluminum sign panels that are installed as shown on the plans or as directed by the Engineer.

MA-D1-7a – W6x12

MA-D1-7b - S5x10

The post sizes shown herein shall be verified by the Contractor and approved by the Engineer prior to fabrication and installation of posts and foundations.

All new supports provided under these Items shall be designed to sustain a minimum wind speed of 90 mph. Base plate bolts shall be torqued per current MassDOT and AASHTO standards.

The Contractor shall provide all excavations, backfilling, compaction, foundations, materials, labor, equipment tools, appurtenances, and incidentals necessary to satisfactorily complete these Items of work, complete, in place and accepted.

In advance of the sign support installations, the Contractor shall mark, on site, the sign support locations with any changes required by field conditions such as utilities. The sign support layouts shall be inspected and approved by the Engineer before they are installed.

METHOD OF MEASUREMENT

Items 844.201 and 824.202 will be measured for payment per EACH guide sign support installed complete in place.

BASIS OF PAYMENT

Items 844.201 and 824.202 will be paid at their respective contract unit prices per EACH, which prices shall constitute full compensation for all labor, materials, equipment, and incidental costs required to complete the work.

Guide signs will be paid for separately under Item 829.07 Roadside Guide Sign (MA-D1-7) – Aluminum Panel (Type B).

ITEM 852.11 TEMPORARY PEDESTRIAN BARRICADE FOOT
ITEM 852.12 TEMPORARY PEDESTRIAN CURB RAMP EACH

DESCRIPTION

Work under these Items consist of furnishing, deploying, maintaining in proper operating conditions, and removing temporary pedestrian barricades and temporary pedestrian ramps as part of a Temporary Pedestrian Access Route (TPAR) in order to guide pedestrians around a fully-or partially closed sidewalk. These devices are intended to prevent pedestrians from entering the work area and to prevent pedestrians from inadvertently entering the vehicle travel lane by providing visual and physical separation between each space.

MATERIALS

The Temporary Pedestrian Barricade shall have a continuous bottom rail or edge no more than two (2) inches above the ground and eight (8) inches in height (minimum) to accommodate cane users, have a smooth and continuous hand railing along the top edge no less than 32 inches above the ground and not obstruct or project into the pedestrian path of travel. Barricade walls shall be nearly vertical and generally within the same plane.

If exposed to traffic, Temporary Pedestrian Barricades shall be crashworthy.

The Temporary Pedestrian Curb Ramp shall provide a 48-inch minimum width, with a firm, stable, and non-slip surface. Protective edging with a two (2) inch minimum height shall be installed when the curb ramp or landing platform has a vertical drop of six (6) inches or greater.

The Temporary Pedestrian Curb Ramp walkway and landing area surface shall be of a solid, continuous, contrasting color abutting up to the existing sidewalk.

If a Temporary Pedestrian Curb Ramp leads to a crosswalk, a detectable warning pad must be used at the base of the ramp; if it leads to a protected path that does not conflict with vehicular traffic then a detectable pad shall not be used.

CONSTRUCTION METHODS

The Temporary Pedestrian Barricade shall be placed in an area that will provide pedestrians with a TPAR on a smooth, continuous hard surface for its entirety. The geometry and alignment of the facility shall meet the applicable requirements of the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities" and the Massachusetts Architectural Access Board.

The recommended width of the TPAR is 60 inches, but if constraints exist a minimum clear width of 48 inches shall be provided along its entirety. If a 60-inch width cannot be accommodated in full, a 60 inch by 60 inch passing space shall be provided every 200 feet or less along the TPAR.

ITEMS 852.11 & 852.12 (Continued)

Turning areas shall be 60 inches by 60 inches minimum.

Lateral joints between any surfaces shall not exceed 0.5 inches. Lateral edges may be vertical up to 0.25 inches high and shall be beveled at 1V:2H between 0.25 inches and 0.5 inches.

The TPAR shall be kept clear of debris, snow, and ice and the Temporary Pedestrian Barricades and Temporary Pedestrian Curb Ramps shall not obstruct drainage.

Removal and/or resetting of Temporary Pedestrian Barricades and Temporary Pedestrian Curb Ramps shall be considered incidental.

COMPENSATION

Payment for Temporary Pedestrian Barricade 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, removing and resetting, removal, and maintaining in good working condition.

Payment for Temporary Pedestrian Curb Ramp 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, removing and resetting, removal, and maintaining in good working condition.

ITEM 853.8 TEMPORARY ILLUMINATION FOR WORK ZONE DAY

The work under this Item shall conform to the relevant provisions of Subsection 850 of the Standard Specifications and the following:

The use of temporary portable light towers shall be limited to balloon diffuser systems.

These portable light towers shall be used throughout the project area for temporary work zone lighting. The use of unshielded high wattage flood lights shall not be permitted.

The portable balloon light tower shall be used, relocated, and adjusted to meet the criteria in Section 850 of the Standard Specifications.

A detailed lighting plan with photometrics detailing the lighting levels to be provided. Said plan shall include types, locations and mounting heights and directionality of all lighting provided and utilized (any existing). Plan shall be designed by a registered professional Engineer registered in Massachusetts and submitted to the Engineer for approval prior to any operations within the right of way.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 853.8 will be measured and paid for at the contract unit price per Day. This cost shall include all labor, materials, equipment, tools, and all incidentals required for the design and installation of work zone lighting equipment. This shall include, but not limited to, lighting plan preparation, wiring connections, equipment relocations and include all material and labor incidental to meet a complete and functional and operational system. The price of this Item shall include any possible fabrication, modification and installation of luminaires or diffusers.

The per DAY price shall be full compensation for all “Temporary Illumination of Work Zone” regardless of the number of concurrent work areas, amount of equipment concurrently in use, or the durations of or changes of the work shifts per day.

Furnishing, Installing, resetting, modifying and removing equipment for work zone illumination shall be incidental to Item 853.8.

ITEM 859.1 REFLECTORIZED DRUMS WITH SEQUENTIAL FLASHING WARNING LIGHTS DAY

The work under this Item shall conform the relevant provisions of Subsection 850 of the Standard Specifications and the following:

The work under this Item consists of furnishing, installing, maintaining 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 retro reflectivity.

The Contractor shall use one of the following sequential flashing warning light systems unless otherwise approved by the Engineer:

1. Empco-Lite LWCSD.
2. pi-Lit® Sequential Barricade-Style Lamp; or
3. Unipart Dorman SynchroGUIDE.

Sequential flashing warning lights shall be secured to reflectorized drums per the light manufacturer's specifications.

Construction Methods

The first ten (10) drums in any merging or shifting taper as designated in the Temporary Traffic Control Plan shall be equipped with sequential flashing warning lights. These lights shall be operating, at a minimum, between dusk and dawn when the taper is deployed.

The successive flashing of the sequential warning lights shall occur from the upstream end of the merging or shifting taper to the downstream end of the taper in order to identify the desired vehicle path. Each warning light in the sequence shall be flashed at a rate of not less than 55, nor more than 75 times per minute.

Warning lights shall be powered off when drums are not deployed in a taper.

METHOD OF MEASUREMENT

A group of ten (10) reflectorized drums with sequential flashing warning lights is considered one (1) unit and will be measured by the DAY. Each period of up to 24 hours during which this unit is in use will be measured as one DAY regardless of the number of times that the drums are positioned, repositioned, removed, or returned to service.

BASIS OF PAYMENT

Reflectorized Drums with Sequential Flashing Warning Lights will be paid for at the Contract unit price per DAY, which shall include full compensation for furnishing, positioning, repositioning, and removing the group of ten (10) drums as directed by the Engineer.

ITEM 864.031 PAVEMENT LEGEND REFL. EACH
WHITE THERMOPLASTIC (PREFORMED) – BIKE LANE RIDER

ITEM 864.032 PAVEMENT LEGEND REFL. EACH
WHITE THERMOPLASTIC (PREFORMED) – BIKE LANE ARROW

ITEM 864.036 PAVEMENT LEGEND REFL. EACH
WHITE THERMOPLASTIC (PREFORMED) – YIELD

ITEM 864.037 PAVEMENT LEGEND REFL. EACH
WHITE THERMOPLASTIC (PREFORMED) – SPEED HUMP

ITEM 864.110 PAVEMENT LEGEND REFL. EACH
WHITE THERMOPLASTIC (PREFORMED) – ROUTE SHIELD LEGEND

ITEM 864.111 PAVEMENT LEGEND REFL. EACH
WHITE THERMOPLASTIC (PREFORMED) – CARDINAL DIRECTION TEXT

ITEM 864.112 PAVEMENT LEGEND REFL. EACH
WHITE THERMOPLASTIC (PREFORMED) – BUS BIKE ONLY LEGENDS

ITEM 864.114 PAVEMENT LEGEND REFL. EACH
WHITE THERMOPLASTIC (PREFORMED) – PED LEGEND

ITEM 864.115 PAVEMENT LEGEND REFL. EACH
WHITE THERMOPLASTIC (PREFORMED) – XING LEGEND

ITEM 864.116 PAVEMENT LEGEND REFL. EACH
WHITE THERMOPLASTIC (PREFORMED) – BIKE BOX LEFT ARROW

ITEM 864.117 PAVEMENT LEGEND REFL. EACH
WHITE THERMOPLASTIC (PREFORMED) – BIKE BOX BICYCLE RIDER

The work under these Items shall conform to 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 relevant provisions of Subsection 860 of the Standard Specifications and the following:

The work shall consist of preparing pavement surfaces, along with furnishing and installing retroreflective preformed thermoplastic legends and symbols associated with bus/bicycle pavement markings and route shield legends at locations shown on the plans or as directed by the Engineer, and in accordance with this special provision.

The Contractor shall provide all labor and material (i.e. propane fueled torch with pressure regulator and hose, tape measure, utility knife, putty knife, hammer, chisel, chalk sticks and snap lines, sealer, adequate supply of propane) and all other equipment, materials and incidental costs necessary to complete the installation of the preformed thermoplastic markings.

Shop Drawings

Within 30 days following execution of the Contract, the Contractor shall submit shop drawings for the performed thermoplastic material, and the manufacturer's materials specifications to the Engineer in accordance with the relevant provisions of MassDOT Standards Section 815.20.

ITEMS 864.031 thru 864.117 (Continued)

No work shall be commenced by the Contractor until approval of the shop drawings and manufacturer's data has been received in writing from the Engineer. Approval of these drawings will be general in character and shall not relieve the Contractor from the responsibility of, or the necessity of, furnishing materials and workmanship conforming to the plans and specifications.

The Contractor shall deliver to the Engineer a certificate of compliance with the manufacturer for all materials purchased from the manufacturer.

Materials

All preformed markings shall be selected from the following suppliers or approved equivalent:

- PreMARK Bike Marking, with ViziGrip, as manufactured by Ennis Flint Trading, Inc., 115 Todd Court, Thomasville, NC 27360.
- Ozark Materials, LLC 591 Glendale Avenue, Greenville, AL 36037
- RAE Products & Chemical Corp. 11638 South Mayfield Avenue, Alsip, IL 60803

The preformed bike markings shall have a thickness of 90 mils.

The surface of the markings shall upon application provide a minimum skid resistance value of 45 BPN when tested according to ASTM: E 303.

Item	Legends & Symbols	Manufacturer's Item No.		
		PreMark	RAE Paint	Ozark
864.031 864.032	Bike Lane Rider Bike lane Straight Arrow	PM602006(L) 89330268HS	3573 3525	OZ-BP1013-090 OZ-BP1025-090
864.116 864.117	Bike Box - Left Turn Arrow - Bike Rider	PM6092756(L) 89230525(L)HS	3522 3574	OZ-BP1015-090 OZ-AR1026-90
864.036	Yield (24"X36")	8231002	3541	OZ-YH1003-090
864.037	Speed Hump	8230126HS	4278	OZ-YH1006-090
864.110	State Route Shield Legend (Route 38)	---	---	---
864.110	Interstate Route Shield Legend (I-93)(4' x 10')	8230100410IS-93	---	---
864.111	Interstate Cardinal Direction Text (SOUTH) (9'x 10')	PM602844BVG	---	---
864.111	Cardinal Direction Text (SOUTH) (9'x 10')	PM602844BKVG	---	---
864.112 864.112 864.112	Bus/Bike Lane - BUS (8') - BIKE (8') - ONLY (8')	8130002 (B,U,S) 8130002(B,I,K,E) 8130002(O,N,L,Y)	3939(B,U,S) 3939(B,I.K,E) 3939(O,N,L,Y)	OZ-WN08F (B.U,S)-090 OZ-WN08F (B.I,K,E)-090 OZ-WN08F(O,N,L,Y)-090
864.114 864.115	PED (8') X-ING (8')	8130114 8130107	3616 3627	OZ-LE1014-090 OZ-LE1028-090

ITEMS 864.031 thru 864.117 (Continued)

Application

In advance of the preformed marking installations, the Contractor shall mark, on site, the preformed markings with any changes required by field conditions such as manholes. The marking layouts shall be inspected and approved by the Engineer before the markings are installed.

The Contractor shall provide certification, to the Engineer, from the manufacturer documenting the Contractor's qualifications to install the preformed markings in a manner acceptable to the manufacturer and documented in installation materials provided by the manufacturer.

Prior to installation the pavement shall dry and free of dirt, debris, deicing agents, chemicals, and significant oily substances.

The Contractor shall be responsible for controlling and minimizing airborne dust and similar debris generated by surface preparation and cleanup to prevent a hazard to motor vehicle operation, pedestrians, or nuisance to adjacent property.

The preformed markings shall be subject to a 180-day observation period under normal traffic conditions. The observation period shall begin with the satisfactory completion and acceptance of the work by the Engineer and MassDOT.

The preformed markings shall show no signs of failure such as: blistering, excessive cracking, chipping, discoloration, poor adhesion to the pavement, loss of reflectivity or vehicle damage. MassDOT reserves the right to check the color and retroreflectivity any time prior to the end of the observation period.

The Contractor, at no additional cost to MassDOT, shall replace any preformed markings that do not perform satisfactorily under the 180-day observation period.

Warranty

The Manufacturer shall warrant the preformed markings against material defects for a period of one year from the date of the acceptance letter of the project by MassDOT.

METHOD OF MEASUREMENT

The work under Items 864.031, 864.032, 864.036, 864.037, 864.110, 864.111, 864.112, 864.114, 864.115, 864.116, and 864.117 will be measured for payment per EACH installed complete in place.

BASIS OF PAYMENT

Items 864.031, 864.032, 864.036, 864.037, 864.110, 864.111, 864.112, 864.114, 864.115, 864.116, and 864.117 will be paid at their respective Contract unit prices per EACH, which prices shall constitute full payment for all labor, material, equipment and incidental costs required to complete the work.

ITEM 864.41 GREEN COLORIZED PAVEMENT MARKINGS SQUARE FOOT
ITEM 864.51 RED COLORIZED PAVEMENT MARKINGS SQUARE FOOT

The work under these Items shall conform to the relevant provisions of Subsection 860 of the Standard Specifications and the following:

The Work consists of furnishing and installing Colorized Pavement Markings at the locations shown on the plans or as directed by the Engineer.

This work shall consist of furnishing and placing green colorized pavement markings for bicycle safety and red colorized pavement markings for bus lanes as identified in the Contract Drawings.

MATERIALS

Colorized Pavement Markings are composed of Epoxy, Methyl Methacrylate (MMA), or Preformed Thermoplastic Materials.

The initial daytime chromaticity coordinates for green colorized pavement shall fall within the area created by the following coordinates:

Initial Daytime Chromaticity Coordinates (Corner Points) for Green Colorized Pavement Markings				
	1	2	3	4
x	0.230	0.266	0.367	0.444
y	0.754	0.460	0.480	0.583

The initial daytime chromaticity coordinates for red colorized pavement shall fall within the area created by the following coordinates:

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.

ITEMS 864.41 and 864.51 (Continued)

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.

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.

The Contractor shall construct a control section with a minimum area of one square yard to represent the green and red colorized pavement markings. The color, the surface texture, materials and installation, shall be presented for acceptance and approval by the Engineer prior to installation. The control section may be constructed on the project and if accepted may remain as part of the completed work. MassDOT will perform a visual inspection for approval.

METHOD OF MEASUREMENT

The work under Items 864.41 and 864.51 will be measured for payment per SQUARE FOOT of markings installed complete in place.

BASIS OF PAYMENT

Items 864.41 and 864.51 will be paid at their respective contract unit prices per SQUARE FOOT, which prices shall constitute full payment for all labor, material, tools, equipment testing and all incidental costs required to complete the work.

ITEM 868.106	**6 INCH WET REFLECTIVE RECESSED WHITE LINE (THERMOPLASTIC)**	**FOOT**
ITEM 868.112	**12 INCH WET REFLECTIVE RECESSED WHITE LINE (THERMOPLASTIC)**	**FOOT**
ITEM 869.106	**6 INCH WET REFLECTIVE RECESSED YELLOW LINE (THERMOPLASTIC)**	**FOOT**
ITEM 869.112	**12 INCH WET REFLECTIVE RECESSED YELLOW LINE (THERMOPLASTIC)**	**FOOT**

The Work under these Items shall conform to the relevant provisions of Subsection 860 of the Standard Specifications and the following:

Work shall consist of grooving a slot in the pavement surface and the furnishing and installation of wet reflective thermoplastic pavement markings. All work incidental to these Items, the Contractor or pavement marking Material Supplier(s) shall measure the performance of the pavement markings upon installation, six months following installation, and one year following installation.

Item 868.106 shall be used for SWL, BWL, DWLEx, Bike lane crossing border.

Item 868.112 shall be used for DWL, SWCHL, Crosswalks, Stop lines.

Item 869.106 shall be used DBYL, SYL.

Item 869.112 shall be used SYCHL.

MATERIALS

Wet reflective thermoplastic pavement markings shall consist of a liquid binder, first drop beads or elements to provide dry and wet retoreflectivity, and second drop glass beads to improve the durability of the pavement marking, reduce track-free times, and provide supplementary dry retroreflectivity.

The Contractor shall use one of the following binders or approved equivalents:

1. Ennis-Flint Hydrocarbon Thermoplastic;
2. Integrated Traffic Systems iTherm® Hydrocarbon;
3. Ozark Materials Hydrocarbon Thermoplastic; or
4. SWARCO Hydrocarbon Thermoplastic.

The Contractor shall use one of the following first drop beads or elements, or approved equivalents:

1. 3M™ All Weather Series 90S Elements;
2. Ennis-Flint HP300 Glass Beads;
3. Potters VISIMAX® Glass Bead System; or
4. SWARCO MEGALUX-BEADS®.

ITEMS 868.106, 868.112, 869.106, & 869.112 (Continued)

Second drop beads shall be manufactured from glass of a composition that is highly resistant to traffic wear and to the effects of weathering. If coating is required to meet the performance requirements, the second drop beads shall be coated to ensure satisfactory embedment and adhesion. Second drop beads retained on a No. 40 U.S. Standard Mesh Sieve shall have a minimum crush strength of 30 lbs. when tested in accordance with ASTM D1213.

Second drop beads shall have a minimum refractive index of 1.51 when tested in accordance with AASHTO M247.

Second drop beads passing the No. 30 sieve shall have a minimum of 75 percent true spheres when tested in accordance with ASTM D1155. All second drop beads retained on the No. 20 and No. 30 sieves shall have a minimum of 80 percent true spheres as determined by ASTM D1155. Second drop beads shall meet the following gradation requirements when tested in accordance with ASTM D1214:

U.S. Standard Sieve No.	Percent Retained
20	3-10
30	15-35
50	45-75
70	0-10
Pan	0-5

CONSTRUCTION METHODS

Prior to the installation of the grooves and the wet reflective thermoplastic, a preplacement meeting shall be organized with the Contractor, the Engineer, and a representative from the manufacturers of the pavement marking materials.

Installation of Groove

Prior to cutting out the grooves for all recessed lines, the Contractor shall use a chalk line or other suitable method to layout the proposed pavement markings on the surface course so that the Engineer can inspect the locations. Once the Engineer has inspected and approved the proposed striping layout, the grooves for the proposed pavement markings may be cut. No pavement grooving shall be done without the prior approval of the Engineer.

Groove position shall be a minimum of 4 inches from the edge of the pavement marking to any longitudinal pavement joints. The groove shall not be installed on bridge joints, on drainage structures, or in other areas identified by the Engineer. **The groove shall not be installed continuously for intermittent pavement markings, but only where markings are to be applied.**

ITEMS 868.106, 868.112, 869.106, & 869.112 (Continued)

The use of gang stacked diamond cutting blades to grind a smooth square slot is required for producing all grooves. The spacers between blade cuts shall be such that there will be less than a 10 mil rise in the finished groove between the blades. The acceptability of the surface texture will be determined by the Engineer.

The diamond grinder shall have an articulating head so that the slots are installed correctly on grades and super elevated sections.

Grooves that are ground deeper or wider than the specified allowable limits shall be repaired per the direction of the Engineer at no additional cost. Grooves that are ground too shallow, too narrow, or with unacceptable rises between blade cuts shall be reground to the correct size, depth, and surface finish at no additional cost. Slots ground out of alignment shall be patched using an approved method and materials.

Grooves shall be 1 inch ± ¼ inch wider than the pavement marking material. Groove depth shall be 150 mils ±5 mils, unless otherwise approved by the Engineer. Depth shall be consistent across the full width of the groove. Depth plates shall be provided by the Contractor to the Engineer to assure that desired groove depth is achieved.

Grooves shall be clean, dry and free of laitance, oil, dirt, grease, paint or other foreign contaminants. Shrouds and a vacuum apparatus shall be included as part of the grinder to remove larger pieces of pavement that are ground out. If water is used to clean the groove or the grooving process takes place during rainfall, a minimum of 24 hours of dry time is required prior to the placement of pavement markings.

After the depth, width, length, and surface condition has been approved by the Engineer, an air lance shall be used to remove fine particles from the groove. Air compressors shall initially be blown out away from the application area to prevent compressor condensation build-up from entering the groove. The Contractor shall prevent traffic from traversing the grooves and re-clean grooves, as necessary, prior to application of pavement markings at no additional cost to MassDOT.

All grooves must be given final approval by the Engineer prior to the placement of pavement markings.

Installation of Wet Reflective Thermoplastic

Installation of wet reflective thermoplastic pavement markings shall conform to the Manufacturer's specifications and the following:

Application rate for binder and all beads and elements shall consider final pavement surface composition and smoothness in advance of application to ensure proper wet film thickness and embedment of all beads and elements. The Contractor shall provide the Engineer with documentation from the Manufacturer with all recommended application rates in advance of any pavement marking installation.

ITEMS 868.106, 868.112, 869.106, & 869.112 (Continued)

The minimum uniform wet thickness for the thermoplastic binder shall be 90 mils ± 5 mils. The line thickness shall be met across at least the middle ⅔ of the pavement marking width. Depth plates shall be provided by the Contractor to the Engineer to assure that desired thickness is achieved.

The finished white color shall be free from tint, with good opacity and visibility under both daylight and artificial light. The finished yellow color shall be defined by Federal Test Standard 595 - Color Chip Number 13538, using Federal Test Standard 141 (Method 4252). The finished lines shall be uniform in color and have clean, well-defined edges.

First and second drop beads and/or elements shall be applied in a manner that does not induce rolling or bouncing, to ensure that exposed portions of beads are free of binder material. Beads and elements should be embedded in the binder to a depth of approximately 50% of their diameter.

Drop rate for first drop bead or element shall be per the Manufacturer's specifications.
Drop rate for second drop glass bead shall be 6.4-10.2 lbs. per gallon.

Newly installed pavement markings shall be protected from tracking during the setting period per Subsection 860.63.

Once the installed pavement markings have been open for traffic for a minimum of 48 hours, the Design Builder shall perform retroreflectance readings per the measurement and sampling procedures contained in ASTM D7585 (Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments) using the Referee Evaluation Protocol found in section 6.4. The following tests shall be performed during the measurement and sampling process:

1. ASTM E1710 *(Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer)*; and
2. ASTM E2177 *(Standard Test Method for Measuring the Coefficient of Retroreflected Luminance (R_L) of Pavement Markings in a Standard Condition of Wetness).*

The average initial retroreflectance readings shall exceed the following minimum values:

	White Markings	Yellow Markings
ASTM E1710 (Dry)	475 mcd/lux/m^2	375 mcd/lux/m^2
ASTM E2177 (Wet Recovery)	375 mcd/lux/m^2	300 mcd/lux/m^2

Observation Angle = 1.05°, Entrance Angle = 88.8°

Pavement markings with measured average initial retroreflectance readings that do not meet the specified minimum values using the procedures outlined in subsection 6.4.5 of ASTM D7585 shall be removed by a method approved by the Engineer and reapplied at no additional cost to MassDOT.

ITEMS 868.106, 868.112, 869.106, & 869.112 (Continued)

Test Strip for Liquid Pavement Markings

Prior to the first application of liquid pavement markings, one test strip for each line color, width, and material type shall be constructed at a location designated by the Engineer. Each test strip shall consist of a minimum of 500 linear feet of liquid pavement marking. Pavement markings shall be surface applied; no groove is required for the test strip.

The test strip(s) shall demonstrate the capability of the proposed liquid pavement marking material, equipment, and installation procedures to comply with the specifications for uniform wet thickness, dry time, reflective element application and retention, marking width, and overall appearance (color uniformity and clean, well-defined edges).

A test strip shall be required for each applicator unit used. Additional test strips may be required when major equipment repairs or adjustments are made or if the application of the liquid pavement markings fail to comply with these specifications.

During the test strip application, the following Items shall be recorded, in the presence of the Engineer:

1. Liquid binder application rate;
2. Reflective element type(s) and drop rate.

Once the liquid pavement marking materials have cured, the Contractor shall perform retroreflectance readings per the measurement and sampling procedures contained in ASTM D7585 (Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments) using the Referee Evaluation Protocol found in section 6.4 shall be followed.

The following tests shall be performed during the measurement and sampling process:

1. ASTM E1710 (Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer); and
2. ASTM E2177 (Standard Test Method for Measuring the Coefficient of Retroreflected Luminance (RL) of Pavement Markings in a Standard Condition of Wetness).

Pavement Marking Asset Management

Upon completion of the pavement marking installation, the following data shall be tabulated by the Contractor:

1. Retroreflectance readings, including date(s), time(s), and location(s) where readings took place;
2. Liquid binder type(s) and application rate;
3. Reflective element type and drop rate;
4. Date of groove installation;
5. Lot, batch number, or any other material identifiers and manufacturing information;
6. Date and time of final liquid marking installation;

ITEMS 868.106, 868.112, 869.106, & 869.112 (Continued)

7. Highway location (including direction) of installation;
8. Air and pavement temperature during application;
9. Measured material application thickness, depth of groove; and
10. Any other pertinent information that may assist MassDOT with Quality Control.

Results for all readings shall be provided within 10 business days of testing to the Engineer, with a second copy sent to:

State Traffic Engineer
Attention: Pavement Marking Installation & Testing
10 Park Plaza, Room 7210
Boston, MA 02116

The cost to prepare and submit this data shall be considered incidental to the cost of the Items.

METHOD OF MEASUREMENT

Items 868.106, 868.112, 869.106, and 869.112 will be measured for payment per FOOT, complete in place, as specified under Section 860.80.

BASIS OF PAYMENT

Items 868.106, 868.112, 869.106, and 869.112 will be paid at the respective contract unit price per FOOT. The contract prices shall include all material, labor, and equipment required or incidental to the satisfactory completion of the work.

ITEM 874.2 TRAFFIC SIGN REMOVED AND RESET EACH

The work under this Item shall conform to the relevant provisions of Subsection 828 of the Standard Specifications and the following:

The work under this Item shall include the dismantling, removal, transporting, storing, and resetting at new locations of all existing signs, attachment hardware and sign support posts not included under other sign Items as shown on the drawings and as requested by the Engineer .

Included under this Item are Warning-Regulatory and Route Marker signs, Guide sign D6-4, and miscellaneous directional signs.

Signs, attachment hardware and sign support posts shall be satisfactorily stored and protected until reset in the proposed work.

Signs, attachment hardware and sign support posts lost, damaged or otherwise made unsuitable for reuse while being removed, transported, stored or reset shall be replaced with new materials at no additional cost to MassDOT. New attachment hardware shall be furnished and installed as necessary to replace any missing or unusable existing hardware.

The Contractor shall backfill with compacted gravel all holes resulting from the removal of the existing signs and their foundations and restore the area to match existing conditions of adjacent areas.

METHOD OF MEASUREMENT

Item 874.2 will be measured for payment by EACH traffic sign that is removed and reset.

BASIS OF PAYMENT

Item 874.2 will be paid at the contract unit price per EACH, which price shall constitute full payment for all labor, materials, equipment, backfill, area restoration, and incidental costs required to complete the work.

ITEM 874.4 TRAFFIC SIGNS REMOVED AND STACKED EACH

The work under this Item shall conform to the relevant provisions of Subsection 828 of the Standard Specifications and the following:

The work shall include the careful removal of warning-regulatory/ route marker/ miscellaneous directional signs, attached hardware and supports from locations shown on the plans and as directed by the Engineer.

The Contractor shall coordinate the removal of signs and posts with the Engineer by notifying the Engineer prior to and at the completion of the above work. Existing signs shall remain in place until proposed signs are in place unless directed by the Engineer.

Contractor shall coordinate with MassDOT District 4 Traffic Maintenance to schedule drop-off time and location for all signs within MassDOT's right-of-way. For signs outside MassDOT's right-of-way the Contractor shall coordinate with the City of Somerville to schedule drop-off time and location.

METHOD OF MEASUREMENT

Item 874.4 will be measured for payment as units, per EACH removed and stacked complete in place.

BASIS OF PAYMENT

Item 874.4 will be paid at the contract unit price per EACH, which price shall constitute full payment for all labor, material, equipment and incidental costs required to complete the work.

***END OF DOCUMENT ***

ORDER NO _____

THE COMMONWEALTH OF MASSACHUSETTS MASSACHUSETTS DEPARTMENT OF TRANSPORTATION TEN PARK PLAZA - BOSTON, MA

—PRELIMINARY ESTIMATE OF QUANTITIES — DETAIL SHEET—

CITY	SOMERVILLE	YEAR:	2024
STA.:	100+50 TO 123+00 CONSTRUCTION BASELINE 300+00 TO 315+00 CONSTRUCTION BASELINE	ROAD:	FELLSWAY / McGRATH HWY (ROUTE 28) MYSTIC AVENUE (ROUTE 38)
		CLASS:	URBAN PRINCIPAL ARTERIAL
Type of Project:	SIGNAL AND INTERSECTION IMPROVEMENTS PROJECT	DATE:	JULY 19, 2024

Unclassified Excavation	3,600	Cu. Yards	Subbase Full Depth Pvm't	232	Cu. Yards
Class "A" Trench Excav	-	Cu. Yards	Gravel for Sidewalks/Mixing Zone	702	Cu. Yards
Class "B" Trench Excav	10	Cu. Yards	Gravel for Driveways	57	Cu. Yards
Channel Excav	-	Cu. Yards	Gravel for Pedestrian Curb Ramps	221	Cu. Yards
Ordinary Borrow	-	Cu. Yards	Gravel for Median/Buffers	198	Cu. Yards
Special Borrow	-	Cu. Yards	Gravel for Shared Use Path	524	Cu. Yards
			Gravel for Separated Bike Lane	212	Cu. Yards
			Embankment +15%	-	Cu. Yards

PROPOSED FULL DEPTH PAVEMENT **AREA = 155 SY**

SURFACE: 1.75" SUPERPAVE SURFACE COURSE 12.5 - POLYMER (SSC-12.5-P) OVER
2" SUPERPAVE SURFACE COURSE - 12.5 POLYMER (SSC - 12.5 - P) OVER

BASE: 4" SUPERPAVE BASE COURSE 37.5 (SBC-37.5) MATERIAL PLACED IN ONE COURSE OVER

SUBBASE: 4" DENSE GRADED CRUSHED STONE OVER
8" GRAVEL BORROW, TYPE b

PROPOSED FULL DEPTH PAVEMENT (LESS THAN 4.0 FEET WIDE) **AREA = 891 SY**

SURFACE: 1.75" SUPERPAVE SURFACE COURSE 12.5 – POLYMER (SSC-12.5-P) OVER
2" SUPERPAVE SURFACE COURSE - 12.5 POLYMER (SSC - 12.5 - P) OVER

BASE: 6" HIGH EARLY STRENGTH CEMENT CONCRETE FOR BASE COURSE OVER

SUBBASE: 8" GRAVEL BORROW, TYPE b

Plan No.'s	15-22	Estimated by	A. Loncarevic
Profile No.'s	N/A	Reviewed by	K. Langlois
Calculation Book No.'s	608562	Submitted by	T. McIntosh

PROPOSED PAVEMENT MILL & OVERLAY – TYPE 1 **AREA = 1.928 SY**

SURFACE: 1.75” SUPERPAVE SURFACE COURSE 12.5 POLYMER (SSC-12.5-P)

1.75” STANDARD MILL

PROPOSED PAVEMENT MILL & OVERLAY – TYPE 2 **AREA = 25.282 SY**

SURFACE: 1.75” SUPERPAVE SURFACE COURSE 12.5 POLYMER (SSC-12.5-P) OVER
2” SUPERPAVE INTERMEDIATE COURSE 12.5 POLYMER (SSC-12.5-P) OVER
VARIABLE DEPTH (1" MIN, 2" MAX) SUPERPAVE
LEVELING COURSE 9.5 (SLC-9.5) - LOCATION AS INDICATED BELOW

3.75” PAVEMENT MILL IN 2 PASSES

VARIABLE DEPTH (1" - 2") LEVELING COURSE
STA 413+50 TO STA 415+50

PROPOSED CEMENT CONCRETE SIDEWALK
SIDEWALK BUFFER / ROADWAY BUFFER / MEDIAN **AREA = 2076SY**

SURFACE: 4” CEMENT CONCRETE (AIR ENTRAINED 4000 PSI, 3/4", 610)

FOUNDATION: 8” GRAVEL BORROW, TYPE b

PROPOSED CEMENT CONCRETE DRIVEWAY **AREA = 255 SY**

SURFACE: 6” CEMENT CONCRETE (AIR ENTRAINED 4000 PSI, 3/4", 610)

FOUNDATION: 8” GRAVEL BORROW, TYPE b

PROPOSED CEMENT CONCRETE PEDESTRIAN CURB RAMPS **AREA = 1015 SY**

SURFACE: 4” CEMENT CONCRETE (AIR ENTRAINED 4000 PSI, 3/4", 610)

FOUNDATION: 8” GRAVEL BORROW, TYPE b

PROPOSED STAMPED CEMENT CONCRETE **AREA = 1142 SY**

SURFACE: 4” STAMPED COLORED CEMENT CONCRETE
(AIR ENTRAINED 4000 PSI, 3/4", 610)

FOUNDATION: 8” GRAVEL BORROW, TYPE b

PROPOSED HOT MIX ASPHALT SEPARATED BIKE LANE (SBL) **AREA = 955 SY**

SURFACE: 1.75” SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER
2.25” SUPERPAVE INTERMEDIATE COURSE 12.0 (SIC-2.0) OVER

FOUNDATION: 8” GRAVEL BORROW, TYPE b

PROPOSED HOT MIX ASPHALT SHARED USE PATH (SUP) **AREA = 2,356 SY**

SURFACE: 1.75” SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER
2.25” SUPERPAVE INTERMEDIATE COURSE 12.0 (SIC-12.0) OVER

FOUNDATION: 8” GRAVEL BORROW, TYPE b

PROPOSED HOT MIX ASPHALT SIDEWALK AND DRIVEWAY **AREA = 928 SY**

SURFACE: 1.25” SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER
1.75” SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.0) OVER

FOUNDATION: 8” GRAVEL BORROW, TYPE b

ITEM 102.2 **TREE TRIMMING**

Trimming of low hanging tree limbs in areas adjacent to the proposed shared use path, sidewalk, or roadway, which may conflict with construction operations or the safe passage of vehicles, bicyclists or pedestrians or sight distance.

And as directed.

ITEM 102.511 **TREE PROTECTION – ARMORING AND PRUNING**

Fellsway to McGrath

Sta. 99+81, 45.6' RT	Sta. 99+94, 49.4' RT	Sta. 101+61, 62.6' RT
Sta. 102+07, 63.0' RT	Sta. 103+14, 63.5' RT	Sta. 103+45, 63.3' RT
Sta. 103+75, 63.7' RT	Sta. 104+34, 62.0' RT	

Mystic Ave (Rte-38)

Sta. 305+92, 18.3' LT	Sta. 307+54, 20.5'LT	Sta. 307+92, 16.8' LT
Sta. 308+15, 43.9' RT	Sta. 308+62, 14.9' LT	Sta. 313+61, 27.8' RT
Sta. 313+91, 28.0' RT	Sta. 314+19, 27.5' RT	Sta. 314+51, 27.7' RT

Auxiliary Connector E

Sta. 503+46, 42.3' RT	Sta. 503+64, 62.2' RT

And as directed.

ITEM 102.522 **TREE AND PLANT PROTECTION FENCE - CHAIN LINK**

At various locations where existing trees or other areas of quality. Vegetation is to remain, as directed by the Engineer and the MassDOT landscape architect, prior to any construction activities and at the locations below:

Fellsway to McGrath
Sta. 111+49 to Sta. 113+00, LT

And as directed.

ITEM 103. **TREE REMOVED – DIAMETER UNDER 24 INCHES**

Fellsway to McGrath
Sta. 100+75, 30.3' RT
And as directed.

ITEM 120.1 **UNCLASSIFIED EXCAVATION**

For roadway reconstruction, sidewalk and driveway construction, removal of trees less than 9 inches in diameter, as may be required for staging and as directed.

ITEM 141. **CLASS A TRENCH EXCAVATION**

For Quarry face block wall.
Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 401+29.6, 29.3' LT to Sta. 402+05.5, 36.9' LT

ITEM 141.1 **TEST PIT FOR EXPLORATION**

At various locations to determine the location of underground utilities that may be in conflict with the proposed work as directed.

ITEM 142. **CLASS B TRENCH EXCAVATION**

At various locations during over depth excavation of drainage, water and sewer pipes and as directed for bedding, except Class B Rock Excavation.

ITEM 145. **DRAINAGE STRUCTURE ABANDONED**

At locations detailed below, and as directed.

Mystic Ave (Rte-38)
Sta. 305+41, 20.8' RT
Sta. 306+62, 20.7' RT
Sta. 308+38, 33.2' RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 419+64, 28.6' LT
Sta. 422+08, 28.7' LT

ITEM 146. **DRAINAGE STRUCTURE REMOVED**

At locations detailed below, and as directed.

Fellsway - McGrath (Rte-28)
Sta. 118+78, 14.5' LT

Fellsway (Rte-28) to I-93 SB On-Ramp
Sta. 205+97, 15.9’ LT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 312+93, 10.1’ LT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 418+86, 28.1‘ LT

ITEM 151.01 **GRAVEL BORROW – TYPE C**

For use in trenches as shown on the Plans and as directed.

ITEM 156. **CRUSHED STONE**

To be used during wet conditions as pipe bedding and as directed.

ITEM 220. **DRAINAGE STRUCTURE ADJUSTED**

To be used for new and existing drainage, water and other public structures for adjusting once to final grade, and as directed, except for Sanitary Structure Adjusted.

ITEM 220.10 **MWRA WATER STRUCTURE ADJUSTED**

At locations detailed below, and as directed.

Fellsway - McGrath (Rte-28)
Sta. 105+64, 15.0' RT
Sta. 105+66, 22.0' RT
Sta. 106+27, 39.5' RT
Sta. 106+33, 44.1' RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 419+25, 38.6' LT

Auxiliary Connector
Sta. 502+58, 16.8' RT

ITEM 220.2 **DRAINAGE STRUCTURE REBUILT**

At locations detailed below, and as directed.

Mystic Ave (Rte-38)
Sta. 307+75, 34.6' RT
Sta. 304+77, 54.0' RT
Sta. 305+01, 35.0' RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 415+80, 23.0' LT
Sta. 416+29, 27.9' LT
Sta. 418+87, 23.4' RT
Sta. 417+65, 27.8‘ LT

ITEM 220.3 **DRAINAGE STRUCTURE CHANGE IN TYPE**

At locations detailed below, and as directed.

Fellsway - McGrath (Rte-28)
Sta. 112+24, 28.1' RT
Sta. 116+79, 28.1' RT
Sta. 118+77, 28.5' RT
Sta. 120+79, 26.2' RT

Mystic Ave (Rte-38)
Sta. 311+71, 6.5' LT
Sta. 312+10, 19.2' RT
Sta. 312+89, 16.4' RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 411+87, 11.6' RT
Sta. 420+36, 23.2' RT

ITEM 220.5 **DRAINAGE STRUCTURE REMODELED**

At locations detailed below, and as directed. To be used for existing drainage that need to be adjusted over 6" to final grade.

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 413+62, 52.4' LT

ITEM 221. **FRAME AND COVER**

To be used for new manholes.

ITEM 222.1 **FRAME AND GRATE – MASSDOT CASCADE TYPE**

To be used for catch basins and gutter inlets.

ITEM 222.31 **GALVANIZED STEEL CURB COVER AND FRAME**

To be used in the following locations, or where existing utility frames and covers conflict with the proposed curb line.

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 400+00, 43.1' LT
Sta. 417+02, 24.1' LT

And as directed.

ITEM 223.2 **FRAME AND GRATE (OR COVER) REMOVED AND DISCARDED**

Frames and grates (or covers) of existing drainage and sewer structures to be abandoned or removed that are unacceptable to be re-used as directed.

ITEM 224.10 **10 INCH HOOD**

To be used in all catch basins with 10" diameter outlet pipes and as directed.

ITEM 224.12 **12 INCH HOOD**

To be used in all catch basins with 12" diameter outlet pipes and as directed.

ITEM 227.3 **REMOVAL OF DRAINAGE STRUCTURE SEDIMENT**

For removal and disposal of sediments in existing drainage structures being removed, abandoned, adjusted, rebuilt, remodeled, changed in type and as directed.

ITEM 227.31 **REMOVAL OF DRAINAGE PIPE SEDIMENT**

For removal and disposal of sediments for existing drainage pipes being removed, replaced, or are directly connected to new structures or change in types, and as directed.

ITEM 227.4 **MASONRY PLUG**

To be used for pipe ends in abandoned pipes not connected to existing structures to be removed or abandoned. Pipe ends in abandoned and removed structures are considered incidental to the respective work.

ITEM 303.06 **6 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT)**

To be used for hydrant installations and relocations.

Fellsway to McGrath (at Bailey Rd)
Sta. 104+45, RT

Mystic Ave. (Rte-38) SB
Sta. 313+52, RT

ITEM 309. **DUCTILE IRON FITTINGS FOR WATER PIPE**

To be used as directed if the existing water line is found to be in conflict with the proposed work.

ITEM 357.06 **6 INCH GATE BOX**

For use to replace existing 6” gate boxes that may be broken or damaged during construction.

ITEM 357.08 **8 INCH GATE BOX**

For use to replace existing 8” gate boxes that may be broken or damaged during construction.

ITEM 357.10 **10 INCH GATE BOX**

For use to replace existing 10" gate boxes that may be broken or damaged during construction.

ITEM 357.12 **12 INCH GATE BOX**

For use to replace existing 12" gate boxes that may be broken or damaged during construction.

ITEM 357.16 **16 INCH GATE BOX**

For use to replace existing 16" gate boxes that may be broken or damaged during construction.

ITEM 358. **GATE BOX ADJUSTED**

Fellsway to McGrath

Station	Offset		Station	Offset	
105+64.5	11.9	RT	106+29.8	41.0	RT
105+64.2	13.6	LT	106+30.2	32.5	RT
105+76.1	40.3	RT	106+30.3	41.4	RT
105+91.4	32.5	RT	106+31.3	44.2	RT
106+10.5	41.6	RT	106+35.0	46.8	RT

Mystic Ave. SB

Station	Offset		Station	Offset	
304+81.7	2.7	RT	307+22.3	7.6	RT
304+83.7	45.1	RT	307+24.7	22.4	RT
305+77.7	6.2	RT	313+14.5	17.4	RT
306+86.0	7.7	RT	313+52.0	15.2	RT

Mystic Ave. to McGrath

Station	Offset		Station	Offset	
407+18.0	11.4	RT	415+56.9	36.2	LT
415+14.8	34.6	LT	419+50.9	39.4	LT
415+31.4	36.7	LT	419+58.1	48.2	LT
415+54.5	36.4	LT	419+79.6	36.4	LT

ITEM 370.2 **10 X 6 INCH TAPPING SLEEVE, VALVE AND BOX**

Auxiliary Connector E

Station	Offset
503+46	80.3' RT

ITEM 376.2 **HYDRANT - REMOVED AND RESET**

Mystic Ave (Rte-38) SB
Sta. 313+52, 18.5' RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 405+36, 222.6' LT

ITEM 381. **SERVICE BOX**

For use for the proposed irrigation system within "Peanut" landscaping area and as directed for replacing existing service boxes that are broken.

ITEM 381.3 **SERVICE BOX ADJUSTED**

For use to adjust service boxes found during construction.

ITEM 451. **HMA FOR PATCHING**

To be used as part of permanent hot mix asphalt patching for utilities trenches and deteriorated pavement within micro milling areas and as directed.

ITEM 472. **TEMPORARY ASPHALT PATCHING**

To be used for temporary pedestrian curb ramps, temporary sidewalks, temporary access to driveways, patching utility trenches within full depth pavement, patching areas where existing medians are removed, tying proposed limits of work into existing, and general staging purposes as directed.

ITEM 482.4 **SAWCUTTING CEMENT CONCRETE PAVEMENT**

To be used when meeting existing cement concrete walk at limits of work.

ITEM 482.5 **SAWCUTTING ASPHALT PAVEMENT FOR BOX WIDENING**

To be used when sawcutting existing pavement to widen the roadway or remove existing medians.

ITEM 506. GRANITE CURB TYPE VB – STRAIGHT

Fellsway - McGrath Hwy (Rte-28)

Sta 102+42 to 102+54 RT	Sta 102+92 to Sta 103+12 RT
Sta 105+10 to Sta 105+34 island	Sta 105+33 to Sta 105+41 island
Sta 105+93 to Sta 106+16 RT	Sta 106+37 to Sta 106+73RT
Sta 106+73 to Sta 108+04 RT	Sta 108+55 to Sta 108+69 LT
Sta 108+84 to Sta 108+95 RT	Sta 108+95 to Sta 109+03 RT
Sta 109+60 to Sta 110+24 RT	Sta 110+07 to Sta 110+24 LT
Sta 110+34 to Sta 110+40 LT	Sta 110+34 to Sta 112+21 RT
Sta 112+21 to Sta 116+26 RT	Sta 116+26 to Sta 117+06 RT
Sta 116+22 to Sta 117+05 LT	Sta 117+14 to Sta 118+06 RT
Sta 117+15 to Sta 117+60 LT	Sta 118+02 to Sta 118+05 LT
Sta 118+14 to Sta 118+96 RT	Sta 118+15 to Sta 118+38 LT
Sta 118+38 to Sta 118+63 LT	Sta 118+63 to Sta 119+41 LT
Sta 118+96 to Sta 119+37 RT	Sta 119+41 to Sta 120+25 LT
Sta 119+37 to Sta 120+75 RT	Sta 120+75 to Sta 122+58 RT
Sta 122+61 to Sta 122+81 RT	Sta 122+86 to Sta 122+90 RT

Mystic Ave (Rte-38) SB

Sta 304+68 to Sta 304+76 RT	Sta 305+04 to Sta 305+08 RT
Sta 305+10 to Sta 305+87 RT	Sta 306+11 to Sta 306+26 RT
Sta 306+51 to Sta 307+14 RT	Sta 306+56 to Sta 307+96 LT
Sta 307+20 to Sta 307+25 RT	Sta 307+69 to Sta 307+96 RT
Sta 307+96 to Sta 309+66 RT	Sta 307+96 to Sta 309+32 LT
Sta 309+66 to Sta 309+80 RT	Sta 309+91 to Sta 309+99 LT
Sta 309+99 to Sta 310+36 LT	Sta 310+41 to Sta 310+50 LT
Sta 310+50 to Sta 311+41 LT	Sta 310+72 to Sta 312+10 RT
Sta 312+28 to Sta 312+66 LT	Sta 312+48 to Sta 312+66 RT
Sta 312+72 to Sta 313+07 LT	Sta 312+72 to Sta 312+92 RT
Sta 312+72 to Sta 313+07 LT	Sta 313+66 to Sta 314+40 RT
Sta 314+50 to Sta 314+60 RT	Sta 314+50 to Sta 314+60 RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)

Sta 400+93 to Sta 401+14 LT	Sta 401+14 to Sta 401+71 LT
Sta 401+71 to Sta 402+63 LT	Sta 402+44 to Sta 402+72 LT
Sta 402+45 to Sta 402+62 LT	Sta 402+63 to Sta 402+65 LT
Sta 402+74 to Sta 402+83 LT	Sta 402+81 to Sta 402+90 LT
Sta 402+90 to Sta 404+00 LT	Sta 408+44 to Sta 408+79 LT
Sta 408+98 to Sta 409+19 RT	Sta 409+36 to Sta 409+43 RT
Sta 409+54 to Sta 410+05 LT	Sta 410+03 to Sta 410+05 RT
Sta 410+10 to Sta 411+05 RT	Sta 411+05 to Sta 411+53 RT
Sta 411+05 to Sta 411+67 LT	Sta 411+67 to Sta 412+28 LT
Sta 413+52 to Sta 418+72 LT	Sta 418+62 to Sta 418+72 LT
Sta 418+62 to Sta 418+70 LT	Sta 418+74 to Sta 418+74 RT
Sta 418+84 to Sta 419+26 RT	Sta 418+84 to Sta 418+84 RT
Sta 419+20 to Sta 419+20 LT	Sta 419+65 to Sta 419+75 RT
Sta 419+75 to Sta 419+75 RT	Sta 419+85 to Sta 419+85 RT
Sta 419+85 to Sta 421+95 RT	Sta 420+32 to Sta 420+59 LT

Sta 421+05 to Sta 412+32 LT
Sta 421+97 to Sta 422+78 LT
Sta 423+12 to Sta 424+04 LT

Auxiliary Connector
Sta 501+59 to Sta 501+62
Sta 501+74 to Sta 501+80
Sta 501+97 to Sta 502+14 Island

ITEM 506.1 GRANITE CURB TYPE VB – CURVED

Fellsway - McGrath Hwy (Rte-28)

Sta 103+19 to Sta 103+24 RT	Sta 104+53 to Sta 104+89 RT
Sta 104+89 to Sta 104+96 RT	Sta 105+08 to Sta 105+10 RT
Sta 105+08 to Sta 105+18 RT	Sta 105+12 to Sta 105+15 RT
Sta 105+24 to Sta 105+29 RT	Sta 105+30 to Sta 105+33 RT
Sta 105+44 to Sta 105+47 RT	Sta 105+89 to Sta 105+93 RT
Sta 108+23 to Sta 108+25 RT	Sta 108+69 to Sta 108+74 LT
Sta 108+81 to Sta 108+84 RT	Sta 109+03 to Sta 109+05 LT
Sta 117+92 to Sta 118+02 LT	Sta 122+58 to Sta 122+70 RT

Mystic Ave (Rte-38) SB

Sta 304+74 to Sta 304+79 RT	Sta 304+78 to Sta 304+76 RT
Sta 304+99 to Sta 305+01 RT	Sta 304+99 to Sta 305+04 RT
Sta 305+01 to Sta 305+02 RT	Sta 305+07 to Sta 305+14 RT
Sta 307+04 to Sta 307+12 RT	Sta 313+32 to Sta 313+66 RT
Sta 314+64 to Sta 314+67 RT	

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)

Sta 413+27 to Sta 413+52 LT	Sta 418+12 to Sta 418+31 RT
Sta 418+31 to Sta 418+70 RT	Sta 418+92 to Sta 419+03 LT
Sta 419+26 to Sta 419+29 RT	Sta 419+29 to Sta 419+32 RT
Sta 419+32 to Sta 419+30 RT	Sta 419+61 to Sta 419+66 LT

Auxiliary Connector

Sta 501+55 to Sta 501+59	Sta 501+97 to Sta 501+99

ITEM 516. GRANITE CURB CORNER TYPE A

Mystic Ave (Rte-38) SB

Sta 305+87, 13.0 RT	Sta 306+09,13.0 RT
Sta 306+26, 13.0 RT	Sta 306+49, 13.0 RT
Sta 307+29, 37.3 RT	

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)

Sta 419+93, 24.0 LT	Sta 420+32, 24.0 LT
Sta 420+59, 24.0 LT	Sta 421+05, 24.0 LT
Sta 421+32, 24.0 LT	Sta 421+97, 24.0 LT
Sta 422+78, 24.0 LT	Sta 423+12, 24.0 LT

ITEM 580. **CURB REMOVED AND RESET**

To be used as directed for existing granite curb that is determined to be suitable for reuse.

ITEM 582. **CURB CORNER REMOVED AND RESET**

To be used as directed for existing granite curb corners that are determined to be suitable for reuse.

ITEM 594. **CURB REMOVED AND DISCARDED**

To be used as directed where existing granite curb is determined to be unacceptable for reuse and where existing curved granite curb has a radius of 10 feet or less.

ITEM 595. **CURB INLET REMOVED AND DISCARDED**

To be used as directed where existing granite curb inlets are determined to be unacceptable for reuse and where existing curved granite curb inlets have a radius of 160 feet or less.

ITEM 596. **CURB CORNER REMOVED AND DISCARDED**

To be used as directed where existing granite curb corners are determined to be unacceptable for reuse.

ITEM 597. **EDGING REMOVED AND DISCARDED**

To be used as directed where existing granite edging is determined to be unacceptable for reuse and where existing curved granite edging has a radius of 10 feet or less.

ITEM 627.1 **TRAILING ANCHORAGE**

Fellsway - McGrath Hwy (Rte-28)
Sta. 108+25.6 LT to Sta. 108+35.0 LT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 402+75.8 LT to Sta. 402+84.5 LT

ITEM 628.21 **TRANSITION TO NCHRP 350 GUARDRAIL**

Fellsway - McGrath Hwy (Rte-28)
Sta. 107+91.3 LT to Sta. 108+25.6 LT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 402+84.5 LT to Sta. 403+16.4 LT

ITEM 628.23 **TRANSITION TO RIGID BARRIER (DOUBLE FACED)**

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 418+05.9 RT to Sta. 418+51.6 RT

ITEM 628.302 PERMANENT IMPACT ATTENUATOR, NON-REDIRECTIVE, TL-2

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 418+51.6 RT to Sta. 418+65.7 RT

ITEM 630.2 HIGHWAY GUARD REMOVED AND DISCARDED

To be used as directed where existing highway guard is determined to be unacceptable for reuse.

ITEM 644.048 48 INCH CHAIN LINK FENCE (SPRING TENSION WIRE) (LINE POST OPTION)

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28) Sta.401+48.5, LT to
Sta.402+19.8, LT Sta.402+47.7, LT to
Sta.405+29.3, LT Sta.402+91.6, LT to
Sta.404+71.6, LT Sta.405+16.1, LT to
Sta.408+22.5, LT

Fellsway-McGrath (Rte-28)
Sta. 106+32.0, RT to Sta. 107+38.9, RT

ITEM 652.048 48 INCH CHAIN LINK FENCE END POST

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)

Sta. 401+48, 42.9' LT	Sta. 402+06, 42.7' LT	Sta. 402+48, 59.9' LT
Sta. 402+92, 30.0' LT	Sta. 404+72, 31.4' LT	Sta. 405+15, 38.7' LT
Sta. 405+29, 193.4' LT		

Fellsway-McGrath (Rte-28)

Sta. 106+32, 30.0' RT	Sta. 107+39, 30.0' RT3

ITEM 653.048 48 INCH CHAIN LINK FENCE CORNER OR INTERMEDIATE BRACE POST

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)

Sta. 405+24, 171.4' LT	Sta. 405+29, 178.4' LT	Sta. 405+39, 39.1' LT
Sta. 405+40, 31.0' LT	Sta. 406+26, 44.9' LT	Sta. 407+94, 41.4' LT
Sta. 407+93, 48.3' LT	Sta. 408+05, 49.6' LT	Sta. 408+06, 43.2' LT

ITEM 670. FENCE REMOVED AND RESET

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 405+13 to Sta. 408+31, LT

ITEM 670.1 FENCE REMOVED AND DISCARDED

To be used at the location below and as directed for existing fencing that is determined to be unacceptable for reuse.

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 401+48.5 to Sta. 402+22.7, LT
Sta. 402+50.7 to Sta. 405+28.0, LT
Sta. 403+31.7 to Sta. 404+74.6, LT

ITEM 672. FENCE GATE AND GATE POSTS REMOVED AND RESET

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 402+22.6 to Sta. 402+50.8, LT

ITEM 693. QUARRY FACED GRANITE WALL

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 401+30.0 to Sta. 402+06, LT
Sta. 52+95 to Sta. 53+21, RT

ITEM 697.1 SILT SACK

To be used in existing catch basins within 50 feet of paving limits and proposed and temporary catch basins and gutter inlets for the duration of the construction. Replacement necessary during construction will not be measured for payment.

ITEM 702. HOT MIX ASPHALT WALK SURFACE

To be used as directed.

ITEM 710.3 BOUND – LETTERED GRANITE

Mystic Ave (Rte-38) SB
Sta 313+30.2, 69.3 RT
Sta 313+63.3, 23.9 RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta 418+84.8, 39.4 LT
Sta 419+14.8, 69.4 LT
Sta 419+64.8,69.5 LT

ITEM 767.6 AGED PINE BARK MULCH

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta. 413+67 to Sta 415+40, LT
Sta. 415+44 to Sta 418+00, LT

ITEM 811.22 **ELECTRICAL HANDHOLE - SD2.022**
For Traffic Signal

Mystic Ave (Rte-38)
Sta 309+93, 42.0' RT Sta 310+79, 23.4' RT Sta 311+95, 41.5' RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta 407+99, 46.8' LT Sta 407+99, 38.1' LT
Sta 404+64, 34.3' LT Sta 405+30, 27.3' LT

Auxiliary Connector
Sta 502+02, 34.0' RT

For Eversource Light Poles (unmetered)

Fellsway - McGrath (Rte-28)
Sta 120+19, 25.4' RT Sta 121+67, 27.0' RT

Mystic Ave (Rte-38)
Sta 305+49, 28.9' RT Sta 305+53, 27.9' RT
Sta 307+96, 42.9' RT Sta.309+60, 28.7’ RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta 413+84, 48.1' LT Sta 414+95, 30.8' LT
Sta 416+22, 27.7' LT Sta 417+56, 27.1' LT

ITEM 811.30 **PULL BOX 12x 12 INCHES - SD2.031**
For State owned Light Poles

Mystic Ave (Rte-38)
Sta 312+04, 28.2' RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta 401+61, 28.0' LT Sta 405+20, 21.0' LT

ITEM 811.31 **PULL BOX 12x 12 INCHES - SD2.031**

FOR TRAFFIC SIGNALS Mystic Ave (Rte-38) at Wheatland Street
Mystic Ave (Rte-38)
Sta 304+60.6,17.3' LT Sta 305+05.6,69.1' LT Sta 305+23.5,28.0' RT

FOR TRAFFIC SIGNALS Mystic Ave (Rte-38) at Fellsway-McGrath Hwy (Rte-28)
Mystic Ave (Rte-38)
Sta 307+95.1, 44.8' RT Sta 307+98.0,24.4' LT Sta 308+92.8,33.2' RT
Sta 309+01.3,16.8'LT Sta 309+17.3,19.8' LT Sta 310+43.8,54.4' RT
Sta 311+29.5,17.9' RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta 408+67.0, 32.9' LT Sta 409+34.6, 40.4' LT
Sta 409+60.9, 24.1' LT Sta 410+14.1, 24.1' LT
Sta 410+17.6, 16.1' RT

FOR TRAFFIC SIGNALS Mystic Ave (Rte-38) SB at McGrath Hwy NB
Mystic Ave (Rte-38)
Sta 312+63.0, 38.9' RT Sta 312+18.1, 31.1' LT Sta 312+63.6, 17.8' LT

FOR TRAFFIC SIGNALS Mystic Ave NB at Aux Connector "E"
Auxiliary Connector
Sta 502+35.8, 43.6' RT Sta 500+94.2, 28.7' RT

FOR TRAFFIC SIGNALS Blakeley Ave at McGrath Hwy (Rte-28)
Fellsway - McGrath Hwy (Rte-28)
Sta 117+15.3, 35.5' RT Sta 118+13.4, 35.1' RT

ITEM 812.09 **LIGHT STANDARD FOUNDATION PRECAST**
For new foundation for relocated light poles owned by state.

Mystic Ave (Rte-38)
Sta 313+38, 23.0' RT Sta. 312+00, 27.0’ RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta 401+61, 28.0' LT Sta 405+19, 19.0' LT

ITEM 823.70 **HIGHWAY LIGHTING POLE AND LUMINAIRE REMOVED AND RESET**

For relocating state owned light poles.

Mystic Ave (Rte-38)
Sta 313+38, 23.0' RT Sta. 312+00, 27.0' RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta 401+61, 28.0' LT Sta 405+19, 19.0' LT

ITEM 823.701 **HIGHWAY LIGHTING POLE AND LUMINAIRE REMOVED AND RESET (UN-METRED)**

For relocating Eversource owned light poles.

Fellsway - McGrath Hwy (Rte-28)
Sta 120+19, 30.0' RT Sta. 121+68, 30.0' RT

Mystic Ave (Rte-38)
Sta 307+96, 37.0' RT Sta. 309+60, 29.0' RT

Mystic Ave (Rte-38) to McGrath Hwy (Rte-28)
Sta 413+82,52.0' LT Sta 414+99, 33.0' LT
Sta 416+25,32.0' LT Sta 422+63, 33.0' LT

ITEM 852. **SAFETY SIGNING FOR TRAFFIC MANAGEMENT**

This item will be used per temporary traffic control plans and as directed by the Engineer.

ITEM 854.016 **TEMPORARY PAVING MARKINGS - 6 INCH (PAINTED)**

This item will be used to reproduce all pavement marking on intermediate course, including side street, crosswalks, and stop lines.

ITEM 854.036 **TEMPORARY PAVING MARKINGS - 6 INCH (TAPE)**

Applied in 4ft strips at 20 foot intervals for the length of the project corridor for temporary yellow centerline and white lane lines on surface course before final pavement markings are applied.

ITEM 901.3 **4000 PSI. 1.5 INCH. 565 CEMENT CONCRETE FOR POST FOUNDATION**

To be used for proposed chain link fence foundations.

ITEM 903. **3000 PSI. 1.5 IN.. 470 CEMENT CONCRETE**

To be used for thrust blocks at proposed hydrant relocations, at proposed ductile iron fittings for water pipe if required, and as directed.

DOCUMENT A00807

GEOTECHNICAL STUDY

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LGCI
Lahlaf Geotechnical Consulting, Inc.

February 13, 2024

Mr. Timothy B. McIntosh
Vanasse Hangen Brustlin, Inc.
101 Walnut Street
P.O. Box 9151
Watertown, MA 02471-9151
Phone: (617) 924-1770
Fax: (617) 924-2286
E-mail: TMcIntosh@VHB.com

Re: **Geotechnical Letter Report**
Proposed Mast Arms – Route 28 and Route 38
Somerville, Massachusetts
LGCI Project No. 2305

Dear Mr. McIntosh,

Lahlaf Geotechnical Consulting, Inc. (LGCI) has completed a geotechnical study for the proposed mast arms along Route 28 and Route 38 in Somerville, Massachusetts. This geotechnical letter report presents the results of our study.

We performed our services in general accordance with our proposal No. 20036-Rev. 2 dated May 4, 2020, revised on August 24, 2022, and in general accordance with the terms and conditions of the Subconsultant Authorization (Agreement) by Vanasse Hangen Brustlin, Inc. (VHB), dated January 16, 2023, and signed by Mr. Robert Penfield of VHB on January 26, 2023.

1. PROJECT INFORMATION

1.1 Purpose and Scope of Services

The purpose of our geotechnical services was to perform subsurface explorations at the site and to provide construction recommendations, including subgrade preparation for drilling procedures for drilled shafts.

LGCI performed the following services:

- Coordinated the boring locations with VHB and provided an LGCI geotechnical field representative to mark the boring locations in the field.

- Engaged a drilling subcontractor to advance six (6) soil borings, including performing vacuum explorations in the top few feet at each boring. Our drilling subcontractor contacted Dig Safe Systems, Inc . for utility clearance, and applied for and obtained a MassDOT permit

prior to the start of our explorations. Our drilling subcontractor also implemented a traffic management plan consisting of road signs and cones, and coordinated with and engaged a police detail for the duration of the borings.

- Coordinated with VHB who applied for a Massachusetts Water Resources Authority (MWRA) 8M Permit.

- Provided an LGCI geotechnical field representative, full-time, at the site to coordinate and observe the vacuum explorations and borings, describe the soil samples, and prepare the field logs.

- Prepared this geotechnical letter report containing the results of our subsurface explorations and our geotechnical recommendations for mast arm foundation design in accordance with standard drawings: "Overhead Signal Structure & Foundation, Sheets 1 through 7," by the Massachusetts Department of Transportation (MassDOT), Highway Division and dated December 2015.

LGCI did not perform environmental services for this project. LGCI's scope of services did not include an environmental assessment for the presence or absence of wetlands or analytical testing for hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site, or mold in the soil or in any structure at the site. Any statements regarding odors, colors, or unusual or suspicious items or conditions are for information only and to support our geotechnical services.

Our scope did not include attending meetings, preparing specifications, performing contract document review, or providing construction services. LGCI would be pleased to perform these services when needed under a separate agreement. Recommendations for stormwater management, erosion control, pavement design, slope stability analyses, and detailed cost or quantity estimates are not included in our scope of work.

1.2 Site Description

Our understanding of the existing conditions is based on our field observations, our conversations with VHB, and on the following drawings.

- Drawings titled: "Traffic Sign & Pavement Markings, Somerville, Fellsway/McGrath Hwy (Rte-28)/Mystic Ave (Rte-38)," (Existing Conditions Plan) prepared by VHB, plotted on August 7, 2023, and provided to LGCI by VHB via e-mail on August 7, 2023.

- Drawings titled: "Temporary Traffic Control Plans, Boring Work, Somerville, Fellsway/McGrath Hwy (Rte-28)/Mystic Ave (Rte-38)," (Traffic Management Plan), prepared by VHB, plotted on August 15, 2023, and provided to LGCI by VHB via e-mail on August 16, 2023.

- Drawings titled: "Soil Boring and QLA Test Pit Locations, Somerville, Fellsway/McGrath Hwy (RTE-28)/Mystic Hwy (RTE-38)," prepared by VHB and plotted on February 12, 2024, and provided to LGCI by VHB via e-mail on February 12, 2024.

The site of the proposed mast arms is located near the intersection of Fellsway/McGrath Highway (Route 28) and Mystic Avenue (Route 38) in Somerville, Massachusetts, as shown in Figure 1. Route 28 generally runs in a north-south direction and Route 38 generally runs in an east-west direction. The site is bordered by commercial properties on the eastern side, residential properties on the northern side, and residential and commercial properties on the southern and western sides. Foss Park borders the site on the western side. Based on the Existing Conditions Plan and the Traffic Management Plan, the existing grades at the site generally range between El. 8 feet and El. 11 feet and generally the grades rise in an easterly direction.

1.3 Project Description

Our understanding of the proposed mast arms is based on our discussions with VHB and on the drawings listed in Section 1.2 of this geotechnical letter report.

We understand that VHB has been retained by the City of Somerville to design improvements at the intersection of Fellsway/McGrath Highway (Route 28) and Mystic Avenue (Route 38) in Somerville, Massachusetts. The proposed improvements will include the installation of six (6) mast arms. The sizes of the mast arms are as follows:

- 25-foot mast arm on the northern side of the intersection of Mystic Avenue and Wheatland Street;
- 30-foot mast arm on the southern side of the intersection of Mystic Avenue and Wheatland Street;
- 30-foot mast arm along Fellsway West, north of the intersection of Mystic Avenue and McGrath Highway;
- 45-foot mast arm at the southwestern corner of the intersection of Mystic Avenue and McGrath Highway;
- 35-foot mast arm along Mystic Avenue, east of the intersection of Mystic Avenue and McGrath Highway;
- 35-foot mast arm at the northeastern corner of the intersection of Mystic Avenue and McGrath Highway.

2. SITE AND SUBSURFACE CONDITIONS

2.1 Surficial Geology

LGCI reviewed the following surficial geologic map: "Surficial Materials Map of the Boston North Quadrangle, Massachusetts," compiled by Stone, B.D., and DiGiacomo-Cohen, M.L., Scientific Investigation Map 3402, Quadrangle 125 – Boston North, 2018.

The Surficial Geologic Map indicates that the soils in the general vicinity of the site consist of artificial fill overlying glaciomarine fine deposits, thin till, and thick till.

The artificial fill consists of earth materials and manmade materials that have been artificially emplaced.

The glaciomarine fine deposits consist of clay, silty clay, fine sand, and some fine gravel deposited in a higher-level sea in environments of low wave energy along the coast in river estuaries.

The thin till consists of a non-sorted, non-stratified matrix of sand, some silt, and little clay containing scattered pebble, cobble, and boulder clasts. The thin till is generally less than 10 to 15 feet thick. The thick till is similar in composition to the thin till but is commonly more than 100 feet thick.

The Surficial Geological Map of the site is shown in Figure 2.

2.2 LGCI's Explorations

2.2.1 General

LGCI coordinated our exploration locations with VHB and marked the exploration locations in the field by taping distances from the existing landmarks.

Our drilling subcontractor contacted the utility clearance agency (Dig Safe Systems, Inc.) for utility clearance. Our drilling subcontractor coordinated the clearance of water, sewer, and drains with the City of Somerville. Our drilling subcontractor also obtained a MassDOT permit, implemented a traffic management plan, and coordinated with police details.

Unless notified otherwise, we will dispose of the soil samples obtained during our explorations after three months.

2.2.2 Soil Borings

LGCI engaged Northern Drill Service, Inc. (NDS) of Northborough, Massachusetts to advance six (6) soil borings (B-1/B-1A, B-2/B-2A and B-3 to B-6) between the dates of January 9 and 23, 2024. The borings were advanced with a Mobile B-48 ATV Rig using drive and wash technique with a 4-inch casing. In order to clear surficial utilities not cleared by the City of Somerville, the drilling subcontractor performed vacuum explorations in the top six 4.2 to 6.3 feet in all the borings using a Vacmasters System 4000. The borings extended to depths ranging between 4.2 feet and 41 feet beneath the ground surface. In boring B-1, refusal was encountered at a depth of 5.7 feet and the boring was relocated and completed as B-1A. Boring B-2 was attempted twice (B-2 and B-2A), and refusal was encountered at both attempted locations at depths of 6.3 and 4.2 feet beneath the ground

surface, respectively. Due to the presence of many utilities in the general area, boring B-2 was abandoned.

Upon completion, the boreholes were backfilled with either soil cuttings, gravel, or both. In paved areas, the ground surface was restored with asphalt cold patch.

NDS performed Standard Penetration Tests (SPT) during drilling and obtained split spoon samples in the borings with an automatic hammer at typical depth intervals of 2 feet or 5 feet as noted on the boring logs in general accordance with ASTM D-1586.

An LGCI geotechnical engineer observed and logged the borings in the field.

2.2.3 Boring Logs and Locations

The boring locations are shown in Figures 3A and 3B, and Attachment A contains LGCI's boring logs. Table 1 includes a summary of LGCI's borings.

2.3 Subsurface Conditions

The subsurface description in this report is based on a limited number of borings and is intended to highlight the major soil strata encountered during our borings. The subsurface conditions are known only at the actual boring locations. Variations may occur and should be expected between boring locations. The boring logs represent conditions that we observed at the time of our borings and were edited, as appropriate, based on the results of the laboratory test data and inspection of the soil samples in the laboratory. The strata boundaries shown in our boring logs are based on our interpretations and the actual transitions may be gradual. Graphic soil symbols are for illustration only.

The soil strata encountered in the borings was as follows, starting at the ground surface.

Asphalt/Concrete – Asphalt was encountered at the ground surface in borings B-1, B-2, B-3, B-4, and B-6. The thickness of the asphalt ranged between 0.5 feet and 0.7 feet. Concrete was encountered at the ground surface in boring B-2A and was ~0.7 feet thick.

Topsoil – Topsoil was encountered at the ground surface in boring B-5. The thickness of the topsoil was 1 foot.

Fill – A layer of fill was encountered beneath the asphalt, concrete, and topsoil in all borings. The fill extended to the termination depths on refusal in borings B-1 and B-2A at depths 5.7 and 4.2 feet beneath the ground surface, respectively. Boring B-2 was terminated in the fill at the request of a representative of Eversource due to proximity to an electrical vault. In the remainder of the borings, the fill extended to the top of a concrete slab at a depth of 6.3 feet in borings B-1A, to the top of peat and buried organic soil at a depth of 14 feet in borings B-3 and B-5, respectively, to the top of clay layer at a depth of 18 feet in boring B-4, and to the termination

depth of 23 feet in boring B-6. The samples in this layer were described as poorly graded sand, well graded sand, well graded gravel, silty sand, and clayey sand. The fines content in the fill ranged between 0 and 40 percent, and the gravel content ranged between 5 and 45 percent. For samples described as gravel, the sand content ranged between 25 and 40 percent sand. The fill also contained traces of organic soil, bricks, glass, crushed rock, cobbles, concrete, and asphalt.

The Standard Penetration Test (SPT) N-values recorded in the fill ranged between 4 blows per foot (bpf) and 23 bpf, with most values below 16 bpf, indicating very loose to medium dense material.

Concrete – A buried concrete slab was encountered between the depths of 6.2 and 6.9 feet beneath the ground surface in boring B-1A.

Peat and Buried Organic Soil – A two-foot layer of peat was encountered beneath the fill in boring B-3 at a depth of 14 feet, and an eight-foot layer of buried organic soil was encountered beneath the fill in boring B-5 at a depth of 14 feet. The peat and buried organic soil extended to depths of 16 feet and 22 feet beneath the ground surface in borings B-3 and B-5, respectively. The samples in this layer were described as peat and silty sand. The fines content in this layer ranged between 35 and 40 percent.

The SPT N-values recorded in the buried organic soil ranged between 2 bpf and 6 bpf, indicating very loose to loose material.

Clay – A layer of clay was encountered beneath the buried concrete slab in boring B-1A, beneath the fill layer in boring B-4, and below the buried organic soil layer in borings B-3 and B-5. The clay extended to the termination depths in borings B-1A, and B-3 to B-5. The samples in this layer were described as lean clay, silty sand, sandy clay, and clayey sand. The sand content in this layer ranged between 0 and 35 percent. The gravel content in this layer was 0 percent. When described as a sand, the fines content in this layer ranged between 15 and 45 percent.

The SPT N-values in the clay ranged between 3 bpf and 30 bpf, with most values ranging between 7 bpf and 25 bpf, indicating medium stiff to very stiff clay.

2.4 Groundwater

Groundwater was measured at the end or shortly after the end of drilling in all borings at depths ranging between 4.7 feet and 8.0 feet beneath the ground surface as shown in Table 1 and the boring logs.

The groundwater information reported herein is based on observations made during or shortly after the completion of drilling and may not represent the actual groundwater conditions. Furthermore, the drilling procedure introduced water into the boreholes; therefore, additional time may be required for the groundwater levels to stabilize. The groundwater information

presented in this report only represents the conditions encountered at the time and location of the explorations. Seasonal fluctuation should be anticipated.

3. EVALUATION AND RECOMMENDATIONS

3.1 Mast Arm Foundation Recommendations

Based on the results of the borings, the subsurface conditions at the site are suitable to support the proposed mast arm foundations. Each mast arm should be supported on a cored pier (drilled shaft) designed in accordance with the standard drawings: "Overhead Signal Structure & Foundation, Sheets 1 through 7," by the MassDOT, Highway Division and dated December 2015 (Standard Drawing).

Using the average SPT N-value (with hammer energy correction), we assessed the soil designation in accordance with the Standard Drawing. The table below shows the average SPT N-values (corrected and uncorrected for hammer energy), the mast arm length, the depth to groundwater, and the recommended soil designation for design of the drilled shafts. As shown in the table below, we recommend designing the mast arms at boring B-1A a "Stiff Clay"designation, and the mast arms at borings B-3, B-4, B-5, and B-6 as a "Wet Sand (Loose)"designation.

Intersection	Boring	Ground Water Level (ft.)	Mast Arm Length (ft.)	Average SPT N-Value[1]	Corrected Average SPT N-Value*	Designation**
Mystic Ave. and McGrath Hwy.	B-3[1]	5.5	30	6.43	8.57	Wet Sand (Loose)
	B-4	6.0	45	4.57	6.10	Wet Sand (Loose)
	B-5[2]	4.5	35	4.57	6.10	Wet Sand (Loose)
	B-6	8.0	35	10.57	14.10	Wet Sand (Loose)
Mystic Ave. and Wheatland St.	B-1A	4.7	25	14.64	19.52	Stiff Clay
	B-2[3]	N/E	30	N/A	N/A	Boring not completed

1. In boring B-3, the bottom of the shaft will be at a depth of 13.5 feet below ground surface, i.e., less than one (1) foot above a 2-foot peat layer. To reduce the potential for settlement of the shaft, we recommend extending the drilled shaft to the top of the silt layer at a depth of 16 feet below ground surface.
2. In boring B-5, the bottom of the shaft will be at a depth of 17 feet below ground surface, the bottom of the shaft will be embedded 3 feet int the 8-foot buried organic soil layer. To reduce the potential for settlement of the shaft, we recommend extending the drilled shaft through the peat layer to the top of the underlying clay layer at a depth of 22 feet below ground surface. We believe that the presence of the organic soil layer does not warrant a special design because the peat layer is 14 feet deep; and at this depth, the lateral movement of the drilled shaft is negligible.
3. Subsurface data is not available at boring B-2 at depths greater than 6 feet. However, due to the proximity to boring B-1, we believe that it is not unreasonable to assume that the subsurface conditions consist of clay. The design of the shaft could conservatively be based on the designation "Clay (Soft to Medium Stiff)." If an organic soil layer is encountered during drilling of the drilled shaft near the bottom of the shaft, drilling should continue to a firm layer to reduce the potential for settlement of the drilled shaft.

4. CONSTRUCTION CONSIDERATIONS

4.1 Site Preparation and Earthwork

4.1.1 General

Loose, soft, or organic materials as well as abandoned structures, if any, and utilities and deleterious matter encountered during initial stripping operations should be removed within the proposed foundation area. Material placed around the mast arm near the surface should be compacted.

4.1.2 Drilled Shaft

- During construction of the cored pier foundation (drilled shaft), a temporary casing that will be removed when concrete is placed will be required to prevent collapse of the fill and sand.

- We did not encounter boulders in our borings. However, the fill could contain cobbles and boulders. The contractor should be prepared to remove such boulders, if encountered, during the installation of the drilled shaft.

- When the drilling operations are complete, concrete should be placed inside the casing as soon as possible.

- The concrete should be placed using a tremie pipe. We recommend pouring the pier foundation concrete on the same day that the pier is drilled.

- A representative of LGCI should assess that the pier foundation is founded on competent bearing materials and that the pier foundation installation procedures comply with our recommendations.

5. REPORT LIMITATIONS

Our analysis and recommendations are based on project information provided to us at the time of this report. If changes to the type, size, and location of the proposed structures or to the site grading are made, the recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions and recommendations modified in writing by LGCI. LGCI cannot accept responsibility for designs based on our recommendations unless we are engaged to review the final plans and specifications to determine whether any changes in the project affect the validity of our recommendations and whether our recommendations have been properly implemented in the design.

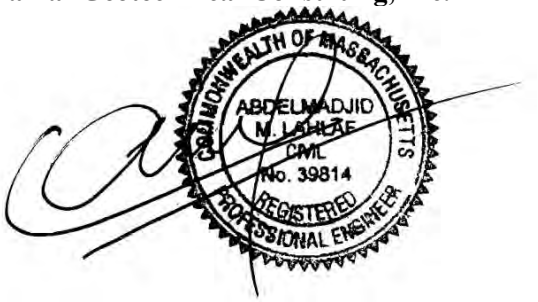
It is not part of our scope to perform a more detailed site history; therefore, we have not explored for or researched the locations of buried utilities or other structures in the area of the proposed

construction. Our scope did not include environmental services or services related to moisture, mold, or other biological contaminates in or around the site.

We cannot accept responsibility for designs based on recommendations in this report unless we are engaged to 1) make site visits during construction to check that the subsurface conditions exposed during construction are in general conformance with our design assumptions and 2) ascertain that, in general, the work is being performed in compliance with the contract documents.

Our report has been prepared in accordance with generally accepted engineering practices and in accordance with the terms and conditions set forth in our agreement. No other warranty, expressed or implied, is made. This report has been prepared for the exclusive use of Vanasse Hangen Brustlin, Inc. for the specific application to the proposed mast arm borings along Route 28 and Route 38 in Somerville, Massachusetts as conceived at this time.
Very truly yours,

Lahlaf Geotechnical Consulting, Inc.



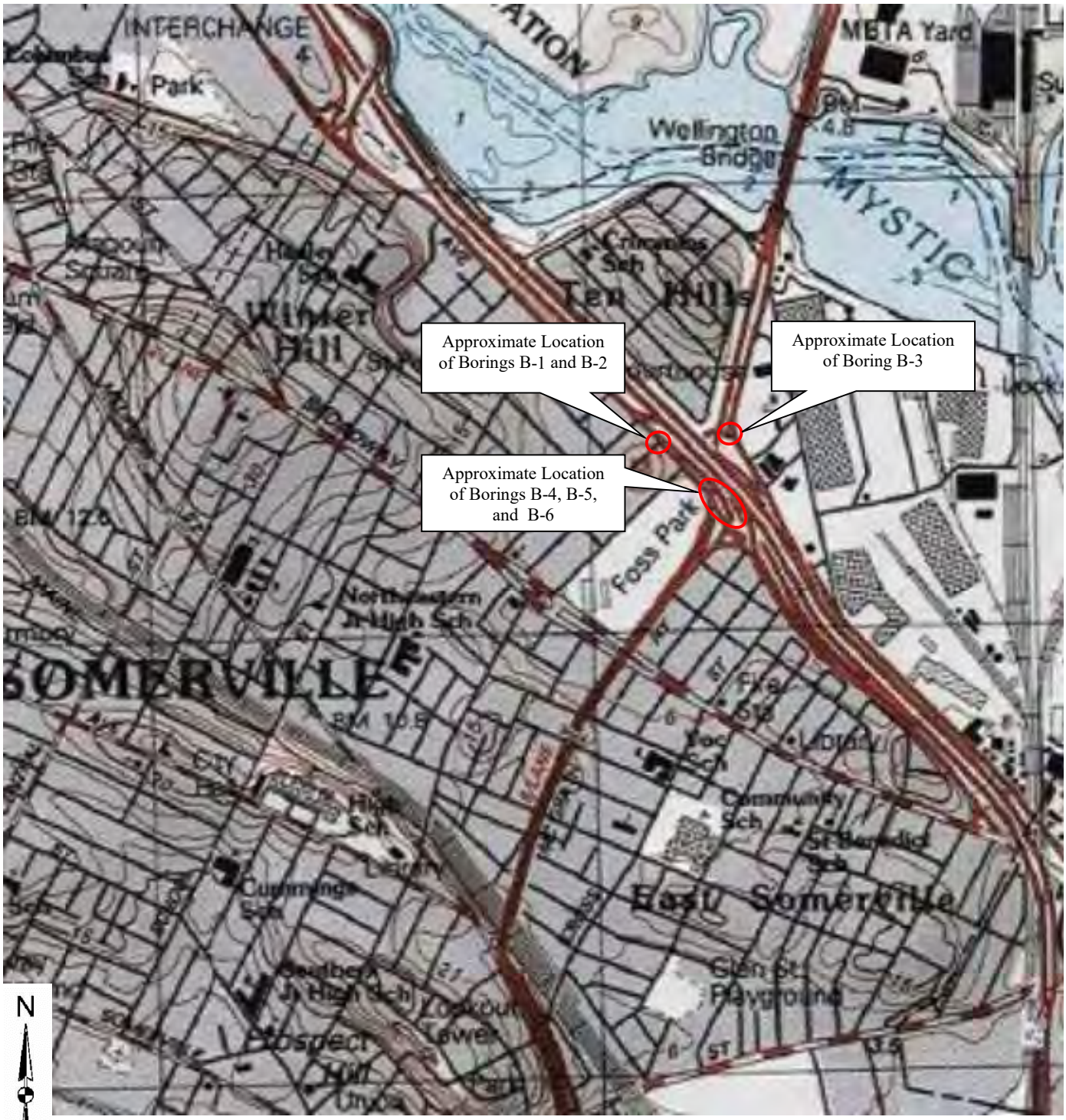
Abdelmadjid M. Lahlaf, Ph.D., P.E.
Principal Engineer

Attachments: Table 1 – Summary of LGCI's Boring
Figure 1 – Site Location Map
Figure 2 – Surficial Geologic Map
Figure 3A and 3B – Boring Location Plan
Attachment A – Boring Logs

Table 1 - Summary of LGCI's Borings
Proposed Mast Arms, Route 28 and Route 38
Somerville, MA
LGCI Project No. 2305

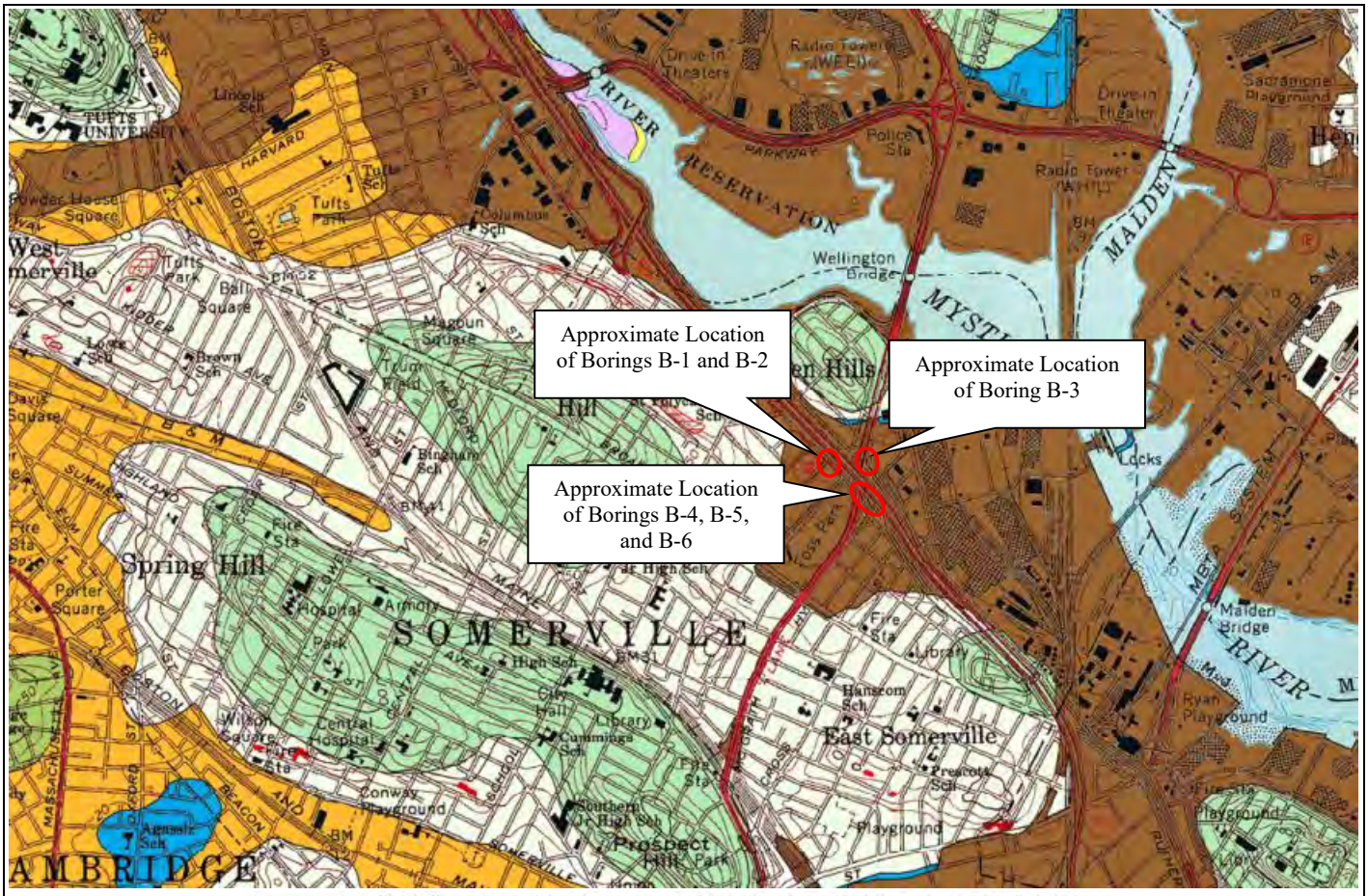
Boring No.	Ground Surface Elevation (ft.)[1]	Groundwater[2] Depth / El. (ft.)	Bottom of Topsoil / **Asphalt** / *Concrete* Depth / El. (ft.)	Bottom of Fill Depth / El. (ft.)	Bottom of Buried Organic Soil Depth / El. (ft.)	Bottom of Clay Depth / El. (ft.)	Bottom of Boring Depth / El. (ft.)
B-1	10.0	- / **-**	**0.7** / **9.3**	5.7 [3] / **4.3**	- / **-**	- / **-**	5.7 / **4.3**
B-1A	10.0	4.7 / **5.3**	- / **-**	6.2 [4] / **3.8**	- / **-**	41.0 [5] / **-31.0**	41.0 / **-31.0**
B-2	9.0	- / **-**	**0.5** / **8.5**	6.3 [6] / **2.7**	- / **-**	- / **-**	6.3 / **2.8**
B-2A	9.0	- / **-**	*0.7* / ***8.3***	4.2 [7] / **4.8**	- / **-**	- / **-**	4.2 / **4.8**
B-3	9.0	5.5 / **3.5**	**0.7** / **8.3**	14.0 / **-5.0**	16.0 / **-7.0**	31.0 [5] / **-22.0**	31.0 / **-22.0**
B-4	10.0	6.0 / **4.0**	**0.6** / **9.4**	18.0 / **-8.0**	- / **-**	31.0 [5] / **-21.0**	31.0 / **-21.0**
B-5	10.0	4.5 / **5.5**	1.0 / **9.0**	14.0 / **-4.0**	22.0 / **-12.0**	31.0 [5] / **-21.0**	31.0 / **-21.0**
B-6	10.0	8.0 / **2.0**	**0.6** / **9.4**	23.0 [8] / **-13.0**	- / **-**	- / **-**	23.0 / **-13.0**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: “Soil Boring and QLA Test Pit Locations, Somerville, Fellsway/McGrath Hwy (RTE-28)/Mystic Hwy (RTE-38)," prepared by VHB, plotted on February 12 2024, and provided to LGCI by via e-mail on February 12, 2024.
2. Groundwater was measured at the end of the drilling or based on sample moisture, whichever is shallower.
3. Boring B-1 terminated on a concrete structure at a depth of 5.7 feet.
4. Buried concrete slab encountered at boring B-1A between depths of 6.2 and 6.9 feet.
5. Boring terminated in the clay layer.
6. Offset boring at request of a representative of Eversource due to proximity of electrical vault.
7. Boring terminated in rubble and abandoned.
8. Boring B-6 terminated due to split spoon bouncing on hard unknown object at depth of 23 feet.
9. "-" means groundwater or layer was not encountered.



Note: Figure based on USA Topo Maps of Somerville, MA obtained from https://viewer.nationalmap.gov/

Client:	Project:	Figure 1 – Site Location Map	
Vanasse Hangen Brustlin, Inc.	Proposed Mast Arms – Route 28 and Route 38		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Somerville, MA	LGCI Project No.: 2305	Date: Feb. 2024



Artificial fill—Earth materials and manmade materials that have been artificially emplaced, primarily in highway and railroad embankments and in dams; unit may also include landfills, urban-development areas, and filled coastal wetlands

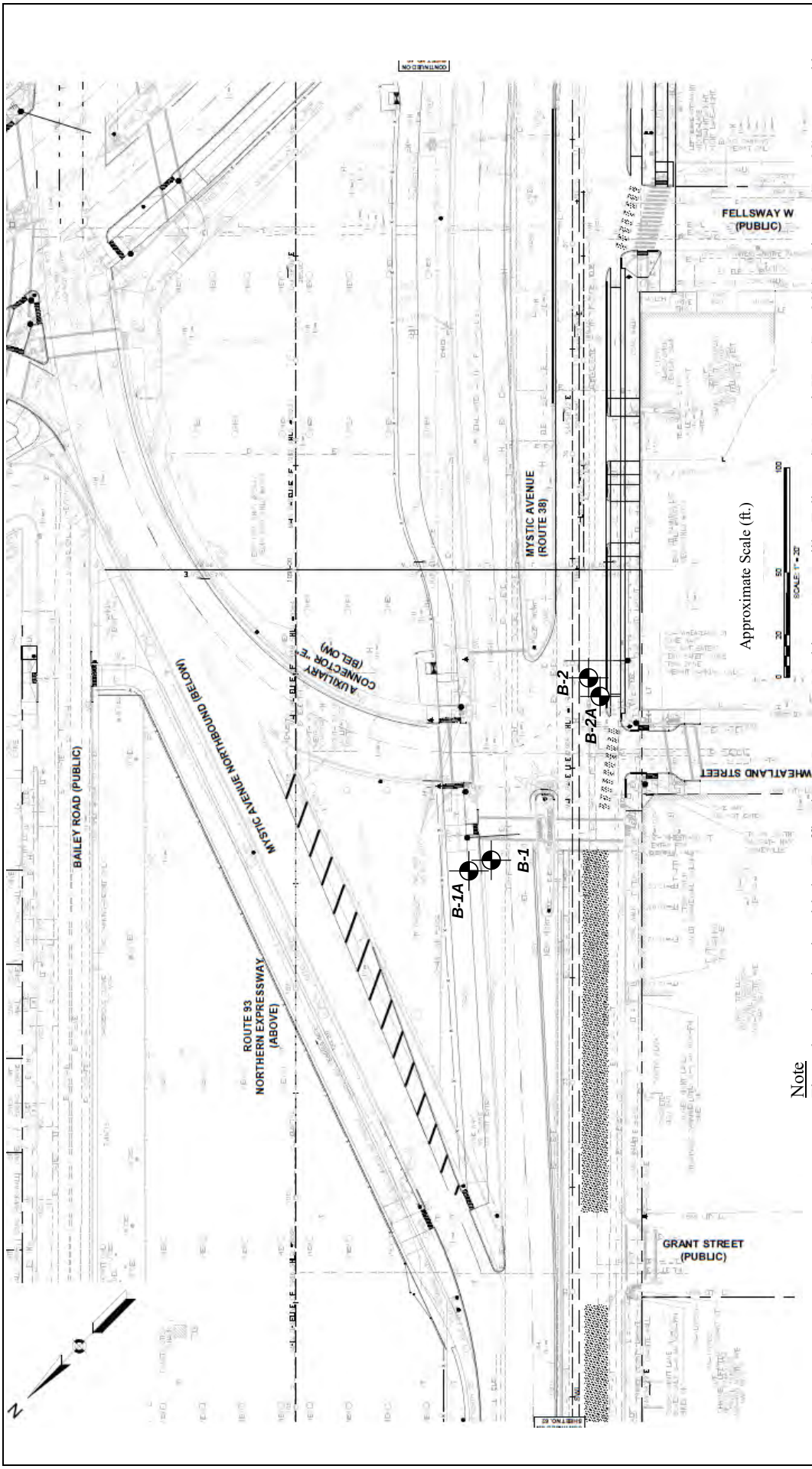
Thin till—Nonsorted, nonstratified matrix of sand, some silt, and little clay containing scattered pebble, cobble, and boulder clasts; large surface boulders are common; unit was mapped where till is generally less than 10 to 15 ft thick including areas of shallow bedrock. Predominantly consists of upper till of the last glaciation; loose to moderately compact, generally sandy, commonly stony. Two facies are present in some places: a looser, coarser grained ablation facies, melted out from supraglacial position; and an underlying more compact, finer grained lodgement facies deposited subglacially. In general, both ablation and lodgement facies of upper till derived from fine-grained bedrock are finer grained, more compact, less stony and have fewer surface boulders than upper till derived from coarse-grained crystalline rocks. Across Massachusetts, fine-grained bedrock sources include the red Mesozoic sedimentary rocks of the Connecticut Valley lowland, marble in the western river valleys, and fine-grained schists in upland areas

Thick till—Nonsorted, nonstratified matrix of sand, some silt, and little clay containing scattered pebbles, cobbles, and boulders in the shallow subsurface; at greater depths consists of compact, nonsorted matrix of silt, very fine sand, and some clay containing scattered small gravel clasts. Mapped in areas where till is greater than 10 to 15 ft thick, mostly in drumlin landforms in which till thickness commonly exceeds 100 ft (maximum recorded thickness is 230 ft). Although upper till of late Wisconsinan age is the surface deposit, lower till of probable Illinoian age constitutes the bulk of the material in thick-till areas. Lower till is moderately to very compact and is commonly finer grained and less stony than upper till. An oxidized zone, the lower part of a soil profile formed during a period of interglacial weathering, is generally present in the upper part of the lower till. This zone commonly shows closely spaced joints that are stained with iron and manganese oxides

Glaciomarine fine deposits include clay, silty clay, fine sand, and some fine gravel deposited in a higher-level sea in environments of low wave energy along the coast and in river estuaries. Fine to very fine sand, massive and laminated, commonly is present at the surface and grades downward into interbedded very fine sand, silt, silty clay, and clay. The lower silty clay and clay is massive and thinly laminated. Total thickness is generally a few feet to 75 ft

Note: Figure based on map titled: "Surficial Materials Map of the Boston North Quadrangle, Massachusetts," prepared by Stone, B.D., and DiGiacomo-Cohen, M.L., Scientific Investigation Map 3402, Quadrangle 125 – Boston North, 2018.

Client:	Project	Figure 2 – Surficial Geologic Map	
Vanasse Hangen Brustlin, Inc.	Proposed Mast Arms – Route 28 and Route 38		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Somerville, MA	LGCI Project No.: 2305	Date: Feb. 2024

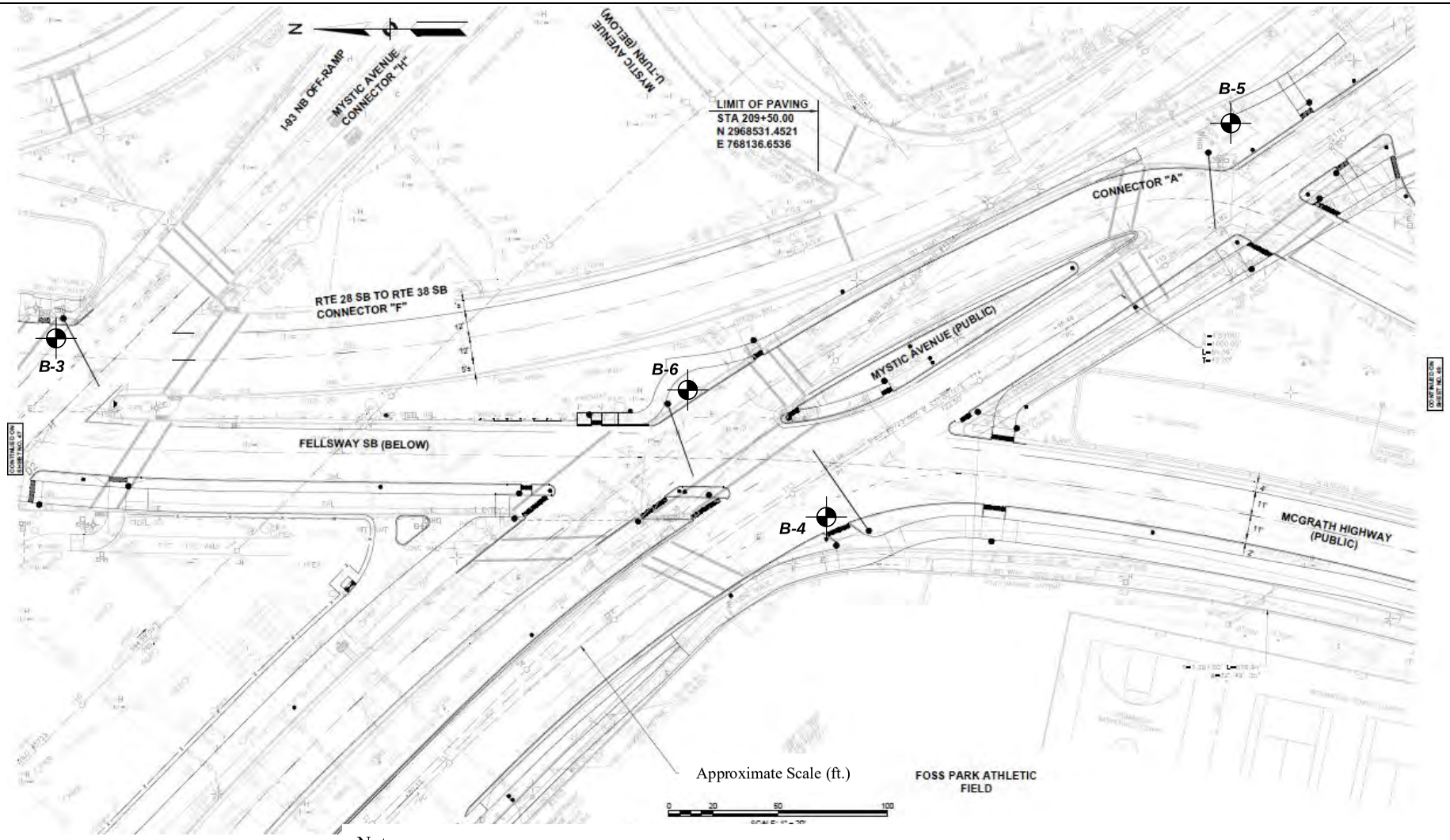


Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA between January 9 and 23, 2024, and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).

Note
Figure based on drawing titled: "Traffic Sign & Pavement Markings, Somerville, Fellsway/McGrath Hwy (Rte-28)/Mystic Ave (Rte-38), prepared by Vanasse Hangen Brustlin, Inc. (VHB), plotted on August 7, 2023, and provided to LGCI by VHB via e-mail on August 7, 2023.

Client: Vanasse Hangen Brustlin, Inc.	Project: Proposed Mast Arms – Route 28 and Route 38	Figure 3A – Boring Location Plan (Borings B-1 and B-2)	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Somerville, MA	LGCI Project No.: 2305	Date: Feb. 2024



Legend

Approximate location of borings advanced by Northern Drill Services, Inc. (NDS) of Northborough, MA between January 9 and 23, 2024, and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).

Note

Figure based on drawing titled: "Traffic Sign & Pavement Markings, Somerville, Fellsway/McGrath Hwy (Rte-28)/Mystic Ave (Rte-38), prepared by Vanasse Hangen Brustlin, Inc. (VHB), plotted on August 7, 2023, and provided to LGCI by VHB via e-mail on August 7, 2023.

Client:	Project:	Figure 3A – Boring Location Plan (Borings B-3 to B-6)	
Vanasse Hangen Brustlin, Inc.	Proposed Mast Arms – Route 28 and Route 38		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Somerville, MA	LGCI Project No.: 2305	Date: Feb. 2024

Attachment A – Boring Logs

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

B-1
PAGE 1 OF 1

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Mast Arms - Route 28 and Route 38
LGCI PROJECT NUMBER: 2305
PROJECT LOCATION: Somerville, MA

DATE STARTED: 1/11/24 **DATE COMPLETED:** 1/11/24
BORING LOCATION: North side of Mystic Ave. & Wheatland St. Intersection
COORDINATES: NA
SURFACE El.: 10 ft. (see note 1) **TOTAL DEPTH:** 5.7 ft.
WEATHER: 30's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: Not encountered
AT END OF DRILLING: Dry at the end of drilling
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: John Beirholm
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Vacmasters System 4000 / Mobile B-48
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: AR **CHECKED BY:** JKW

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0.7					Asphalt	0.7	Top 8": Asphalt
			G1		12/12		Fill	9.3	G1 - Poorly Graded SAND with Gravel (SP), medium to coarse, trace of fine sand, 0-5% fines, 35-40% fine to coarse angular gravel, trace of glass, grey, moist
		1.7	G2		16/16				G2 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 15-20% fine to coarse subrounded gravel, brown, moist
		3	G3		32/32				G3 - Well Graded GRAVEL with Sand (GW), fine to coarse, angular, 0-5% fines, 30-35% fine to coarse sand, trace of brick, trace of asphalt, trace of cobbles, grey, moist
5	5.0	5.7				1		5.7	REMARK 1: Advanced vacuum exploration to refusal on concrete structure at depth of 5.7 feet. Boring abandoned and relocated to boring B-1A. Bottom of borehole at 5.7 feet. Backfilled borehole with soil cuttings and gravel. Ground surface restored with asphalt cold patch.
10	0.0								
15	-5.0								
20	-10.0								
25	-15.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: “Soil Boring and QLA Test Pit Locations, Somerville, Fellsway/McGrath Hwy (RTE-28)/Mystic Hwy (RTE-38)," prepared by VHB, plotted on February 12 2024, and provided to LGCI by via e-mail on February 12, 2024.

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

B-1A
PAGE 1 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Mast Arms - Route 28 and Route 38
LGCI PROJECT NUMBER: 2305
PROJECT LOCATION: Somerville, MA

DATE STARTED: 1/11/24 **DATE COMPLETED:** 1/23/24
BORING LOCATION: North side of Mystic Ave. & Wheatland St. Intersection
COORDINATES: NA
SURFACE El.: 10 ft. (see note 1) **TOTAL DEPTH:** 41 ft.
WEATHER: 30's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 7.0 ft. / El. 3.0 ft. Based on sample moisture
AT END OF DRILLING: 4.7 ft. / El. 5.3 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: John Beirholm
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Vacmasters System 4000 / Mobile B-48
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: AR **CHECKED BY:** JKW

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1		30/30		Fill		G1 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 20-25% fine to coarse subangular gravel, trace of cobbles, trace of brick, trace of crushed rock, trace of cinder, dark brown to grey, moist
		2.5	G2		43/43				G2 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, trace of coarse sand, 5-10% fines, 35-40% fine subangular gravel, trace of brick, trace of crushed rock, trace of cinder, dark brown to grey, moist
5	5.0								
		6.1				1	Concrete	6.2 3.8 6.8 3.2	REMARK 1: Advanced vacuum exploration to refusal on concrete structure at depth of 6.2 feet. MWRA and Somerville DPW indicated that they did not have utilities within this area and cleared the drillers to drill through concrete structure. 8 inch concrete slab
		7	S1	6-6-9-11 (15)	24/1				S1 - Silty SAND (SM), fine, 35-40% fines, grey, wet
		9	S2	5-6-7-9 (13)	24/12				S2 - Lean CLAY with Gravel (CL), plastic, 20-25% fine subangular gravel, brown grey, wet
10	0.0	11	S3	12-13-12-12 (25)	24/12				S3 - Lean CLAY with Gravel (CL), plastic, 20-25% fine subangular gravel, trace of organics, trace of roots, brown grey, wet
		13	S4	3-5-5-7 (10)	24/18				S4 - Lean CLAY with Sand (CL), moderately plastic, 20-25% fine sand, trace of organic soil, brown, wet
15	-5.0	15	S5	9-9-7-6 (16)	24/24		Clay		S5 - Lean CLAY with Sand (CL), moderately plastic, 20-25% fine sand, trace of organic soil, trace of organics, brown, wet
		17	S6	2-3-3-4 (6)	24/24				S6 - Lean CLAY with Sand (CL), moderately plastic, 20-25% fine sand, trace of organic soil, trace of organics, brown, wet
20	-10.0	19	S7	1-1-2-2 (3)	24/24				S7 - Clayey SAND (SC), fine, 40-45% fines, brown, wet
		21	S8	2-3-3-2 (6)	24/18				S8 - Clayey SAND (SC), fine, 35-40% fines, brown, wet
		23							
25	-15.0	24	S9	1-0-0-1 (0)	24/16				S9 - Lean CLAY (CL), moderately plastic, grey, wet

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: “Soil Boring and QLA Test Pit Locations, Somerville, Fellsway/McGrath Hwy (RTE-28)/Mystic Hwy (RTE-38)," prepared by VHB, plotted on February 12 2024, and provided to LGCI by via e-mail on February 12, 2024.

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

B-1A
PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Mast Arms - Route 28 and Route 38
LGCI PROJECT NUMBER: 2305
PROJECT LOCATION: Somerville, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		26							
		29							
30	-20.0		S10	0-0-0-1 (0)	24/18				S10 - Lean CLAY (CL), moderately plastic, grey, wet
		31							
		34					Clay		
35	-25.0		S11	0-0-0-1 (0)	24/14				S11 - Lean CLAY (CL), moderately plastic, grey, wet
		36							
		39							
40	-30.0		S12	0-0-0-1 (0)	24/18				S12 - Lean CLAY (CL), moderately plastic, grey, wet
		41						41.0	
45	-35.0								Bottom of borehole at 41.0 feet. Backfilled borehole with gravel.
50	-40.0								
55	-45.0								
60	-50.0								

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

B-2

PAGE 1 OF 1

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Mast Arms - Route 28 and Route 38
LGCI PROJECT NUMBER: 2305
PROJECT LOCATION: Somerville, MA

DATE STARTED: 1/9/24 **DATE COMPLETED:** 1/9/24
BORING LOCATION: South side of Mystic Ave. & Wheatland St. Intersection
COORDINATES: NA
SURFACE El.: 9 ft. (see note 1) **TOTAL DEPTH:** 6.25 ft.
WEATHER: 30's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: Not encountered
AT END OF DRILLING: Not encountered
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: John Beirholm
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Vacmasters System 4000 / Mobile B-48
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: AR **CHECKED BY:** JKW

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0.5					Asphalt	0.5	Top 6.5": Asphalt
		1.5	G1		12/12			8.5	G1 - Poorly Graded SAND with Gravel (SP), fine to medium, trace of coarse sand, 0-5% fines, 40-45% fine to coarse subangular gravel, grey, moist
			G2		30/30		Fill		G2 - Silty SAND with Gravel (SM), fine to medium, trace of coarse sand, 30-35% fines, 20-25% fine subangular gravel, trace of crushed rock, brown, moist
	5.0	4							
5			G3		27/27				G3 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 35-40% fine to coarse angular gravel, trace of crushed rock, brown to grey, moist
		6.3				1		6.3	REMARK 1: Advanced vacuum exploration to depth of 6.3 feet. Eversource indicated the presence of high voltage electrical line near the borehole and suggested to offset borehole. Boring abandoned and relocated to boring B-1A. Bottom of borehole at 6.3 feet. Backfilled borehole with soil cuttings and gravel. Ground surface restored with asphalt cold patch.
	0.0								
10									
	-5.0								
15									
	-10.0								
20									
	-15.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: “Soil Boring and QLA Test Pit Locations, Somerville, Fellsway/McGrath Hwy (RTE-28)/Mystic Hwy (RTE-38)," prepared by VHB, plotted on February 12 2024, and provided to LGCI by via e-mail on February 12, 2024.

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

B-2A
PAGE 1 OF 1

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Mast Arms - Route 28 and Route 38
LGCI PROJECT NUMBER: 2305
PROJECT LOCATION: Somerville, MA

DATE STARTED: 1/19/24 **DATE COMPLETED:** 1/19/24
BORING LOCATION: South side of Mystic Ave. & Wheatland St. Intersection
COORDINATES: NA
SURFACE El.: 9 ft. (see note 1) **TOTAL DEPTH:** 4.2 ft.
WEATHER: 30's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: Not encountered
AT END OF DRILLING: Not encountered
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: John Beirholm
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Vacmasters System 4000 / Mobile B-48
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: AR **CHECKED BY:** JKW

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0.7	G1		9/9		Concrete	0.7	Top 8": Concrete
		1.5	G2		33/33		Fill	8.3	G1 - Well Graded SAND with Silt (SW-SM), fine to coarse, 5-10% fines, 10-15% fine to coarse subangular gravel, brown, moist G2 - Poorly Graded SAND with Silt and Gravel (SP-SM), medium to coarse, trace of fine sand, 10-15% fines, 40-45% fine to coarse angular gravel, trace of concrete, dark brown to grey, moist
	5.0	4.3				1		4.2	REMARK 1: Advanced vacuum exploration to refusal on top of pile of bricks and blasted rock at depth of 4.2 feet. Could not offset borehole due to presence of utilities. Boring abandoned.
5									Bottom of borehole at 4.2 feet. Backfilled borehole with soil cuttings and gravel. Ground surface restored with asphalt cold patch.
	0.0								
10									
	-5.0								
15									
	-10.0								
20									
	-15.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: “Soil Boring and QLA Test Pit Locations, Somerville, Fellsway/McGrath Hwy (RTE-28)/Mystic Hwy (RTE-38)," prepared by VHB, plotted on February 12 2024, and provided to LGCI by via e-mail on February 12, 2024.

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

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PAGE 1 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Mast Arms - Route 28 and Route 38
LGCI PROJECT NUMBER: 2305
PROJECT LOCATION: Somerville, MA

DATE STARTED: 1/19/24 **DATE COMPLETED:** 1/22/24
BORING LOCATION: North of Mystic Ave. & McGrath Hwy. Intersection
COORDINATES: NA
SURFACE El.: 9 ft. (see note 1) **TOTAL DEPTH:** 31 ft.
WEATHER: 30's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 8.0 ft. / El. 1.0 ft. Based on sample moisture
AT END OF DRILLING: 5.5 ft. / El. 3.5 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: John Beirholm
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Vacmasters System 4000 / Mobile B-48
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: AR **CHECKED BY:** JKW

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0.7					Asphalt	0.7	Top 8": Asphalt
			G1		28.5/28.5		Fill	8.3	G1 - Poorly Graded SAND with Gravel (SP), medium to coarse, trace of fine sand, 0-5% fines, 40-45% fine to coarse subangular gravel, trace of asphalt, brown, moist
		3.1							
	5.0		G2		23/23				G2 - Poorly Graded SAND with Gravel (SP), medium to coarse, 0-5% fines, 25-30% fine to coarse subangular to rounded gravel, brown, moist
5		5							
		6				1			REMARK 1: Advanced vacuum exploration to depth of 6 feet.
			S1	2-3-3-4 (6)	24/0				S1 - No recovery
		8							
	0.0		S2	2-3-3-2 (6)	24/8				S2 - Silty SAND with Gravel (SM), fine to coarse, 30-35% fines, 15-20% fine subangular gravel, light brown, wet
10		10							
			S3	3-4-4-3 (8)	24/0				S3 - No recovery
		12							
			S4	4-3-4-5 (7)	24/6				S4 - Clayey SAND with Gravel (SC), fine to coarse, 30-35% fines, 35-40% fine to coarse subangular gravel, trace of organic soil, grey brown, wet
	-5.0	14						14.0 -5.0	
15			S5	4-1-2-3 (3)	24/18		Peat		S5 - Peat (PT), fibrous, dark brown, wet
		16						16.0 -7.0	
			S6	2-2-5-6 (7)	24/14		Clay		S6 - Sandy SILT (ML), non-plastic, 30-35% fine sand, trace of organic soil, grey, wet
		18							
	-10.0		S7	10-8-10-9 (18)	24/14				S7 - Silty SAND (SM), fine to medium, 15-20% fines, grey, wet
20		20							
			S8	9-7-6-7 (13)	24/12				S8 - Clayey SAND (SC), fine, trace of medium sand, 35-40% fines, grey, wet
		22							
			S9	6-5-7-7 (12)	24/16				S9 - Clayey SAND (SC), fine, trace of medium sand, 35-40% fines, grey, wet
	-15.0	24							
25			S10	10-8-9-7 (17)	24/18				S10 - Sandy Lean CLAY (CL), slightly plastic, 30-35% fine to medium sand, grey, wet

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: “Soil Boring and QLA Test Pit Locations, Somerville, Fellsway/McGrath Hwy (RTE-28)/Mystic Hwy (RTE-38)," prepared by VHB, plotted on February 12 2024, and provided to LGCI by via e-mail on February 12, 2024.

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

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PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Mast Arms - Route 28 and Route 38
LGCI PROJECT NUMBER: 2305
PROJECT LOCATION: Somerville, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		26							
	-20.0	29					Clay		S11 - Lean CLAY (CL), moderately plastic, grey, wet
30			S11	1-0-0-1 (0)	24/12				
		31						31.0	
	-25.0								Bottom of borehole at 31.0 feet. Backfilled borehole with gravel. Ground surface restored with asphalt cold patch.
35									
	-30.0								
40									
	-35.0								
45									
	-40.0								
50									
	-45.0								
55									
	-50.0								
60									

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

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PAGE 1 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Mast Arms - Route 28 and Route 38
LGCI PROJECT NUMBER: 2305
PROJECT LOCATION: Somerville, MA

DATE STARTED: 1/15/24 **DATE COMPLETED:** 1/18/24
BORING LOCATION: SW corner of Mystic Ave. & McGrath Hwy. Intersection
COORDINATES: NA
SURFACE El.: 10 ft. (see note 1) **TOTAL DEPTH:** 31 ft.
WEATHER: 30's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 6.0 ft. / El. 4.0 ft. Based on sample moisture
AT END OF DRILLING: 9.0 ft. / El. 1.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: John Beirholm
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Vacmasters System 4000 / Mobile B-48
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: AR **CHECKED BY:** JKW

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0.6					Asphalt	0.6	Top 7": Asphalt
			G1		12/12			9.4	G1 - Well Graded SAND with Gravel (SW), fine to coarse, 0-5% fines, 15-20% fine subangular gravel, brown, moist
		1.6							G2 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 10-15% fines, 15-20% fine to coarse subangular gravel, grey, moist
			G2		53/53				
5	5.0								
		6	S1	1-2-3-6 (5)	24/12	1			REMARK 1: Advanced vacuum exploration to depth of 6 feet. S1 - Silty SAND with Gravel (SM), fine to coarse, 25-30% fines, 30-35% fine to coarse subangular gravel, brown, wet
		8	S2	1-2-2-1 (4)	24/14		Fill		S2 - Silty SAND with Gravel (SM), fine to coarse, 25-30% fines, 20-25% fine to coarse subangular gravel, brown, wet
10	0.0	10	S3	4-2-2-2 (4)	24/7				S3 - Silty SAND with Gravel (SM), fine to coarse, 25-30% fines, 25-30% fine to coarse subangular gravel, brown, wet
		12	S4	2-1-3-3 (4)	24/3				S4 - Silty SAND with Gravel (SM), fine to coarse, 30-35% fines, 25-30% fine to coarse subangular gravel, brown, wet
		14	S5	4-3-2-3 (5)	24/10				S5 - Silty SAND with Gravel (SM), fine to medium, trace of coarse sand, 30-35% fines, 15-20% fine to coarse subangular gravel, light brown, wet
15	-5.0	16	S6	2-2-5-5 (7)	24/10				S6 - Top 12": Silty SAND with Gravel (SM), fine to medium, trace of coarse sand, 30-35% fines, 15-20% fine to coarse subangular gravel, light brown, wet Bot. 6": Silty SAND with Gravel (SM), fine to medium, trace of coarse sand, 25-30% fines, 25-30% fine to coarse subangular gravel, trace of organic soil, grey, wet
		18	S7	2-2-5-7 (7)	24/16			18.0 -8.0	S7 - Lean CLAY with Sand (CL), slightly plastic, 15-20% fine sand, grey, wet
20	-10.0	20	S8	11-14-16-15 (30)	24/18				S8 - Lean CLAY with Sand (CL), slightly plastic, 15-20% fine sand, grey, wet
		22	S9	6-7-10-10 (17)	24/14		Clay		S9 - Lean CLAY (CL), moderately plastic, grey, wet
		24							
25	-15.0		S10	9-9-9-8 (18)	24/12				S10 - Lean CLAY (CL), moderately plastic, grey, wet

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: “Soil Boring and QLA Test Pit Locations, Somerville, Fellsway/McGrath Hwy (RTE-28)/Mystic Hwy (RTE-38)," prepared by VHB, plotted on February 12 2024, and provided to LGCI by via e-mail on February 12, 2024.

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

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PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Mast Arms - Route 28 and Route 38
LGCI PROJECT NUMBER: 2305
PROJECT LOCATION: Somerville, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		26							
		29					Clay		S11 - Lean CLAY (CL), moderately plastic, grey, wet
30	-20.0		S11	1-2-2-2 (4)	24/14			31.0	
		31							Bottom of borehole at 31.0 feet. Backfilled borehole with gravel. Ground surface restored with asphalt cold patch.
35	-25.0								
40	-30.0								
45	-35.0								
50	-40.0								
55	-45.0								
60	-50.0								

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

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PAGE 1 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Mast Arms - Route 28 and Route 38
LGCI PROJECT NUMBER: 2305
PROJECT LOCATION: Somerville, MA

DATE STARTED: 1/15/24 **DATE COMPLETED:** 1/16/24
BORING LOCATION: East of Mystic Ave. & McGrath Hwy. Intersection
COORDINATES: NA
SURFACE El.: 10 ft. (see note 1) **TOTAL DEPTH:** 31 ft.
WEATHER: 30's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 10.0 ft. / El. 0.0 ft. Based on sample moisture
AT END OF DRILLING: 4.5 ft. / El. 5.5 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: John Beirholm/ Cam Flateau
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Vacmasters System 4000 / Mobile B-48
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: AR **CHECKED BY:** JKW

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	G1		12/12		Topsoil	1.0	G1 - Topsoil
		1	G2		60/60		Fill	9.0	G2 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 10-15% fines, ~15% fine to coarse subangular gravel, trace of organic soil, dark brown, moist
5	5.0								
		6	S1	6-2-2-2 (4)	24/9	1			REMARK 1: Advanced vacuum exploration to depth of 6 feet. S1 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 10-15% fines, ~15% fine to coarse subangular gravel, trace of organic soil, dark brown, moist
		8	S2	3-2-3-8 (5)	24/11				S2 - Silty SAND with Gravel (SM), fine to medium, 20-25% fines, 10-15% fine to coarse subangular gravel, brown, moist
10	0.0	10	S3	4-2-3-2 (5)	24/4				S3 - Silty SAND with Gravel (SM), fine to medium, 30-35% fines, 15-20% fine to coarse subangular gravel, light brown, wet
		12	S4	3-3-3-3 (6)	24/13				S4 - Silty SAND (SM), fine to medium, 35-40% fines, 5-10% fine to coarse subangular gravel, brown grey, wet
		14	S5	1-1-1-2 (2)	24/18			14.0 -4.0	S5 - Silty SAND (SM), fine to medium, 35-40% fines, trace of organic soil, trace of peat fibers, dark brown to grey, wet
15	-5.0	16	S6	2-2-2-2 (4)	24/20		Buried Organic Soil		S6 - Silty SAND (SM), fine to medium, 35-40% fines, trace of organic soil, trace of peat fibers, interbedded layers of peat, dark brown to grey, wet
		18	S7	1-1-1-1 (2)	24/1				S7 - Silty SAND (SM), fine to medium, 35-40% fines, trace of organic soil, trace of peat fibers, dark brown to grey, wet
20	-10.0	20	S8	2-3-3-6 (6)	24/24				S8 - PEAT (PT), fibrous, dark brown to grey, wet
		22	S9	8-12-17-17 (29)	24/18		Clay	22.0 -12.0	S9 - Lean CLAY with SAND (CL), slightly plastic, 20-25% fine sand, grey, wet
		24	S10	4-7-9-10 (16)	24/24				S10 - Lean CLAY (CL), slightly plastic, 10-15% fine sand, grey, wet
25	-15.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: “Soil Boring and QLA Test Pit Locations, Somerville, Fellsway/McGrath Hwy (RTE-28)/Mystic Hwy (RTE-38)," prepared by VHB, plotted on February 12 2024, and provided to LGCI by via e-mail on February 12, 2024.

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

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PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Mast Arms - Route 28 and Route 38
LGCI PROJECT NUMBER: 2305
PROJECT LOCATION: Somerville, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		26							
		29					Clay		S11 - Lean CLAY (CL), moderately plastic, 0-5% fine sand, grey, wet
30	-20.0		S11	3-4-4-5 (8)	24/22				
		31						31.0	Bottom of borehole at 31.0 feet. Backfilled borehole with gravel.
35	-25.0								
40	-30.0								
45	-35.0								
50	-40.0								
55	-45.0								
60	-50.0								

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG

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PAGE 1 OF 1

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Mast Arms - Route 28 and Route 38
LGCI PROJECT NUMBER: 2305
PROJECT LOCATION: Somerville, MA

DATE STARTED: 1/12/24 **DATE COMPLETED:** 1/18/24
BORING LOCATION: NE corner of Mystic Ave. & McGrath Hwy. Intersection
COORDINATES: NA
SURFACE El.: 10 ft. (see note 1) **TOTAL DEPTH:** 23 ft.
WEATHER: 30's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 8.0 ft. / El. 2.0 ft. Based on sample moisture
AT END OF DRILLING: 8.2 ft. / El. 1.8 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: John Beirholm/ Cam Flateau
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Vacmasters System 4000 / Mobile B-48
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: AR **CHECKED BY:** JKW

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0.6					Asphalt	0.6	Top 7": Asphalt
		1.3	G1		9/9			9.4	G1 - Poorly Graded SAND with Gravel (SP), fine to medium, trace of coarse sand, 0-5% fines, 25-30% fine to coarse subangular gravel, brown, moist
			G2		56/56				G2 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 15-20% fine subangular gravel, brown, moist
5	5.0								
		6	S1	6-3-4-3 (7)	24/14	1			REMARK 1: Advanced vacuum exploration to depth of 6 feet. S1 - Silty SAND (SM), fine to coarse, 15-20% fines, 10-15% fine to coarse subangular gravel, brown, moist
		8	S2	7-7-6-6 (13)	24/12				S2 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 5-10% fines, 20-25% fine to coarse subangular gravel, brown, wet
10	0.0	10	S3	7-13-10-7 (23)	24/8				S3 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subangular, 10-15% fines, 35-40% fine to coarse sand, brown, wet
		12	S4	9-5-5-4 (10)	24/12		Fill		S4 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines 10-15% fine to coarse subangular gravel, brown, wet
		14	S5	4-4-7-8 (11)	24/7				S5 - Silty SAND with Gravel (SM), fine to medium, trace of coarse sand, 15-20% fines, 20-25% fine to coarse subanguar gravel, grey, wet
15	-5.0	16	S6	11-8-8-12 (16)	24/12				S6 - Silty SAND with Gravel (SM), fine to medium, trace of coarse sand, 15-20% fines, 20-25% fine to coarse subanguar gravel, grey, wet
		18	S7	13-11-12-14 (23)	24/12				S7 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 35-40% fine to coarse subangular gravel, grey, wet
20	-10.0	20	S8	17-10-10-4 (20)	24/12				S8 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 35-40% fine to coarse subangular gravel, grey, wet
		22	S9	5-4	12/4				S9 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, angular, 5-10% fines, 25-30% fine to coarse sand, grey, wet
		23				2		23.0	REMARK 2: Split spoon bouncing on top of hard object at depth of 23 feet. Did not continue drilling due to safety concerns. Bottom of borehole at 23.0 feet. Backfilled borehole with gravel. Ground surface restored with asphalt cold patch.
25	-15.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: “Soil Boring and QLA Test Pit Locations, Somerville, Fellsway/McGrath Hwy (RTE-28)/Mystic Hwy (RTE-38)," prepared by VHB, plotted on February 12 2024, and provided to LGCI by via e-mail on February 12, 2024.

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DOCUMENT A00808

PROJECT UTILITY COORDINATION FORM

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Project Utilities Coordination (PUC) Form

CONTACTS AND GENERAL UTILITY INFORMATION

6/24/2024

Revision Date:

City/Town:	Project File #:	PUC Completed by:	Utility Pole Set:		
Somerville	608562	GPitta.ardadaraga@dot.state.ma.us	Eversource		
Route/Street:	**Asst. Dist Const /Dist Utility Reimb. Eng**	**Mass DOT PM:**	**Scheduled Ad Date:**	**Total Poles Relocated:**	6/24/2024
I-93 at Mystic Ave and McGrath Highway	Peter.Tramontozzi@dot.state.ma.us 857 368 4085 Amanda.Klemm@dot.state.ma.us/781-570-1154	David.Shedd@dot.s	7/20/2024	NONE	PRINTED

Consultant:	Contact:	Office #	Cell #	Email
MassDOT Consultant: VHB	Timothy B. Mcintosh Alex Loncarevic	617 607 2719	617 429 7679	TMcIntosh@VHB.com ALoncarevic@VHB.com

Utility Company	Contact	Office #	Cell #	Email	Scope, Budget, Duration Submitted		Reimbursement			Potential for District Initiated Early Relocation *		Utilities On Bridge/Structure		Utilities Underground (UG) /Aerial (OH)	
					Yes	No	Agreement	Non-Reimb'le	Notes	YES	NO	YES	NO	UG	OH
Eversource Electric	Ned Sadowski Luis Escobar		413-537-6594	ned.sadowski@eversource.com Luis.escobar@eversource.com		x		x(Adj EMH - no reimbrsement)	No Conflicts between Drainage or Lighting and UG Ev. Distribution Primaries. Relocation of EVS Lighting conduit, to be done under Contract Items.		x		x	x	
Eversource Service Dept Electric	Terence Doonan			terence.doonan1@eversource.com		x	x		Contract Allowance Item 999.860- Speciaty Services is used to reimburse massDOT Contractor for WO# Invoices I.E. Payments to Eversource(EVS) to R&R Pentagon Cem.Conc. Light Poles(un-Metered), and for EVS Disconnect/Reconnect at EMHs, and Replace ug lighting wiring as required 1.)Req a WO# from Eversource Service Dept., and pay all fees, 2.) Perform test pits in location of Prop Light Pole to support Pole R&R by EVS 3.) Install new Conduit and Split Conduit, and EHHs to support EVS Rewireing, and R&R Un-Metered Light Poles.		x		x	x	
Eversource UG Transmission	Andrew Hogan Thomas Cloonan Jack Strollo			andrew.hogan@eversource.com Thomas.Cloonan@eversource.com Jack.strollo@eversource.com		x		x	2 seperated 115 KV are within the limits! Coordination required to have eversource provide an inspector when working within 10ft		x		x	x	
MassDOT D4 Electrical	Peter Gfatter			Peter.Gfatter@dot.state.ma.us					MassDOT Lighting, Signals						
Enbridge	Kathy M. Aruda		(508) 938-7728	kathleen.aruda@enbridge.com		x		x	14" high pressure gas (433psi) coordination required for any work within 10 ft of the gas. Including Mast arm, Draiange, lighting and new services.		x		x	x	
NGrid Gas	Melissa Owens Michael Hilbrunner	(781) 907-2845 (781) 227-0621		melissa.owens@nationalgrid.com michael.hilbrunner@nationalgrid.com		x		x	Gas within Limits - GG Adjusts required. Gas Line close to proposed drainage at Sta 422+07 Notify NG when pipe is uncovered and when placing structures.		x		x	x	
MBTA	Christine Bresnahan	(617) 222-3361	(617) 455-7087	CBresnahan@mbta.com		x		x	Bus Stops within limits Coordinate to Place Early worning signs and stagger the Prop sidewalk at Bus Stops.		x		x		x
MWRA Water	Ralph Francesconi	(617) 305 5827		Ralph.Francesconi@mwra.com		x		x	8M permit is included in contract. Contractor to coordinate with MWRA to provide list of contacts and emergency number and req inspector for all work near.		x		x	x	
MWRA Sewer	Kevin McKenna		(617) 305-5956	Kevin.McKenna@mwra.com		x		x	8M permit is included in contract. Contractor to coordinate with MWRA to provide list of contacts and emergency number and follow all standards		x		x	x	
Somerville Electrical Lights and Lines	Jeffrey Barbiere Vincent DeValis Chris Caley (Foreman)	EX.5607	617 625 6600 617 448 1133 (CC)	jbarbiere@somervillema.gov vdevellis@somervillema.gov		x	x	x	Mystic Ave Sta 305+20 Rt R&R Conduit to fit Mast arm casing in - Contract to Test pit over Conduit, and With Coordiantion with Somerville Lights and Lines to install Split Duct and Move the Fire Alarm Duct t the side of the Mast Arm Foundation.		x		x	x	
RCN	Alex Ortiz Jennifer O'Neill	(781) 316-8878 (781) 316-8890	(617) 756-9881	alex.ortiz@rcn.net jennifer.oneill@rcn.net				x	02 24 2024 No involvement - OHW on Pole(RET)		x		x		x
Verizon	Paul Diamantopoulos	(978) 323-0282	(508) 245-5522	paul.e.diamantopoulos@verizon.com		x		x	No conflicts 2022 8 10 Confirm no conflicts with overhead wire on wheatland		x		x		x

For Information Only									
Somerville DPW Water	Jay Hayden	(617) 625-6600 Ext 5854		jhayden@somervillema.gov					
Somerville DPW Engineering	Brian Postlewaite	EX. 5418	617 - 625 - 6600	bpostlewaite@somervillema.gov					
DPW Commissioner	Jill Lathan	EX. 5110	617 - 625 - 6600	jlathan@somervillema.gov					
Water + Sewer Director	Demetrios Vidalis, P.E.	EX. 5850	618 - 625 - 6600	water@somervillema.gov					
DOT RE Adjacent Project	Stasio, Winnick								
No Facilities or No Conflicts									
LightPath	Jeff Harrington	617-999-5371		jeff.harrington@lightpathfiber.com					No response
Lumen	Micheal Mugo		(516) 712-3041	relocations@lumen.com Michael.mugo@lumen.com					2023 22 09 Clarify lumen facility .2021 02 11 Has Fiber in leased facilities within project area .
AT&T	E. Hudson			erica.hudson@sienaengineeringgroup.com					2023 01 05 & 2022 08 02 No Facilities
CSX/ PanAm Railways	Ted Krug		(978) 663-1077	tkrug@panam.com					No Rail - RCS
First Light	Keith Mellor Heather Araujo			kmellor@firstlight.netharaujo@firstlight.net					2021 02 12 No Facilities
MCI Verizon	Stephen Parretti		(508) 248-1305	stephen.parretti@verizon.com					2021 02 17 No Facilities
Comcast	Wendy Brown		(978) 848-5163	Wendy_Brown@comcast.com					2021 02 19 No Facilities
Eversource Gas	Jeffrey Evans Mongeon		(508) 305-6970	Jeffrey.Evans-Mongeon@eversource.com					2021 03 01 No Facilities
ZAYO	Richard Moran	(978) 844-7525		richard.moran@zayo.com					2022-08-25 no infrastructure within the limits
Crown Castle	Christopher Stevens Mark Bonnano	(508) 621-1874	(978) 881-4543	Christopher.Stevens@crowncastle.com mark.bonanno@crowncastle.com					2021 04 14 No Anticipated conflicts at 25% - 7-27 22 UG and OHW sent to update plans
Eversource Fiber	Bachir Khoury	781-441-3864		bechir.khoury@eversource.com					2021 04 13 No Facilities

Utility Relocation Notes for MassDOT Contractor

Unless otherwise noted by Contract, the MassDOT Contractor is to provide the District Construction Office with 7 Calendar Days advance notification in order to validate the current progress and provide the required 30 Days

Additional notes:

Suggested Sequence of Relocation (Based on Consultant proposed construction staging)

The sequence as detailed on the following pages is based on the consultants proposed staging plan. This information was compiled through meetings that included all of the utilities listed below along with the designer and Somerville. The information provided is the best available information prior to project advertisement.

PUC FORM - CONTINUED

Is 'enabling' (prep) work, by the Contractor, necessary prior to the start of the first series of utility relocations:	Yes	No
	x	

Has any of the Utility work been identified to work concurrently	Yes	No
		x

6/24/2024
PRINTED

massDOT Massachusetts Department of Transportation Highway Division

Project File #:	608562
City/Town:	Somerville
Route/Street:	I-93 at Mystic Ave and McGrath Highway

	RESPONSIBLE PARTY		DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by Utilities (Lead time not included)	Concurrent / Exclusive Utility Work. Contractor note: In planning and executing the work, the Access Restraints listed in the Special Provisions, takes precedence over the checklist in these 4 columns.				Access Restraint & Limitations of Operations Notes. Should an AR be considered for the Contractor ?	
	C = Contractor	U = Utility Co.			Exclusive Utility on site: Utility working with no other Utilities in vicinity	Concurrent Utilities: Utility working with other Utilities on site	Contractor Off-Site: No Contractor physical construction operations on-site (while Utility is	Contractor Concurrent: Contractor and Utility are working on-site - but NOT in the same vicinity	Potential Access Restraint (Yes/No)	Reason/Note (optional)
Stage : 1 Phase : A			Enabling' work by the Contractor - Digsafes, Develops Plan submission to Eversource for each R&R Light Pole location and/or Conduit Relay. Contractor Request a Service Disconnect/Reconnect for each Location, and Pays all fees. (Sta. 308+00, 309+50, 414+00, 415+00, 416+30, 120+20, and 121+60). Contractor be advised that WO (workorder) may take up to 120 days. This Work Order quote paid paid by Contractor and reimbursed under under Contract Allowance Item 999.860.							
			UTILITY OPERATIONS - R&R Light Poles - Un-Metered Eversource Lighting System							
Task: 1			***Utility Co. Eversource***							
	c		Contractor the requests a work order number (WO#) from ES (Eversource) relocate the street light poles at Station 308+00, 309+50, 414+00, 415+00, 416+30, 120+20, and 121+60. Contractor be advised that WO may take up to 120 days.	90		x		x		* DUCE Est
	c		Contractor to DigSafe, Test Pits and provide traffic Control and each new pole/conduit Relocation.	3		x		x		* DUCE Est
		u	Eversource Disconnects Power from EMH	1		x		x		* DUCE Est
		u	Eversource R&R light pole onto new location.	1		x		x		* DUCE Est
		u	Eversource rewires Light to EMH and Reconnects.	1		x		x	N	* DUCE Est
	c		Contractor installs new conduits, and EHHs, backfills Adjusts EHH, and Resurfaces as necessary at each Location.	1		x		x		* DUCE Est
			Sub-Total	**97**						
			UTILITY OPERATIONS - Electric Conduit Relocation - Un-Metered Eversource Lighting System							
Task: 2			***Utility Co. Eversource***							
	c		Contractor the requests a work order number (WO#) from ES (Eversource) relocate the Conduit at Station 417+50 Lt., 305+50 Rt. Contractor be advised that WO may take up to 120 days.	90		x		x	N	* DUCE Est
	c		Install conduits from manhole to manhole with Approved ES Contractor under ES Inspection	1		x		x	N	* DUCE Est
	c		Break into manhole at location specified by ES, Install concrete encased conduits per ES standards, mud up hole	1		x		x	N	* DUCE Est
		u	Eversource to pull new cable,	5		x		x	N	* DUCE Est
		u	Eversource to splice cables	5		x		x	N	* DUCE Est
		u	Eversource to pull abandon cables and abandon Conduit	1		x		x	N	* DUCE Est
	c		Contractor to install drainage							
			Sub-Total	**103**						
Stage : 1 Phase : B			Enabling' work by the Contractor -Digsafes, Develops Plan submission to District 4 Traffic Electrical for each R&R Light Pole location (Sta. 312+00, 313+20, 401+50, 405+20). Contractor shall request a Street Light Lock out/tag out from D4-Traffic Section at the Highway Lighting Load Center. A Lockout/Tagout Approval Submission shall include proposed wireing, connections, grounding and materials(Cable, conduit, Light Pole Foundation, EHH, etc.)							
			UTILITY OPERATIONS - R&R massDOT Owned Light Poles							
Task: 3			***Utility Co. MassDot D4 Traffic Electrical Lighting***							
	c		Contractor coordinate with D4 Taffic Section to LockOut/Tag out each Load Center Location	5		x		x	N	* DUCE Est
	c		Contractor to DigSafe, Test Pits and receive approvals from Traffic for each location.	3		x		x	N	* DUCE Est
		u	Approvals from Traffic for each location.	30		x		x	N	* DUCE Est
	c		Contractor installs new light pole foundation. Item Number 812.09	1		x		x	N	* DUCE Est
	c		Contractor installs new conduit/ EHH to new foundation	1		x		x	N	* DUCE Est
	c		Contractor is Locked out/Tagged Out-Lights out- Coordination with massDOT required	1		x		x	N	* DUCE Est
	c		Contractor R&R light poles, and rewires. Item Number 823.70	1		x		x	N	* DUCE Est
	c		Contractor recieves Inspection /Approval from D4 Traffic, Lock Off- Lights on	1		x		x	N	* DUCE Est
	c		Contractor R&D/R&S old light foundations/EHH, Backfills, Resurfaces, Adjusts EHHs	1		x		x	N	* DUCE Est
			Sub-Total	**44**						

	RESPONSIBLE PARTY		DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by Utilities (Lead time not included)	Concurrent / Exclusive Utility Work Contractor note: In planning and executing the work, the Access Restraints listed in the Special Provisions, takes precedence over the checklist in these 4 columns.				Access Restraint & Limitations of Operations Notes Should an AR be considered for the Contractor ?	
	C = Contractor	U = Utility Co.			Exclusive Utility on site: Utility working with no other Utilities in vicinity	Concurrent Utilities: Utility working with other Utilities on site	Contractor Off-Site: No Contractor physical construction operations on-site (while Utility is	Contractor Concurrent: Contractor and Utility are working on-site - but NOT in the same vicinity	Potential Access Restraint (Yes/No)	Reason/Note (optional)
Stage : 2 Phase : A			Enabling' work by the Contractor This work will not be on the Force Account.- Contractor to provide lane closure / police/ and coordinate with utility to adjust structures.							
			UTILITY OPERATIONS - ADJ MWRA Water Gates and WMH - 8 M Permit							
Task: 4			***Utility Co. MWRA - Water***							
	C		Coordinate w/ MWRA - Complete submission of 8M Permit(Contact info, Notifications, Inspection, Equipment Stockpileing, etc.)							
		U	MWRA to provide Inspection, new CASTINGS if necessary	1						* DUCE Est
	C		Contractor shall R&D old Casting - This old casting is not to be reused - it must be scrapped/destroyed.							
			Sub-Total	**1**						
			UTILITY OPERATIONS - ADJ MWRA SMH							
Task: 5			***Utility Co. MWRA - Wasterwater***							
	C		Coordinate w/ MWRA - Complete submission of 8M Permit(Contact info, Notifications, Inspection, Equipment Stockpileing, etc.)							
		U	MWRA to provide Inspection, new CASTINGS if necessary	1						* DUCE Est
	C		Contractor shall R&D old Casting - This old casting is not to be reused - it must be scrapped/destroyed.							
			Sub-Total	**1**						
			UTILITY OPERATIONS - Work Adjacent to Algonquin HP Gas							
Task: 6			***Utility Co. Endbridge 14" Coated Steel 400 PSI***							
	C		Advanced coordinate with Enbridge to review sheilding and all work adjacent to HP Gas. (10')							* DUCE Est
		U	Endbridge to provide Inspection for work considered to put pipe at risk.							* DUCE Est
		U	Endbridge may request to install vibration monitoring.							
		U	Provide Enbridge 2 weeks notice of work within 10' of HP gas							
			Sub-Total	**0**						
			UTILITY OPERATIONS - Eversource 115 kV Transmission Lines							
Task: 7			***Utility Co. Eversource - 3 - 115KV UG PTCs - (1- Abandoned, 2- Active/live)***							
	C		Advanced coordinate with Eversource to review markout EMH ADJ BO							* DUCE Est
		U	Eversource Transmission to provide Inspection for work considered to put pipe at risk.							* DUCE Est
		U	Eversource may require Inspection							
		U	Provide Eversource 2 weeks notice of work within 10' of HV Electric							
			Sub-Total	**0**						
			UTILITY OPERATIONS - Paving & SW reconstruction							
Task: 8			***Utility Co. Various***							
	C		Contractor to adjust drainage /traffic handhole / water gates							
	C		Adj MWRA Structures - Contractor to Plan this through 8M Permit							* DUCE Est
		U	Vz adjust telphone manholes	2		x		x	N	* DUCE Est
		U	Ngrid adjust gas gate	2		x		x	N	* DUCE Est
		U	Eversource adjusts electric manholes	2		x		x	N	* DUCE Est
			Sub-Total	**6**						

IMPORTANT BASIS NOTES - FOR CONTRACTOR

1	Unless otherwise specified in the MassDOT Construction Contract, or unless specifically noted within this PUC Form, these durations (herein) are based upon the Contractor providing *unimpeded access* to the Utility company to perform Utility relocations (see Note 5 - Access).
2	"Concurrent Utilities" operations noted herein, are to signify those Utility Company operations that can be worked concurrently (e.g. Utility A and Utility B work on-site together) - MassDOT and the Contractor are to prepare NTPs to Utilities accordingly.
3	"Potential Access Restraints" noted within this PUC Form are for planning purposes. See MassDOT Contract for Contractual Access Restraints (refer to Subsections 8.02, 8.03, and/or 8.06 for Design Bid Build Contracts and Volume II Section 9 for Design Build Contracts).
4	Utility non-work periods - For planning purposes, the durations above contain some non work days (contingency) for New England conditions (precipitation, high temperatures, low temperatures, snow, ice). Gas line work however, typically has a seasonal restriction and can NOT be installed from 15-November to 15-March. Municipally Owned Electric and Gas Utilities are also restricted from proceeding from 15-November to 15-March. The Contractor shall (and the CTD plan) reflect this calendar restriction within the schedule (unless otherwise note).
5	Access - Unless otherwise noted in the Contract, and in addition to the 'enabling' notes above, the Contractor must provide safe and unimpeded access (for trucks, lifts, cranes, etc.) to the Utilities, to allow for the proposed relocation(s) - including but not limited to snow removal, clearing and grubbing, guard rail removal, barrier removal, tree removal, and grading. Any costs associated with these tasks are deemed to be incidental to the project.
6	For all MassDOT construction contracts issued after January 2014, the new Utility Coordination/documentation specification is required. This is Section 8.14 in Design-Bid-Build Contracts (see Design-Build index reference for applicable section #).
7	Prior to starting any and all enabling work for Utilities, the Contractor is to plan in advance with submittals and approved durations.
8	* Potential District Initiated Early Utility Relocation - if noted herein, the District reserves the right to initiate early utility relocation in advance of the Contract NTP. In submitting a bid price and in the development/basis of the Baseline Schedule, the Contractor shall not plan the Work with the potential benefit of any form of 'early utility relocation.' As a requirement of the Baseline submission, unless otherwise noted in this Specification, the earliest that the first Utility company is to receive the 30 days advance notification to mobilize to the site, will be 7 calendar days after the pre-construction meeting and never sooner than 7 days after the Contract NTP.
9	

R&R

DOT Owned Poles

	Google Streetview	Ev Plan Link to DUCE File	Label	Sta	Ofsett	EHH	Conduit(ft)	
1	https://maps.app.goo.gl/6Xy6244knpo5FKmeA		MS12-LC1	313+42	30'Rt.	1	5	
2	https://maps.app.goo.gl/JNMwCFpG7dMde1xA7		MS13-LC1	312+00	30'Rt.	0	11	
3	https://maps.app.goo.gl/iAZSTbCu9TMGxS4P7		MC15 LC2	401+61	32' Lt	0	6	
4	https://maps.app.goo.gl/3sDjXYs9sTSPgQnUA		CA2 LC2-4	405+17	18'Lt.	0	12	Review Wall at Hwy Lighting Conduit - See 606528 SUE plans

Eversource unmetered Light Poles

			Label	Sta	Ofsett	EHH	Conduit (ft)	
1	https://maps.app.goo.gl/1rajdJmXfjZCnbyaA	..\..\6	1687	307+93	35' Rt.	0	9	
2	https://maps.app.goo.gl/RMoGhrLsM6wW81xt7		1205	309+62	26'Rt.	1	10	Possible 1688(5)
3	https://maps.app.goo.gl/MJmTZesSDyvHXctj8		1196	413+85	53' Rt.	1	6	
4	https://maps.app.goo.gl/XXnbHZzXDkCWkriq6		1193	414+98	36' Lt.	1	6	
5	https://maps.app.goo.gl/yQQTZEohzSighegN7		1192	416+24	32' Rt.	0	6	
6	DISCONNECT RECONNECT		1190	417+80	32' Rt.	1	100	
7	https://maps.app.goo.gl/ks4uTWkFKjPyPFVJ9		1185	120+18	35' Rt.	1	10	
8	https://maps.app.goo.gl/XCTCjYuwC9L5ffgLA		1183	121+70	32'Rt	1	4	
9								
10	https://maps.app.goo.gl/t46qyCoWq1tYkCxt5		M1214	307+23	36'Rt.	1	1	
11	https://maps.app.goo.gl/EavG5TCzfr5F7WZ96		1547(5)					

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DOCUMENT A00810

MWRA 8m SEWER PERMIT - #23-04-2083M

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MASSACHUSETTS WATER RESOURCES AUTHORITY

PERMIT

8m Permit # 23-04-2083M

07-Sep-23

MassDOT Highway Division
10 Park Plaza
Boston, MA 02111

This Permit is subject to the 8(m) Permit Terms and Conditions, and the 8(m) Permit Special Terms and Conditions, if any, attached hereto and made a part hereof. Permittee agrees that it shall be bound by, and shall comply with, said Terms and Conditions.

The land is described as follows:

MWRA Section 35 (Metropolitan Sewer) between Sta. 62+00 and 43+25 along Mystic Ave. in Somerville as depicted within "Construction Plans Signal and Intersection Improvements MWRA 8(m) Permit Application April 14, 2023 - Somerville Mystic Ave (Rt. 38) at Fellsway (Rt. 28).

You may use the land for the purpose of:

Traffic Improvements which include: Mill and Overlay along Mystic Ave, Signal Upgrades, ADA Ramp Construction and Pedestrian Safety Improvements near MWRA Section 35 Somerville.

Approved as to Form:
Massachusetts Water Resources Authority

Christopher John
Law Division

Approved
Massachusetts Water Resources Authority

Deputy Chief OO, PP&P

This Permit is subject to the 8(m) Permit Terms and Conditions, and the 8(m) Permit Special Terms and Conditions, if any, attached hereto and made a part hereof. Permittee agrees that it shall be bound by, and shall comply with, said Terms and Conditions.

Permittee: John J. Bechard, PE / John J. Bechard, Deputy Chief Engineer
Signature Print Name 9/12/2023

This Permit shall have no effect until such time as the Authority issues the fully executed original of this Permit.

Massachusetts Water Resources Authority
2 Griffin Way
Chelsea, MA 02150
Attn: Wastewater Operations - Permitting Department

8(m) PERMIT TERMS AND CONDITIONS

1. Permittee shall be responsible to stay apprised of and comply with all applicable federal, state and local laws, rules, and orders including, but not limited to, guidelines and requirements for construction sites, and all supplements, amendments and/or changes thereto and notices thereof. Prior to commencing work pursuant to this Permit, Permittee shall have obtained all other required permits, written approval(s) and necessary authorizations to perform the work. Failure to comply with the terms stated herein shall render this Permit null and void by the Authority, and Permittee shall bear all responsibility, liability, damages and costs arising from the Permittee's noncompliance.

2. Permittee's use of the permitted land shall at no time interfere with the Authority's activities or operations on the permitted land. The Authority has the right to review and approve all of the Permittee's work including such plans and specifications, as the Authority deems necessary. Any proposed future work beyond the scope of this Permit shall have the prior written approval of the Authority.

3. To the fullest extent permitted by law, the Permittee shall indemnify, defend with counsel acceptable to the Authority, keep and save harmless the Authority and its board members, officers, representatives, contractors, agents, employees, successors, and assigns, in both their individual and official capacities, against all suits, claims, liabilities, damages, losses (including but not limited to loss of use resulting therefrom) and expenses, including but not limited to attorney's fees, caused by, arising out of or resulting from any work or activity under this Permit and/or act, omission, breach or default of the Permittee or of any contractor, subcontractor of vendor of the Permittee or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

4. The granting of this Permit shall in no way interfere with the rights of the Authority to exercise its existing rights in or over the permitted land. Permittee acknowledges that the Authority, within its sole discretion, may enter upon the permitted land at any time in order to carry out inspections, maintenance, repairs, replacements, or other activities.

5. The Authority may revoke this Permit at any time. The sale or disposition of the permitted land by its owner will cause this Permit to terminate without further notice. Permittee shall give the Authority at least 72 hours notice before commencing the operations as pursuant herein. This Permit shall not be assigned or transferred.

6. No blasting, drilling or other activity that could in any way affect the integrity or operability of the Authority's property or use of the permitted land shall be permitted without express prior written approval of the Authority.

7. The Permittee shall remove, at its own expense, within six months of the date of written notice from the Authority, any or all conduits and appurtenances installed by the Permittee under this Permit if, in the Authority's sole discretion, such removal is necessary for the operation, maintenance or replacement of the Authority's infrastructure.

8. To the fullest extent permitted by law, and in consideration of the issuance of this Permit, Permittee hereby releases the Authority and its board members, officers, representatives, contractors, agents, employees, successors, and assigns, in both their individual and official capacities, from all suits, claims, liabilities, damages, losses (including but not limited to loss of use resulting therefrom) and expenses, including but not limited to attorney's fees, caused by, arising out of or resulting from any work or activity under this Permit and/or act, omission, breach or default of the Permittee or of any

CONDITIONS (Cont'd)

contractor, subcontractor of vendor of the Permittee or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. This release includes, but is not limited to, all suits, claims, liabilities, damages (including, but not limited to, direct, indirect, and consequential damages, economic loss, and loss of profits) and losses which are attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including the loss of use resulting therefrom, together with all attorneys' fees, costs and expenses.

9. The Permittee shall conduct design, construction, and excavation in accordance with all federal, state and local safety regulations, including but not limited to, federal OSHA regulations (29 CFR 1926) and Massachusetts Department of Public Safety regulations (520 CMR 14.00). During construction, Permittee shall take appropriate sheeting and shoring measures to protect the integrity of the Authority's water and/or sewer mains. Permittee shall submit design plans stamped by a professional engineer licensed in Massachusetts to the Authority for approval prior to the start of construction.

10. The Permittee shall adjust any or all Authority frames and covers to grade within the limits of work in accordance with the plans referenced in this Permit. The Authority will provide the Permittee with new replacement Authority frames and covers that have been deemed unusable by the Authority.

11. If the Permittee is proposing to take borings and/or place test pits within the permitted land, the Permittee shall mark the proposed boring and test pit locations on the ground using paint and/or stakes and submit engineering documents to the Authority showing the proposed boring and test pit locations. Authority staff will review all boring and test pit locations at the site. Upon written clearance of the proposed boring and test pit locations by Authority staff and subject to Permittee providing the Authority with seventy-two (72) hours prior notice, Permittee may commence work at the site.

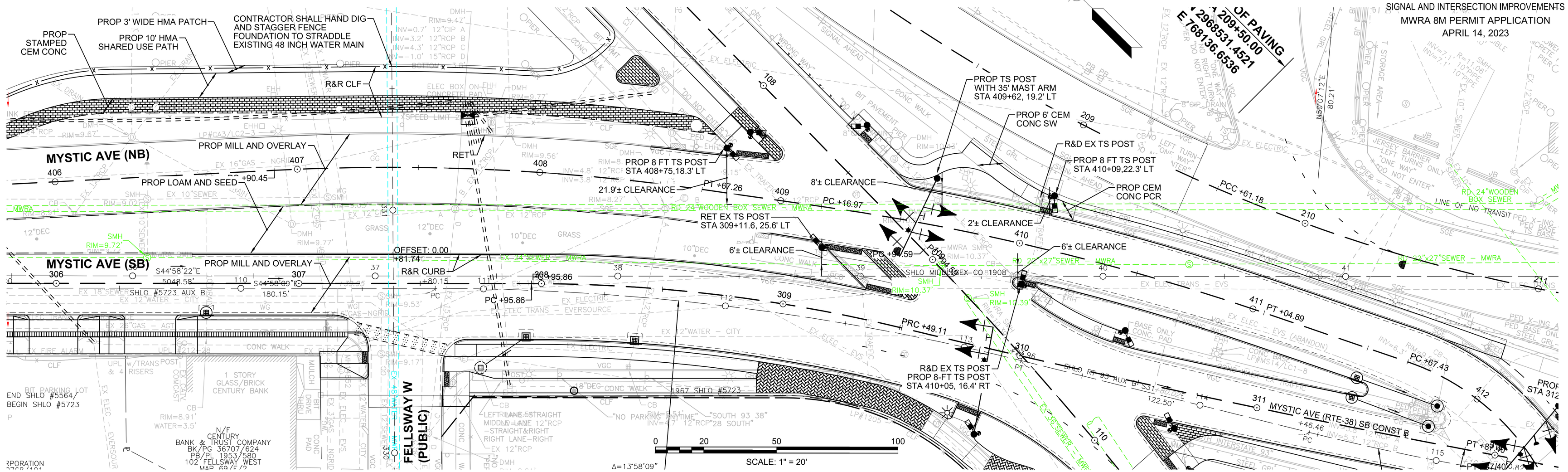
    The Permittee shall be responsible for the locations of proposed borings and test pits regardless of any act or omission of the Authority. The Permittee shall be responsible for repairing and/or replacing, at the Authority's election, the Authority's property or infrastructure, which is damaged as a result of the Permittee's, its contractors, agents, representatives, employees, and/or invitees activities pursuant to this Permit. The Permittee's obligations under this paragraph shall include payment to the Authority for all costs to repair all such damage caused to the Authority's property.

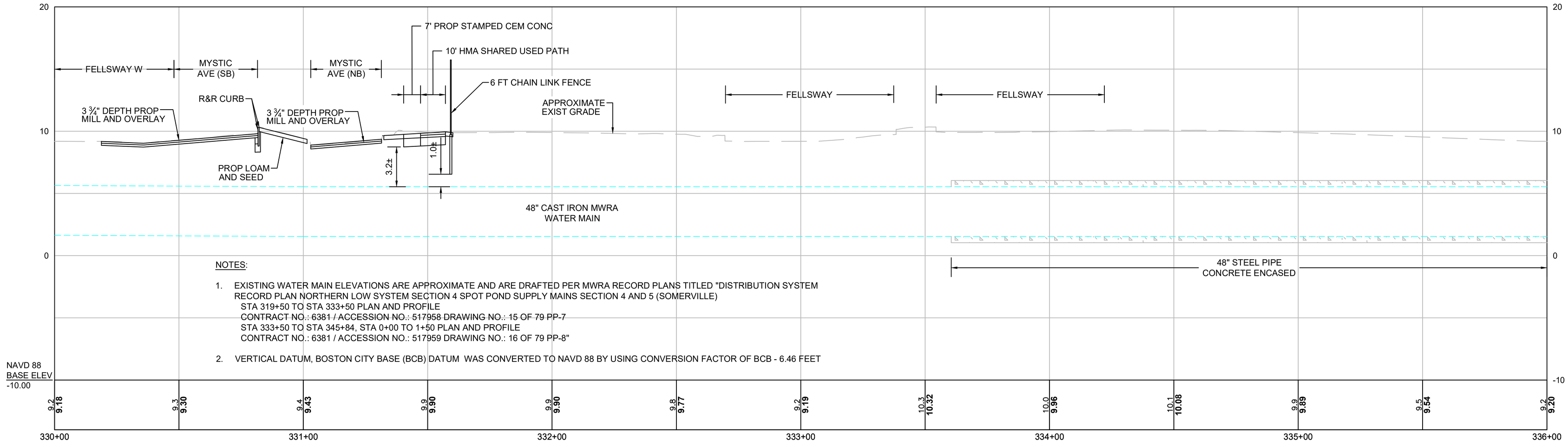
SOMERVILLE
MYSTIC AVENUE (RTE-38) AT FELLSWAY (RTE-28)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	XXXX	1	10
PROJECT FILE NO. 608562			

CONSTRUCTION PLANS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
APRIL 14, 2023

608562_HD(CONST).DWG Plotted on 6-Apr-2023 11:54 AM





NOTES:

1. EXISTING WATER MAIN ELEVATIONS ARE APPROXIMATE AND ARE DRAFTED PER MWRA RECORD PLANS TITLED "DISTRIBUTION SYSTEM RECORD PLAN NORTHERN LOW SYSTEM SECTION 4 SPOT POND SUPPLY MAINS SECTION 4 AND 5 (SOMERVILLE)
   STA 319+50 TO STA 333+50 PLAN AND PROFILE
   CONTRACT NO.: 6381 / ACCESSION NO.: 517958 DRAWING NO.: 15 OF 79 PP-7
   STA 333+50 TO STA 345+84, STA 0+00 TO 1+50 PLAN AND PROFILE
   CONTRACT NO.: 6381 / ACCESSION NO.: 517959 DRAWING NO.: 16 OF 79 PP-8"
2. VERTICAL DATUM, BOSTON CITY BASE (BCB) DATUM WAS CONVERTED TO NAVD 88 BY USING CONVERSION FACTOR OF BCB - 6.46 FEET

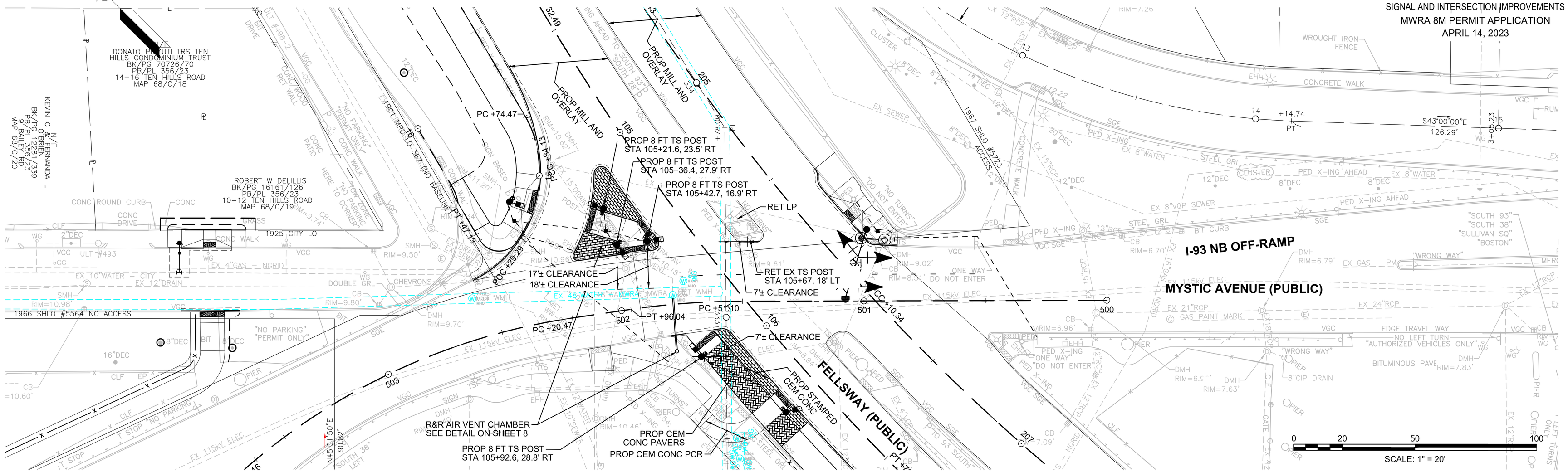
A00810 - 7

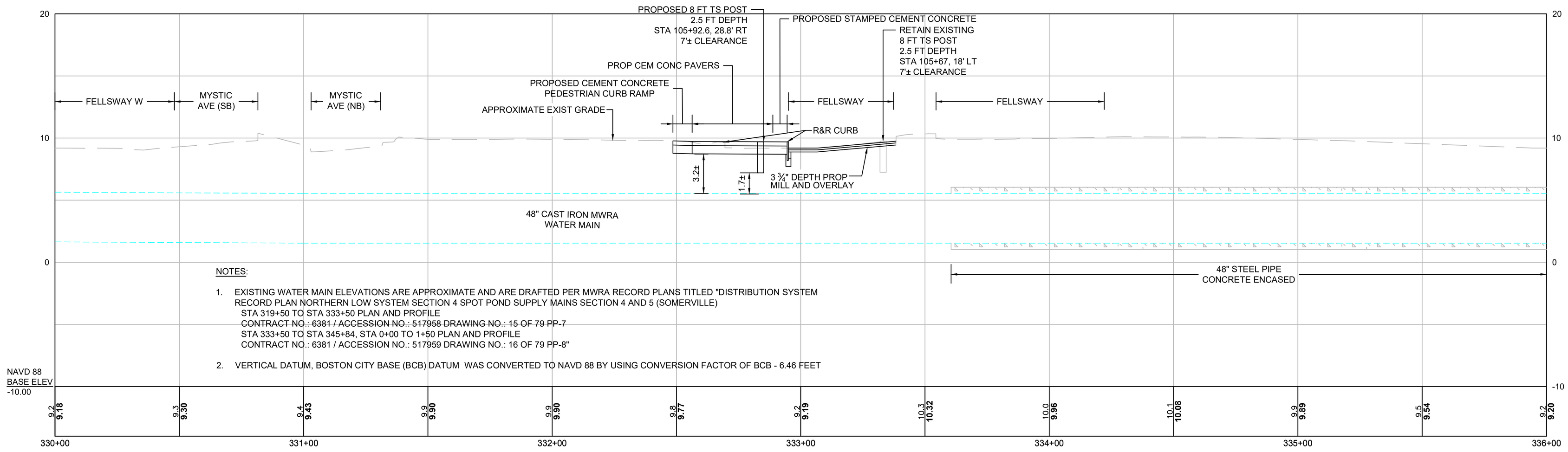
Proposal No. 608562-127758

SOMERVILLE
MYSTIC AVENUE (RTE-38) AT FELLSWAY (RTE-28)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	XXXX	2	10
PROJECT FILE NO. 608562			

CONSTRUCTION PLANS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
APRIL 14, 2023





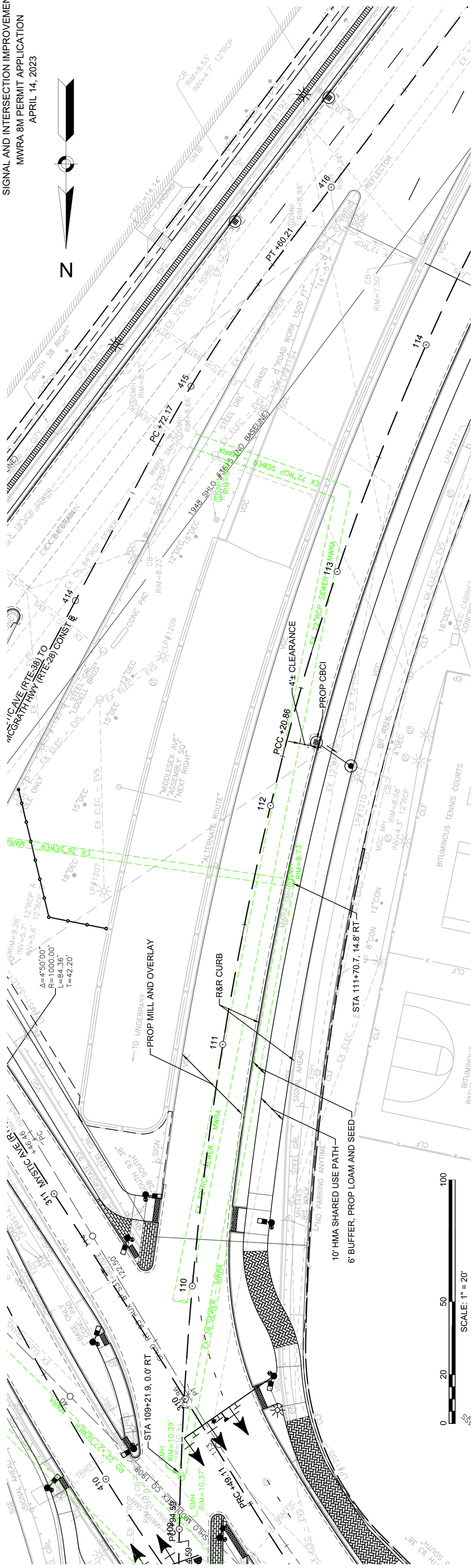
NOTES:

1. EXISTING WATER MAIN ELEVATIONS ARE APPROXIMATE AND ARE DRAFTED PER MWRA RECORD PLANS TITLED "DISTRIBUTION SYSTEM RECORD PLAN NORTHERN LOW SYSTEM SECTION 4 SPOT POND SUPPLY MAINS SECTION 4 AND 5 (SOMERVILLE)
   STA 319+50 TO STA 333+50 PLAN AND PROFILE
   CONTRACT NO.: 6381 / ACCESSION NO.: 517958 DRAWING NO.: 15 OF 79 PP-7
   STA 333+50 TO STA 345+84, STA 0+00 TO 1+50 PLAN AND PROFILE
   CONTRACT NO.: 6381 / ACCESSION NO.: 517959 DRAWING NO.: 16 OF 79 PP-8"
2. VERTICAL DATUM, BOSTON CITY BASE (BCB) DATUM WAS CONVERTED TO NAVD 88 BY USING CONVERSION FACTOR OF BCB - 6.46 FEET

SOMERVILLE
FELLSWAY/MCGRATH HWY (RTE-28)/MYSTIC AVE (RTE-38)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	XXXX	3	10
PROJECT FILE NO. 608562			

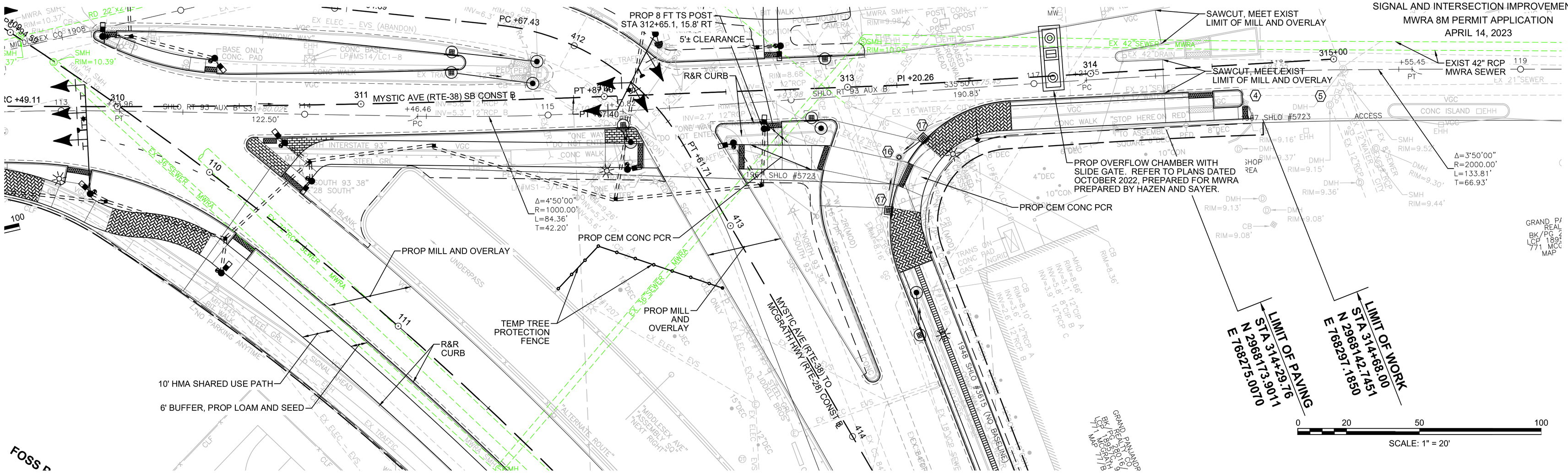
CONSTRUCTION PLANS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
APRIL 14, 2023

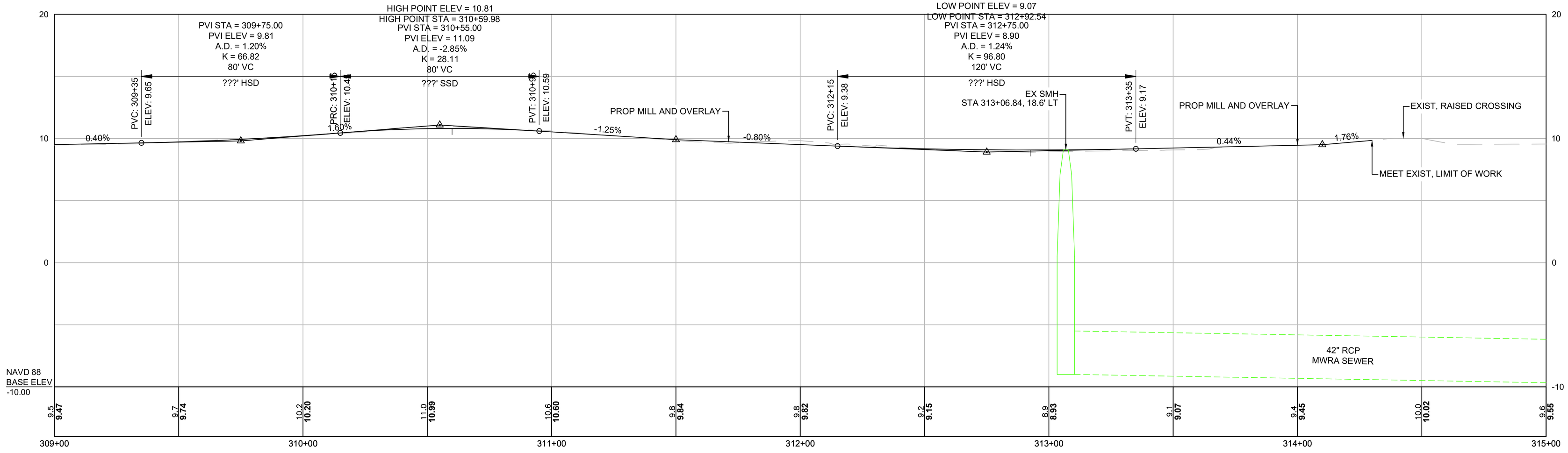


SOMERVILLE
FELLSWAY/MCGRATH HWY (RTE-28)/MYSTIC AVE (RTE-38)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	XXXX	4	10
PROJECT FILE NO. 608562			

CONSTRUCTION PLANS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
APRIL 14, 2023





608562_HD(CONST).DWG Plotted on 25-Apr-2023 8:34 AM

Proposal No. 608562-127758

A00810 - 10

SOMERVILLE
FELLSWAY/MCGRATH HWY (RTE-28)/MYSTIC AVE (RTE-38)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	XXXX	5	10
PROJECT FILE NO.	608562		

CONSTRUCTION DETAILS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
APRIL 14, 2023

PAVEMENT NOTES

PROPOSED PAVEMENT MILL AND OVERLAY

SURFACE:	1¾"	SUPERPAVE SURFACE COURSE 12.5 - P (SSC-12.5-P)
INTERMEDIATE:	2"	SUPERPAVE INTERMEDIATE COURSE 12.5 - P (SIC-12.5-P)
MICROMILL:	3¾"	

PROPOSED FULL DEPTH PAVEMENT

SURFACE:	1¾"	SUPERPAVE SURFACE COURSE 12.5 - P (SSC-12.5-P)
INTERMEDIATE:	2"	SUPERPAVE INTERMEDIATE COURSE 12.5 - P (SIC-12.5-P)
BASE COURSE:	4"	SUPERPAVE BASE COURSE 37.5 (SBC-37.5)
SUBBASE:	4"	DENSE GRADED CRUSHED STONE FOR SUB-BASE
SUBBASE:	8"	GRAVEL BORROW (TYPE B)

PROPOSED FULL DEPTH PAVEMENT LESS THAN 4 FEET WIDE

SURFACE:	1¾"	SUPERPAVE SURFACE COURSE 12.5 - P (SSC-12.5-P)
INTERMEDIATE:	2"	SUPERPAVE INTERMEDIATE COURSE 12.5 - P (SIC-12.5-P)
BASE COURSE:	6"	HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE
SUBBASE:	8"	GRAVEL BORROW (TYPE B)

PROPOSED CEMENT CONCRETE PEDESTRIAN CURB RAMP / SIDEWALK / SIDEWALK BUFFER / ROADWAY BUFFER / MEDIAN

SURFACE:	4"	CEMENT CONCRETE AIR ENTRAINED (4000 PSI, ¾", 610 LB)
SUBBASE:	8"	GRAVEL BORROW, (TYPE B)

PROPOSED CEMENT CONCRETE DRIVEWAY

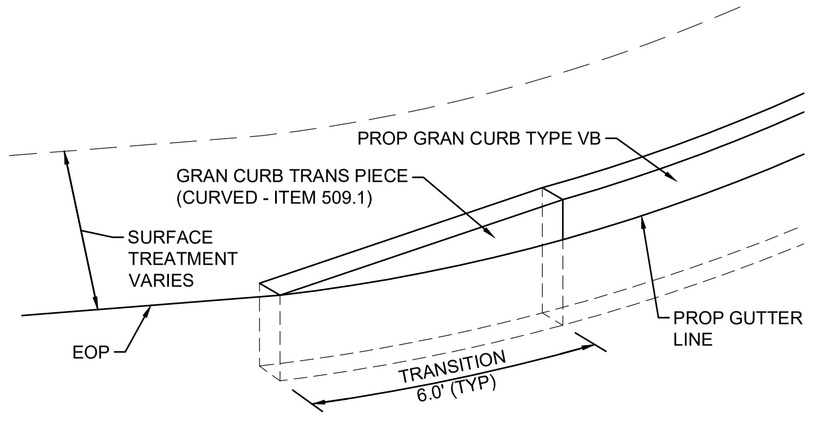
SURFACE:	6"	CEMENT CONCRETE AIR ENTRAINED (4000 PSI, ¾", 610 LB)
SUBBASE:	8"	GRAVEL BORROW, (TYPE B)

PROPOSED HOT MIX ASPHALT - SEPARATED BIKE LANE (SBL)
PROPOSED HOT MIX ASPHALT - SHARED USE PATH (SUP)

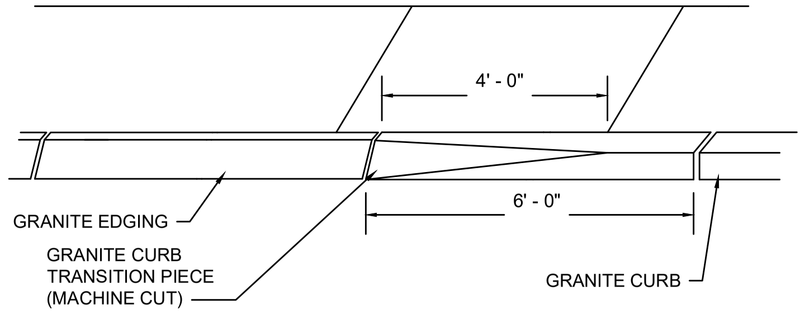
SURFACE:	1¾"	SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5)
INTERMEDIATE:	2 ¼"	SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5)
SUBBASE:	8"	GRAVEL BORROW, (TYPE B)

PROPOSED HOT MIX ASPHALT - SIDEWALK

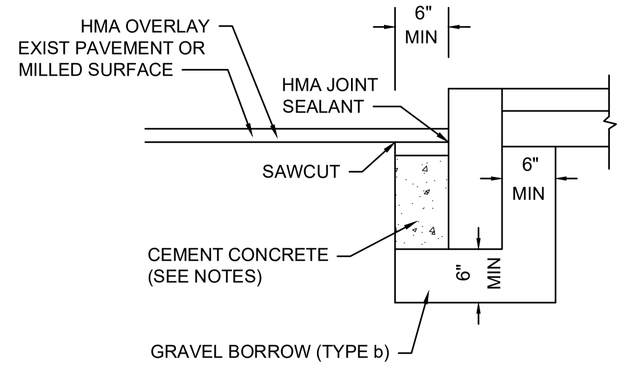
SURFACE:	1¼"	SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5)
INTERMEDIATE:	1¾ "	SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5)
SUBBASE:	8"	GRAVEL BORROW, (TYPE B)



GRANITE CURB TRANSITION PIECE
SCALE: NTS



GRANITE CURB SPLAYED END
SCALE: N.T.S.



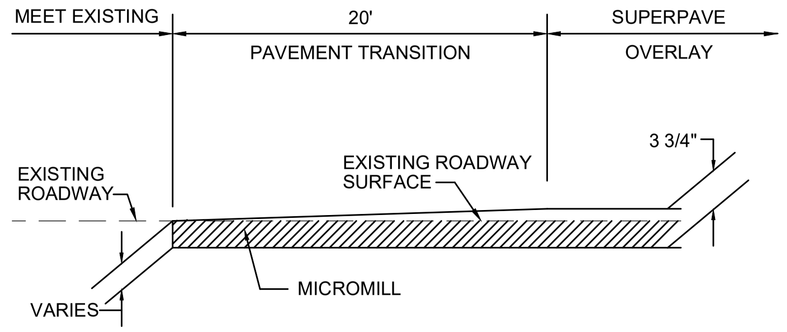
NOTES:

1. CONCRETE SHALL BE INCLUDED IN PRICE BID FOR GRANITE CURB.
2. SAWCUT 6" FROM CURB LINE AND REMOVE EXISTING PAVEMENT AND GRAVEL. REPLACE WITH CEMENT CONCRETE.
3. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS MAY BE USED. ALL TEST REQUIREMENTS ARE WAIVED. HOT MIX ASPHALT SHALL NOT BE USED AS A SUBSTITUTE.

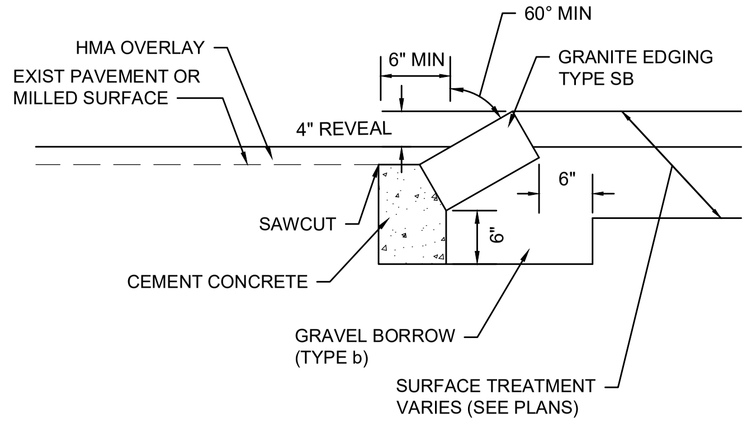
GRANITE CURB IN EXISTING PAVEMENT - WITH OVERLAY
SCALE: N.T.S. DWG: CURB-04 DATE: MARCH 2013

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	XXXX	6	10
PROJECT FILE NO.	608562		

CONSTRUCTION DETAILS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
APRIL 14, 2023

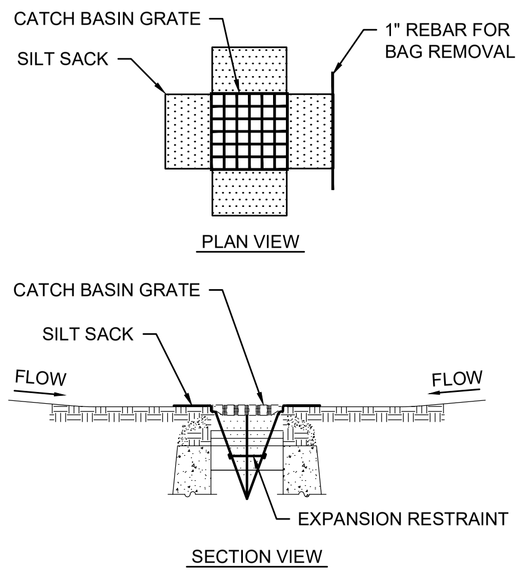


PAVEMENT STANDARD MILLING & OVERLAY TRANSITION SECTION
SCALE: NTS



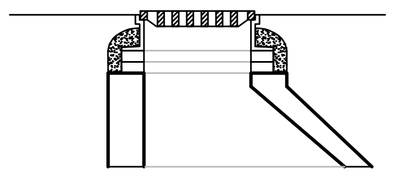
NOTES:
1. CONCRETE SHALL BE IN PRICE BID FOR GRANITE EDGING
2. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS MAY BE USED. ALL TEST REQUIREMENTS ARE WAIVED. HOT MIX ASPHALT SHALL NOT BE USED AS A SUBSTITUTE.

GRANITE EDGING IN EXISTING PAVEMENT - WITH OVERLAY
SCALE: N.T.S.

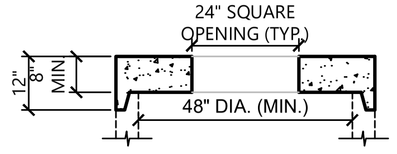


NOTES:
1. INSTALL SILT SACK IN EXISTING CATCH BASINS, BEFORE COMMENCING WORK, AND IN NEW CATCH BASINS IMMEDIATELY AFTER INSTALLATION OF STRUCTURE. REMOVE AFTER BINDER COURSE PAVING IS COMPLETE AND A PERMANENT STAND OF GRASS HAS BEEN ESTABLISHED.
2. GRATE TO BE PLACED OVER SILT SACK.
3. SILT SACK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND CLEANING OR REPLACEMENT SHALL BE PERFORMED

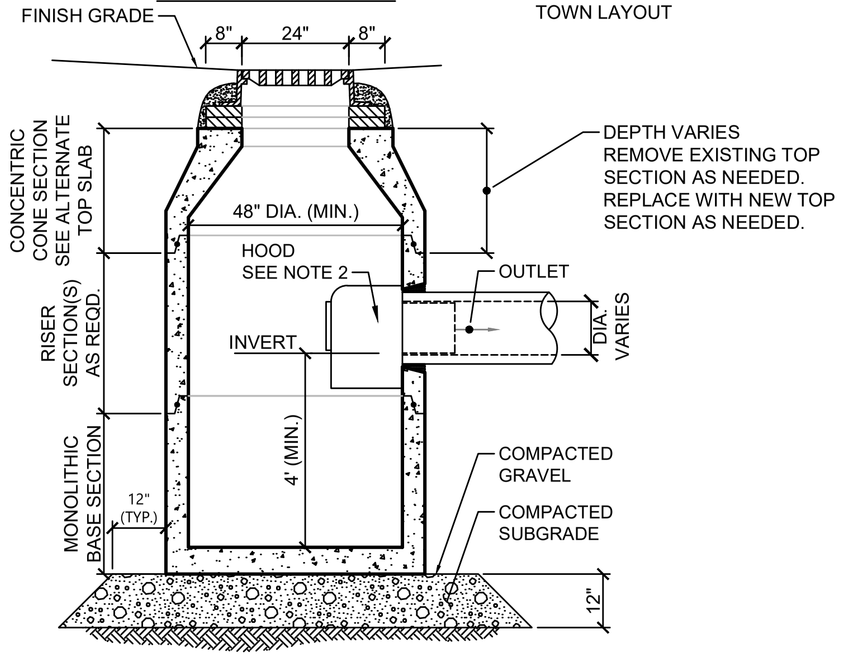
INLET PROTECTION - SILT SACK IN CATCH BASIN
SCALE: N.T.S. DWG: EV-03 DATE: MARCH 2013



ALTERNATE ECCENTRIC CONE SECTION

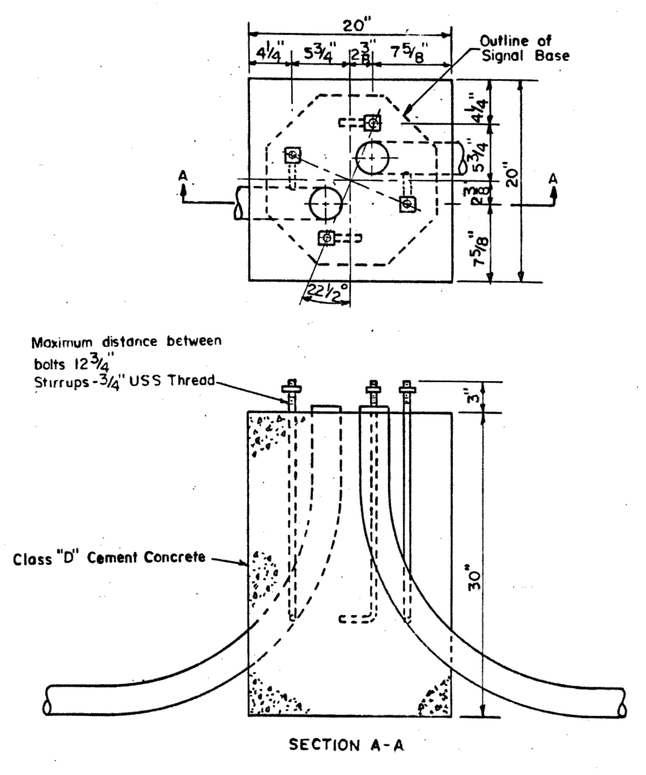


ALTERNATE TOP SLAB

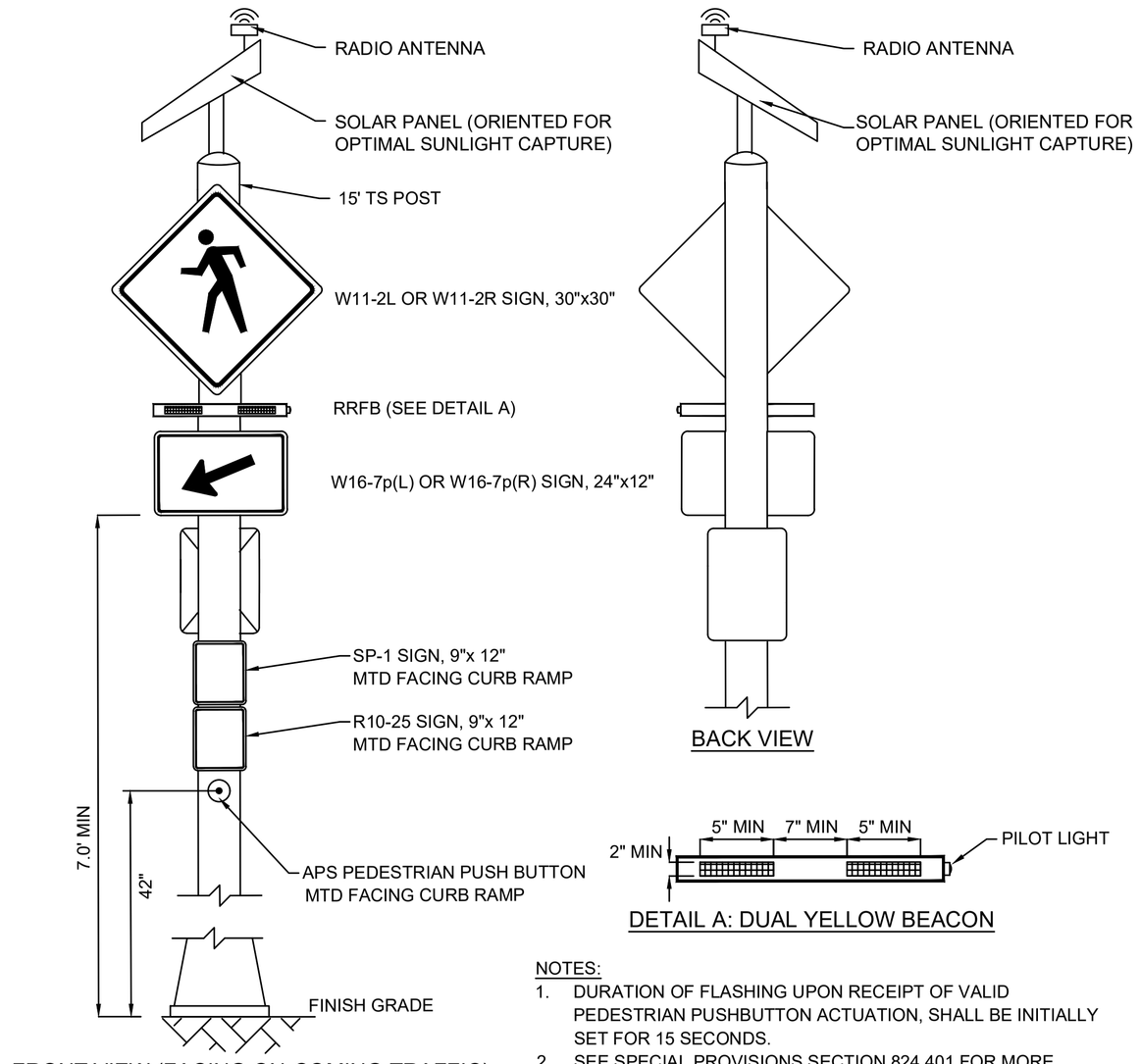


NOTES:
1. BASED ON ACTUAL FIELD CONDITIONS; THE CONTRACTOR SHALL DETERMINE WHICH STYLE OF THE SECTION SHOULD BE USED.
2. HOODS TO BE INSTALLED IN ALL CATCH BASINS LOCATED WITHIN TOWN LAYOUT

CATCH BASIN
SCALE: N.T.S.



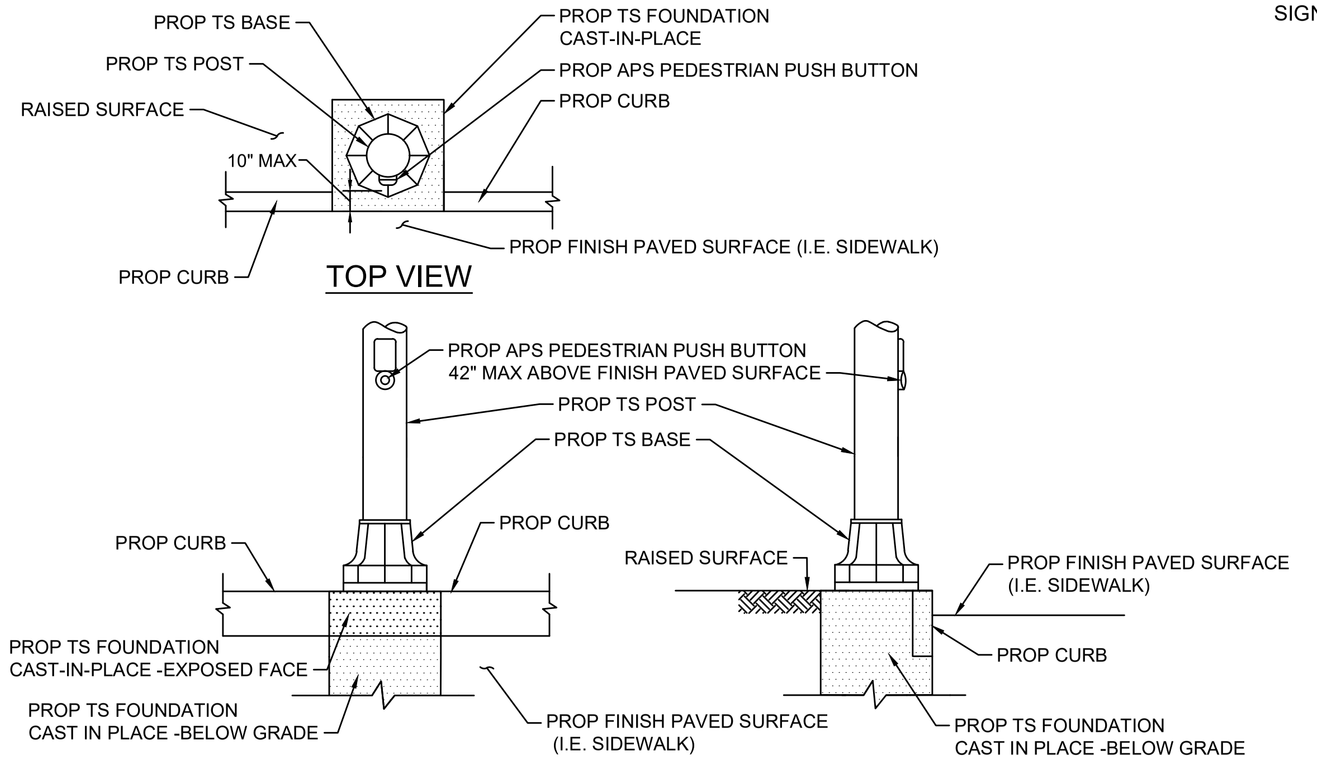
CONCRETE BASE STANDARD TRAFFIC SIGNAL POST
SCALE: NTS



NOTES:
1. DURATION OF FLASHING UPON RECEIPT OF VALID PEDESTRIAN PUSHBUTTON ACTUATION, SHALL BE INITIALLY SET FOR 15 SECONDS.
2. SEE SPECIAL PROVISIONS SECTION 824.401 FOR MORE DETAILS.

RECTANGULAR RAPID FLASHING BEACON (RRFB) (SOLAR POWER)

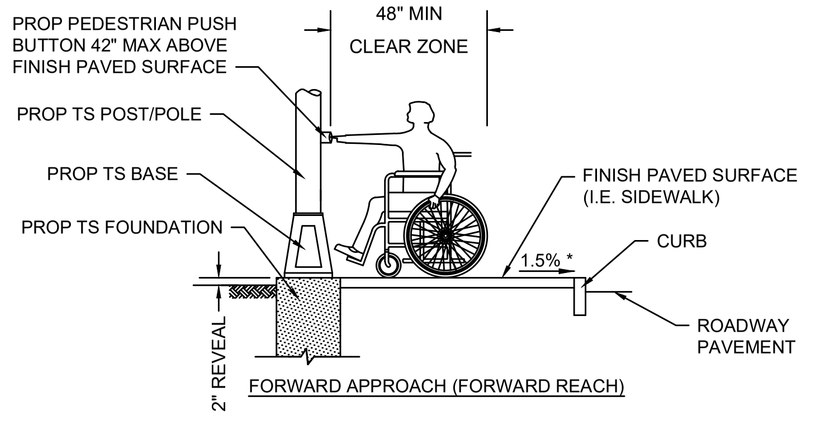
SCALE: NTS



NOTE:
1. SEE DETAIL SD3-031 IN THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AS AMENDED FOR DIMENSIONS AND CONCRETE MIXTURE.

TRAFFIC SIGNAL POST CAST IN PLACE (POURED)FOUNDATION

SCALE: N.T.S.



NOTE:

A CLEAR GROUND SPACE SHALL CONSIST OF A STABLE AND FIRM AREA, COMPLYING WITH 521 CMR 6.5 (FORWARD REACH) OR 521 CMR 6.6 (SIDE REACH) AND SHALL BE PROVIDED AT EACH OF THE PEDESTRIAN PUSH BUTTONS.

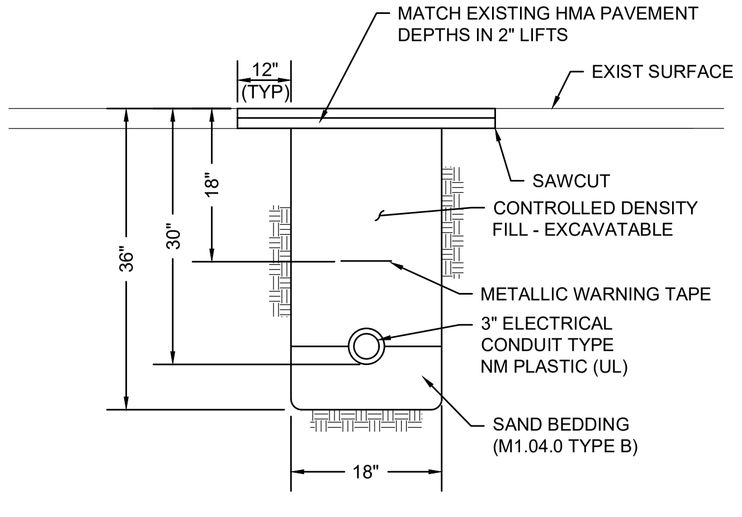
a. WHERE A FORWARD APPROACH IS PROVIDED, PEDESTRIAN PUSH BUTTONS SHALL ABUT AND BE CENTERED ON THE CLEAR GROUND SPACE.

b. WHERE A PARALLEL APPROACH IS PROVIDED, PEDESTRIAN PUSH BUTTONS SHALL BE WITHIN TEN INCHES (10") HORIZONTALLY OF AND CENTERED ON THE CLEAR GROUND SPACE.

* TOLERANCE FOR CONSTRUCTION ±0.5%

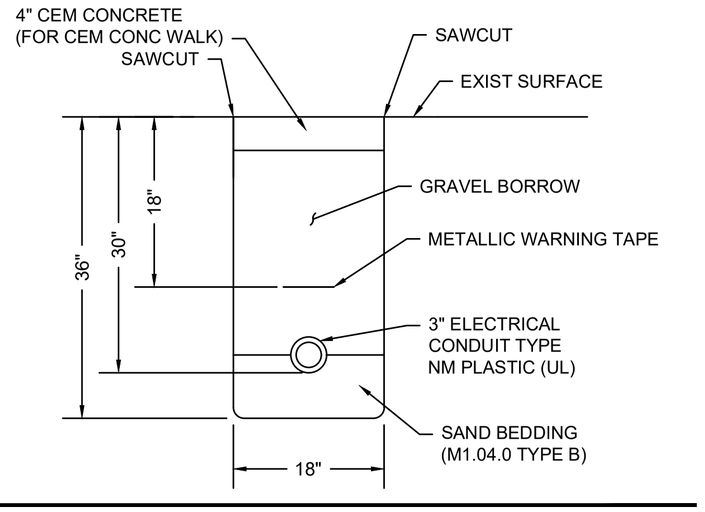
PEDESTRIAN PUSH BUTTON CLEAR ZONE

SCALE: N.T.S.



CONDUIT CROSSING ROADWAY/DRIVEWAY

SCALE: N.T.S.

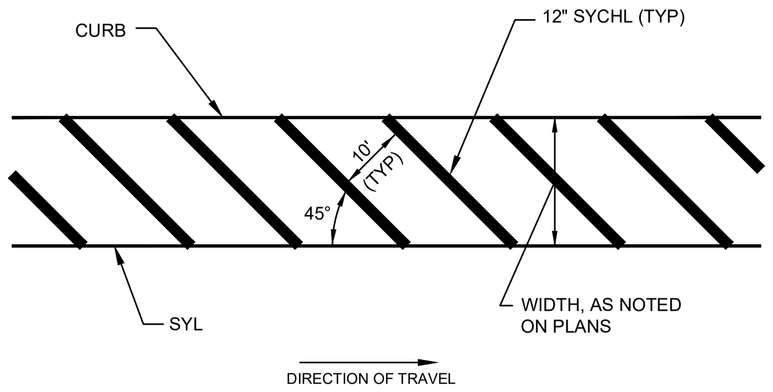


CONDUIT IN SIDEWALK

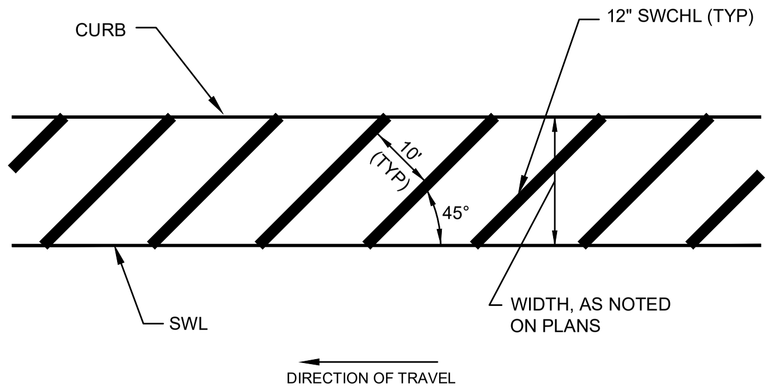
SCALE: N.T.S. DWG: TRENCH-03 DATE: MARCH 2013

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	XXXX	8	10
PROJECT FILE NO.	608562		

CONSTRUCTION DETAILS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
APRIL 14, 2023



MARKINGS TO THE LEFT OF TRAVEL DIRECTION

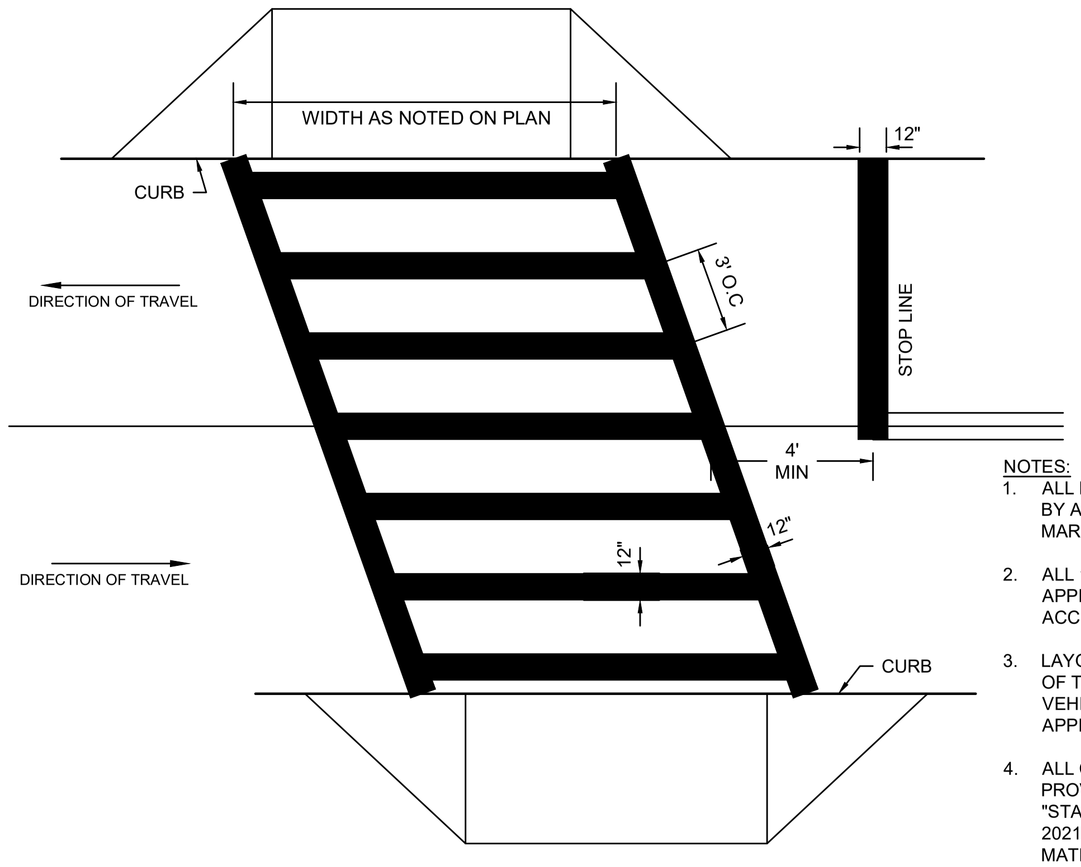


MARKINGS TO THE RIGHT OF TRAVEL DIRECTION

NOTES:
1. ALL 12" LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (e.g. TWO - 6" LINES) WILL BE ACCEPTED.
2. ALL PAVEMENT MARKINGS SHALL BE REFLECTORIZED THERMOPLASTIC.

CHANNELIZED MARKINGS - EDGE OF ROADWAY FOR ROADWAYS 40MPH OR LESS

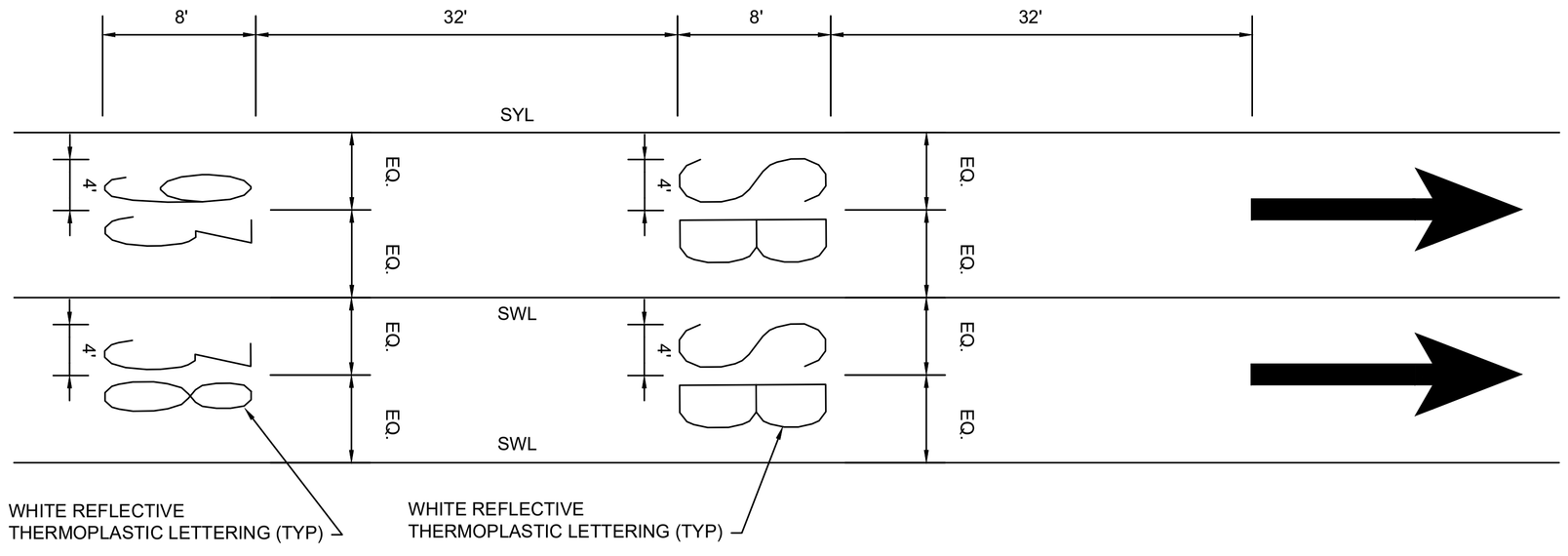
SCALE: NTS DWG: PM-15 DATE: OCT 2015



NOTES:
1. ALL EXISTING CROSSWALK MARKINGS SHALL BE FULLY ERADICATED BY APPROVED METHOD PRIOR TO THE APPLICATION OF PROPOSED MARKINGS.
2. ALL 12" THERMOPLASTIC LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO - 6" LINES) WILL BE ACCEPTED.
3. LAYOUT OF CROSSWALKS SHALL BE ORIENTATED IN THE DIRECTION OF TRAVEL AND LOCATED OUTSIDE OF THE WHEEL PATH OF VEHICLES. LAYOUT SHALL BE APPROVED BY MASSDOT PRIOR TO APPLICATION OF THERMOPLASTIC.
4. ALL CROSSWALKS INSTALLED SHALL CONFORM TO THE RELEVANT PROVISIONS OF THE MASSACHUSETTS HIGHWAY DEPARTMENT "STANDARD SPECIFICATION FOR HIGHWAY AND BRIDGES" DATED 2021, SECTION 860 FOR REFLECTORIZED LINE (THERMO-PLASTIC) & MATERIAL M7.01.20, LATEST REVISIONS.

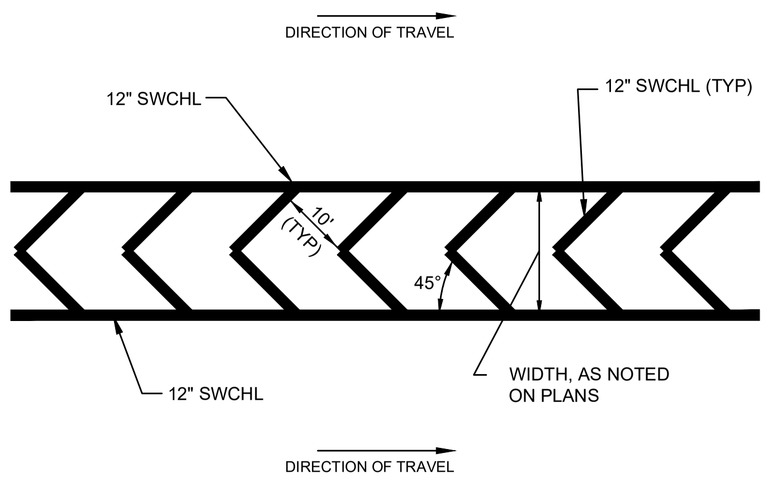
LADDER-STYLE CROSSWALK - 12" WIDE LINES

SCALE: N.T.S. DWG: PM-27 DATE: MAY 2017



ROUTE MARKING (93 SB / 38 SB)

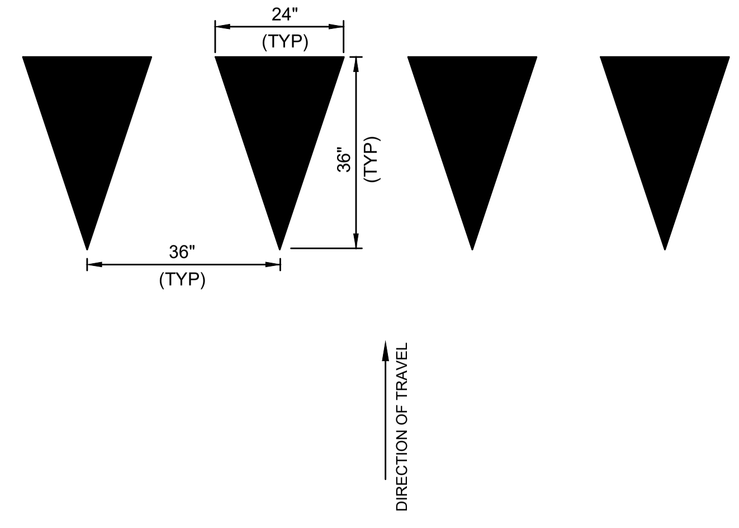
SCALE: N.T.S.



NOTES:
1. ALL 12" LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (e.g. TWO - 6" LINES) WILL BE ACCEPTED.
2. ALL PAVEMENT MARKINGS SHALL BE REFLECTORIZED THERMOPLASTIC.

CHANNELIZED MARKINGS - MEDIAN FOR ROADWAYS 40MPH OR LESS

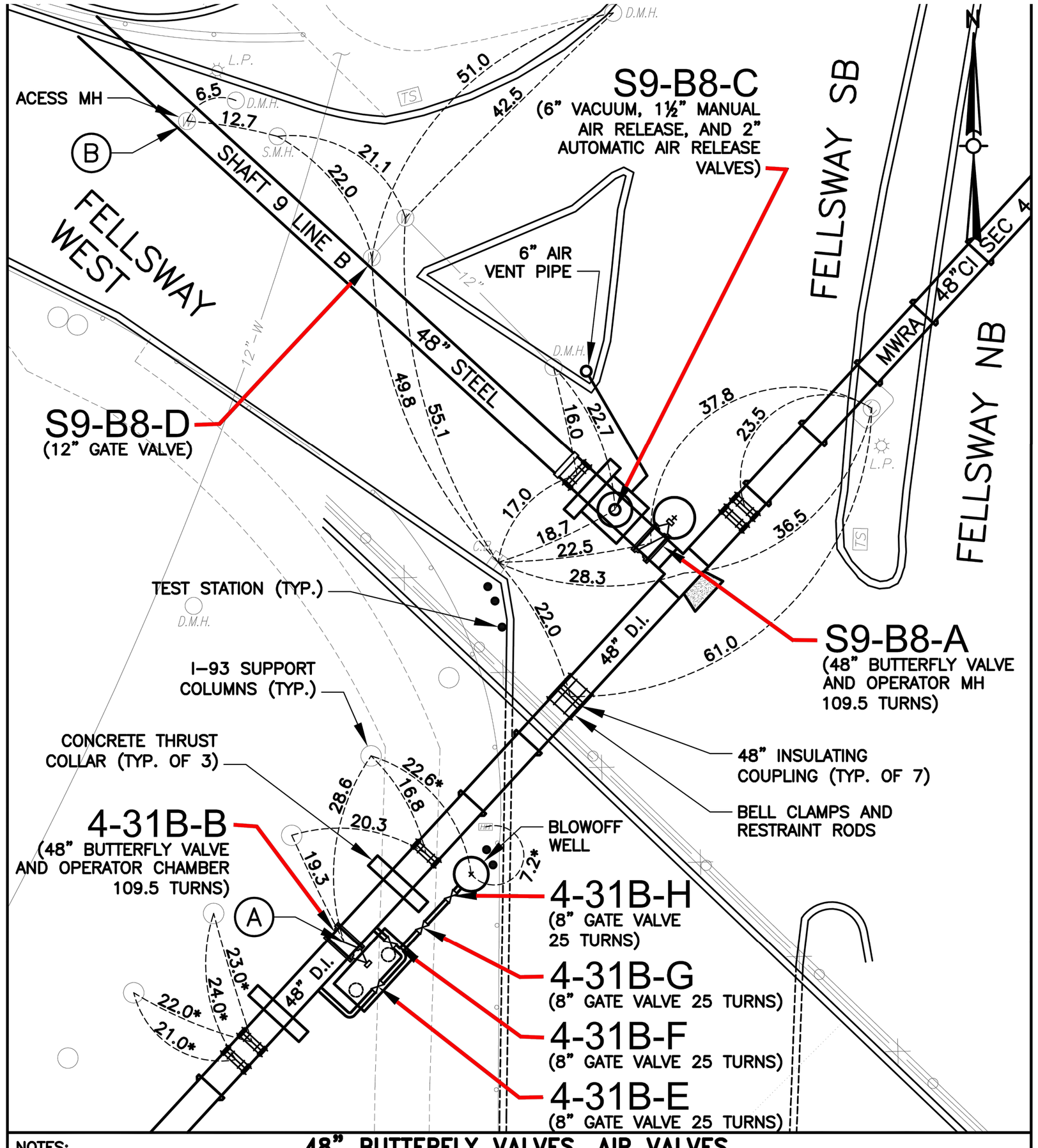
SCALE: NTS DWG: PM-15 DATE: OCT 2015



NOTES:
1. YIELD LINES SHALL CONSIST OF A ROW OF SOLID WHITE TRIANGLES.
2. IF APPLICABLE, YIELD LINES SHALL BE PLACED 4-FEET IN ADVANCE OF THE NEAREST CROSSWALK LINE.
3. IN THE ABSENCE OF A MARKED CROSSWALK, YIELD LINES SHALL BE PLACED AS SHOWN ON THE PLANS.
4. ALL PAVEMENT MARKINGS SHALL BE REFLECTORIZED THERMOPLASTIC.

YIELD LINE TRIANGLES

SCALE: NTS



NOTES:
1. PIPE JOINTS SCALED FROM EXISTING DETAIL RECORDS.
2. * DISTANCE SCALED FROM SURVEY AND NOT FIELD LOCATED.

48" BUTTERFLY VALVES, AIR VALVES, 8" GATE VALVES AND BLOWOFF FELLSWAY AT FELLSWAY WEST SOMERVILLE

20 10 0 20

SCALE: 1"=20'

JANUARY 1992
REVISED JUNE 2006

ELEVATION DATUM: BOSTON CITY BASE		
AT	GND.	TOP OF PIPE
A	16.0	12.0
B	28.4	20.8

SECT. 4 – ℄ BUTTERFLY VALVE STA. 332+07

DETAIL RECORD NLS 4-31B
SHAFT 9 LINE B8

FIELD BOOK NO.: 1630 PAGE NO.: —
PLOTTED BY: MWH
CHECKED BY: MWH

EXISTING VENT DETAIL
SCALE: NTS

SOMERVILLE
FELLSWAY/MCGRATH HWY (RTE-28)/MYSTIC AVE (RTE-38)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	XXXX	9	10
PROJECT FILE NO.		608562	

CONSTRUCTION DETAILS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
APRIL 14, 2023

608562_HD(DET).DWG Plotted on 6-Apr-2023 12:29 PM

Proposal No. 608562-127758

A00810 - 15

SOMERVILLE
FELLSWAY/MCGRATH HWY (RTE-28)/MYSTIC AVE (RTE-38)

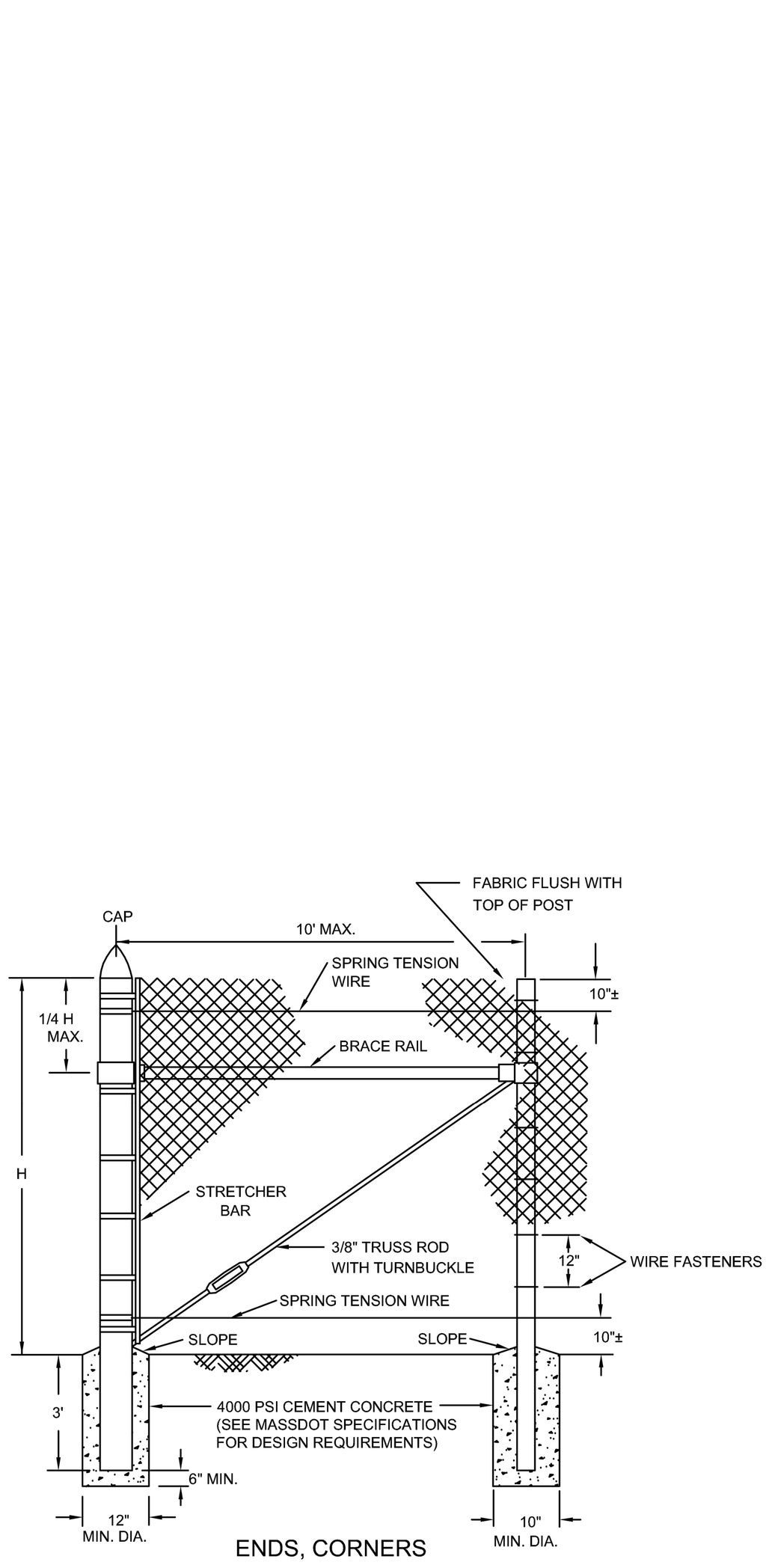
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	XXXX	10	10
PROJECT FILE NO.	608562		

CONSTRUCTION DETAILS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
APRIL 14, 2023

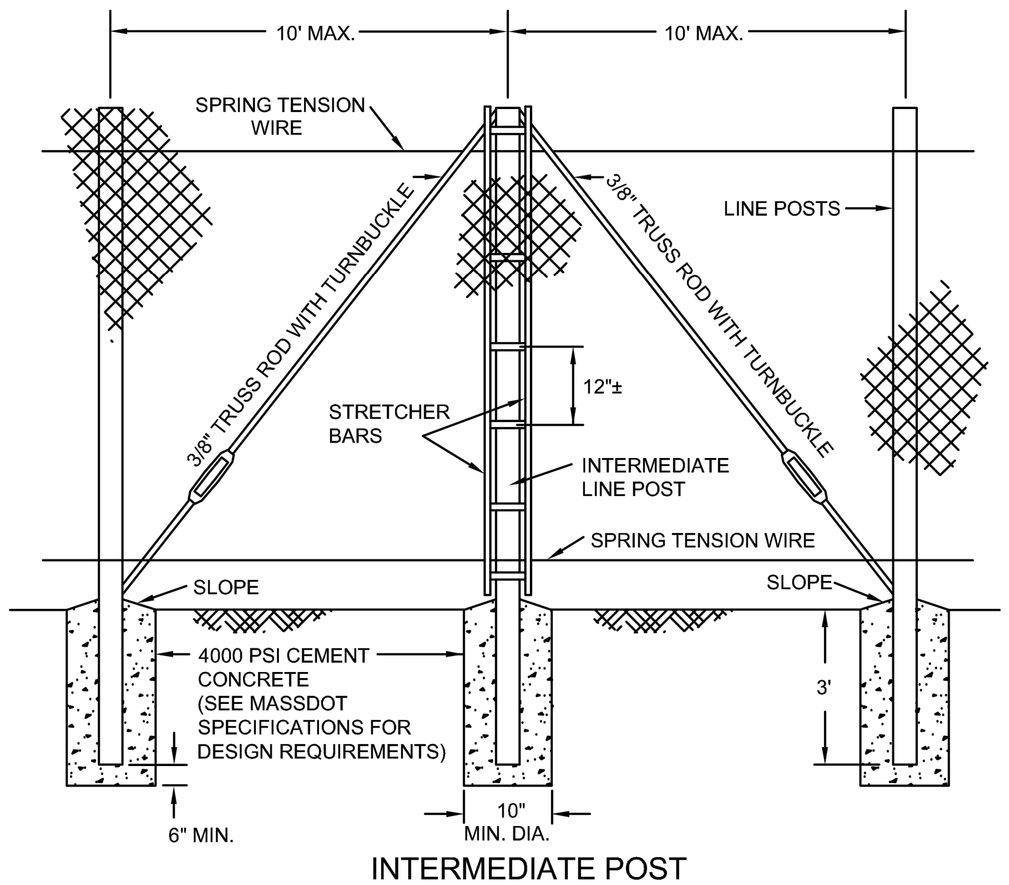
608562_HD(DET).DWG Plotted on 6-Apr-2023 12:27 PM

Proposal No. 608562-127758

A00810 - 16

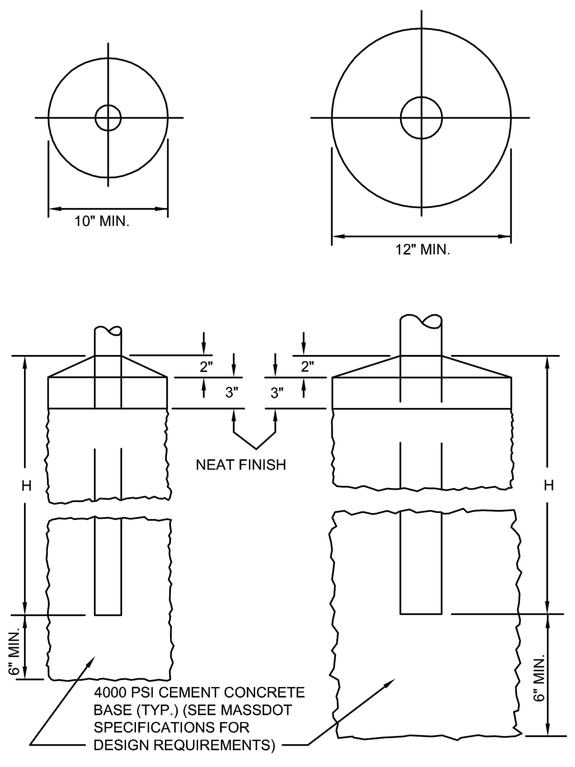


ENDS, CORNERS



INTERMEDIATE POST

POST BASES



FOR CORNER, END LINE AND PULL POSTS

FOR GATE POSTS

FENCE HEIGHT	MIN. H
5' OR LESS	2'-6"
OVER 5'	3'-0"

NOTES:

CHAIN LINK FENCE
SCALE: NTS

DOCUMENT A00811

MWRA 8m WATER PERMIT - #3340

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MASSACHUSETTS WATER RESOURCES AUTHORITY

PERMIT

8(m) Permit #3340

14-Jun-24

Mass DOT (Project File # 608562)
10 Park Plaza
Boston, MA 02111

Pursuant to Section 8 (m) of Chapter 372 of the Acts of 1984 you are hereby granted permission to use a certain portion of land presently under the jurisdiction and control of the Massachusetts Water Resources Authority for the purpose set forth below.

The land is described as follows:

Section 4, Low Service Pipeline - Shaft 9 Line B Pipeline - Mystic Ave & Fellsway West - Somerville, Massachusetts

You may use the land for the purpose of:

Roadway and Intersection Improvements Project in Accordance with Plans Titled: Somerville Mystic Avenue (Rte 38) ay Fellsway West (Rte 28) - Mass Dot Project File No. 608562 - Date: June 12, 2024 - Sheet No. 1 & 2

Approved as to Form:
Massachusetts Water Resources Authority

Christopher John
Law Division

Approved
Massachusetts Water Resources Authority

Deputy Chief OO, PP&P

This Permit is subject to the 8(m) Permit Terms and Conditions, and the 8(m) Permit Special Terms and Conditions, if any, attached hereto and made a part hereof. Permittee agrees that it shall be bound by, and shall comply with, said Terms and Conditions.

Permittee: John J. Bechard, P.E. / John J. Bechard, Deputy Chief Engineer
Signature Print Name 7/1/2024

This Permit shall have no effect until such time as the Authority issues the fully executed original of this Permit.

Massachusetts Water Resources Authority
2 Griffin Way
Chelsea, MA 02150
Attn: Water Operations - Permitting Department

8(m) 24-3340

June 14, 2024

8(m) PERMIT TERMS AND CONDITIONS

1. Permittee shall be responsible to stay apprised of and comply with all applicable federal, state and local laws, rules, and orders including, but not limited to, guidelines and requirements for construction sites, and all supplements, amendments and/or changes thereto and notices thereof. Prior to commencing work pursuant to this Permit, Permittee shall have obtained all other required permits, written approval(s) and necessary authorizations to perform the work. Failure to comply with the terms stated herein shall render this Permit null and void by the Authority, and Permittee shall bear all responsibility, liability, damages and costs arising from the Permittee's noncompliance.

2. Permittee's use of the permitted land shall at no time interfere with the Authority's activities or operations on the permitted land. The Authority has the right to review and approve all of the Permittee's work including such plans and specifications, as the Authority deems necessary. Any proposed future work beyond the scope of this Permit shall have the prior written approval of the Authority.

3. To the fullest extent permitted by law, the Permittee shall indemnify, defend with counsel acceptable to the Authority, keep and save harmless the Authority and its board members, officers, representatives, contractors, agents, employees, successors, and assigns, in both their individual and official capacities, against all suits, claims, liabilities, damages, losses (including but not limited to loss of use resulting therefrom) and expenses, including but not limited to attorney's fees, caused by, arising out of or resulting from any work or activity under this Permit and/or act, omission, breach or default of the Permittee or of any contractor, subcontractor of vendor of the Permittee or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

4. The granting of this Permit shall in no way interfere with the rights of the Authority to exercise its existing rights in or over the permitted land. Permittee acknowledges that the Authority, within its sole discretion, may enter upon the permitted land at any time in order to carry out inspections, maintenance, repairs, replacements, or other activities.

5. The Authority may revoke this Permit at any time. The sale or disposition of the permitted land by its owner will cause this Permit to terminate without further notice. Permittee shall give the Authority at least 72 hours notice before commencing the operations as pursuant herein. This Permit shall not be assigned or transferred.

6. No blasting, drilling or other activity that could in any way affect the integrity or operability of the Authority's property or use of the permitted land shall be permitted without express prior written approval of the Authority.

7. The Permittee shall remove, at its own expense, within six months of the date of written notice from the Authority, any or all conduits and appurtenances installed by the Permittee under this Permit if, in the Authority's sole discretion, such removal is necessary for the operation, maintenance or replacement of the Authority's infrastructure.

8. To the fullest extent permitted by law, and in consideration of the issuance of this Permit, Permittee hereby releases the Authority and its board members, officers, representatives, contractors, agents, employees, successors, and assigns, in both their individual and official capacities, from all suits, claims, liabilities, damages, losses (including but not limited to loss of use resulting therefrom) and expenses, including but not limited to attorney's fees, caused by, arising out of or resulting from any work or activity under this Permit and/or act, omission, breach or default of the Permittee or of any

CONDITIONS (Cont'd)

contractor, subcontractor of vendor of the Permittee or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. This release includes, but is not limited to, all suits, claims, liabilities, damages (including, but not limited to, direct, indirect, and consequential damages, economic loss, and loss of profits) and losses which are attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including the loss of use resulting therefrom, together with all attorneys' fees, costs and expenses.

9. The Permittee shall conduct design, construction, and excavation in accordance with all federal, state and local safety regulations, including but not limited to, federal OSHA regulations (29 CFR 1926) and Massachusetts Department of Public Safety regulations (520 CMR 14.00). During construction, Permittee shall take appropriate sheeting and shoring measures to protect the integrity of the Authority's water and/or sewer mains. Permittee shall submit design plans stamped by a professional engineer licensed in Massachusetts to the Authority for approval prior to the start of construction.

10. The Permittee shall adjust any or all Authority frames and covers to grade within the limits of work in accordance with the plans referenced in this Permit. The Authority will provide the Permittee with new replacement Authority frames and covers that have been deemed unusable by the Authority.

11. If the Permittee is proposing to take borings and/or place test pits within the permitted land, the Permittee shall mark the proposed boring and test pit locations on the ground using paint and/or stakes and submit engineering documents to the Authority showing the proposed boring and test pit locations. Authority staff will review all boring and test pit locations at the site. Upon written clearance of the proposed boring and test pit locations by Authority staff and subject to Permittee providing the Authority with seventy-two (72) hours prior notice, Permittee may commence work at the site.

    The Permittee shall be responsible for the locations of proposed borings and test pits regardless of any act or omission of the Authority. The Permittee shall be responsible for repairing and/or replacing, at the Authority's election, the Authority's property or infrastructure, which is damaged as a result of the Permittee's, its contractors, agents, representatives, employees, and/or invitees activities pursuant to this Permit. The Permittee's obligations under this paragraph shall include payment to the Authority for all costs to repair all such damage caused to the Authority's property.

EXHIBIT A

MWRA WATER OPERATIONS SPECIAL TERMS AND CONDITIONS

1. Prior to entry, Permittee or its designee shall provide at least **seventy two (72) - hours prior** notice to the **MWRA's Inspection Department, by calling (617) 305-5833**, located at 2 Griffin Way, Chelsea, MA 02150.

2. A minimum vertical clearance of eighteen (18) inches shall be maintained between the MWRA's water mains and other utility crossings unless otherwise noted. However, water/gas and other utility service crossings with a pipe size diameter of two (2) inches or less maybe permitted to cross above the MWRA's pipeline at a reduced clearance subject to MWRA's review. **(Except for special provisions, i.e. capped or plugged pipes, thrust blocks and or bends which would require a greater clearance and separation).**

3. A minimum of three (3) feet to five (5) feet horizontal clearance is required between adjacent utilities and the side (spring line) of any MWRA water main. (Except for special provisions, i.e. capped or plugged pipes, **thrust blocks**, and/or pipe bends which would require a greater clearance separation).

4. Crossings of MWRA water mains shall be located a minimum horizontal distance of at least four (4) feet from any joints of the MWRA's water mains.

5. Proposed pipe/utility crossings of the MWRA's water mains shall cross at a ninety (90) degree angle to minimize interference.

6. **For distances over four (4) feet of the MWRA's water mains, which are to be undermined, the method and type of pipe support plan shall be submitted and stamped by a Professional Engineer (P.E.) licensed in Massachusetts for prior approval by the MWRA.**

7. For distances under four (4) feet from the MWRA's water mains, which are to be undermined, the on-site MWRA inspector shall review and approve the proposed support of the water main. Under no circumstances shall the MWRA's water main be left in an unsupported, undermined position overnight.

8. During construction, appropriate sheeting measures must be taken to protect the integrity of the MWRA's water mains. The sheeting design must be reviewed by the MWRA prior to the start of the construction. The design shall be stamped by a Professional Engineer, licensed in Massachusetts. The use of a Trench Box is not permitted in this application.

9. Suitable compaction methods shall be employed in restoring the beds of the MWRA's water mains and backfilling around the MWRA's water mains shall be placed in maximum six (6) inch lifts and compacted by hand vibratory compactors.

SPECIAL TERMS AND CONDITIONS (Cont'd)

10. The MWRA's water mains shall be protected at all times during construction. The MWRA may require a professional engineer licensed in the State of Massachusetts to submit a construction plan and or pipeline analysis that is to be attached to this Permit.

11. Screened gravel shall be uniformly graded with maximum size of a particle between 3/8 inch and 3/4 inch. Screened gravel shall consist of clean, hard and durable particles free from an excess of soft, elongated and disintegrated pieces or other objectionable material. Crushed rock of suitable size and grading maybe used in place of screened gravel at the option of the MWRA Inspector.

12. For test pit excavations or unearthing of the MWRA's water mains the Permittee shall excavate the last two (2) feet, before the top of pipe, by hand or use a vacuum boring method and backfill with approved material within an fee interest, easement or roadway area.

13. **The Permittee is responsible to adjust any or all MWRA frames and covers to grade within their limits of work in accordance with the plans referenced in this Permit. The MWRA will provide the Permittee with new replacement MWRA frames and covers (at no expense to the Permittee) for any existing frames and covers that have been deemed unusable by MWRA personnel.**

14. All MWRA manhole openings that were covered during the binder course installation shall be made accessible within forty eight (48) hours. MWRA manhole frame and covers shall not be removed for grinding and or pulverizing. Pulverizing is not allowed over MWRA manhole structures.

15. The Permittee shall provide a logistics construction schedule in writing, along with emergency contact information whenever MWRA valves (manhole covers) or facilities are covered or obstructed.

16. **MWRA Inspection personnel must be on site whenever excavation, construction, hoisting or rigging occurs around an MWRA water main.**

17. No construction equipment including cranes, backhoes, or material may be parked, stationed, set up, or stored on top of the MWRA's water mains or infrastructure.

18. Replacement (shutdown) of the MWRA's water mains shall be coordinated with the MWRA. Four (4) weeks-advanced notice in writing is required for shutdowns.

19. The Permittee or its designee shall contact the MWRA three (3) weeks in advance of when an MWRA water main valve must be operated. **Only MWRA personnel will operate MWRA valves**. The Permittee or its designee shall not operate any MWRA water main valves. **MWRA Valve Operations are limited during peak demand periods and may not be available between the dates of May 15th and September 15th of each calendar year.**

SPECIAL TERMS AND CONDITIONS (Cont'd)

20. The Permittee will be responsible to protect and correct any damage(s) to the MWRA's property, water main pipelines and/or any related infrastructure at no cost to the MWRA.

21. As-built drawings shall be furnished to the MWRA upon the completion of the work authorized by this Permit. A Professional Massachusetts Registered Land Surveyor or Engineer shall stamp as-built drawings.

22. MWRA Detail Records "field sketches" shall be updated (with accurate field ties) by the Permittee and shall be furnished to the MWRA upon the completion of the work authorized by this Permit.

23. The Permittee shall indemnify and hold harmless the MWRA and its successors and assigns from any and all damages and/or claims for damage to the Permittee's conduits, facilities and/or property as a result of the MWRA's operation, maintenance, repair, and/or replacement of MWRA property, or as a result of the failure of an MWRA water main.

24. This Permit addresses only MWRA-owned and operated infrastructure. The Permittee is required to obtain all needed separate approvals from Cities, Towns, State Agencies or other entities.

25. **The work authorized by this Permit and location of installed facilities and appurtenances shall not deviate from the construction plan that is referenced in this Permit. No field changes are allowed without prior review and written approval by the MWRA 8(m) Permit Project Manager. An MWRA on-site inspector shall review all field changes and coordinate with the Permittee regarding submitting a change of work plan to the MWRA for review and comment. If MWRA field inspection indicates changes undertaken without approval, the Permittee may be issued a cease and desist order and be required to correct/reconstruct any completed work.**

26. The MWRA requires a construction plan along with an analysis of the MWRA's water main pipeline (prepared by a professional engineer licensed in the State of Massachusetts). The pipeline analysis shall take into consideration the construction equipment, which would be used over the MWRA's water main pipeline in instances where the existing roadway surface will be completely excavated away removing the protection of the HS-20 surface loading barrier. This Plan and supporting calculations will need to be submitted to the MWRA for review. This includes open cross-country areas where no HS 20 Roadway Loading exists.

27. The MWRA requires the submittal of "Cut Sheets and or Shop Drawings" for review of all newly proposed materials that will come under the ownership of the MWRA.

SPECIAL TERMS AND CONDITIONS (Cont'd)

28. Where pipe jacking is required for work that is in close proximity to the MWRA's water mains, submittals prepared by a professional engineer and reviewed by the MWRA are required.

29. Permittee shall not expose the spring line or undermine the MWRA's water main pipeline. The Permittee or its designee shall cease excavation operations and secure the open trench by backfilling the open trench to secure the MWRA's water main pipeline whenever the spring line is expose

30. In instances where the layout of the MWRA water mains are to be accurate and precise beyond the MWRA's regular mark out services the Permittee, at the direction of the MWRA, shall have a professional land surveyor licensed in Massachusetts mark out MWRA water mains using field survey instruments.

31. Disinfection of MWRA pipelines includes the entire isolated length of MWRA's pipeline(s). Disinfection is the responsibility of the applicant including independent lab testing procedures in accordance with MWRA standards.

SOMERVILLE
MYSTIC AVENUE (RTE-38) AT FELLSWAY (RTE-28)

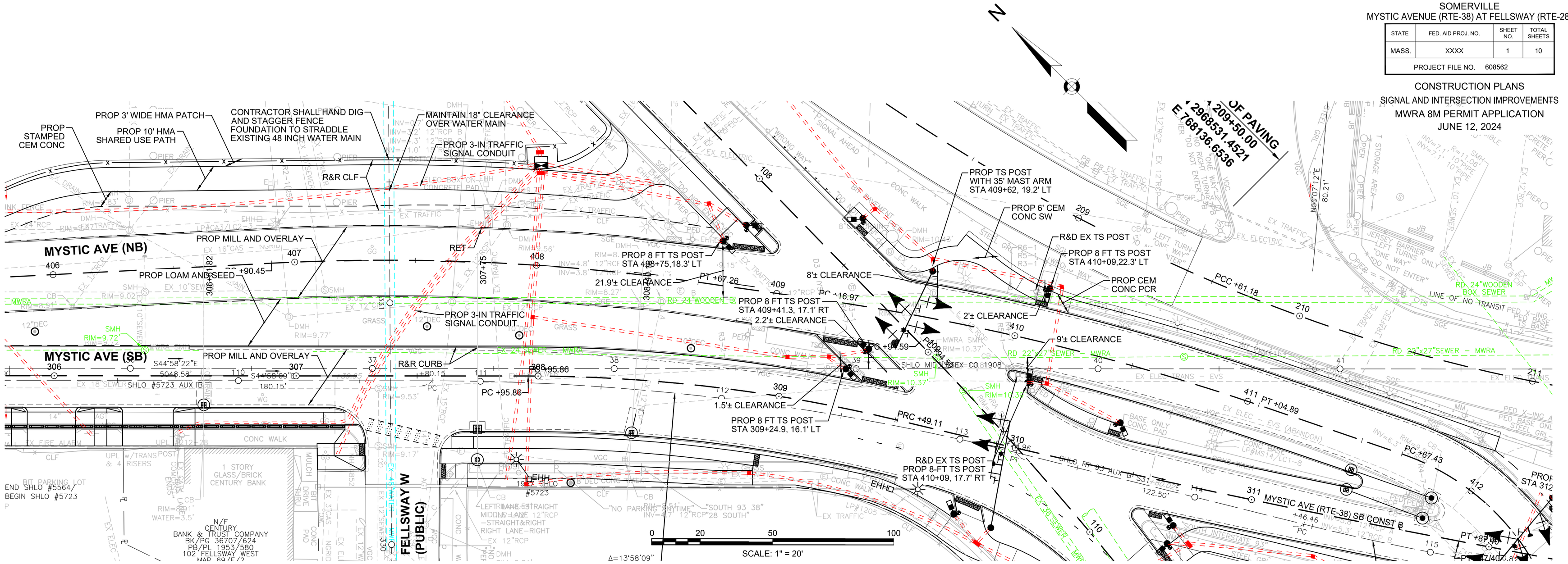
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	XXXX	1	10
PROJECT FILE NO. 608562			

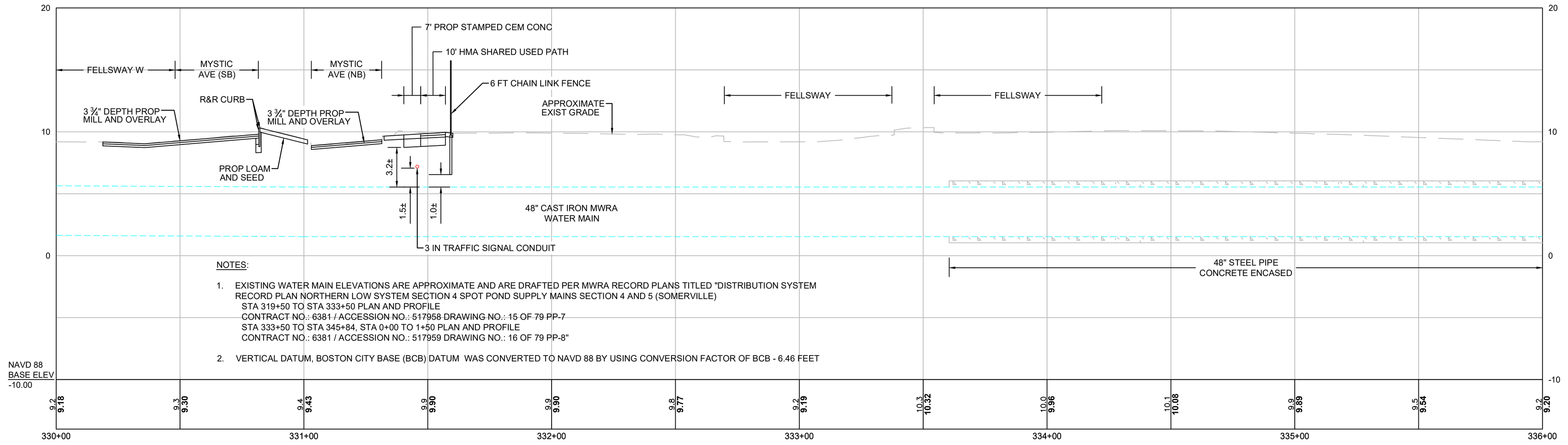
CONSTRUCTION PLANS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
JUNE 12, 2024

608562_HDI(CONST).DWG Plotted on 3-Jun-2024 7:24 AM

Proposal No. 608562-127758

A00811 - 11





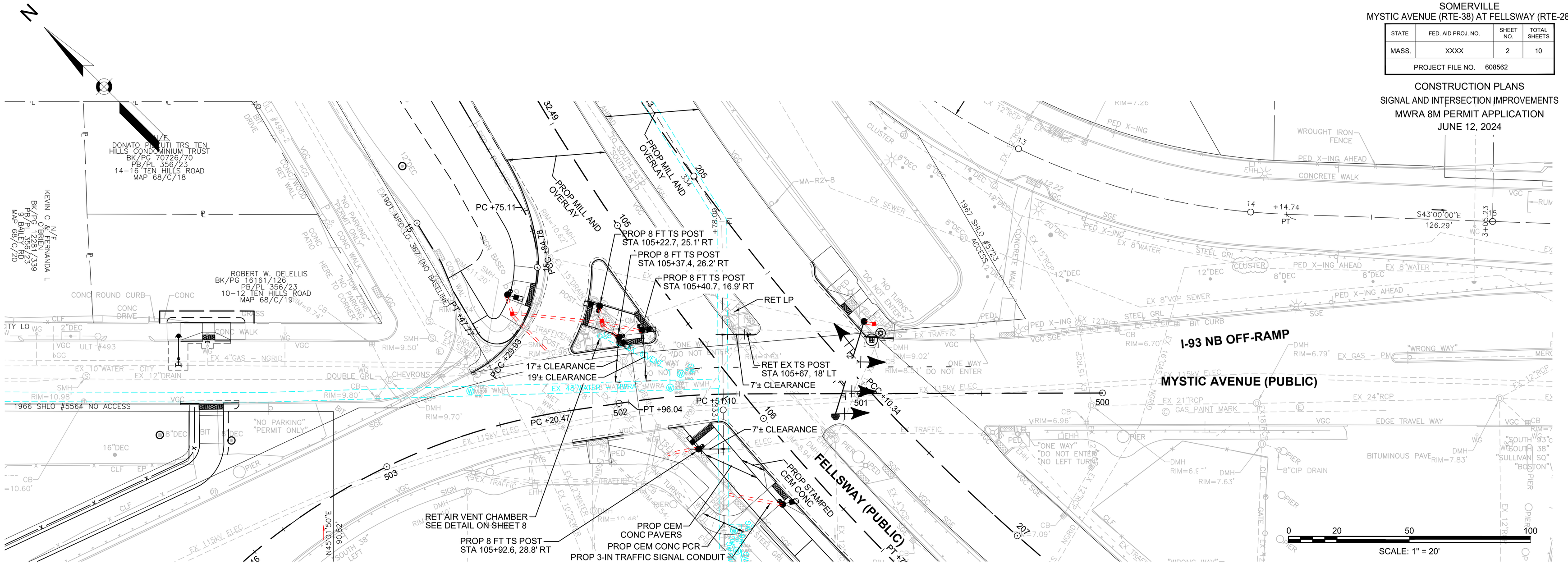
NOTES:

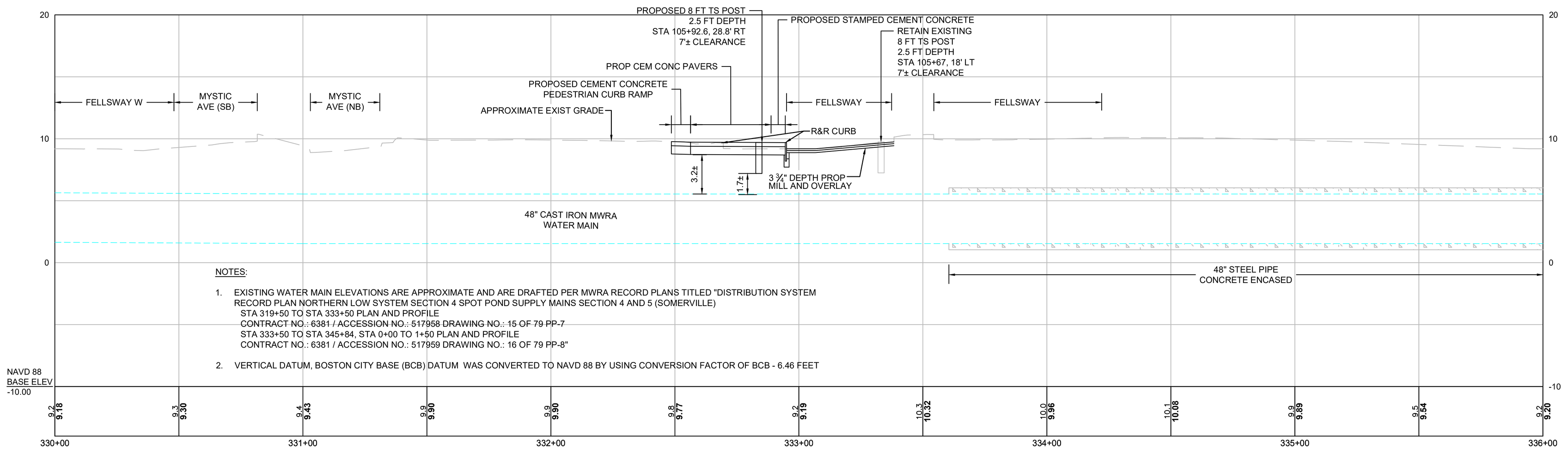
1. EXISTING WATER MAIN ELEVATIONS ARE APPROXIMATE AND ARE DRAFTED PER MWRA RECORD PLANS TITLED "DISTRIBUTION SYSTEM RECORD PLAN NORTHERN LOW SYSTEM SECTION 4 SPOT POND SUPPLY MAINS SECTION 4 AND 5 (SOMERVILLE)
   STA 319+50 TO STA 333+50 PLAN AND PROFILE
   CONTRACT NO.: 6381 / ACCESSION NO.: 517958 DRAWING NO.: 15 OF 79 PP-7
   STA 333+50 TO STA 345+84, STA 0+00 TO 1+50 PLAN AND PROFILE
   CONTRACT NO.: 6381 / ACCESSION NO.: 517959 DRAWING NO.: 16 OF 79 PP-8"
2. VERTICAL DATUM, BOSTON CITY BASE (BCB) DATUM WAS CONVERTED TO NAVD 88 BY USING CONVERSION FACTOR OF BCB - 6.46 FEET

SOMERVILLE
MYSTIC AVENUE (RTE-38) AT FELLSWAY (RTE-28)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	XXXX	2	10
PROJECT FILE NO. 608562			

CONSTRUCTION PLANS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
JUNE 12, 2024





NOTES:

1. EXISTING WATER MAIN ELEVATIONS ARE APPROXIMATE AND ARE DRAFTED PER MWRA RECORD PLANS TITLED "DISTRIBUTION SYSTEM RECORD PLAN NORTHERN LOW SYSTEM SECTION 4 SPOT POND SUPPLY MAINS SECTION 4 AND 5 (SOMERVILLE)
   STA 319+50 TO STA 333+50 PLAN AND PROFILE
   CONTRACT NO.: 6381 / ACCESSION NO.: 517958 DRAWING NO.: 15 OF 79 PP-7
   STA 333+50 TO STA 345+84, STA 0+00 TO 1+50 PLAN AND PROFILE
   CONTRACT NO.: 6381 / ACCESSION NO.: 517959 DRAWING NO.: 16 OF 79 PP-8"
2. VERTICAL DATUM, BOSTON CITY BASE (BCB) DATUM WAS CONVERTED TO NAVD 88 BY USING CONVERSION FACTOR OF BCB - 6.46 FEET

SOMERVILLE
FELLSWAY/MCGRATH HWY (RTE-28)/MYSTIC AVE (RTE-38)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	XXXX	3	10
PROJECT FILE NO. 608562			

CONSTRUCTION PLANS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
JUNE 12, 2024

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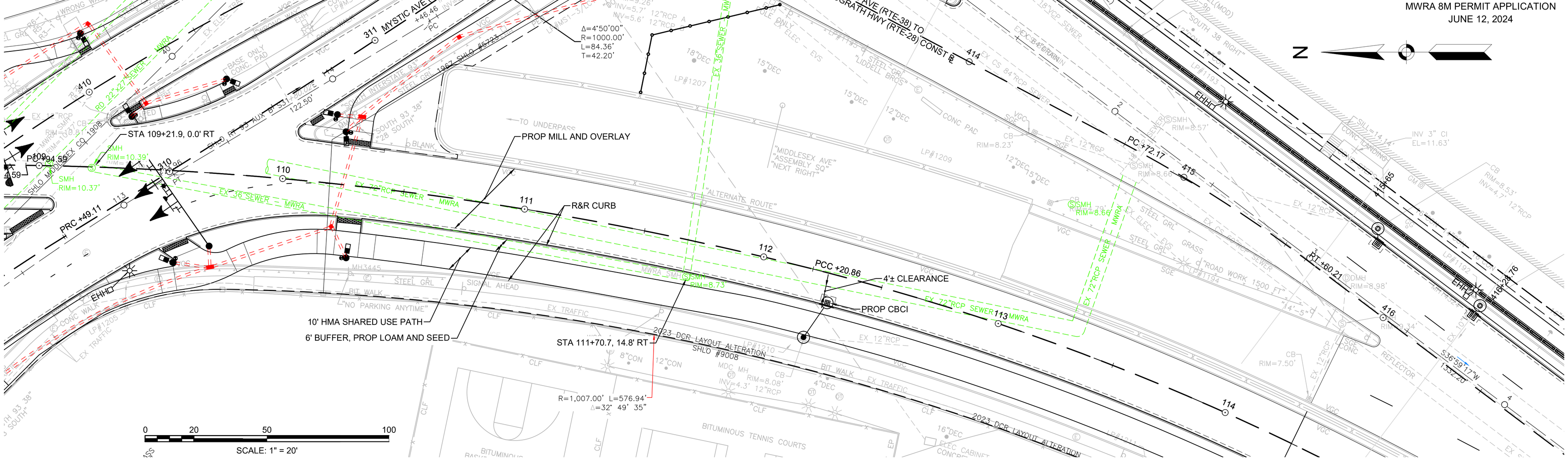
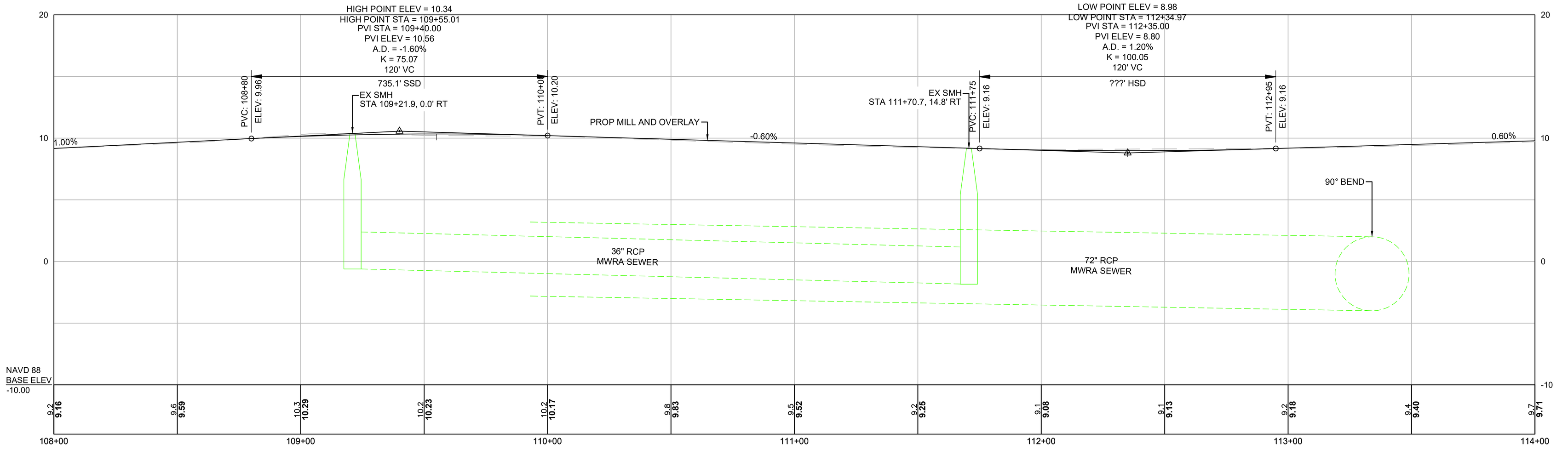




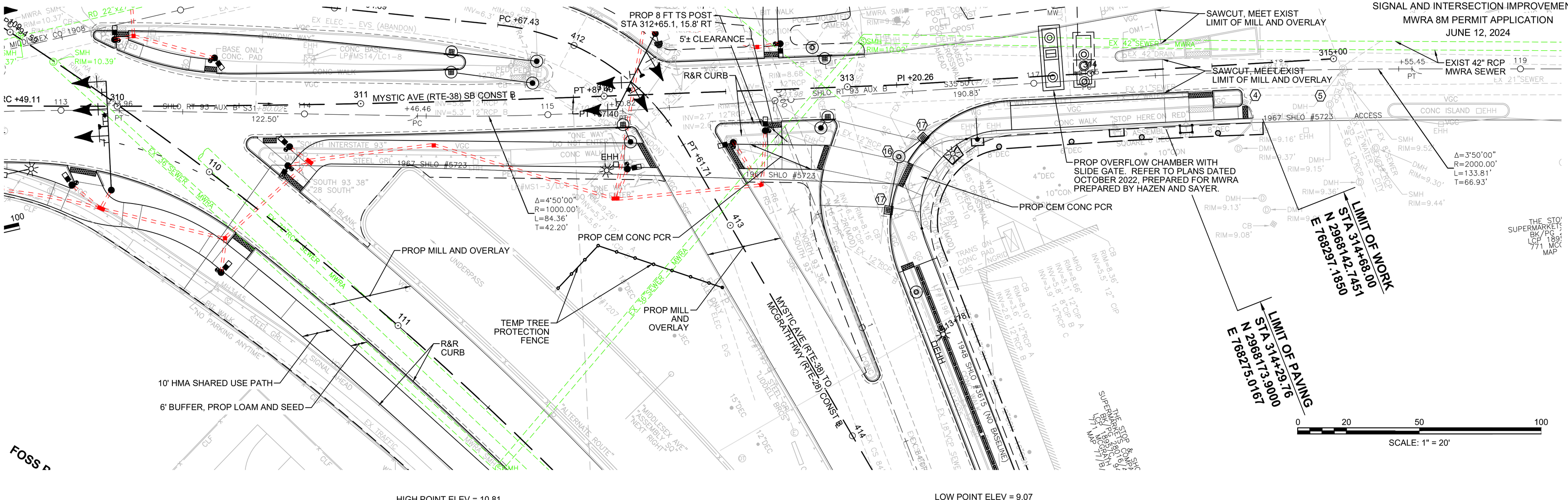
A00811 - 13

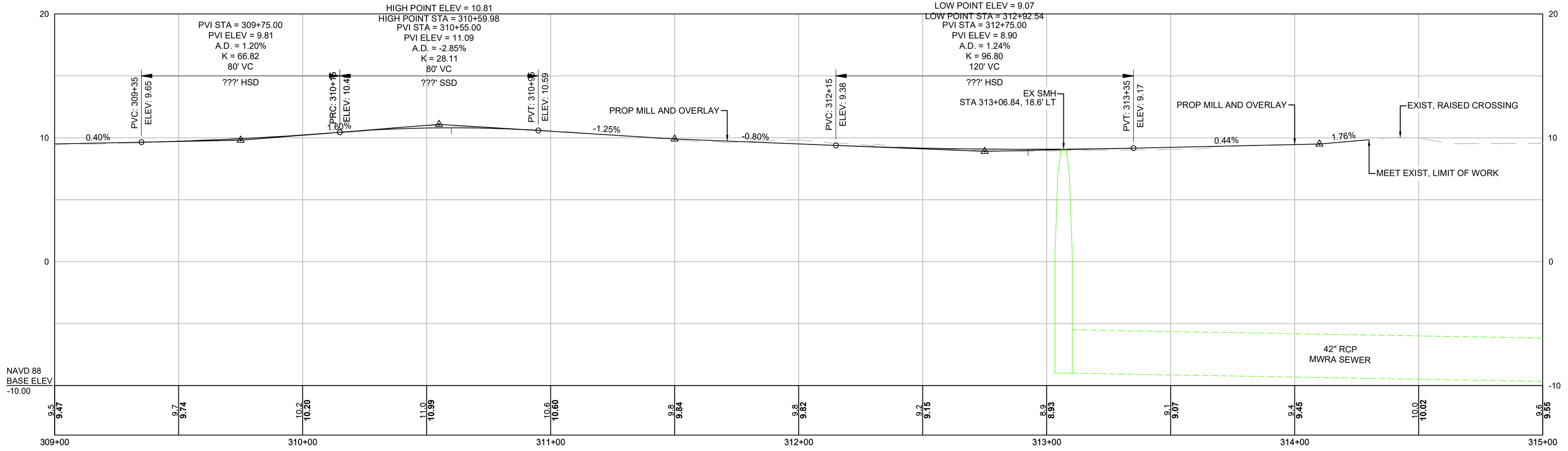
Proposal No. 608562-127758

SOMERVILLE
FELLSWAY/MCGRATH HWY (RTE-28)/MYSTIC AVE (RTE-38)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	XXXX	4	10
PROJECT FILE NO. 608562			

CONSTRUCTION PLANS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
JUNE 12, 2024





PAVEMENT NOTES

PROPOSED PAVEMENT MILL AND OVERLAY

SURFACE:	1¾"	SUPERPAVE SURFACE COURSE 12.5 - P (SSC-12.5-P)
INTERMEDIATE:	2"	SUPERPAVE INTERMEDIATE COURSE 12.5 - P (SIC-12.5-P)
MICROMILL:	3¾"	

PROPOSED FULL DEPTH PAVEMENT

SURFACE:	1¾"	SUPERPAVE SURFACE COURSE 12.5 - P (SSC-12.5-P)
INTERMEDIATE:	2"	SUPERPAVE INTERMEDIATE COURSE 12.5 - P (SIC-12.5-P)
BASE COURSE:	4"	SUPERPAVE BASE COURSE 37.5 (SBC-37.5)
SUBBASE:	4"	DENSE GRADED CRUSHED STONE FOR SUB-BASE
SUBBASE:	8"	GRAVEL BORROW (TYPE B)

PROPOSED FULL DEPTH PAVEMENT LESS THAN 4 FEET WIDE

SURFACE:	1¾"	SUPERPAVE SURFACE COURSE 12.5 - P (SSC-12.5-P)
INTERMEDIATE:	2"	SUPERPAVE INTERMEDIATE COURSE 12.5 - P (SIC-12.5-P)
BASE COURSE:	6"	HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE
SUBBASE:	8"	GRAVEL BORROW (TYPE B)

PROPOSED CEMENT CONCRETE PEDESTRIAN CURB RAMP / SIDEWALK / SIDEWALK BUFFER / ROADWAY BUFFER / MEDIAN

SURFACE:	4"	CEMENT CONCRETE AIR ENTRAINED (4000 PSI, ¾", 610 LB)
SUBBASE:	8"	GRAVEL BORROW, (TYPE B)

PROPOSED CEMENT CONCRETE DRIVEWAY

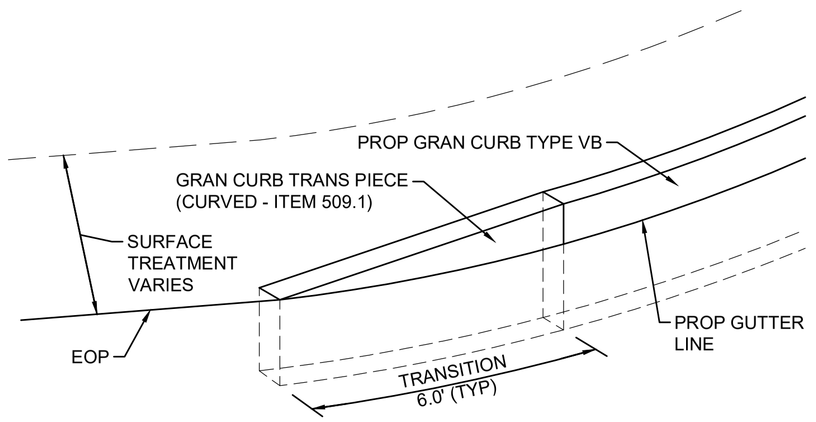
SURFACE:	6"	CEMENT CONCRETE AIR ENTRAINED (4000 PSI, ¾", 610 LB)
SUBBASE:	8"	GRAVEL BORROW, (TYPE B)

PROPOSED HOT MIX ASPHALT - SEPARATED BIKE LANE (SBL)
PROPOSED HOT MIX ASPHALT - SHARED USE PATH (SUP)

SURFACE:	1¾"	SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5)
INTERMEDIATE:	2 ¼"	SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5)
SUBBASE:	8"	GRAVEL BORROW, (TYPE B)

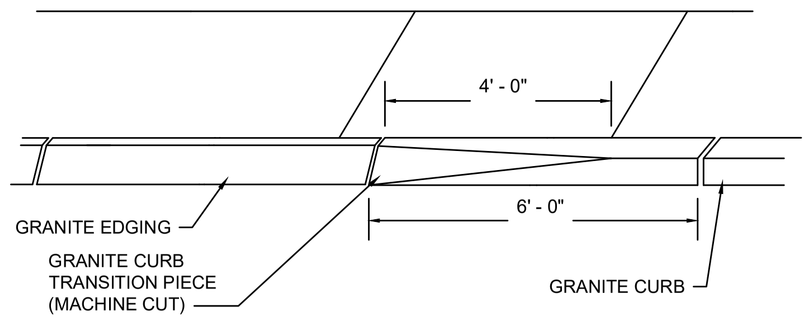
PROPOSED HOT MIX ASPHALT - SIDEWALK

SURFACE:	1¼"	SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5)
INTERMEDIATE:	1¾ "	SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5)
SUBBASE:	8"	GRAVEL BORROW, (TYPE B)



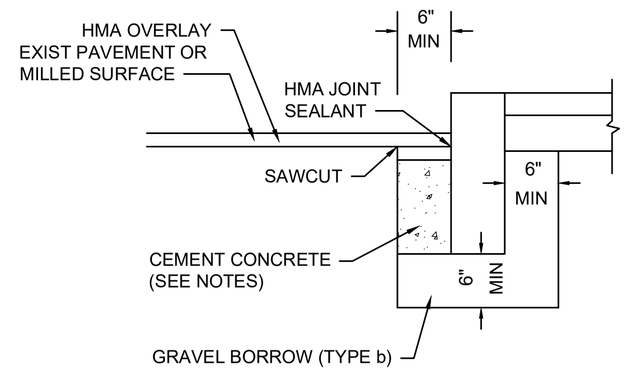
GRANITE CURB TRANSITION PIECE

SCALE: NTS



GRANITE CURB SPLAYED END

SCALE: N.T.S.



NOTES:

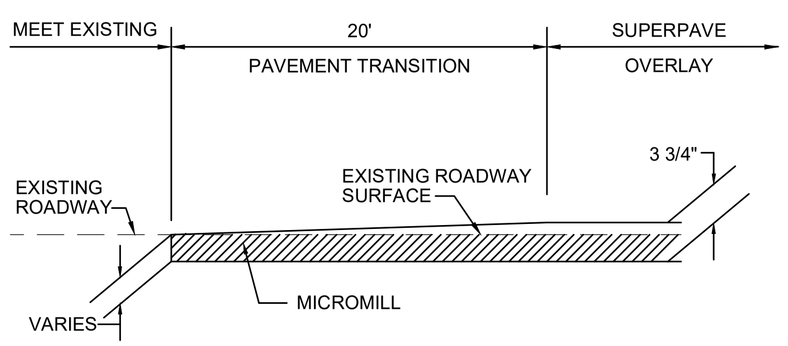
1. CONCRETE SHALL BE INCLUDED IN PRICE BID FOR GRANITE CURB.
2. SAWCUT 6" FROM CURB LINE AND REMOVE EXISTING PAVEMENT AND GRAVEL. REPLACE WITH CEMENT CONCRETE.
3. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS MAY BE USED. ALL TEST REQUIREMENTS ARE WAIVED. HOT MIX ASPHALT SHALL NOT BE USED AS A SUBSTITUTE.

GRANITE CURB IN EXISTING PAVEMENT - WITH OVERLAY

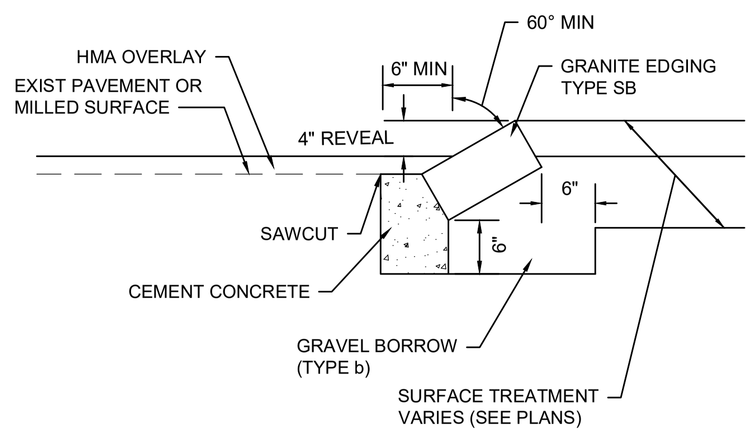
SCALE: N.T.S. DWG: CURB-04 DATE: MARCH 2013

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	XXXX	6	10
PROJECT FILE NO.	608562		

CONSTRUCTION DETAILS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
JUNE 12, 2024

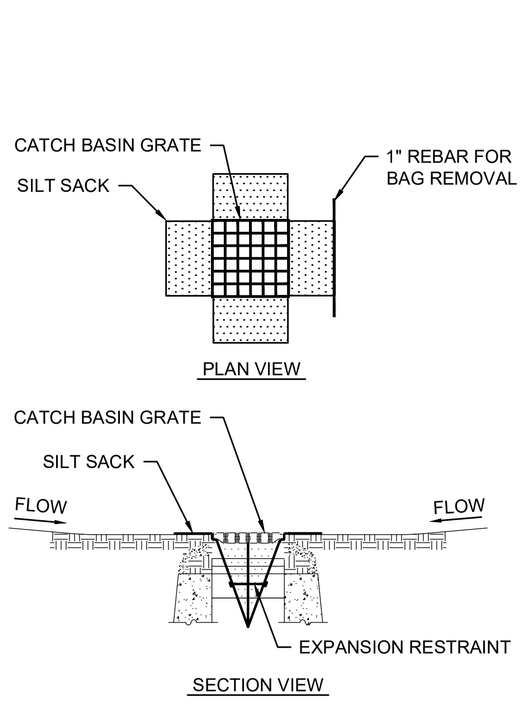


PAVEMENT STANDARD MILLING & OVERLAY TRANSITION SECTION
SCALE: NTS



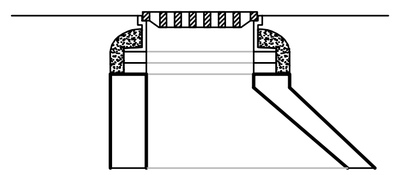
NOTES:
1. CONCRETE SHALL BE IN PRICE BID FOR GRANITE EDGING
2. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS MAY BE USED. ALL TEST REQUIREMENTS ARE WAIVED. HOT MIX ASPHALT SHALL NOT BE USED AS A SUBSTITUTE.

GRANITE EDGING IN EXISTING PAVEMENT - WITH OVERLAY
SCALE: N.T.S.

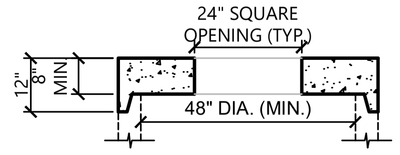


NOTES:
1. INSTALL SILT SACK IN EXISTING CATCH BASINS, BEFORE COMMENCING WORK, AND IN NEW CATCH BASINS IMMEDIATELY AFTER INSTALLATION OF STRUCTURE. REMOVE AFTER BINDER COURSE PAVING IS COMPLETE AND A PERMANENT STAND OF GRASS HAS BEEN ESTABLISHED.
2. GRATE TO BE PLACED OVER SILT SACK.
3. SILT SACK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND CLEANING OR REPLACEMENT SHALL BE PERFORMED

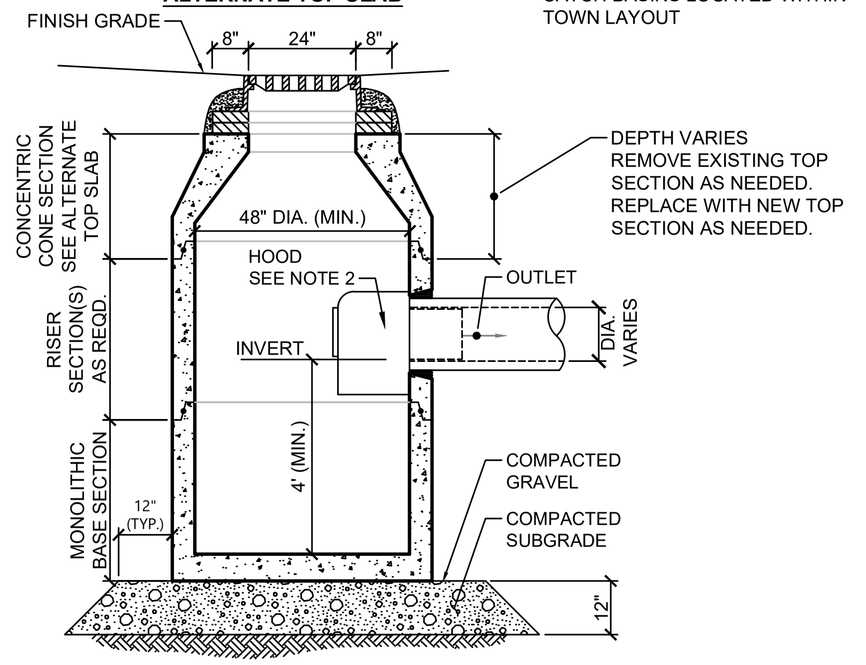
INLET PROTECTION - SILT SACK IN CATCH BASIN
SCALE: N.T.S. DWG: EV-03 DATE: MARCH 2013



ALTERNATE ECCENTRIC CONE SECTION

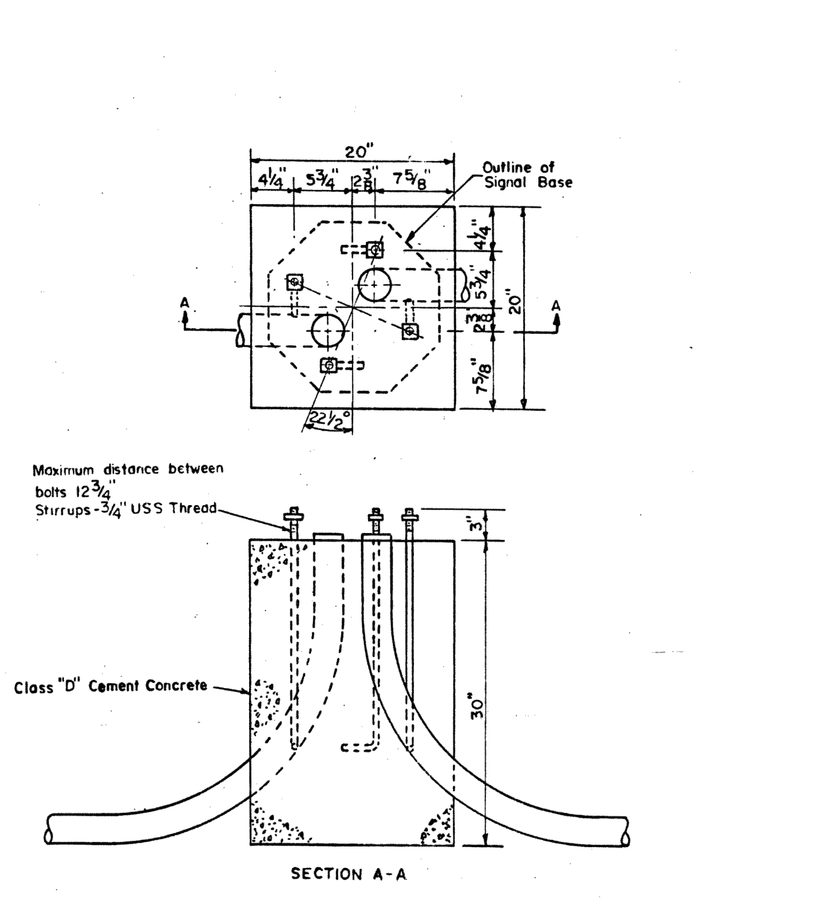


ALTERNATE TOP SLAB

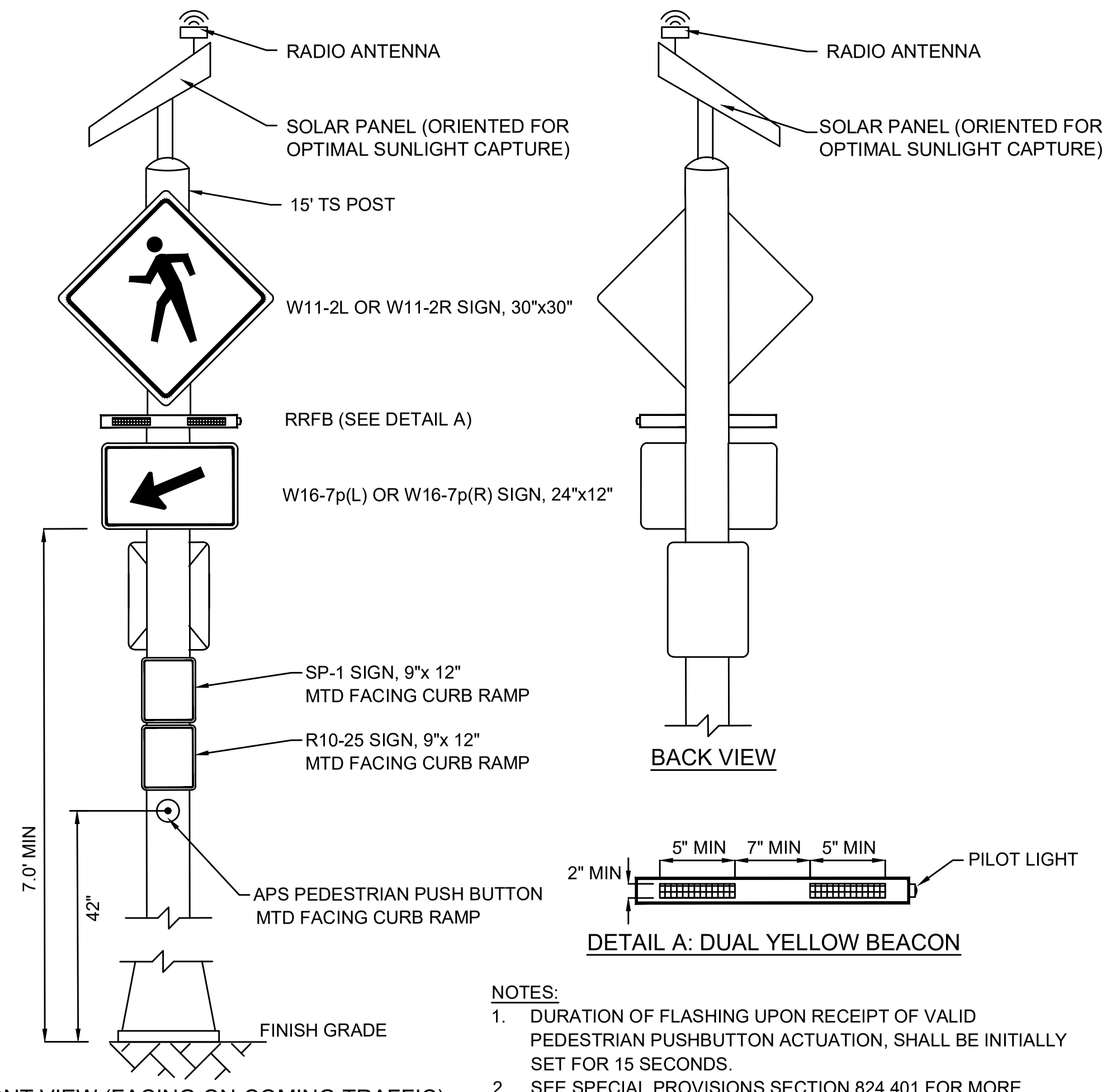


NOTES:
1. BASED ON ACTUAL FIELD CONDITIONS; THE CONTRACTOR SHALL DETERMINE WHICH STYLE OF THE SECTION SHOULD BE USED.
2. HOODS TO BE INSTALLED IN ALL CATCH BASINS LOCATED WITHIN TOWN LAYOUT

CATCH BASIN
SCALE: N.T.S.



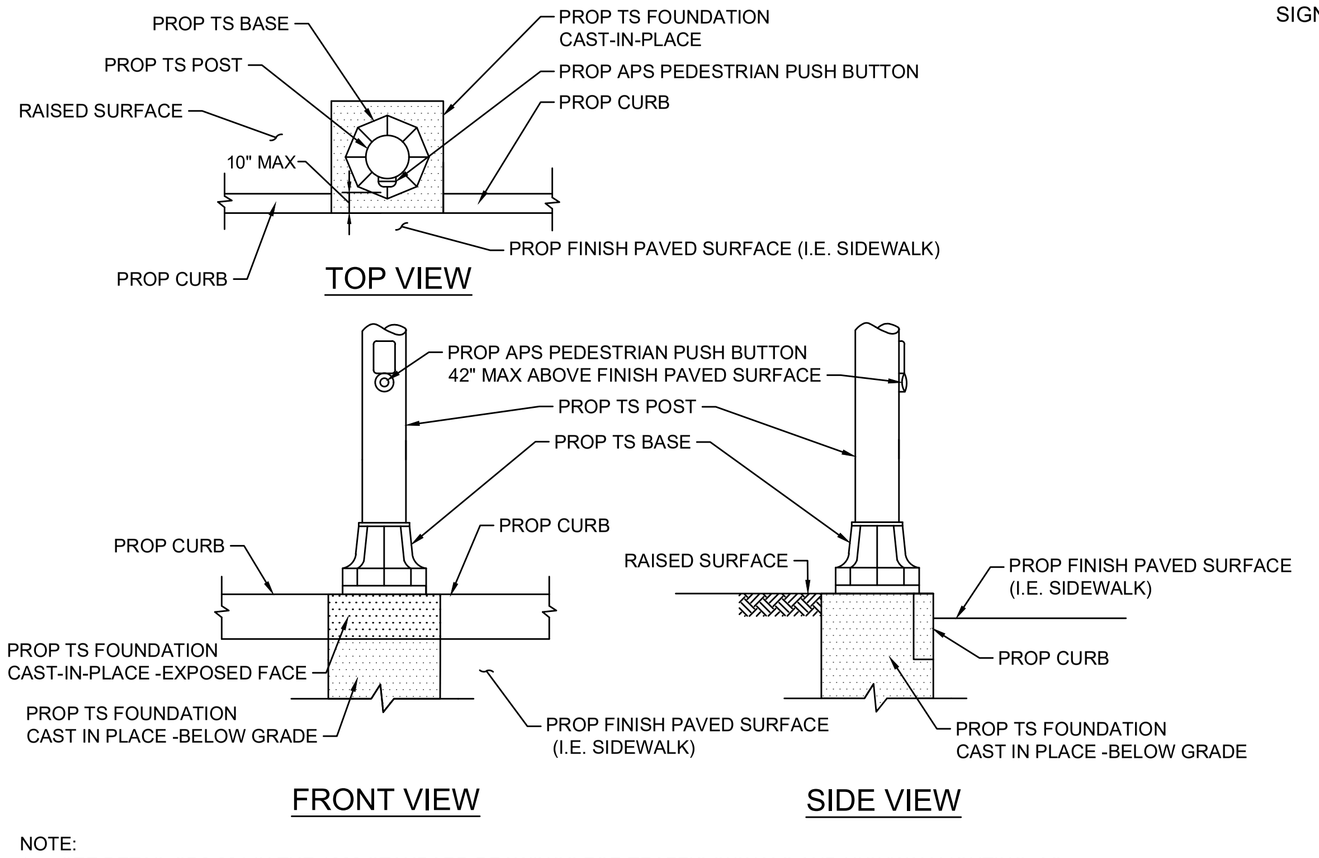
CONCRETE BASE STANDARD TRAFFIC SIGNAL POST
SCALE: NTS



NOTES:
1. DURATION OF FLASHING UPON RECEIPT OF VALID PEDESTRIAN PUSHBUTTON ACTUATION, SHALL BE INITIALLY SET FOR 15 SECONDS.
2. SEE SPECIAL PROVISIONS SECTION 824.401 FOR MORE DETAILS.

RECTANGULAR RAPID FLASHING BEACON (RRFB) (SOLAR POWER)

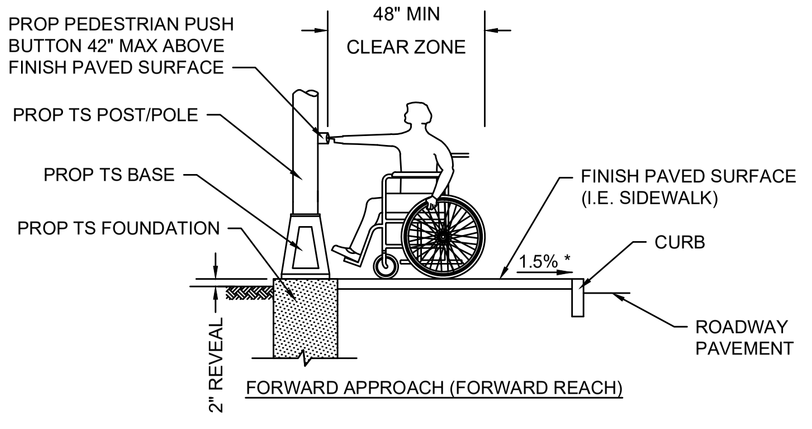
SCALE: NTS

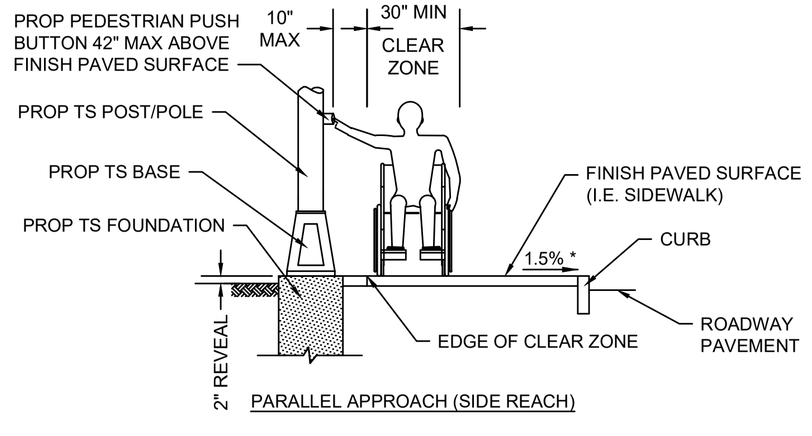


NOTE:
1. SEE DETAIL SD3-031 IN THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AS AMENDED FOR DIMENSIONS AND CONCRETE MIXTURE.

TRAFFIC SIGNAL POST CAST IN PLACE (POURED)FOUNDATION

SCALE: N.T.S.





NOTE:

A CLEAR GROUND SPACE SHALL CONSIST OF A STABLE AND FIRM AREA, COMPLYING WITH 521 CMR 6.5 (FORWARD REACH) OR 521 CMR 6.6 (SIDE REACH) AND SHALL BE PROVIDED AT EACH OF THE PEDESTRIAN PUSH BUTTONS.

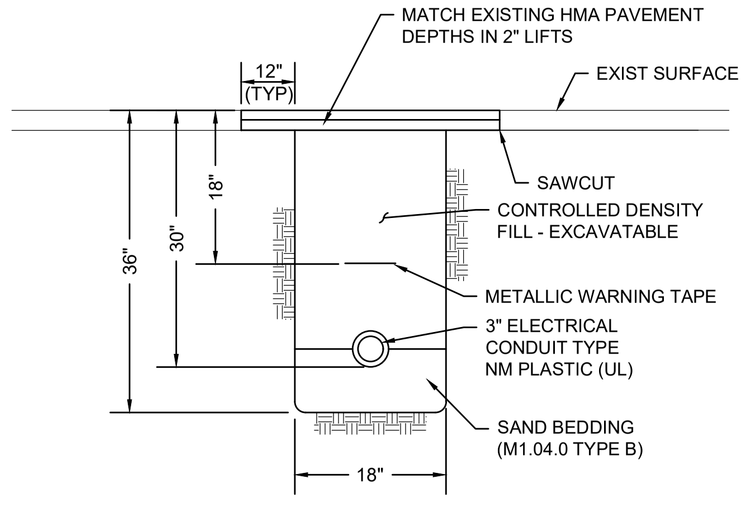
a. WHERE A FORWARD APPROACH IS PROVIDED, PEDESTRIAN PUSH BUTTONS SHALL ABUT AND BE CENTERED ON THE CLEAR GROUND SPACE.

b. WHERE A PARALLEL APPROACH IS PROVIDED, PEDESTRIAN PUSH BUTTONS SHALL BE WITHIN TEN INCHES (10") HORIZONTALLY OF AND CENTERED ON THE CLEAR GROUND SPACE.

* TOLERANCE FOR CONSTRUCTION ±0.5%

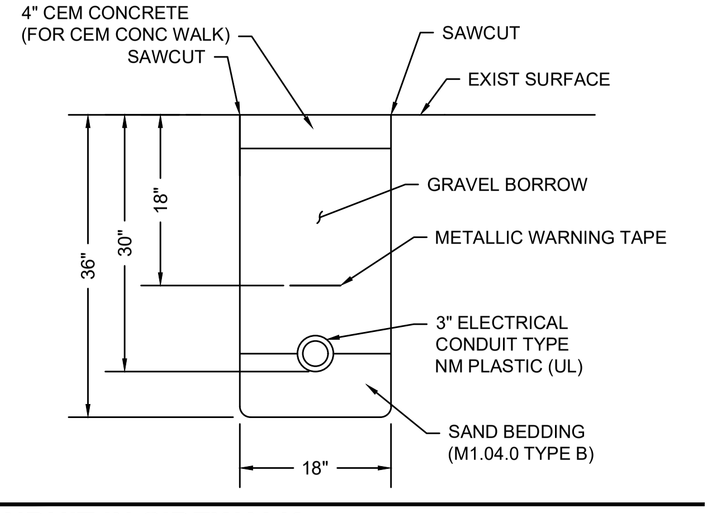
PEDESTRIAN PUSH BUTTON CLEAR ZONE

SCALE: N.T.S.



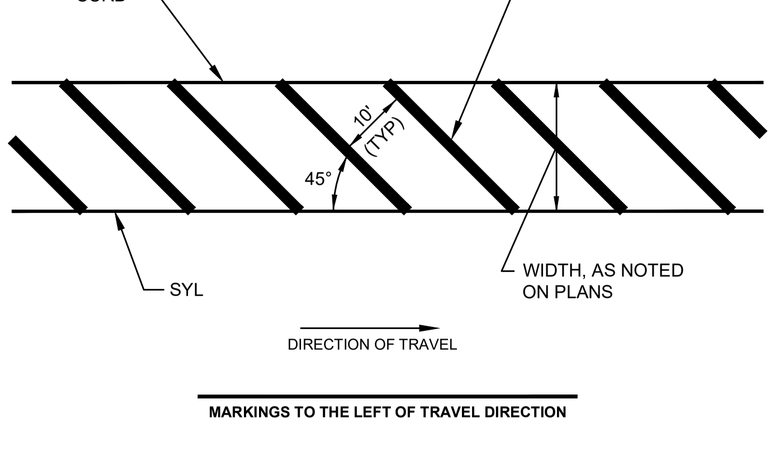
CONDUIT CROSSING ROADWAY/DRIVEWAY

SCALE: N.T.S.

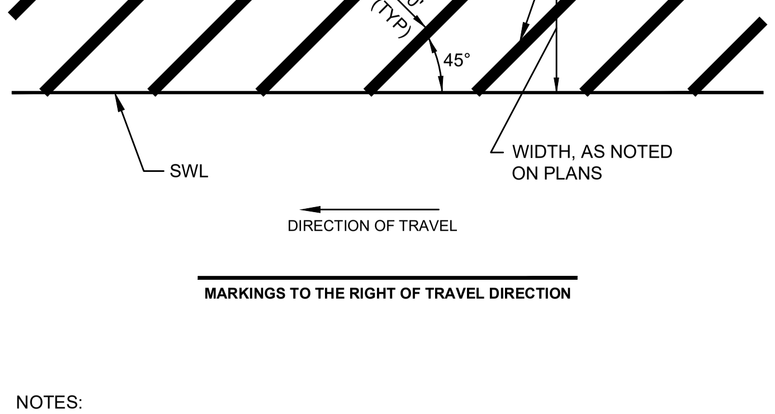


CONDUIT IN SIDEWALK

SCALE: N.T.S. DWG: TRENCH-03 DATE: MARCH 2013



MARKINGS TO THE LEFT OF TRAVEL DIRECTION

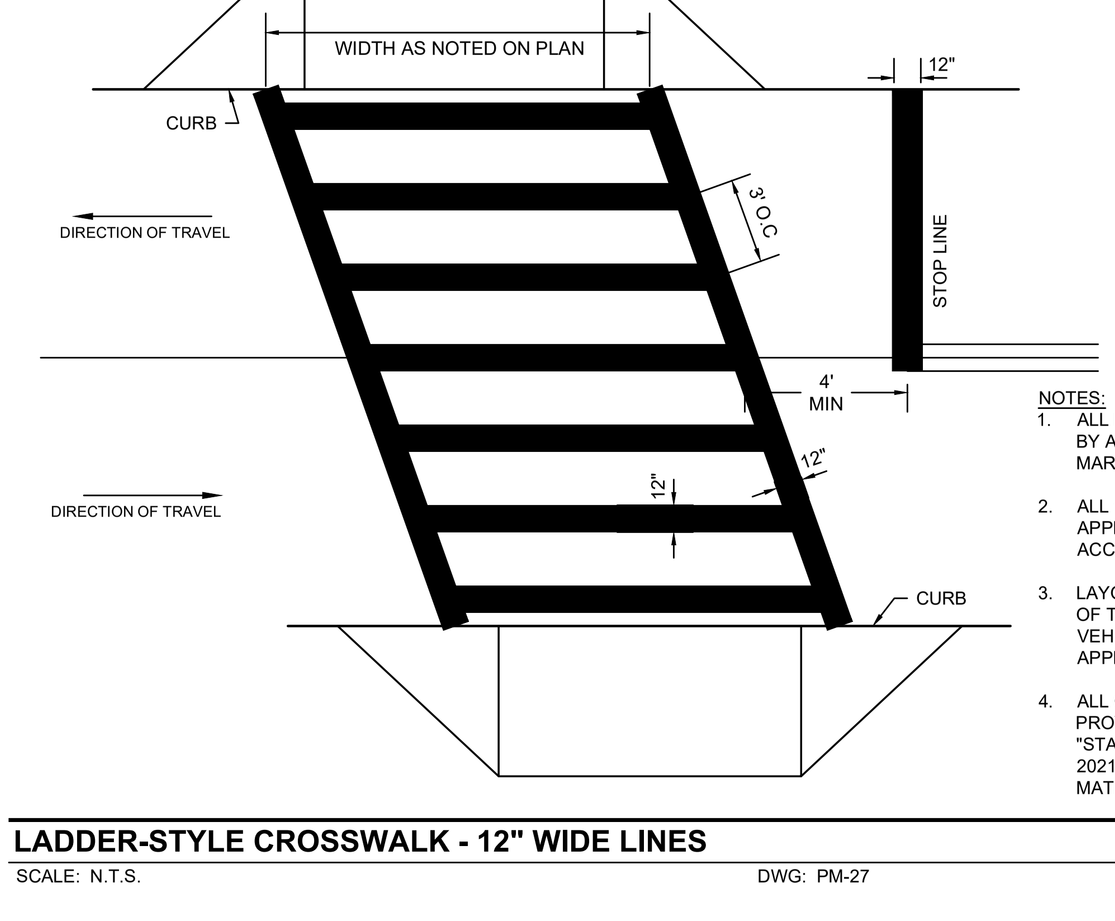


MARKINGS TO THE RIGHT OF TRAVEL DIRECTION

NOTES:
1. ALL 12" LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (e.g. TWO - 6" LINES) WILL BE ACCEPTED.
2. ALL PAVEMENT MARKINGS SHALL BE REFLECTORIZED THERMOPLASTIC.

CHANNELIZED MARKINGS - EDGE OF ROADWAY FOR ROADWAYS 40MPH OR LESS

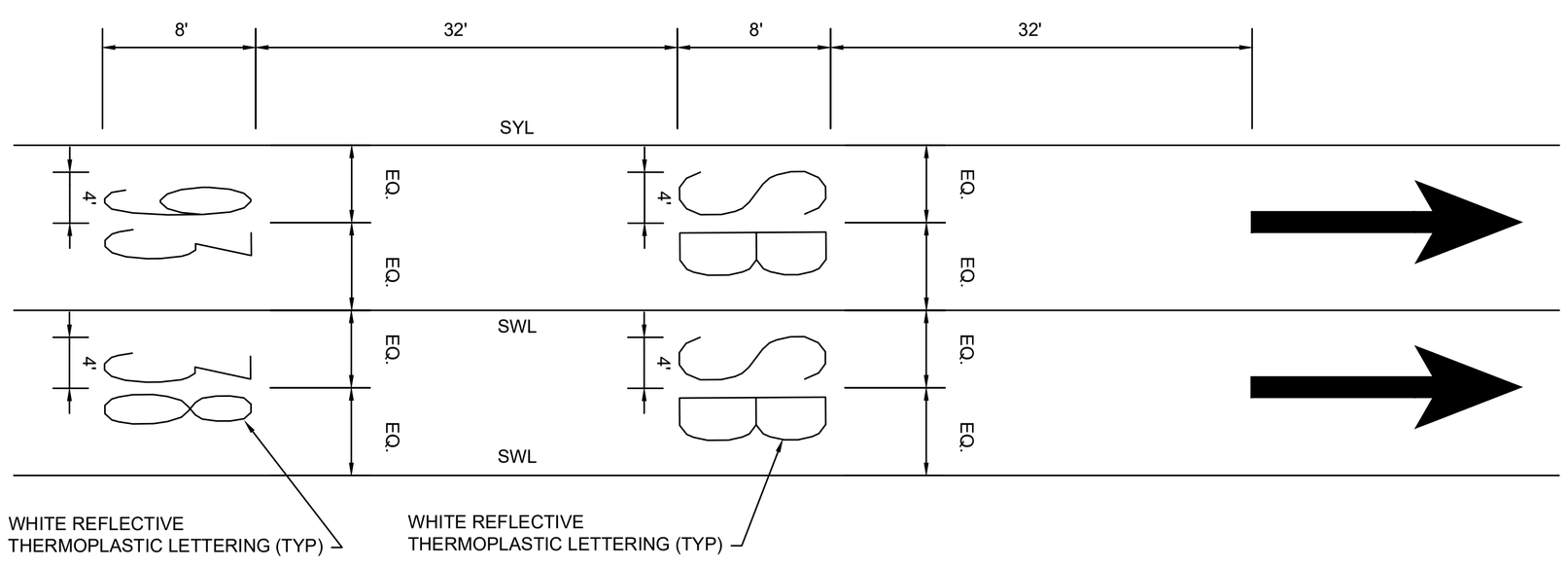
SCALE: NTS DWG: PM-15 DATE: OCT 2015



NOTES:
1. ALL EXISTING CROSSWALK MARKINGS SHALL BE FULLY ERADICATED BY APPROVED METHOD PRIOR TO THE APPLICATION OF PROPOSED MARKINGS.
2. ALL 12" THERMOPLASTIC LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO - 6" LINES) WILL BE ACCEPTED.
3. LAYOUT OF CROSSWALKS SHALL BE ORIENTATED IN THE DIRECTION OF TRAVEL AND LOCATED OUTSIDE OF THE WHEEL PATH OF VEHICLES. LAYOUT SHALL BE APPROVED BY MASSDOT PRIOR TO APPLICATION OF THERMOPLASTIC.
4. ALL CROSSWALKS INSTALLED SHALL CONFORM TO THE RELEVANT PROVISIONS OF THE MASSACHUSETTS HIGHWAY DEPARTMENT "STANDARD SPECIFICATION FOR HIGHWAY AND BRIDGES" DATED 2021, SECTION 860 FOR REFLECTORIZED LINE (THERMO-PLASTIC) & MATERIAL M7.01.20, LATEST REVISIONS.

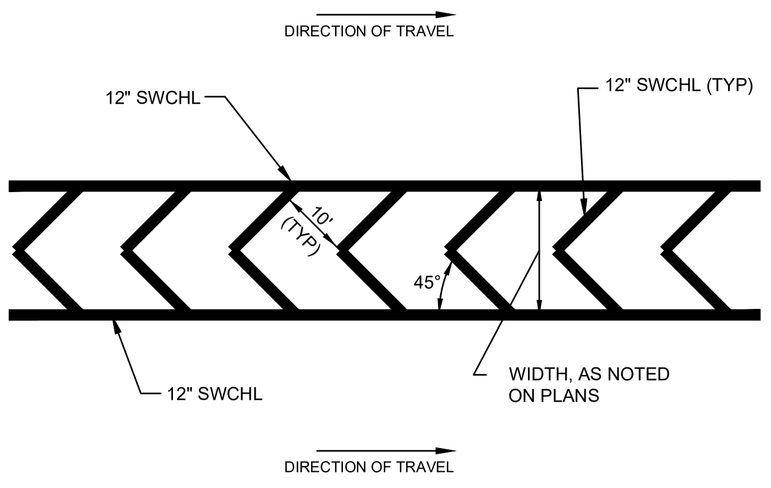
LADDER-STYLE CROSSWALK - 12" WIDE LINES

SCALE: N.T.S. DWG: PM-27 DATE: MAY 2017



ROUTE MARKING (93 SB / 38 SB)

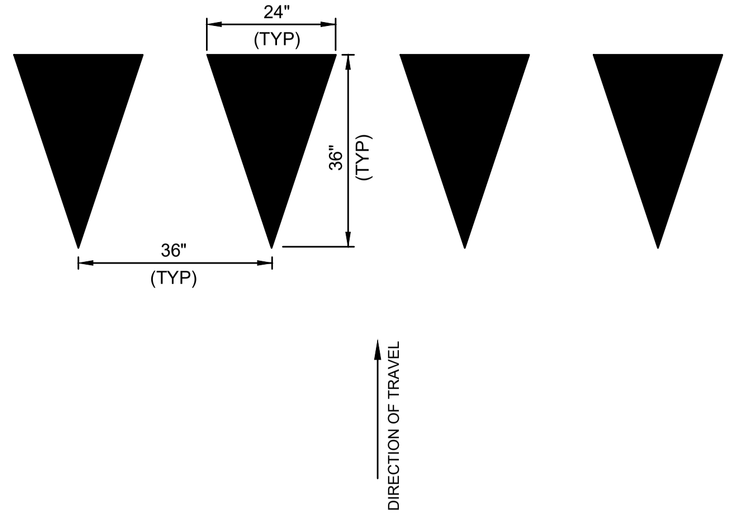
SCALE: N.T.S.



NOTES:
1. ALL 12" LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (e.g. TWO - 6" LINES) WILL BE ACCEPTED.
2. ALL PAVEMENT MARKINGS SHALL BE REFLECTORIZED THERMOPLASTIC.

CHANNELIZED MARKINGS - MEDIAN FOR ROADWAYS 40MPH OR LESS

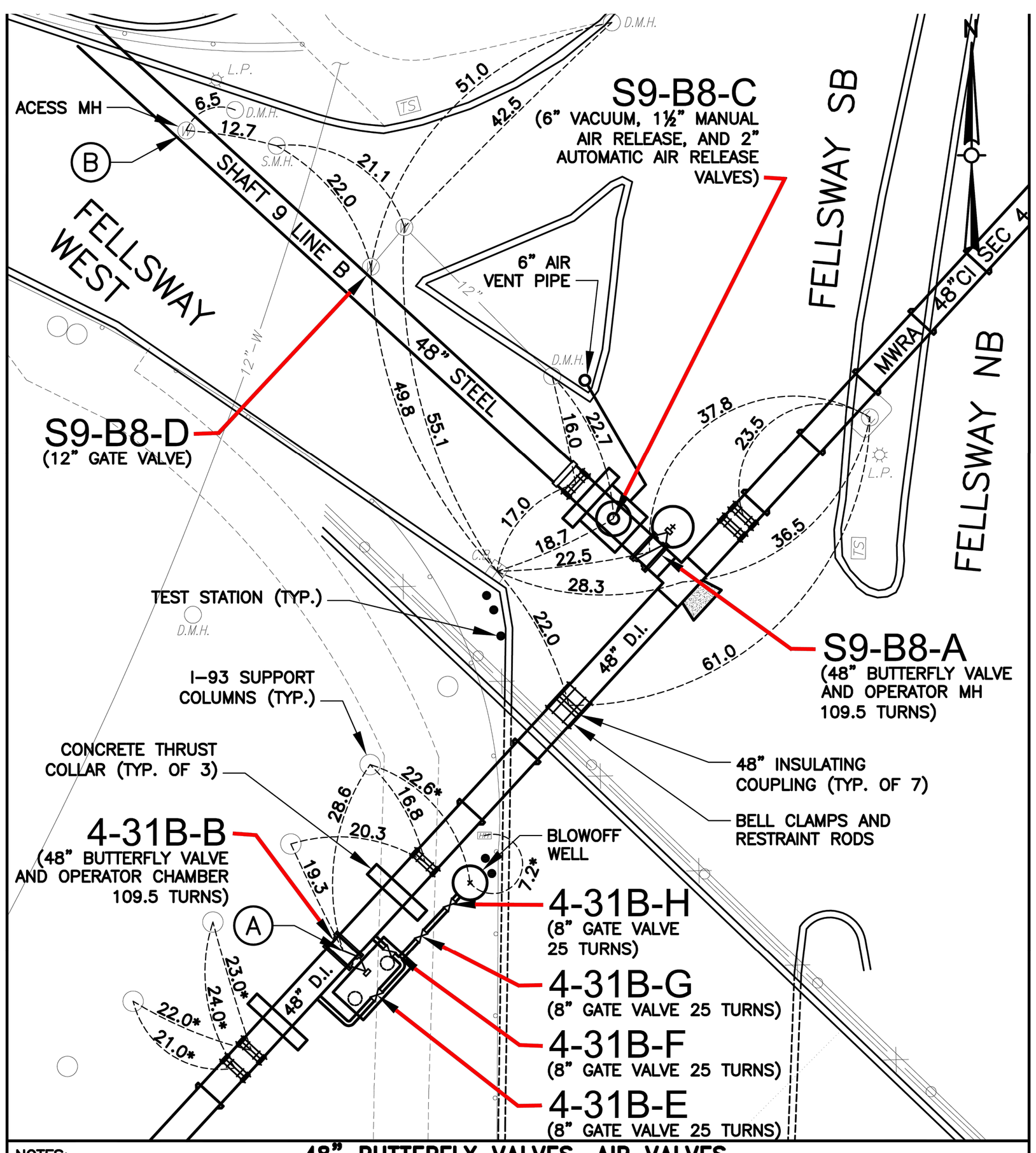
SCALE: NTS DWG: PM-15 DATE: OCT 2015



NOTES:
1. YIELD LINES SHALL CONSIST OF A ROW OF SOLID WHITE TRIANGLES.
2. IF APPLICABLE, YIELD LINES SHALL BE PLACED 4-FEET IN ADVANCE OF THE NEAREST CROSSWALK LINE.
3. IN THE ABSENCE OF A MARKED CROSSWALK, YIELD LINES SHALL BE PLACED AS SHOWN ON THE PLANS.
4. ALL PAVEMENT MARKINGS SHALL BE REFLECTORIZED THERMOPLASTIC.

YIELD LINE TRIANGLES

SCALE: NTS



NOTES:
1. PIPE JOINTS SCALED FROM EXISTING DETAIL RECORDS.
2. * DISTANCE SCALED FROM SURVEY AND NOT FIELD LOCATED.

48" BUTTERFLY VALVES, AIR VALVES, 8" GATE VALVES AND BLOWOFF
FELLSWAY AT FELLSWAY WEST
SOMERVILLE

20 10 0 20

SCALE: 1"=20'

JANUARY 1992
REVISED JUNE 2006

ELEVATION DATUM: BOSTON CITY BASE		
AT	GND.	TOP OF PIPE
A	16.0	12.0
B	28.4	20.8

SECT. 4 – ℄ BUTTERFLY VALVE STA. 332+07

DETAIL RECORD NLS 4–31B
SHAFT 9 LINE B8

EXISTING VENT DETAIL
SCALE: NTS

FIELD BOOK NO.: 1630 PAGE NO.: —
PLOTTED BY: MWH
CHECKED BY: MWH

SOMERVILLE
FELLSWAY/MCGRATH HWY (RTE-28)/MYSTIC AVE (RTE-38)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	XXXX	9	10
PROJECT FILE NO.	608562		

CONSTRUCTION DETAILS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
APRIL 14, 2023

608562_HD(DET).DWG Plotted on 3-Jun-2024 7:33 AM

A00811 - 19

Proposal No. 608562-127758

SOMERVILLE
FELLSWAY/MCGRATH HWY (RTE-28)/MYSTIC AVE (RTE-38)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	XXXX	10	10
PROJECT FILE NO.	608562		

CONSTRUCTION DETAILS
SIGNAL AND INTERSECTION IMPROVEMENTS
MWRA 8M PERMIT APPLICATION
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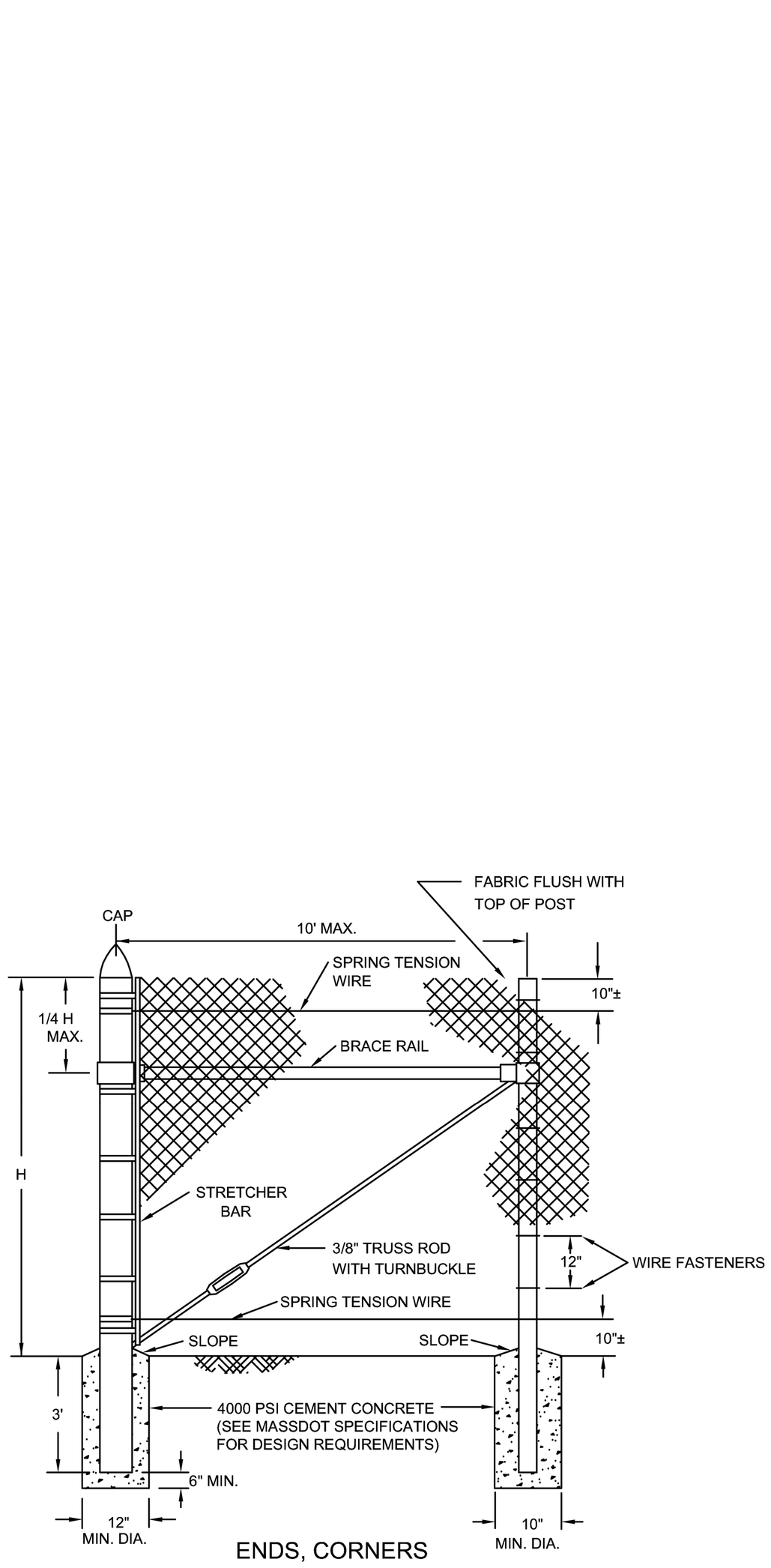
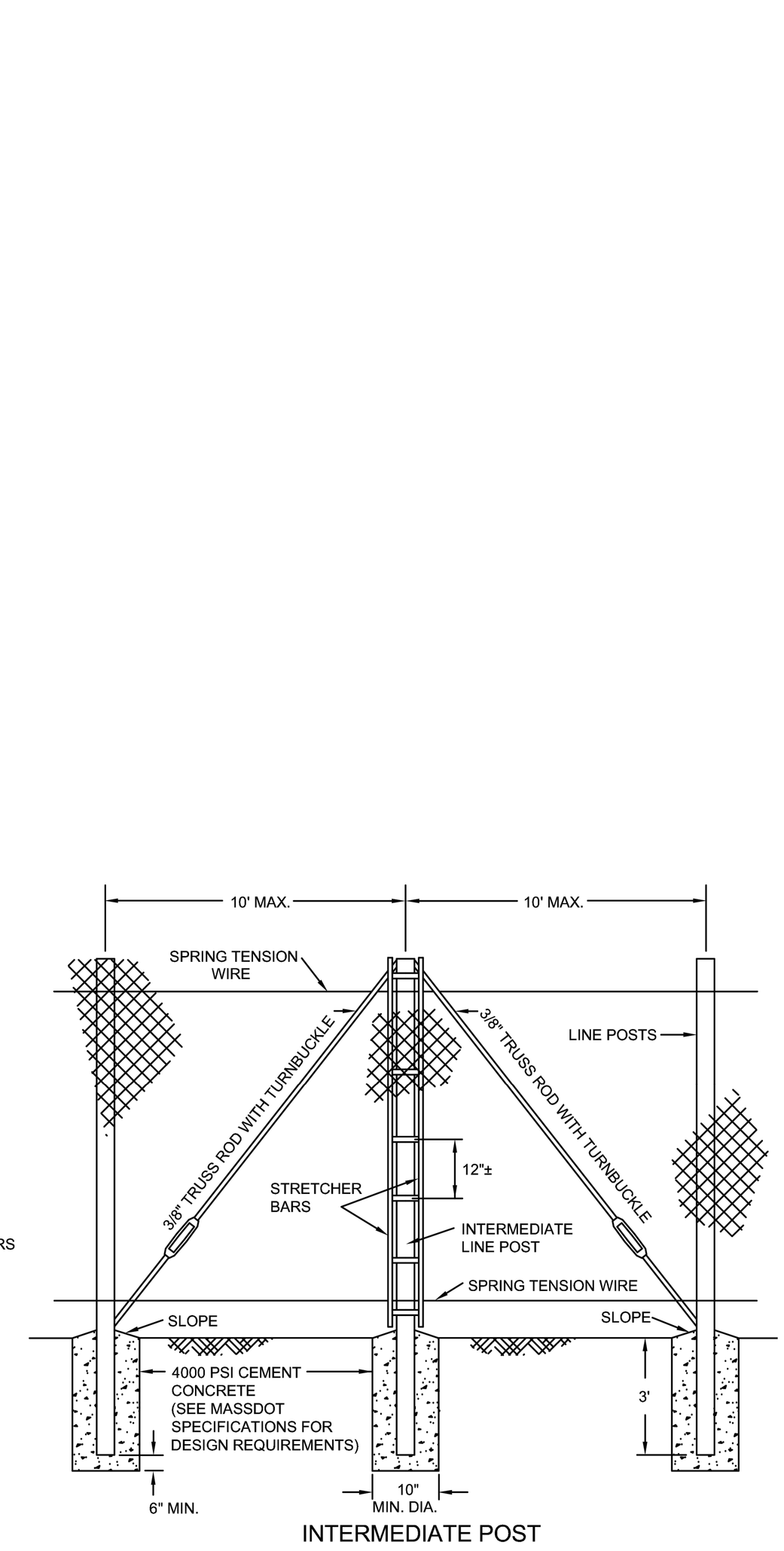
608562_HD(DET).DWG Plotted on 3-Jun-2024 7:33 AM

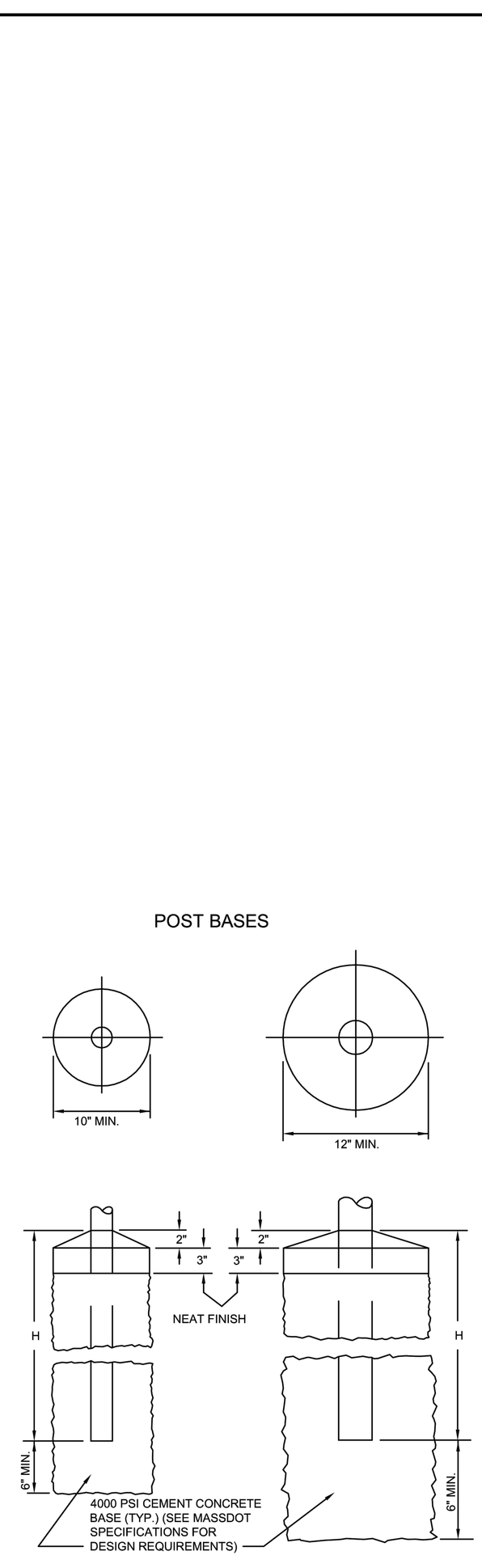


ENDS, CORNERS



INTERMEDIATE POST

POST BASES



FOR CORNER, END LINE AND PULL POSTS

FOR GATE POSTS

FENCE HEIGHT	MIN. H
5' OR LESS	2'-6"
OVER 5'	3'-0"

NOTES:

CHAIN LINK FENCE
SCALE: NTS

Temporary Traffic Control

Typical Details and
Massachusetts Guidelines
for MassDOT, Municipalities,
Utilities, and Contractors

SHEET INDEX (1 OF 3)

SHEET INDEX (2 OF 3)

STATIONARY OPERATIONS (CONT.) **PAGE**

MOBILE OPERATIONS

SHEET INDEX (3 OF 3)

INTRODUCTION

This guide has been prepared to assist in the planning and installing of temporary traffic controls in maintenance, utility, or short-term construction work areas (work lasting 10 hours or less). This guide serves to assist with the many decisions that must be made for each work site. Special planning for traffic control is necessary on a case by case basis because conditions can vary widely among work locations. **Since this guide cannot cover every situation, representative illustrations covering typical short-term construction, maintenance, and utility operations are presented**.

All typical traffic control device setups illustrated should be considered as guides. The traffic control devices that are shown, the arrangement or position of the devices, and the distances prescribed in the tables are based on the Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) and the Massachusetts Amendments to the MUTCD (MA Amendments), but these illustrations only present minimum standards. The provision of safe work zones for all roadway users and roadway workers affected by these activities is paramount. Traffic controls may be expanded or improved upon whenever deemed necessary. Traffic movement through the work site all traffic control devices shall be periodically observed and inspected at all locations.

If necessary, Part 6 of the MUTCD and the MA Amendments, Chapter 17 (Work Zone Management) of MassDOT's Project Development & Design Guide, and the “Traffic Engineering and Safety Section” of the MassDOT web site: (https://www.massdot.state.ma.us/highway/Departments/TrafficandSafetyEngineering.aspx), as well as MassDOT District offices can provide additional guidance, information, and suggestions for work zone setups.

RESPONSIBILITIES FOR TRAFFIC CONTROL

Short-term construction, maintenance, and utility work on or near the roadway creates a potentially hazardous situation, typically requiring the use of temporary traffic controls. These controls are important to protect both work crews and the road users. It is the responsibility of each maintenance foreman to establish and maintain safe and effective controls.

Usually the supervisor, working with the crew, plans the traffic control procedures for proposed work sites. The foreman is responsible for re-questing, storing, and maintaining all traffic control devices necessary for their crews.

The foreman is responsible for placing the devices according to these guidelines. They must inspect each installation and observe traffic flow through the area. The foreman is generally authorized to make adjustments to the original installations that, in their judgment, are necessary to improve the control of traffic and establish greater safety.

All necessary traffic control devices must be installed before work begins and properly maintained during the work period. They must also be removed as soon as they are no longer relevant to the roadway conditions.

In situations such as night time road or lane closures, detours, or other unusual conditions on state highways, the District Traffic Maintenance Engineer (DTME) should be advised. If the DTME is absent, the section foreman shall follow the instructions of the District Maintenance Engineer.

TRAFFIC CONTROL DEVICES

Traffic control devices regulate the movement of road users, warn of unexpected or unusual roadway conditions, and inform them how to maneuver safely through or around the work area. All signs, channelizing devices, barricades, and other miscellaneous traffic control devices should work together to guide traffic safely and efficiently. Common temporary traffic control devices are outlined and described below.

Signs

Temporary traffic control zone (TTCZ) signs are the primary means of providing information and directions to roadway users. All signs must be retroreflective per MassDOT's latest standard.

Warning signs call attention to unexpected conditions and to situations that might not be readily apparent to road users on or adjacent to a roadway. Warning signs alert road users to conditions that might call for a reduction of speed or an action in the interest of safety and efficient traffic operations. Nearly all warning signs for construction and work areas have black legends and borders on a fluorescent orange background.

Regulatory signs shall be used to inform road users of selected traffic laws or regulations and indicate the applicability of the legal requirements. Regulatory signs typically have black legends and borders on a white background.

Channelizing Devices

When used properly, traffic cones, reflectorized plastic drums, and barricades guide traffic through the work area along an appropriate travel path. It takes roadway users a certain distance along the roadway to safely move away from the upcoming active work site. These transition distances are based on the following taper length (L) formulas:

$L = WS^2/60$ for speeds of 40 mph or less; or

$L = WS$ for speeds of 45 mph or more; where

- L = minimum length of taper in feet,
- S = posted speed limit or typical travel speed in miles per hour prior to the work, and
- W = width of lane closure in feet.

The spacing of channelizing devices (in feet) is approximately equal to the existing speed of traffic (in mph).

Warning Lights

Rotating beacons and other flashing lights mounted on work vehicles, signs, or channelizing devices help alert roadway users to the work area. They may also be used to warn roadway users of hazards within the work area. The first 10 drums in any taper shall be equipped with sequential flashing lights.

Arrow Boards

Arrow boards are a special type of sign that are highly visible work zone warning devices. They are particularly effective on highways, where both speed and volume are high. Arrow boards in the non-directional, CAUTION, mode (four corner flashing) may be used to indicate that a shoulder is closed. Arrow boards in the arrow mode shall only be used when a travel lane is dropped on a multi-lane road and one lane of traffic must merge with another. All arrow boards should be located at the beginning of each lane or shoulder closure taper without extending outside of it. Arrow boards shall flash at a rate of 25 to 40 flashes per minute. Arrow boards shall not be used to indicate a lane shift.

BASIC REQUIREMENTS

In every work situation, the temporary traffic control setup must: Give roadway users sufficient advance warning of the work area; advise roadway users of the proper actions to take and travel paths to follow; and provide protection to roadway users, workers, and the work area. These three general requirements can be met as outlined below.

Provide Advance Warning

Warning devices along the approaches to a work area alert roadway Users to changes to road and operating conditions. Roadway users are usually alerted to these dangers via a sign or series of signs installed in the same order as the roadway user generally would expect to see them on long-term construction projects.

The initial project limit sign is usually a general warning such as “ROAD WORK 1500 FT”. Other operational warning signs then provide the roadway user with more specific information about the situation. A minimum of three advance warning signs (the initial project limit sign and two operational warning signs) is recommended when work is located on the traveled way. Warning lights and flags can be used to attract attention to the signs. A highly visible work area helps reinforce the advance warnings.

Advise and Direct Travelers

Operational warning signs provide information to the road-way user such as the type of work being performed, special conditions to watch for, or actions to take. These include signs such as, SHOULDER WORK, RIGHT LANE CLOSED, DETOUR 500 FT, ROAD CLOSED to THRU TRAFFIC, POLICE OFFICER AHEAD, etc. All of these signs must be located far enough in advance of the work area that the roadway user has sufficient time to react to them appropriately. For projects in Urban Areas, see detail: Typical Device Spacing for minimum sign spacing.

Protect Travelers, Workers, and the Work Area

The primary protection of any work area is its own visibility. Traffic cones, reflectorized plastic drums, portable breakaway barricades, etc. are used to make the work area visible and separate workers from traffic.

Other devices, such as flashing lights, flags, delineators, temporary lighting, and portable changeable message signs (PCMS) can be used to provide additional emphasis and visibility.

Workers must protect themselves by being alert to their work situation, wearing safety vests and hard hats, and by facing traffic whenever possible.

Work vehicles can also add protection when they are equipped with truck mounted attenuators, rotating beacons, flashing lights, flashing arrow boards, etc. and are parked between workers and oncoming traffic. However, workers should not position themselves between two closely parked vehicles. No private personal vehicles are allowed within the work site.

PLANNING GUIDELINES

Decisions regarding selection of work area traffic control devices require a knowledge and understanding of the specifics of each work zone. As there may be vast differences between situations, three main variables need to be considered prior to determining the need for, or the selection of, traffic control devices: 1) location of work, 2) type of roadway, and 3) speed of traffic.

Compiling information about these variables will help with planning a safe work area control. Each of these variables is explained below.

Location of Work

The choice of traffic controls needed for a short-term construction, maintenance, or utility operation depends upon the work zone's location. As a general rule, the closer the active work site is to the roadway, the more control devices are needed. Work can take place:

- Away from the shoulder or edge of pavement. No special devices are needed if work is confined to an area 15 or more feet from the edge of the shoulder. A general warning sign, such as ROAD WORK AHEAD, should be used if workers and equipment must occasionally move closer to the roadway.
- On or near the shoulder/ edge of pavement. This area should be signed as if work were on the road itself, since it is part of the roadway users' recovery area. Advance warning and operational signs are needed, as well as channelization devices to direct traffic and keep the work area visible to roadway users.
- On the median of a divided highway. Work in this location may require traffic control in both directions of traffic. Advance warning and channelization devices should be used if the median is narrow.
- On the roadway. This condition requires detailed protection for workers and sufficient warning to roadway users. Advance warning must provide a general message that work is taking place as well as information about specific hazards and specific actions the roadway user must take.

TYPE OF ROADWAY

The characteristics of the roadway also have an important influence on the selection of work area traffic control. The roadway, itself, may present special hazards. You should plan for maximum protection, using the worst hazard present as your guide to signing the work area. Some general considerations are described below for road conditions.

One-way roads: A one-way road requires signage on both sides of the road if it carries two or more lanes in one direction, ensuring roadway users in all lanes are alerted and informed.

Two-way roads:

- **Undivided:** Two-way, undivided roads will usually require controls for both directions of traffic. When the active work site is well off the roadway, controls for the opposite lane may be eliminated.
- **Divided:** Work on divided multi-lane roadways can often be handled as work along a one-way road (i.e. signs are provided along both sides of the roadway along the direction affected). If the work is in the median, both directions of traffic must be controlled, and both approaches should be double signed (i.e. have all 3 advance warning signs on both sides of each direction).

EFFECTS OF SPEED ON WORK ZONES

Speed is an important consideration in the use of work area traffic control devices. As a general rule, the greater the speed of traffic approaching a work area, the greater the size, number, and spacing of control devices.

Size. The standard size for most warning signs is 36 x 36 inches on conventional roadways and 48 x 48 inches on freeways and expressways. Signs larger than the standard 36 x 36 inches may be desirable on high-speed conventional roads.

Position. Install signs far enough in advance of the work area so the roadway users have time to react to them (see charts associated with diagrams for spacing).

OTHER FACTORS

Sight Obstructions. To ensure safety, work areas must be visible. Assess the placement of the temporary traffic control devices by driving through the area, and determine if the devices can be easily seen and provide sufficient time for roadway users to react in a safe manner. Extra precaution should be enacted in areas where horizontal or vertical curves may obstruct a roadway user's clear view of road activities ahead.

Police/Flaggers. It should be noted that the MUTCD does not require police/flaggers for stationary setups. If police/flaggers are used, a police/flagger ahead sign should be used in advance of any point where the police/flagger is stationed to control road users.

PROCEDURES FOR WORK AREA TRAFFIC CONTROL

1. PLAN YOUR WORK

Inspect location of work area and its surroundings.

Analyze:

- Location of work in relation to the traveled way, intersecting road-ways, driveways, and sight distances;
- Type of roadway and traffic involved; and
- Volume and speed of traffic.

Meet and discuss the work and necessary traffic control with the crew.

Study representative illustrations in this guide to develop a temporary traffic control plan (TTCP).

Other Considerations:

- Base your traffic control plan on the premise that all roadway users are unfamiliar with the area.
- The closer the work area location is to traffic, the more controls are needed.
- Plan for maximum protection.
- Select and inspect the temporary control devices needed (including all warning signs), if they are not in good condition, REPLACE THEM!
- Then collect and transport them to the work site.
- Determine their proper placement.
- Install signs and other traffic control devices prior to allowing personnel or equipment onto the roadway.
- Make sure signs are reflective, accurate, clean, and meet specifications. Completely cover any existing permanent signs that will conflict with the messages of the new work area control signs.

2. INSTALLING/REMOVING TEMP. TRAFFIC CONTROL DEVICES

Care must be exercised when installing and removing temporary traffic control (TTC) devices. The traffic control needed to perform the operation safely is dictated by the location on the roadway the operation will occur: in a shoulder or a lane, in the left lane or right, etc. In all cases, installing TTC begins and ends as a mobile operation.

A shadow vehicle with a truck mounted attenuator (TMA) shall be used to protect workers installing and removing TTC devices on all roadways with a posted speed limit of 45 MPH or greater as directed by the engineer. TTC devices shall not be installed or removed from a shadow vehicle with a TMA. TTC devices shall be installed or removed from a work operation vehicle only and a shadow vehicle with a TMA shall be used to protect the workers installing or removing the devices.

PROCEDURES FOR WORK AREA TRAFFIC CONTROL (CONT.)

3. INSTALL TRAFFIC CONTROL DEVICES AT WORK SITE

FOR LOWER SPEED (≤ 40 MPH) ROADWAYS:

1) All devices shall be installed in order with the flow of traffic.

2) Where one direction of traffic is being affected, the first sign installed should be the sign farthest from the work site, and on the same side as the work.

3) Where two directions of traffic are affected, install signs for opposing traffic first, starting with the sign farthest from the work area. When signs for opposing traffic have been installed, install signs on the same side as the work area, again beginning with the sign farthest from the active work site.

4) Once signs are in place, other traffic control devices shall be installed in the same manner as the signs.

FOR HIGHER SPEED (≥ 45 MPH) ROADWAYS:

1) All devices shall be installed in order with the flow of traffic.

2) Install all advance warning signs, beginning with the ROAD WORK XXX (W20-1) sign and ending with the END ROAD WORK/DOUBLE FINES END (MA-R2-10E) sign.

3) Install all signs beginning with the opposite side which will be closed (for a right lane closure; first, install all signs on the left side (shoulder) and then install all signs on the right side (shoulder). No signs shall be erected on the roadway unless delineated by traffic control devices.

4) If required, install shoulder taper as the mobile operation advances.

5) Install arrow board on the shoulder prior to the merging taper or as close to the beginning of the merging taper as possible.

6) Install channelizing devices to form a merging taper. Use of a shadow vehicle with a TMA during installation is required on roads with speed limits of 45 MPH or greater or as directed by the Engineer.

7) Install traffic control devices along the buffer space at the appropriate spacing.

8) Continue placing devices along the work space at the appropriate spacing.

9) Install devices for the termination area as necessary.

10) Place the shadow vehicle with a TMA in advance of the first work crew or hazard approached by motorists. Multiple shadow vehicles may be required based on the number of lane and shoulder closures implemented.

4. INSPECT WORK AREA SIGNING AND CONTROL DEVICES

1) Assess the placement of the temporary traffic control devices by driving through the work area. All approaches to the work zone should be checked.

2) Ensure roadway users will have sufficient time to read signs and react in a safe manner.

PROCEDURES FOR WORK AREA TRAFFIC CONTROL (CONT.)

3) Check visibility of entire work area. If approaching roadway users can't see the work area well, or if they can't see ahead to traffic that may already be queued on the approach because of the work, additional traffic control devices should be deployed.

4) Check to ensure the proper temporary traffic control devices are positioned to protect workers from traffic (where possible).

5) Ensure all workers wear safety vests, hard hats, and all other necessary safety equipment. All worker safety gear should be in good condition. All reflective gear should be clean and highly visible in the dark.

6) Record in the log book the number and location of all signs and devices.

Considerations:

- Work area signs should never be blocked from view or obscured by vegetation, existing signs, or other obstructions.
- Flags, flashing lights, and edge line traffic cones can be used to improve visibility.

5. REMOVE TRAFFIC CONTROL DEVICES AT WORK SITE

All workers and equipment should be clear from work site BEFORE removing signs and other devices.

FOR LOWER SPEED (≤ 40 MPH) ROADWAYS:

1) Remove signs and other devices within the delineated area when work is complete.

2) Remove other traffic control devices in the reverse order in which they were installed

3) Remove signs in the reverse order in which they were installed (i.e. sign closest to the work area to be removed first).

4) When the operation is complete, uncover any existing permanent signs covered in Step 2.

5) Record in the log book the time at which the signs were removed.

FOR HIGHER SPEED (≥ 45 MPH) ROADWAYS:

All TTC devices for a stationary lane closure on a multi-lane roadway, except advance warning signs, should be removed against the flow of traffic in the following sequence:

1) Remove the channelizing devices starting from the end of the activity area working back to the widest part of the merging taper.

2) A shadow vehicle with TMA shall be positioned to protect workers removing devices and work backwards as the setup is removed from the roadway.

PROCEDURES FOR WORK AREA TRAFFIC CONTROL (CONT.)

3) Place the removal vehicle on the shoulder, and remove the channelizing devices from the merging taper by hand onto the work vehicle.

4) Remove the arrow board once traffic is clear and it is safe to do so.

5) Circle back and moving with the flow of traffic, remove the advance warning signs starting with the opposite side from previous lane closure first.

6) At no time shall workers run across the multilane roadway to remove signs on both sides of the road simultaneously.

7) Record in the log book the time at which the signs were removed

RAMP FACILITIES

At all times it is necessary to control the on and off-ramp traffic during the installation and breakdown of traffic control devices. Use of temporary traffic slow-downs or rolling roadblocks is recommended to allow for the safety of workers handing temporary traffic control devices on ramp facilities. A shadow vehicle with a TMA shall be used to protect the workers installing or removing the devices. At no time shall the work operation vehicle be used as the shadow vehicle with the TMA.

USE OF THIS GUIDE

Illustrations showing minimum standards for short-term construction, maintenance, and utility operations are arranged in this guide by type of operation. The users of this guide should compare all illustrated examples and examine their differences. After gathering information about the work zones using the general guidelines as outlined, proceed as follows:

1) Turn to the Index. Consider the type of operations and the type of roadway upon which work will occur.

2) Select the figure that most closely matches the conditions where you plan to work. Remember that all diagrams represent minimum standards.

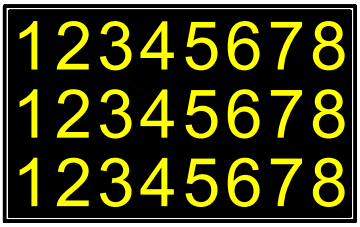
3) Read the title of the illustration to ensure that it is appropriate to your location. Study the layout of traffic control devices and read all notes.

4) Consult the appropriate tables, as directed on each illustration to determine taper length and proper spacing of signs. Notice that distances change when speeds change. Also note that these are guidelines, only, and they must be adapted to your specific work area.

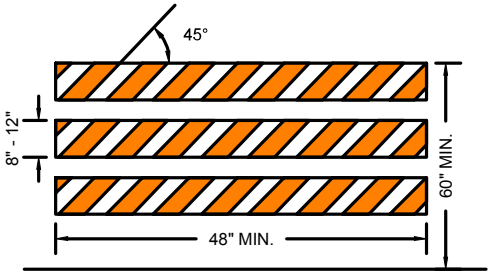
5) Use the **"PROCEDURES FOR WORK AREA TRAFFIC CONTROL"** for assistance in completing all necessary steps to provide effective and safe work area traffic control.

massDOT Massachusetts Department of Transportation Highway Division PAGE 10	Work Zone Safety Standard Details and Drawings	FIGURE 1 TYPICAL TRAFFIC CONTROL DEVICES NOT TO SCALE

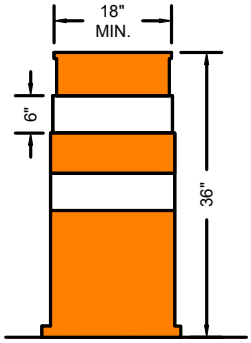
SIGN



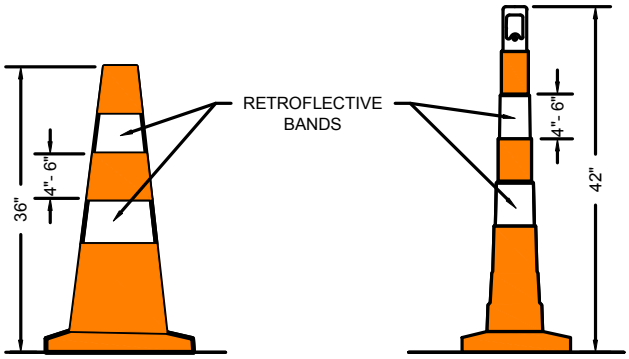
PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)



TYPE III BARRICADE

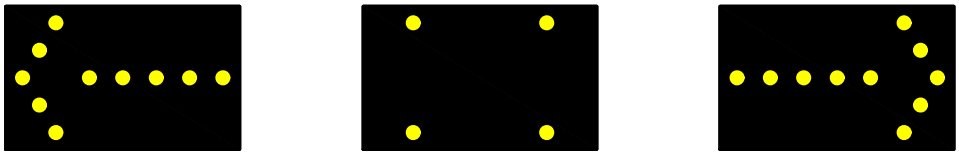


DRUM



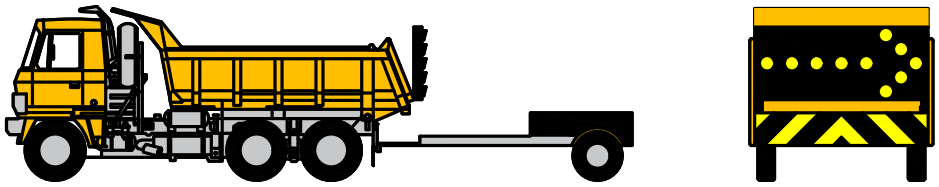
CONES

Cones may be used for all daytime operations. For night work, drums should be used to form the taper(s) and cones can be used along the tangent section of the work setup.



LEFT CAUTION RIGHT

ARROW BOARD (WITH MODE)



TRUCK MOUNTED ATTENUATORS

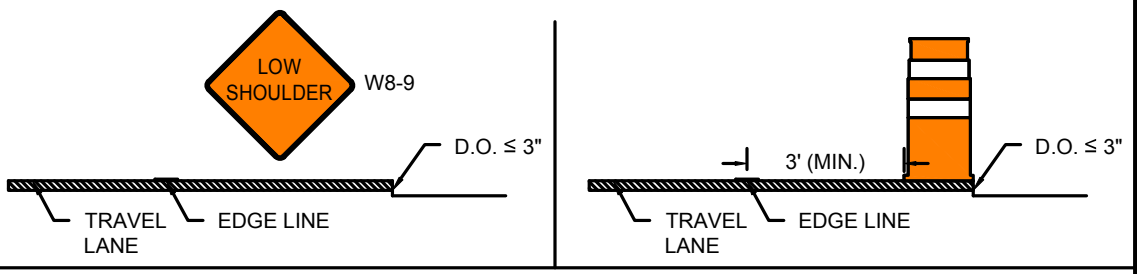
Truck Mounted Attenuators (TMA) shall be positioned between the start of the work area and the end of the designated buffer zone. The TMAs are to be positioned in each temporarily closed lane. This includes shoulders (≥8 feet) whether combined with a travel lane closure or being closed alone. These TMA conditions are required on roadways with speeds of 45 MPH or greater. TMAs can be used on other roadways at the discretion of the engineer. TMAs shall be used for the deployment and removal of all traffic control devices, including all advance warning signs.

SHORT-TERM PAVEMENT EDGE DROP-OFFS

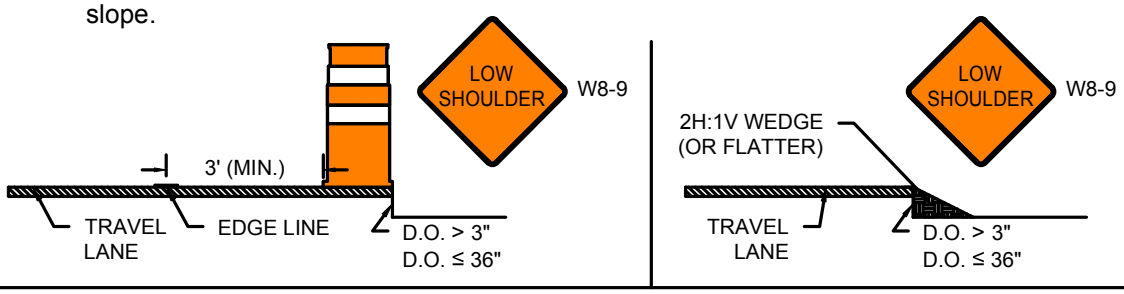
Note that this guidance is adopted from the Roadside Design Guide*, 4th Edition.*

Pavement drop-offs may occur during paving, excavation, and other construction activities. Drop-offs create hazards for vehicles if not properly mitigated. The following applies for all roads with speed limits greater than 30 mph; for roads with speed limits of 30 mph or less, treatments for pavement edge drop-offs are at the discretion of the Engineer. Drop-offs between adjacent, open travel lanes should not exceed 2", and any drop-off in excess of 3" should not be left unattended without one of these mitigation measures applied.

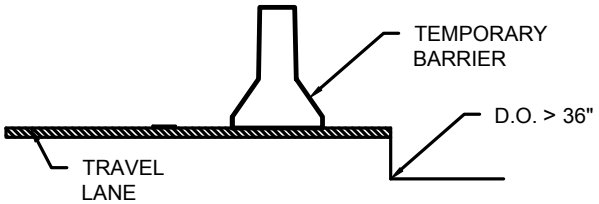
- Shoulder drop-offs 3" or less adjacent to a shoulder or active travel lane should be mitigated by:
  - ✓ A W8-9 (LOW SHOULDER) sign in advance of and at regular intervals throughout the treatment; or
  - ✓ The placement of drums on the traffic side of the drop-off.



- Shoulder drop-offs greater than 3" but less than or equal to 36" should be mitigated by:
  - ✓ A W8-9 (LOW SHOULDER) sign in advance of and at regular intervals throughout the treatment and the placement of drums on the traffic side off the drop-off, offset at least 3' from the travel lane; or
  - ✓ A W8-9 (LOW SHOULDER) sign in advance of and at regular intervals throughout the treatment and the placement of a temporary wedge of material along the face of the drop-off. The wedge should consist of stable material placed on a 2H:1V or flatter slope.



- Shoulder drop-offs greater than 36" must be protected by temporary barrier.



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Work Zone Safety Standard Details and Drawings

FIGURE 2
PAVEMENT EDGE
DROP-OFF GUIDANCE
NOT TO SCALE

massDOT Massachusetts Department of Transportation Highway Division PAGE 12	Work Zone Safety Standard Details and Drawings	TYPICAL DEVICE SPACING

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	320	305	20	55
45-55	500 / 1000 / 1000	660	495	40	40
60-65	1000 / 1600 / 2600	780	645	40	50

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

MINIMUM SPACING OF ADVANCE WARNING SIGNS FOR URBAN ROADWAYS	
ROAD TYPE	DISTANCE BETWEEN SIGNS
URBAN (LOW SPEED)	100 FT
URBAN (HIGH SPEED)	350 FT

NOTES

1. 40 FT = 10 FT PAVEMENT MARKING + 30 FT SKIP

LEGEND


WORK ZONE


CHANNELIZATION DEVICE

FLASHING ARROW BOARD


PORTABLE CHANGEABLE MESSAGE SIGN


TRUCK MOUNTED ATTENUATOR

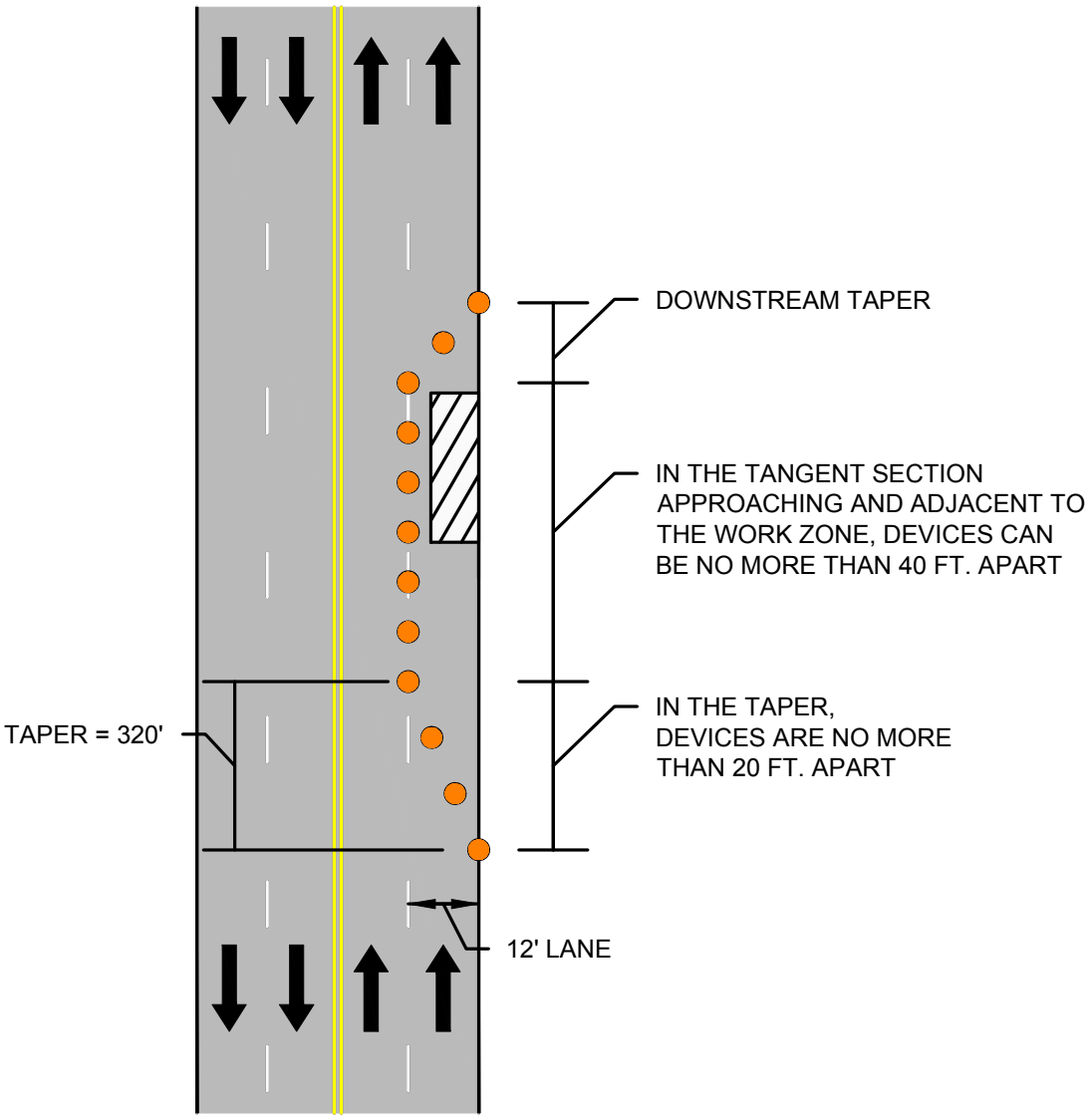
RADAR SPEED FEEDBACK BOARD

POLICE DETAIL OR UNIFORMED FLAGGER

TEMPORARY PORTABLE RUMBLE STRIP

TYPE III BARRICADE

NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division PAGE 13	Work Zone Safety Standard Details and Drawings	FIGURE 3 TYPICAL DEVICE SPACING (AT 30 MPH)

Guidance for Flagging Operations

NOTE:
A flagger shall always be aware of their surroundings and have a good escape route. A flagger shall never be positioned directly beside or against construction equipment. When a flagger is required to direct traffic in an area where the escape route is partially blocked by a traversable obstruction such as a guardrail, the flagger shall be physically capable of traversing that obstruction. Prior to commencing a project, the supervisor in charge shall review the project, including guardrail areas, for safe flagging stations. The supervisor in charge shall clearly communicate with the flagger(s), indicating any locations where they cannot safely perform their duties.

Each flagger shall be equipped with the following high visibility clothing, signaling, and safety devices:

1) A white protective hard hat with a minimum level of reflectivity per the requirements of ANSI, Type I, Class E&G;
2) A clean, unfaded, untorn lime/yellow reflective safety vest and pants meeting the requirements of ANSI 107 Class 3 with the words "Traffic Control" on the front and rear panels in minimum two (2) inch (50 millimeter) high letters;
3) A 24 inch "STOP/SLOW" traffic paddle conforming to the requirements of Part 6E.03 of the Manual on Uniform Traffic Control Devices (MUTCD), a weighted, reflectorized red flag, flagger station advance warning signage, and two-way radios capable of providing clear communication within the work zone between flaggers, the Contractor, and the Engineer. The traffic paddle shall be mounted on a pole of sufficient length to be seven feet above the ground as measured from the bottom of the paddle;
4) A working flashlight with a minimum of 15,000 candlepower and a six inch red attachable wand, a whistle with a working lanyard, and a First Aid kit that complies with the requirements of ANSI Z308.1; and
5) An industrial/safety type portable air horn that complies with the requirements of the U.S. Coast Guard.

A "STOP/SLOW" paddle should be the primary hand-signaling device. It shall have an octagonal shape on a rigid handle. Flag use should be limited to emergency situations.

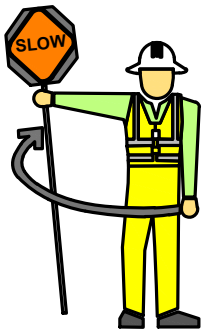
TO STOP TRAFFIC

Properly Trained Flaggers

- Give clear messages to drivers.
- Allow distance for drivers to react.
- Coordinate with other flaggers.
- Use standard signaling methods.

Properly Equipped Flaggers

- Use approved stop/slow paddles.
- Use approved safety apparel.
- Use retroreflective equipment.
- Use hand held radios, as needed.
- All flaggers shall wear safety apparel that meets ANSI Class 3 requirements. The combination of vest and pants is required.



TO LET TRAFFIC PROCEED

Proper Flagging Stations

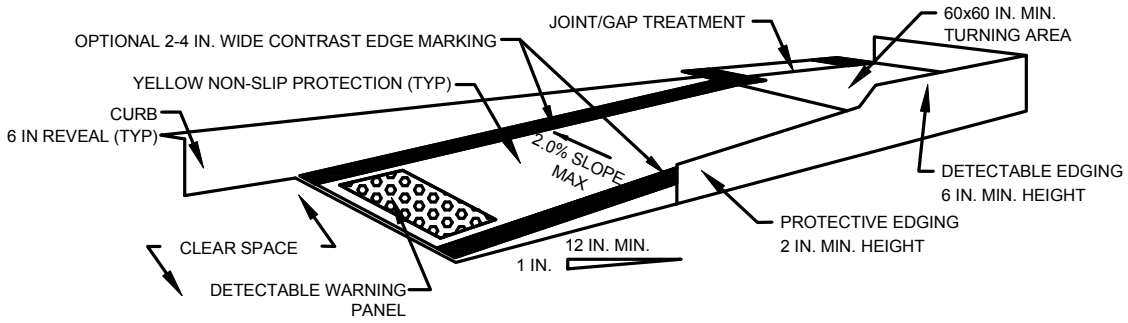
- Good approach sight distance.
- Highly visible to traffic.
- Stand alone away from other machinery and people.
- Stand on right edge of pavement or shoulder- proceed to centerline only when first vehicle has come to stop.
- Have a good escape route.

TO ALERT AND SLOW TRAFFIC

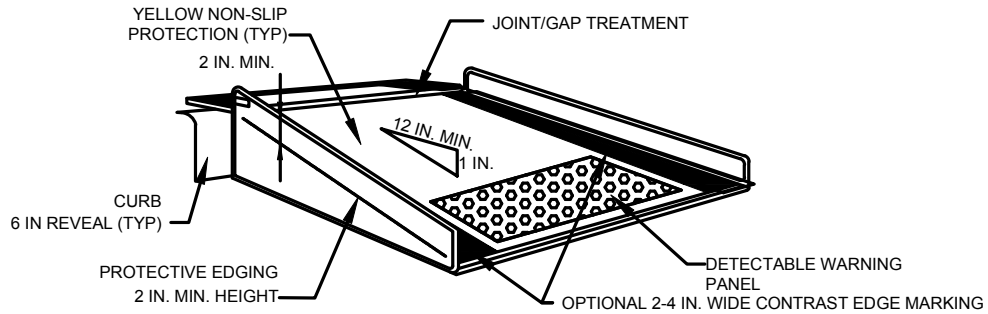
Proper Advance Warning Signs

- Always use warning signs.
- Allow for reaction distance from signs.
- Remove signs if no longer necessary or not flagging.
- Use free hand in up-and-down motion to help slow traffic.

massDOT Massachusetts Department of Transportation Highway Division PAGE 16	Work Zone Safety Standard Details and Drawings	FIGURE 4 TYPICAL PEDESTRIAN DEVICES (1 OF 2) NOT TO SCALE



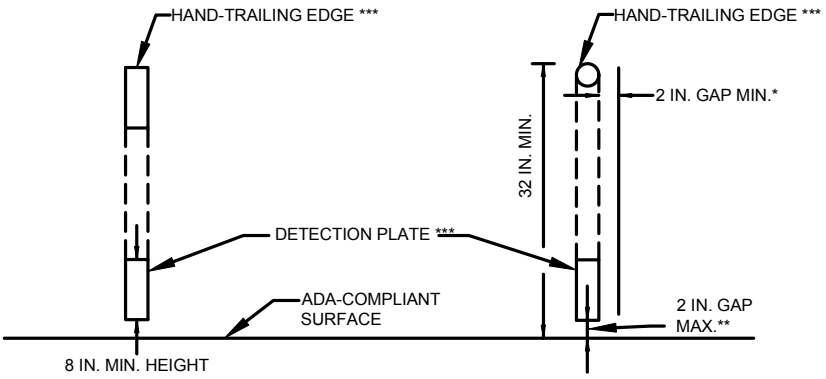
TEMPORARY CURB RAMP-PARALLEL TO CURB



TEMPORARY CURB RAMP-PERPENDICULAR TO CURB

NOTES:

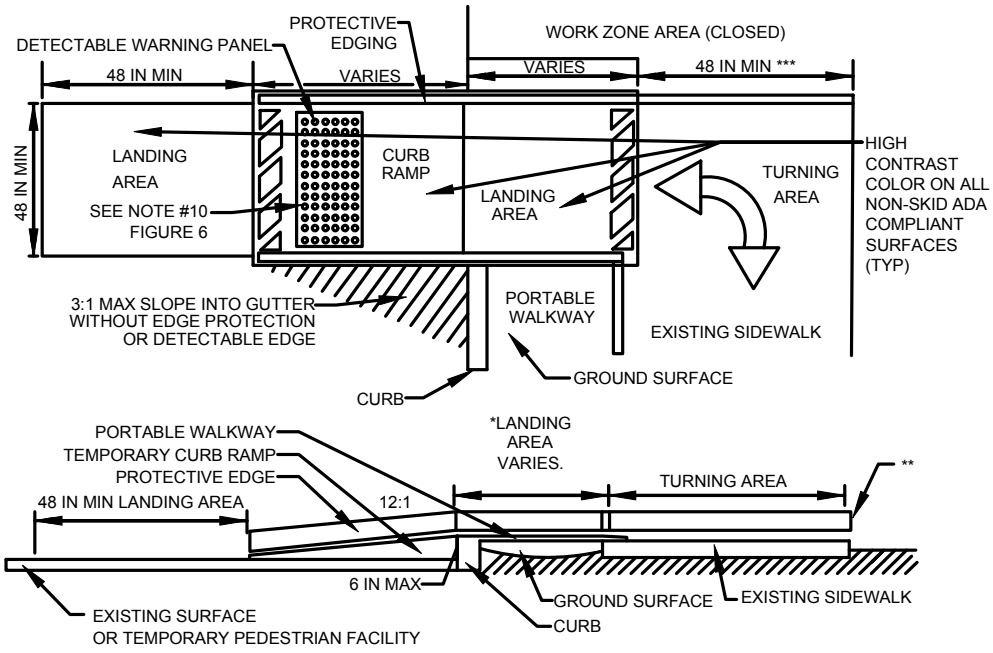
1. CURB RAMPS SHALL BE 60 IN. MINIMUM WIDTH WITH A FIRM, STABLE, AND NON-SLIP SURFACE.
2. PROTECTIVE EDGING WITH A 2 IN. MINIMUM HEIGHT SHALL BE INSTALLED WHEN THE CURB RAMP OR LANDING PLATFORM HAS A VERTICAL DROP OF 6 IN. OR GREATER OR HAS A SIDE APRON SLOP STEEPER THAN 1:3 (33%). PROTECTIVE EDGING SHOULD BE CONSIDERED WHEN THE CURB RAMPS OR LANDING PLATFORMS HAVE A VERTICAL DROP OF 3 IN. OR MORE.
3. PROTECTABLE EDGING WITH 6 IN. MINIMUM HEIGHT AND CONTRASTING COLOR SHALL BE INSTALLED ON ALL CURB RAMP LANDINGS WHERE THE WALKWAY CHANGES DIRECTION (TURNS).
4. THE CURB RAMP WALKWAY AND LANDING AREA SURFACE SHALL BE OF A SOLID CONTINUOUS CONTRASTING COLOR ABUTTING UP TO THE EXISTING SIDEWALK.
5. CURB RAMPS AND LANDINGS SHOULD HAVE A 1:50 (2%) MAX CROSS-SLOPE.
6. CLEAR SPACE OF 48x48 IN. MINIMUM SHALL BE PROVIDED ABOVE AND BELOW THE CURB RAMP.
7. WATER FLOW IN THE GUTTER SYSTEM SHALL HAVE MINIMAL RESTRICTION.
8. LATERAL JOINTS OR GAPS BETWEEN SURFACES SHALL BE LESS THAN 0.5 IN. WIDTH.
9. CHANGES BETWEEN SURFACE HEIGHTS SHOULD NOT EXCEED 0.5 IN. LATERAL EDGES SHOULD BE VERTICAL UP TO 0.25 IN. HIGH, AND BEVELED AT 1:2 BETWEEN 0.25 IN. AND 0.5 IN. HEIGHT.
10. IF A TEMPORARY PEDESTRIAN RAMP LEADS TO A CROSSWALK, THEN A DETECTABLE WARNING PAD MUST BE ADHERED TO THE BASE OF THE RAMP. IF IT LEADS TO A PROTECTED PEDESTRIAN BYPASS THAT DOES NOT CONFLICT WITH VEHICULAR TRAFFIC, THEN A PAD SHALL NOT BE INSTALLED ON THE RAMP.



CROSS SECTION VIEW

PEDESTRIAN CHANNELIZING DEVICE

* THERE SHALL BE A 2 INCH GAP BETWEEN THE HAND-TRAILING EDGE AND ITS SUPPORT.
** A MAXIMUM 2 INCH GAP BETWEEN THE BOTTOM OF THE BOTTOM RAIL AND THE SURFACE MAY BE USED TO PROVIDE DRAINAGE.
*** THE HAND-TRAILING EDGE AND DETECTION PLATE SHALL BE CONTINUOUS THROUGHOUT THE LENGTH OF THE PATH SUCH THAT A PEDESTRIAN USER WITH A LONG CANE CAN FOLLOW IT.



TEMPORARY CURB RAMP

* LANDING AREA USED TO OVERLAP NON-ADA COMPLIANT SURFACES.
** DETECTABLE EDGE REMOVED IF A CONTINUOUS SIDEWALK.
*** 60 IN. IF AN OBSTRUCTION IS AT BACK OF SIDEWALK.

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Work Zone Safety Standard Details and Drawings

FIGURE 5
TYPICAL PEDESTRIAN DEVICES
(2 OF 2)
NOT TO SCALE

massDOT Massachusetts Department of Transportation Highway Division PAGE 18	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS TWO LANE UNDIVIDED ROADWAY HALF OF ROADWAY CLOSED WORK NEAR CURVE

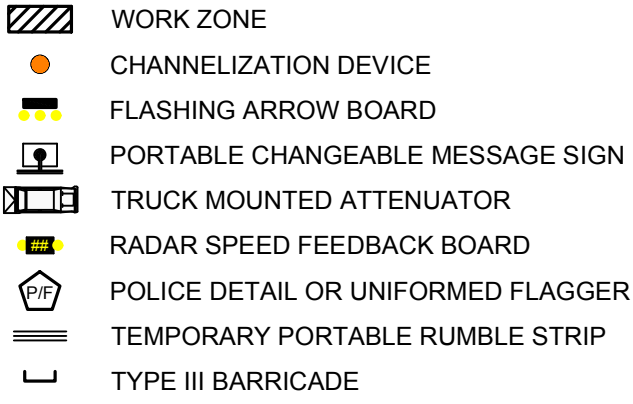
POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	50	100	20	30
45-55	500 / 1000 / 1000	100	150	40	20

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

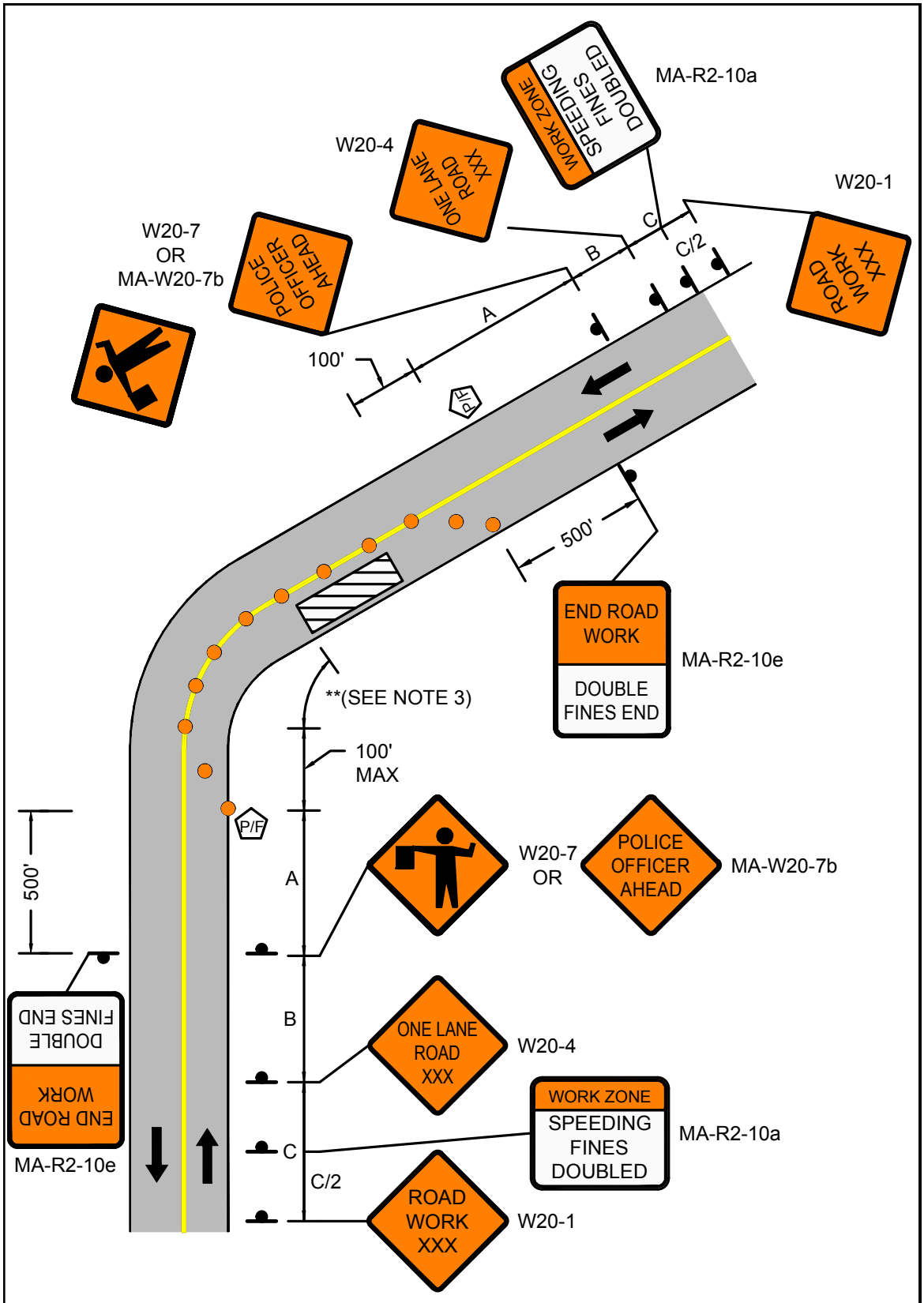
NOTES

1. IF POLICE DETAIL/UNIFORMED FLAGGER SUPPORT IS REQUIRED, PROVIDE TWO UNITS.
2. MA-R2-10a LOCATED AT C/2.
3. ** = EXTEND ENOUGH SO TAPER IS BEFORE CURVE

LEGEND



NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division PAGE 19	Work Zone Safety Standard Details and Drawings	FIGURE 6 STATIONARY OPERATIONS TWO LANE UNDIVIDED ROADWAY HALF OF ROADWAY CLOSED WORK NEAR CURVE

massDOT Massachusetts Department of Transportation Highway Division PAGE 20	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS TWO LANE UNDIVIDED ROADWAY HALF OF ROADWAY CLOSED

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	50	100	20	30
45-55	500 / 1000 / 1000	100	150	40	20

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED REGULATORY OR WORK ZONE SPEED	SEPARATION BETWEEN RUMBLE STRIPS
36-mph to 55-mph	15-feet
35-mph and under	10-feet

NOTES

1. IF POLICE DETAIL/UNIFORMED FLAGGER SUPPORT IS REQUIRED, PROVIDE TWO UNITS.
2. MA-R2-10a LOCATED AT C/2.
3. ** OPTIONAL AT THE ENGINEER'S DISCRETION.
4. *** SHALL BE DEPLOYED IF RUMBLE STRIPS ARE PRESENT.

LEGEND


WORK ZONE


CHANNELIZATION DEVICE

FLASHING ARROW BOARD


PORTABLE CHANGEABLE MESSAGE SIGN


TRUCK MOUNTED ATTENUATOR

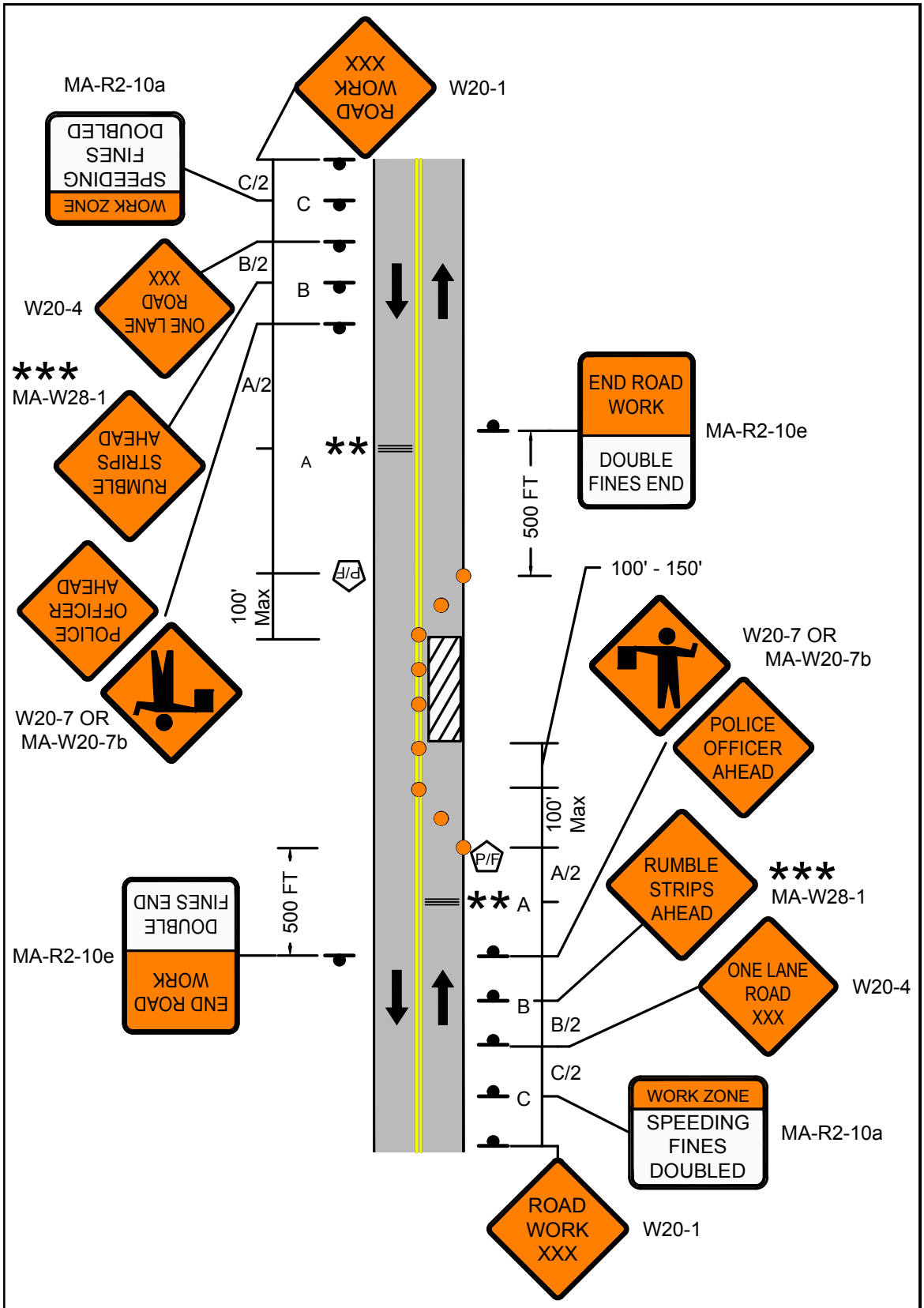
RADAR SPEED FEEDBACK BOARD

POLICE DETAIL OR UNIFORMED FLAGGER

TEMPORARY PORTABLE RUMBLE STRIP

TYPE III BARRICADE

NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division PAGE 21	Work Zone Safety Standard Details and Drawings	FIGURE 7 STATIONARY OPERATIONS TWO LANE UNDIVIDED ROADWAY HALF OF ROADWAY CLOSED

massDOT Massachusetts Department of Transportation Highway Division PAGE 22	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS TWO LANE UNDIVIDED ROADWAY SHOULDER CLOSED

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		SHOULDER TAPER LENGTH (L/3) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	110	305	20	45
45-55	500 / 1000 / 1000	220	495	40	30
60-65	1000 / 1600 / 2600	260	645	40	35

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

NOTES
1. MA-R2-10a at C/2 and A/2.

LEGEND


WORK ZONE


CHANNELIZATION DEVICE

FLASHING ARROW BOARD


PORTABLE CHANGEABLE MESSAGE SIGN


TRUCK MOUNTED ATTENUATOR

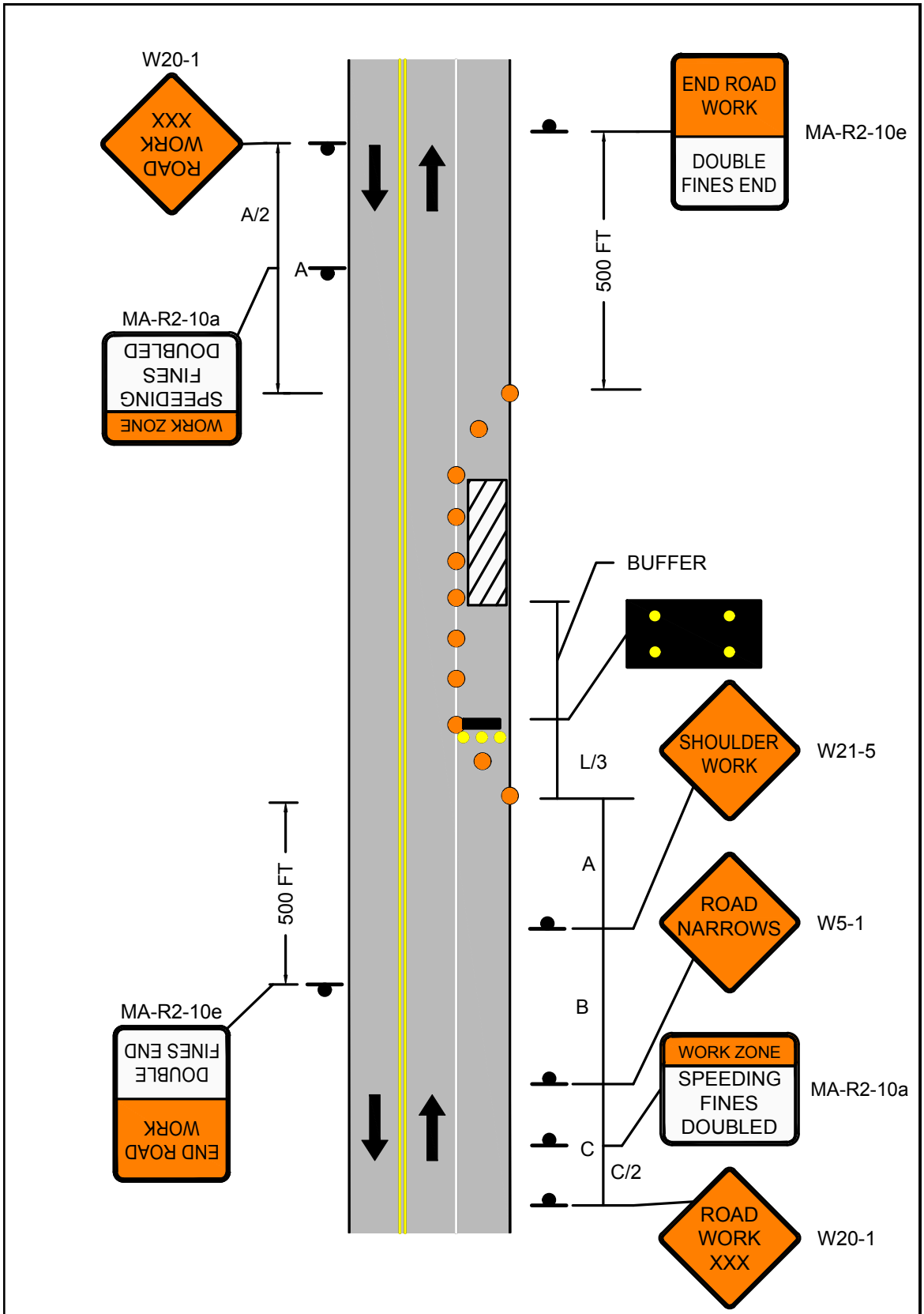
RADAR SPEED FEEDBACK BOARD

POLICE DETAIL OR UNIFORMED FLAGGER

TEMPORARY PORTABLE RUMBLE STRIP

TYPE III BARRICADE

NOT TO SCALE



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Work Zone Safety Standard Details and Drawings

FIGURE 8
STATIONARY OPERATIONS
TWO LANE UNDIVIDED ROADWAY
SHOULDER CLOSED

massDOT Massachusetts Department of Transportation Highway Division PAGE 24	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS TWO LANE UNDIVIDED ROADWAY WITH TRAVERSABLE SHOULDER HALF OF ROADWAY CLOSED MAINTAIN TWO-WAY TRAFFIC

POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)				
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE SHIFT LENGTH (L/2) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	160	305	20	125
45-55	220	330	495	40	100
60-65	260	390	645	40	115

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

NOTES

1. MA-R2-10a LOCATED AT C/2.

LEGEND


WORK ZONE


CHANNELIZATION DEVICE

FLASHING ARROW BOARD


PORTABLE CHANGEABLE MESSAGE SIGN


TRUCK MOUNTED ATTENUATOR

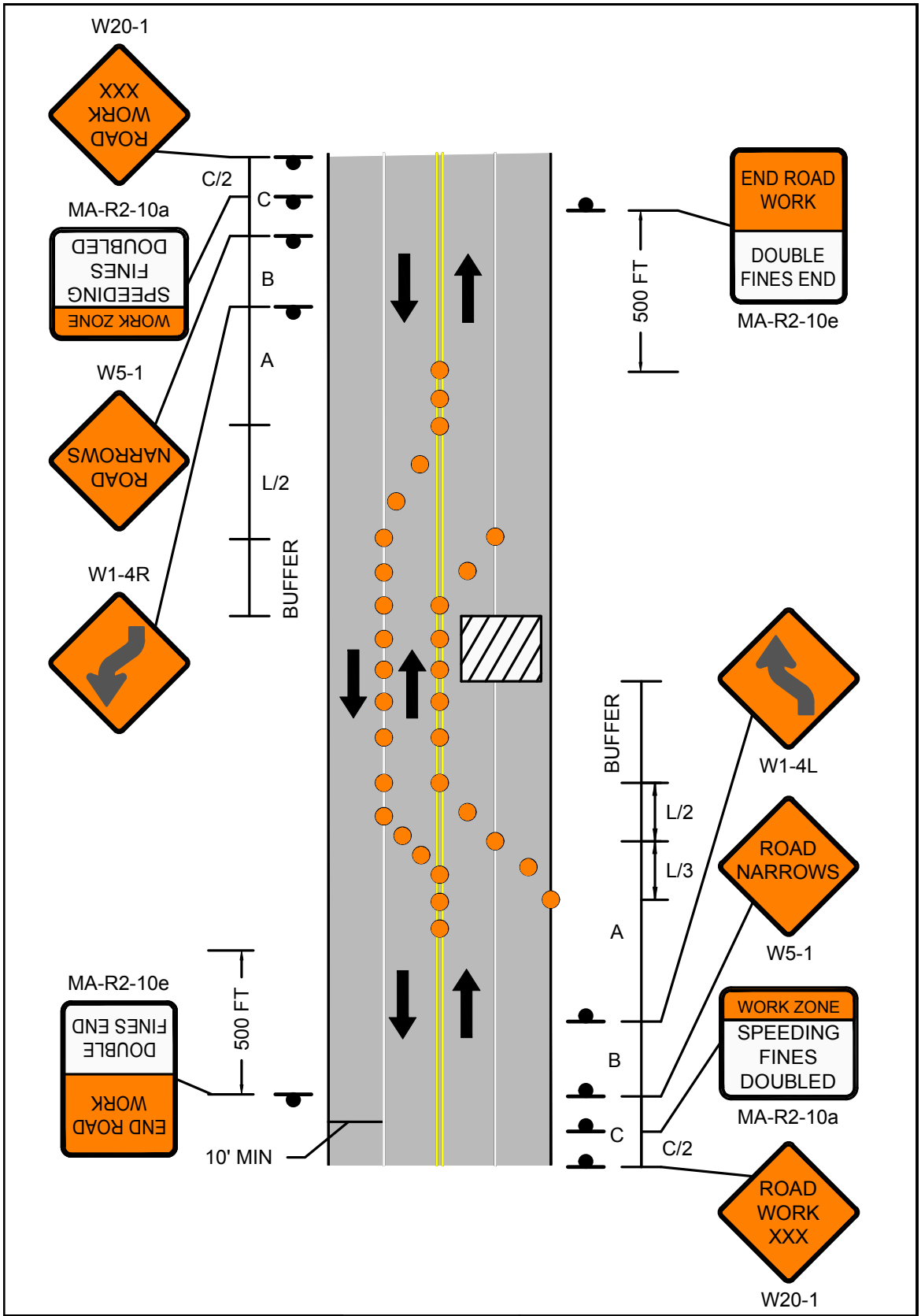
RADAR SPEED FEEDBACK BOARD

POLICE DETAIL OR UNIFORMED FLAGGER

TEMPORARY PORTABLE RUMBLE STRIP

TYPE III BARRICADE

NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division

PAGE 25

Work Zone Safety Standard Details and Drawings

FIGURE 9
STATIONARY OPERATIONS
TWO LANE UNDIVIDED ROADWAY
WITH TRAVERSABLE SHOULDER
HALF OF ROADWAY CLOSED
MAINTAIN TWO-WAY TRAFFIC

massDOT Massachusetts Department of Transportation Highway Division PAGE 26	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS FOUR LANE UNDIVIDED ROADWAY RIGHT LANE CLOSED

POSTED SPEED LIMIT (MPH)	CHANNELATION DEVICES (DRUMS OR CONES)				
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	305	20	60
45-55	220	660	495	40	50
60-65	260	780	645	40	55

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

NOTES

1. MA-R2-10a LOCATED AT A/2 AND C/2.
2. ** OPTIONAL AT THE ENGINEER'S DISCRETION.

LEGEND


WORK ZONE


CHANNELIZATION DEVICE

FLASHING ARROW BOARD


PORTABLE CHANGEABLE MESSAGE SIGN


TRUCK MOUNTED ATTENUATOR

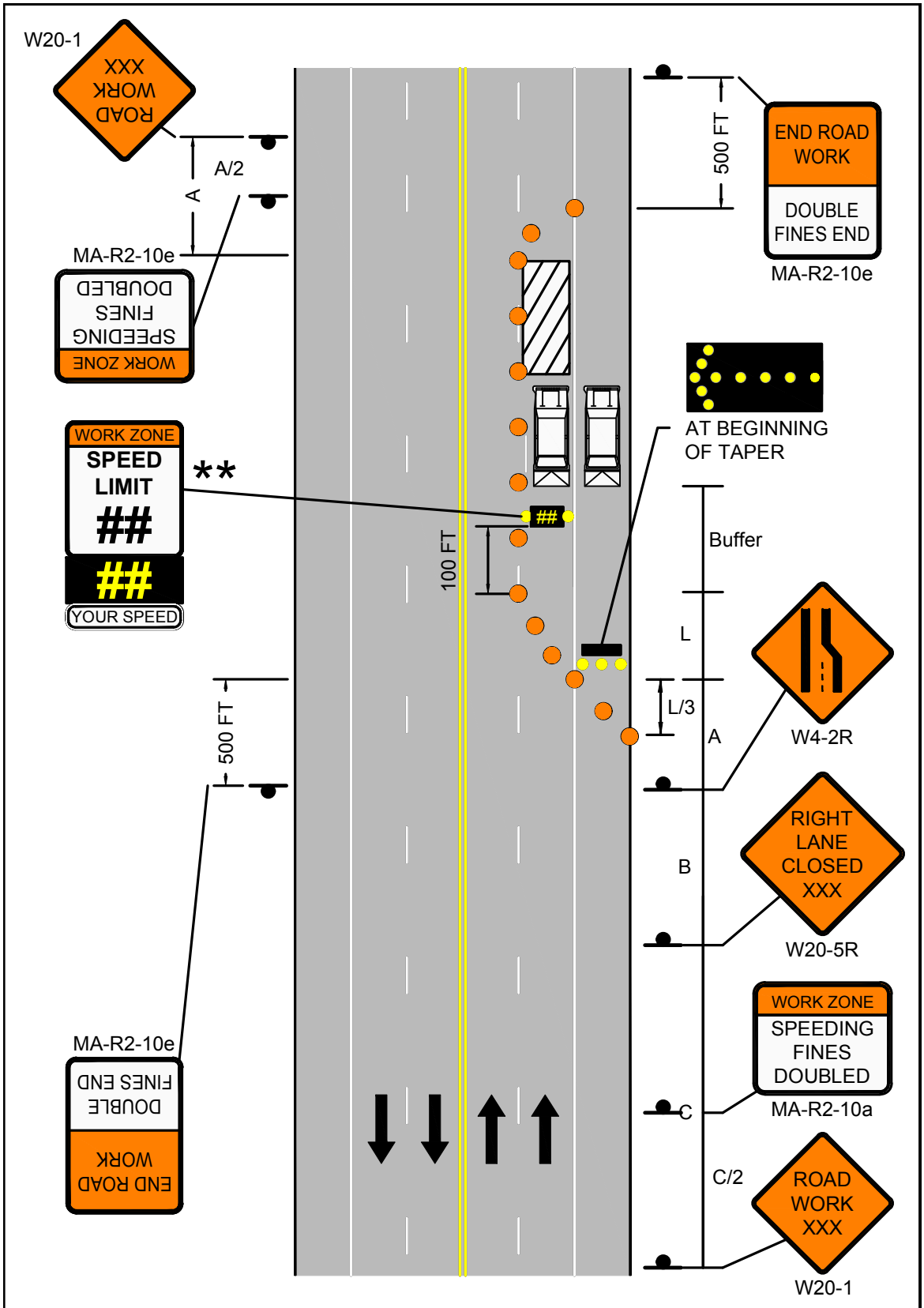
RADAR SPEED FEEDBACK BOARD

POLICE DETAIL OR UNIFORMED FLAGGER

TEMPORARY PORTABLE RUMBLE STRIP

TYPE III BARRICADE

NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division PAGE 27	Work Zone Safety Standard Details and Drawings	FIGURE 10 STATIONARY OPERATIONS FOUR LANE UNDIVIDED ROADWAY RIGHT LANE CLOSED

massDOT Massachusetts Department of Transportation Highway Division PAGE 28	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS FOUR LANE UNDIVIDED ROADWAY LEFT LANE CLOSED

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	320	305	20	105
45-55	500 / 1000 / 1000	660	495	40	80
60-65	1000 / 1600 / 2600	780	645	40	100

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

NOTES

1. MA-R2-10a LOCATED AT A/2 AND C/2.
2. ** OPTIONAL AT THE ENGINEER'S DISCRETION. 2' OFFSET FROM EDGE OF TRAVEL LANE TO RADAR SPEED FEEDBACK BOARD IS REQUIRED. BOARD MAY BE MOVED FULLY OR PARTIALLY OFF PAVED SHOULDER, IF REQUIRED.

LEGEND


WORK ZONE


CHANNELIZATION DEVICE

FLASHING ARROW BOARD


PORTABLE CHANGEABLE MESSAGE SIGN


TRUCK MOUNTED ATTENUATOR

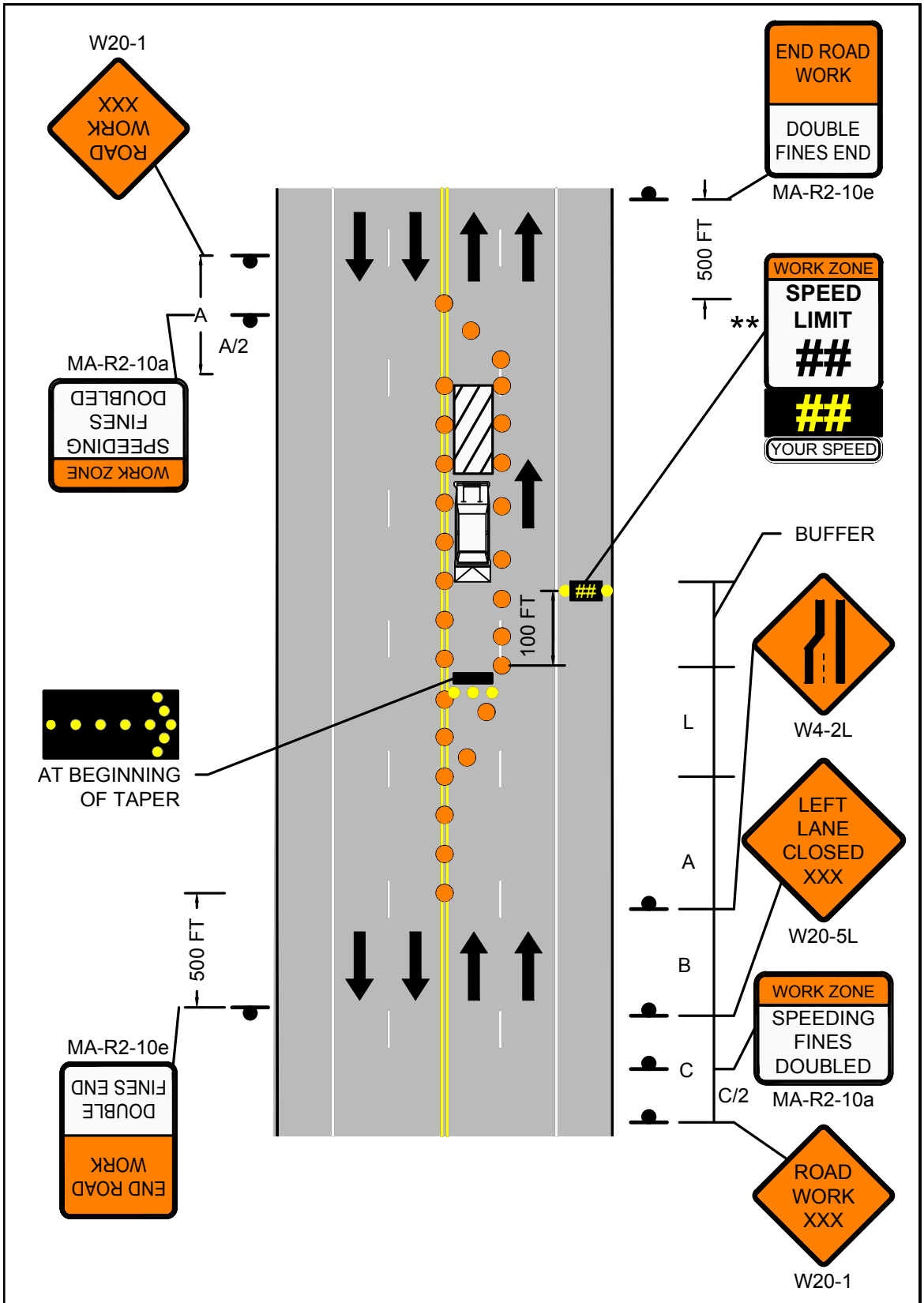
RADAR SPEED FEEDBACK BOARD

POLICE DETAIL OR UNIFORMED FLAGGER

TEMPORARY PORTABLE RUMBLE STRIP

TYPE III BARRICADE

NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division PAGE 29	Work Zone Safety Standard Details and Drawings	FIGURE 11 STATIONARY OPERATIONS FOUR LANE UNDIVIDED ROADWAY LEFT LANE CLOSED

massDOT Massachusetts Department of Transportation Highway Division PAGE 30	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS FOUR LANE UNDIVIDED ROADWAY HALF OF ROADWAY CLOSED

POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)					
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	TRAVEL LANE SHIFT LENGTH (L/2) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	160	305	20	140
45-55	220	660	330	495	40	120
60-65	260	780	390	645	40	140

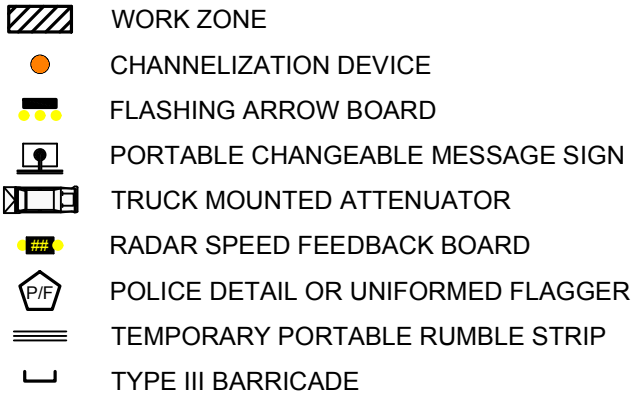
* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

NOTES

1. MA-R2-10a LOCATED AT C/2.
2. ** OPTIONAL AT THE ENGINEER'S DISCRETION.
3. W1-4L SHALL BE PLACED AT THE MIDDLE OF THE TANGENT.

LEGEND



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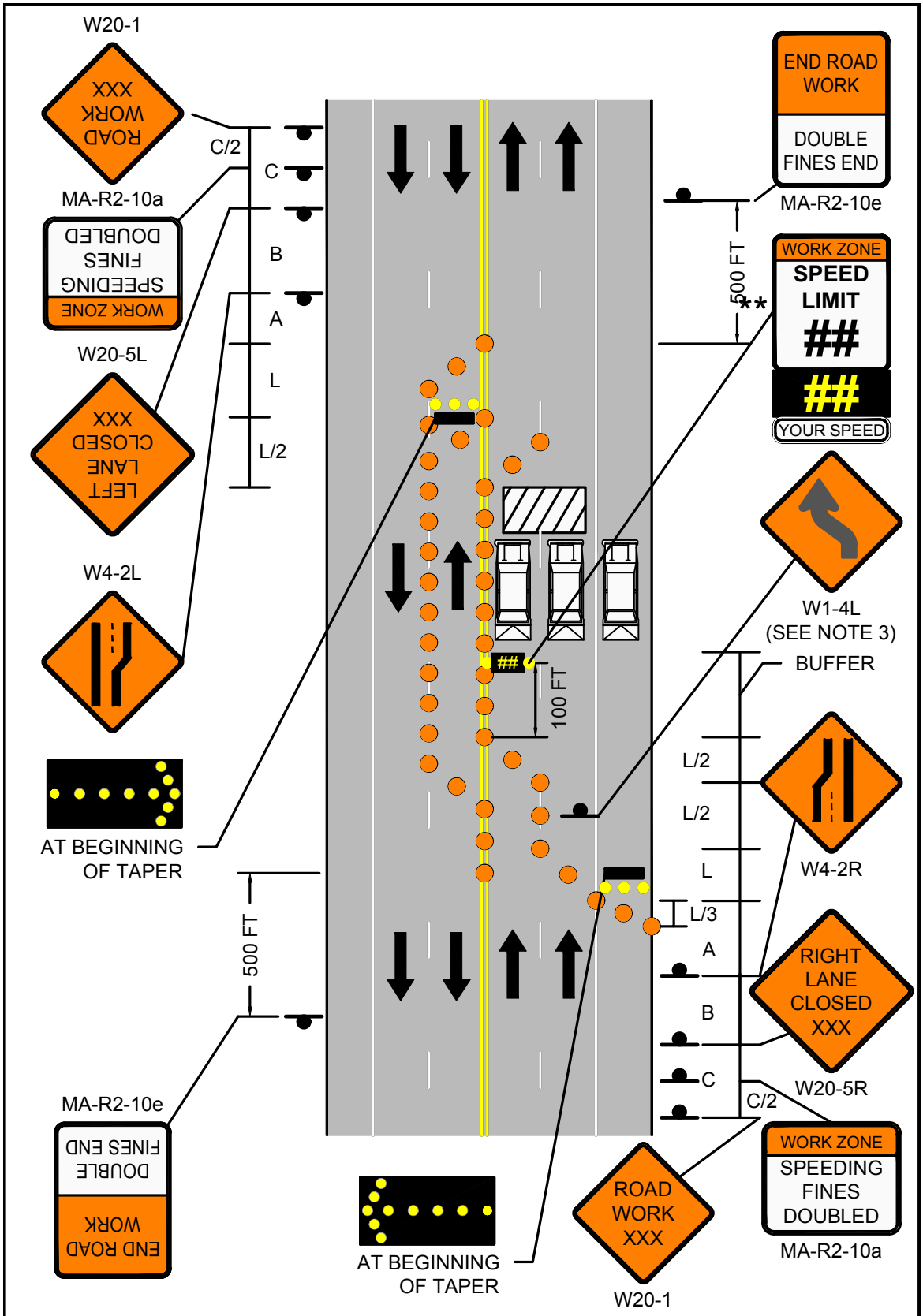


massDOT Massachusetts Department of Transportation Highway Division PAGE 31	Work Zone Safety Standard Details and Drawings	FIGURE 12 STATIONARY OPERATIONS FOUR LANE UNDIVIDED ROADWAY HALF OF ROADWAY CLOSED

massDOT Massachusetts Department of Transportation Highway Division PAGE 32	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY RIGHT LANE CLOSED

POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)				
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	305	20	60
45-55	220	660	495	40	50
60-65	260	780	645	40	55

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

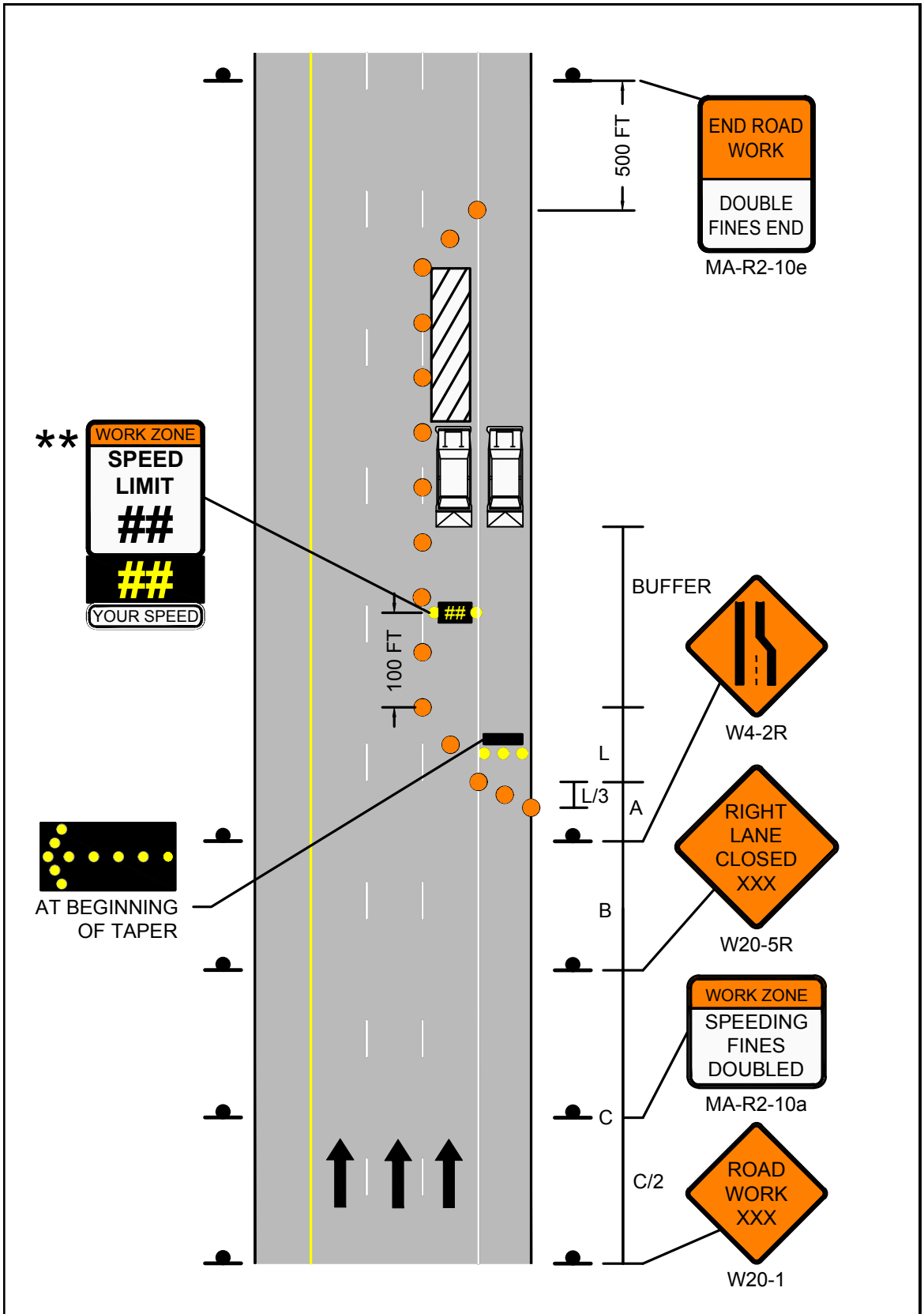
NOTES

1. MA-R2-10a LOCATED AT C/2.
2. ** OPTIONAL AT THE ENGINEER'S DISCRETION.

LEGEND

- WORK ZONE
- CHANNELIZATION DEVICE
- FLASHING ARROW BOARD
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRUCK MOUNTED ATTENUATOR
- RADAR SPEED FEEDBACK BOARD
- POLICE DETAIL OR UNIFORMED FLAGGER
- TEMPORARY PORTABLE RUMBLE STRIP
- TYPE III BARRICADE

NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division PAGE 33	Work Zone Safety Standard Details and Drawings	FIGURE 13 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY RIGHT LANE CLOSED

massDOT Massachusetts Department of Transportation Highway Division PAGE 34	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY LEFT LANE CLOSED

POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)				
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	305	20	60
45-55	220	660	495	40	50
60-65	260	780	645	40	55

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

NOTES

1. MA-R2-10a LOCATED AT C/2.
2. ** OPTIONAL AT THE ENGINEER'S DISCRETION.

LEGEND


WORK ZONE


CHANNELIZATION DEVICE

FLASHING ARROW BOARD


PORTABLE CHANGEABLE MESSAGE SIGN


TRUCK MOUNTED ATTENUATOR

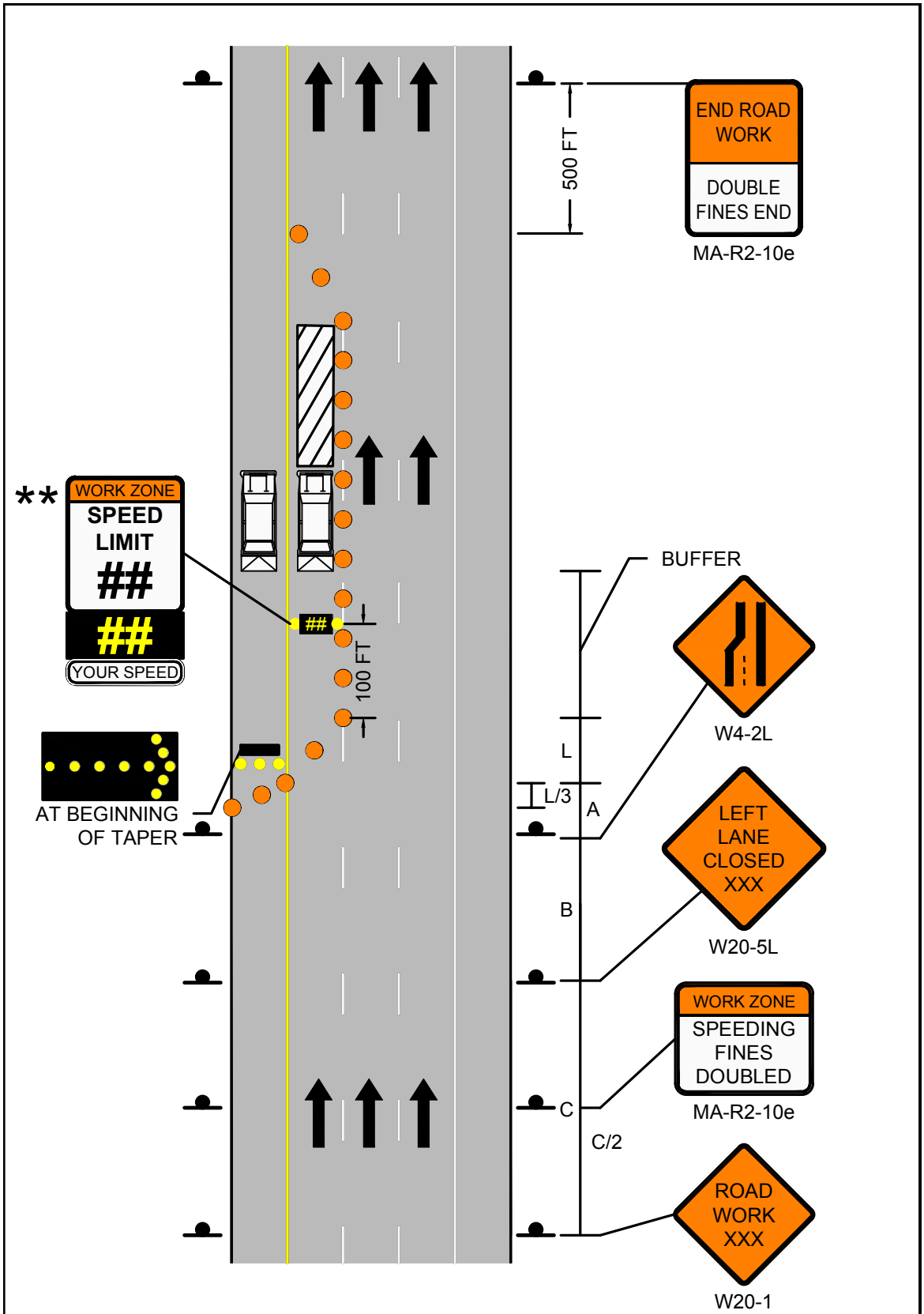
RADAR SPEED FEEDBACK BOARD

POLICE DETAIL OR UNIFORMED FLAGGER

TEMPORARY PORTABLE RUMBLE STRIP

TYPE III BARRICADE

NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division PAGE 35	Work Zone Safety Standard Details and Drawings	FIGURE 14 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY LEFT LANE CLOSED

massDOT Massachusetts Department of Transportation Highway Division PAGE 36	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE OR RIGHT/CENTER LANES CLOSED

POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)					
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	TANGENT LENGTH BETWEEN TAPERS T (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	640	305	20	110
45-55	220	660	1320	495	40	100
60-65	260	780	1560	645	40	115

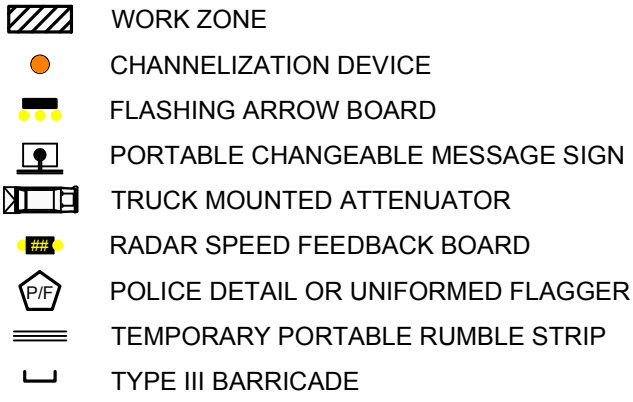
* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

NOTES

1. MA-R2-10a LOCATED AT C/2.
2. ** OPTIONAL AT THE ENGINEER'S DISCRETION.
3. *** THIS SET OF SIGNS SHALL BE LOCATED AT T/2.

LEGEND



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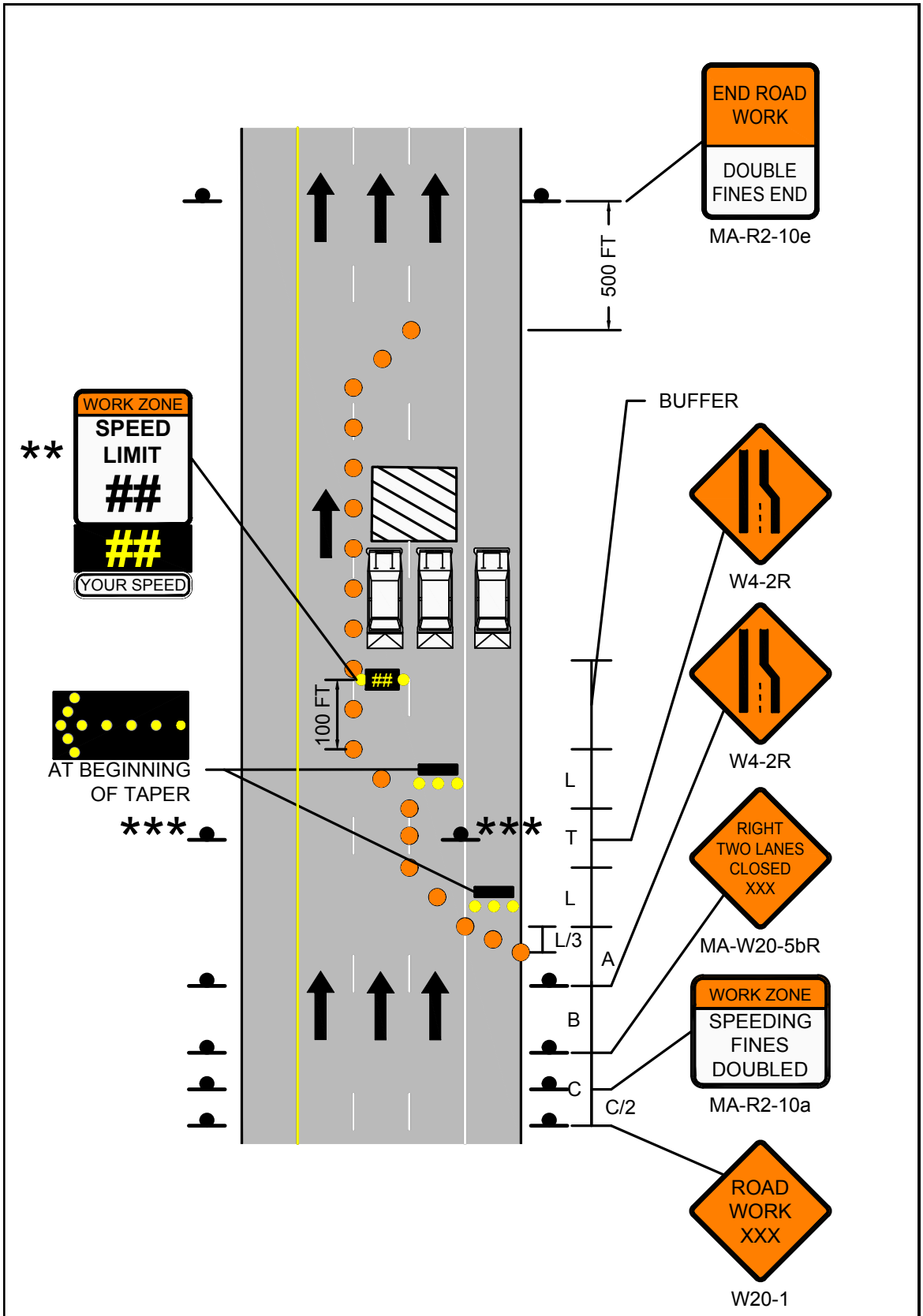


massDOT Massachusetts Department of Transportation Highway Division PAGE 37	Work Zone Safety Standard Details and Drawings	FIGURE 15 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE OR RIGHT/CENTER LANES CLOSED

massDOT Massachusetts Department of Transportation Highway Division PAGE 38	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE OR LEFT/CENTER LANES CLOSED

POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)					
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	TANGENT LENGTH BETWEEN TAPERS T (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	640	305	20	110
45-55	220	660	1320	495	40	100
60-65	260	780	1560	645	40	115

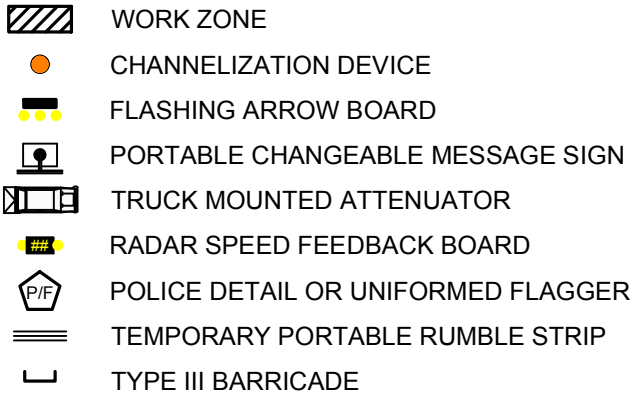
* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

NOTES

1. MA-R2-10a LOCATED AT C/2.
2. ** OPTIONAL AT THE ENGINEER'S DISCRETION.
3. *** THIS SET OF SIGNS SHALL BE LOCATED AT T/2.

LEGEND



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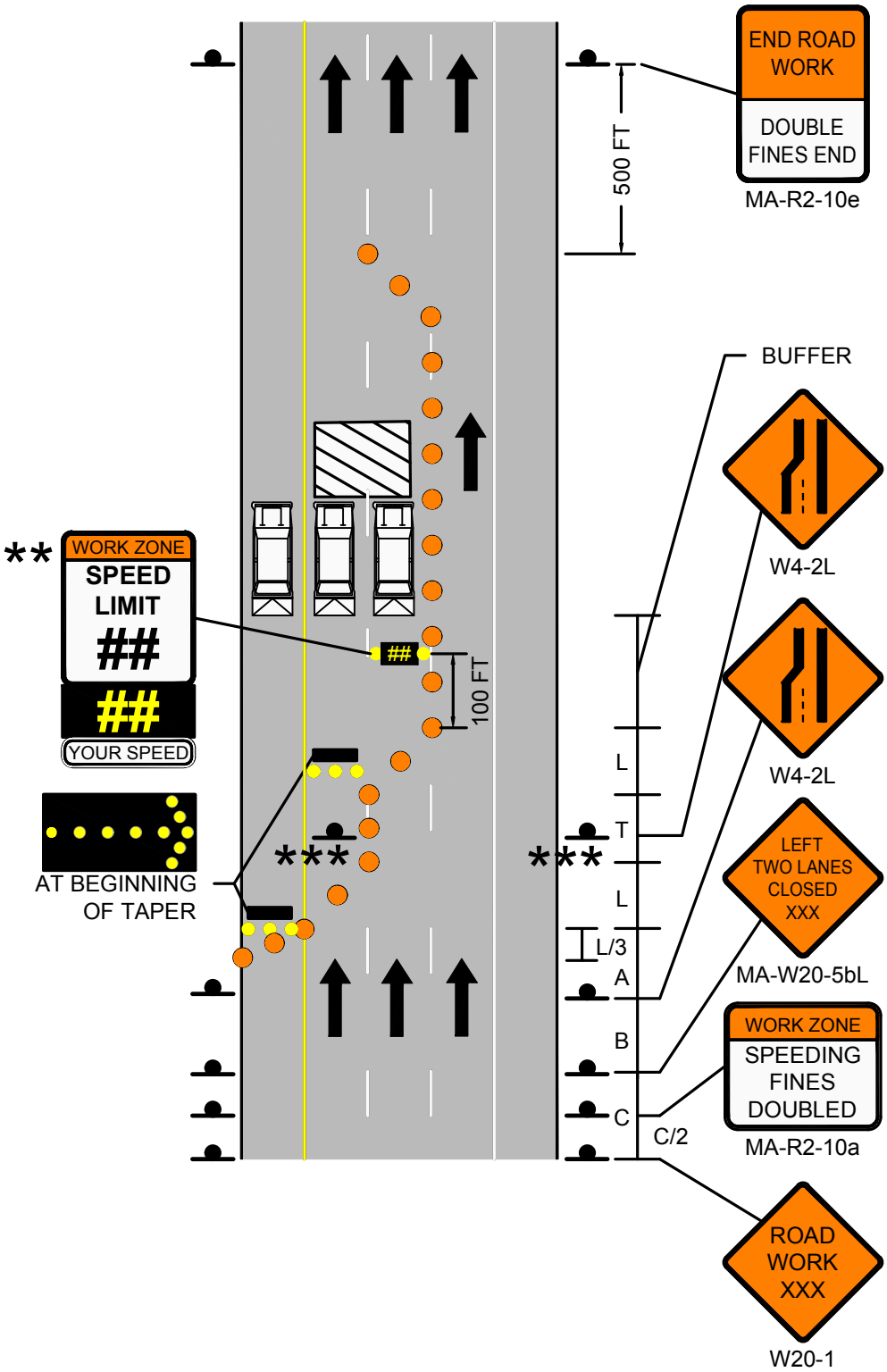


massDOT Massachusetts Department of Transportation Highway Division

PAGE 39

Work Zone Safety Standard Details and Drawings

FIGURE 16
STATIONARY OPERATIONS
MULTILANE DIVIDED ROADWAY
CENTER LANE OR LEFT/CENTER LANES CLOSED

massDOT Massachusetts Department of Transportation Highway Division PAGE 40	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY RIGHT SIDE OF OFF RAMP CLOSED

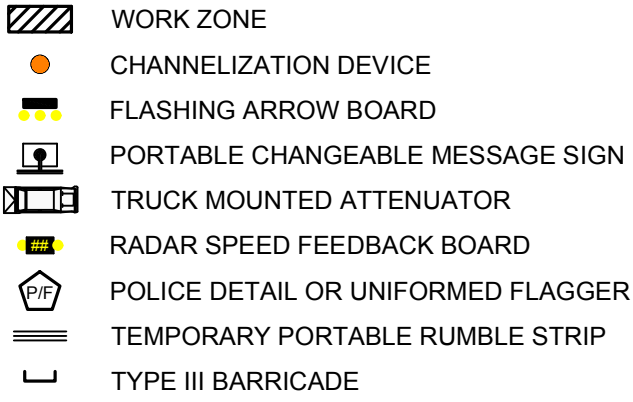
POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE SHIFT LENGTH (L/2) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	160	305	20	45
45-55	500 / 1000 / 1000	330	495	40	35

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

NOTES

1. MA-R2-10a LOCATED AT C/2.

LEGEND



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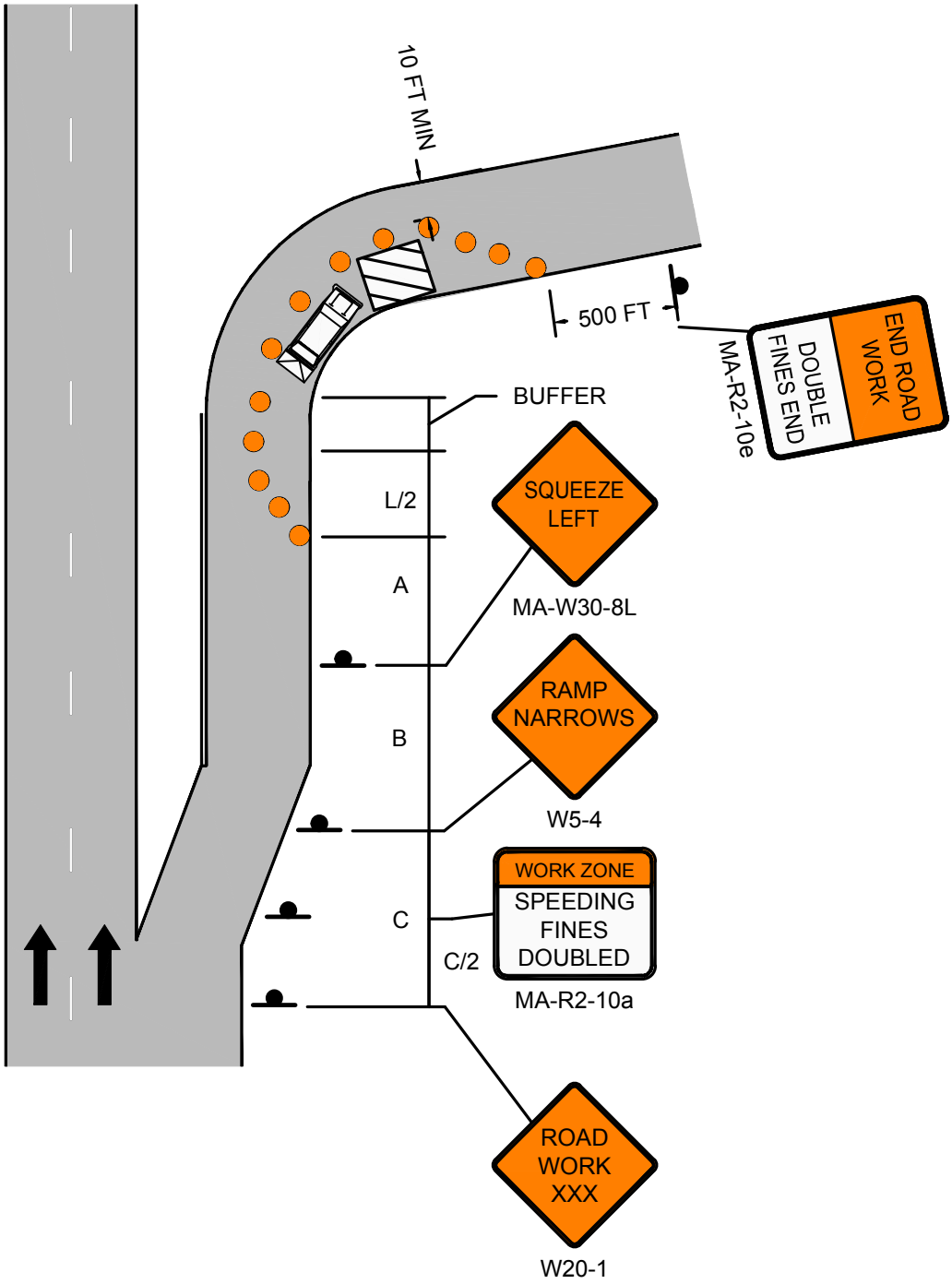


massDOT Massachusetts Department of Transportation Highway Division PAGE 41	Work Zone Safety Standard Details and Drawings	FIGURE 17 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY RIGHT SIDE OF OFF RAMP CLOSED

massDOT Massachusetts Department of Transportation Highway Division PAGE 42	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY LEFT SIDE OF OFF RAMP CLOSED

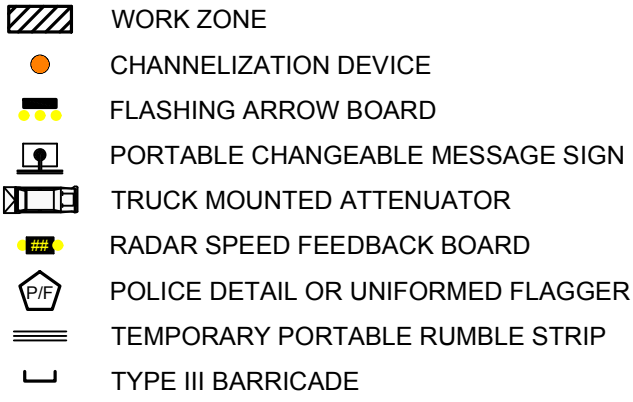
POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE SHIFT LENGTH (L/2) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	160	305	20	45
45-55	500 / 1000 / 1000	330	495	40	35

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

NOTES

1. MA-R2-10a LOCATED AT C/2.

LEGEND



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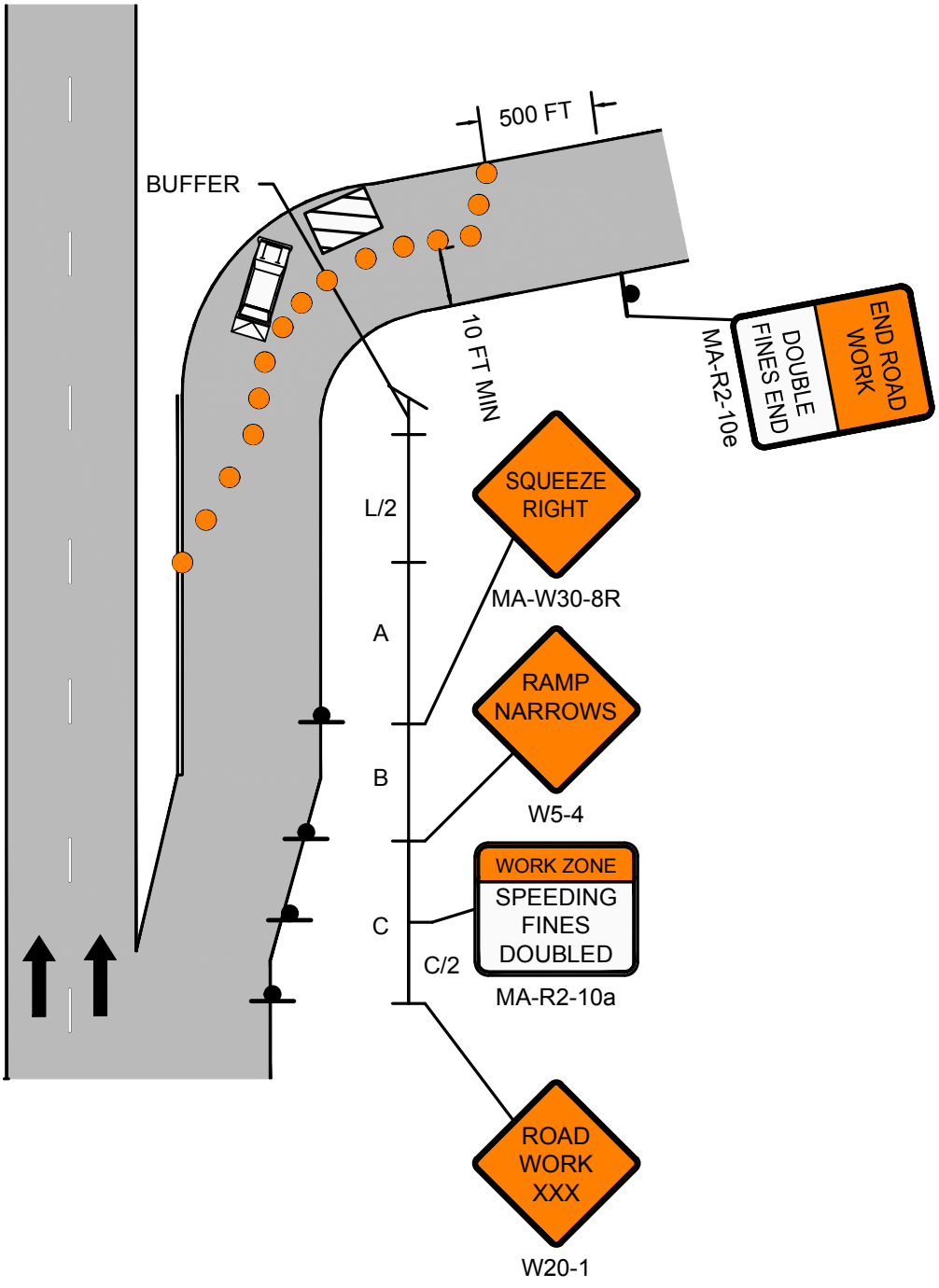


massDOT Massachusetts Department of Transportation Highway Division	Work Zone Safety Standard Details and Drawings	FIGURE 18 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY LEFT SIDE OF OFF RAMP CLOSED PAGE 43

massDOT Massachusetts Department of Transportation Highway Division PAGE 44	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY ROADWORK BEYOND ON RAMP

POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)				
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	305	20	175
45-55	220	660	495	40	135
60-65	260	780	645	40	155

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

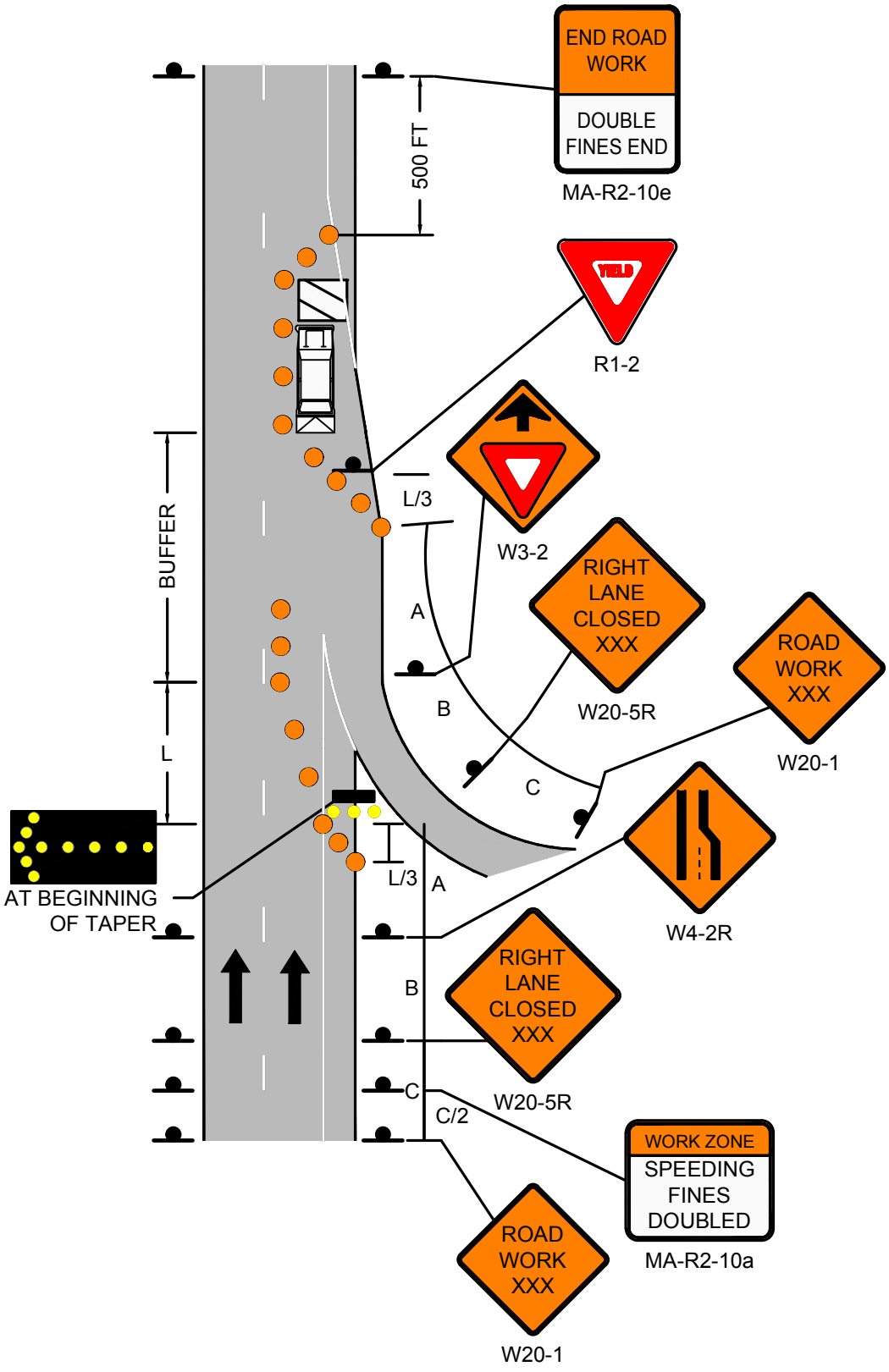
NOTES

1. MA-R2-10a LOCATED AT C/2.

LEGEND

- WORK ZONE
- CHANNELIZATION DEVICE
- FLASHING ARROW BOARD
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRUCK MOUNTED ATTENUATOR
- RADAR SPEED FEEDBACK BOARD
- POLICE DETAIL OR UNIFORMED FLAGGER
- TEMPORARY PORTABLE RUMBLE STRIP
- TYPE III BARRICADE

NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division

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Work Zone Safety Standard Details and Drawings

FIGURE 19
STATIONARY OPERATIONS
MULTILANE DIVIDED ROADWAY
ROADWORK BEYOND ON RAMP

massDOT Massachusetts Department of Transportation Highway Division PAGE 46	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY ROADWORK BEYOND OFF RAMP

POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)					
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	TRAVEL LANE SHIFT LENGTH (L/2) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	160	305	20	70
45-55	220	660	330	495	40	55
60-65	260	780	390	645	40	65

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

NOTES

1. MA-R2-10a LOCATED AT C/2.

LEGEND


WORK ZONE


CHANNELIZATION DEVICE

FLASHING ARROW BOARD


PORTABLE CHANGEABLE MESSAGE SIGN


TRUCK MOUNTED ATTENUATOR

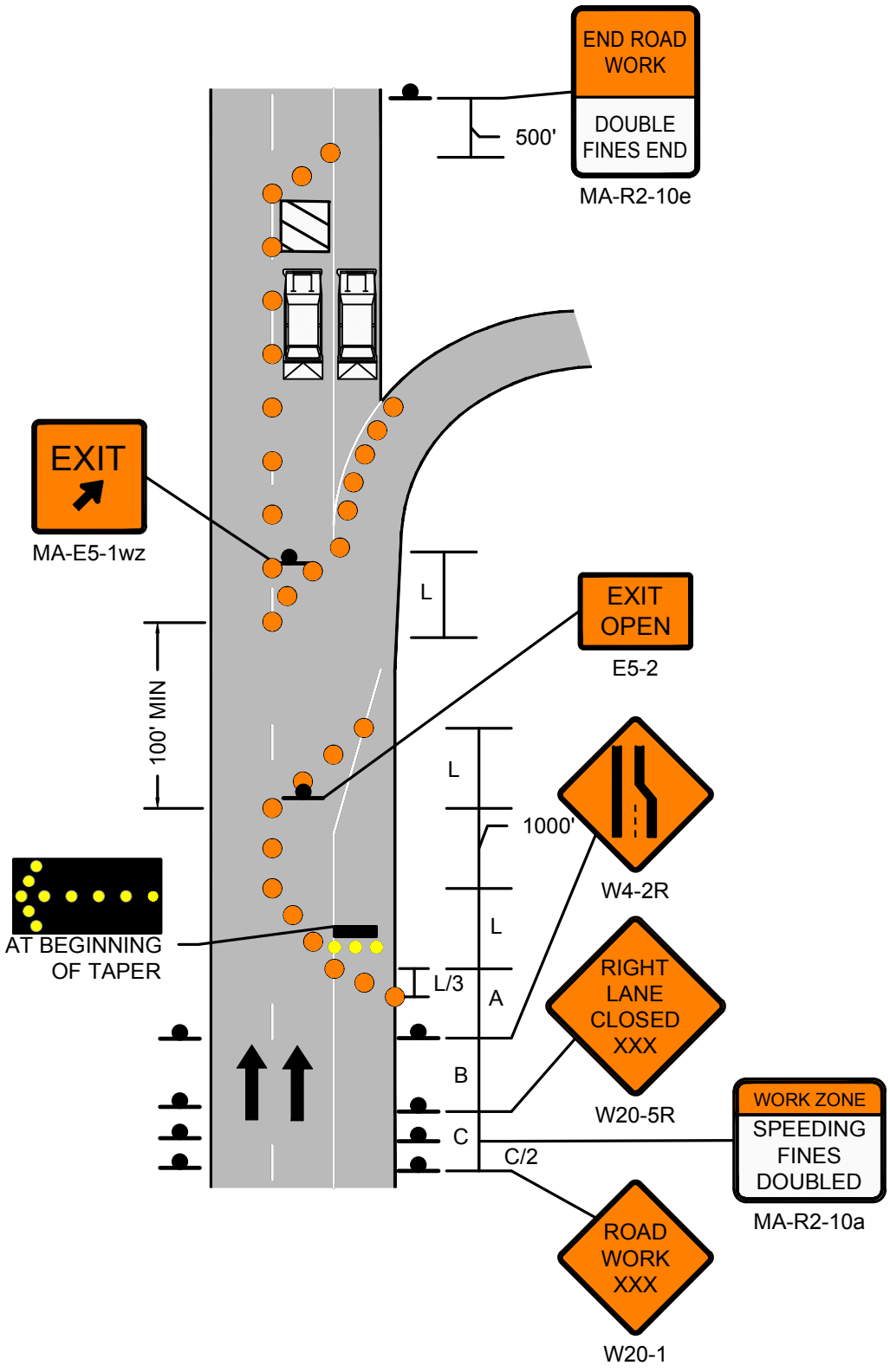
RADAR SPEED FEEDBACK BOARD

POLICE DETAIL OR UNIFORMED FLAGGER

TEMPORARY PORTABLE RUMBLE STRIP

TYPE III BARRICADE

NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division PAGE 47	Work Zone Safety Standard Details and Drawings	FIGURE 20 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY ROADWORK BEYOND OFF RAMP

massDOT Massachusetts Department of Transportation Highway Division PAGE 48	Work Zone Safety Standard Details and Drawings	MULTILANE DIVIDED ROADWAY TYPICAL RAMP CLOSURE

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		SHOULDER TAPER LENGTH (L/3) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES
25-40	500 / 500 / 500	110	305	20	45
45-55	500 / 1000 / 1000	220	495	40	30
60-65	1000 / 1600 / 2600	260	645	40	35

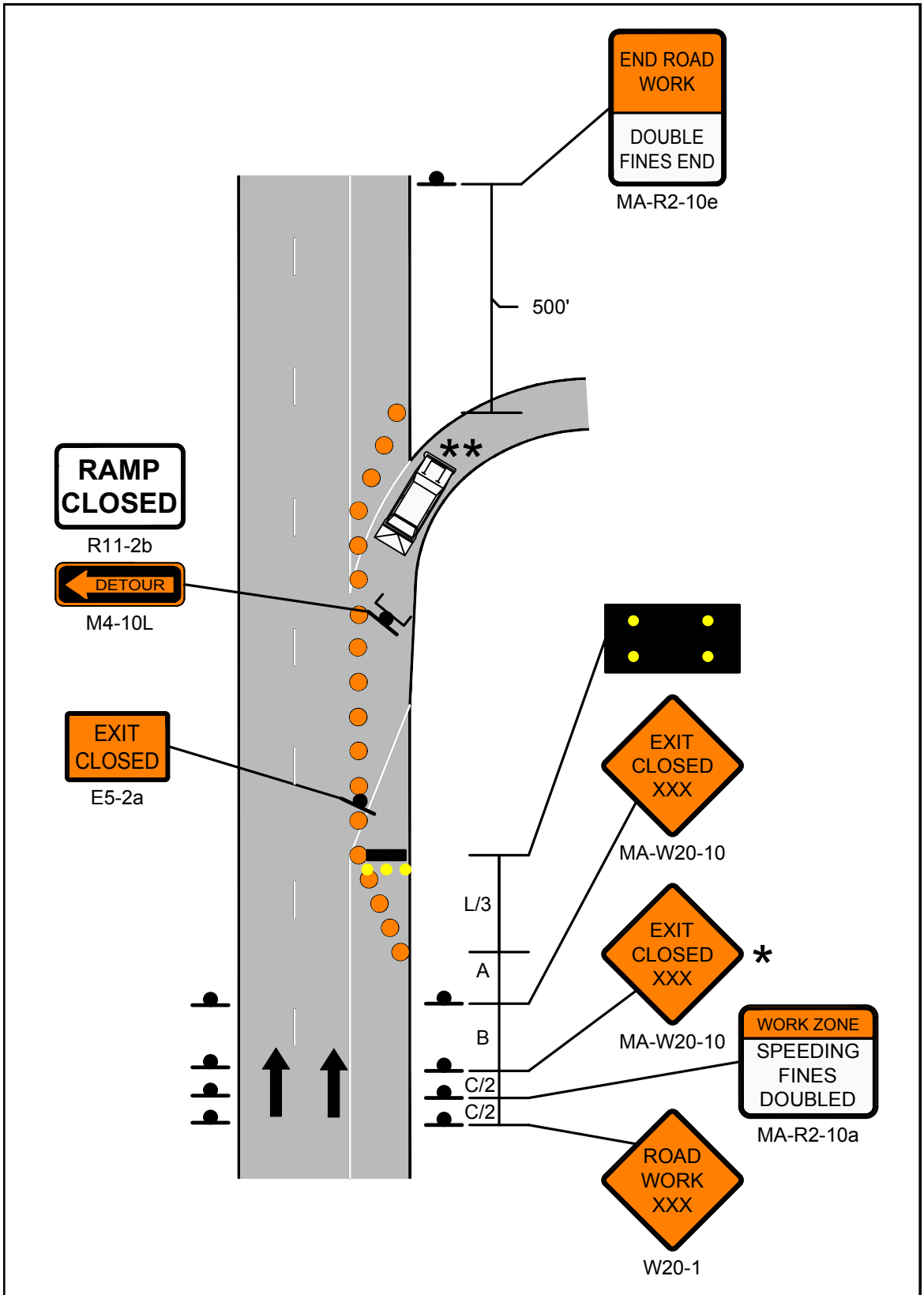
NOTES

1. MA-R2-10a LOCATED AT C/2.
2. * NOT REQUIRED IF RIGHT LANE IS CLOSED IN ADVANCE OF EXIT.
3. ** OPTIONAL AT ENGINEER'S DISCRETION.

LEGEND

- WORK ZONE
- CHANNELIZATION DEVICE
- FLASHING ARROW BOARD
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRUCK MOUNTED ATTENUATOR
- RADAR SPEED FEEDBACK BOARD (##)
- POLICE DETAIL OR UNIFORMED FLAGGER (P/F)
- TEMPORARY PORTABLE RUMBLE STRIP
- TYPE III BARRICADE

NOT TO SCALE



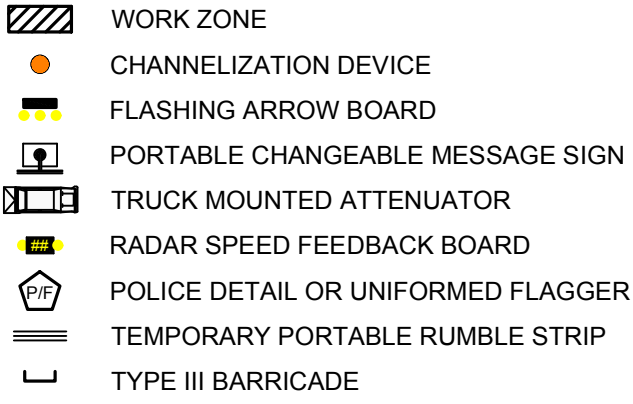
massDOT Massachusetts Department of Transportation Highway Division PAGE 49	Work Zone Safety Standard Details and Drawings	FIGURE 21 MULTILANE DIVIDED ROADWAY TYPICAL RAMP CLOSURE

massDOT Massachusetts Department of Transportation Highway Division PAGE 50	Work Zone Safety Standard Details and Drawings	MULTILANE DIVIDED ROADWAY TYPICAL CLOVERLEAF RAMP CLOSURE

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		SHOULDER TAPER LENGTH (L/3) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES
25-40	500 / 500 / 500	110	305	20	45
45-55	500 / 1000 / 1000	220	495	40	30
60-65	1000 / 1600 / 2600	260	645	40	35

NOTES
1. MA-R2-10a LOCATED AT C/2.
2. * NOT REQUIRED IF RIGHT LANE IS CLOSED IN ADVANCE OF EXIT.
3. ** OPTIONAL AT ENGINEER'S DISCRETION.

LEGEND



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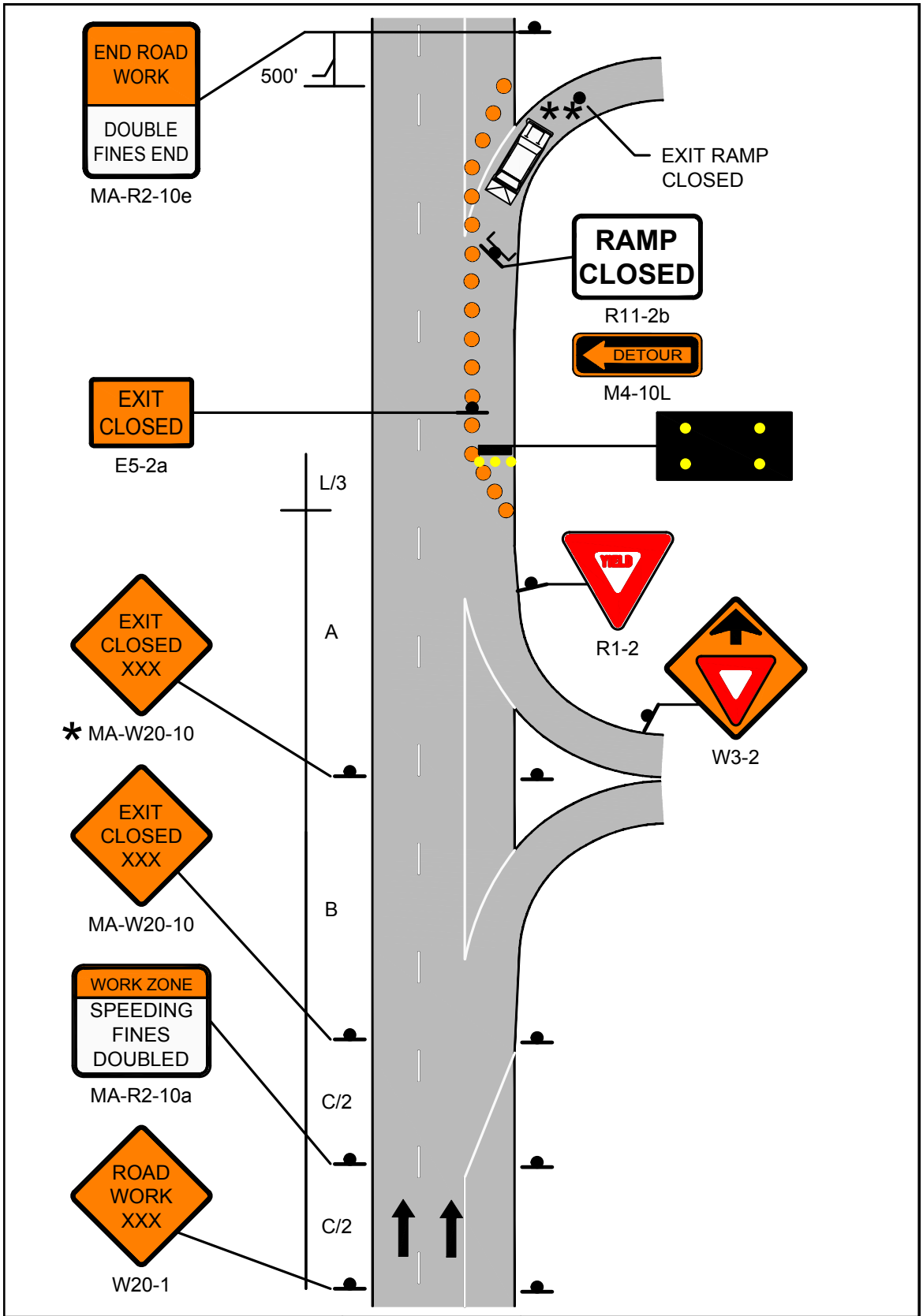


massDOT Massachusetts Department of Transportation Highway Division PAGE 51	Work Zone Safety Standard Details and Drawings	FIGURE 22 MULTILANE DIVIDED ROADWAY TYPICAL CLOVERLEAF RAMP CLOSURE

massDOT Massachusetts Department of Transportation Highway Division PAGE 52	Work Zone Safety Standard Details and Drawings	MULTILANE DIVIDED ROADWAY TYPICAL RAMP CLOSURE ADVANCE SIGNING

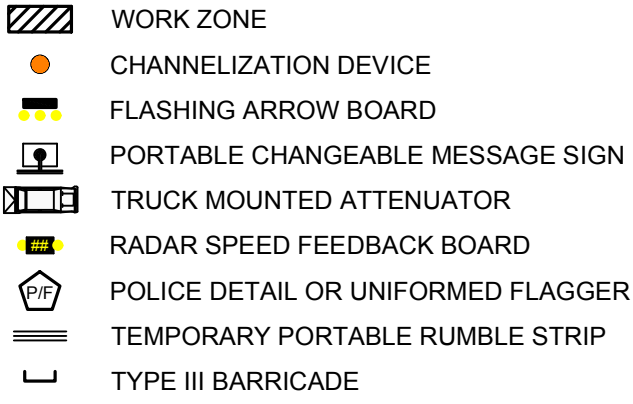
NOTES

1. IF THE CLOSED RAMP IS LOCATED DOWNSTREAM FROM THE PROPOSED DETOUR ROUTE/RAMP, A PCMS SHALL BE POSITIONED AT A SUFFICIENT DISTANCE IN ADVANCE OF THE DETOUR ROUTE/RAMP AND SHOULD STATE WHICH RAMP IS CLOSED AND WHICH SHALL BE USED FOR THE DETOUR.

2. IF THE CLOSED RAMP IS LOCATED UPSTREAM FROM THE PROPOSED DETOUR ROUTE/RAMP, A PCMS SHALL BE POSITIONED PRIOR TO THE CLOSED RAMP AND SHOULD STATE WHICH RAMP IS CLOSED AND WHICH SHALL BE USED FOR THE DETOUR.

3. A SUFFICIENT NUMBER OF DETOUR SIGNS (M4-9 SERIES) SHOULD BE DEPLOYED TO PROPERLY DIRECT DETOURED TRAFFIC. SIGN SPACING SHALL BE AT THE DIRECTION OF THE ENGINEER.

LEGEND



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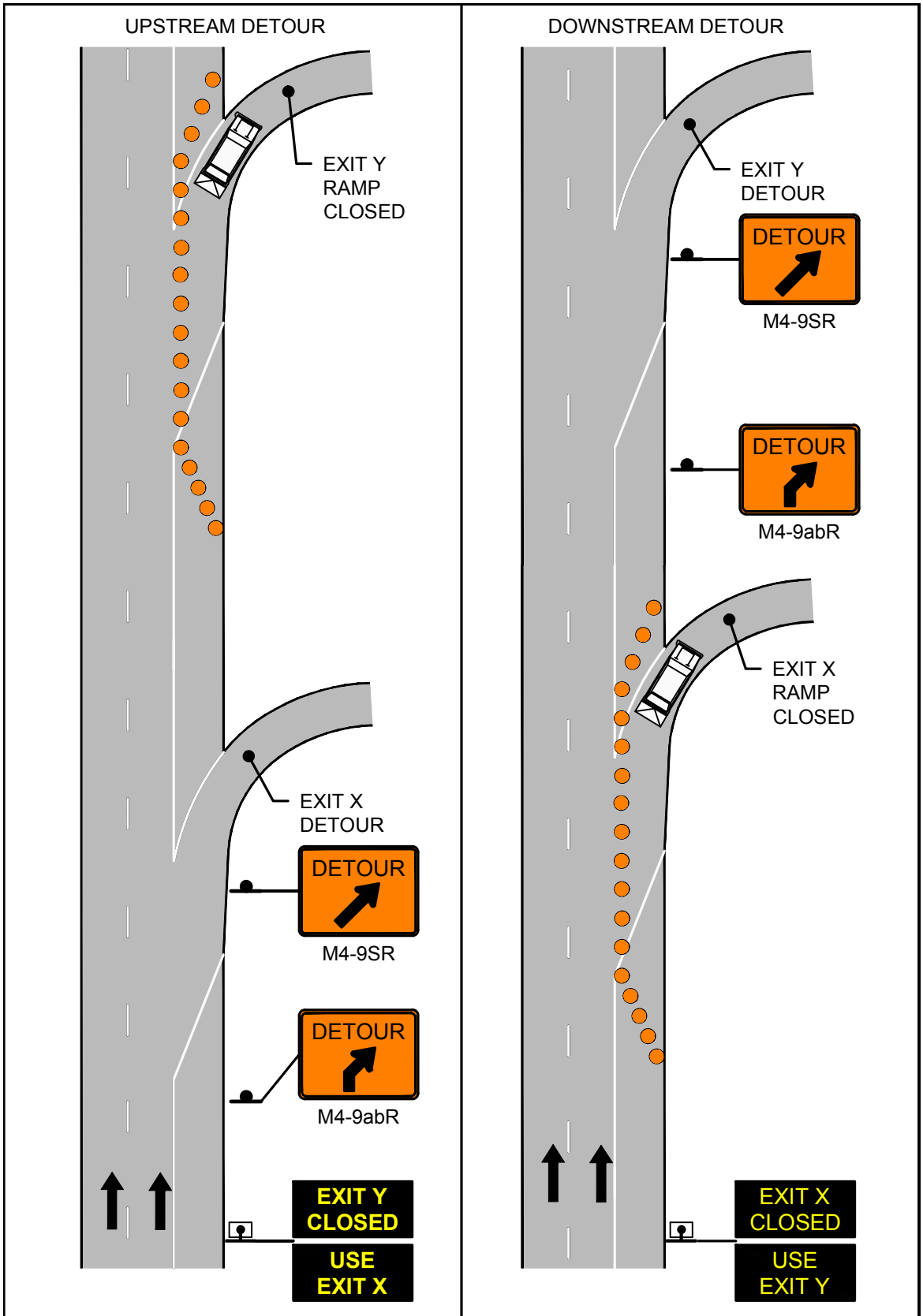

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Work Zone Safety
Standard Details
and Drawings

FIGURE 23
MULTILANE DIVIDED ROADWAY
TYPICAL RAMP CLOSURE
ADVANCE SIGNING

massDOT Massachusetts Department of Transportation Highway Division PAGE 54	Work Zone Safety Standard Details and Drawings	FIGURE 24-1 MULTILANE DIVIDED ROADWAY PLACEMENT OF TEMPORARY PORTABLE RUMBLE STRIPS SHEET 1 OF 2

POSTED REGULATORY OR WORK ZONE SPEED	SEPARATION BETWEEN RUMBLE STRIPS
Above 55-mph	20-feet
36-mph to 55-mph	15-feet
35-mph and under	10-feet

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	TANGENT LENGTH BETWEEN TAPERS (T) (FT)
25-40	500 / 500 / 500	640
45-55	500 / 1000 / 1000	1320
60-65	1000 / 1600 / 2600	1560

NOTES

1. THE INTENTION OF THESE DETAILS IS ONLY TO DEPICT THE PLACEMENT OF TEMPORARY PORTABLE RUMBLE STRIPS (TPRS) IN RELATIONSHIP TO THE TAPER AND THE BUFFER OF A SINGLE- OR MULTI-LANE CLOSURE. THE DEPICTION OF THE NUMBER AND SPACING OF ALL OTHER TRAFFIC CONTROL DEVICES IS NOT TO SCALE. REFER TO OTHER DETAILS FOR LANE CLOSURES FOR THE PLACEMENT AND NUMBER OF ALL OTHER TRAFFIC CONTROL DEVICES.
2. THESE DETAILS ONLY DEPICT RIGHT LANE CLOSURES. LEFT LANE CLOSURES SHOULD UTILIZE A MIRROR IMAGE OF THESE SETUPS, STARTING WITH CLOSURE OF THE LEFTMOST LANE.
3. * THIS TPRS ARRAY IS OPTIONAL AT THE ENGINEER'S DISCRETION. IF USED, IT SHOULD BE PLACED ADJACENT TO THE BUFFER.
4. DETAILS SHOW THE MINIMUM NUMBER OF TPRS REQUIRED. ADDITIONAL MAY BE USED IF CONDITIONS WARRANT.

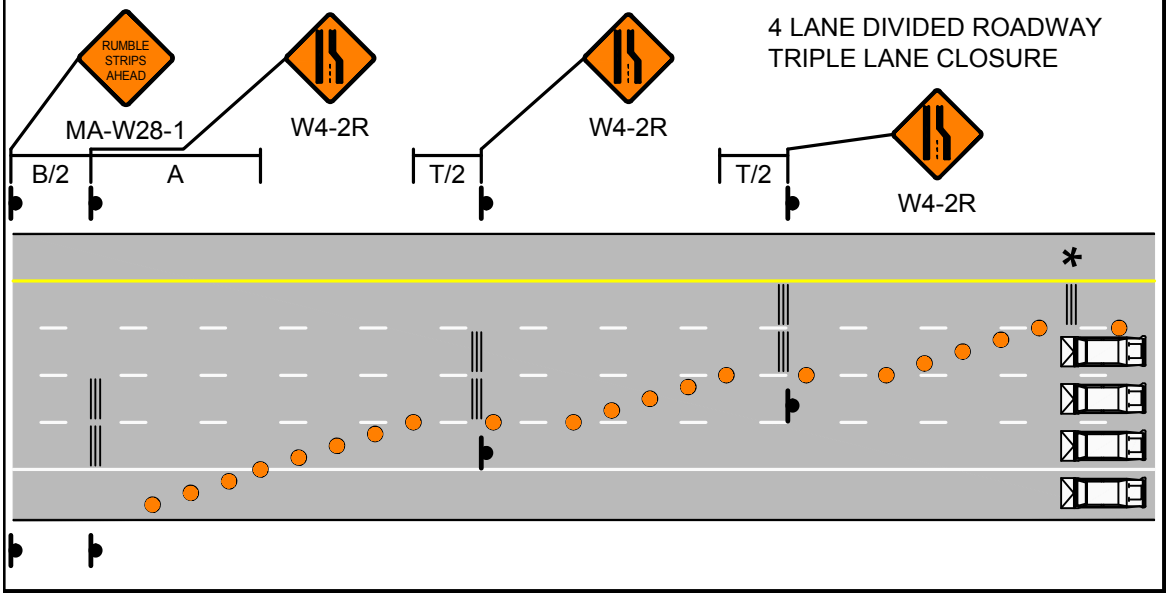
LEGEND

CHANNELIZATION DEVICE

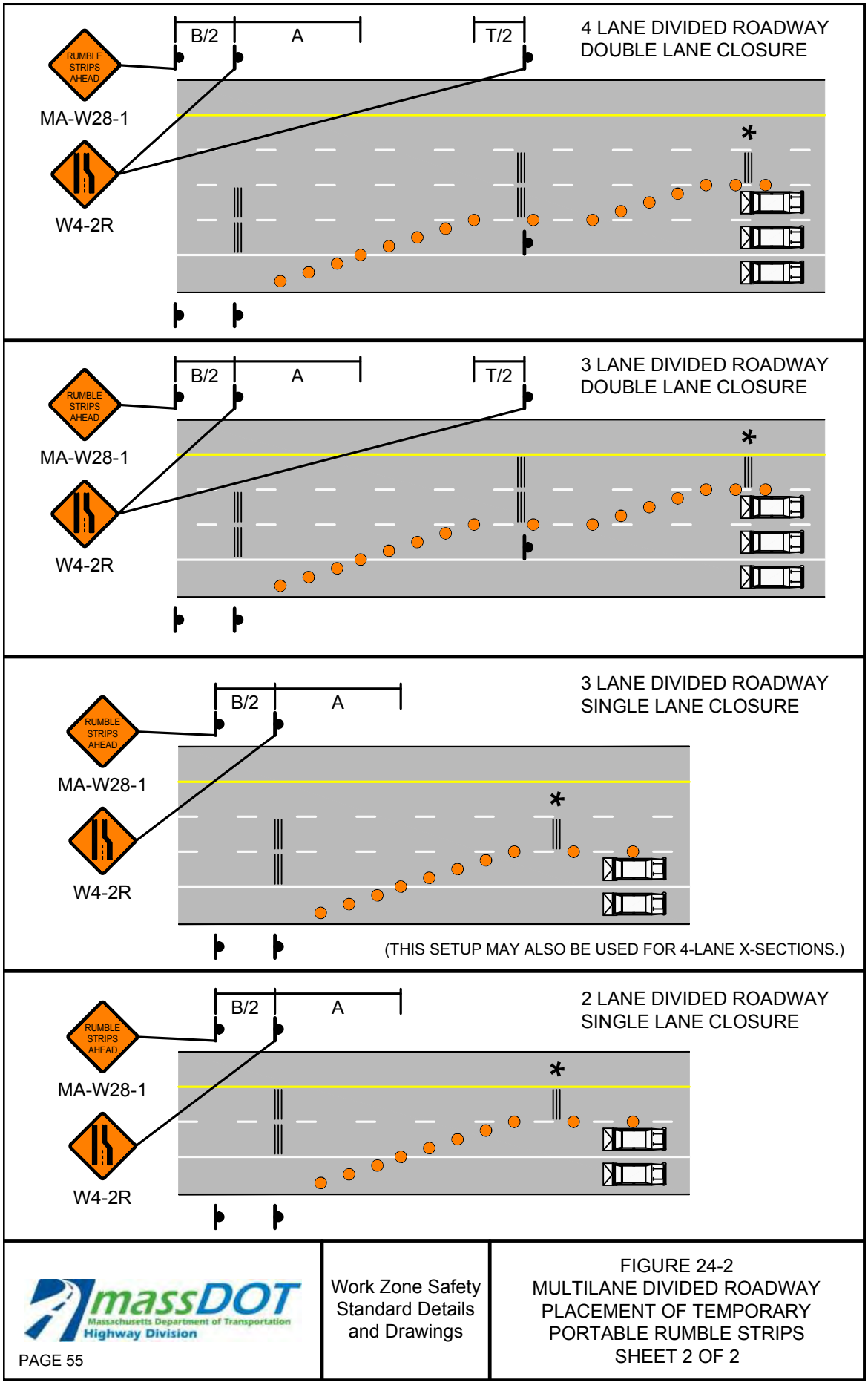
TRUCK MOUNTED ATTENUATOR

TEMPORARY PORTABLE RUMBLE STRIP

NOT TO SCALE



4 LANE DIVIDED ROADWAY
TRIPLE LANE CLOSURE



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Work Zone Safety Standard Details and Drawings

FIGURE 24-2
MULTILANE DIVIDED ROADWAY
PLACEMENT OF TEMPORARY
PORTABLE RUMBLE STRIPS
SHEET 2 OF 2

Notes for Mobile Operations

- Unless otherwise stated, these notes shall apply to all Mobile Operation setups.
- Additional, setup-specific notes may be found on individual sheets.

1. The Supervisor shall travel the designated roadway prior to scheduling the work to ensure that sufficient and appropriate traffic control devices will be available. Special consideration shall be exercised to ensure that appropriate traffic controls be placed in areas that will have limited visibility of the work areas or any associated traffic queues.

2. Vehicles used for these operations shall be made highly visible with appropriate equipment such as flashing lights, rotating beacons, flags, signs, flashing arrow boards, and/or portable changeable message signs. Any signs mounted to these vehicles shall not obscure the visibility of other devices.

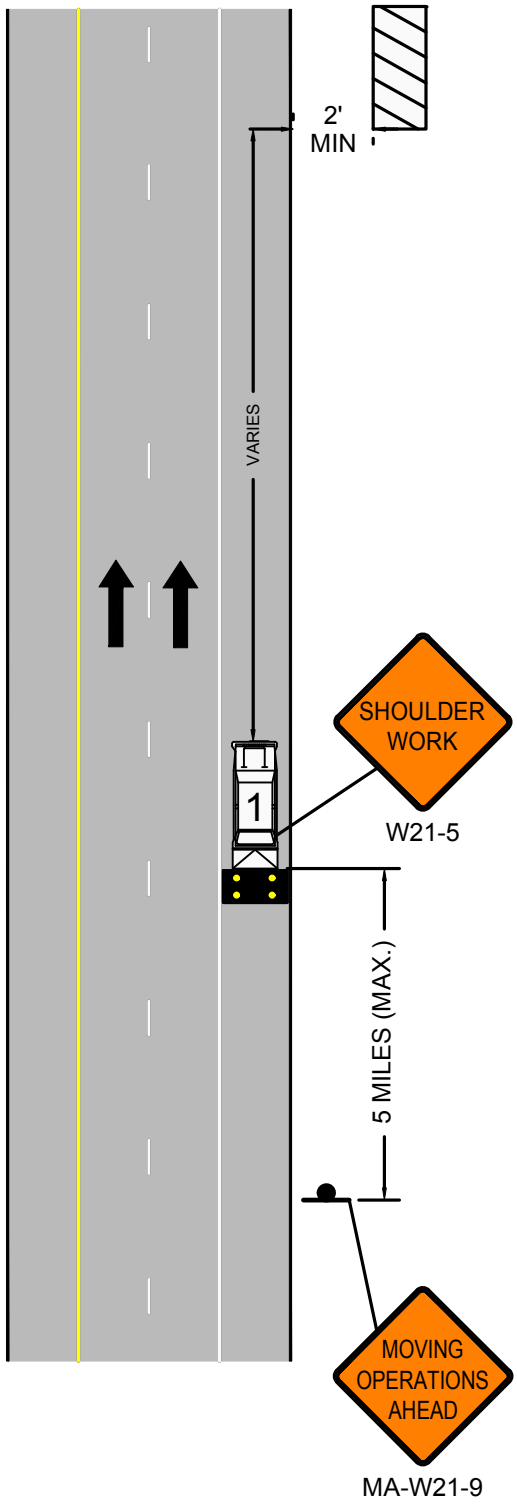
3. All vehicles shown may not be required based upon roadway conditions. However, when needed and practical, additional shadow vehicles and equipment to warn and protect motorists and workers should be used. Based upon roadway conditions, the addition of a police detail with cruiser may be used for additional protection or warning for the traveling public.

4. The distance between the work and shadow vehicle(s) may vary according to the terrain and other factors. Shadow vehicles are used to warn traffic of the operations ahead. Whenever adequate sight distance exists, the shadow vehicle(s) should maintain the minimum appropriate distance and maintain the same speed to prevent non-work related vehicles from entering the work convoy. If this formation cannot be maintained then additional traffic control devices should be deployed in advance of any vertical or horizontal curves that may restrict the sight distance of an oncoming vehicle to either the work vehicle or associated traffic queue.

5. All shadow vehicles shall be equipped with a truck or trailer mounted attenuator (TMA) and a flashing arrow board.

6. Signs should be covered or turned from view when work is not in progress.

7. Portable changeable message signs may be used in lieu of MA-W21-9 signs and any signs mounted directly to a shadow vehicle.



LEGEND

WORK ZONE

SHADOW VEHICLE

FLASHING ARROW BOARD
(WITH STATUS)

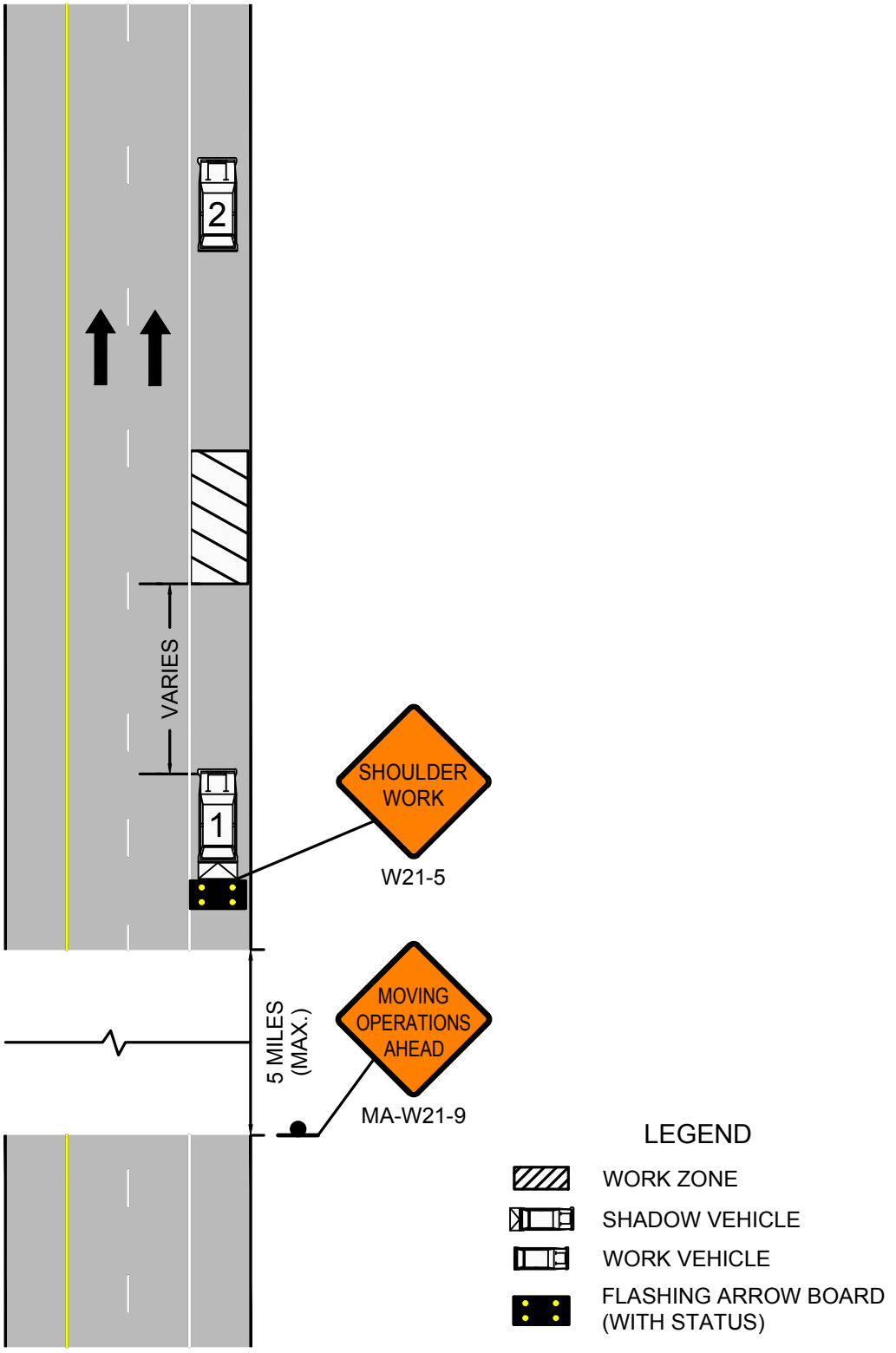
NOT TO SCALE

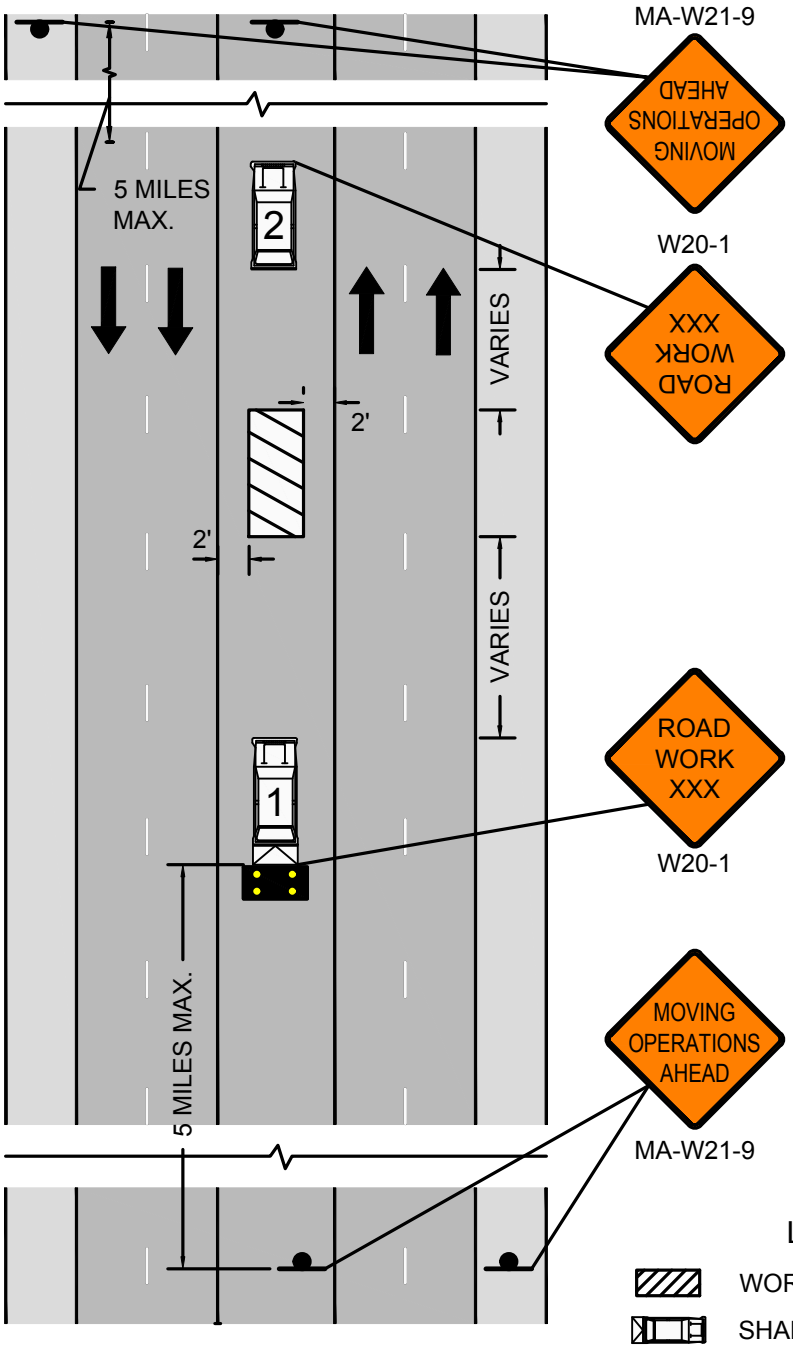
NOTES

1. IF THE WORK AREA IS SUFFICIENTLY AWAY FROM THE EDGE OF ROADWAY (20' MINIMUM) THEN SIGNS AND VEHICLES MAY NOT BE REQUIRED.

massDOT Massachusetts Department of Transportation Highway Division PAGE 57	Work Zone Safety Standard Details and Drawings	FIGURE 25 MOBILE OPERATIONS ANY ROADWAY BEYOND RIGHT SHOULDER

massDOT Massachusetts Department of Transportation Highway Division PAGE 58	Work Zone Safety Standard Details and Drawings	FIGURE 26 MOBILE OPERATIONS ANY ROADWAY SHOULDER





LEGEND

- WORK ZONE
- SHADOW VEHICLE
- WORK VEHICLE
- FLASHING ARROW BOARD (WITH STATUS)

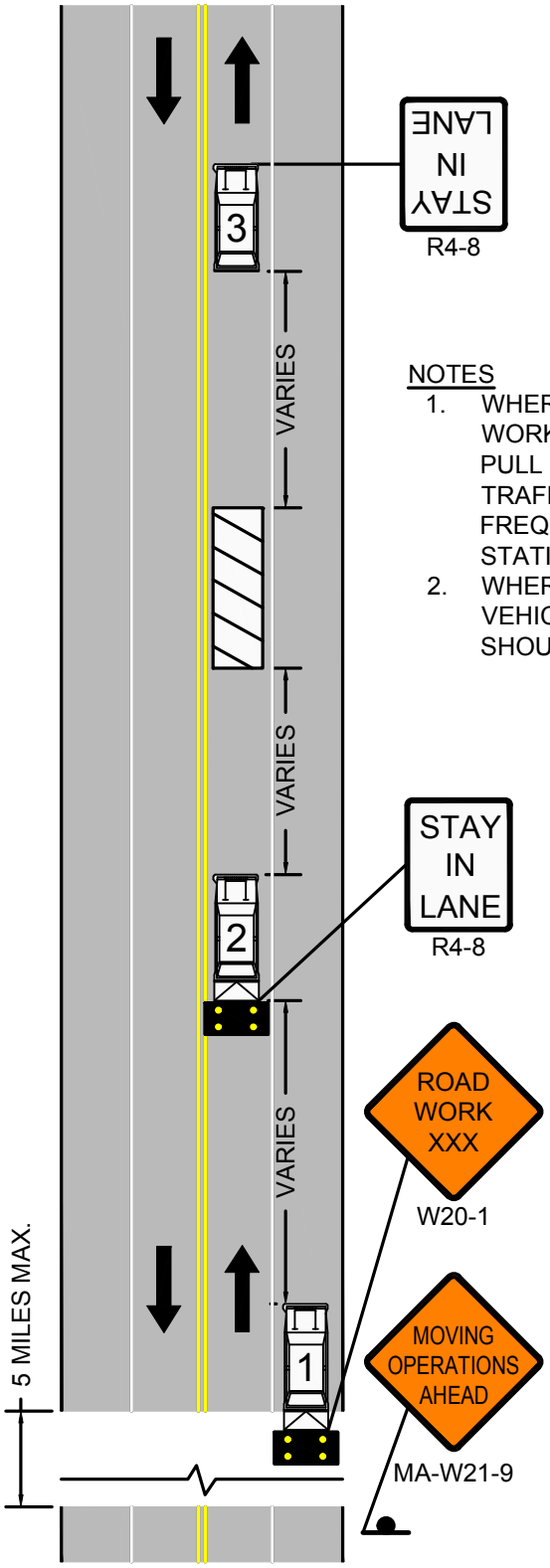
NOT TO SCALE

NOTES

1. IF THE 2' OFFSET CANNOT BE MAINTAINED, A SHORT-TERM STATIONARY SETUP SHOULD BE USED.

massDOT Massachusetts Department of Transportation Highway Division PAGE 59	Work Zone Safety Standard Details and Drawings	FIGURE 27 MOBILE OPERATIONS DIVIDED ROADWAY MEDIAN WORK

massDOT Massachusetts Department of Transportation Highway Division PAGE 60	Work Zone Safety Standard Details and Drawings	FIGURE 28 MOBILE OPERATIONS UNDIVIDED TWO LANE ROADWAY HALF OF ROADWAY CLOSED



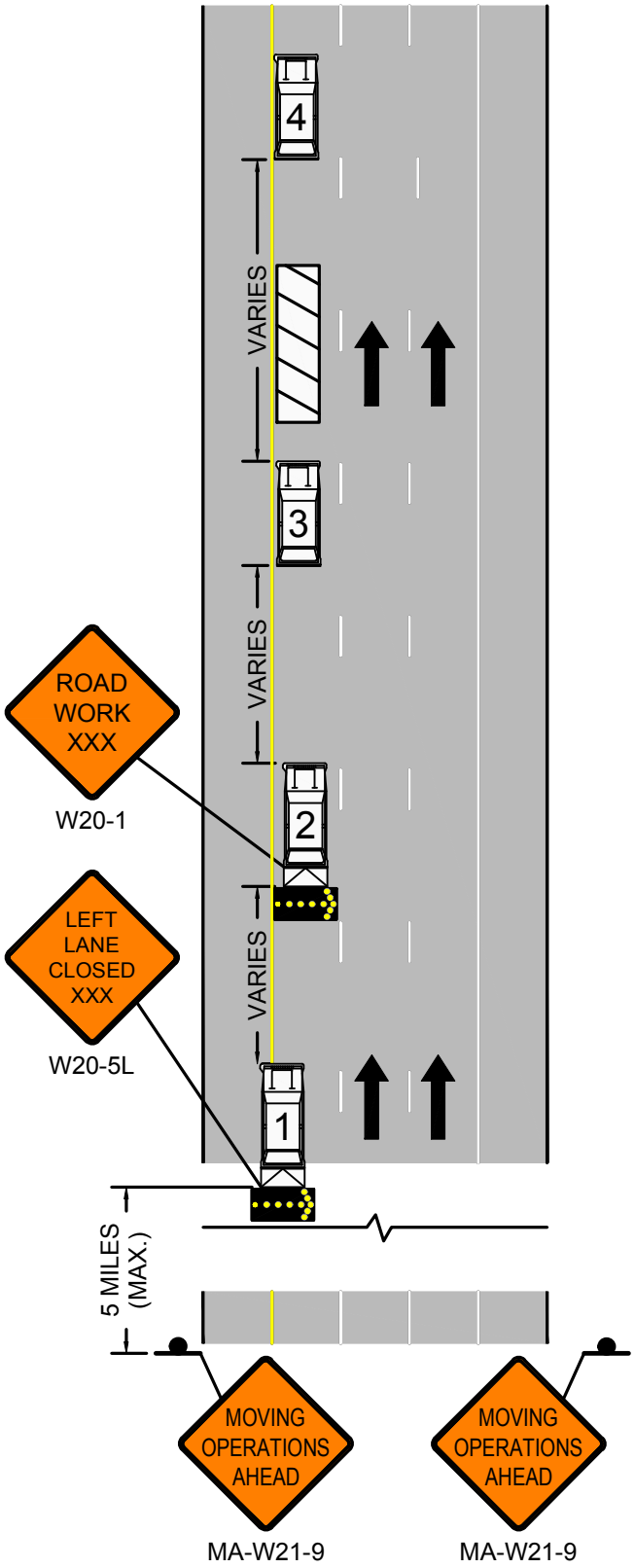
NOTES

1. WHERE PRACTICAL AND WHEN NEEDED, THE WORK AND SHADOW VEHICLE(S) SHOULD PULL OVER PERIODICALLY TO ALLOW TRAFFIC TO PASS. IF THIS CANNOT BE DONE FREQUENTLY, THEN AN ALTERNATE STATIONARY SETUP SHALL BE DEPLOYED.
2. WHERE A WIDE SHOULDER EXISTS, SHADOW VEHICLE #1 SHOULD DRIVE ON THE SHOULDER.

LEGEND

- WORK ZONE
- SHADOW VEHICLE
- WORK VEHICLE
- FLASHING ARROW BOARD (WITH STATUS)

NOT TO SCALE



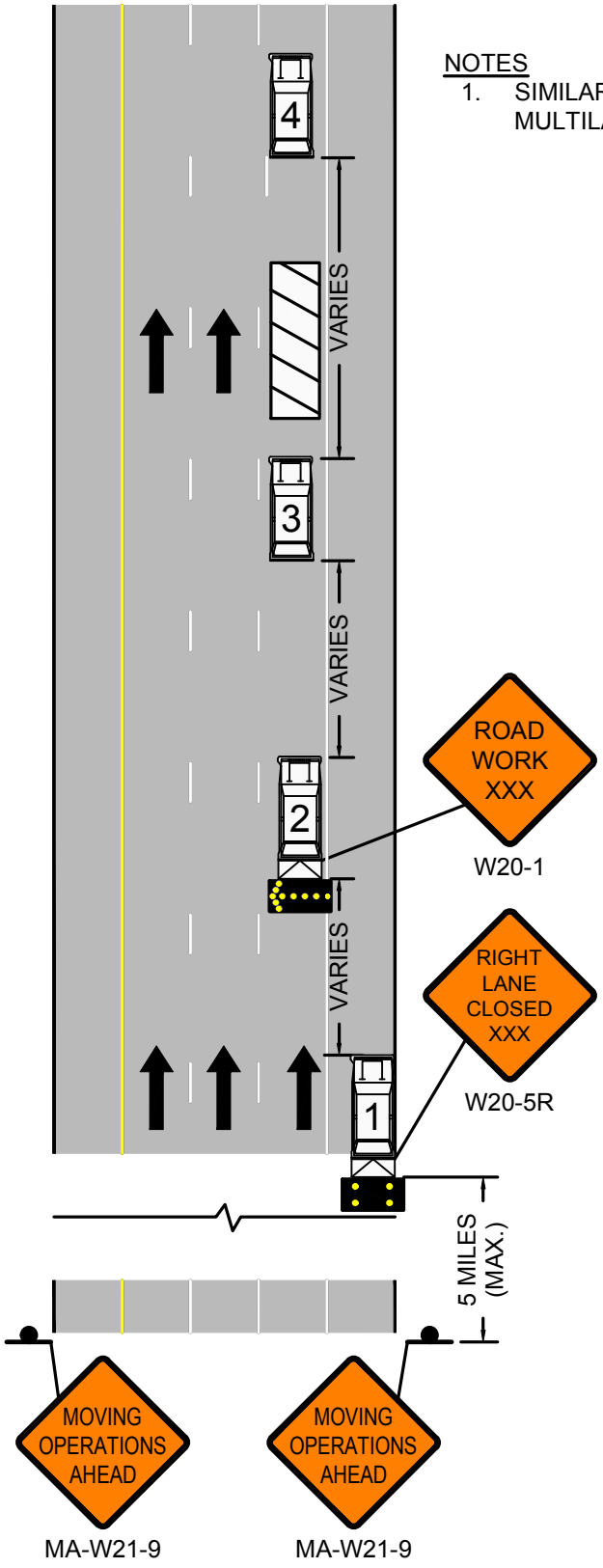
LEGEND

- WORK ZONE
- SHADOW VEHICLE
- WORK VEHICLE
- FLASHING ARROW BOARD (WITH STATUS)

NOT TO SCALE

massDOT Massachusetts Department of Transportation Highway Division PAGE 61	Work Zone Safety Standard Details and Drawings	FIGURE 29 MOBILE OPERATIONS MULTILANE DIVIDED ROADWAY LEFT LANE

massDOT Massachusetts Department of Transportation Highway Division PAGE 62	Work Zone Safety Standard Details and Drawings	FIGURE 30 MOBILE OPERATIONS MULTILANE DIVIDED ROADWAY RIGHT LANE



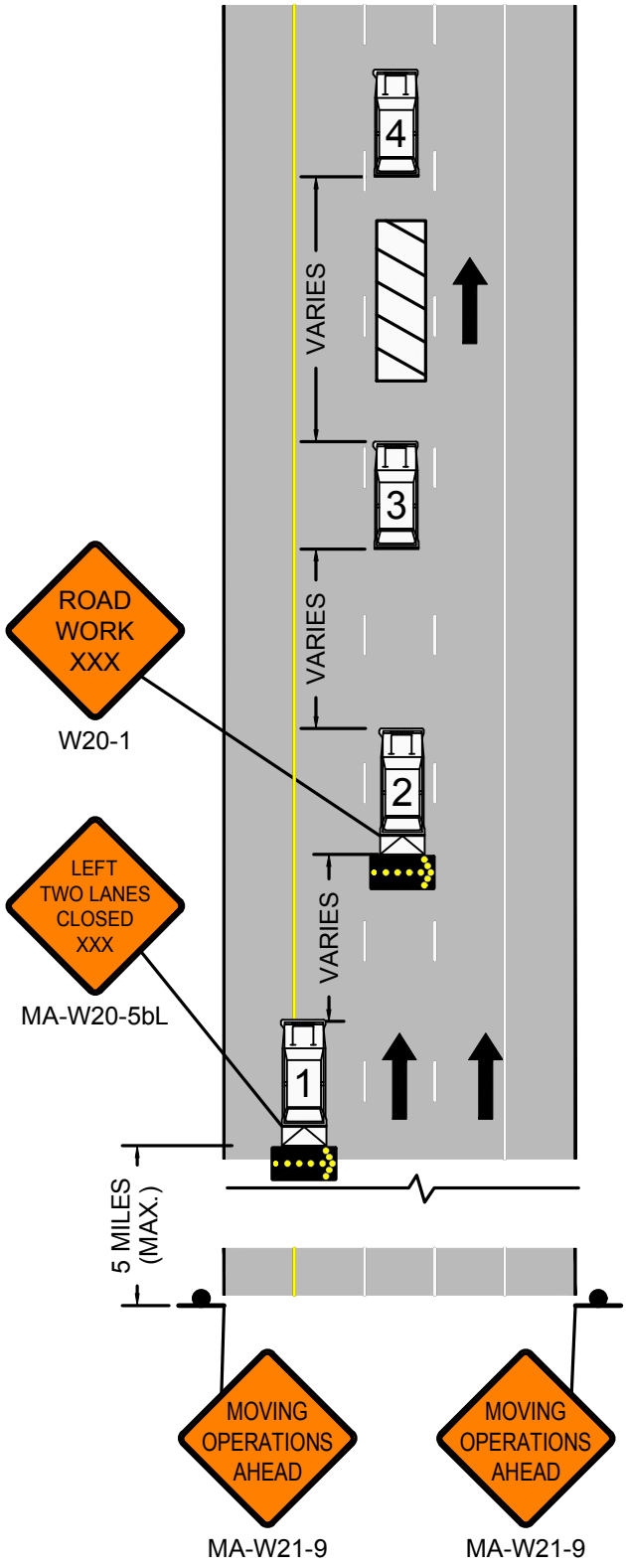
NOTES

1. SIMILAR SETUP MAY BE USED FOR A MULTILANE UNDIVIDED HIGHWAY.

LEGEND

- WORK ZONE
- SHADOW VEHICLE
- WORK VEHICLE
- FLASHING ARROW BOARD (WITH STATUS)

NOT TO SCALE



LEGEND

WORK ZONE

SHADOW VEHICLE

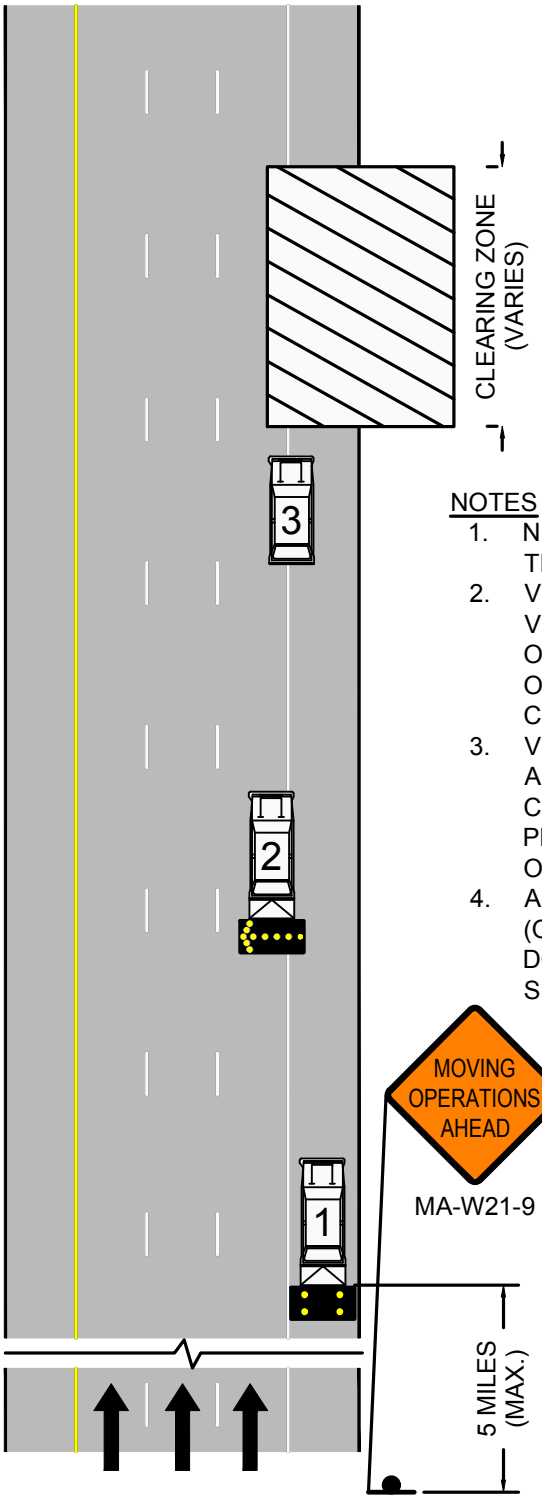
WORK VEHICLE

FLASHING ARROW BOARD (WITH STATUS)

NOT TO SCALE

massDOT Massachusetts Department of Transportation Highway Division PAGE 63	Work Zone Safety Standard Details and Drawings	FIGURE 31 MOBILE OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE

massDOT Massachusetts Department of Transportation Highway Division PAGE 64	Work Zone Safety Standard Details and Drawings	FIGURE 32 MOBILE OPERATIONS POST-STORM CLEANUP OPERATION



NOTES

1. NO OTHER NOTES ARE APPLICABLE TO THIS DETAIL.
2. VEHICLE #3 IS A SNOW/DEBRIS REMOVAL VEHICLE AND SHALL ALWAYS BE AWARE OF THE SURROUNDINGS. MORE THAN ONE VEHICLE MAY BE USED IN THE CLEARING ZONE.
3. VEHICLE #1 SHOULD BE EQUIPPED WITH A PCMS, A TMA, AND STAY IN VISUAL CONTACT WITH VEHICLE #3 WHILE PROVIDING AMPLE WARNING TO ONCOMING TRAFFIC.
4. A POLICE DETAIL WITH BLUE LIGHTS (OPTIONAL) SHALL REMAIN DOWNSTREAM OF VEHICLE #1 IN THE SHOULDER.

LEGEND

- WORK ZONE
- SHADOW VEHICLE
- WORK VEHICLE
- FLASHING ARROW BOARD (WITH STATUS)

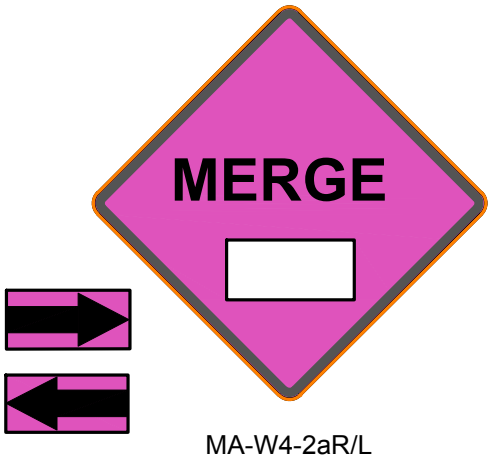
NOT TO SCALE

Notes for Traffic Emergency or Incident Operations

- The goal is to increase awareness of during traffic emergencies or incidents.
- These signs are to be used to differentiate from the traditional construction work zone and an emergency or incident.
- Upon arrival MassDOT First Responders shall assess the magnitude of the scene to determine if the incident is likely to last an hour or more in duration which would trigger the requirement to use these signs.
- Place the "Emergency Ahead" sign on the same side of the road as the incident, if possible, for up to an hour. Emergency response signs should be put up for all incidents and emergencies as soon as possible.
- Place the emergency sign 500 to 1000 feet before the first channelization devices.
- As an incident evolves this sign would be used as a secondary sign with all other emergency controls put in place.
- Only use "MERGE" signs where applicable (Not on 2 lane roads).
- Use MERGE signs on Multi-lane Roads to move traffic away from the incident and keep them in a safe lane.
- Place the MERGE sign about 500 feet before the closure.
- If additional signs are available, they should be placed accordingly as a sign informing people coming in the other direction or on the opposite side of the roadway.
- Use 12 emergency cones spaced 40 to 80 feet apart to form a taper and protect the scene.
- Sequential flashing lights/flares may be used in lieu of or to supplement cones.
- During a major incident that will last for a long duration, the EMERGENCY AHEAD sign should be moved back before an intersecting road or ramp to alert travelers and give them an option of using an alternate route. (Be sure all other devices are in place before moving this sign).

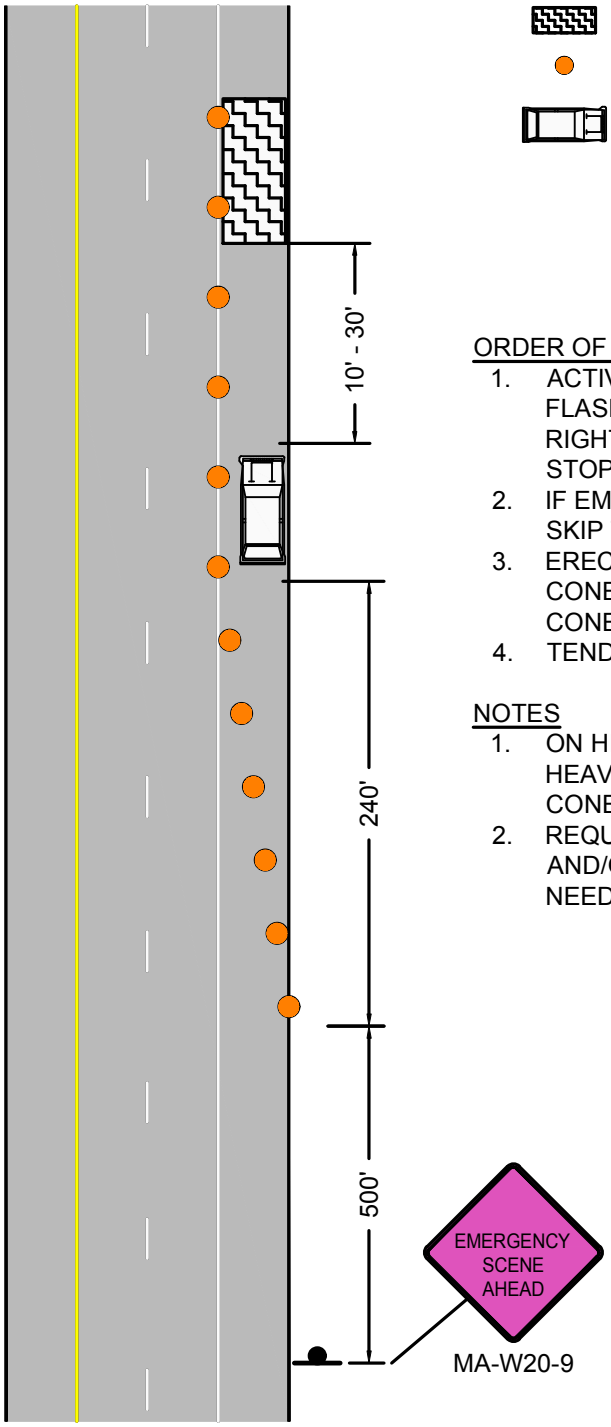
Standard Emergency Signs (36"x36" or 48"x48")

MA-W20-9



MA-W4-2aR/L

massDOT Massachusetts Department of Transportation Highway Division PAGE 66	Work Zone Safety Standard Details and Drawings	FIGURE 33 EMERGENCY RESPONSE ANY ROADWAY SHOULDER ENCROACHMENT



LEGEND

EMERGENCY AREA

CHANNELIZATION DEVICE

EMERGENCY RESPONSE VEHICLE

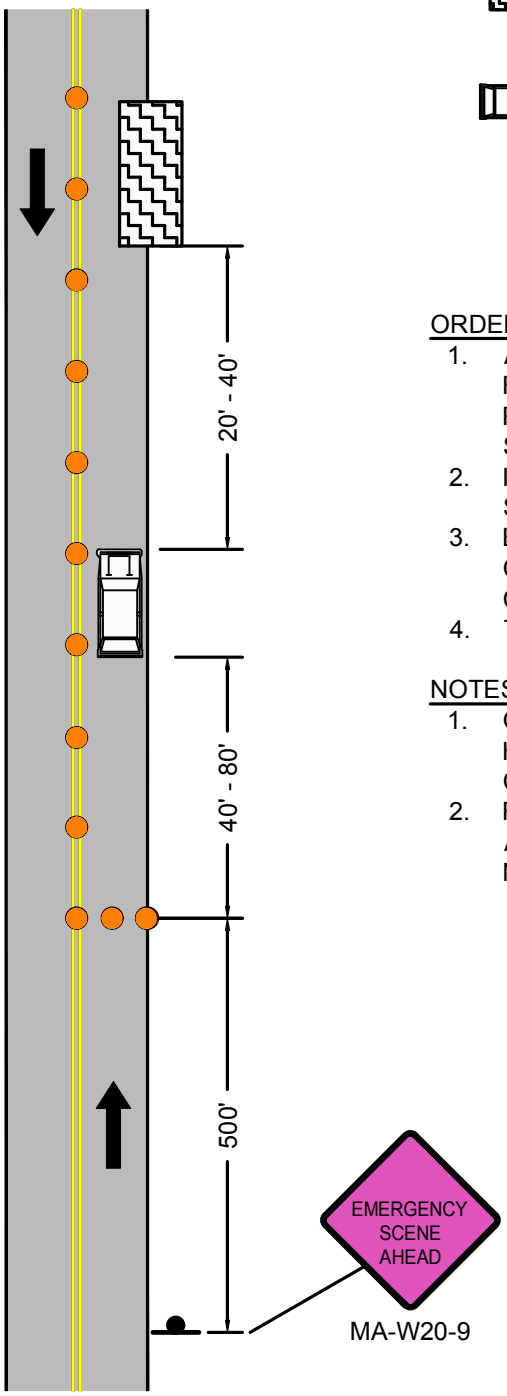
NOT TO SCALE

ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. PULL VEHICLE OVER TO THE RIGHT EDGE OF TRAVEL LANE BEFORE STOPPING.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 4 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. TEND TO EMERGENCY/INCIDENT.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.



LEGEND

EMERGENCY AREA

CHANNELIZATION DEVICE

EMERGENCY RESPONSE VEHICLE

NOT TO SCALE

ORDER OF RESPONSE ACTIVITIES

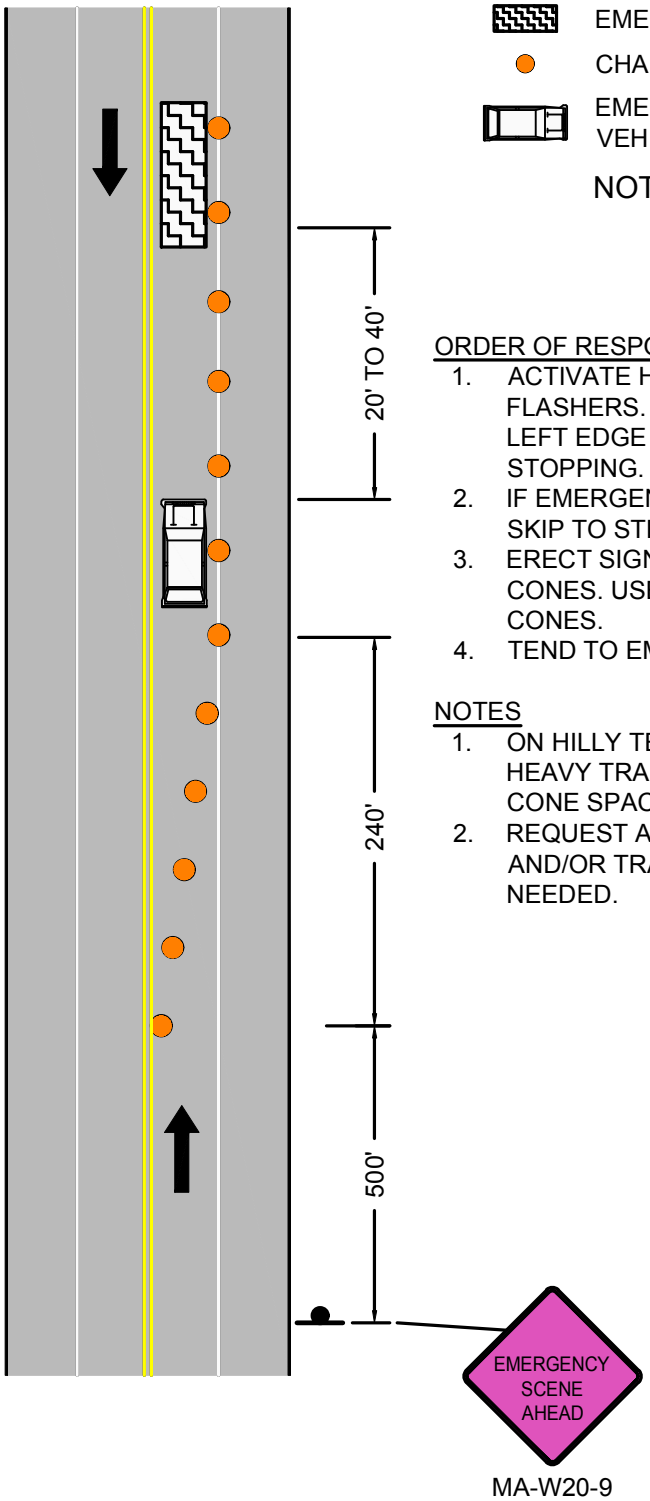
1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. PULL VEHICLE OVER TO THE RIGHT EDGE OF TRAVEL LANE BEFORE STOPPING.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 4 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. TEND TO EMERGENCY/INCIDENT.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.

massDOT Massachusetts Department of Transportation Highway Division PAGE 67	Work Zone Safety Standard Details and Drawings	FIGURE 34 EMERGENCY RESPONSE TWO LANE ROADWAY NO SHOULDER TRAVEL LANE ENCROACHMENT

massDOT Massachusetts Department of Transportation Highway Division PAGE 68	Work Zone Safety Standard Details and Drawings	FIGURE 35 EMERGENCY RESPONSE TWO LANE ROADWAY TRAVERSABLE SHOULDER SINGLE LANE ENCROACHMENT



LEGEND

- EMERGENCY AREA
- CHANNELIZATION DEVICE
- EMERGENCY RESPONSE VEHICLE

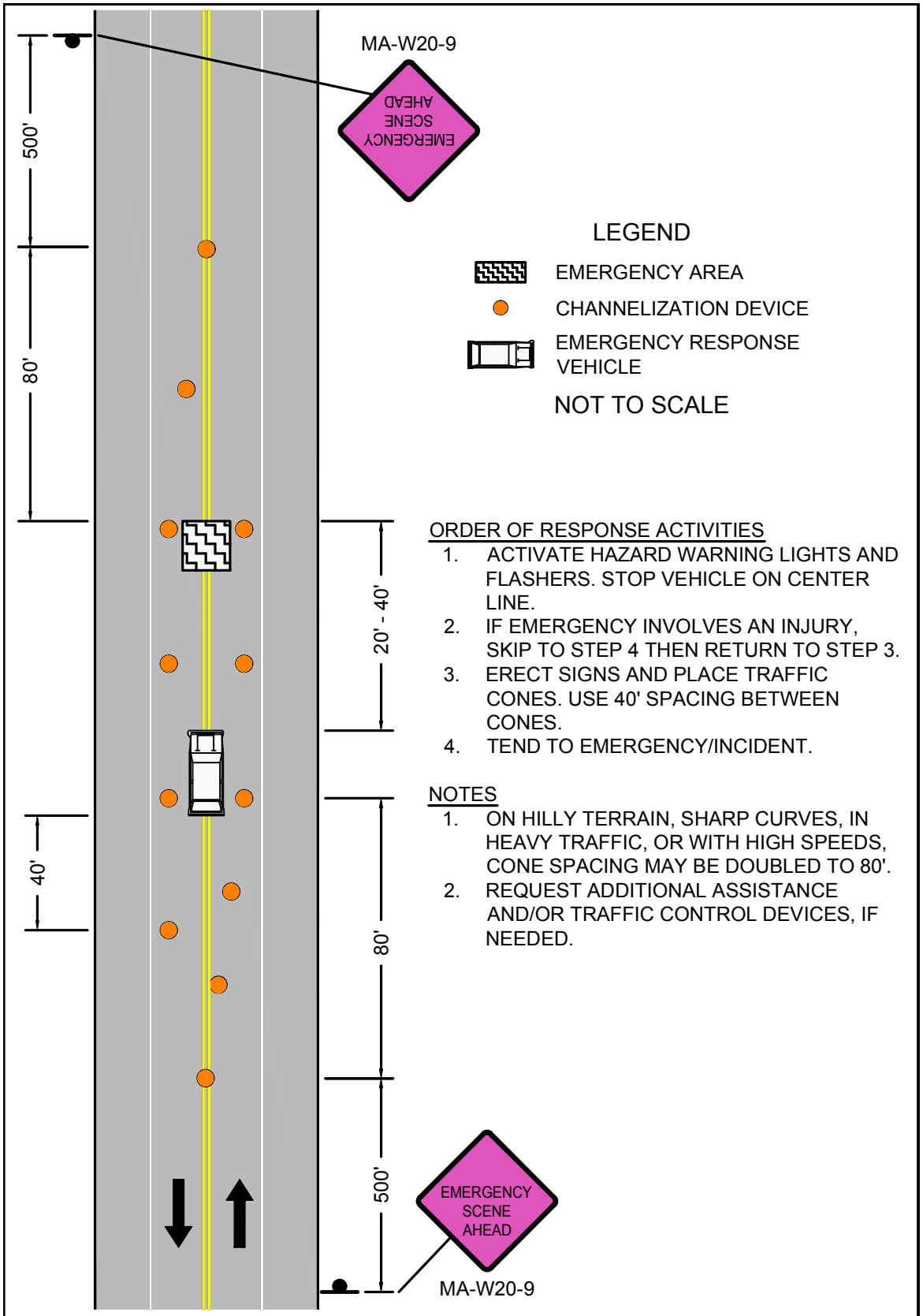
NOT TO SCALE

ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. PULL VEHICLE OVER TO THE LEFT EDGE OF TRAVEL LANE BEFORE STOPPING.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 4 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. TEND TO EMERGENCY/INCIDENT.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.



ORDER OF RESPONSE ACTIVITIES

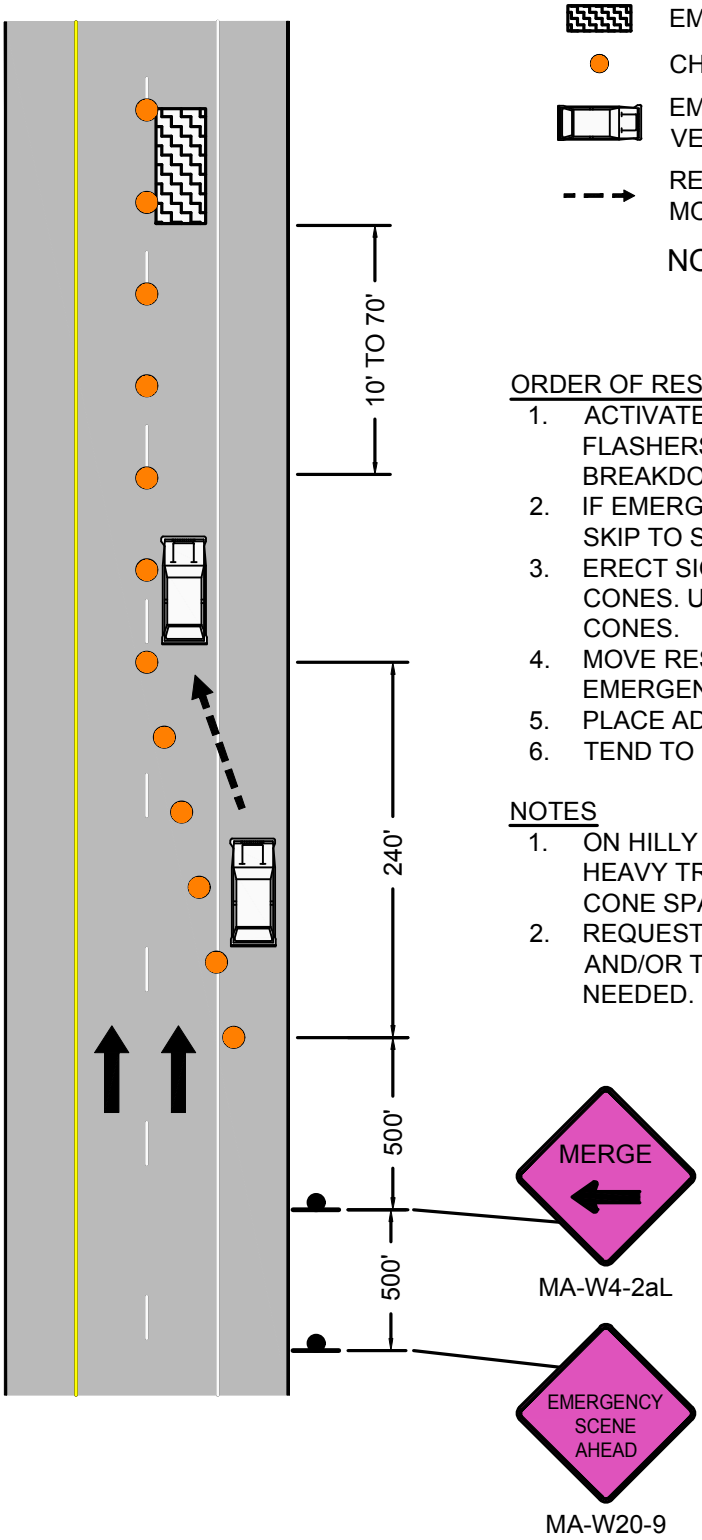
1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. STOP VEHICLE ON CENTER LINE.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 4 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. TEND TO EMERGENCY/INCIDENT.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.

massDOT Massachusetts Department of Transportation Highway Division PAGE 69	Work Zone Safety Standard Details and Drawings	FIGURE 36 EMERGENCY RESPONSE TWO LANE ROADWAY TRAVERSABLE SHOULDER CENTER OF ROADWAY

massDOT Massachusetts Department of Transportation Highway Division PAGE 70	Work Zone Safety Standard Details and Drawings	FIGURE 37 EMERGENCY RESPONSE MULTILANE DIVIDED ROADWAY RIGHT LANE



LEGEND

- EMERGENCY AREA
- CHANNELIZATION DEVICE
- EMERGENCY RESPONSE VEHICLE
- RESPONSE VEHICLE MOVEMENT

NOT TO SCALE

ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. STOP VEHICLE IN BREAKDOWN LANE.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 6 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. MOVE RESPONSE VEHICLE BEHIND EMERGENCY.
5. PLACE ADDITIONAL CONES.
6. TEND TO EMERGENCY.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.

LEGEND

EMERGENCY AREA

CHANNELIZATION DEVICE

EMERGENCY RESPONSE VEHICLE

RESPONSE VEHICLE MOVEMENT

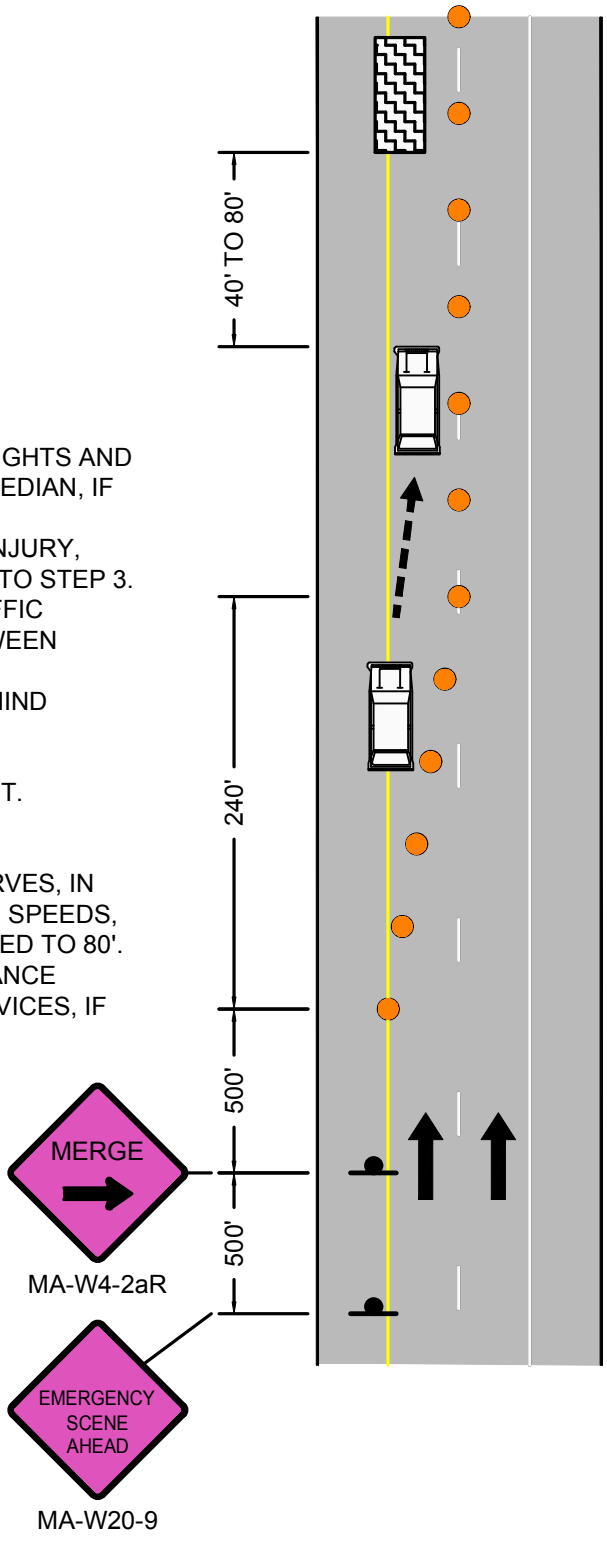
NOT TO SCALE

ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. STOP VEHICLE IN MEDIAN, IF PRESENT.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 6 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. MOVE RESPONSE VEHICLE BEHIND EMERGENCY.
5. PLACE ADDITIONAL CONES.
6. TEND TO EMERGENCY/INCIDENT.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.



massDOT Massachusetts Department of Transportation Highway Division

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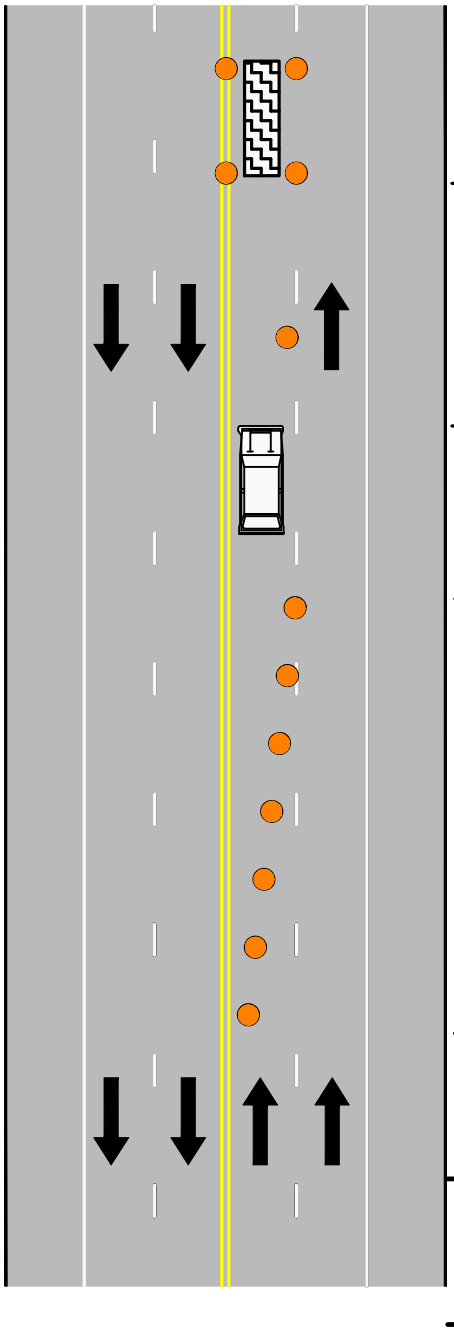
Work Zone Safety Standard Details and Drawings

FIGURE 38
EMERGENCY RESPONSE
MULTILANE DIVIDED ROADWAY
LEFT LANE

massDOT Massachusetts Department of Transportation Highway Division PAGE 72	Work Zone Safety Standard Details and Drawings	FIGURE 39 EMERGENCY RESPONSE MULTILANE UNDIVIDED ROADWAY LEFT LANE



LEGEND

- EMERGENCY AREA
- CHANNELIZATION DEVICE
- EMERGENCY RESPONSE VEHICLE

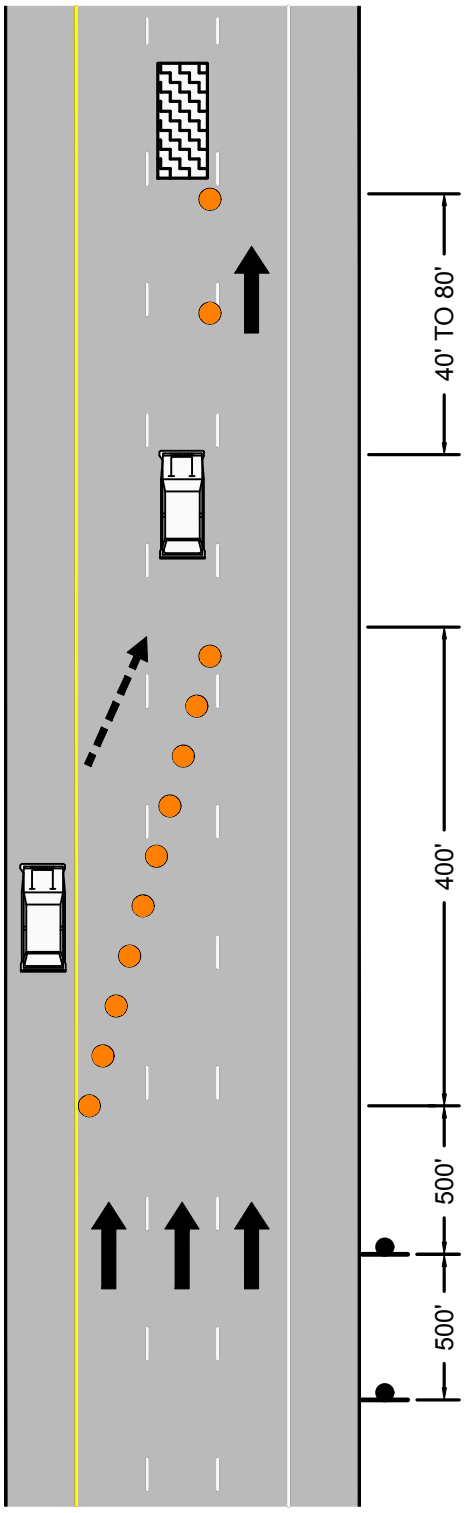
NOT TO SCALE

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.

ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. PULL VEHICLE OVER TO THE RIGHT EDGE OF BREAKDOWN LANE OR SHOULDER OR, IF NOT PRESENT, RIGHT EDGE OF TRAVEL LANE BEFORE STOPPING.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 4 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. TEND TO EMERGENCY/INCIDENT.



LEGEND

- EMERGENCY AREA
- CHANNELIZATION DEVICE
- EMERGENCY RESPONSE VEHICLE
- RESPONSE VEHICLE MOVEMENT

NOT TO SCALE

ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. STOP VEHICLE IN MEDIAN, IF PRESENT.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 6 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. MOVE RESPONSE VEHICLE BEHIND EMERGENCY.
5. PLACE ADDITIONAL CONES.
6. TEND TO EMERGENCY/INCIDENT.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.

massDOT Massachusetts Department of Transportation Highway Division PAGE 73	Work Zone Safety Standard Details and Drawings	FIGURE 40 EMERGENCY RESPONSE MULTILANE DIVIDED ROADWAY MIDDLE LANE APPROACH FROM LEFT

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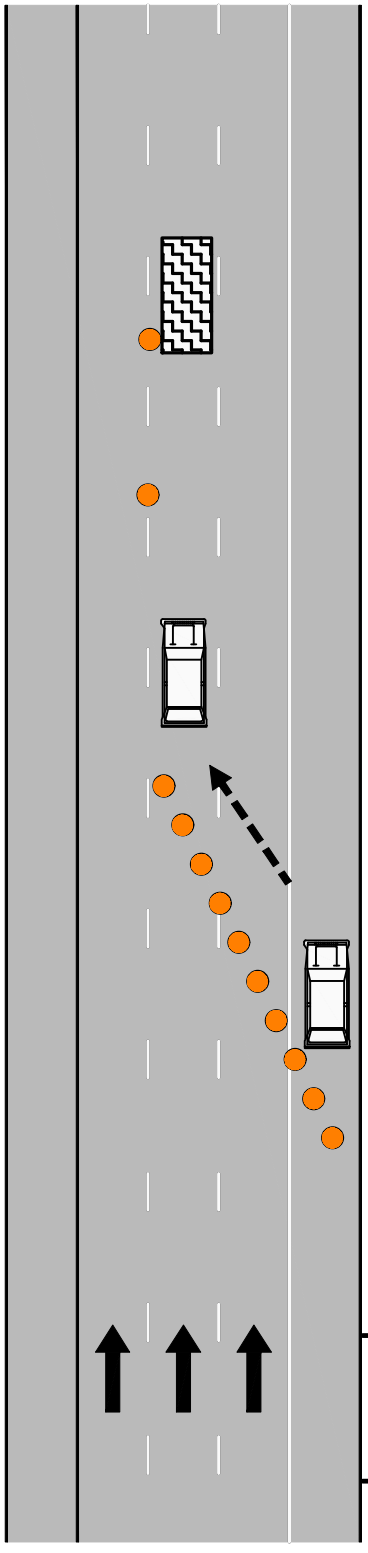
Work Zone Safety Standard Details and Drawings

FIGURE 41
EMERGENCY RESPONSE
MULTILANE DIVIDED ROADWAY
MIDDLE LANE
APPROACH FROM RIGHT



LEGEND

- EMERGENCY AREA
- CHANNELIZATION DEVICE
- EMERGENCY RESPONSE VEHICLE
- RESPONSE VEHICLE MOVEMENT

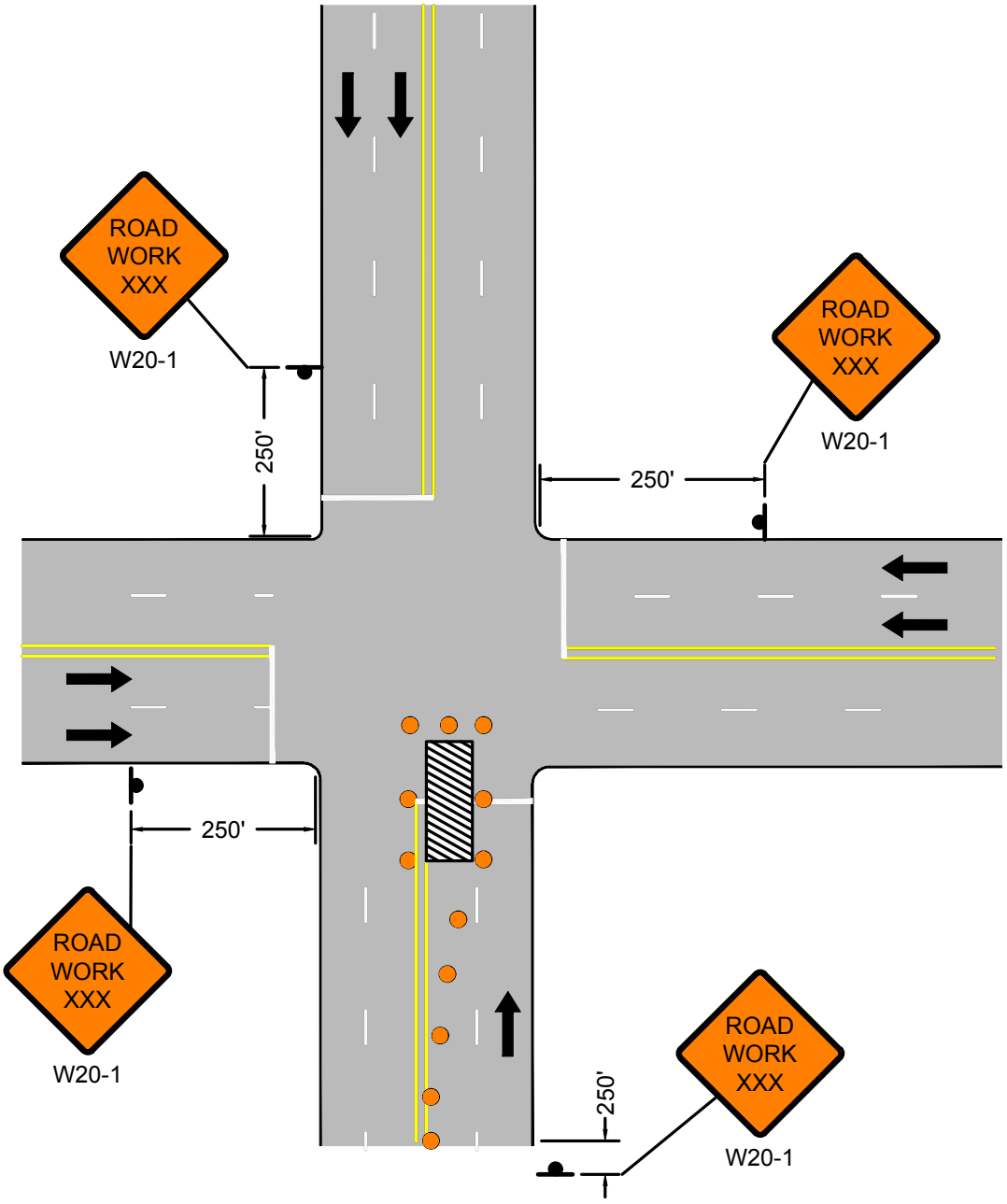
NOT TO SCALE

ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. STOP VEHICLE IN BREAKDOWN LANE.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 6 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. MOVE RESPONSE VEHICLE BEHIND EMERGENCY.
5. PLACE ADDITIONAL CONES.
6. TEND TO EMERGENCY.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.



LEGEND

WORK ZONE

CHANNELIZATION DEVICE

NOT TO SCALE

NOTES

1. DURATION OF WORK = 20 MINUTES OR LESS.
2. EQUIPMENT: 12 CONES + 4 PORTABLE SIGNS.
3. CONE SPACING IS 20 FEET.
4. SINGLE WORK VEHICLE PARKED/STOPPED.
5. POLICE DETAIL REQUIRED.

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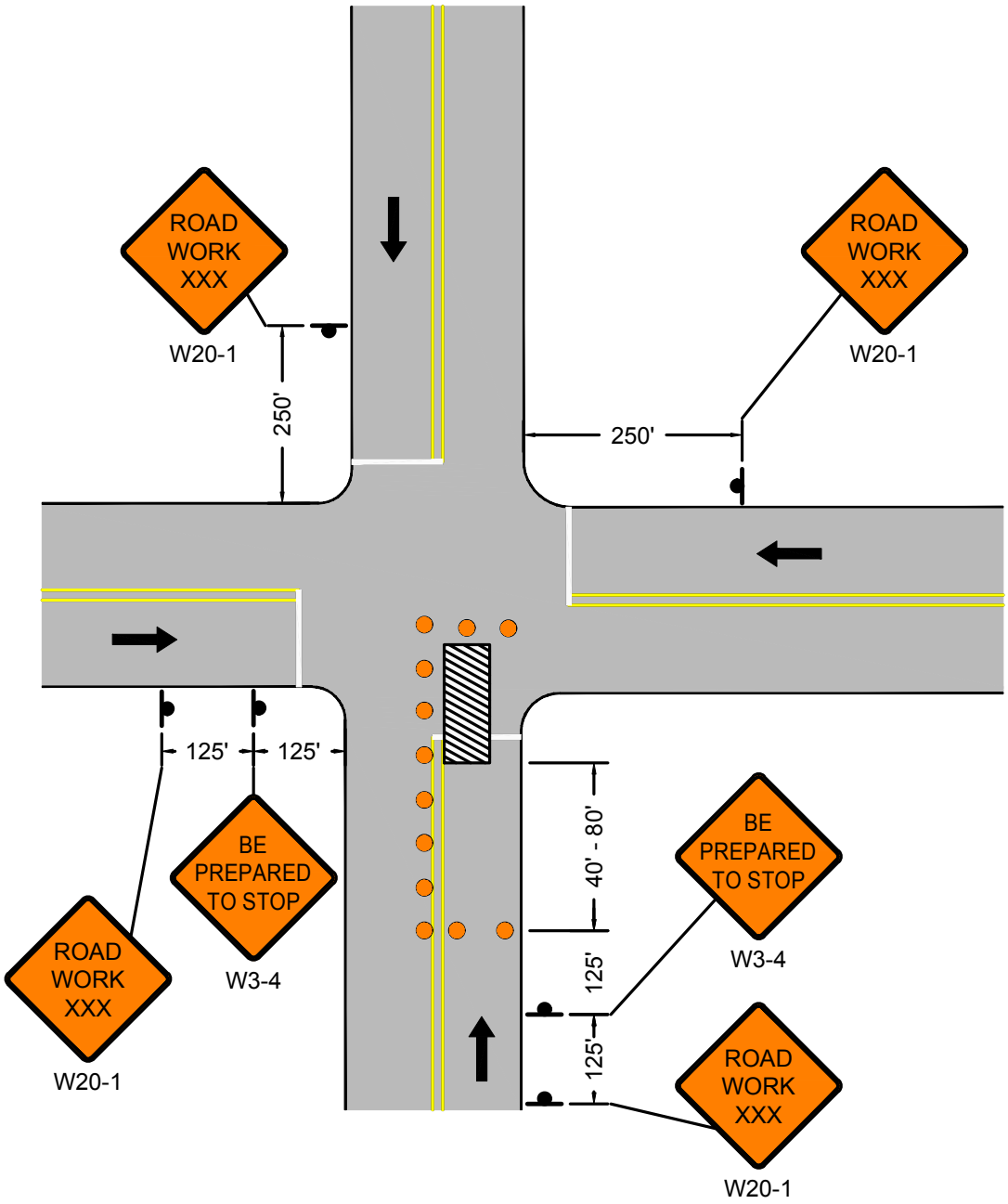
Work Zone Safety Standard Details and Drawings

FIGURE 42
TRAFFIC SIGNAL REPAIR WORK
MULTILANE UNDIVIDED ROADWAY
LEFTMOST OR LEFT TURNING LANE

massDOT Massachusetts Department of Transportation Highway Division PAGE 76	Work Zone Safety Standard Details and Drawings	FIGURE 43 TRAFFIC SIGNAL REPAIR WORK TWO LANE UNDIVIDED ROADWAY ONE LEG OF INTERSECTION



LEGEND

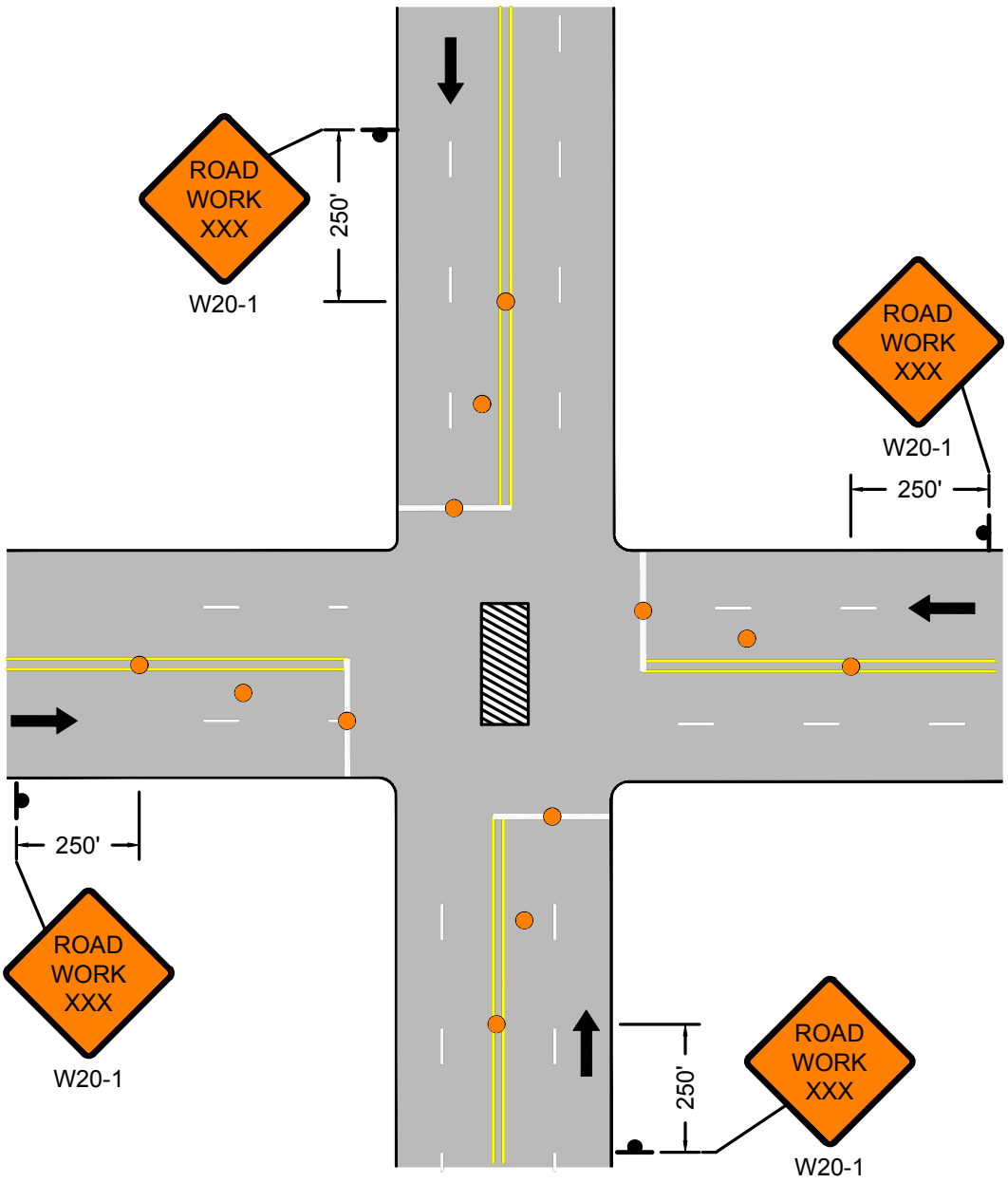
WORK ZONE

CHANNELIZATION DEVICE

NOT TO SCALE

NOTES

1. DURATION OF WORK = 20 MINUTES OR LESS.
2. EQUIPMENT: 12 CONES + 6 PORTABLE SIGNS.
3. CONE SPACING IS 20 FEET.
4. SINGLE WORK VEHICLE PARKED/STOPPED.
5. POLICE DETAIL REQUIRED.



LEGEND

WORK ZONE

CHANNELIZATION DEVICE

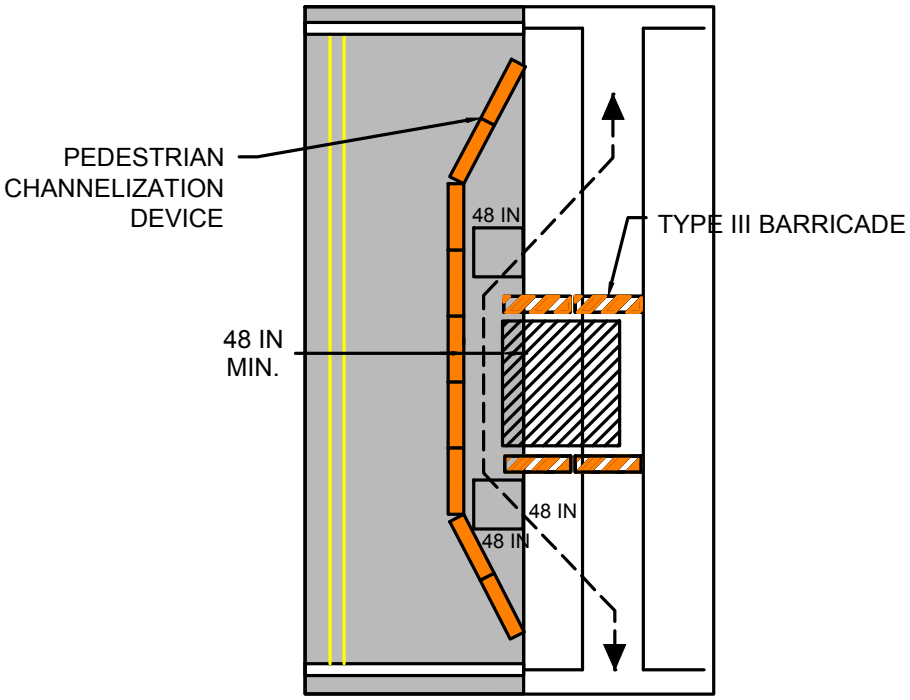
NOT TO SCALE

NOTES

1. DURATION OF WORK = 20 MINUTES OR LESS.
2. EQUIPMENT: 12 CONES + 4 PORTABLE SIGNS.
3. CONE SPACING IS 20 FEET.
4. SINGLE WORK VEHICLE PARKED/STOPPED.
5. POLICE DETAIL REQUIRED.

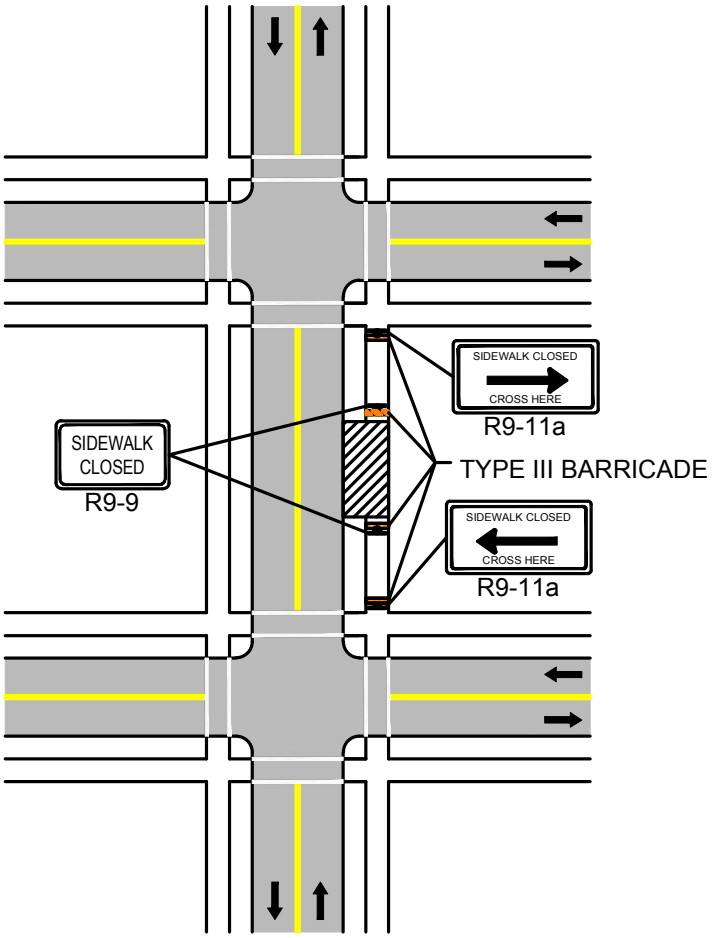
massDOT Massachusetts Department of Transportation Highway Division PAGE 77	Work Zone Safety Standard Details and Drawings	FIGURE 44 TRAFFIC SIGNAL REPAIR WORK MULTILANE UNDIVIDED ROADWAY CENTER OF INTERSECTION

massDOT Massachusetts Department of Transportation Highway Division PAGE 78	Work Zone Safety Standard Details and Drawings	FIGURE 45 PEDESTRIAN BYPASS



NOTES:

1. WHEN EXISTING PEDESTRIAN FACILITIES ARE DISRUPTED, CLOSED, OR RELOCATED IN A TTC ZONE, TEMPORARY FACILITIES SHALL BE PROVIDED AND THEY SHALL BE DETECTABLE AND INCLUDE ACCESSIBILITY FEATURES CONSISTENT WITH THE FEATURES PRESENT IN THE EXISTING PEDESTRIAN FACILITY.
2. A PEDESTRIAN CHANNELIZATION DEVICE THAT IS DETECTABLE BY A PERSON WITH A VISUAL DISABILITY TRAVELING WITH THE AID OF A LONG CANE SHALL BE PLACED ALONG THE FULL LENGTH OF THE TEMPORARY PEDESTRIAN ROUTE.
3. WHEN USED, TEMPORARY RAMPS SHALL COMPLY WITH AMERICANS WITH DISABILITIES ACT.
4. THE ALTERNATE PATHWAY SHOULD HAVE A SMOOTH CONTINUOUS HARD SURFACE FOR THE ENTIRE LENGTH OF THE TEMPORARY PEDESTRIAN FACILITY.
5. THE TEMPORARY SIDEWALK SHOULD BE A MINIMUM OF 4 FEET WIDE. IF THE SIDEWALK EXCEEDS 200 FEET THEN A 5 FOOT BY 5 FOOT PASSING ZONE SHALL BE PROVIDED NEAR THE MID-POINT OF THE CLOSURE.
6. THE PROTECTIVE REQUIREMENTS OF A TTC WORK ZONE MAY HAVE AN IMPACT IN DETERMINING THE NEED FOR TEMPORARY TRAFFIC BARRIERS AND THEIR USE IN PROVIDING PEDESTRIAN DELINEATION SHOULD BE BASED ON ENGINEERING JUDGMENT.
7. ON-DEMAND PEDESTRIAN ASSISTANCE PERSONNEL TO ASSIST WITH NAVIGATION AROUND THE CLOSURE/WORK AREA MAY BE CONSIDERED AS AN OPTION IN PLACE OF PROVIDING ADA/AAB DEVICES FOR WORK FOR CLOSURES LASTING 4 HOURS OR LESS.
8. CONTROLS ONLY FOR PEDESTRIAN TRAFFIC ARE SHOWN; VEHICULAR TRAFFIC SHOULD BE HANDLED AS SHOWN ELSEWHERE. THESE DETAILS ARE USED IN CONJUNCTION WITH THE PROPOSED LANE CLOSURE DETAILS AND DURING CONSTRUCTION STAGING, AS DETERMINED BY THE ENGINEER.



NOTES:

1. CLOSURE OF A SIDEWALK FACILITY SHALL CONSTITUTE THE PROVISION FOR MANAGING PEDESTRIAN TRAFFIC AND ACCOMMODATING ALL USERS. IF THE EXISTING PEDESTRIAN ACCESS ROUTE(S) CAN BE TEMPORARILY RELOCATED ALONG THE EXISTING SIDEWALK , AND SAID FACILITY PROVIDES A MINIMUM WIDTH OF 48-INCHES OF SOLID, SMOOTH UNOBSTRUCTED SURFACE, THEN NO DETOURING OF THE ROUTE SHALL BE REQUIRED. DELINEATION OF THE WORK AREA IS STILL REQUIRED.

2. IF IT IS NECESSARY TO DIVERT PEDESTRIAN TRAFFIC TO AN ALTERNATE ROUTE ACROSS THE ROADWAY FROM THE EXISTING FACILITY, THE FIGURE ABOVE SHALL BE FOLLOWED TO PROVIDE ADEQUATE DIRECTION TO PEDESTRIANS. ALTERNATE ROUTE SHALL PROVIDE THE SAME LEVEL OF ACCOMMODATION AS THE FACILITY THAT IS BEING DETOURED AND RETAIN ADA COMPLIANCE IN ITS ENTIRETY.

3. FOR EMERGENCY OR SHORT-DURATION SIDEWALK CLOSURES OF 4-HOURS OR LESS, IT IS OPTIONAL TO HAVE ON-DEMAND PEDESTRIAN ASSISTANCE PERSONNEL AVAILABLE AT ALL TIMES DURING THE CLOSURE TO ASSIST THOSE MOBILITY CHALLENGED PERSONS WHO REQUIRE ADDITIONAL ASSISTANCE TO SAFELY NAVIGATE AROUND THE WORK AREA IN LIEU OF A FULL DETOUR.

massDOT Massachusetts Department of Transportation Highway Division PAGE 80	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS BIKE LANE CLOSURE

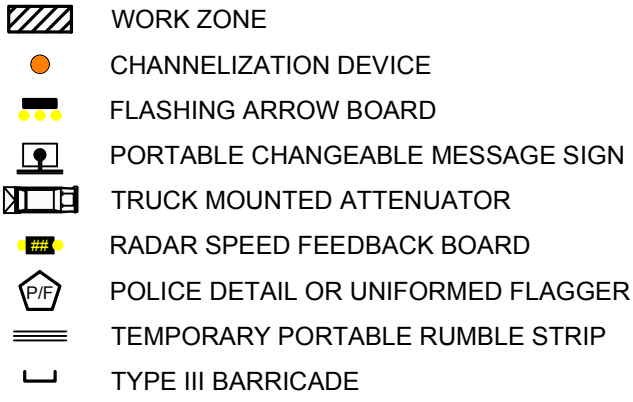
POSTED SPEED LIMIT (MPH)	SPACING FOR BIKE ADVANCE WARNING SIGNS (FT) (A,B))	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRANSITION LENGTH (L/3)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	150 / 150	100	305	20	45
45-55	150 / 150	220	495	40	35
60-65	150 / 150	260	645	40	40

* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

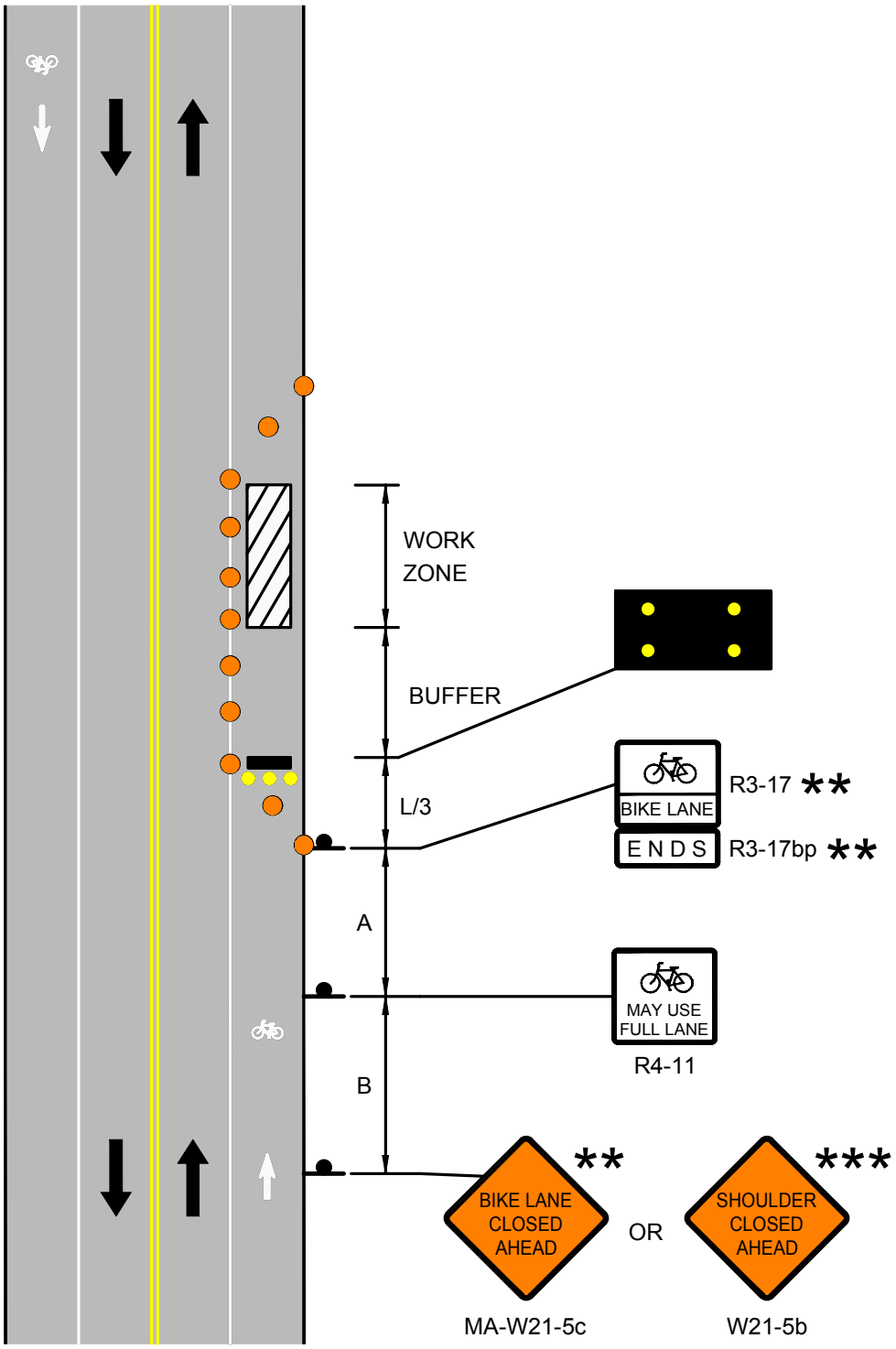
NOTES

1. DETAIL SHALL BE USED IN CONJUNCTION WITH THE PROPOSED LANE CLOSURE DETAILS. SIGNING SHOWN ONLY FOR BIKE TRAFFIC. FOLLOW ALL OTHER RELEVANT DETAILS FOR TTC DEVICES FOR VEHICULAR TRAFFIC.
2. ** SIGN SHALL BE USED ONLY IF THERE IS A MARKED BIKE LANE.
3. *** SIGN SHALL BE USED ONLY IF THERE IS NO MARKED BIKE LANE.

LEGEND



NOT TO SCALE



massDOT Massachusetts Department of Transportation Highway Division PAGE 81	Work Zone Safety Standard Details and Drawings	FIGURE 48 STATIONARY OPERATIONS BIKE LANE CLOSURE

Rev. June, 2017

DOCUMENT A00816

ATC TEST PLAN

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Per MassDOT ATC and ATCC Specfications

Test Location:_____ **Date:_____** **Time: _____**

Cabinet Location: _____

Validate that the supplied ATC cabinet and controller meet the standards outline in the Plans and Special Provisions.

Test Procedure	Expected Result	Actual Result	Pass/ Fail	Comments
Pre-Test Physical Cabinet Inspection				
Unpack cabinet and check for shipping damage to the outside of cabinet; dents, paint chips, scratches, etc.	All equipment is undamaged.			
Verify that the cabinet dimensions match what is required per the project specfications.	The cabinet dimensions are correct.			
Verfiy that cabinet layout of devices conforms to the cabinet drawing as shown on the plans.	Layout of devices conforms to cabinet drawing.			
Verify that the input/output channel assignment is in compliance with the specifications.	Input/put channel assignment is in compliance with the specifications.			
Verify that the cabinet is supplied as a four-door or two-door M or two-door P front access only ground mounted configuration.	The cabinet is supplied in the state configuration.			
Verify that the cabinet is installed on a 6-inch aluminum riser-base.	A 6-inch riser-base is supplied and installed.			
Verify that two sets of cabinet keys and police door keys have been supplied.	The keys are supplied.			
Verify that each key will open each of the supplied locks.	The keys oopen each door.			
Open all cabinet doors. Verify proper door alignment and door handle latch operation.	All doors open and are properly alligned.			
Verify that the hinge pins are made of stainless steel.	Hinge pins are stainless steel.			
Verify that cabinet doors have captive door stops at both 90 and 180 degrees.	Door stops are provided at 90 and 180 degrees.			
Verify that the cabinet doors have a three point draw roller latch and rollers are made of nylon.	The doors have three point draw rollers.			

Test Procedure	Expected Result	Actual Result	Pass/ Fail	Comments
Verify that the cabinet locking system has a 3/4-inch diameter shank, stainless steel locking handle and provisions for padlocking the door in a closed postion.	Proper locking system supplied.			
Verify that a permanent label is installed on the upper portion of the inside front main door which contains the cabinet manufacturer, controller manufacturer, model/part number and year/month of assembly.	Label installed with appropriate data.			
Verify that all racks are mounted in the expected locations.	Equipment installed in the proper location.			
Verify that there is no shipping damage to the racks and any of the equipment.	No shipping damage.			
Verify that a spare equipment card cage is installed at the top of the second rack, as shown on the drawings.	Equipment installed in the proper location.			
Verify that all connectors are physically tight and in their proper locations.	All connectors are tight and in the propoer location.			
Verify that the cabinet contains the proper number of light panels; as shown on the contract plans.	Equipment installed in the proper location and operates properly.			
Verify that the cabinet is supplied with a pullout storage drawer with a non-conductive/non-skid top material.	Equipment installed in the proper location.			
Verify that the cabinet is supplied with a heavy duty plastic envelope.	Equipment installed in the proper location.			
Inspect the controller for damage.	Controller is undamaged.			
Record the controller model and serial numbers.	N/A			
Verify that the controller is a rack-mounted, solid-state, menu-driven, keyboard entry unit.	Equipment conforms to the requirements.			
Verify that the controller conforms to the ATC 5201 v06.25 ATC Standard.	Documentation from manufacturer confirming compliance			
Verify that the controller is supplied with at least three USB 2.0 ports.	Equipment conforms to the requirements.			
Verify that the controller is supplied with at least three 10/100 Base-T RJ-45 ports.	Equipment conforms to the requirements.			
Install controller into its proper mounting position.	N/A			
Verify that the controller is connected to the AI 085-02 FMU via an Ethernet cable.	Equipment is connected.			

Test Procedure	Expected Result	Actual Result	Pass/ Fail	Comments
Verify that an Auxiliary Display Unit (ADU) is installed in the cabinet.	Equipment installed in the proper location.			
Inspect all plug-in modules.	Equipment installed in the proper location.			
Record model and serial numbers for all plug-in modules.	N/A			
Verify that the proper number of each plug-in module is included as called for on the plans and in the specification.	Equipment installed in the proper location.			
A full complement of switch packs (load switches & flashers).	Equipment installed in the proper location.			
A full complement of SIUs.	Equipment installed in the proper location.			
Two (2) additional spare SIUs.	Equipment installed in the proper location.			
A full complement of flash transfer relays.	Equipment installed in the proper location.			
(1) Single Point Video Detector, Rack Mount	Equipment installed in the proper location.			
One (1) 4-channel emergency vehicle phase selector.	Equipment installed in the proper location.			
One (1) 2-channel DC isolator card.	Equipment installed in the proper location.			
Install the necessary switch packs required.	Equipment installed in the proper location.			
Install the necessary SIUs required.	Equipment installed in the proper location.			
Install the CMU with the programmed monitor key.	Equipment installed in the proper location.			
Verify that the CMU is connected to the AI 085-02 FMU via an Ethernet cable.	Equipment is connected.			
Verify that one (1) Datakey programmer and a copy of the associated software have been supplied.	Equipment is supplied.			
Verify that a hard copy of the Datakey programming is provided.	Hard copies are provided.			

Test Procedure	Expected Result	Actual Result	Pass/ Fail	Comments
Verify that a Cyber Intrusion Prevention Device (CIPD) is installed in the cabinet.	The AI 085-02 device serves as the CIPD for this cabinet.			
Verify that all circuit breakers operate properly.	Circuit breakers operate properly.			
Verfiy that the main cabinet circuit breaker is rated at 30 amps.	Equipment is installed.			
Verify that a rack-mounted cabinet power supply is installed.	Equipment is installed.			
Verify that a GFCI outlet is installed on the service panel.	Equipment is installed.			
Verify that a surge arrestor / line filter is installed on the service panel.	Equipment is installed.			
Verify that all electrical equipment over 50 volts is dead front with no open terminals, busbars, breakers, or exposed terminal strips.	Equipment is installed.			
Cabinet shall be in compliance with the latest NFPA 70E requirements.	Documentation from manufacturer confirming compliance			
Verify that the two exhast fans have safety screens installed.	Equipment is installed.			
Verify that removable air filters are supplied and installed on the ventilation intake openings.	Equipment is installed.			
Verify that the police door panel contains the following switches:	Equipment is installed.			
Signals ON/OFF	Equipment is installed.			
AUTO / FLASH	Equipment is installed.			
AUTO / Manual	Equipment is installed.			
Power On/Off	Equipment is installed.			
Manual advance pushbutton (with 6-foot coiled cord) with strain relief	Equipment is installed.			
Verify that the back of police panel contains the following switches:	Equipment is installed.			

Test Procedure	Expected Result	Actual Result	Pass/ Fail	Comments
Controller On/Off	Equipment is installed.			
Flash/Auto	Equipment is installed.			
Signals ON/OFF	Equipment is installed.			
Stop Time Normal/On	Equipment is installed.			
Verify that the cabinet contains a detector switch panel.	Equipment is installed.			
Verify that the cabinet is supplied with a GPS controller time-sync system and the antenna is mounted per the specifications.	The AI 085-02 device serves as the GPS time sync unit for this cabinet.			
Verify that the laminated door stickers have been properly installed and contains:	Equipment is installed.			
Vehicle detection information including detector channel assignment, phase assigned, approach and cabinet termination points	Data included.			
Per approach preemption information including channel, approach/direction and termination points	Data included.			
Field termination chart showing per approach/per phase numbering of all signal circuits	Data included.			
Verify that all in cabinet, High Speed SDLC cables connectors have factory installed protective covers	Protective covers installed			
Verify that all incoming electrical/telecommuncations lines enetering/exiting the cabinet have the proper level of surge suppersion devices installed.	Surge devices installed on all devices.			
Verify that a rack mounted power strip has been installed within the cabinet.	Power strip installed			
Verfiy that the controller is programmed to operate the signal operations as shown on the project design plan.	Data included.			

Test Procedure	Expected Result	Actual Result	Pass/ Fail	Comments
Functional Cabinet Test				
Place all circuit breakers and switches in the cabinet in the OFF position.	N/A			
Connect a cabinet power cord to the utility terminal block on the service assembly panel.	N/A			
Plug the power cord into an appropriate outlet.	N/A			
Turn on circuit breaker #1	Curcuits energize.			
Turn on circuit breaker #2	Curcuits energize.			
Verify operation of cabinet lights and switches.	Lights and switches operate properly.			
Verify operation of all fans and thermostats using a heat gun.	Equipment functions properly.			
Verify that the controller contains the ATC API operational software conforming to ATC 5401 Standard v02	Controller meets the requirement.			
Verify that the controller is configured to operate in an ATCC 5301 v02 platform cabinet.	Controller meets the requirement.			
Verify that the controller is supplied with the appropriate version of the Linux operating system, Board Support Package (BSP) and internal processing levels necessary to support connected vehicle (CV) as well as local and system operations.	Controller meets the requirement.			Verify license has been supplied to support this requirement
Verify that the controller is fully compliant with NTCIP 1201 and 1202 standards.	Controller meets the requirement.			
Verify that the controller meets the functional requirements of the NEMA TS-2, 2016 Standard, including all amendments.	Controller meets the requirement.			
Verify that the controller can be configured to provide a minimum six FYA/FRA flashing pairs.	Controller meets the requirement.			
Verify that the controller contains an internal real-time clock/calendar capable of daily, weekly and yearly events.	Controller meets the requirement.			
Verify that the controller provides the ability to modify the internal database configuration via the local front panel keyboard.	Controller meets the requirement.			

Test Procedure	Expected Result	Actual Result	Pass/ Fail	Comments
Verify that all user changeable user names and passwords have been altered to unique alpha numeric combinations provided by MassDOT.	Passwords have been changed.			
Verify that the controller provides the ability to remotely modify the internal database configuration via a computer connected with an Ethernet cable.	Controller meets the requirement.			
Verify the controller provides the ability to modify the internal database configuration remotely using the central management system application.	Controller meets the requirement.			
Verify the controller is supplied with the ability to collect, store and report various measures of effectiveness (MOE).	Controller meets the requirement.			
Verify the controller collects and records the Purdue high-resolution controller data.	Controller meets the requirement.			
Collect and processes all high resolution data as defined in the report. "Indiana Traffic signal HI resolution data enumerations" dated November 2012	Controller meets the requirement.			
Verify the controller is able to backup and restore programming data via USB memory memory stick.	Controller meets the requirement.			
Verify the controller is able to upgrade the local controller firmware via USB memory stick.	Controller meets the requirement.			
Verify that the signal phase timing and sequence is configured in accordance with the plans.	Programming matches the plans.			
Verify the programming of the cabinet monitor data key using the MonitorKey software and key reader.	Monitor key is programmed correctly.			
Connect the necessary signal display outputs to the test board.	N/A			
Verify that the flashing operation conforms the contract plans.	Flash operation conforms to plans.			
Verify automatic transfer from flashing operation conforms to the MUTCD.	Transfer from flash conforms to the MUTCD.			
Observe the sequence, timings and operations of the controller to verify it is in conformance with the plans.	Sequence, timings and operations conforms to the plans.			
Verify all equipment inputs, outputs, and terminals are identified by the phase designations shown on the plans.	Equipment inputs, outputs, and terminals are identified.			
Verify the operation and location of the following switches in the police door panel:	Switches function properly.			
Signals ON/OFF	On = Field signals are on Off = Field signals are dark			

Test Procedure	Expected Result	Actual Result	Pass/ Fail	Comments
AUTO / FLASH	Auto = Stop & Go operation Flash = Flashing operation			
AUTO / Manual	Auto = Stop & Go operation Manual = Manual Control Enabled			
Power On/Off	On = Cabinet power is on Off = Cabinet power is off			
Manual advance pushbutton. All phases shall be called regardless of vehicle detection and the controller shall be advanced upon pulse from the hand cord circuit, except yellow and red clearance intervals shall be timed for the duration programmed.	Pressing the Manual pushbutton advances the signal to the next phase.			
Verify the operation and location of the following switches on the back of police panel:	Switches function properly.			
Controller On/Off	On = Controller is powered Off = Controller is not powered			
Flash/Auto	Auto = Stop & Go operation Flash = Flashing operation			
Signals ON/OFF	On = Field signals are on Off = Field signals are dark			
Stoptime Normal/On	Normal = Stop & Go operation On = Stop time is active.			
Verify that all detector test switches are assigned to the proper channels.	Test switches call appropriate phases.			
Verify that the detector test switches operate as follows:	Test switches operate correctly.			
In the UP position, a constant call is placed to the assigned phase.	Test switches operate correctly.			
In the CENTER position, No call is placed on the assigned phase.	Test switches operate correctly.			
In the DOWN position, a momentary call is placed to the assigned phase.	Test switches operate correctly.			
Connect laptop to The SPVD Processor "Laptop" Port.	SPVD Processor can be viewed in The SPVD Client via a Laptop.			
Open The SPVD Client Software.	Configured as per the Engineer for IP address information			

Test Procedure	Expected Result	Actual Result	Pass/ Fail	Comments
The SPVD Processor Configuration Settings are Correct	For Bench testing, Verify IP Address, Firmware version and Proper Pasword Configuration.			
Default Controller IP Address _____ New IPAddress: _____	Device set to assigned IP address.			
Default CMU IP Address _____ New IPAddress: _____	Device set to assigned IP address.			
Default FMU IP Address _____ New IPAddress: _____	Device set to assigned IP address.			
Verify that all user changeable user name and passwords have been altered to unique alpha numeric combinations. As called for in the project specification.	All devices have been configured to meet the project security specifications.			
Verify that all remote communications by the CIPD/FMU is via encrypted VPN tunnels, as called for in the project specifications.	All devices have been configured to meet the project security specifications.			
Verify that the CIPD/FMU is configured to provide alarms for physical as well as network access to the ATC and the ATCC as per the project specifications.	All devices have been configured to meet the project security specifications.			
Install FMU into cabinet rack.	Installed as per the drawings.			
Connect FMU power and Input / output cables.	N/A			
Inspect the FMU and verify that it contains two or more outlets that can be controlled remotely.	FMU meets the specifications			
Inspect the FMU and verify this it has an internal battery to power the unit for a minimum of five hours in the event of a power failure.	FMU meets the specifications			
Inspect that the FMU is rack mounted with all connectors on the rear panel and all switches and LED's on the front panel.	FMU meets the specifications			
Inspect that the FMU contain four Ethernet ports on the rear panel.	FMU meets the specifications			
Apply Power to the FMU.	FMU powers up properly			
Verify the status of the Heart Beat LED.	FMU Heart Beat LED operates properly			
Verify the status of the Central LED.	FMU Central LED operates properly			
Record FMU Antenna Signal strength.	N/A			

Test Procedure	Expected Result	Actual Result	Pass/ Fail	Comments
Connect laptop to FMU.	N/A			
Open web browser and navigate to MCOMMS.	N/A			
Verify that the FMU is configured to provide remote ATC front panel access via the MCOMMS software as called for in the project specifications.	FMU is configured as per the specifications.			
Verify that the FMU is configured to allow remote video streaming of the local detection cameras via the MCOMMS software as called for in the specifications.	FMU is configured as per the specifications.			
Verify that the FMU is configured to broadcast CV data (SPAT, BSM, TIM and etc.) to the mobile device application as called for in the project specifications.	FMU is configured as per the specifications.			
Verify that the FMU is configured to record, monitor and display all the ATC/ATCC/CV parameters as called for in the project specifications.	FMU is configured as per the specifications.			
Connect the Ethernet cable from FMU to Controller.	Controller communicating with the FMU via Ethernet			
Connect the Ethernet cable from FMU to CMU.	CMU communicating with the FMU via Ethernet			
Connect the Ethernet cable from FMU to SPVD Processor "Network" Port.	SPVD Processor communicating with the FMU via Ethernet.			
Record Manufactures Identification Numbers:				
Model Number: _____	All supplied equipment information is recorded.			
Serial Number: _____	All supplied equipment information is recorded.			
Intersection ID Number: _____	All supplied equipment information is recorded.			
Record Cellular Antenna Manufacture's model Number: _____	All supplied equipment information is recorded.			
Verify that the CMU functions for any conflicting signal circuit outputs by using a jumper wire to introduce green, yellow and walk conflicts. A conflict chart shall be developed which defines the possible conflict combinations specific to the intersection. This conflict chart shall be used and filled in during the testing process.	Conflicts are correctly programmed.			

Test Procedure	Expected Result	Actual Result	Pass/ Fail	Comments

Contractor performing test Name & Signature: _____

Agency Representive Witness Name & Signature: _____

Project Manager Name & Signature: _____

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DOCUMENT A00820

Massachusetts Department of Transportation
Conditions of Custody

REQUEST FOR RELEASE OF MASSDOT AUTOCAD FILES FORM
(Only to be used following award of contract)

City/Town: SOMERVILLE Project File Number: 608562

Contract Number: 127758

Project Description Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)

All AutoCAD files are provided solely as a courtesy to facilitate public access to information. MassDOT attempts to provide current and accurate information but cannot guarantee so. MassDOT provides such documents, files or other data "as is" without any warranty of any kind, either expressed or implied, including but not limited to, accuracy, reliability, omissions, completeness and currentness. The Commonwealth of Massachusetts and its Consultants shall not be liable for any claim for damages, including lost profits or other consequential, exemplary, incidental, indirect or special damages, relating in any way to the documents, files or other data accessible from this file, including, but not limited to, claims arising out of or related to electronic access or transmission of data or viruses. Because data stored on electronic media can deteriorate undetected or be modified without our knowledge, MassDOT cannot be held liable for its completeness or correctness. MassDOT makes no representation as to the compatibility of these files beyond the version of the stated CAD software.

By signing this form, I agree that it shall be my responsibility to reconcile this electronic data with the conformed contract documents, and that only the conformed contract documents shall be regarded as legal documents for this Project. I understand that this authorization does not give me the right to distribute the files. I agree to the terms above and wish to receive the AutoCAD files.

This signed form shall be emailed to the Highway Design Engineer at the MassDOT -Highway Division at the following email address:

DOTHighwayDesign@dot.state.ma.us
Attn: AutoCAD Files

Name of person requesting AutoCAD files: _____

Affiliation/Company: _____

Address: _____

_____

Telephone number: _____

Email address: _____

Signature/Date: _____

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DOCUMENT A00872

U.S. FISH AND WILDLIFE SERVICE

FHWA, FRA & FTA INDIANA BAT & NORTHERN LONG-EARED BAT PROGRAMMATIC BIOLOGICAL OPINION –

NO EFFECT CONSISTENCY LETTER

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 03/27/2024 15:12:09 UTC
Project code: 2024-0068808
Project Name: 608562 - SOMERVILLE- SIGNAL AND INTERSECTION IMPROVEMENT ON I-93

Subject: Consistency letter for the '608562 - SOMERVILLE- SIGNAL AND INTERSECTION IMPROVEMENT ON I-93' project under the amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion (dated March 23, 2023) for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (NLEB).

To whom it may concern:

The U.S. Fish and Wildlife Service (Service) has received your request dated March 27, 2024 to verify that the **608562 - SOMERVILLE- SIGNAL AND INTERSECTION IMPROVEMENT ON I-93** (Proposed Action) may rely on the amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion Opinion (dated March 23, 2023) for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (PBO) to satisfy requirements under section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 *et seq.*).

Based on the information you provided (Project Description shown below), you have determined that the Proposed Action will have no effect on the endangered Indiana bat (*Myotis sodalis*) or the endangered northern long-eared bat (*Myotis septentrionalis*). If the Proposed Action is not modified, **no consultation is required for these two species.** If the Proposed Action is modified, or new information reveals that it may affect the Indiana bat and/or northern long-eared bat in a manner or to an extent not considered in the PBO, further review to conclude the requirements of ESA section 7(a)(2) may be required.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities:
If your initial bridge/culvert or structure assessment failed to detect Indiana bats and/or NLEBs use or occupancy, yet later detected prior to, or during construction, please submit the Post Assessment Discovery of Bats at Bridge/Culvert or Structure Form (User Guide Appendix E) to this Service Office within 2 working days of the incident. In these instances, potential incidental

take of Indiana bats and/or NLEBs may be exempted provided that the take is reported to the Service.

If the Proposed Action may affect any other federally-listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Office is required. If the proposed action has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency accordingly.

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Candidate
- Tricolored Bat *Perimyotis subflavus* Proposed Endangered

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

608562 - SOMERVILLE- SIGNAL AND INTERSECTION IMPROVEMENT ON I-93

DESCRIPTION

608562 - SOMERVILLE- SIGNAL AND INTERSECTION IMPROVEMENT ON I-93 AT MYSTIC AVENUE AND MCGRATH HIGHWAY (TOP 200 CRASH LOCATION)
The project includes traffic signal upgrade and safety improvements at Mystic Avenue northbound and Route 28 (Fellsway), at Route 38 southbound (Mystic Avenue) and Route 28 (McGrath Avenue) southbound, at Route 38 southbound (Mystic Avenue) and Route 28 (McGrath Avenue) northbound and at Route 38 southbound at Wheatland Street.
Tricolored Bat: Proposed Endangered Species only. At this time, no formal USFWS consultation is required.
Monarch Butterfly: Candidate Species only, no conservation measures at this time.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.39311635,-71.08560544646622,14z

DETERMINATION KEY RESULT

Based on the information you provided, you have determined that the Proposed Action will have no effect on the endangered Indiana bat and/or the endangered northern long-eared bat. Therefore, no consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required for these two species.

QUALIFICATION INTERVIEW

1. Is the project within the range of the Indiana bat[1]?

   [1] See Indiana bat species profile

   Automatically answered
   No

2. Is the project within the range of the northern long-eared bat[1]?

   [1] See northern long-eared bat species profile

   Automatically answered
   Yes

3. [Semantic] Does your proposed action intersect an area where Indiana bats and northern long-eared bats are not likely to occur?

   Automatically answered
   Yes

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING NLEB OR INDIANA BAT

This key was last updated in IPaC on October 30, 2023. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) for the endangered **Indiana bat** (*Myotis sodalis*) and the endangered **northern long-eared bat** (NLEB) (*Myotis septentrionalis*).

This decision key should only be used to verify project applicability with the Service's amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion (dated March 23, 2023) for Transportation Projects. The programmatic biological opinion covers limited transportation activities that may affect either bat species, and addresses situations that are both likely and not likely to adversely affect either bat species. This decision key will assist in identifying the effect of a specific project/activity and applicability of the programmatic consultation. The programmatic biological opinion is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic biological opinion, or that may affect ESA-listed species other than the Indiana bat or NLEB, or any designated critical habitat, may require additional ESA Section 7 consultation.

IPAC USER CONTACT INFORMATION

Agency: Massachusetts Department of Transportation
Name: Hana Isihara
Address: 10 Park Plaza
City: Boston
State: MA
Zip: 02116
Email hana.l.isihara@dot.state.ma.us
Phone: 6178964454

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

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DOCUMENT A00875

POLICY DIRECTIVE P-22-001
AND
POLICY DIRECTIVE P-22-002

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massDOT Massachusetts Department of Transportation Highway Division

Number: P-22-001
Date: 9/23/22

POLICY DIRECTIVE

Jonathan Gulliver (signature on original)
HIGHWAY ADMINISTRATOR

Off-Site Stockpiling of Soil from MassDOT Construction Projects

Purpose

The purpose of this Policy Directive is to formally establish a policy and procedures for managing and stockpiling soil generated and transported from MassDOT construction projects. This Policy Directive does not supersede any Federal, State, or Local regulations.

Date of Effect

This Policy Directive is effective immediately for all projects, including active construction projects.

For active construction projects and for other projects advertised prior to October 15, 2022, changes to the contract documents needed to implement the requirements of this Policy Directive will be considered on a case-by-case basis and shall be approved by the District Highway Director, as necessary.

For projects advertised on or after October 15, 2022, MassDOT will include the requirements and implementation procedures of this Policy Directive in the construction contract documents.

Policy Requirements

This policy is intended to prevent the off-site relocation of excavated soil generated from MassDOT projects to areas near residential receptors and to control potential fugitive dusts and/or contaminants. To that end, excavated soil may not be moved from the project site without knowledge of the content of the material. Knowledge may include visual field observations for presence of staining, odor, and/or debris, screening with a photoionization detector (PID), laboratory analysis, and/or site history. Pavement millings and other non-soil materials are not subject to the requirements of this Policy Directive.

Moving soil from a MassDOT project site to a temporary off-site storage location must be approved in writing by the District Highway Director.

The Contractor must select a storage location that is at least 500 feet away from residential receptors, as defined herein to include, but not be limited to, residential dwellings, residentially

zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities.

Temporary off-site storage of excavated soil from a MassDOT project is only permissible at a location approved and permitted by MassDOT. The temporary storage location should be located within the same municipality where the soil was excavated, where possible. Stockpiled soil must be securely covered, and appropriate measures must be taken to minimize fugitive dust and erosion.

Signs indicating the source of the soil, the date the soil was generated, and contact information must be erected and maintained until the stockpiled soils are transported to a disposal facility or reused on the project site.

Implementation Procedures

To ensure that off-site storage of excavated soils is managed properly on MassDOT projects, this policy requires the following:

1. **Off-Site Stockpile Storage Locations**
    a. The Contractor shall provide proposed off-site storage locations to the Engineer for approval at least 30 days prior to transporting soil off site. Off-site storage locations should be in the same municipality as the work site.
    b. The Contractor shall keep excavated soil on site until adequately characterized to the satisfaction of the Engineer.
    c. The Contractor shall provide notification of the approved off-site storage location to the local Board of Health and the Town Manager's/Mayor's Office at least 7-days prior to transporting soil off site.
    d. The Contractor shall provide the Engineer with at least 3-days' notice prior to transporting soil off site.
    e. For off-site storage locations on MassDOT property, the Contractor is required to obtain an Access Permit through the District Permits Office prior to storage of soil or other materials. MassDOT will issue these permits at no cost to the Contractor. Information to be submitted by the Contractor as part of the permit application shall include:
        i. A description of material to be stored off-site, including available analytical data;
        ii. A figure of the location with distances to residences and residential receptors; and
        iii. Anticipated duration of temporary storage.
    f. Stockpile locations should not be within 500 feet of residential receptors (e.g., residential dwellings, residentially zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities).
        i. If the stockpile location must be within 500 feet of residential receptors, then soil must be less than RCS-1 (per 310 CMR 40.1600) and free of potentially hazardous or regulated items.

g. For off-site storage locations on non-MassDOT property, the Contractor must notify the property owner(s) at least 7 days prior to transporting material.
h. Exceptions to these rules will be reviewed by MassDOT and may be approved by the District Highway Director on a case-by-case basis.

2. Off-Site Stockpile Management

a. The Contractor shall keep soil stockpiles on impermeable surfaces (e.g., asphalt or concrete) or on 10-mil polyethylene sheeting.
b. The Contractor shall cover soil stockpiles with 10-mil polyethylene sheeting and surround with a berm made of hay bales, straw wattles, or similar.
    i. Piles that are actively being worked on must be covered and re-secured at the end of the work shift.
c. The Contractor shall label stockpiles with signs, including:
    i. Location of origin (including any Release Tracking Numbers)
    ii. Stockpile ID number (including MassDOT District office-assigned tracking ID, if different)
    iii. Date of initial accumulation
    iv. Applicable telephone numbers for the Contractor and MassDOT.
d. The Contractor shall mitigate fugitive dust at storage locations under the direction of an appropriately trained/certified environmental professional.
e. The Contractor shall remedy noncompliance with this policy within 48 hours.
f. The Contractor shall remedy noncompliance with this policy on the SAME DAY for potentially hazardous material, as determined by the Engineer.
g. The Contractor shall handle excavated soil according to federal, state, and local regulations.
h. The Contractor shall use appropriate shipping documents for all movements of excavated soil on public roadways (e.g., Bill of Lading, Material Shipping Record, Manifest, Asbestos Waste Shipment Record, etc.).

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massDOT Massachusetts Department of Transportation Highway Division

Number: P-22-002
Date: 9/23/22

POLICY DIRECTIVE

Jonathan Gulliver (signature on original)
HIGHWAY ADMINISTRATOR

Use of MassDOT Property for Staging and other Construction-Related Operations

Purpose

This Policy Directive is intended to address the use of MassDOT property by MassDOT Contractors for construction staging and other construction-related operations that are not specifically defined in the construction contract. Such use of MassDOT property will only be allowed if permitted by the District Office in accordance with 700 CMR 13.00, Approval of Access to MassDOT Highways and Other Property. This includes the use of MassDOT property for staging, laydown, and storage of equipment and materials, including soil excavated from a project site.

This Policy Directive requires the Contractor/applicant to obtain a Non-Vehicular Access Permit from MassDOT to use MassDOT property for these purposes.

This Policy Directive is effective immediately and applies to all MassDOT construction projects.

General Permit Considerations and Conditions

In addition to other normal MassDOT Access Permit procedures, MassDOT shall consider the following during the application, review, implementation and monitoring processes of Access Permits required by this Policy Directive:

- Storage and placement of the Contractor's equipment and materials should not be allowed within the clear zone of the roadway.
- Stockpiled soils should not be located within 500 feet of residential receptors, as defined herein to include, but not be limited to, residential dwellings, residentially zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities.
- The Contractor/applicant shall identify the access/egress locations of the proposed storage areas. MassDOT will only approve locations determined to be safe for roadway users, construction workers and the general public.
- The Contractor may be required to submit a Traffic Management Plan and/or Lighting Plan for MassDOT review and approval as part of the permit application, depending on the proposed use of the area.

- The Contractor shall submit the permit application through MassDOT's online State Highway Access Permit System (SHAPS).
- MassDOT will waive the permit application fee for any application received from a MassDOT Contractor for any permit required by this Policy Directive and will waive any subsequent amendment and extension fees that may otherwise be required.
- MassDOT will review the permit application in accordance with applicable standard procedures and will apply standard permit terms and conditions, as necessary.
- The Resident Engineer will verify that the permit is approved before allowing the Contractor to use the affected area for the requested purpose.
- Areas permitted are for use by the approved applicant only and are not to be shared with or used by other vendors. Subcontractors specifically engaged with the applicant working on the specific MassDOT project will be allowed to use the area in accordance with the terms of the permit.
- Permits are issued on an annual basis and will require the Contractor to file for an extension each year to continue use.

Exemptions from Permit Requirements

Equipment and materials being used for active construction operations and located within the work zone of the construction contract are exempt from this permit requirement, provided they do not interfere with the safety or operation of the roadway or the work zone. Examples of these types of exempt uses are:

- Equipment and materials parked or stored within a protected (barriered) work zone.
- Materials placed in the work zone prior to same-day installation or use.
- Soils excavated temporarily and scheduled to be replaced, such as for trenching operations or for installation of drainage structures.

DOCUMENT B00420

PROPOSAL

SOMERVILLE

For: **Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)**

COMMONWEALTH OF MASSACHUSETTS

LOCATION

The work referred to herein is in the City of **SOMERVILLE** in Middlesex County, in the Commonwealth of Massachusetts, and is shown by the locus map (Document 00331) in the Proposal Pamphlet, the work locations extend as follows:

Broadway

Begin – Sta. 122+91.65 +/-

End – Sta. 424+30.00 +/-

Mystic Avenue (Rt. 38)

Begin – Sta. 300 + 93.00 +/-

End – Sta. 314 + 68.00 +/-

McGrath Highway - Fellsway (Rt. 28)

Begin – Sta. 100 + 50.00 +/-

End – Sta. 601 + 15.00 +/-

Bridge No. S-17-031

The contract prices shall include the furnishing of all materials (except as otherwise herein specified), the performing of all the labor requisite or proper, the providing of all necessary machinery, tools, apparatus and other means of construction, the doing of all the abovementioned work in the manner set forth, described and shown in the specifications and on the drawings for the work, and in the form of contract, and the completion thereof within **1011 CALENDAR DAYS** upon receipt of a Notice to Proceed, except that if the completion date falls between December 1 and March 15 then the same number of days beyond December 1st will be extended after March 15th.

The Work of this project is described by the following Items and quantities.

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massDOT Massachusetts Department of Transportation Highway Division

CMS Contract Management System

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
100.	1	SCHEDULE OF OPERATIONS - FIXED PRICE $55,500 AT Fifty Five Thousand Five Hundred Dollars LUMP SUM	$55,500.00	$55,500.00
102.2	1	TREE TRIMMING AT _____ LUMP SUM		
102.511	11	TREE PROTECTION - ARMORING AND PRUNING AT _____ EACH		
102.522	560	TREE AND PLANT PROTECTION FENCE - CHAIN LINK AT _____ PER FOOT		
103.	1	TREE REMOVED - DIAMETER UNDER 24 INCHES AT _____ EACH		
120.1	3,600	UNCLASSIFIED EXCAVATION AT _____ PER CUBIC YARD		
141.	20	CLASS A TRENCH EXCAVATION AT _____ PER CUBIC YARD		
141.1	230	TEST PIT FOR EXPLORATION AT _____ PER CUBIC YARD		
142.	10	CLASS B TRENCH EXCAVATION AT _____ PER CUBIC YARD		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
145.	5	DRAINAGE STRUCTURE ABANDONED AT _____ EACH		
146.	4	DRAINAGE STRUCTURE REMOVED AT _____ EACH		
151.	3,200	GRAVEL BORROW AT _____ PER CUBIC YARD		
151.01	210	GRAVEL BORROW - TYPE C AT _____ PER CUBIC YARD		
156.	30	CRUSHED STONE AT _____ PER TON		
170.	9,700	FINE GRADING AND COMPACTING - SUBGRADE AREA AT _____ PER SQUARE YARD		
180.01	1	ENVIRONMENTAL HEALTH AND SAFETY PROGRAM AT _____ LUMP SUM		
180.02	16	PERSONAL PROTECTION LEVEL C UPGRADE AT _____ PER HOUR		
180.03	40	LICENSED SITE PROFESSIONAL SERVICES AT _____ PER HOUR		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
181.11	650	DISPOSAL OF UNREGULATED SOIL AT _____ PER TON		
181.12	1,630	DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY AT _____ PER TON		
181.13	650	DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY AT _____ PER TON		
181.14	340	DISPOSAL OF HAZARDOUS WASTE AT _____ PER TON		
182.1	1	INSPECTION AND TESTING FOR ASBESTOS AT _____ LUMP SUM		
182.2	50	REMOVAL OF ASBESTOS AT _____ PER FOOT		
201.	23	CATCH BASIN AT _____ EACH		
204.	8	GUTTER INLET AT _____ EACH		
204.11	3	GUTTER INLET - SPECIAL AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
220.	77	DRAINAGE STRUCTURE ADJUSTED AT _____ EACH		
220.10	6	MWRA WATER STRUCTURE ADJUSTED AT _____ EACH		
220.2	7	DRAINAGE STRUCTURE REBUILT AT _____ PER FOOT		
220.3	9	DRAINAGE STRUCTURE CHANGE IN TYPE AT _____ EACH		
220.5	1	DRAINAGE STRUCTURE REMODELED AT _____ EACH		
220.7	26	SANITARY STRUCTURE ADJUSTED AT _____ EACH		
221.	33	FRAME AND COVER AT _____ EACH		
222.1	58	FRAME AND GRATE - MASSDOT CASCADE TYPE AT _____ EACH		
222.31	2	GALVANIZED STEEL CURB COVER AND FRAME AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
223.2	72	FRAME AND GRATE (OR COVER) REMOVED AND DISCARDED AT _____ EACH		
224.10	2	10 INCH HOOD AT _____ EACH		
224.12	15	12 INCH HOOD AT _____ EACH		
227.3	50	REMOVAL OF DRAINAGE STRUCTURE SEDIMENT AT _____ PER CUBIC YARD		
227.31	230	REMOVAL OF DRAINAGE PIPE SEDIMENT AT _____ PER FOOT		
227.4	15	MASONRY PLUG AT _____ PER SQUARE FOOT		
238.10	120	10 INCH DUCTILE IRON PIPE AT _____ PER FOOT		
238.12	10	12 INCH DUCTILE IRON PIPE AT _____ PER FOOT		
244.12	300	12 INCH REINFORCED CONCRETE PIPE CLASS V AT _____ PER FOOT		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
252.10	10	10 INCH CORRUGATED PLASTIC PIPE AT _____ PER FOOT		
252.12	10	12 INCH CORRUGATED PLASTIC PIPE AT _____ PER FOOT		
303.06	30	6 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT) AT _____ PER FOOT		
309.	60	DUCTILE IRON FITTINGS FOR WATER PIPE AT _____ PER POUND		
357.06	1	6 INCH GATE BOX AT _____ EACH		
357.08	1	8 INCH GATE BOX AT _____ EACH		
357.10	1	10 INCH GATE BOX AT _____ EACH		
357.12	1	12 INCH GATE BOX AT _____ EACH		
357.16	1	16 INCH GATE BOX AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
358.	26	GATE BOX ADJUSTED AT _____ EACH		
370.2	1	10 X 6 INCH TAPPING SLEEVE, VALVE AND BOX AT _____ EACH		
376.2	2	HYDRANT - REMOVED AND RESET AT _____ EACH		
381.	5	SERVICE BOX AT _____ EACH		
381.3	5	SERVICE BOX ADJUSTED AT _____ EACH		
415.1	28,000	PAVEMENT STANDARD MILLING AT _____ PER SQUARE YARD		
431.	900	HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE AT _____ PER SQUARE YARD		
440.	30,000	CALCIUM CHLORIDE FOR ROADWAY DUST CONTROL AT _____ PER POUND		
443.	2	WATER FOR ROADWAY DUST CONTROL AT _____ PER 1000 GALLONS		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
450.231	2,900	SUPERPAVE SURFACE COURSE - 12.5 POLYMER (SSC - 12.5 - P) AT _____ PER TON		
450.311	3,100	SUPERPAVE INTERMEDIATE COURSE - 12.5 POLYMER (SIC -12.5 - P) AT _____ PER TON		
450.42	40	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5) AT _____ PER TON		
450.52	330	SUPERPAVE LEVELING COURSE - 9.5 (SLC - 9.5) AT _____ PER TON		
451.	300	HMA FOR PATCHING AT _____ PER TON		
452.	4,700	ASPHALT EMULSION FOR TACK COAT AT _____ PER GALLON		
453.	23,000	HMA JOINT ADHESIVE AT _____ PER FOOT		
472.	140	TEMPORARY ASPHALT PATCHING AT _____ PER TON		
480.1	990	PAVEMENT CRACK SEALING - CRACK SEALER AT _____ PER GALLON		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
482.5	920	SAWCUTTING ASPHALT PAVEMENT FOR BOX WIDENING AT _____ PER FOOT		
506.	1,510	GRANITE CURB TYPE VB - STRAIGHT AT _____ PER FOOT		
506.1	430	GRANITE CURB TYPE VB - CURVED AT _____ PER FOOT		
509.	570	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - STRAIGHT AT _____ PER FOOT		
509.1	110	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - CURVED AT _____ PER FOOT		
514.	22	GRANITE CURB INLET - STRAIGHT AT _____ EACH		
515.	2	GRANITE CURB INLET - CURVED AT _____ EACH		
516.	5	GRANITE CURB CORNER TYPE A AT _____ EACH		
517.02	2	GRANITE CURB BULLNOSE END AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
580.	3,460	CURB REMOVED AND RESET AT _____ PER FOOT		
582.	8	CURB CORNER REMOVED AND RESET AT _____ EACH		
594.	1,550	CURB REMOVED AND DISCARDED AT _____ PER FOOT		
596.	8	CURB CORNER REMOVED AND DISCARDED AT _____ EACH		
597.	860	EDGING REMOVED AND DISCARDED AT _____ PER FOOT		
627.1	2	TRAILING ANCHORAGE AT _____ EACH		
628.21	2	TRANSITION TO NCHRP 350 GUARDRAIL AT _____ EACH		
628.23	1	TRANSITION TO RIGID BARRIER (DOUBLE FACED) AT _____ EACH		
628.302	1	PERMANENT IMPACT ATTENUATOR, NON-REDIRECTIVE, TL-2 AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
630.2	1,300	HIGHWAY GUARD REMOVED AND DISCARDED AT _____ PER FOOT		
644.048	700	48 INCH CHAIN LINK FENCE (SPRING TENSION WIRE) (LINE POST OPTION) AT _____ PER FOOT		
652.048	9	48 INCH CHAIN LINK FENCE END POST AT _____ EACH		
653.048	9	48 INCH CHAIN LINK FENCE CORNER OR INTERMEDIATE BRACE POST AT _____ EACH		
670.	340	FENCE REMOVED AND RESET AT _____ PER FOOT		
670.1	580	FENCE REMOVED AND DISCARED AT _____ PER FOOT		
672.	1	FENCE GATE AND GATE POSTS REMOVED AND RESET AT _____ EACH		
693.	76	QUARRY FACED GRANITE WALL AT _____ PER FOOT		
697.1	90	SILT SACK AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
701.	2,300	CEMENT CONCRETE SIDEWALK AT _____ PER SQUARE YARD		
701.1	270	CEMENT CONCRETE SIDEWALK AT DRIVEWAYS AT _____ PER SQUARE YARD		
701.2	1,050	CEMENT CONCRETE PEDESTRIAN CURB RAMP AT _____ PER SQUARE YARD		
701.3	1,700	TRAPEZOIDAL DELINEATOR AT _____ PER FOOT		
701.4	1,000	STAMPED CEMENT CONCRETE AT _____ PER SQUARE YARD		
702.	970	HOT MIX ASPHALT SIDEWALK OR DRIVEWAY AT _____ PER TON		
710.3	5	BOUND - LETTERED GRANITE AT _____ EACH		
740.	33	ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) AT _____ PER MONTH		
748.	1	MOBILIZATION AT _____ LUMP SUM		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
751.	380	LOAM FOR ROADSIDES AT _____ PER CUBIC YARD		
751.1	320	LOAM FOR LAWNS AT _____ PER CUBIC YARD		
765.	5,000	SEEDING AT _____ PER SQUARE YARD		
765.412	50	SHORT GRASSLAND MIX-SANDY SOIL AT _____ PER POUND		
767.6	20	AGED PINE BARK MULCH AT _____ PER CUBIC YARD		
769.	220	PAVEMENT MILLING MULCH UNDER GUARD RAIL AT _____ PER FOOT		
775.140	6	LINDEN - AMERICAN 2-2.5 INCH CALIPER AT _____ EACH		
776.524	6	MAPLE - RED - ARMSTRONG 2-2.5 INCH CALIPER AT _____ EACH		
777.039	5	OAK - NORTHERN RED 2-2.5 INCH CALIPER AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
777.351	4	OAK – ENGLISH COLUMNAR 2.5 INCH CALIPER AT _____ EACH		
777.677	3	SWEETGUM – SLENDER SILHOUETTE 2.5 INCH CALIPER AT _____ EACH		
777.829	3	BIRCH – HERITAGE CLUMP 2.5 INCH CALIPER AT _____ EACH		
778.161	3	SASSAFRAS 2.5 INCH CALIPER AT _____ EACH		
783.467	3	TUPELO 2-2.5 INCH CALIPER AT _____ EACH		
790.635	14	DOGWOOD - REDOSIER ARTIC FIRE 2 – 3 FEET HT AT _____ EACH		
804.2	540	2 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC (UL) AT _____ PER FOOT		
804.3	3,000	3 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC -(UL) AT _____ PER FOOT		
811.22	20	ELECTRIC HANDHOLE - SD2.022 AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
811.30	3	PULL BOX 8 X 23 INCHES - SD2.030 AT _____ EACH		
811.31	25	PULL BOX 12 X 12 INCHES - SD2.031 AT _____ EACH		
811.36	29	ELECTRIC MANHOLE ADJUSTED AT _____ EACH		
811.37	41	ELECTRIC HANDHOLE ADJUSTED AT _____ EACH		
812.09	4	LIGHT STANDARD FOUNDATION PRECAST AT _____ EACH		
813.792	1	COMMUNICATION CABLE SYSTEM - FIBER OPTIC CABLE AT _____ LUMP SUM		
814.	1	ADAPTIVE TRAFFIC SIGNAL SYSTEM AT _____ LUMP SUM		
816.01	1	TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 1 AT _____ LUMP SUM		
816.02	1	TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 2 AT _____ LUMP SUM		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
816.03	1	TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 3 AT _____ LUMP SUM		
816.04	1	TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 4 AT _____ LUMP SUM		
816.05	1	TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 5 AT _____ LUMP SUM		
816.06	1	TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 6 AT _____ LUMP SUM		
816.07	1	TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 7 AT _____ LUMP SUM		
823.70	4	HIGHWAY LIGHTING POLE AND LUMINAIRE REMOVED AND RESET AT _____ EACH		
823.701	8	HIGHWAY LIGHTING POLE AND LUMINAIRE REMOVED AND RESET (UN-METERED) AT _____ EACH		
823.702	10	UNDERGROUND DISCONNECT AND RECONNECT AT _____ EACH		
828.2	1	GROUND MOUNTED SIGN (GF-1) REMOVED AND RESET AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
829.07	100	ROADSIDE GUIDE SIGN (MA-D1-7) - ALUM. PANEL (TYPE B) AT _____ PER SQUARE FOOT		
832.	850	WARNING-REGULATORY AND ROUTE MARKER - ALUMINUM PANEL (TYPE A) AT _____ PER SQUARE FOOT		
844.201	2	SUPPORTS FOR GUIDE SIGN (MA-D1-7A) STEEL AT _____ EACH		
844.202	2	SUPPORTS FOR GUIDE SIGN (MA-D1-7B) STEEL AT _____ EACH		
847.1	95	SIGN SUP (N/GUIDE)+RTE MKR W/1 BRKWAY POST ASSEMBLY - STEEL AT _____ EACH		
848.1	5	SIGN SUP (N/GUIDE)+RTE MKR W/2 BRKWAY POST ASSEMBLIES-STEEL AT _____ EACH		
852.	2,000	SAFETY SIGNING FOR TRAFFIC MANAGEMENT AT _____ PER SQUARE FOOT		
852.11	200	TEMPORARY PEDESTRIAN BARRICADE AT _____ PER FOOT		
852.12	2	TEMPORARY PEDESTRIAN CURB RAMP AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
853.1	7	PORTABLE BREAKAWAY BARRICADE TYPE III AT _____ EACH		
853.8	100	TEMPORARY ILLUMINATION FOR WORK ZONE AT _____ PER DAY		
854.016	10,900	TEMPORARY PAVING MARKINGS - 6 INCH (PAINTED) AT _____ PER FOOT		
854.036	10,900	TEMPORARY PAVING MARKINGS - 6 INCH (TAPE) AT _____ PER FOOT		
856.	2,100	ARROW BOARD AT _____ PER DAY		
856.12	200	PORTABLE CHANGEABLE MESSAGE SIGN AT _____ PER DAY		
859.	43,500	REFLECTORIZED DRUM AT _____ PER DAY		
859.1	1,420	REFLECTORIZED DRUMS WITH SEQUENTIAL FLASHING WARNING LIGHTS AT _____ PER DAY		
864.031	10	PAVEMENT LEGENDS REFL. WHITE THERMOPLASTIC (PREFORMED) - BIKE LANE RIDER AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
864.032	10	PAVEMENT LEGENDS REFL. WHITE THERMOPLASTIC (PREFORMED) - BIKE LANE ARROW AT _____ EACH		
864.036	9	PAVEMENT LEGENDS REFL. WHITE THERMOPLASTIC (PREFORMED) - YIELD AT _____ EACH		
864.037	3	PAVEMENT LEGENDS REFL. WHITE THERMOPLASTIC (PREFORMED) - SPEED HUMP AT _____ EACH		
864.04	3,300	PAVEMENT ARROWS AND LEGENDS REFLECTORIZED WHITE (THERMOPLASTIC) AT _____ PER SQUARE FOOT		
864.110	2	PAVEMENT LEGEND REFL. WHITE THERMOPLASTIC (PREFORMED) – ROUTE SHIELD LEGEND AT _____ EACH		
864.111	2	PAVEMENT LEGEND REFL. WHITE THERMOPLASTIC (PREFORMED) – CARDINAL DIRECTION TEXT AT _____ EACH		
864.112	22	PAVEMENT LEGEND REFL. WHITE THERMOPLASTIC (PREFORMED) – BUS BIKE ONLY LEGENDS AT _____ EACH		
864.114	2	PAVEMENT LEGEND REFL. WHITE THERMOPLASTIC (PREFORMED) – PED LEGEND AT _____ EACH		
864.115	2	PAVEMENT LEGEND REFL. WHITE THERMOPLASTIC (PREFORMED) – XING LEGEND AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
864.116	1	PAVEMENT LEGEND REFL. WHITE THERMOPLASTIC (PREFORMED) – BIKE BOX LEFT ARROW AT _____ EACH		
864.117	1	PAVEMENT LEGEND REFL. WHITE THERMOPLASTIC (PREFORMED) – BIKE BOX BICYCLE RIDER AT _____ EACH		
864.41	1,200	GREEN COLORIZED PAVEMENT MARKINGS AT _____ PER SQUARE FOOT		
864.51	4,700	RED COLORIZED PAVEMENT MARKINGS AT _____ PER SQUARE FOOT		
868.106	11,000	6 INCH WET REFLECTIVE RECESSED WHITE LINE (THERMOPLASTIC) AT _____ PER FOOT		
868.112	9,000	12 INCH WET REFLECTIVE RECESSED WHITE LINE (THERMOPLASTIC) AT _____ PER FOOT		
869.106	8,300	6 INCH WET REFLECTIVE RECESSED YELLOW LINE (THERMOPLASTIC) AT _____ PER FOOT		
869.112	425	12 INCH WET REFLECTIVE RECESSED YELLOW LINE (THERMOPLASTIC) AT _____ PER FOOT		
874.	14	STREET NAME SIGN AT _____ EACH		

Project # 608562	Contract # 127758			
Location : SOMERVILLE				
Description : Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
874.2	5	TRAFFIC SIGN REMOVED AND RESET AT _____ EACH		
874.4	120	TRAFFIC SIGN REMOVED AND STACKED AT _____ EACH		
901.3	2	4000 PSI, 1.5 INCH, 565 CEMENT CONCRETE FOR POST FOUNDATION AT _____ PER CUBIC YARD		
903.	2	3000 PSI, 1.5 INCH, 470 CEMENT CONCRETE AT _____ PER CUBIC YARD		
Total Qty:	256,727			

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DOCUMENT B00853

SCHEDULE OF PARTICIPATION BY DISADVANTAGED BUSINESS ENTERPRISES (DBES)

PRIME BIDDER: _____

DATE OF BID OPENING: _____ PROJECT NO.: 608562

FEDERAL AID PROJECT NO. HSI/HSI(VUS)-003S(762)

PROJECT LOCATION: SOMERVILLE

Name, Address, and Phone Number(s) of DBE	Name of Activity	(a)† DBE Contractor Activity Amount *Construction Work*	(b) DBE Other Business Amount *Services, Supplies, Material*	(c) Total amount eligible for credit under rules in Section 6 of Document 00719 - DBE Special Provisions
Total Bid Amount	TOTALS:	$	$	$
$	DBE Percentage of Total Bid:	%	%	%

†*Column (a) must be at least one-half of the DBE participation goal. Attach additional sheets as necessary.*

Is MassDOT Document B00855 (Joint Check Approval) being submitted for any of the above? ☐ Yes ☐ No ☐ Not Known at This Time

Will any of the contractors listed above be using a third party (i.e. manufacturer) to deliver materials or perform any portion of work by a third party? ☐ Yes ☐ No

CERTIFICATION: I HEREBY DECLARE, TO THE BEST OF MY KNOWLEDGE, THAT **I HAVE READ THE SPECIAL PROVISIONS FOR PARTICIPATION BY DISADVANTAGED BUSINESS ENTERPRISES - DOCUMENT 00719.** BOTH THIS SCHEDULE AND THE RELEVANT AND ACCOMPANYING LETTER(S) OF INTENT ARE IN FULL COMPLIANCE WITH THE PROVISIONS OF, AND IN ACCORDANCE WITH, TITLE 49 CODE OF FEDERAL REGULATIONS, PART 26 (49 CFR Part 26).

SIGNATURE:_____ DATE_____

NAME AND TITLE (*PRINT*):_____

EMAIL ADDRESS: _____TEL NO.:_____

*** END OF DOCUMENT ***

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DOCUMENT B00854

DISADVANTAGED BUSINESS ENTERPRISES (DBE) PARTICIPATION LETTER OF INTENT

(To be completed by the DBE – Page 1 of 2)

TO: _____ (Prime Bidder)

FROM: _____ (DBE Firm)

RE: PROJECT NO.: 608562 FEDERAL AID PROJECT NO.: HSI/HSI(VUS)-003S(762)

PROJECT LOCATION: SOMERVILLE

DATE OF BID OPENING: _____

I, _____, authorized signatory of the above-referenced DBE firm hereby declare:
Print Name

1. My company is currently certified as a Disadvantaged Business Enterprise (DBE) by the Massachusetts Supplier Diversity Office ("SDO"), formerly known as the State Office of Minority and Women Business Assistance (SOMWBA), as a: (check all applicable, see Section 1 of the Special Provisions For Participation By Disadvantaged Business Enterprises, MassDOT Document 00719 additional guidance is available at Title 49, Code of Federal Regulations, Part 26.55 (49 CFR Part 26.55)):

   ( ) CONTRACTOR ( ) REGULAR DEALER ( ) BROKER
   ( ) MANUFACTURER ( ) TRUCKING OPERATIONS ( ) PROFESSIONAL SERVICES

2. My firm has the ability to manage, supervise and perform the activity described on page 2 of this Letter of Intent. If you are awarded the contract, my company intends to enter into a contract with your firm to perform the items of work or other activity described on the following sheet for the prices indicated.

3. There have been no changes affecting the ownership, control or independence of my company since my last certification review on _____ ___, 20___. If any such change is planned or occurs prior to my company's completion of this proposed work, I will give prior written notification to your firm and to the Massachusetts Department of Transportation ("MassDOT") Office of Civil Rights and SDO.

4. I have read the MassDOT proposal for the Project which may be entitled "Project Contract Documents and Special Provisions" or the draft "Contract" which includes MassDOT Document 00719, and acknowledge that my company will comply with that document and the requirements of 49 CFR Part 26.

5. For the purpose of obtaining subcontractor approval from MassDOT, my firm will provide to you:

   A. ***The following construction work:***
      (i) a resume, stating the qualifications and experience, of the superintendent or foreperson who will supervise on site-work;
      (ii) a list of equipment owned or leased by my firm for use on this project; and
      (iii) a list of all projects (public or private) upon which my firm is currently performing, is committed to perform, or intends to make a commitment to perform. I shall also include, for each project: the name and telephone number of a contact person for the contracting authority, person, or organization; the dollar value of the work; a description of the work; and my firm's work schedule for the project.

   B. ***The following services, materials or supplies***:
      (i) a written agreement and invoices for the materials or supplies, and any other documents evidencing the terms of providing such items;
      (ii) information concerning brokers fees and commissions for providing services or materials; and
      (iii) a statement concerning whether my firm intends or will be required to use a joint check arrangement; and any other documents that may be required by MassDOT.

_____ Date_____
DBE Company Authorized Signature

DISADVANTAGED BUSINESS ENTERPRISES (DBE) PARTICIPATION
LETTER OF INTENT
(To be completed by the DBE – Page 2 of 2)

DATE OF BID OPENING: _____

PROJECT NUMBER: 608562

FEDERAL AID PROJECT NUMBER: HSI/HSI(VUS)-003S(762)

PROJECT LOCATION: SOMERVILLE

PRIME BIDDER: _____

DBE COMPANY NAME: _____

Item number if applicable	NAICS Code	Description of Activity with notations such as Services, or Brokerage, Installation Only, Material Only, or Complete	Quantity	Unit Price	Amount
			TOTAL AMOUNT:		

Please give full explanations, attach additional sheets if necessary.

I HEREBY VERIFY THAT _____ WILL SOLELY
(DBE company name)
PERFORM THE WORK, OR PROVIDE THE SERVICES OR MATERIALS, AS DESCRIBED ABOVE.

DBE AUTHORIZED SIGNATURE: _____

NAME AND TITLE (PRINT):_____

TELEPHONE NUMBER: _____FAX NUMBER: _____

EMAIL ADDRESS: _____

Rev'd 9/20/19

*** END OF DOCUMENT ***

DOCUMENT B00855

DBE JOINT CHECK ARRANGEMENT APPROVAL FORM

(to be submitted by Prime Contractor)

Contract No: 127758 **Project No.** 608562 **Federal Aid No.:** HSI/HSI(VUS)-003S(762)

Location: SOMERVILLE **Bid Opening Date:** _____

Project Description: Signal and Intersection Improvement on I-93 at Mystic Avenue and McGrath Highway (Top 200 Crash Location)

We have received the attached request for the use of a joint check arrangement from _____ _____ , a DBE on the above- referenced Contract and _____ _____, a Material Supplier/Vendor for the subject Contract. The DBE has complied with the requirements of 49 CFR Part 26.55(c)(1). In particular, the DBE has:

- a written agreement with the material supplier/vendor;
- applied for credit with the subject material supplier and has supplied the vendor's response;
- shown that it will place all orders to the subject material supplier/vendor;
- made and retains all decision-making responsibilities concerning the materials; and
- provided a Joint Check Agreement that is acceptable to MassDOT;

As the Contractor for the Project, we agree to issue joint checks (made payable to the Material Supplier/Vendor and the DBE) for payment of sums due pursuant to invoices from the Supplier/Vendor and DBE.

Contractor:

_____ _____
Company Name Signature
Duly Authorized

_____
Printed Name

_____ _____
Date Title

SubContractor:

_____ _____
Company Name Signature –
Duly Authorized

_____
Printed Name

_____ _____
Date Title

*** END OF DOCUMENT ***

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DOCUMENT B00856

JOINT VENTURE AFFIDAVIT

(All Firms)

- All Information Requested By This Schedule Must Be Answered. Additional Sheets May Be Attached.
- If, there is any change in the information submitted, the Joint Venture parties must inform MassDOT Pre-Qualifications Office (and, if one of the companies is a DBE, the Director of Contract Compliance, Office of Civil Rights) *prior* to such change, in writing, either directly or through the Prime Contractor if the Joint Venture is a subcontractor.
- If the Joint Venture Entity will be the bidder on a prime Contract, it must bid and submit all required documents (insurance, worker's compensation, bonds, etc.) in the name of the Joint Venture Entity.

I. Name of Joint Venture: _____

Type of Entity if applicable (Corp., LLC):_____Filing State _____

Address of joint venture: _____

_____

Phone No(s) for JV Entity: _____E-mail:_____

Contact Person(s)_____

Tax ID/EIN of Joint Venture: _____Vendor Code:_____

II. Identify each firm or party to the Joint Venture:

Name of Firm: _____

Address: _____

Phone : _____E-mail:_____

Contact person(s) _____

Name of Firm: _____

Address: _____

Phone: _____E-mail:_____

Contact Person(s)_____

III. Describe the role(s) of the each party to the Joint Venture:

_____

_____

IV. Attach a copy of the Joint Venture Agreement. The proposed Joint Venture Agreement should include specific details including, but not limited to: (1) the contributions of capital and equipment; (2) work items to be performed by each company's forces, (3) work items to be performed under the supervision of any DBE Venturer; (4) the commitment of management, supervisory and operative personnel employed by the DBE to be dedicated to the performance of the Project; and (5) warranty, guaranty, and indemnification clauses.

V. Attach any applicable Corporate or LLC Votes, Authorizations, etc.

VI. Ownership of the Joint Venture:

A. What is the percentage(s) of each company's ownership in the Joint Venture?

ownership percentage(s): _____

ownership percentage(s): _____

B. Specify percentages for each of the following (provide narrative descriptions and other detail as applicable):

1. Sharing of profit and loss: _____
2. Capital contributions:

(a) Dollar amounts of initial contribution: _____

(b) Dollar amounts of anticipated on-going contributions: _____

(c) Contributions of equipment (specify types, quality and quantities of equipment to be provided by each firm): _____

_____

4. Other applicable ownership interests, including ownership options or other agreements, which restrict or limit ownership and/or control:

_____

_____

5. Provide copies of all other written agreements between firms concerning bidding and operation of this Project or projects or contracts.

6. Identify all current contracts and contracts completed during the past two (2) years by either of the Joint Venture partners to this Joint Venture:

_____

_____

VII. Control of and Participation in the Joint Venture. Identify by name and firm those individuals who are, or will be, responsible for and have the authority to engage in the following management functions and policy decisions. (Indicate any limitations to their authority such as dollar limits and co-signatory requirements.):

A. Joint Venture check signing:

_____

_____

B. Authority to enter Contracts on behalf of the Joint Venture:

_____

_____

C. Signing, co-signing and/or collateralizing loans:

_____

_____

D. Acquisition of lines of credit:

_____

_____

E. Acquisition and indemnification of payment and performance bonds:

_____

_____

F. Negotiating and signing labor agreements:

_____

_____

G. Management of contract performance. *(Identify by name and firm only)*:

1. Supervision of field operations: _____
2. Major purchases: _____
3. Estimating: _____
4. Engineering: _____

VIII. Financial Controls of Joint Venture:

A. Which firm and/or individual will be responsible for keeping the books of account?

_____

_____

B. Identify the "Managing Partner," if any, and describe the means and measure of their compensation:

_____

_____

C. What authority does each firm have to commit or obligate the other to insurance and bonding companies, financing institutions, suppliers, subcontractors, and/or other parties participating in the performance of this Contract or the work of this Project?

_____

IX. Personnel of Joint Venture: State the approximate number of personnel (by trade) needed to perform the Joint Venture's work under this Contract. Indicate whether they will be employees of the majority firm, DBE firm, or the Joint Venture.

	Firm 1 (number)	Firm 2 (number)	Joint Venture (number)
Trade			
Professional			
Administrative/Clerical			
Unskilled Labor			

Will any personnel proposed for this Project be employees of the Joint Venture?: _____

If so, who: _____

A. Are any proposed Joint Venture employees currently employed by either firm?

Employed by Firm 1: _____ Employed by firm 2 _____

B. Identify by name and firm the individual who will be responsible for Joint Venture hiring: ____

_____

X. Additional Information. Please state any material facts and additional information pertinent to the control and structure of this Joint Venture.

_____

_____

XI. AFFIDAVIT OF JOINT VENTURE PARTIES. The undersigned affirm that the foregoing statements and attached documents are correct and include all material information necessary to identify and explain the terms and operations of our Joint Venture and the intended participation of each firm in the undertaking. Further, the undersigned covenant and agree to provide to MassDOT current, complete and accurate information regarding actual Joint Venture work, payments, and any proposed changes to any provisions of the Joint Venture, or the nature, character of each party to the Joint Venture. We understand that any material misrepresentation will be grounds for terminating any Contract awarded and for initiating action under Federal or State laws concerning false statements.

Firm 1	Firm 2
Signature Duly Authorized	Signature Duly Authorized
Printed Name and Title	Printed Name and Title
Date	Date

*** END OF DOCUMENT ***