

COMMONWEALTH OF MASSACHUSETTS



**CONTRACT DOCUMENTS
AND SPECIAL PROVISIONS**

PROPOSAL NO.	610869-128933
P.V. =	\$2,290,000.00
PLANS	YES

FOR

**Pedestrian/Bike Bridge Superstructure Replacement, N-03-007,
Spring Street over the MBTA**

in the Town of

NATICK

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

This Proposal to be opened and read:

WEDNESDAY, JANUARY 22, 2025 at 2:00 P.M.

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DOCUMENT 00010

TABLE OF CONTENTS

DOCUMENT 00010
 TABLE OF CONTENTS 00010-1 through 2

DOCUMENT 00102
 NOTICE TO CONTRACTORS 00102- 1 through 2

DOCUMENT 00210
 REQUIREMENTS OF MASSACHUSETTS GENERAL
 LAWS CHAPTER 30 SECTION 39R; CHAPTER 30, SECTION 39O 00210-1 through 4

DOCUMENT 00331
 LOCUS MAP 00331-1 through 2

DOCUMENT 00439
 CONTRACTOR PROJECT EVALUATION FORM 00439-1 through 2

DOCUMENT 00440
 SUBCONTRACTOR PROJECT EVALUATION FORM 00440-1 through 2

DOCUMENT 00710
 GENERAL CONTRACT PROVISIONS..... 00710-1 through 2

DOCUMENT 00713
 SUBSECTION 701
 CEMENT CONCRETE SIDEWALKS, PEDESTRIAN CURB RAMPS, AND DRIVEWAYS
 AND GUIDE TO THE INTERIM SUBSECTION 701
 CEMENT CONCRETE SIDEWALK SPECIFICATION..... 00713-1 through 34

DOCUMENT 00715
 SUPPLEMENTAL SPECIFICATIONS 00715-1 through 24

DOCUMENT 00718
 SPECIAL PROVISION FOR PARTICIPATION BY MINORITY OR WOMEN'S
 BUSINESS ENTERPRISES AND SERVICE- DISABLED VETERAN- OWNED
 BUSINESS ENTERPRISES 00718-1 through 10

DOCUMENT 00761
 SPECIAL PROVISIONS FOR CERTIFICATION REGARDING DEBARMENT,
 SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION 00761-1 through 4

DOCUMENT 00811
 MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT
 (HMA) MIXTURES..... 00811-1 through 2

DOCUMENT 00812
 MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE 00812-1 through 2

DOCUMENT 00813
 PRICE ADJUSTMENT FOR STRUCTURAL STEEL
 AND REINFORCING STEEL 00813-1 through 4

DOCUMENT 00814
 PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES 00814-1 through 2

DOCUMENT 00820
 THE COMMONWEALTH OF MASSACHUSETTS
 SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY,
 NON-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM 00820-1 through 6

DOCUMENT 00821
 ELECTRONIC REPORTING REQUIREMENTS
 CIVIL RIGHTS PROGRAM AND CERTIFIED PAYROLL 00821-1 through 2

DOCUMENT 00859
 CONTRACTOR/SUBCONTRACTOR CERTIFICATION FORM 00859-1 through 2

TABLE OF CONTENTS (Continued)

DOCUMENT 00860
COMMONWEALTH OF MASSACHUSETTS PUBLIC EMPLOYMENT LAWS 00860-1 through 2

DOCUMENT 00861
STATE PREVAILING WAGE RATES 00861-1 through 46

DOCUMENT A00801
SPECIAL PROVISIONS A00801-1 through 164

DOCUMENT A00802
DETAIL SHEETS A00802-1 through 6

DOCUMENT A00808
PROJECT UTILITY COORDINATION FORM..... A00808-1 through 6

DOCUMENT A00809
WATERING LOG FOR MASSDOT PLANTINGS..... A00809-1 through 2

DOCUMENT A00810
MASSDOT HERBICIDE USE REPORT A00810-1 through 2

DOCUMENT A00811
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RAILROAD OPERATIONS DIRECTORATE A00811-1 through 134

DOCUMENT A00812
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
FLAGGING REQUEST FORM A00812-1 through 4

DOCUMENT A00813
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
SPECIAL INSTRUCTIONS AND CONSTRUCTION SAFETY A00813-1 through 28

DOCUMENT A00814
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
PTC INFRASTRUCTURE CHANGE REQUIREMENTS A00814-1 through 64

DOCUMENT A00815
WORK ZONE SAFETY
TEMPORARY TRAFFIC CONTROL A00815-1 through 86

DOCUMENT A00820
REQUEST FOR RELEASE OF MASSDOT AUTOCAD FILES FORM..... A00820-1 through 2

DOCUMENT A00875
POLICY DIRECTIVE P-22-001 AND POLICY DIRECTIVE P-22-002 A00875-1 through 8

DOCUMENT B00420
PROPOSAL.....B00420-1 through 16

DOCUMENT B00842
SCHEDULE OF PARTICIPATION BY MINORITY OR WOMEN BUSINESS
ENTERPRISE (M/WBE)B00842-1 through 2

DOCUMENT B00843
MINORITY OR WOMENS BUSINESS ENTERPRISE PARTICIPATION
LETTER OF INTENT.....B00843-1 through 2

DOCUMENT B00846
M/WBE OR SDVOBE JOINT CHECK ARRANGEMENT APPROVAL FORM.....B00846-1 through 2

DOCUMENT B00847
JOINT VENTURE AFFIDAVITB00847-1 through 4

*** END OF DOCUMENT ***

DOCUMENT 00102

**NOTICE TO CONTRACTORS**

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

WEDNESDAY, JANUARY 22, 2025 at 2:00 P.M. **

NATICK

**Pedestrian/Bike Bridge Superstructure Replacement, N-03-007,
Spring Street over the MBTA**

****Date Subject to Change**

PROJECT VALUE = \$2,290,000.00

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

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

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

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

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

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

NOTICE TO CONTRACTORS (Continued)

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

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

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

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 \$560.00 per ton, Portland cement \$425.53 per ton, diesel fuel \$2.694 per gallon, and gasoline \$2.329 per gallon, and Steel Base Price Index 378.2. MassDOT posts the **Price Adjustments** on their Highway Division’s website at

<https://www.mass.gov/massdot-contract-price-adjustments>

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

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

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

BY: Monica G. Tibbits-Nutt, Secretary and CEO, MassDOT
Jonathan L. Gulliver, Administrator, MassDOT Highway Division
SATURDAY, JANUARY 7, 2025

DOCUMENT 00210

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

July 1, 1981, updated October 2016

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

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

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

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

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

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

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

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

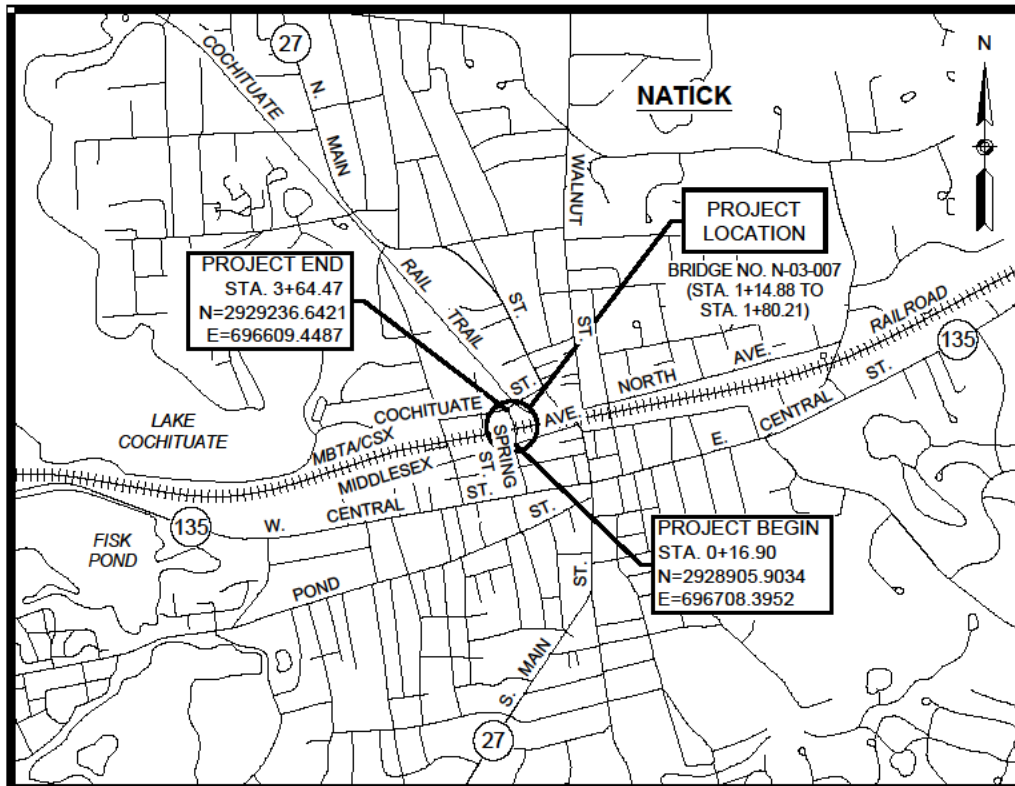
- (1) whether the representations of management in response to this paragraph and paragraph (b) above are consistent with the result of management's evaluation of the system of internal accounting controls; and
- (2) whether such representations of management are, in addition, reasonable with respect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

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DOCUMENT 00331

LOCUS MAP

NATICK
Pedestrian/Bike Bridge Superstructure Replacement, N-03-007,
Spring Street over the MBTA



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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 ***



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: _____

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 ($\geq 4,000$ 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		–

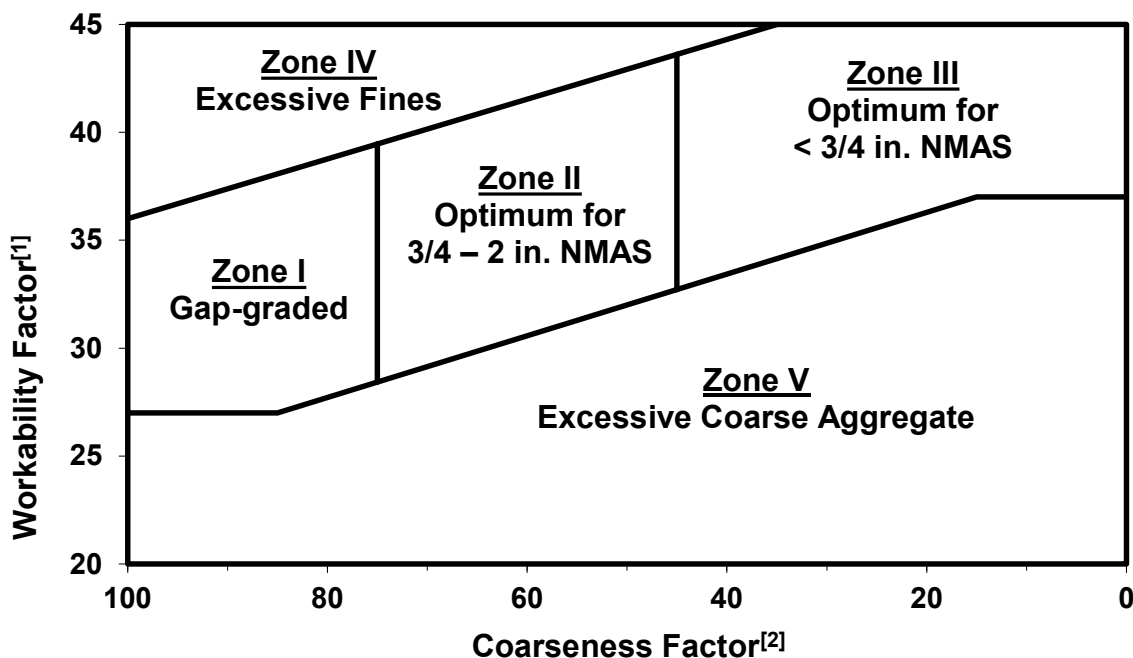
2. Shilstone Workability-Coarseness Chart.

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. – 3/4 in.	Optimized workability factor and coarseness factor
Zone III	Optimum mixture for nominal maximum aggregate size < 3/4 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 increases. 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 ($\leq 0.60\%$ 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).

$$\begin{aligned}
 V_{\text{CEMENT}} &= W_{\text{CEMENT}} / SG_{\text{CEMENT}} * D_{\text{WATER}} \\
 V_{\text{SCM}} &= W_{\text{SCM}} / SG_{\text{SCM}} * D_{\text{WATER}} \\
 V_{\text{ADMIXTURE}} &= V_{\text{ADMIXTURE in oz.}} / 957.5 \text{ oz. per cf} \\
 V_{\text{WATER}} &= V_{\text{WATER in gal.}} / 7.48 \text{ gal. per cf} \\
 V_{\text{COARSE}} &= W_{\text{COARSE}} / SG_{\text{COARSE}} * D_{\text{WATER}} \\
 V_{\text{FINE}} &= W_{\text{FINE}} / SG_{\text{FINE}} * D_{\text{WATER}} \\
 V_{\text{CONCRETE}} &= V_{\text{CEMENT}} + V_{\text{SCM}} + V_{\text{ADMIXTURE}} + V_{\text{WATER}} + V_{\text{COARSE}} + V_{\text{FINE}} + V_{\text{AIR}}
 \end{aligned}$$

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

$$\begin{aligned}
 V_{\text{PASTE}} &= V_{\text{CEMENT}} + V_{\text{SCM}} + V_{\text{ADMIXTURE}} + V_{\text{WATER}} \\
 PC_{\text{CONCRETE}} &= V_{\text{PASTE}} / V_{\text{CONCRETE}}
 \end{aligned}$$

^[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.

$$\begin{aligned}
 VC_{\text{COARSE}} &= SG_{\text{COARSE}} * D_{\text{WATER}} - BD_{\text{COARSE}} / D_{\text{COARSE}} \\
 VC_{\text{FINE}} &= SG_{\text{FINE}} * D_{\text{WATER}} - BD_{\text{FINE}} / D_{\text{FINE}} \\
 VC_{\text{AGGREGATE}} &= [(V_{\text{COARSE}} / (V_{\text{COARSE}} + V_{\text{FINE}})) * VC_{\text{COARSE}} + (V_{\text{FINE}} / (V_{\text{COARSE}} + V_{\text{FINE}})) * VC_{\text{FINE}}] \\
 AVC_{\text{CONCRETE}} &= [VC_{\text{AGGREGATE}} * ((V_{\text{COARSE}} + V_{\text{FINE}}) / V_{\text{CONCRETE}})]
 \end{aligned}$$

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

^[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. Applying 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/ft²/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 \pm 1.5
Workability	T 119	Segregation Resistance ^[2]	100 cy	1 per Sublot	Point of Discharge	Pass
Thermal	T 309	Concrete Temperature ($^{\circ}$ 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	\geq 70% f'_c
		Compressive Strength at 28 Days (psi) ^[3]	100 cy	1 per Sublot	Point of Discharge	\geq 100% f'_c
		Compressive Strength at 56 Days (psi) ^{[3][4]}	100 cy	1 per Sublot	Point of Discharge	\geq 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	–	\leq 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. <ul style="list-style-type: none"> • 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	
	<p>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.</p> <ul style="list-style-type: none"> • NRMCA Concrete Exterior Finisher Certification • ACI Concrete Flatwork Technician and Flatwork Finisher <p>Quality Control inspection report forms shall be completed by the Contractor and submitted to the Department for review</p>	Requirement

DOCUMENT 00715



SUPPLEMENTAL SPECIFICATIONS

SEPTEMBER 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 1: DEFINITION OF TERMS

Subsection 1.03: Defined Terms

Under Part of the First Part replace the words Chapter 90 of the General Laws with MGL Chapter 6C, Section 4[b].

SECTION 2: PROPOSAL REQUIREMENTS AND CONDITIONS

Subsection 2.01: Proposal Forms and Plans

Replace the first paragraph under A. Prequalification Prior to Requesting Proposal Forms with the following:

Subject to the requirements of M.G.L. Chapter 81, Section 8B, each prospective Bidder proposing to bid on any work, excepting the construction, reconstruction, repair or alteration of buildings, to be awarded by the Department or by a municipality under the provisions of M.G.L. Chapter 6C, Section 4(b) must be prequalified in accordance with 700 CMR 14.00 Prequalification of contractors and subcontractors, if the amount of the proposal added to the value of the uncompleted work already under contract with the Department will aggregate \$50,000 or more.

Replace the second paragraph under B. Issuance of Proposal Forms and Plans with the following:

For projects to be awarded under the provisions of M.G.L. Chapter 6C, Section 4(b), bidders may obtain plans and specifications from the applicable municipality at the place specified in the Notice to Contractors.

SECTION 4: SCOPE OF WORK

Subsection 4.04: Changed Conditions

Replace the last paragraph with the following.

The provisions of Section 39N of Chapter 30 of the General Laws, as amended, do not apply to construction contracts entered into on behalf of a municipality under the provisions of M.G.L. Chapter 6C, Section 4(b).

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.

SECTION 9: MEASUREMENT AND PAYMENT

Subsection 9.03: Payment for Extra Work

Replace paragraph B., (2) with the following.

- (2) Plus 13 percent of direct labor, for the actual costs of Federal Insurance Contribution Act (FICA) including Medicare; Federal Unemployment Tax Act (FUTA); State Unemployment Tax Act (SUTA), which includes Unemployment Insurance, the Workforce Training Fund Program, ~~and~~ Employer Medical Assistance Contribution, and COVID-19 Recovery Assessment; Earned Sick Time (EST) Law (940 CMR 33.00); and Paid Family and Medical Leave (PFML) Act (458 CMR 2.00); or, as an alternative to the above 13 percent, the Contractor may elect to use actual rates for FICA, FUTA, SUTA, EST and PFML provided the actual rates are supported with verifiable documentation and shall be subject to review by MassDOT Audit Operations.

Subsection 9.04: Partial Payments

Replace the last sentence of the first paragraph with the following;

No such estimates or payment shall be required to be made when, in the Engineer's judgment, the work is not proceeding in accordance with the provisions of the Contract, or when in their judgment the total value of the work completed since the last estimate amounts to less than \$5,000.00.

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 - Cubic Yard
 Manual Excavatable (≤ 100 PSI)
- 160.2 Controlled Low-Strength Material – Cubic Yard
 Mechanical Excavatable (101-300 PSI)
- 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 690.40: 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 ⁰ + A ¹ SQRT(t) + A ² t. 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⁾ Na₂O equivalent = %Na₂O + 0.658 (%K₂O)
⁽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 subsection 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	-
		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: MISCELLANEOUS 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 its 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

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DOCUMENT 00718

SPECIAL PROVISION FOR PARTICIPATION BY MINORITY OR WOMEN'S BUSINESS ENTERPRISES
AND SERVICE- DISABLED VETERAN- OWNED BUSINESS ENTERPRISES

(Implementing Chapter 102, Section 24 and
Chapter 273, Section 124, of the Acts of 1994 and Chapter 56, Sections 1 to 5 of the Acts of 2010
and subsequent Acts)

Revised: September 27, 2021

I. PARTICIPATION

M/WBE PARTICIPATION GOAL

On this Contract, the Massachusetts Department of Transportation (MassDOT) has established a goal for participation by Minority or Women Business Enterprise(s) (M/WBE). One half of the goal shall be met in the form of contractor activity. This goal shall remain in effect throughout the life of the Contract.

Design-Bid-Build Projects: M/WBE Participation Goal 12%
(One half of this goal shall be met in the form of Subcontractor construction activity)

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

SDVOBE PARTICIPATION BENCHMARK

On this Contract, the Massachusetts Department of Transportation (MassDOT) has established a goal for participation by Service- Disabled Veteran- Owned Business Enterprise(s) (SDVOBE). This goal shall remain in effect throughout the life of the Contract.

Design-Bid-Build Projects: SDVOBE Participation Goal ___%

Design-Build Projects: SDVOBE Design Participation Goal ___% and SDVOBE
Construction Participation Goal ___%

II. POLICY

It is the policy of the MassDOT that Minority, Women Business Enterprises (M/WBEs) and Service- Disabled Veteran- Owned Business Enterprises (SDVOBEs) have equal opportunity to receive and participate in the performance of its state funded Contracts.

III. M/WBE and SDVOBE OBLIGATION

The Contractor agrees to take all necessary and reasonable steps to ensure that MBE, WBE, and SDVOBEs have the maximum opportunity to compete for, and to perform, Department Contracts.

IV. FAILURE TO COMPLY WITH M/WBE OR SDVOBE REQUIREMENTS

All Contractors and Subcontractors are hereby advised that failure to carry out the requirements of these Provisions constitutes a breach of Contract which may result in termination of the Contract, a determination that the Contractor or Subcontractor be barred from bidding on Department Contracts for up to three (3) years, or any other remedy as the Department may impose under Section XIV of these Special Provisions.

V. REQUIRED SUBCONTRACT PROVISIONS

The Prime Contractor shall include the Provisions of Sections II, III, and IV above in every subcontract making those provisions binding on each subcontractor, supplier, manufacturer, consultant or service provider.

VI. DEFINITIONS

For the purpose of these Special Provisions, the terms listed below are defined as follows:

Minority Business Enterprise or MBE means any individual, business organization, or non-profit corporation certified as a MBE by the Supplier Diversity Office (SDO), formerly known as the State Office of Minority and Women Business Assistance (SOMWBA), or by the Department for the purposes of a particular bid or proposal to be submitted to the Department.

Women Business Enterprise or WBE means any individual, business or organization, or non-profit corporation certified as a WBE by SDO, or by the Department for the purposes of a particular bid or proposal to be submitted to the Department.

Service- Disabled Veterans- Owned Businesses or SDVOBE means a business not less than 51 percent of which is owned by one or more service- disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and the management and daily business operations of which are controlled by one or more service- disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

"Contractor activity" means any work, including but not limited to, construction, demolition, renovation, survey, test boring services, or maintenance work performed under the Contract.

"Approved Joint Venture" means a joint venture between M/WBEs and non-M/WBEs, or SDVOBEs and non-SDVOBEs, which has been established for the purpose of participation on a particular contract, where:

1. The M/WBE or SDVOBE partner(s) shares in the ownership, control, management responsibilities, risks and profits of the joint venture; and
2. The Joint Venture has been approved by the Department for M/WBE or SDVOBE participation on the particular contract.

"Equipment Rental Firm" means a firm that owns equipment and assumes actual and contractual responsibility to rent said equipment to perform a useful function of the work of the contract consistent with normal industry practice.

"Material Supplier" means a vendor engaged in sales to the highway construction industry from an established place of business or source of supply, which:

- (a) Manufactures goods from raw materials or substantially alters them before resale, or
- (b) Provides and maintains a storage facility for materials used in the work, consistent with normal industry practice.

"Department" means the Massachusetts Department of Transportation (MassDOT).

"SDO" means the Massachusetts Supplier Diversity Office.

VII. ELIGIBILITY of M/WBEs

Only firms, *OTHER THAN THE PRIME CONTRACTOR*, which have been certified by SDO and/or the Department as eligible to participate on state funded contracts as MBEs or WBEs may be used on this contract for credit toward the toward the M/WBE participation goal.

1. SDO Directory of Certified M/WBEs: The Supplier Diversity Office publishes a Directory of certified MBE and WBEs. This Directory can be obtained from SDO at <https://www.sdo.osd.state.ma.us/>. This site lists those firms which have been certified as minority owned (MBEs) or women owned (WBEs) in accordance with the criteria of 425 CMR 2.00 et seq to participate as M/WBEs on state funded contracts. It also lists the kinds of work in which each firm engages but does not constitute an endorsement of the quality or performance of any business and does not represent Department subcontractor approval.
2. Application for Certification by the Department for a Particular Project: A firm which has (1) submitted a fully completed M/WBE application to SDO at least 30 days previously, (2) has provided in a timely manner, any additional information which may have been requested by SDO, and (3) can provide evidence, satisfactory to the Department, of a bidder's conditional commitment to subcontract with the firm, if certified, may apply directly to the MassDOT Office of Civil Rights to be certified for participation on the particular contract.
3. Joint Venture Approval: To obtain recognition as an approved joint venture between M/WBEs and non-M/WBEs, the Joint Venture must provide to the MassDOT Office of Civil Rights, at least 14 business days before the bid opening date, the Joint Venture Affidavit Document B00847, and a copy of the Joint Venture Agreement, which shall include a detailed breakdown of the following:
 - (a) Capital participation by the M/WBE,
 - (b) Specific equipment to be provided to the Joint Venture by the M/WBE,
 - (c) Specific responsibilities of the M/WBE in the management of the Joint Venture,
 - (d) Workforce and specific skills to be provided to the Joint Venture by the M/WBE, and
 - (e) Percentage distribution to the M/WBE of the projected profit or loss incurred by the Joint Venture.
 - (f) The Joint Venture shall provide all such additional information as may be requested by the Department for the purpose of determining joint venture eligibility.

VIII. ELIGIBILITY of SDVOBEs

Only firms, *OTHER THAN THE PRIME CONTRACTOR*, which have demonstrated that they are listed as a service-disabled veteran- owned small businesses within the VetBiz database may be used on this contract for credit toward the SDVOBE participation goal.

1. VetBiz Database: The website, located at www.VetBiz.gov, listing verified service- disabled veteran- owned businesses.
2. Joint Venture Approval: To obtain recognition as an approved joint venture between SDVOBEs and non-SDVOBEs, the joint venture must provide to the MassDOT Office of Civil Rights, at least 14 business days before the bid opening date, an application for joint venture participation approval, and a copy of the Joint Venture Agreement, which shall include a detailed breakdown of the following:
 - (a) Capital participation by the SDVOBE,
 - (b) Specific equipment to be provided to the joint venture by the SDVOBE,
 - (c) Specific responsibilities of the SDVOBE in the management of the Joint Venture,
 - (d) Workforce and specific skills to be provided to the joint venture by the SDVOBE, and

- (e) Percentage distribution to the SDVOBE of the projected profit or loss incurred by the Joint Venture.
- (f) The Joint Venture shall provide all such additional information as may be requested by the Department for the purpose of determining joint venture eligibility.

IX. COUNTING M/WBE PARTICIPATION AND SDVOBE BENCHMARKS TOWARDS M/WBE AND SDVOBE GOALS

In order for M/WBE participation and SDVOBE benchmarks to count toward the Contract goal, the M/WBE and SDVOBE must have independently managed, supervised and performed the Contract work with its own workforce, equipment and resources. M/WBE and SDVOBE participation which fulfills these requirements shall be counted toward meeting the M/WBE and SDVOBE goals in accordance with the following rules:

1. If a firm has been determined to be an eligible MBE, WBE or SDVOBE, the total dollar value of the contract performed by the M/WBE or SDVOBE is counted toward the applicable goal as follows:
 - a. Except as provided below, in Section IX (1)(g), work performed by a M/WBE or a SDVOBE Prime Contractor shall not be counted toward the M/WBE or SDVOBE goal, and all Prime Contractors, including M/WBE or SDVOBE Prime Contractors, must comply with the M/WBE and SDVOBE requirements of this Contract.
 - b. For a M/WBE or SDVOBE material supplier, sixty percent (60%) of the amount to be paid for materials and supplies required under this Contract shall be credited toward the goal.
 - c. For a M/WBE or SDVOBE who provides a bonafide service such as professional, technical, consultant or managerial services and assistance in the procurement of essential personnel, facilities, equipment, materials, or supplies required for performance of the contract, reasonable fees or commissions charged for the service shall be listed, but the cost of items themselves shall not be credited.
 - d. For a M/WBE or SDVOBE hauler, trucker, or delivery service, which is not also the manufacturer of or a regular dealer in the materials and supplies, reasonable fees charged for delivery of materials and supplies required on the job site shall be credited; the cost of the materials and supplies themselves shall not be credited.
 - e. For a M/WBE or SDVOBE who provides any bonds or insurance specifically required for the performance of the contract, reasonable fees or commissions charged for such service shall be listed, but the face amount or actual premium paid for the bond or insurance shall not be credited.
 - f. The Department shall determine if the fees or commissions listed in accordance with paragraphs (c), (d), and (e) are not excessive as compared with fees or commissions customarily allowed for similar services.
 - g. That portion of the contract total dollar value equal to the percentage of ownership and control of the M/WBE partner(s) or SDVOBE partner(s) in an approved Joint Venture shall be counted toward the Contract goal, except that credit for M/WBE and SDVOBE participation in an approved Prime Joint Venture shall not exceed one half of the Contract goal.

X. JOINT CHECK POLICY

1. 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 M/WBE or SDVOBE third party such as a regular dealer of material or supplies. The Prime Contractor issues the check as payor to the M/WBE or SDVOBE 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 M/WBE or SDVOBE. MassDOT has established criteria to ensure that M/WBEs or SDVOBEs are in fact performing a commercially useful function ("CUF") while using a joint check arrangement. Contractors and M/WBEs or SDVOBEs must meet and conform to these conditions and criteria governing the use of joint checks.

2. In the event that a Contractor, M/WBE or SDVOBE Subcontractor desires to use a joint check, MassDOT will require prior notice and will closely monitor the arrangement for compliance. MassDOT may allow a joint check arrangement and give credit to a Contractor for use of the M/WBE or SDVOBE 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 (M/WBEs, SDVOBE and non-M/WBEs or non-SDVOBEs); 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 M/WBE or SDVOBE (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.
3. Other factors MassDOT may consider:
 - Whether there is a requirement by the Prime Contractor that a M/WBE or SDVOBE should use a specific vendor or supplier to meet their Subcontractor specifications;
 - Whether there is a requirement that a M/WBE or SDVOBE use the Prime Contractor's negotiated price;
 - The independence of the M/WBE or SDVOBE;
 - 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 M/WBE or SDVOBE has made an effort to establish alternate arrangements for following periods (i.e., the M/WBE or SDVOBE 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 M/WBE or SDVOBE remain responsible for compliance with all other elements of the Special Provisions, and must still be able to prove that a commercially useful function is being performed for the Contractor.

XI. JOINT CHECK PROCEDURES

- The M/WBE or SDVOBE 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 B00846) and by notification on the M/WBE Letter of Intent (Document B00843) or SDVOBE Letter of Intent (Document B00845), 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 Contractor and M/WBE or SDVOBE must have:
 - (a) a written agreement with the material supplier/vendor;
 - (b) applied for credit with the subject material supplier and has supplied the vendor's response;

- (c) shown that it will place all orders to the subject material supplier/vendor;
 - (d) made and retains all decision-making responsibilities concerning the materials; and
 - (e) provided a Joint Check Agreement that is acceptable to MassDOT;
- The MassDOT Office of Civil Rights will review the request and render a decision as part of the approval process for M/WBE or SDVOBE 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 M/WBE or SDVOBE 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 M/WBE or SDVOBE (i.e. if possible, funds or the joint check should be processed by the M/WBE or SDVOBE and sent by the M/WBE or SDVOBE 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 M/WBE or SDVOBE 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 M/WBE or SDVOBE Program policies and procedures as part of the Subcontractor approval process.

XII. AWARD DOCUMENTATION AND PROCEDURES

1. The two lowest bidders/the two bidders with the lowest price per quality score point, including any M/WBE bidder or SDVOBE bidder, shall submit, by the close of business on the third business day after the bid opening, a completed Schedule of M/WBE and SDVOBE participation, in the form attached, which shall list:
 - a. The full company name, address and telephone number of each M/WBE or SDVOBE with whom the bidder intends to make a commitment;
 - b. The Contract item(s), by number(s) and quantity(ies), if applicable, or specific description of other business activity to be performed by each M/WBE or SDVOBE 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 Section XII of these Special Provisions.
 - c. The total dollar amount to be paid to each M/WBE or SDVOBE. (Bidders are cautioned that at least one half of the participation goal must be met with Contract work.)
 - d. The total dollar amount to be paid to each M/WBE or SDVOBE which is eligible for credit toward the M/WBE or SDVOBE goal under the crediting rules set out in Section IX.
 - e. The total creditable M/WBE or SDVOBE participation as a percentage of the total bid price.
2. All firms listed on the Schedule must be currently certified.
3. The two lowest bidders/the two bidders with the lowest price per quality score point shall submit with their Schedules of Participation, fully completed, signed Letters of Intent from each of the M/WBEs or SDVOBEs listed on the Schedule. The Letters of Intent shall be in the form attached and shall identify specifically the contract activity the M/WBE or SDVOBE proposes to perform, expressed as contract item number, if applicable, description of the activity, 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.

4. Evidence of good faith efforts will be evaluated by the Department in the selection of the lowest responsible bidder/best value bidder. All information requested by the Department for the purpose of evaluating the bidder's efforts to achieve the goal must be provided within three calendar days and must be accurate and complete in every detail. The apparent low bidder's/best value bidder's attainment of the M/WBE or SDVOBE goal or a satisfactory demonstration of good faith efforts is a prerequisite for Award of the Contract.
5. 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 on the Schedule of Participation, and provide the required Letters of Intent for, M/WBE or SDVOBE 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 the Department, that good faith efforts were made to achieve the goal.
6. If the Department finds that the percentage of M/WBE or SDVOBE participation submitted by the bidder on its Schedule does not meet the Contract goal, or that the 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 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.
7. If, after administrative reconsideration, the Department 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.
8. Actions which constitute evidence of good faith efforts to meet the M/WBE or SDVOBE goals include, but are not limited to, all of the following examples:
 - a. Efforts made to select portions of the work proposed to be performed by M/WBEs or SDVOBEs in order to increase the likelihood of achieving the stated goal, including, where appropriate, but not limited to, breaking down contracts into economically feasible units to facilitate M/WBE and SDVOBE participation. The value of such work is required to at least equal the M/WBE and SDVOBE goal.
 - b. Reasonable written notification prior to the opening of bids soliciting individual M/WBEs or SDVOBEs interested in participation in the contract as subcontractors, regular dealers, manufacturers, consultants, or service providers and identifying the specific items or type of work being solicited.
 - c. Written notification to M/WBE or SDVOBE economic development assistance agencies and organizations which provide assistance in recruitment and placement of M/WBEs and SDVOBEs, describing the type of work, supplies or services being considered for M/WBE or SDVOBE subcontracting on this contract.
 - d. Efforts made to negotiate with M/WBEs or SDVOBEs for specific items of work including evidence of:
 - (1) The names, addresses, telephone numbers of M/WBEs or SDVOBEs who were contacted, the dates of initial contact and whether initial solicitations of interest were followed up by contacts with M/WBEs or SDVOBEs to determine with certainty whether the M/WBEs or SDVOBEs were interested. Personal or phone contacts are expected.
 - (2) A description of the information provided by the M/WBEs or SDVOBEs regarding the plans and specifications and estimated quantities for portions of the work to be performed.
 - (3) A statement of why additional agreements with M/WBEs or SDVOBEs were not reached.
 - (4) Documentation of each M/WBE or SDVOBE contacted but rejected and the reasons for the rejection.
 - e. Absence of any agreements between the Contractor and the M/WBE or SDVOBE in which M/WBE or SDVOBE promises not to provide subcontracting quotations to other bidders.
 - f. Efforts made to assist the M/WBEs or SDVOBEs that need assistance in obtaining bonding, insurance, or lines of credit required by the Contractor.

- g. Documentation that qualified M/WBEs or SDVOBEs are not available, or are not interested.
 - h. Attendance at any meeting scheduled by the Department to encourage better Contractor-M/WBE or Contractor- SDVOBE relationships and/or to inform M/WBEs or SDVOBEs of forthcoming M/WBE or SDVOBE utilization opportunities.
 - i. Advertisement, in general circulation media, in trade association publications and in disadvantaged business enterprise-focused media, of interest in utilizing M/WBEs or SDVOBEs and the area of interest.
 - j. Efforts to effectively use the services of available minority community organizations; women organizations, veteran organizations, minority, women disadvantaged and veteran contractor's groups; local, state and federal disadvantaged business assistance offices; and other organizations that provide assistance in recruitment and placement of M/WBEs or SDVOBEs.
9. The demonstration of good faith efforts must establish that the Contractor has actively and aggressively sought out M/WBEs or SDVOBEs to participate in the project and has taken all actions which could be reasonably expected to achieve the goal. Examples of circumstances or actions not acceptable as reasons for failure to meet the M/WBE or SDVOBE goal, include, but are not limited to:
- a. The M/WBE or SDVOBE was unable to provide performance and/or payment bonds.
 - b. The M/WBEs or SDVOBEs commercially reasonable bid was rejected based on price.
 - c. The M/WBE or SDVOBE would not agree to perform items of work at the unit bid price.
 - d. The Contractor does not want to subcontract a percentage of the work sufficient to meet the goal.
 - e. Solicitation by mail or fax only.

XIII. COMPLIANCE

1. All activity performed by a M/WBE or SDVOBE for credit toward the Contract goal must be performed, managed and supervised by the M/WBE or SDVOBE. Prime Contractor shall not enter into, or condone, any other arrangement.
2. The Prime Contractor shall not perform with its own organization, or assign to any other business, any activity designated for the M/WBEs or SDVOBEs named on the Schedule submitted by the Prime Contractor under Section IX, or under Section XII(6), without the approval of the Department in accordance with the requirements of Sections XIII(6) and XIII(10).
3. The Department may suspend payment for any activity which was not performed by the M/WBE or SDVOBE to whom the activity was committed on the approved Schedule of Participation, or which was not performed in accordance with the requirements of Section XIII(1).
4. The Department retains the right to approve or disapprove all subcontractors. Requests by the Prime Contractor for approval of participation by a M/WBE or SDVOBE subcontractor for credit toward the Contract goal must include, in addition to any other requirements for subcontractor approval, the following:
 - a. A copy of the proposed subcontract. The subcontract must be for at least the dollar amount, and for the work described, in the Prime Contractor's Schedule of Participation.
 - b. A resume stating the qualifications and experience of the M/WBE or SDVOBE 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.
 - c. A Schedule of Operations indicating when the M/WBE or SDVOBE is expected to perform the work.

- d. A list of (1) equipment owned by the M/WBE or SDVOBE to be used on the Project, and (2) equipment to be leased by the M/WBE or SDVOBE for use on the Project.
 - e. A list of: (1) all projects (public and private) which the M/WBE or SDVOBE is currently performing, (2) all projects (public and private) to which the M/WBE or SDVOBE is committed, (3) all projects (public and private) to which the M/WBE or SDVOBE 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 M/WBEs or SDVOBEs work schedule for each project.
5. If, pursuant to the subcontractor approval process, the Department finds that a M/WBE or SDVOBE subcontractor does not have sufficient experience or resources to perform, manage and supervise work of the kind proposed in accordance with the requirements of Section XIII(1), approval of the M/WBE or SDVOBE subcontractor may be denied. In the event of such denial, the Prime Contractor shall proceed in accordance with the requirements of Sections XIII(6) and XIII(10).
 6. If, for reasons beyond its control, the Prime Contractor cannot comply with its M/WBE or SDVOBE commitment in accordance with the Schedule of participation submitted under Section IX and the terms of these Special Provisions, the Prime Contractor shall submit to the Department the reasons for its inability to comply with its obligations under Section I and shall submit, and request approval for, a revised Schedule of Participation. If approved by the Department, the revised Schedule shall govern the Prime Contractor's performance in meeting its obligations under these special provisions.
 7. A Prime Contractor's compliance with the participation goal in Section I shall be determined by reference to the required percentage of the total Contract price, including any additions and modifications thereto, provided, however, that no decrease in the dollar amount of a bidder's commitment to any M/WBE or SDVOBE shall be allowed without the approval of the Department.
 8. If the Contract amount is increased, the Prime Contractor shall submit a revised Schedule of Participation in accordance with Sections XIII(6) and XIII(10).
 9. In the event of the decertification of a M/WBE or SDVOBE participating or scheduled to participate on the contract for credit toward the goal, the Contractor shall proceed in accordance with Sections XIII(6) and XIII(10).
 10. The Prime Contractor shall notify the Department immediately of any facts which come to its attention indicating that it may or will be unable to comply with any aspect of its M/WBE or SDVOBE obligation under this Contract.
 11. Any notice required by these Special Provisions shall be given in writing to the Resident Engineer and the district designated Compliance Officer with a copy to the Director of Compliance, Office of Diversity and Civil Rights, 10 Park Plaza, Room 3170, Boston MA 02116.
 12. The Prime Contractor and its subcontractors shall comply with the Department's Electronic Reporting System Requirements (Contract Document 00821) and submit all information required by the Department related to the M/WBE Special Provisions and SDVOBE Special Provisions through the Equitable Business Opportunity Solution (EBO). The Department reserves the right to request reports in the format it deems necessary anytime during the performance of the Contract.
 13. The Contractor shall pay each M/WBE or SDVOBE for satisfactory performance of its Contract no later than 10 days from receipt of payment for the work from the Department. Any delay or postponement of payment to the M/WBEs or SDVOBEs must be for good cause and only with the prior approval of the Department.
 14. The Department may withhold the Contractor's next periodic payment if each M/WBE or SDVOBE is not paid in accordance with Section XIII(13).
 15. The Department may require specific performance of the Prime Contractor's commitment under the Contract by requiring the Prime Contractor to subcontract with a M/WBE or SDVOBE for any contract or specialty item.

XIV. SANCTIONS

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

1. Retain, in connection with final acceptance and final payment, an amount determined by multiplying the total contract amount by the percentage in Section I, less the amount paid to approved M/WBEs or SDVOBEs for work performed under the Contract in accordance with the provisions of Section X. The Prime Contractor shall have the right to appeal such retention of funds in accordance with the provisions of M.G.L. c. 30A s.10.
2. 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.
3. 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 5.07.
4. Initiate debarment proceedings under M.G.L. c.29 §29F.

XV. FURTHER INFORMATION

Any proposed M/WBE, SDVOBE, bidder, Contractor or subcontractor shall provide such information as is necessary in the judgement of the Department to ascertain its compliance with the terms of this Special Provision.

XVI. LIST OF ADDITIONAL DOCUMENTS

1. The following documents shall be completed and signed by the bidder and designated M/WBEs or SDVOBEs in accordance with Section XII - Award Documentation and Procedures. These documents must be returned by the bidder to MassDOT's Bid Document Distribution Center:
 - Schedule of M/WBEs (Document B00842) or SDVOBE Participation (Document B00844)
 - Letter of Intent: M/WBEs (Document B00843) or SDVOBE (Document B00845)
 - M/WBEs or SDVOBE Joint Check Arrangement Approval Form (Document B00846), if Contractor and M/WBE or SDVOBE plan, or if M/WBE or SDVOBE is required to use a Joint Check (when applicable)
2. The following document shall be signed and returned by Contractor and Subcontractors/M/WBEs or SDVOBEs 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 (M/WBEs or SDVOBEs and non-M/WBEs or SDVOBEs alike)).
3. 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:
 - Joint Venture Affidavit of M/WBE or SDVOBE/Non-M/WBE or Non-SDVOBE (Document B00847)
4. 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 00761

**SPECIAL PROVISIONS FOR CERTIFICATION REGARDING DEBARMENT,
SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION**

Revised: 02/09/16

I. Instructions for Certification - Primary Covered Transactions:

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

1. 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 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 MassDOT's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.
2. The certification in this clause is a material representation of fact upon which reliance was placed when the MassDOT determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available, the MassDOT may terminate this transaction for cause of default.
3. The prospective primary participant shall provide immediate written notice to the MassDOT if any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
4. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the MassDOT for assistance in obtaining a copy of those regulations.
5. The prospective primary 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 MassDOT.
6. The prospective primary 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 Transaction," provided by the MassDOT, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
7. 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 may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement portion of the "Lists of Parties Excluded From Federal Procurement or Nonprocurement Programs" (Nonprocurement List) which is compiled by the General Services Administration and the Debarment Lists compiled by both the Massachusetts Office of the Attorney General and the Department of Capital Asset Management and Maintenance (DCAMM) and published separately in the Central Register.
8. 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.
9. Except for transactions authorized under paragraph 5 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, the MassDOT may terminate this transaction for cause or default.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion -- Primary Covered Transactions

The prospective primary 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 covered transactions by any Federal, State or local department or agency;
2. Have not within a 3-year period preceding this proposal been convicted of or had a civil judgement 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;
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 2 of this certification; and
4. Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

II. Instructions for Certification - Lower Tier Covered Transactions:

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

1. 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 the MassDOT may pursue available remedies, including suspension and/or debarment.
2. 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.
3. The terms "covered transaction," "debarred," "suspended," "ineligible," "primary covered transaction," "participant," "person," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the MassDOT for assistance in obtaining a copy of those regulations.
4. 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 MassDOT.
5. 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.
6. 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 may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List and the Debarment Lists.

7. 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.
8. Except for transactions authorized under paragraph 4 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, the MassDOT may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions

The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal, State or local department or agency.

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

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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

December 12, 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	\$0.58
2	ASTM A27 (AASHTO M103) Steel Castings, H-Pile Points & Pipe Pile Shoes (See Note below.)	\$0.81
3	ASTM A668 / A668M (AASHTO M102) Steel Forgings	\$0.81
4	ASTM A108 (AASHTO M169) Steel Forgings for Shear Studs	\$0.84
5	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Plate	\$0.89
6	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Shapes	\$0.83
7	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Plate	\$0.89
8	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Shapes	\$0.83
9	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Plate	\$0.92
10	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Shapes	\$0.84
11	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W 345W Structural Steel Plate	\$0.92
12	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W or 345W Structural Steel Shapes	\$0.84
13	ASTM A709/A709M Grade HPS 50W / AASHTO M270M/M270 Grade HPS 50W or 345W Structural Steel Plate	\$0.96
14	ASTM A709/A709M Grade HPS 70W / AASHTO M270M/M270 Grade HPS 70W or 485W Structural Steel Plate	\$1.03
15	ASTM A514/A514M-05 Grade HPS 100W / AASHTO M270M/M270 Grade HPS 100W or 690W Structural Steel Plate	\$1.58
16	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Plate	\$0.92
17	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Shapes	\$0.84
18	ASTM A276 Type 316 Stainless Steel	\$4.71
19	ASTM A240 Type 316 Stainless Steel	\$4.71
20	ASTM A148 Grade 80/50 Steel Castings (See Note below.)	\$1.62
21	ASTM A53 Grade B Structural Steel Pipe	\$1.03
22	ASTM A500 Grades A, B, 36 & 50 Structural Steel Pipe	\$1.03
23	ASTM A252, Grades 240 (36 KSI) & 414 (60 KSI) Pipe Pile	\$0.82
24	ASTM 252, Grade 2 Permanent Steel Casing	\$0.82
25	ASTM A36 (AASHTO M183) for H-piles, steel supports and sign supports	\$0.87
26	ASTM A328 / A328M, Grade 50 (AASHTO M202) Steel Sheetpiling	\$1.55
27	ASTM A572 / A572M, Grade 50 Sheetpiling	\$1.55
28	ASTM A36/36M, Grade 50	\$0.89
29	ASTM A570, Grade 50	\$0.87
30	ASTM A572 (AASHTO M223), Grade 50 H-Piles	\$0.89
31	ASTM A1085 Grade A (50 KSI) Steel Hollow Structural Sections (HSS), heat-treated per ASTM A1085 Supplement S1	\$1.03
32	AREA 140 LB Rail and Track Accessories	\$0.53

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

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DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

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

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

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

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

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

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

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

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

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

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DOCUMENT 00820

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

I. Definitions

For purposes of this contract,

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

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

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

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

II. Equal Opportunity, Non-Discrimination and Affirmative Action

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

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

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

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

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

III. Minority and Women Workforce Participation

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

IV. Liaison Committee

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

V. Reports and Records

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

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

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

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

VI. Access to Work Site

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

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

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

VIII. Sanctions

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

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

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

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

IX. Severability

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

X. Contractor's Certification

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

XI. Subcontractor Requirements

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

Rev'd 03/07/14

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DOCUMENT 00821

ELECTRONIC REPORTING REQUIREMENTS
CIVIL RIGHTS PROGRAMS AND CERTIFIED PAYROLL

Implemented on March 2, 2009

Revised June 04, 2019

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

Contractor and Sub-Contractor EBO User Certification

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

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

Vetting of Firms and Designated Firm Individuals

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

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

Interim Reporting Requirements

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

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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: 128933 Project No. 610869 Federal Aid No.: NFA

Location: NATICK

Project Description: Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA

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

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

This is not a Federally-aided construction project

Document #

- 00718 –Participation By Minority Or Women's Business Enterprises and SDVOBE†
- 00761 –Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion
- 00820 – MA Supplemental Equal Employment Opportunity, Non-Discrimination, and Affirmative Action Program
- 00821 – Electronic Reporting Requirements, Civil Rights Programs, and Certified Payroll
- 00859 – Contractor/Subcontractor Certification Form (this document)
- 00860 – MA Employment Laws
- 00861 – Applicable State Wage Rates in the Contract Proposal**
- B00842 – MA Schedule of Participation By Minority or Women Business Enterprises (M/WBEs)†
- B00843 – MA Letter of Intent – M/WBEs†
 - ** Does not apply to Material Suppliers, unless performing work on-site
 - † Applies only if Subcontractor is a M/WBE; only include these forms for the particular M/WBE Entity
- B00844 - Schedule of Participation By SDVOBE
- B00845 - Letter of Intent – SDVOBE
- B00846 – M/WBE or SDVOBE Joint Check Arrangement Approval Form
- B00847 – Joint Venture Affidavit

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

Document #

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



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

*Applicable only to Contracts or Subcontracts in excess of \$10,000

**Does not apply to Material Suppliers, unless performing work on-site

† Applies only if Subcontractor is a DBE; only include these forms for the particular DBE Entity

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

(Print Name and Title)

(Authorized Signature)

PART 2

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

1. This company recognizes that if this is a Federal-Aid Project, then this Contract is covered by the equal employment opportunity laws administered and enforced by the United States Department of Labor (“USDOL”), Office of Federal Contract Compliance Programs (“OFCCP”). By signing below, we acknowledge that this company has certain reporting obligations to the OFCCP, as specified by 41 CFR Part 60-4.2.
2. This company further acknowledges that any contractor with fifty (50) or more employees on a Federal-aid Contract with a value of fifty-thousand (\$50,000) dollars or more must annually file an EEO-1 Report (SF 100) to the EEOC, Joint Reporting Committee, on or before September 30th, each year, as specified by 41 CFR Part 60-1.7a.
3. For more information regarding the federal reporting requirements, please contact the USDOL, OFCCP Regional Office, at 1-646-264-3170 or EEO-1, Joint Reporting Committee at 1-866-286-6440. You may also find guidance at: <http://www.dol.gov/ofccp/TAGuides/consttag.pdf> or <http://www.wdol.gov/dba.aspx#0>.
4. This company has, has not, participated in a previous contract or subcontract subject to the Equal Opportunity clauses set forth in 41 CFR Part 60-4 and Executive Order 11246, and where required, has filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance Programs or the EEO Commission all reports due under the applicable filing requirements.
5. This company is in full compliance with applicable Federal and Commonwealth of Massachusetts laws, rules, and regulations and is not currently debarred or disqualified from bidding on or participating in construction contracts in any jurisdiction of the United States. See : <https://www.mass.gov/service-details/contractors-and-vendors-suspended-or-debarred-by-massdot>
6. This company is properly registered and in good standing with the Office of the Secretary of the Commonwealth.

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

Firm: _____

Address: _____

(Print Name and Title)

Telephone Number: _____

Federal I.D. Number: _____

(Authorized Signature)

Estimated Start Date: _____

Estimated Completion Date: _____

Estimated Dollar Amount: _____

(Date)

DOCUMENT 00860

COMMONWEALTH OF MASSACHUSETTS PUBLIC EMPLOYMENT LAWS

Revised February 20, 2019

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

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

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

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

The Prevailing Wage Rate generally includes the following:

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

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

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

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

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

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

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

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

STATEMENT OF COMPLIANCE

Date: _____

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

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

(Contractor or Subcontractor)

on the _____
(MassDOT Project Location and Contract Number)

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

Signature _____

Title _____

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

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

MassDOT will request the updates no later 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
Contract Number: 128933 **City/Town:** NATICK
Description of Work: NATICK: Pedestrian/Bike Bridge Superstructure Replacement, N-03-007,
Spring Street over the MBTA
Job Location: Spring Street over the MBTA

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2024	\$39.95	\$15.07	\$20.17	\$0.00	\$75.19
	01/01/2025	\$39.95	\$15.57	\$20.17	\$0.00	\$75.69
	06/01/2025	\$40.95	\$15.57	\$20.17	\$0.00	\$76.69
	12/01/2025	\$40.95	\$15.57	\$21.78	\$0.00	\$78.30
	01/01/2026	\$40.95	\$16.17	\$21.78	\$0.00	\$78.90
	06/01/2026	\$41.95	\$16.17	\$21.78	\$0.00	\$79.90
	12/01/2026	\$41.95	\$16.17	\$23.52	\$0.00	\$81.64
	01/01/2027	\$41.95	\$16.77	\$23.52	\$0.00	\$82.24
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2024	\$40.02	\$15.07	\$20.17	\$0.00	\$75.26
	01/01/2025	\$40.02	\$15.57	\$20.17	\$0.00	\$75.76
	06/01/2025	\$41.02	\$15.57	\$20.17	\$0.00	\$76.76
	12/01/2025	\$41.02	\$15.57	\$21.78	\$0.00	\$78.37
	01/01/2026	\$41.02	\$16.17	\$21.78	\$0.00	\$78.97
	06/01/2026	\$42.02	\$16.17	\$21.78	\$0.00	\$79.97
	12/01/2026	\$42.02	\$16.17	\$23.52	\$0.00	\$81.71
	01/01/2027	\$42.02	\$16.77	\$23.52	\$0.00	\$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2024	\$40.14	\$15.07	\$20.17	\$0.00	\$75.38
	01/01/2025	\$40.14	\$15.57	\$20.17	\$0.00	\$75.88
	06/01/2025	\$41.14	\$15.57	\$20.17	\$0.00	\$76.88
	12/01/2025	\$41.14	\$15.57	\$21.78	\$0.00	\$78.49
	01/01/2026	\$41.14	\$16.17	\$21.78	\$0.00	\$79.09
	06/01/2026	\$42.14	\$16.17	\$21.78	\$0.00	\$80.09
	12/01/2026	\$42.14	\$16.17	\$23.52	\$0.00	\$81.83
	01/01/2027	\$42.14	\$16.77	\$23.52	\$0.00	\$82.43
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	01/01/2024	\$117.16	\$10.08	\$24.29	\$0.00	\$151.53
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.61	\$9.65	\$17.70	\$0.00	\$67.96
	06/01/2025	\$42.00	\$9.65	\$17.70	\$0.00	\$69.35
	12/01/2025	\$43.38	\$9.65	\$17.70	\$0.00	\$70.73
	06/01/2026	\$44.82	\$9.65	\$17.70	\$0.00	\$72.17
	12/01/2026	\$46.26	\$9.65	\$17.70	\$0.00	\$73.61
	06/01/2027	\$47.71	\$9.65	\$17.70	\$0.00	\$75.06
	12/01/2027	\$49.16	\$9.65	\$17.70	\$0.00	\$76.51
	06/01/2028	\$50.66	\$9.65	\$17.70	\$0.00	\$78.01
	12/01/2028	\$52.16	\$9.65	\$17.70	\$0.00	\$79.51
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$40.61	\$9.65	\$17.80	\$0.00	\$68.06
	06/01/2025	\$42.00	\$9.65	\$17.80	\$0.00	\$69.45
	12/01/2025	\$43.38	\$9.65	\$17.80	\$0.00	\$70.83
	06/01/2026	\$44.82	\$9.65	\$17.80	\$0.00	\$72.27
	12/01/2026	\$46.26	\$9.65	\$17.80	\$0.00	\$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. <i>HEAT & FROST INSULATORS LOCAL 6 (BOSTON)</i>	12/01/2024	\$42.80	\$14.50	\$11.05	\$0.00	\$68.35
	06/01/2025	\$43.80	\$14.50	\$11.05	\$0.00	\$69.35
	12/01/2025	\$44.80	\$14.50	\$11.05	\$0.00	\$70.35
ASPHALT RAKER <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.11	\$9.65	\$17.70	\$0.00	\$67.46
	06/01/2025	\$41.50	\$9.65	\$17.70	\$0.00	\$68.85
	12/01/2025	\$42.88	\$9.65	\$17.70	\$0.00	\$70.23
	06/01/2026	\$44.32	\$9.65	\$17.70	\$0.00	\$71.67
	12/01/2026	\$45.76	\$9.65	\$17.70	\$0.00	\$73.11
	06/01/2027	\$47.21	\$9.65	\$17.70	\$0.00	\$74.56
	12/01/2027	\$48.66	\$9.65	\$17.70	\$0.00	\$76.01
	06/01/2028	\$50.16	\$9.65	\$17.70	\$0.00	\$77.51
12/01/2028	\$51.66	\$9.65	\$17.70	\$0.00	\$79.01	
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$57.03	\$15.55	\$16.50	\$0.00	\$89.08
	06/01/2025	\$58.33	\$15.55	\$16.50	\$0.00	\$90.38
	12/01/2025	\$59.78	\$15.55	\$16.50	\$0.00	\$91.83
	06/01/2026	\$61.08	\$15.55	\$16.50	\$0.00	\$93.13
	12/01/2026	\$62.53	\$15.55	\$16.50	\$0.00	\$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$57.03	\$15.55	\$16.50	\$0.00	\$89.08
	06/01/2025	\$58.33	\$15.55	\$16.50	\$0.00	\$90.38
	12/01/2025	\$59.78	\$15.55	\$16.50	\$0.00	\$91.83
	06/01/2026	\$61.08	\$15.55	\$16.50	\$0.00	\$93.13
	12/01/2026	\$62.53	\$15.55	\$16.50	\$0.00	\$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.11	\$9.65	\$17.70	\$0.00	\$67.46
	06/01/2025	\$41.50	\$9.65	\$17.70	\$0.00	\$68.85
	12/01/2025	\$42.88	\$9.65	\$17.70	\$0.00	\$70.23
	06/01/2026	\$44.32	\$9.65	\$17.70	\$0.00	\$71.67
	12/01/2026	\$45.76	\$9.65	\$17.70	\$0.00	\$73.11
	06/01/2027	\$47.21	\$9.65	\$17.70	\$0.00	\$74.56
	12/01/2027	\$48.66	\$9.65	\$17.70	\$0.00	\$76.01
	06/01/2028	\$50.16	\$9.65	\$17.70	\$0.00	\$77.51
12/01/2028	\$51.66	\$9.65	\$17.70	\$0.00	\$79.01	
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.61	\$9.65	\$17.70	\$0.00	\$67.96
	06/01/2025	\$42.00	\$9.65	\$17.70	\$0.00	\$69.35
	12/01/2025	\$43.38	\$9.65	\$17.70	\$0.00	\$70.73
	06/01/2026	\$44.82	\$9.65	\$17.70	\$0.00	\$72.17
	12/01/2026	\$46.26	\$9.65	\$17.70	\$0.00	\$73.61
	06/01/2027	\$47.71	\$9.65	\$17.70	\$0.00	\$75.06
	12/01/2027	\$49.16	\$9.65	\$17.70	\$0.00	\$76.51
	06/01/2028	\$50.66	\$9.65	\$17.70	\$0.00	\$78.01
	12/01/2028	\$52.16	\$9.65	\$17.70	\$0.00	\$79.51
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$40.61	\$9.65	\$17.80	\$0.00	\$68.06
	06/01/2025	\$42.00	\$9.65	\$17.80	\$0.00	\$69.45
	12/01/2025	\$43.38	\$9.65	\$17.80	\$0.00	\$70.83
	06/01/2026	\$44.82	\$9.65	\$17.80	\$0.00	\$72.27
	12/01/2026	\$46.26	\$9.65	\$17.80	\$0.00	\$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2024	\$48.12	\$7.07	\$20.60	\$0.00	\$75.79

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) <i>BRICKLAYERS LOCAL 3 (LOWELL)</i>	08/01/2024	\$62.36	\$11.49	\$22.90	\$0.00	\$96.75
	02/01/2025	\$63.66	\$11.49	\$22.90	\$0.00	\$98.05
	08/01/2025	\$65.81	\$11.49	\$22.90	\$0.00	\$100.20
	02/01/2026	\$67.16	\$11.49	\$22.90	\$0.00	\$101.55
	08/01/2026	\$69.36	\$11.49	\$22.90	\$0.00	\$103.75
	02/01/2027	\$70.76	\$11.49	\$22.90	\$0.00	\$105.15

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

Effective Date - 08/01/2024

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

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.83	\$11.49	\$22.90	\$0.00	\$66.22
2	60	\$38.20	\$11.49	\$22.90	\$0.00	\$72.59
3	70	\$44.56	\$11.49	\$22.90	\$0.00	\$78.95
4	80	\$50.93	\$11.49	\$22.90	\$0.00	\$85.32
5	90	\$57.29	\$11.49	\$22.90	\$0.00	\$91.68

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$56.40	\$15.55	\$16.50	\$0.00	\$88.45
	06/01/2025	\$57.68	\$15.55	\$16.50	\$0.00	\$89.73
	12/01/2025	\$59.12	\$15.55	\$16.50	\$0.00	\$91.17
	06/01/2026	\$60.40	\$15.55	\$16.50	\$0.00	\$92.45
	12/01/2026	\$61.84	\$15.55	\$16.50	\$0.00	\$93.89

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

CAISSON & UNDERPINNING BOTTOM MAN <i>LABORERS - FOUNDATION AND MARINE</i>	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 <i>LABORERS - FOUNDATION AND MARINE</i>	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"

CAISSON & UNDERPINNING TOP MAN <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2024	\$47.28	\$9.65	\$18.22	\$0.00	\$75.15
	06/01/2025	\$48.78	\$9.65	\$18.22	\$0.00	\$76.65
	12/01/2025	\$50.28	\$9.65	\$18.22	\$0.00	\$78.15
	06/01/2026	\$51.83	\$9.65	\$18.22	\$0.00	\$79.70
	12/01/2026	\$53.33	\$9.65	\$18.22	\$0.00	\$81.20

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.11	\$9.65	\$17.70	\$0.00	\$67.46
	06/01/2025	\$41.50	\$9.65	\$17.70	\$0.00	\$68.85
	12/01/2025	\$42.88	\$9.65	\$17.70	\$0.00	\$70.23
	06/01/2026	\$44.32	\$9.65	\$17.70	\$0.00	\$71.67
	12/01/2026	\$45.76	\$9.65	\$17.70	\$0.00	\$73.11
	06/01/2027	\$47.21	\$9.65	\$17.70	\$0.00	\$74.56
	12/01/2027	\$48.66	\$9.65	\$17.70	\$0.00	\$76.01
	06/01/2028	\$50.16	\$9.65	\$17.70	\$0.00	\$77.51
	12/01/2028	\$51.66	\$9.65	\$17.70	\$0.00	\$79.01

For apprentice rates see "Apprentice- LABORER"

CARPENTER <i>CARPENTERS -ZONE 2 (Eastern Massachusetts)</i>	09/01/2024	\$48.37	\$9.83	\$19.97	\$0.00	\$78.17
	03/01/2025	\$49.62	\$9.83	\$19.97	\$0.00	\$79.42
	09/01/2025	\$50.87	\$9.83	\$19.97	\$0.00	\$80.67
	03/01/2026	\$52.12	\$9.83	\$19.97	\$0.00	\$81.92
	09/01/2026	\$53.37	\$9.83	\$19.97	\$0.00	\$83.17
	03/01/2027	\$54.62	\$9.83	\$19.97	\$0.00	\$84.42

Apprentice - CARPENTER - Zone 2 Eastern MA

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$21.77	\$9.83	\$1.73	\$0.00	\$33.33
2	45	\$21.77	\$9.83	\$1.73	\$0.00	\$33.33
3	55	\$26.60	\$9.83	\$3.40	\$0.00	\$39.83
4	55	\$26.60	\$9.83	\$3.40	\$0.00	\$39.83
5	70	\$33.86	\$9.83	\$16.51	\$0.00	\$60.20
6	70	\$33.86	\$9.83	\$16.51	\$0.00	\$60.20
7	80	\$38.70	\$9.83	\$18.24	\$0.00	\$66.77
8	80	\$38.70	\$9.83	\$18.24	\$0.00	\$66.77

Effective Date - 03/01/2025

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

Notes:

Apprentice to Journeyworker Ratio:1:5

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

All Aspects of New Wood Frame Work

Apprentice - CARPENTER (Wood Frame) - Zone 3

Effective Date - 10/01/2024

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

Effective Date - 10/01/2025

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

Notes:

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING <i>BRICKLAYERS LOCAL 3 (LOWELL)</i>	01/01/2024	\$49.33	\$13.00	\$23.57	\$1.30	\$87.20
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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - CEMENT MASONRY/PLASTERING - Lowell

Effective Date - 01/01/2024

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

Notes:

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

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.11	\$9.65	\$17.70	\$0.00	\$67.46
	06/01/2025	\$41.50	\$9.65	\$17.70	\$0.00	\$68.85
	12/01/2025	\$42.88	\$9.65	\$17.70	\$0.00	\$70.23
	06/01/2026	\$44.32	\$9.65	\$17.70	\$0.00	\$71.67
	12/01/2026	\$45.76	\$9.65	\$17.70	\$0.00	\$73.11
	06/01/2027	\$47.21	\$9.65	\$17.70	\$0.00	\$74.56
	12/01/2027	\$48.66	\$9.65	\$17.70	\$0.00	\$76.01
	06/01/2028	\$50.16	\$9.65	\$17.70	\$0.00	\$77.51
	12/01/2028	\$51.66	\$9.65	\$17.70	\$0.00	\$79.01

For apprentice rates see "Apprentice- LABORER"

CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$58.18	\$15.55	\$16.50	\$0.00	\$90.23
	06/01/2025	\$59.51	\$15.55	\$16.50	\$0.00	\$91.56
	12/01/2025	\$60.98	\$15.55	\$16.50	\$0.00	\$93.03
	06/01/2026	\$62.31	\$15.55	\$16.50	\$0.00	\$94.36
	12/01/2026	\$63.79	\$15.55	\$16.50	\$0.00	\$95.84

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

COMPRESSOR OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$36.67	\$15.55	\$16.50	\$0.00	\$68.72
	06/01/2025	\$37.52	\$15.55	\$16.50	\$0.00	\$69.57
	12/01/2025	\$38.47	\$15.55	\$16.50	\$0.00	\$70.52
	06/01/2026	\$39.33	\$15.55	\$16.50	\$0.00	\$71.38
	12/01/2026	\$40.28	\$15.55	\$16.50	\$0.00	\$72.33

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

DELEADER (BRIDGE) <i>PAINTERS LOCAL 35 - ZONE 2</i>	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	12/02/2024	\$47.00	\$9.65	\$18.40	\$0.00	\$75.05
LABORERS - ZONE 2	06/02/2025	\$48.50	\$9.65	\$18.40	\$0.00	\$76.55
	12/01/2025	\$50.00	\$9.65	\$18.40	\$0.00	\$78.05
	06/01/2026	\$51.55	\$9.65	\$18.40	\$0.00	\$79.60
	12/07/2026	\$53.05	\$9.65	\$18.40	\$0.00	\$81.10
	06/07/2027	\$54.65	\$9.65	\$18.40	\$0.00	\$82.70
	12/06/2027	\$56.25	\$9.65	\$18.40	\$0.00	\$84.30
	06/05/2028	\$57.93	\$9.65	\$18.40	\$0.00	\$85.98
	12/04/2028	\$59.60	\$9.65	\$18.40	\$0.00	\$87.65

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: BACKHOE/LOADER/HAMMER OPERATOR <i>LABORERS - ZONE 2</i>	12/02/2024	\$48.00	\$9.65	\$18.40	\$0.00	\$76.05
	06/02/2025	\$49.50	\$9.65	\$18.40	\$0.00	\$77.55
	12/01/2025	\$51.00	\$9.65	\$18.40	\$0.00	\$79.05
	06/01/2026	\$52.55	\$9.65	\$18.40	\$0.00	\$80.60
	12/07/2026	\$54.05	\$9.65	\$18.40	\$0.00	\$82.10
	06/07/2027	\$55.65	\$9.65	\$18.40	\$0.00	\$83.70
	12/06/2027	\$57.25	\$9.65	\$18.40	\$0.00	\$85.30
	06/05/2028	\$58.93	\$9.65	\$18.40	\$0.00	\$86.98
	12/04/2028	\$60.60	\$9.65	\$18.40	\$0.00	\$88.65
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS <i>LABORERS - ZONE 2</i>	12/02/2024	\$47.75	\$9.65	\$18.40	\$0.00	\$75.80
	06/02/2025	\$49.25	\$9.65	\$18.40	\$0.00	\$77.30
	12/01/2025	\$50.75	\$9.65	\$18.40	\$0.00	\$78.80
	06/01/2026	\$52.30	\$9.65	\$18.40	\$0.00	\$80.35
	12/07/2026	\$53.80	\$9.65	\$18.40	\$0.00	\$81.85
	06/07/2027	\$55.40	\$9.65	\$18.40	\$0.00	\$83.45
	12/06/2027	\$57.00	\$9.65	\$18.40	\$0.00	\$85.05
	06/05/2028	\$58.68	\$9.65	\$18.40	\$0.00	\$86.73
	12/04/2028	\$60.35	\$9.65	\$18.40	\$0.00	\$88.40
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER <i>LABORERS - ZONE 2</i>	12/02/2024	\$48.00	\$9.65	\$18.40	\$0.00	\$76.05
	06/02/2025	\$49.50	\$9.65	\$18.40	\$0.00	\$77.55
	12/01/2025	\$51.00	\$9.65	\$18.40	\$0.00	\$79.05
	06/01/2026	\$52.55	\$9.65	\$18.40	\$0.00	\$80.60
	12/07/2026	\$54.05	\$9.65	\$18.40	\$0.00	\$82.10
	06/07/2027	\$55.65	\$9.65	\$18.40	\$0.00	\$83.70
	12/06/2027	\$57.25	\$9.65	\$18.40	\$0.00	\$85.30
	06/05/2028	\$58.93	\$9.65	\$18.40	\$0.00	\$86.98
	12/04/2028	\$60.60	\$9.65	\$18.40	\$0.00	\$88.65
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR <i>LABORERS - ZONE 2</i>	12/02/2024	\$47.75	\$9.65	\$18.40	\$0.00	\$75.80
	06/02/2025	\$49.25	\$9.65	\$18.40	\$0.00	\$77.30
	12/01/2025	\$50.75	\$9.65	\$18.40	\$0.00	\$78.80
	06/01/2026	\$52.30	\$9.65	\$18.40	\$0.00	\$80.35
	12/07/2026	\$53.80	\$9.65	\$18.40	\$0.00	\$81.85
	06/07/2027	\$55.40	\$9.65	\$18.40	\$0.00	\$83.45
	12/06/2027	\$57.00	\$9.65	\$18.40	\$0.00	\$85.05
	06/05/2028	\$58.68	\$9.65	\$18.40	\$0.00	\$86.73
	12/04/2028	\$60.35	\$9.65	\$18.40	\$0.00	\$88.40
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: WRECKING LABORER <i>LABORERS - ZONE 2</i>	12/02/2024	\$47.00	\$9.65	\$18.40	\$0.00	\$75.05
	06/02/2025	\$48.50	\$9.65	\$18.40	\$0.00	\$76.55
	12/01/2025	\$50.00	\$9.65	\$18.40	\$0.00	\$78.05
	06/01/2026	\$51.55	\$9.65	\$18.40	\$0.00	\$79.60
	12/07/2026	\$53.05	\$9.65	\$18.40	\$0.00	\$81.10
	06/07/2027	\$54.65	\$9.65	\$18.40	\$0.00	\$82.70
	12/06/2027	\$56.25	\$9.65	\$18.40	\$0.00	\$84.30
	06/05/2028	\$57.93	\$9.65	\$18.40	\$0.00	\$85.98
	12/04/2028	\$59.60	\$9.65	\$18.40	\$0.00	\$87.65
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$56.40	\$15.55	\$16.50	\$0.00	\$88.45
	06/01/2025	\$57.68	\$15.55	\$16.50	\$0.00	\$89.73
	12/01/2025	\$59.12	\$15.55	\$16.50	\$0.00	\$91.17
	06/01/2026	\$60.40	\$15.55	\$16.50	\$0.00	\$92.45
	12/01/2026	\$61.84	\$15.55	\$16.50	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2024	\$78.11	\$10.08	\$21.66	\$0.00	\$109.85
	as of 8-1-24, Apprentices with diving licenses begin at second year. % of Diver wage 70/80/90 2A \$69.83, 3A \$91.79,4A \$102.14 Total Rate					
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2024	\$55.79	\$10.08	\$24.29	\$0.00	\$90.16
	as of 8-1-24, Apprentices with diving licenses begin at second year. % of Piledriver wage 70/80/90 2A \$54.20, 3A \$73.93,4A \$82.05 Total Rate					
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2024	\$83.69	\$10.08	\$24.29	\$0.00	\$118.06
	For apprentice rates see "Apprentice- PILE DRIVER"					
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2024	\$117.16	\$10.08	\$24.29	\$0.00	\$151.53
	For apprentice rates see "Apprentice- PILE DRIVER"					
DRAWBRIDGE OPERATOR (Construction) <i>DRAWBRIDGE - SEIU LOCAL 888</i>	07/01/2020	\$26.77	\$6.67	\$3.93	\$0.16	\$37.53
ELECTRICIAN <i>ELECTRICIANS LOCAL 103</i>	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 - 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

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$25.99	\$13.00	\$0.78	\$0.00	\$39.77
2	40	\$25.99	\$13.00	\$0.78	\$0.00	\$39.77
3	45	\$29.24	\$13.00	\$16.71	\$0.00	\$58.95
4	45	\$29.24	\$13.00	\$16.71	\$0.00	\$58.95
5	50	\$32.49	\$13.00	\$17.21	\$0.00	\$62.70
6	55	\$35.74	\$13.00	\$17.72	\$0.00	\$66.46
7	60	\$38.99	\$13.00	\$18.23	\$0.00	\$70.22
8	65	\$42.24	\$13.00	\$18.74	\$0.00	\$73.98
9	70	\$45.49	\$13.00	\$19.24	\$0.00	\$77.73
10	75	\$48.74	\$13.00	\$19.76	\$0.00	\$81.50

Notes :

Apprentice to Journeyworker Ratio:2:3***

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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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 <i>ELEVATOR CONSTRUCTORS LOCAL 4</i>	01/01/2022	\$45.93	\$16.03	\$20.21	\$0.00	\$82.17
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For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21

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

FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2024	\$51.78	\$15.30	\$16.40	\$0.00	\$83.48
	05/01/2025	\$53.22	\$15.30	\$16.40	\$0.00	\$84.92
	11/01/2025	\$54.51	\$15.30	\$16.40	\$0.00	\$86.21
	05/01/2026	\$55.95	\$15.30	\$16.40	\$0.00	\$87.65
	11/01/2026	\$57.24	\$15.30	\$16.40	\$0.00	\$88.94
	05/01/2027	\$58.67	\$15.30	\$16.40	\$0.00	\$90.37

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2024	\$53.37	\$15.30	\$16.40	\$0.00	\$85.07
	05/01/2025	\$54.82	\$15.30	\$16.40	\$0.00	\$86.52
	11/01/2025	\$56.12	\$15.30	\$16.40	\$0.00	\$87.82
	05/01/2026	\$57.57	\$15.30	\$16.40	\$0.00	\$89.27
	11/01/2026	\$58.87	\$15.30	\$16.40	\$0.00	\$90.57
	05/01/2027	\$60.32	\$15.30	\$16.40	\$0.00	\$92.02

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2024	\$25.37	\$15.30	\$16.40	\$0.00	\$57.07
	05/01/2025	\$26.22	\$15.30	\$16.40	\$0.00	\$57.92
	11/01/2025	\$26.98	\$15.30	\$16.40	\$0.00	\$58.68
	05/01/2026	\$27.83	\$15.30	\$16.40	\$0.00	\$59.53
	11/01/2026	\$28.59	\$15.30	\$16.40	\$0.00	\$60.29
	05/01/2027	\$29.44	\$15.30	\$16.40	\$0.00	\$61.14

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 103</i>	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 <i>LOCAL 103</i> / COMMISSIONING <i>ELECTRICIANS</i>	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) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$45.96	\$15.55	\$16.50	\$0.00	\$78.01
	06/01/2025	\$47.02	\$15.55	\$16.50	\$0.00	\$79.07
	12/01/2025	\$48.19	\$15.55	\$16.50	\$0.00	\$80.24
	06/01/2026	\$49.25	\$15.55	\$16.50	\$0.00	\$81.30
	12/01/2026	\$50.43	\$15.55	\$16.50	\$0.00	\$82.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$27.01	\$9.65	\$17.80	\$0.00	\$54.46
	06/01/2025	\$28.09	\$9.65	\$17.80	\$0.00	\$55.54
	12/01/2025	\$28.09	\$9.65	\$17.80	\$0.00	\$55.54
	06/01/2026	\$29.21	\$9.65	\$17.80	\$0.00	\$56.66
	12/01/2026	\$29.21	\$9.65	\$17.80	\$0.00	\$56.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE 1</i>	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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - FLOORCOVERER - Local 2168 Zone I

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

Effective Date - 03/01/2025

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

Notes: Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$57.03	\$15.55	\$16.50	\$0.00	\$89.08
	06/01/2025	\$58.33	\$15.55	\$16.50	\$0.00	\$90.38
	12/01/2025	\$59.78	\$15.55	\$16.50	\$0.00	\$91.83
	06/01/2026	\$61.08	\$15.55	\$16.50	\$0.00	\$93.13
	12/01/2026	\$62.53	\$15.55	\$16.50	\$0.00	\$94.58

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GENERATOR/LIGHTING PLANT/HEATERS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$36.67	\$15.55	\$16.50	\$0.00	\$68.72
	06/01/2025	\$37.52	\$15.55	\$16.50	\$0.00	\$69.57
	12/01/2025	\$38.47	\$15.55	\$16.50	\$0.00	\$70.52
	06/01/2026	\$39.33	\$15.55	\$16.50	\$0.00	\$71.38
	12/01/2026	\$40.28	\$15.55	\$16.50	\$0.00	\$72.33

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) <i>GLAZIERS LOCAL 35 (ZONE 2)</i>	07/01/2024	\$46.76	\$9.95	\$23.95	\$0.00	\$80.66
	01/01/2025	\$47.96	\$9.95	\$23.95	\$0.00	\$81.86

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - GLAZIER - Local 35 Zone 2

Effective Date - 07/01/2024

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

Effective Date - 01/01/2025

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

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

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

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - OPERATING ENGINEERS - Local 4

Effective Date - 12/01/2024

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

Effective Date - 06/01/2025

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

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 17 - A	08/01/2024	\$57.94	\$14.75	\$28.12	\$2.98	\$103.79
	02/01/2025	\$59.69	\$14.75	\$28.12	\$2.98	\$105.54
	08/01/2025	\$61.54	\$14.75	\$28.12	\$2.98	\$107.39
	02/01/2026	\$63.49	\$14.75	\$28.12	\$2.98	\$109.34

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 103	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"

HVAC (TESTING AND BALANCING - AIR) SHEETMETAL WORKERS LOCAL 17 - A	08/01/2024	\$57.94	\$14.75	\$28.12	\$2.98	\$103.79
	02/01/2025	\$59.69	\$14.75	\$28.12	\$2.98	\$105.54
	08/01/2025	\$61.54	\$14.75	\$28.12	\$2.98	\$107.39
	02/01/2026	\$63.49	\$14.75	\$28.12	\$2.98	\$109.34

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) <i>PIPEFITTERS LOCAL 537</i>	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 <i>PIPEFITTERS LOCAL 537</i>	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 <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.61	\$9.65	\$17.70	\$0.00	\$67.96
	06/01/2025	\$42.00	\$9.65	\$17.70	\$0.00	\$69.35
	12/01/2025	\$43.38	\$9.65	\$17.70	\$0.00	\$70.73
	06/01/2026	\$44.82	\$9.65	\$17.70	\$0.00	\$72.17
	12/01/2026	\$46.26	\$9.65	\$17.70	\$0.00	\$73.61
	06/01/2027	\$47.71	\$9.65	\$17.70	\$0.00	\$75.06
	12/01/2027	\$49.16	\$9.65	\$17.70	\$0.00	\$76.51
	06/01/2028	\$50.66	\$9.65	\$17.70	\$0.00	\$78.01
	12/01/2028	\$52.16	\$9.65	\$17.70	\$0.00	\$79.51
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$40.61	\$9.65	\$17.80	\$0.00	\$68.06
	06/01/2025	\$42.00	\$9.65	\$17.80	\$0.00	\$69.45
	12/01/2025	\$43.38	\$9.65	\$17.80	\$0.00	\$70.83
	06/01/2026	\$44.82	\$9.65	\$17.80	\$0.00	\$72.27
	12/01/2026	\$46.26	\$9.65	\$17.80	\$0.00	\$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (BOSTON)</i>	09/01/2024	\$56.92	\$14.75	\$19.61	\$0.00	\$91.28
	09/01/2025	\$60.34	\$14.75	\$19.61	\$0.00	\$94.70
	09/01/2026	\$63.76	\$14.75	\$19.61	\$0.00	\$98.12

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

Effective Date - 09/01/2024

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

Effective Date - 09/01/2025

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

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER <i>IRONWORKERS LOCAL 7 (BOSTON AREA)</i>	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

JACKHAMMER & PAVING BREAKER OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.11	\$9.65	\$17.70	\$0.00	\$67.46
	06/01/2025	\$41.50	\$9.65	\$17.70	\$0.00	\$68.85
	12/01/2025	\$42.88	\$9.65	\$17.70	\$0.00	\$70.23
	06/01/2026	\$44.32	\$9.65	\$17.70	\$0.00	\$71.67
	12/01/2026	\$45.76	\$9.65	\$17.70	\$0.00	\$73.11
	06/01/2027	\$47.21	\$9.65	\$17.70	\$0.00	\$74.56
	12/01/2027	\$48.66	\$9.65	\$17.70	\$0.00	\$76.01
	06/01/2028	\$50.16	\$9.65	\$17.70	\$0.00	\$77.51
	12/01/2028	\$51.66	\$9.65	\$17.70	\$0.00	\$79.01

For apprentice rates see "Apprentice- LABORER"

LABORER <i>LABORERS - ZONE 2</i>	12/01/2024	\$39.86	\$9.65	\$17.70	\$0.00	\$67.21
	06/01/2025	\$41.25	\$9.65	\$17.70	\$0.00	\$68.60
	12/01/2025	\$42.63	\$9.65	\$17.70	\$0.00	\$69.98
	06/01/2026	\$44.07	\$9.65	\$17.70	\$0.00	\$71.42
	12/01/2026	\$45.51	\$9.65	\$17.70	\$0.00	\$72.86
	06/01/2027	\$46.96	\$9.65	\$17.70	\$0.00	\$74.31
	12/01/2027	\$48.41	\$9.65	\$17.70	\$0.00	\$75.76
	06/01/2028	\$49.91	\$9.65	\$17.70	\$0.00	\$77.26
	12/01/2028	\$51.41	\$9.65	\$17.70	\$0.00	\$78.76

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - LABORER - Zone 2

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$23.92	\$9.65	\$17.70	\$0.00	\$51.27
2	70	\$27.90	\$9.65	\$17.70	\$0.00	\$55.25
3	80	\$31.89	\$9.65	\$17.70	\$0.00	\$59.24
4	90	\$35.87	\$9.65	\$17.70	\$0.00	\$63.22

Effective Date - 06/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$24.75	\$9.65	\$17.70	\$0.00	\$52.10
2	70	\$28.88	\$9.65	\$17.70	\$0.00	\$56.23
3	80	\$33.00	\$9.65	\$17.70	\$0.00	\$60.35
4	90	\$37.13	\$9.65	\$17.70	\$0.00	\$64.48

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY)	12/01/2024	\$39.86	\$9.65	\$17.80	\$0.00	\$67.31
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	06/01/2025	\$41.25	\$9.65	\$17.80	\$0.00	\$68.70
	12/01/2025	\$42.63	\$9.65	\$17.80	\$0.00	\$70.08
	06/01/2026	\$44.07	\$9.65	\$17.80	\$0.00	\$71.52
	12/01/2026	\$45.51	\$9.65	\$17.80	\$0.00	\$72.96

Apprentice - LABORER (Heavy & Highway) - Zone 2

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$23.92	\$9.65	\$17.80	\$0.00	\$51.37
2	70	\$27.90	\$9.65	\$17.80	\$0.00	\$55.35
3	80	\$31.89	\$9.65	\$17.80	\$0.00	\$59.34
4	90	\$35.87	\$9.65	\$17.80	\$0.00	\$63.32

Effective Date - 06/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$24.75	\$9.65	\$17.80	\$0.00	\$52.20
2	70	\$28.88	\$9.65	\$17.80	\$0.00	\$56.33
3	80	\$33.00	\$9.65	\$17.80	\$0.00	\$60.45
4	90	\$37.13	\$9.65	\$17.80	\$0.00	\$64.58

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER <i>LABORERS - ZONE 2</i>	12/01/2024	\$39.86	\$9.65	\$17.70	\$0.00	\$67.21
	06/01/2025	\$41.25	\$9.65	\$17.70	\$0.00	\$68.60
	12/01/2025	\$42.63	\$9.65	\$17.70	\$0.00	\$69.98
	06/01/2026	\$44.07	\$9.65	\$17.70	\$0.00	\$71.42
	12/01/2026	\$45.51	\$9.65	\$17.70	\$0.00	\$72.86
	06/01/2027	\$46.96	\$9.65	\$17.70	\$0.00	\$74.31
	12/01/2027	\$48.41	\$9.65	\$17.70	\$0.00	\$75.76
	06/01/2028	\$49.91	\$9.65	\$17.70	\$0.00	\$77.26
	12/01/2028	\$51.41	\$9.65	\$17.70	\$0.00	\$78.76
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER <i>LABORERS - ZONE 2</i>	12/01/2024	\$39.86	\$9.65	\$17.70	\$0.00	\$67.21
	06/01/2025	\$41.25	\$9.65	\$17.70	\$0.00	\$68.60
	12/01/2025	\$42.63	\$9.65	\$17.70	\$0.00	\$69.98
	06/01/2026	\$44.07	\$9.65	\$17.70	\$0.00	\$71.42
	12/01/2026	\$45.51	\$9.65	\$17.70	\$0.00	\$72.86
	06/01/2027	\$46.96	\$9.65	\$17.70	\$0.00	\$74.31
	12/01/2027	\$48.41	\$9.65	\$17.70	\$0.00	\$75.76
	06/01/2028	\$49.91	\$9.65	\$17.70	\$0.00	\$77.26
	12/01/2028	\$51.41	\$9.65	\$17.70	\$0.00	\$78.76
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER <i>LABORERS - ZONE 2</i>	12/02/2024	\$39.95	\$9.65	\$17.76	\$0.00	\$67.36
	06/02/2025	\$41.34	\$9.65	\$17.76	\$0.00	\$68.75
	12/01/2025	\$42.72	\$9.65	\$17.76	\$0.00	\$70.13
	06/01/2026	\$44.16	\$9.65	\$17.76	\$0.00	\$71.57
	12/07/2026	\$45.60	\$9.65	\$17.76	\$0.00	\$73.01
	06/07/2027	\$47.05	\$9.65	\$17.76	\$0.00	\$74.46
	12/06/2027	\$48.50	\$9.65	\$17.76	\$0.00	\$75.91
	06/05/2028	\$50.00	\$9.65	\$17.76	\$0.00	\$77.41
	12/04/2028	\$51.50	\$9.65	\$17.76	\$0.00	\$78.91
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.11	\$9.65	\$17.70	\$0.00	\$67.46
	06/01/2025	\$41.50	\$9.65	\$17.70	\$0.00	\$68.85
	12/01/2025	\$42.88	\$9.65	\$17.70	\$0.00	\$70.23
	06/01/2026	\$44.32	\$9.65	\$17.70	\$0.00	\$71.67
	12/01/2026	\$45.76	\$9.65	\$17.70	\$0.00	\$73.11
	06/01/2027	\$47.21	\$9.65	\$17.70	\$0.00	\$74.56
	12/01/2027	\$48.66	\$9.65	\$17.70	\$0.00	\$76.01
	06/01/2028	\$50.16	\$9.65	\$17.70	\$0.00	\$77.51
	12/01/2028	\$51.66	\$9.65	\$17.70	\$0.00	\$79.01
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 2</i>	12/01/2024	\$39.86	\$9.65	\$17.70	\$0.00	\$67.21
	06/01/2025	\$41.25	\$9.65	\$17.70	\$0.00	\$68.60
	12/01/2025	\$42.63	\$9.65	\$17.70	\$0.00	\$69.98
	06/01/2026	\$44.07	\$9.65	\$17.70	\$0.00	\$71.42
	12/01/2026	\$45.51	\$9.65	\$17.70	\$0.00	\$72.86
	06/01/2027	\$46.96	\$9.65	\$17.70	\$0.00	\$74.31
	12/01/2027	\$48.41	\$9.65	\$17.70	\$0.00	\$75.76
	06/01/2028	\$49.91	\$9.65	\$17.70	\$0.00	\$77.26
	12/01/2028	\$51.41	\$9.65	\$17.70	\$0.00	\$78.76
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER <i>LABORERS - ZONE 2</i>	12/01/2024	\$39.86	\$9.65	\$17.70	\$0.00	\$67.21
	06/01/2025	\$41.25	\$9.65	\$17.70	\$0.00	\$68.60
	12/01/2025	\$42.63	\$9.65	\$17.70	\$0.00	\$69.98
	06/01/2026	\$44.07	\$9.65	\$17.70	\$0.00	\$71.42
	12/01/2026	\$45.51	\$9.65	\$17.70	\$0.00	\$72.86
	06/01/2027	\$46.96	\$9.65	\$17.70	\$0.00	\$74.31
	12/01/2027	\$48.41	\$9.65	\$17.70	\$0.00	\$75.76
	06/01/2028	\$49.91	\$9.65	\$17.70	\$0.00	\$77.26
	12/01/2028	\$51.41	\$9.65	\$17.70	\$0.00	\$78.76
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.11	\$9.65	\$17.70	\$0.00	\$67.46
	06/01/2025	\$41.50	\$9.65	\$17.70	\$0.00	\$68.85
	12/01/2025	\$42.88	\$9.65	\$17.70	\$0.00	\$70.23
	06/01/2026	\$44.32	\$9.65	\$17.70	\$0.00	\$71.67
	12/01/2026	\$45.76	\$9.65	\$17.70	\$0.00	\$73.11
	06/01/2027	\$47.21	\$9.65	\$17.70	\$0.00	\$74.56
	12/01/2027	\$48.66	\$9.65	\$17.70	\$0.00	\$76.01
	06/01/2028	\$50.16	\$9.65	\$17.70	\$0.00	\$77.51
	12/01/2028	\$51.66	\$9.65	\$17.70	\$0.00	\$79.01
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	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	08/01/2024	\$64.52	\$11.49	\$23.56	\$0.00	\$99.57
BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2025	\$65.82	\$11.49	\$23.56	\$0.00	\$100.87
	08/01/2025	\$67.97	\$11.49	\$23.56	\$0.00	\$103.02
	02/01/2026	\$69.32	\$11.49	\$23.56	\$0.00	\$104.37
	08/01/2026	\$71.52	\$11.49	\$23.56	\$0.00	\$106.57
	02/01/2027	\$72.92	\$11.49	\$23.56	\$0.00	\$107.97

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile

Effective Date - 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) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$56.40	\$15.55	\$16.50	\$0.00	\$88.45
	06/01/2025	\$57.68	\$15.55	\$16.50	\$0.00	\$89.73
	12/01/2025	\$59.12	\$15.55	\$16.50	\$0.00	\$91.17
	06/01/2026	\$60.40	\$15.55	\$16.50	\$0.00	\$92.45
	12/01/2026	\$61.84	\$15.55	\$16.50	\$0.00	\$93.89

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$56.40	\$15.55	\$16.50	\$0.00	\$88.45
	06/01/2025	\$57.68	\$15.55	\$16.50	\$0.00	\$89.73
	12/01/2025	\$59.12	\$15.55	\$16.50	\$0.00	\$91.17
	06/01/2026	\$60.40	\$15.55	\$16.50	\$0.00	\$92.45
	12/01/2026	\$61.84	\$15.55	\$16.50	\$0.00	\$93.89

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 2) <i>MILLWRIGHTS LOCAL 1121 - Zone 2</i>	01/01/2024	\$42.76	\$10.08	\$21.47	\$0.00	\$74.31
	01/06/2025	\$45.09	\$10.08	\$21.47	\$0.00	\$76.64
	01/05/2026	\$47.42	\$10.08	\$21.47	\$0.00	\$78.97

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - MILLWRIGHT - Local 1121 Zone 2

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$23.52	\$10.08	\$5.50	\$0.00	\$39.10
2	65	\$27.79	\$10.08	\$6.50	\$0.00	\$44.37
3	75	\$32.07	\$10.08	\$18.97	\$0.00	\$61.12
4	85	\$36.35	\$10.08	\$19.97	\$0.00	\$66.40

Effective Date - 01/06/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$24.80	\$10.08	\$5.50	\$0.00	\$40.38
2	65	\$29.31	\$10.08	\$6.50	\$0.00	\$45.89
3	75	\$33.82	\$10.08	\$18.97	\$0.00	\$62.87
4	85	\$38.33	\$10.08	\$19.97	\$0.00	\$68.38

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	12/01/2024	\$40.11	\$9.65	\$17.70	\$0.00	\$67.46
<i>LABORERS - ZONE 2</i>	06/01/2025	\$41.50	\$9.65	\$17.70	\$0.00	\$68.85
	12/01/2025	\$42.88	\$9.65	\$17.70	\$0.00	\$70.23
	06/01/2026	\$44.32	\$9.65	\$17.70	\$0.00	\$71.67
	12/01/2026	\$45.76	\$9.65	\$17.70	\$0.00	\$73.11
	06/01/2027	\$47.21	\$9.65	\$17.70	\$0.00	\$74.56
	12/01/2027	\$48.66	\$9.65	\$17.70	\$0.00	\$76.01
	06/01/2028	\$50.16	\$9.65	\$17.70	\$0.00	\$77.51
	12/01/2028	\$51.66	\$9.65	\$17.70	\$0.00	\$79.01

For apprentice rates see "Apprentice- LABORER"

OILER (OTHER THAN TRUCK CRANES,GRADALLS)	12/01/2024	\$25.37	\$15.30	\$16.40	\$0.00	\$57.07
<i>OPERATING ENGINEERS LOCAL 4</i>	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)	12/01/2024	\$31.08	\$15.30	\$16.40	\$0.00	\$62.78
<i>OPERATING ENGINEERS LOCAL 4</i>	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 <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$56.40	\$15.55	\$16.50	\$0.00	\$88.45
	06/01/2025	\$57.68	\$15.55	\$16.50	\$0.00	\$89.73
	12/01/2025	\$59.12	\$15.55	\$16.50	\$0.00	\$91.17
	06/01/2026	\$60.40	\$15.55	\$16.50	\$0.00	\$92.45
	12/01/2026	\$61.84	\$15.55	\$16.50	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) <i>PAINTERS LOCAL 35 - ZONE 2</i>	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) *	07/01/2024	\$48.16	\$9.95	\$23.95	\$0.00	\$82.06
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. <i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2025	\$49.36	\$9.95	\$23.95	\$0.00	\$83.26

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

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

Effective Date - 07/01/2024

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

Effective Date - 01/01/2025

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

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

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

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

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

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.11	\$9.95	\$0.00	\$0.00	\$33.06
2	55	\$25.42	\$9.95	\$6.66	\$0.00	\$42.03
3	60	\$27.73	\$9.95	\$7.26	\$0.00	\$44.94
4	65	\$30.04	\$9.95	\$7.87	\$0.00	\$47.86
5	70	\$32.35	\$9.95	\$20.32	\$0.00	\$62.62
6	75	\$34.67	\$9.95	\$20.93	\$0.00	\$65.55
7	80	\$36.98	\$9.95	\$21.53	\$0.00	\$68.46
8	90	\$41.60	\$9.95	\$22.74	\$0.00	\$74.29

Effective Date - 01/01/2025

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

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	07/01/2024	\$46.76	\$9.95	\$23.95	\$0.00	\$80.66
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	01/01/2025	\$47.96	\$9.95	\$23.95	\$0.00	\$81.86

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER - Local 35 Zone 2 - BRUSH NEW

Effective Date - 07/01/2024

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

Effective Date - 01/01/2025

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

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

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

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT

Effective Date - 07/01/2024

Table with 7 columns: Step, percent, Apprentice Base Wage, Health, Pension, Supplemental Unemployment, Total Rate. Rows 1-8 showing wage progression from 50% to 90%.

Effective Date - 01/01/2025

Table with 7 columns: Step, percent, Apprentice Base Wage, Health, Pension, Supplemental Unemployment, Total Rate. Rows 1-8 showing wage progression from 50% to 90%.

Notes: Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Table with 7 columns: Classification, Effective Date, Base Wage, Health, Pension, Supplemental Unemployment, Total Rate. Rows for PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) LABORERS - ZONE 2 (HEAVY & HIGHWAY) with dates from 12/01/2024 to 12/01/2026.

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

Table with 7 columns: Classification, Effective Date, Base Wage, Health, Pension, Supplemental Unemployment, Total Rate. Rows for PANEL & PICKUP TRUCKS DRIVER TEAMSTERS JOINT COUNCIL NO. 10 ZONE B with dates from 12/01/2024 to 01/01/2027.

Table with 7 columns: Classification, Effective Date, Base Wage, Health, Pension, Supplemental Unemployment, Total Rate. Rows for PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) PILE DRIVER LOCAL 56 (ZONE 1) with dates 08/01/2024 and reference to "Apprentice- PILE DRIVER".

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PILE DRIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2024	\$55.79	\$10.08	\$24.29	\$0.00	\$90.16

Apprentice - PILE DRIVER - Local 56 Zone 1

Effective Date - 08/01/2024

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

Notes:
 % Indentured BEFORE 8/1/20; 50/60/70/75/80/80/90/90
 Step 1 \$62.27/ 2 \$67.84/ 3 \$73.42/ 4 \$76.21/ 5&6 \$79.00/ 7&8 \$84.58
Apprentice to Journeyworker Ratio: 1:5

PIPEFITTER & STEAMFITTER <i>PIPEFITTERS LOCAL 537</i>	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 - 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

Effective Date - 03/01/2025

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

Notes:
 ** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.
 Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)
Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.11	\$9.65	\$17.70	\$0.00	\$67.46
	06/01/2025	\$41.50	\$9.65	\$17.70	\$0.00	\$68.85
	12/01/2025	\$42.88	\$9.65	\$17.70	\$0.00	\$70.23
	06/01/2026	\$44.32	\$9.65	\$17.70	\$0.00	\$71.67
	12/01/2026	\$45.76	\$9.65	\$17.70	\$0.00	\$73.11
	06/01/2027	\$47.21	\$9.65	\$17.70	\$0.00	\$74.56
	12/01/2027	\$48.66	\$9.65	\$17.70	\$0.00	\$76.01
	06/01/2028	\$50.16	\$9.65	\$17.70	\$0.00	\$77.51
	12/01/2028	\$51.66	\$9.65	\$17.70	\$0.00	\$79.01
For apprentice rates see "Apprentice- LABORER"						
PIPELAYER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
PLUMBERS & GASFITTERS <i>PLUMBERS & GASFITTERS LOCAL 12</i>	09/01/2024	\$69.04	\$14.32	\$19.61	\$0.00	\$102.97
	03/02/2025	\$70.84	\$14.32	\$19.61	\$0.00	\$104.77

Apprentice - PLUMBER/GASFITTER - Local 12

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$24.16	\$14.32	\$7.06	\$0.00	\$45.54
2	40	\$27.62	\$14.32	\$8.02	\$0.00	\$49.96
3	55	\$37.97	\$14.32	\$10.93	\$0.00	\$63.22
4	65	\$44.88	\$14.32	\$12.86	\$0.00	\$72.06
5	75	\$51.78	\$14.32	\$14.79	\$0.00	\$80.89

Effective Date - 03/02/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$24.79	\$14.32	\$7.06	\$0.00	\$46.17
2	40	\$28.34	\$14.32	\$8.02	\$0.00	\$50.68
3	55	\$38.96	\$14.32	\$10.93	\$0.00	\$64.21
4	65	\$46.05	\$14.32	\$12.86	\$0.00	\$73.23
5	75	\$53.13	\$14.32	\$14.79	\$0.00	\$82.24

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic\$76.49 tot.rate, Step5 with lic. \$85.32 tot. rate

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.) <i>PIPEFITTERS LOCAL 537</i>	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"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.61	\$9.65	\$17.70	\$0.00	\$67.96
	06/01/2025	\$42.00	\$9.65	\$17.70	\$0.00	\$69.35
	12/01/2025	\$43.38	\$9.65	\$17.70	\$0.00	\$70.73
	06/01/2026	\$44.82	\$9.65	\$17.70	\$0.00	\$72.17
	12/01/2026	\$46.26	\$9.65	\$17.70	\$0.00	\$73.61
	06/01/2027	\$47.71	\$9.65	\$17.70	\$0.00	\$75.06
	12/01/2027	\$49.16	\$9.65	\$17.70	\$0.00	\$76.51
	06/01/2028	\$50.66	\$9.65	\$17.70	\$0.00	\$78.01
	12/01/2028	\$52.16	\$9.65	\$17.70	\$0.00	\$79.51
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWDERMAN & BLASTER <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.86	\$9.65	\$17.70	\$0.00	\$68.21
	06/01/2025	\$42.25	\$9.65	\$17.70	\$0.00	\$69.60
	12/01/2025	\$43.63	\$9.65	\$17.70	\$0.00	\$70.98
	06/01/2026	\$45.07	\$9.65	\$17.70	\$0.00	\$72.42
	12/01/2026	\$46.51	\$9.65	\$17.70	\$0.00	\$73.86
	06/01/2027	\$47.96	\$9.65	\$17.70	\$0.00	\$75.31
	12/01/2027	\$49.41	\$9.65	\$17.70	\$0.00	\$76.76
	06/01/2028	\$50.91	\$9.65	\$17.70	\$0.00	\$78.26
	12/01/2028	\$52.41	\$9.65	\$17.70	\$0.00	\$79.76
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$40.86	\$9.40	\$17.55	\$0.00	\$67.81
	06/01/2025	\$42.25	\$9.40	\$17.55	\$0.00	\$69.20
	12/01/2025	\$43.63	\$9.40	\$17.55	\$0.00	\$70.58
	06/01/2026	\$45.07	\$9.40	\$17.55	\$0.00	\$72.02
	12/01/2026	\$46.51	\$9.40	\$17.55	\$0.00	\$73.46
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$57.03	\$15.55	\$16.50	\$0.00	\$89.08
	06/01/2025	\$58.33	\$15.55	\$16.50	\$0.00	\$90.38
	12/01/2025	\$59.78	\$15.55	\$16.50	\$0.00	\$91.83
	06/01/2026	\$61.08	\$15.55	\$16.50	\$0.00	\$93.13
	12/01/2026	\$62.53	\$15.55	\$16.50	\$0.00	\$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$56.40	\$15.55	\$16.50	\$0.00	\$88.45
	06/01/2025	\$57.68	\$15.55	\$16.50	\$0.00	\$89.73
	12/01/2025	\$59.12	\$15.55	\$16.50	\$0.00	\$91.17
	06/01/2026	\$60.40	\$15.55	\$16.50	\$0.00	\$92.45
	12/01/2026	\$61.84	\$15.55	\$16.50	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$36.67	\$15.55	\$16.50	\$0.00	\$68.72
	06/01/2025	\$37.52	\$15.55	\$16.50	\$0.00	\$69.57
	12/01/2025	\$38.47	\$15.55	\$16.50	\$0.00	\$70.52
	06/01/2026	\$39.33	\$15.55	\$16.50	\$0.00	\$71.38
	12/01/2026	\$40.28	\$15.55	\$16.50	\$0.00	\$72.33
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER <i>TEAMSTERS 170 - Dauphinis (Bellingham)</i>	12/01/2024	\$27.60	\$11.26	\$6.15	\$0.00	\$45.01
	01/01/2025	\$27.60	\$11.26	\$6.15	\$0.00	\$45.01
RECLAIMERS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$56.40	\$15.55	\$16.50	\$0.00	\$88.45
	06/01/2025	\$57.68	\$15.55	\$16.50	\$0.00	\$89.73
	12/01/2025	\$59.12	\$15.55	\$16.50	\$0.00	\$91.17
	06/01/2026	\$60.40	\$15.55	\$16.50	\$0.00	\$92.45
	12/01/2026	\$61.84	\$15.55	\$16.50	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.11	\$9.65	\$17.70	\$0.00	\$67.46
	06/01/2025	\$41.50	\$9.65	\$17.70	\$0.00	\$68.85
	12/01/2025	\$42.88	\$9.65	\$17.70	\$0.00	\$70.23
	06/01/2026	\$44.32	\$9.65	\$17.70	\$0.00	\$71.67
	12/01/2026	\$45.76	\$9.65	\$17.70	\$0.00	\$73.11
	06/01/2027	\$47.21	\$9.65	\$17.70	\$0.00	\$74.56
	12/01/2027	\$48.66	\$9.65	\$17.70	\$0.00	\$76.01
	06/01/2028	\$50.16	\$9.65	\$17.70	\$0.00	\$77.51
12/01/2028	\$51.66	\$9.65	\$17.70	\$0.00	\$79.01	
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$56.40	\$15.55	\$16.50	\$0.00	\$88.45
	06/01/2025	\$57.68	\$15.55	\$16.50	\$0.00	\$89.73
	12/01/2025	\$59.12	\$15.55	\$16.50	\$0.00	\$91.17
	06/01/2026	\$60.40	\$15.55	\$16.50	\$0.00	\$92.45
	12/01/2026	\$61.84	\$15.55	\$16.50	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofers Waterproofing &Roofers Damproofg) <i>ROOFERS LOCAL 33</i>	08/01/2024	\$51.03	\$13.03	\$21.70	\$0.00	\$85.76
	02/01/2025	\$52.28	\$13.03	\$21.70	\$0.00	\$87.01
	08/01/2025	\$53.78	\$13.03	\$21.70	\$0.00	\$88.51
	02/01/2026	\$55.03	\$13.03	\$21.70	\$0.00	\$89.76

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

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.52	\$13.03	\$6.52	\$0.00	\$45.07
2	60	\$30.62	\$13.03	\$21.70	\$0.00	\$65.35
3	65	\$33.17	\$13.03	\$21.70	\$0.00	\$67.90
4	75	\$38.27	\$13.03	\$21.70	\$0.00	\$73.00
5	85	\$43.38	\$13.03	\$21.70	\$0.00	\$78.11

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.14	\$13.03	\$6.52	\$0.00	\$45.69
2	60	\$31.37	\$13.03	\$21.70	\$0.00	\$66.10
3	65	\$33.98	\$13.03	\$21.70	\$0.00	\$68.71
4	75	\$39.21	\$13.03	\$21.70	\$0.00	\$73.94
5	85	\$44.44	\$13.03	\$21.70	\$0.00	\$79.17

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	08/01/2024	\$51.28	\$13.03	\$21.70	\$0.00	\$86.01
ROOFERS LOCAL 33	02/01/2025	\$52.53	\$13.03	\$21.70	\$0.00	\$87.26
	08/01/2025	\$54.03	\$13.03	\$21.70	\$0.00	\$88.76
	02/01/2026	\$55.28	\$13.03	\$21.70	\$0.00	\$90.01

For apprentice rates see "Apprentice- ROOFER"

SHEETMETAL WORKER	08/01/2024	\$57.94	\$14.75	\$28.12	\$2.98	\$103.79
SHEETMETAL WORKERS LOCAL 17 - A	02/01/2025	\$59.69	\$14.75	\$28.12	\$2.98	\$105.54
	08/01/2025	\$61.54	\$14.75	\$28.12	\$2.98	\$107.39
	02/01/2026	\$63.49	\$14.75	\$28.12	\$2.98	\$109.34

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	\$24.33	\$14.75	\$6.13	\$0.00	\$45.21
2	42	\$24.33	\$14.75	\$6.13	\$0.00	\$45.21
3	47	\$27.23	\$14.75	\$12.11	\$1.63	\$55.72
4	47	\$27.23	\$14.75	\$12.11	\$1.63	\$55.72
5	52	\$30.13	\$14.75	\$13.09	\$1.75	\$59.72
6	52	\$30.13	\$14.75	\$13.34	\$1.76	\$59.98
7	60	\$34.76	\$14.75	\$14.75	\$1.94	\$66.20
8	65	\$37.66	\$14.75	\$15.73	\$2.06	\$70.20
9	75	\$43.46	\$14.75	\$17.69	\$2.30	\$78.20
10	85	\$49.25	\$14.75	\$19.15	\$2.52	\$85.67

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	\$25.07	\$14.75	\$6.13	\$0.00	\$45.95
2	42	\$25.07	\$14.75	\$6.13	\$0.00	\$45.95
3	47	\$28.05	\$14.75	\$12.11	\$1.66	\$56.57
4	47	\$28.05	\$14.75	\$12.11	\$1.66	\$56.57
5	52	\$31.04	\$14.75	\$13.09	\$1.78	\$60.66
6	52	\$31.04	\$14.75	\$13.34	\$1.79	\$60.92
7	60	\$35.81	\$14.75	\$14.75	\$1.97	\$67.28
8	65	\$38.80	\$14.75	\$15.73	\$2.09	\$71.37
9	75	\$44.77	\$14.75	\$17.69	\$2.33	\$79.54
10	85	\$50.74	\$14.75	\$19.15	\$2.56	\$87.20

Notes:
Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP > 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2024	\$40.53	\$15.07	\$20.17	\$0.00	\$75.77
	01/01/2025	\$40.53	\$15.57	\$20.17	\$0.00	\$76.27
	06/01/2025	\$41.53	\$15.57	\$20.17	\$0.00	\$77.27
	12/01/2025	\$41.53	\$15.57	\$21.78	\$0.00	\$78.88
	01/01/2026	\$41.53	\$16.17	\$21.78	\$0.00	\$79.48
	06/01/2026	\$42.53	\$16.17	\$21.78	\$0.00	\$80.48
	12/01/2026	\$42.53	\$16.17	\$23.52	\$0.00	\$82.22
	01/01/2027	\$42.53	\$16.77	\$23.52	\$0.00	\$82.82
SPRINKLER FITTER <i>SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1</i>	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 - 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

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$25.42	\$11.51	\$12.90	\$0.00	\$49.83
2	40	\$29.06	\$11.51	\$13.70	\$0.00	\$54.27
3	45	\$32.69	\$11.51	\$14.50	\$0.00	\$58.70
4	50	\$36.32	\$11.51	\$15.30	\$0.00	\$63.13
5	55	\$39.95	\$11.51	\$16.10	\$0.00	\$67.56
6	60	\$43.58	\$11.51	\$16.90	\$0.00	\$71.99
7	65	\$47.22	\$11.51	\$17.70	\$0.00	\$76.43
8	70	\$50.85	\$11.51	\$18.50	\$0.00	\$80.86
9	75	\$54.48	\$11.51	\$19.30	\$0.00	\$85.29
10	80	\$58.11	\$11.51	\$20.10	\$0.00	\$89.72

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

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
STEAM BOILER OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$56.40	\$15.55	\$16.50	\$0.00	\$88.45
	06/01/2025	\$57.68	\$15.55	\$16.50	\$0.00	\$89.73
	12/01/2025	\$59.12	\$15.55	\$16.50	\$0.00	\$91.17
	06/01/2026	\$60.40	\$15.55	\$16.50	\$0.00	\$92.45
	12/01/2026	\$61.84	\$15.55	\$16.50	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$56.40	\$15.55	\$16.50	\$0.00	\$88.45
	06/01/2025	\$57.68	\$15.55	\$16.50	\$0.00	\$89.73
	12/01/2025	\$59.12	\$15.55	\$16.50	\$0.00	\$91.17
	06/01/2026	\$60.40	\$15.55	\$16.50	\$0.00	\$92.45
	12/01/2026	\$61.84	\$15.55	\$16.50	\$0.00	\$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN <i>ELECTRICIANS LOCAL 103</i>	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 - 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

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$23.39	\$13.00	\$0.70	\$0.00	\$37.09
2	45	\$23.39	\$13.00	\$0.70	\$0.00	\$37.09
3	50	\$25.99	\$13.00	\$16.16	\$0.00	\$55.15
4	50	\$25.99	\$13.00	\$16.16	\$0.00	\$55.15
5	55	\$28.59	\$13.00	\$16.57	\$0.00	\$58.16
6	60	\$31.19	\$13.00	\$16.97	\$0.00	\$61.16
7	65	\$33.79	\$13.00	\$17.38	\$0.00	\$64.17
8	70	\$36.39	\$13.00	\$17.78	\$0.00	\$67.17
9	75	\$38.99	\$13.00	\$18.18	\$0.00	\$70.17
10	80	\$41.58	\$13.00	\$18.58	\$0.00	\$73.16

Notes:

Apprentice to Journeyworker Ratio:1:1

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

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 <i>LABORERS - FOUNDATION AND MARINE</i>	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 <i>LABORERS - FOUNDATION AND MARINE</i>	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 <i>LABORERS - FOUNDATION AND MARINE</i>	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"

TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$56.40	\$15.55	\$16.50	\$0.00	\$88.45
	06/01/2025	\$57.68	\$15.55	\$16.50	\$0.00	\$89.73
	12/01/2025	\$59.12	\$15.55	\$16.50	\$0.00	\$91.17
	06/01/2026	\$60.40	\$15.55	\$16.50	\$0.00	\$92.45
	12/01/2026	\$61.84	\$15.55	\$16.50	\$0.00	\$93.89

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2024	\$40.82	\$15.07	\$20.17	\$0.00	\$76.06
	01/01/2025	\$40.82	\$15.57	\$20.17	\$0.00	\$76.56
	06/01/2025	\$41.82	\$15.57	\$20.17	\$0.00	\$77.56
	12/01/2025	\$41.82	\$15.57	\$21.78	\$0.00	\$79.17
	01/01/2026	\$41.82	\$16.17	\$21.78	\$0.00	\$79.77
	06/01/2026	\$42.82	\$16.17	\$21.78	\$0.00	\$80.77
	12/01/2026	\$42.82	\$16.17	\$23.52	\$0.00	\$82.51
	01/01/2027	\$42.82	\$16.77	\$23.52	\$0.00	\$83.11
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	12/01/2024	\$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) <i>LABORERS (COMPRESSED AIR)</i>	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 <i>LABORERS (FREE AIR TUNNEL)</i>	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) <i>LABORERS (FREE AIR TUNNEL)</i>	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"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2024	\$40.24	\$15.07	\$20.17	\$0.00	\$75.48
	01/01/2025	\$40.24	\$15.57	\$20.17	\$0.00	\$75.98
	06/01/2025	\$41.24	\$15.57	\$20.17	\$0.00	\$76.98
	12/01/2025	\$41.24	\$15.57	\$21.78	\$0.00	\$78.59
	01/01/2026	\$41.24	\$16.17	\$21.78	\$0.00	\$79.19
	06/01/2026	\$42.24	\$16.17	\$21.78	\$0.00	\$80.19
	12/01/2026	\$42.24	\$16.17	\$23.52	\$0.00	\$81.93
	01/01/2027	\$42.24	\$16.77	\$23.52	\$0.00	\$82.53

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WAGON DRILL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2024	\$40.61	\$9.65	\$17.70	\$0.00	\$67.96
	06/01/2025	\$42.00	\$9.65	\$17.70	\$0.00	\$69.35
	12/01/2025	\$43.38	\$9.65	\$17.70	\$0.00	\$70.73
	06/01/2026	\$44.82	\$9.65	\$17.70	\$0.00	\$72.17
	12/01/2026	\$46.26	\$9.65	\$17.70	\$0.00	\$73.61
	06/01/2027	\$47.71	\$9.65	\$17.70	\$0.00	\$75.06
	12/01/2027	\$49.16	\$9.65	\$17.70	\$0.00	\$76.51
	06/01/2028	\$50.66	\$9.65	\$17.70	\$0.00	\$78.01
	12/01/2028	\$52.16	\$9.65	\$17.70	\$0.00	\$79.51
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2024	\$57.03	\$15.55	\$16.50	\$0.00	\$89.08
	06/01/2025	\$58.33	\$15.55	\$16.50	\$0.00	\$90.38
	12/01/2025	\$59.78	\$15.55	\$16.50	\$0.00	\$91.83
	06/01/2026	\$61.08	\$15.55	\$16.50	\$0.00	\$93.13
	12/01/2026	\$62.53	\$15.55	\$16.50	\$0.00	\$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER <i>PLUMBERS & GASFITTERS LOCAL 12</i>	09/01/2024	\$69.04	\$14.32	\$19.61	\$0.00	\$102.97
	03/02/2025	\$70.84	\$14.32	\$19.61	\$0.00	\$104.77
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$29.67	\$9.25	\$1.89	\$0.00	\$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$42.03	\$9.25	\$10.27	\$0.00	\$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$34.62	\$9.25	\$10.07	\$0.00	\$53.94
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$27.20	\$9.25	\$1.82	\$0.00	\$38.27
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$42.03	\$9.25	\$14.35	\$0.00	\$65.63
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$37.09	\$9.25	\$10.87	\$0.00	\$57.21
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$27.20	\$9.25	\$1.82	\$0.00	\$38.27
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$22.25	\$9.25	\$1.82	\$0.00	\$33.32
For apprentice rates see "Apprentice- LINEMAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
JOURNEYMAN LINEMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	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 <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/04/2019	\$30.73	\$4.70	\$3.17	\$0.00	\$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/04/2019	\$28.93	\$4.70	\$3.14	\$0.00	\$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/04/2019	\$28.93	\$4.70	\$3.14	\$0.00	\$36.77

Additional Apprentices Information:

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

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DOCUMENT A00801

SPECIAL PROVISIONS**NATICK****Pedestrian/Bike Bridge Superstructure Replacement, N-03-007,
Spring Street over the MBTA**

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 work under this contract consists of the superstructure replacement of the existing Spring Street Bridge (MassDOT Bridge No. N-03-007) over MBTA in the Town of Natick, MA. The roadway over the bridge is currently closed to vehicular traffic. The proposed bridge will carry a Shared Use Path for bicyclists and pedestrians only. The work includes the complete replacement of the existing bridge superstructure with a single-span prefabricated steel truss superstructure with a 6½" exposed concrete deck. The substructure work will consist of the rehabilitation and reuse of the two (2) stone masonry abutments. Demolition of the existing bridge and construction of the proposed bridge will require the complete closure of Spring Street at the bridge location.

Work under this Contract also includes approach roadway work to the limits shown on the Plans including, but not limited to, profile adjustments, construction of shared use path, roadway reconstruction, sidewalk reconstruction and utility relocation.

The Contractor shall satisfy themselves by their own investigation and research as to conditions and measurements affecting the work to be done and shall make their bid in sole reliance thereon.

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.

Railroad Insurance Requirements

Railroad Operations Directorate: Section F:

1. The Contractor shall furnish, with respect to the operations of the Contractor or any of the Contractor's Subcontractors performing within the Railroad right-of-way, broad form Railroad Protective Liability Insurance covering all work performed under this Contract in the amount of not less than \$5,000,000 per occurrence, \$10,000,000 aggregate combined bodily injury and property damage. The Contractor shall carry Worker's Compensation Insurance, including Employers Liability Insurance as provided by Massachusetts General Laws, Chapter 152, as amended, covering all work performed by him under the Contract. The Contractor shall carry Umbrella Liability Coverage with limits of not less than \$10,000,000 per occurrence, covering all work performed by him under this Contract. Automobile Liability Insurance: The Contractor shall provide Automobile Liability Insurance to include the use of all vehicles; owned, leased, hired and non-owned, with limits not less than \$1,000,000 combined single limit covering all work performed under the Contract.
2. Such insurance shall be written on an occurrence basis.
3. The MBTA and applicable railroads shall be the named insureds on such insurance. Additional named insured are listed below. Original policies and certificates shall be made out to the MBTA and applicable railroads and mailed to:

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

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

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

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

SUBSECTION 7.05 INSURANCE REQUIREMENTS (Continued)

4. The Contractor shall furnish to the MBTA and railroad companies a signed original of the Railroad Protective Liability Policy prior to entry upon the railroad right-of-way.
5. Such policies shall provide 30 days notice to each named insured by the insurance company before any change or cancellation of the policies.
6. Such Railroad Protective Insurance policies may be provided in forms commonly referred to as AAR/AASHTO or ISO/RIMA but not Oregon.

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

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

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

CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

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

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

HOLIDAY WORK RESTRICTIONS

(Supplementing Subsection 7.09)

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

Below are the holiday work restrictions:

New 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.

HOLIDAY WORK RESTRICTIONS (Continued)

Evacuation Day (Suffolk County State Holiday)

No work restrictions due to traffic concerns.

Patriot's Day (State Holiday)

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

Mother's Day

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

Memorial Day (Federal Holiday)

No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Bunker Hill Day (Suffolk County State Holiday)

No work restrictions due to traffic concerns.

Juneteenth

No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

Independence Day (Federal Holiday)

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

Labor Day (Federal Holiday)

No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Columbus Day (Federal Holiday)

No work on major arterials from 5:00 AM on the Friday before, until the normal start of business on the following day

Veterans' Day (Federal Holiday)

No work restrictions due to traffic concerns.

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.

SUBSECTION 8.14 UTILITY COORDINATION, DOCUMENTATION, AND MONITORING RESPONSIBILITIES

A. GENERAL

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

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

B. PROJECT UTILITY COORDINATION (PUC) FORM

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

C. INITIATION OF UTILITY WORK

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

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

C.1 - BASELINE SCHEDULE – UTILITY BASIS

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

SUBSECTION 8.14 (Continued)**C.2 – EARLY UTILITY REQUEST – (aka SUBNET SCHEDULE) PRIOR TO THE BASELINE**

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

C.3 – PROPOSAL SCHEDULE - CHANGES TO THE PUC FORM

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

D. UTILITY DELAYS

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

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

SUBSECTION 8.14 (Continued)

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

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

E. LOCATION OF UTILITIES

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

F. POST UTILITY SURVEY – NOTIFICATION

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

G. MEETINGS AND COOPERATION WITH UTILITY OWNERS

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

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

H. FORCE ACCOUNT / UTILITY MONITORING REQUIREMENTS

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

I. ACCESS AND INSPECTION

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

COMPLIANCE WITH THE NATIONAL DEFENSE AUTHORIZATION ACT

(Supplementing Subsection 7.01)

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

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

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

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

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

SUBSECTION 8.02 SCHEDULE OF OPERATIONS

Replace this subsection with the following:

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

NOTICE TO OWNERS OF UTILITIES

(Supplementing Subsection 7.13)

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

Following are the names and addresses of the companies or agencies that may be affected, but the completeness of the list is not guaranteed:

District Utility / Constructability Engineer

Attn: Ross Goodale
Ross.A.Goodale@dot.state.ma.us
(857) 368-3204

Astound

Attn: Alex Ortiz
956 Massachusetts Avenue
Arlington, MA 02476
(781) 316-8878

Telephone

Verizon
Attn: Karen Mealey
385 Myles Standish Blvd.
Taunton, MA 02780
(774) 409-3160

Cable/Communication

Comcast
Attn: Wendy Brown
PO Box 6505, 5 Omni Way
Chelmsford, MA 01824
(978) 848-5163

DPW

Natick DPW
Attn: John Westerling
75 West Street
Natick, MA
(508) 647-6550

Natick DPW – Water & Sewer

Attn: Anthony Comeau
75 West Street
Natick, MA
(508) 647-6557

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

GENERAL REQUIREMENTS FOR DEMOLITION AND WORK INVOLVING PAINTED STEEL

(02/06/2020)

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

Work Involving Painted Steel.

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

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

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

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

Environmental

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

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

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

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

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

Cleaning/Removal

Cutting Or Burning Of Steel

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

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

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

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

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

Mechanical Disassembly Of Steel

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

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

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

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. As there is no Federal nexus (Federal funding or permits) for this project Section 7 consultation was not required or conducted. However, Section 9 of the ESA prohibits anyone from “taking” or harming an endangered species, and the below language shall be adhered to in order to maintain compliance with the ESA.

If any of the project locations require work within U.S. Army Corps of Engineers (ACOE) jurisdictional wetlands, the ACOE will be the lead federal agency for ESA consultation with the U.S. Fish & Wildlife Service (USFWS). Most consultations for the NLEB take 30 days.

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

The range of the NLEB in Massachusetts was revised in early 2023, and some AMMs may no longer be applicable at some project locations. The Resident Engineer can check on the status of AMM applicability by sending a locus map of the proposed work to MassDOT Highway Division’s Environmental Services Section - Wildlife & Endangered Species Unit Supervisor for review and a determination if some of the AMMs and TOY restriction can be waived.

Required AMM for all projects:

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

If temporary lighting is proposed within the project scope, the following AMM is applicable:

Lighting AMM:

- Direct temporary lighting away from suitable habitat during the active season: **April 1 to October 31.**

If the Removal of Trees and/or Woody Vegetation >3-inch in diameter is proposed within the project scope, the following AMMs are applicable:

Tree AMMs:

- If additional cutting is proposed by the Contractor that is outside the scope of this contract, additional review is required by the MassDOT Highway Division’s Environmental Services Section, and additional review and restrictions may be required by the USFWS.
- Ensure tree removal is limited to that specified in project plans and ensure that contractors understand clearing limits and how they are marked in the field (e.g., install bright colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits).
- In order to protect northern long-eared bats and their young during their active season, **no tree cutting shall be conducted during the Time of Year (TOY) restriction of April 1 to October 31.**

NORTHERN LONG-EARED BAT PROTECTION (Continued)

- Do not remove **documented** or NLEB roosts that are still suitable for roosting, or trees within 0.25 miles of roosts, or **documented** foraging habitat any time of year (<http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/species-information-and-conservation/rare-mammals/northern-long-eared-bat.html>).
- The Contractor shall ensure all personnel working in on the project site are aware of all environmental commitments related to NLEB, including the **TOY** restriction.

If the Bridge Work is proposed within the project scope, the following AMMs are applicable:
Bridge AMMs:

- **Bridge AMM 1** - To completely avoid direct effects to roosting bats, perform any bridge removal, replacement, and/or maintenance work during the winter hibernation period unless a hibernating colony of bats is present (contact your local USFWS Field Office for exact dates). Also, follow Bridge AMM 4.
 - **Note:** Bridge AMM 1 is an avoidance measure for direct effects; the full implementation of which may not always be practicable. **If bridge removal, replacement, and/or maintenance work must be performed outside of the winter hibernation period, then follow Bridge AMMs 2-4.**
- **Bridge AMM 2 - Colony or Assuming Presence of Bats**
 - If assuming presence of bats or if bridge assessment or P/A surveys suggest presence of a colony of bats, and work is conducted during the active season, ensure activity will not disturb bats. The following types of bridge work can generally be conducted with the presence of bats:
 - above deck work where construction equipment or materials do not extend to the underside of deck where bats may be located (e.g., materials that may drip down to underside of deck), or does not include percussives (vibration) or noise levels above general traffic (e.g., road line painting, wing-wall work).
 - below deck work that is conducted away from roosting bats and does not involve percussives or noise level above general traffic (e.g., wing-wall work, some abutment, beam end, scour, or pier repair).
- **Bridge AMM 3 - Small Number of Bats**
 - If bridge assessment or P/A surveys suggest presence of a small number of bats (<5 – not a colony), and work is conducted during the active season, the following types of bridge work can generally be conducted with the presence of bats:
 - above deck work where construction equipment or materials do not extend to the underside of deck where bats may be located (e.g., materials that may drip down to underside of deck), or does not include percussives (vibration) or noise levels above general traffic (e.g., road line painting, wing-wall work).
 - below deck work that is conducted away from roosting bats and does not involve percussives or noise level above general traffic (e.g., wing-wall work, some abutment, beam end, scour, or pier repair).
 - any other bridge removal, replacement, and/or maintenance work (which may include activities with percussives) conducted in the evening while the bats are feeding, starting one hour after sunset, and ending one hour before daylight excluding the hours between 10 p.m. and midnight and keep the light localized.
- **Bridge AMM 4** - If assuming presence of bats, or if bridge assessment or P/A surveys suggest presence of bats, ensure suitable roosting habitat is maintained. Suitable roosting sites may be incorporated into the design of a new bridge.

MBTA COMMUTER RAIL

Keolis Commuter Service (KCS) operates the commuter rail for the MBTA. All references to MBTA in the provisions will mean Keolis Commuter Service (KCS).

MBTA RAILROAD COORDINATION / ACCESS TO MBTA PROPERTY

The Contractor shall be required to coordinate the work of this Contract with the MBTA and Keolis Commuter Services Co. (“KCS”) through the MassDOT Resident Engineer and MassDOT designated Field Staff. A majority of the prerequisites for the Contractor to perform work on or adjacent to MBTA transit lines may be found in the “MBTA Special Instructions” provided herein. The Contractor shall be required to comply with the all applicable requirements of the latest edition of the MBTA Special Instructions available at the time of Contract Award.

The Contractor will have to perform construction related activities on, over, under, within or adjacent to railroad property owned or controlled by the MBTA. Any work that will affect Commuter Rail operations, involve work on, over, under, within or adjacent to the commuter rail right of way must be coordinated with MBTA Railroad Operations and KCS and shall comply with the latest version of the MBTA Railroad Operations Directorate.

An owner or Contractor who wishes permission to enter upon or perform work over, on, under or adjacent to MBTA property shall submit to the offices of the MBTA’s designated representative, a request in writing, a minimum of forty-two (42) days prior to the owner or the Contractor’s planned commencement of any of the above stated activities.

MBTA COORDINATION – SUBSTITUTE BUSING

Substitute bus transportation will be required for weekend MBTA Commuter Rail shutdowns. The Contractor must coordinate with MBTA Operations Department for provision of bus service. The Contractor shall contact MBTA Operations Dept. a minimum of 6 weeks prior to any planned rail shutdown. The MBTA will be responsible for planning, procuring, and administering the necessary substitute bus transportation services and operations based on the Contractor’s approved work schedule.

Prime Contact:
Eric Ciborowski
32 Cobble Hill Road
Somerville, MA 02143
617-634-2567
ECIBOROWSKI@MBTA.com

Secondary Contact:
Delrico Gomes
32 Cobble Hill Road
Somerville, MA 02143
857-366-0404
DGOMES@MBTA.COM

The Contractor shall be required to attend the MBTA Weekly Track Outage Schedule Coordination Meetings held Wednesdays at 10:00 am at 32 Cobble Hill Road in the small classroom located in the training area at the rear of the building.

MBTA FLAGGING

The Contractor shall provide a minimum two week notice for flagging support for MBTA bridges and railroads. This applies only to bridges and railroads operated by Keolis Commuter Services (KCS). This two week notice does not apply to emergency work, only to routine or scheduled work activities. The contact person for advance request for flagging services is Rich Arnold, MBTA Railroad Operations Department, Phone number (617)-222-3635, email address: rarnold@mbta.com.

PIGEON WASTE

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

EMERALD ASH BORER ADVISORY

To the extent possible, all trees and brush shall be disposed on site, typically chipped and spread in place. When trees or brush must be removed, such as in urban, or otherwise populated areas, Contractor shall identify proposed location for disposal, and provide written notification to the Engineer for approval. Disposal shall be in city or town of project, or at minimum, within county, of construction operations.

EQUIVALENT SINGLE AXLE LOADS (ESALS)

The estimated traffic level to be used for SUPERPAVE HMA mixture designs for this contract, expressed in Equivalent Single Axle Loads (ESALs) for the design travel lane over a 20-year period, is <0.3 Million 18-kip (80-kn) ESALs.

2026 FIFA WORLD CUP – BOSTON, MASSACHUSETTS

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

CONTAMINATED SOIL

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

SOIL STOCKPILING DIRECTIVE P-22-001

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

ENVIRONMENTAL PERMITTING

The proposed work does not occur in jurisdictional wetland resources subject to section 401 or section 404 of the Clean Water Act; therefore, the project does not require a Water Quality Certification from the Massachusetts Department of Environmental Protection or authorization from the US Army Corps of Engineers. The proposed work qualifies for the bridge exemption authorized in the Transportation Bond Bill and is therefore not subject to the Massachusetts Wetlands Protection Act, the Massachusetts Public Waterfront Act (Chapter 91), or the Massachusetts Environmental Policy Act.

If field conditions and/or Contractor-proposed erection, demolition, staging, or other procedures require work to occur in or otherwise impact water or wetland resource areas, the Contractor is advised that no associated work can occur until all required environmental permits have been obtained allowing such work. The Contractor must notify the District 3 Highway Director and Resident Engineer in writing at least 60 days prior to desire commencement of the proposed activity. All environmental submittals, including any Contract with Local, State, or Federal environmental agencies, must be coordinated with the District 3 Environmental Engineer. The Contractor is expected to fully cooperate with requests for information and provide same in a timely manner. The Contractor is further advised that the Department will not entertain a delay claim due to the time required to obtain the environmental permits.

SECTION 722
CONSTRUCTION SCHEDULING
DESCRIPTION

722.20 General

The Contractor's approach to prosecution of the Work shall be disclosed to the Department by submission of a Critical Path Method (CPM) schedule and a cost/resource loaded Construction Schedule as defined by the schedule type set forth below. These requirements are in addition to any requirements imposed in other sections.

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

All schedules shall be prepared and submitted in accordance with this specification and the instructions contained in the Construction Schedule Toolkit located on the MassDOT-Highway Division website at <https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit>.

Type A –

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

Type B –

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

Type C –

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

SECTION 722 (Continued)**Type D -**

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

EQUIPMENT, PERSONNEL**722.40 General****A. Software Requirements**

The Contractor shall use Primavera P6 computer scheduling software.

In addition to the requirements of Section 740 – Engineer’s Field Office and Equipment, the Contractor shall provide to the Department one (1) copy of the scheduling software, one (1) software license and one (1) computer capable of running the scheduling software for the duration of the Contract. This computer and software shall be installed in the Engineer’s Field Office. The computer and software shall be maintained and serviced at no additional cost to the Department.

B. Scheduler Requirements

The Scheduler shall be approved by the Engineer.

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

SCHEDULING METHODS**722.60 General****A. Schedule Planning Session**

The Contractor shall conduct a schedule planning session prior to submission of the Baseline Schedule. This session will be attended by the Department and its consultants. During this session, the Contractor shall present its planned approach to the project including, but not limited to:

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

SECTION 722 (Continued)

9. a summary of the anticipated quarterly cash flow over the life of the project.

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

B. Schedule Reviews by the Department**1. Baseline Schedule Reviews**

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

2. Contract Progress Schedule / Monthly Update Reviews / Recovery Schedules

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

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

722.61 Schedule Content and Preparation Requirements

All schedules shall be prepared and submitted in accordance with the instructions contained in the Construction Schedule Toolkit located on the MassDOT-Highway Division website at:

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

and the following:

A. LOGIC

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

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

SECTION 722 (Continued)**B. ACTIVITIES**

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

1. Notice to Proceed
2. Work Breakdown Structure
3. The Critical Path is clearly defined and organized.
4. Float shall be clearly identified.
5. Detailed activities to satisfy permit requirements.
6. Subcontractor approvals at fifteen (15) Calendar Days from submittal to response
7. The preparation and submission of shop drawings, procedures, and other required submittals, with a planned duration that is to be demonstrated to the Engineer as reasonable.
8. The review and return of shop drawings, procedures, and other required submittals, approved or with comments, the duration of which shall be thirty (30) Calendar Days, unless otherwise specified or as approved by the Engineer.
9. Procurement of fabricated materials and equipment with long lead times, including time for review and approval of submittals required before procuring and fabricating.
10. Each component of the Work defined by specific activities.
11. Right-of-Way (ROW) takings that have been identified in the Contract.
12. Early Utility Relocation (by others) that has been identified in the Contract.
13. Interfaces with adjacent work, utility companies, other public agencies, sensitive abutters, and/or any other third-party work affecting the Contract.
14. Utility work to be performed in accordance with the Project Utility Coordination (PUC) Form as provided in Section 8.14 - Utilities Coordination, Documentation and Monitoring Responsibilities
15. Access Restraints – restrictions on access to areas of the Work that are defined by the Department in the bid package, in Subsection 8.06 – Limitations of Operations or elsewhere in the Contract
16. Limitations of Work – time of year restrictions and any other limitations identified in the contract
17. Traffic work zone set-up and removal, night work and phasing
18. Material Certifications
19. Milestones listed in Subsection 8.03 - Prosecution of Work or elsewhere in the Contract Documents
20. For Type A and B Contracts only: All items to be paid for, including all Unit Price and Lump Sum pay items, shall be identified by activity. This shall include all non-construction activities such as engineering work; purchase of permanent materials and equipment, purchase of structural steel stock, equipment procurement, equipment delivery to the site or storage location and the representative amount of overhead/indirect costs that was included in the Contractor's Bid Prices.

SECTION 722 (Continued)

21. Contractor's request for validation of FBU (ready to open to traffic)
22. Full Beneficial Use (FBU) Contract Milestone per the following requirements:
The majority of contract Work has been completed and the asset(s) has been opened for full multi-modal transportation use, except for limited contract work items that do not materially impair or hinder the intended public use of the transportation facility. All anticipated lane takings have been completed, except for minor, short term work items and as defined in Subsection 8.03 - Prosecution of Work
23. The Department's confirmation of completed work to allow for FBU.
24. Contractor's request for validation of Substantial Completion
25. Department generated punch list of twenty-one (21) Calendar Days
26. Substantial Completion Contract Milestone as defined in the standard specifications.
27. Punch list Completion Period of at least thirty (30) Calendar Days per the requirements of Subsections 5.11 - Final Acceptance, 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes
28. Contractor confirmation that all punchlist work and documentation has been completed.
29. Physical Completion of the Work Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
30. Documentation Completion per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
31. Contractor Field Completion Contract Milestone (which can also be considered the completion date) per the following requirements: All physical contract Work is complete including punchlist. The Contractor has fully de-mobilized from field operations and as defined in Subsection 5.11

C. EARLY AND LATE DATES

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

D. DURATIONS

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

SECTION 722 (Continued)

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

E. MATERIALS ON HAND

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

F. ACTIVITY DESCRIPTIONS

The Contractor shall use activity descriptions in all schedules that clearly describe the work to be performed using a combination of words, structure numbers, station numbers, bid item numbers, work breakdown structure (WBS) and/or elevations in a concise and compact label.

G. ACTIVITY IDENTIFICATION NUMBERS

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

H. ACTIVITY CODES

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

I. CALENDARS

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

Project Special Provisions identify specific calendar restrictions some examples of special calendars include, but are not limited to:

- Winter Shutdown Period, specific work is required by separate special provision to be performed during the winter. See Special Provision 8.03 (if applicable)
- Peak traffic hours on heavily traveled roadways. This shall be from 6:30 am to 9:30 am and from 3:30 pm to 7:00 pm, unless specified differently elsewhere in the Contract.
- Special requirements by sensitive abutters, railroads, utilities and/or other state agencies as defined in the Contract.
- Planting seasons for trees, shrubs and grasses and wetlands mitigation work.

SECTION 722 (Continued)

- Cape Cod and the Islands Summer Roadway Work Restrictions: A general restriction against highway and bridge construction is enforced between Memorial Day and Labor Day, unless otherwise directed by the Engineer. Cape Ann Summer Roadway Work Restrictions: While there are no general restrictions for Cape Ann as there are for Cape Cod and the Islands, project-specific restrictions may be enforced.
- Turtle and/or Fish Migration Periods and/or other in-water work restrictions: Refer to the Project Special Provisions for specific restrictions.
- Working over Waterways Restricted Periods.
- Night-time paving and striping operations, traffic, and temperature restrictions.
- Utility Restrictions shall be as specified within the Contract.

J. FLOAT

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

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

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

1. Each schedule activity shall have an assigned cost that accurately represents the value of the Work. Each schedule activity shall have its resources assigned to it by craft and the anticipated hours to accomplish the work. Each schedule activity's equipment resources shall be assigned to it by equipment type and hours operated. Front-loading or other unbalancing of the cost distribution will not be permitted.
2. The sum of the cost of all schedule activities shall be equal to the Contractor's Bid Price.
3. Indicating the labor hours per individual, per day, by craft and equipment hours/day will be acceptable.
4. The Engineer reserves the right to use the cost-loading as a means to resolve changes, disputes, time entitlement evaluations, increases or decreases in the scope of Work, unit price renegotiations and/or claims.
5. For all Type A and B Schedules, all subnets, fragnets, Proposal Schedules, and Recovery Schedules shall be cost and resource- loaded to help to quickly validate and monitor the duration of the Work to be performed.
6. For Type A Schedules, cost-loading of the schedule will also be used for cash flow projection purposes.
7. The cost-loading of each activity shall indicate the portion of the cost for that activity that is applicable to a specific bid item (cost account.) The total cost for each cost account must equal the bid item price.

SECTION 722 (Continued)**L. NOT TO BE USED IN THE CONTRACTOR'S CPM SCHEDULE**

1. Milestones or constraint dates not specified in the Contract.
2. Scheduled work not required for the accomplishment of a Contract Milestone
3. Use of activity durations, logic ties and/or sequences deemed unreasonable by the Engineer.
4. Delayed starts of follow-on trades.
5. Float suppression techniques.
6. Leads such as leads, lags, SS, SF, & FF relationships without the expressed permission of the Department.

722.62 Submittal Requirements

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

Each monthly Contract Progress Schedule submittal shall be uniquely identified.

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

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

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

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

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

A. Narratives

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

1. itemize and describe the flow of work for all activities on the Critical Path in a format that includes any changes made to the schedule since the previous Contract Progress Schedule / Monthly Update or the Baseline Schedule, whichever is most recent.
2. provide a description of any specification requirements that are not being followed. Identify those that are improvements and those that are not considered to be meeting the requirements.

SECTION 722 (Continued)

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

SECTION 722 (Continued)**B. CPM Bar Charts**

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

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

C. Detailed Activity Schedule Comparisons

A Detailed Activity Schedule Comparison (DASC) is a simple reporting tool in the format of a graphical report that will provide Resident Engineers with immediate, timely and up-to-date information. The DASC consists of an updated bar chart that overlays the current time period's bar chart onto the previous time period's bar chart for an easily read comparison of progress during the present and previous reporting periods.

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

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

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

1. activity ID and description,
2. forecast start and finish dates for each activity and,
3. when submitted as a revised schedule, actual start, and finish dates for each completed activity.
4. any variance to the estimated contract quantity shall be shown.

E. Resource Graphs (Type A only)

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

SECTION 722 (Continued)**F. Projected Spending Reports**

A Projected Spending Report (PSR) shall be prepared and submitted monthly. The PSR shall indicate the monthly spending (cash flow) projection for each month from NTP to Contractor Field Completion (CFC). Each month's actual spending shall be calculated using all CQEs paid during that month. The Projected Spending Report (PSR) shall be depicted in a tabular format and provided in both an .XLS and .PDF.

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

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

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

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

B. Interim Progress-Only Schedule Submissions

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

SECTION 722 (Continued)**C. Contract Progress Schedules / Monthly Updates**

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

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

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

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

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

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

SECTION 722 (Continued)**D. Short-Term Construction Schedule**

The Contractor shall provide a Short-Term Construction Schedule that details daily work activities, including any multiple shift work that the Contractor intends to conduct, in a spreadsheet format. The daily activities shall directly correspond to the Contract Progress Schedule activities, with a matching reference to the activity identification number in the Contract Progress Schedule and may be at a greater level of detail. The Short-Term Construction Schedule shall be submitted every two weeks. It shall display all work for a thirty-five (35) Calendar Day period consisting of completed work for the two (2) week period prior and all planned work for the following three (3) week period. The initial submission shall be provided no later than thirty (30) Calendar Days after NTP or as required by the Engineer.

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

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

The Contractor shall notify the Engineer in writing, with copies to the District and State Construction Engineers, within fifteen (15) of the start of any delays to the Critical Path that are caused by actions or inactions that were not within the control of the Contractor. Delay notifications that are not provided in a letter to the Engineer, such as a delay notification in the schedule narrative, will not be recognized as contractual notice in the determination of any Time Extension related to the impacts to the work associated with this specific alleged delay. Should such a delay continue for more than one (1) week, the Contractor shall note it in the Schedule Narrative until the delay is no longer impacting the Critical Path for the completion of the Contract Milestones. The Engineer will evaluate the alleged delay and its impact and will respond to the Contractor within ten (10) Calendar Days after receipt of a notice of delay.

B. Time Entitlement Analysis

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

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

SECTION 722 (Continued)

TEAs shall be submitted:

1. as part of any Extra Work Order that may impact Contract Time,
2. with a request for a Time Extension,
3. within fifteen (15) Calendar Days after a request for a TEA by the Engineer for any other reason.

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

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

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

When accepted, the changes included in a TEA shall be incorporated into the next Contract Progress Schedule per the requirements of Subsection 722.63.C - Contract Progress Schedules / Monthly Updates. During the review of any TEA, all Contract Progress Schedules shall continue to be submitted as required.

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

C. Recovery Schedules

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

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

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

SECTION 722 (Continued)**D. Proposal Schedules**

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

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

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

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

Proposal Schedules shall clearly indicate any proposed acceleration including overtime hours, additional shifts, and the resources that are proposed to be incorporated in the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts. Proposal Schedules that contain a cost element shall be submitted with a separate Cost Proposal.

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

E. Disputes

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

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

SECTION 722 (Continued)**722.65 Schedule Type D Requirements**

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

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

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

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

A. Bar Chart Schedule

A Bar Chart that shall include the following:

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

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

SECTION 722 (Continued)**B. Short-Term Construction Schedule**

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

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

The Contractor shall be prepared to discuss the Short-Term Construction Schedule, in detail, with the Engineer in order to coordinate field inspection staff requirements, the schedule of work affecting abutters and any corresponding work with affected utilities.

C. Project Spending Report (PSR)

A Projected Spending Report (PSR) shall be prepared and submitted monthly. The PSR shall be for all active work assignments, broken down by work assignment. The PSR shall indicate the monthly spending (cash flow) projection for each month from NTP to Contractor Field Completion (CFC). Each month's actual spending shall be calculated using all CQEs paid during that month. The Projected Spending Report (PSR) shall be depicted in a tabular format and provided in both an .XLS and .PDF

SECTION 722 (Continued)

COMPENSATION

722.80 Method of Measurement

Schedule of Operations (Type A, B and C)

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

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

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

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

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

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

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

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

Schedule of Operations (Type D)

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

SECTION 722 (Continued)

722.81 Basis of Payment

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

All required schedule-related work, including, but not limited to computers, computer software, the planning and coordination with utilities, training, schedule preparation and schedule submittals (including monthly progress schedules, short-term schedules, project spending reports, TEAs, recovery schedules or impacted schedules) shall be included in this work.

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

All Contract Progress Schedule Updates submitted later than ten (10) Calendar Days after the CQE (Contract Quantity Estimate) completion date, or greater than forty (40) Calendar Days from the Data Date of the previous submission, will be deemed to be no longer useful and will not qualify for payment. The late submission of Impacted schedules, including TEAs, recovery schedules and proposal schedules will result in the forfeiture of the monthly payment for the month in which they were due and subsequent months until the submission is made. Late submission of missed submittals will not result in recovery of the previously forfeited portion of the Schedule of Operations Fixed Price Payment Item.

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

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

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

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

722.82 Payment Items

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

ITEM 100.99 STRUCTURE AND GEOTECHNICAL MONITORING LUMP SUM

The work under this Item shall include all materials, equipment, labor and professional services required to install, protect, replace, monitor and report on the existing stone masonry abutments. The Contractor shall install survey points to monitor any movement of the abutment walls and shall also install a seismograph to monitor vibrations caused by the construction activities.

Vibration Monitoring

The Contractor shall install one (1) seismograph onto the top of each abutment prior to the start of construction. The exact location shall be coordinated with the Engineer. The Contractor shall submit a vibration monitoring plan listing all required equipment and showing proposed locations within the structure. The plan shall describe the monitoring procedures to be followed. This plan shall be submitted no less than fifteen (15) days prior to the commencement of the baseline monitoring period. The seismograph shall have the following minimum features:

- Seismic range: 0.01 to 4 inches per second with an accuracy of +/- 5 percent of the measured peak particle velocity or better at frequencies between 10 Hertz and 100 Hertz, and with a resolution of 0.01 inches per second or less.
- Three channels for vibration monitoring.
- Two power sources: internal rechargeable battery and charger and 115 volts AC. Battery must be capable of supplying power to monitor vibrations continuously for up to 24 hours.
- Instruments must be capable of producing strip chart recordings and readings on site within one hour of obtaining readings. Provide computer software to perform analysis, produce reports of continuous monitoring.
- Continuous monitoring mode must be capable of recording single-component peak particle velocities, and frequency of peaks with an interval of one minute or less.

Certification shall be provided to indicate that the test equipment used for this purpose is calibrated and maintained in accordance with the test equipment manufacturer's calibration requirements and that, where applicable, calibrations are traceable to the National Institute of Standards and Technology.

The Contractor shall operate the seismograph for a minimum of five (5) consecutive 24-hour periods prior to the start of construction to establish baseline levels. Copies of the report summarizing the recorded baseline levels shall be distributed as outlined previously a minimum of five (5) days prior to commencement of any construction activity.

Following the start of construction, the Contractor shall monitor the vibration levels on an ongoing basis during the construction of the bridge or other activities as required by the Engineer. The Contractor shall maintain records of the vibration levels and shall submit a report of these levels as requested by the Engineer. The threshold value for peak particle velocity vibration criteria shall be 12.7 millimeters per second (1/2-inch per second). If measurements exceed the threshold value, the following actions shall be taken:

ITEM 100.99 (Continued)

1. Verify measurement reading.
2. Double the frequency of readings.
3. Notify the Engineer. Hold a meeting with representatives of the Contractor and MassDOT. Ensure work is being performed in accordance with the Contract Documents. Meeting to be held within 48 hours of exceeding the threshold value.

The limiting value for peak particle velocity vibration criteria shall be 25.4 millimeters per second (1-inch per second).

If measurements exceed the limiting value, the following actions shall be taken:

1. Stop construction operations immediately.
2. Verify measurement reading.
3. Notify the Engineer and hold a meeting with representatives of the Contractor and MassDOT immediately.
4. Inspect the canal walls for any visible change in condition

Based on the level of damage identified, follow the directions outlined below:

- a. No Damage to Slight damage (as defined in “Building Response to Excavation Induced Settlement, 1989, by Boscardin and Cording”); Proceed with construction operations while monitoring the condition of the abutments. Monitoring shall be continuous during the hours that construction operations are being performed. If wall damage is noted to reach the Moderate level (as defined in “Building Response to Excavation Induced Settlement, 1989, by Boscardin and Cording”) during the monitoring, stop construction activity. Proceed to b.
- b. Moderate to severe damage (as defined in “Building Response to Excavation Induced Settlement, 1989, by Boscardin and Cording”); Install preventative measures to prevent further damage to the walls before proceeding with construction activity. Preventative measures may include supplementary support/stabilization. The Contractor and MassDOT must both approve the proposed additional measure before the measure is implemented. Once the measure is implemented, proceed with construction operations while monitoring of the condition of the structure. Monitoring shall be continuous during the hours that construction activity is being performed. If additional damage is noted, stop construction activity and repeat the above procedure relative to additional preventative measures.

During all monitoring of vibration-producing construction activities the Contractor shall document all events that are responsible for the measured vibration levels, and submit the documentation to the Engineer with the data.

Survey Monitoring (Movement)

In addition to vibration monitoring, survey monitoring for potential movements of the existing substructures are required under this Item.

ITEM 100.99 (Continued)**Materials**

Existing structure monitoring points shall consist of 3 inch long surveyors' "PK" nails, securely nailed in place. The point shall be clearly identified using fluorescent spray paint adjacent to the point. The points shall be affixed to the tops of both abutments as outlined below.

Methods

The Contractor shall retain a Geotechnical Monitoring Consultant to install, monitor, maintain and report on the monitoring points. This proposed subconsultant must be preapproved by the Engineer. The subconsultant shall have the demonstrated experience to perform the work and shall provide reference to at least three (3) similar past projects.

Wall monitoring points shall be installed on the top of each of the abutments. The number and location of monitoring points shall be per the recommendations of the Geotechnical Monitoring Consultant as approved by the Engineer.

Wall monitoring points shall be used to measure horizontal displacements of these points during demolition of the existing bridge and construction of the proposed bridge including excavation and backfilling.

A baseline report shall be prepared for the existing wall points, 2 weeks prior to the start of Construction.

Monitoring frequency on the existing abutment walls shall be daily during excavation and demolition operations. Monitoring frequency shall otherwise be twice per week. The accuracy of the monitoring data points shall be kept to the nearest 0.01 ft.

Criteria

The following "threshold" and "limiting" movements of existing abutments shall be as follows:

- "Threshold" Horizontal Movement: No greater than 0.25 inch.
- "Limiting" Horizontal Movement: No greater than .5 inch.

The Contractor or Geotechnical Monitoring Consultant shall immediately notify the Engineer and shall take immediate steps to control further movement by revising construction procedures, providing supplemental bracing, backfilling or other measures as required if any of the following occur:

1. Field measurements indicate that any of the "threshold" movement criteria are reached or exceeded
2. Field measurements or observations indicate that significant or sustained wall movements, beyond those reasonably expected, are occurring (total movement may be less than the "limiting" movement criteria.)

ITEM 100.99 (Continued)

If “limiting” movements are being approached or reached, the Owner or Engineer may require the Contractor to temporarily suspend the work in the area where such movement is occurring and implement all necessary mitigation measures which are satisfactory to the Engineer and/or Owner, to arrest the movements, at no additional cost.

Work in the area where the “limiting” values have been reached shall not be permitted until the results of surveys can be reviewed and evaluated by the Engineer.

These criteria are intended to establish a minimum basis for the Contractor’s design and procedures and does not relieve the Contractor of its responsibility for preventing detrimental movements and damage to adjacent structures, utilities or other work.

In the event the Contractor does not comply with the approved mitigation plan, or continues work in violation of “threshold” or “limiting” values being reached or exceeded, the Contractor shall not be allowed to continue work until proper mitigation procedures and corrections have been made as determined by the Engineer. No claims for schedule delays will be allowed due to the Contractor’s failure to comply with these requirements.

Submittals

The Contractor shall submit a plan/procedure for the implementation of the monitoring program prior to starting work. As part of this submittal, a mitigation plan shall be provided to indicate the Contractor’s course of action in the event that any of the established criteria are exceeded.

The Geotechnical Monitoring Consultant shall provide the Engineer with the baseline readings three days prior to starting demolition. Subsequent reports shall be provided to the Engineer prior to starting work the day following the day the readings were taken.

BASIS OF PAYMENT

Item 100.99 will be paid for at the Contract unit price Lump Sum, which price shall include all labor, materials, equipment, tools, professional services provided by the Geotechnical Monitoring Consultant, collection and processing of all data, submittals, and all incidental costs required to complete the work.

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

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

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

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

Payment is per hour on-site and shall be compensation for a minimum crew of 2 licensed applicators, 2 back-pack sprayers and mist-blowers, a properly equipped spray truck with spray hoses, and a tank with sufficient capacity for a full day of work. If there is only one applicator, hourly payment shall be adjusted to 50 percent of the unit price. This item is not intended for manual removal of plants.

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

Herbicide shall be applied during daytime hours only.

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

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

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

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

ITEM 102.3 (Continued)

Areas identified for vegetation control measures shall be as shown on the plans and as determined in the field by the Engineer and a MassDOT Landscape Architect. Contact at MassDOT Landscape Design Section is: Stephanie.Smoot@dot.state.ma.us.

QUALIFICATIONS

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

Requirements

1. Company must provide proof of qualifications by providing the following:
 - a. Narrative describing company, its expertise and experience with invasive plant control.
 - b. Demonstrate experience with herbicide treatment as part of restorations and in sensitive areas.
 - c. Describe company's technical qualifications and past performance.
2. Company must meet licensing requirements:
 - a. All crew applicators must have a Massachusetts Commercial Applicator License (CORE).
 - b. At least one or more applicator must have a ROW certification, if required for work.
 - c. Company must provide name(s) of applicator(s) and Applicator License/Certification number for all contractor crew leaders working on the project.
 - d. Company must provide documentation of any warnings, penalties or fines received in the last three (3) years.
3. Company must provide proof of experience with invasive plant control and include following:
 - a. At least five (5) references from prior invasive plant control work completed in last five (5) years. Provide contact information including address, phone number and email.
 - b. Provide a summary of each of these projects including nature of the problem, specific invasive vegetation treated, dates and period of treatment, methodologies used, and summary of success or not in terms of meeting performance objectives. Include summary of equipment used.
 - c. Photo documentation of these projects.
 - d. GPS coordinates of project locations, if available.
4. Crew leader must have expertise with invasive plant control and provide the following:
 - a. Have held Core license for at least five (5) years.
 - b. Resume listing five (5) or more years of experience applying pesticides with the company or with another company specializing in vegetation management.

ITEM 102.3 (Continued)

SUBMITTALS

No work shall begin without approval of the submittals.

Submittals include the following items:

Invasive Plant Management Strategy (IPMS)

At least thirty (30) days prior to proposed treatment the IPMS shall be submitted for approval by the Engineer and MassDOT Landscape Architect. All chemicals, methods and work done under this item shall be consistent with the IPMS. The IPMS shall be as described under Item 102.33.

Herbicide Use Report

Within two (2) weeks after each application, the Contractor shall provide to the Engineer a completed and signed MassDOT Herbicide Use Report.

Photo Documentation

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

MATERIALS

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

METHODS

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

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

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

Herbicide Applications

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

ITEM 102.3 (Continued)

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

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

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

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

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

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

Disposal Of Invasive Plant Material

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

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

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

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

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

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

ITEM 102.3 (Continued)

Follow-Up Treatment

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

MEASURE OF SUCCESS

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

METHOD OF MEASUREMENT

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

BASIS OF PAYMENT

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

Payment will be based upon time spent on the project doing actual work and shall not include travel time to and from the Contractor's place of business and shall also not include time for investigative field trips.

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

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

ITEM 102.33 **INVASIVE PLANT MANAGEMENT STRATEGY** **HOUR**

This item consists of providing an Invasive Plant Management Strategy (IPMS) for the control of invasive plants currently existing on the project site and/or as directed and shall be coordinated with Item 102.3 Herbicide Treatment of Invasive Plants. The IPMS shall be submitted for review and approval and the IPMS shall be implemented on-site.

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

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

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

QUALIFICATIONS

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

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

SUBMITTALS**Task Summary & Reports**

For measurement of payment, the contractor shall submit the total sum and a breakdown of hours for the tasks performed. At a minimum, the tasks shall include the Initial Site Walk, the IPMS Written Report, and if necessary to accommodate project or site changes, a Follow-up Site Inspection and accompanying IPMS Amendment.

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

Invasive Plant Management Strategy (IPMS)

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

ITEM 102.33 (Continued)

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

- I. Project Information**
 - a. Company writing IPMS and performing herbicide application.
 - b. Date of site walk
 - c. Attendees at site walk
 - d. Expected end date of contract and expected last treatment (month/season)
- II. Brief Description of Conditions**
 - a. Provide a free-hand sketch on construction plans or aerial image showing species, location, and as relevant, show or note extent of population as relevant to Strategy (i.e., population extends off ROW preventing eradication, small population and eradication deemed feasible within contract schedule, etc.).
- III. Coordination with Roadway Contractor regarding other work**
 - a. Tree Work: Note coordination to be implemented with tree removal, clearing, and clearing and grubbing as applicable to the project.
 - b. Wetland Mitigation - Include management proposed for wetland mitigation areas in the IPMS, if and as required.
 - c. Planting: If there will be planting in areas proposed for treatment, propose treatment and schedule to avoid herbicide damage to plants.
 - d. Mowing: If coordination is required with state mowers, note need in IPMS.
- IV. Soil Management**
 - a. Provide specifics on how soil with invasive plant roots (in particular) or seeds will be handled (i.e., separate stockpiles, plant material will be buried on-site, re-used on-site, disposed off site and if so, where?).
 - b. Show stockpile locations on plan and include treatment schedule.
 - c. Note measures that will be implemented to avoid spread through equipment, including how and where equipment will be cleaned.
- V. Invasive Plant Treatment & Management**
 - a. Proposed chemical and methods of treatment for each species or area.
 - b. Time of treatment based on target plant species.
 - c. Submit product label including application methods and rates (entire MSDS information need not be submitted if available online).
 - d. Proposed performance metrics or measure of treatment success if different from that specified under Item 102.3.
 - e. Method for disposing invasive plant material. This includes material that may result in spread (i.e., seeds, roots) and material that has been treated and/or is not viable (foliage, dead wood, etc.). Methods may include grinding in place, stockpiling and treating, and incinerating offsite.
 - f. Expected follow-up treatment for duration of contract.
- VI. Monitoring Schedule** if requested by MassDOT.

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

ITEM 102.33 (Continued)**Photo Documentation**

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

METHODS**Initial Site Walk**

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

IPMS Follow-up Amendment

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

Interim Site Monitoring Inspection Reports

If required by the MassDOT Landscape Architect and Engineer, Interim Site Monitoring and an accompanying report shall be conducted.

Final Inspection

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

METHOD OF MEASUREMENT

Item 102.33 will be measured for payment by the Hour. The basis for measurement shall be per the completion of tasks as approved under the Task Summary submittal.

BASIS OF PAYMENT

Item 102.33 will be paid at the contract unit price per Hour, which price shall include all labor, materials, equipment, tools, and all incidentals required to complete the work.

Payment shall not include travel time to and from the Contractor's place of business.

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING EACH

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

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

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

REFERENCES

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

MATERIALS

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

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

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

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

METHODS OF WORK

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

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

ITEM 102.511 (Continued)

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

DAMAGES OR LOSS

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

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

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

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

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

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

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

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

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

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

ITEM 102.521**TREE AND PLANT PROTECTION FENCE****FOOT**

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

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

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

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

MATERIALS

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

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

REFERENCES

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

Establishment of THE TPPZ

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

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

ITEM 102.521 (Continued)

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

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

METHOD OF WORK

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

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

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

REQUIRED WORK WITHIN THE TPPZ

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

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

TREE AND PLANT INJURY OR LOSS

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

ITEM 102.521 (Continued)

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

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

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

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

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

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

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

METHOD OF MEASUREMENT

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

BASIS OF PAYMENT

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

ITEM 102.521 (Continued)

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

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

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

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

ITEM 114.1**DEMOLITION OF SUPERSTRUCTURE
OF BRIDGE NO. N-03-007 (29N)****LUMP SUM**

Work under this Item shall conform to the relevant provisions of Subsection 112, Demolition of Buildings, Structures, and Bridges, of the Standard Specifications for Highways and Bridges and the following.

The work includes furnishing all labor and materials necessary to perform the demolition of the existing bridge superstructure as shown on the Plans or as directed by the Engineer. Except as specified, all material and debris shall become the property of the Contractor, and shall be recycled, reused or disposed of properly.

The Contractor shall remove and dispose of the following: the superstructure and all connected components, including but not limited to, steel through girders, steel and timber stringers, steel floorbeams, timber deck, bituminous wearing surface, chain link fence and water main as indicated on the Plans (see General Requirements for Demolition and Work Involving Painted Steel below).

Prior to performing demolition, the Contractor shall be responsible for installing a temporary shielding system to prevent any debris from falling onto MBTA right-of-way and adjacent sloped areas beneath the bridge.

MassDOT makes no assurances regarding the presented conditions, dimensions, and materials of the existing structure as shown on the Plans. The Contractor shall verify all existing conditions and construction features of the bridge to be demolished, as necessary, for the proper planning and completion of the work. The Contractor shall base the bid on his/her own findings without any additional compensation for variances from the Plans or these Special Provisions regarding actual conditions for the items to be removed.

The Contractor shall exercise extreme care while working under/over/adjacent to existing utility lines and overhead wires.

The current load carrying capacity of the bridge is unknown. The bridge has been closed since 1998 to all vehicular traffic due to its deteriorated condition. **Shall be no additional loading on the deck due to such things as heavy equipment, cranes, backhoes, etc.**

The Contractor is solely responsible for maintaining the stability of the existing structure at all times during the demolition and construction operations and is considered incidental to this Item. Any design, fabrication and installation for temporary strengthening or bracing of portions of the existing structure to facilitate its removal are the responsibility of the Contractor.

ITEM 114.1 (Continued)

The Contractor shall prepare and submit a plan indicating his/her proposed method of demolition including equipment, tools, devices, crane capacity and location, etc. to the Engineer and MBTA for approval. The Contractor shall develop their method of demolition in accordance with MBTA requirements and these special provisions. It shall also include a schedule of operations, methods of utility protection (if any), shielding design (see Item 994.01 for requirements), dust control, and disposal location.

The demolition procedures and any necessary calculations and drawings shall bear the stamp of a Professional Engineer (Structural Engineer) registered in the Commonwealth of Massachusetts certifying that all existing structural members are suitably braced and supported throughout the demolition process. Work shall not commence until the Engineer has given written approval of the method of demolition.

Any temporary lighting that is required for demolition during night-time operations is considered incidental to this Item.

Any lifting plans and supporting calculations for the demolition procedure shall conform to the requirements of Subsection 960 ERECTION of the Standard Specifications for the submittal. The manufacturer's rated capacity of the crane and of all lifting and connecting devices shall be adequate for 150% of the total pick load including spreaders. **The 150% factors of safety are to be used in addition to any factors of safety used by the manufacturer** to calculate the rated capacity. The Contractor's demolition method shall take into consideration any utilities and drainage structures near the bridge. Debris from construction must be carefully contained within the work zone and prevented from falling onto the MBTA right-of-way and adjacent sloped areas. The Contractor shall be required to remove any debris which is generated by demolition from the site immediately and to restore portions of the site affected by the operation to their original undisturbed condition or better. The Contractor shall also be responsible for dust control due to the demolition operation.

The Contractor shall not damage the portions of the substructure that have been designated to remain, or any newly constructed structural components, as shown on the Plans. Any structural components so designated that are damaged or otherwise made unsatisfactory for continued use by the Contractor's operations, as determined by the Engineer, shall be replaced or repaired to the satisfaction of the Engineer by the Contractor at his/her own expense.

The south approach, between the bridge and Middlesex Avenue, may be used to store construction equipment and materials. There is limited space on the north approach, between the bridge and Cochituate Street, as the adjacent parking lot to the East must remain accessible to vehicular traffic throughout the project.

ITEM 114.1 (Continued)

BASIS OF PAYMENT

Item 114.1 will be paid for at the Contract unit price Lump Sum, which price shall include all labor, materials, equipment, required temporary supports/braces, required temporary lighting, and all incidental costs required to complete the work.

No separate payment will be made for removal of hazardous paint/lead, testing, containment, permits, dump fees, taxes, special handling of hazardous materials, miscellaneous removals and disposals that are not specifically listed for payment under another item, but all costs in connection therewith shall be included in the Contract unit price bid.

The disposal of the existing timber deck and timber stringers will be paid for under Item 184.1 Disposal of Treated Wood Products.

The demolition of portions of the existing granite stone masonry abutments and backwalls will be paid for under Item 127. Concrete Excavation.

Providing, installation, and removal the proposed temporary shielding system will be paid for under Item 994.01 Temporary Protective Shielding Bridge NO. N-03-007 (29N).

ITEM 120.

EARTH EXCAVATION

CUBIC YARD

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

The work shall consist of removing all materials required for execution of the work as shown on the Plans and as required by the Engineer, except that material for which payment is made under Items 121., 127., 140. and 142., and except those materials for which payment is made under other items of this Contract.

Also included shall be the excavation and removal of existing pavements, existing sidewalks, existing concrete barriers, existing curbing, any trash and debris within the project limits (as directed by the Engineer) and all other materials not designated to be reused on the project or to be removed and discarded.

The Engineer shall determine the disposition of all materials with respect to removal and disposal.

The Contractor shall perform all excavation in such a manner as to maintain slopes, longitudinally and laterally and to ensure proper and continuous drainage at all times.

To avoid damage to trees which have parts of their root system in roadways or planting areas designated for excavation, such excavation shall be accomplished as carefully as possible or as directed by the Engineer (see also Items 102.511 & 102.521).

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 120. will be measured and paid per Subsections 120.80 and 120.81, respectively.

ITEM 120.2 **GRANITE BLOCK REMOVED AND STACKED** **EACH**

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

The work shall consist of removing and stacking the existing granite blocks located within the project limits as indicated on the Plans and as required by the Engineer. There are granite blocks located along the west side of Spring Street near the intersection of Spring Street and Cochituate Street, and west of Spring Street near the end of the northwest wingwall.

The Contractor shall coordinate with John Westerling of the Town of Natick DPW regarding the location in which to transport the granite blocks. The Contractor shall accept and hold the responsibility for the removal, handling, and stacking at the designated location. Responsibility shall include protection of granite blocks while they are in the Contractor's possession until final delivery to the designated location and the following: Any components lost or damaged through lack of protection or carelessness by the Contractor shall be replaced with satisfactory material in kind at their expense. Materials transported and stacked shall be stored in neat piles that will be convenient for the owner. The Engineer will have final determination on the size, location, and arrangement of the piles of stacked material. The Contractor's responsibility will cease upon final acceptance of the work, or 60 days from the time a certified notice (with copy to Engineer) is sent by Contractor to owner of material that all material has been delivered.

METHOD OF MEASUREMENT

Item 120.2 will be measured for payment by the Each granite block removed and stacked.

BASIS OF PAYMENT

Item 120.2 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, transportation, stacking, and all incidental costs required to complete the work.

ITEM 127.**CONCRETE EXCAVATION****CUBIC YARD**

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

The Work under this item shall include the removal and disposal of the portions of the North and South Abutments and backwalls as indicated on the Plans. Both abutments are composed of granite block stone masonry. Any earth excavation required is paid for separately under Item 140 for abutments. As discussed on the plans, the contractor shall field verify the limits of stone masonry removal. The intention is for the removal limits to correspond to grout lines between granite blocks.

The Contractor shall not to damage existing granite blocks to remain. Any items required to be retained as part of the permanent structure which are damaged or otherwise made unsatisfactory for continued use by the Contractor's operations, shall be repaired or replaced at the Contractor's expense, as directed by the Engineer.

Submittals

Prior to the start of work, the Contractor shall submit Demolition Plans and calculations for review and approval by the Engineer. Plans and calculations shall bear the stamp of a Professional Engineer registered in the Commonwealth of Massachusetts. The procedure shall meet the requirements for a submittal of a demolition procedure as specified under Item 114.1 Demolition of Superstructure of Bridge No. N-03-007(29N) of these Special Provisions.

Construction Methods

During the prosecution of the work under this Item, the Engineer may reject the use of any method or equipment that causes possible damage to the remaining structure. No debris from any excavation shall fall onto MBTA right-of-way or adjacent sloped areas.

METHOD OF MEASUREMENT

Item 127. will be measured for payment by the Cubic Yards of material excavated.

BASIS OF PAYMENT

Item 127. will be paid for at the contract unit price per Cubic Yard, which price shall include all labor, materials, equipment, disposal of excavated materials, and all incidental costs required to complete the work.

Temporary protective shielding will be paid for under Item 994.01.

ITEM 144.

CLASS B ROCK EXCAVATION

CUBIC YARD

Work under this Item shall conform to the relevant provisions of Subsection 140 of the Standard Specifications and the following:

- The removal and disposal of any natural and man-made obstructions that may be encountered during excavation operations for the proposed substructure.
- The removal of boulders measuring one (1) cubic yard or more and all solid rock that requires blasting or breaking by hand power tools encountered within the limits of excavation.

ITEM 153.2

LIGHTWEIGHT FILL

CUBIC YARD

The work under this item shall conform to the relevant provisions of Subsection 150 of the Standard Specifications and the following.

This work includes furnishing and installing Lightweight Foamed Glass Aggregate (LFGA) material for backfill at locations and to the limits shown on the Contract Documents.

The Contractor shall furnish all labor, materials, equipment, tools, and appurtenances required to complete the work as specified herein. The work shall further include the following:

1. Storage and handling of LFGA.
2. Protection and preservation of all existing utilities and structures.
3. Placement of geotextile wrap at locations indicated on the Contract Drawings.
4. Removal and legal disposal of all excess material resulting from the work specified herein.

MATERIALS

Lightweight Foamed Glass Aggregate:

Lightweight Foamed Glass Aggregate (LFGA) shall be manufactured from of a minimum of 98% recycled glass and shall be produced from a dry-mixing process. The friction angle of the fill material shall be 45 degrees or greater.

The LFGA shall consist of particles exhibiting a non-leaching, closed cell structure and shall meet the following gradation requirements:

Sieve Size (in)	Total Percent Passing
4	100
2 ½	85 - 100
3/8	0 - 15

The LFGA shall meet the following chemical requirements:

Requirements	Criteria	Test Methods
Loss on Ignition	0%	ASTM C114
Sulfates	< 15 ppm	AASHTO T290
Chlorides	< 10 ppm	AASHTO T291
TCLP	Non-Leaching	SW-846

The as-delivered LFGA shall have a maximum dry density no greater than 15 pounds per cubic foot (pcf), as determined by ASTM C-29.

The in-place compacted dry density of the LFGA shall not exceed 20 pcf when determined in accordance with the method specified by the Engineer.

ITEM 153.2 (Continued)**Acceptance of Materials:**

The Contractor shall furnish to the Engineer a Certificate of Compliance issued by a laboratory certified by the product manufacturer, certifying that the LFGA material complies with the applicable Contract Specifications. A copy of all test results performed by the Contractor necessary to assure contract compliance shall also be furnished to the Engineer. Acceptance will be based on the Certificate of Compliance, accompanying test reports, and visual inspection by the Engineer.

SUBMITTALS**Material Certification:**

Prior to material delivery to project site, the Contractor shall provide the Engineer with a written certification or manufacturer's quality control data showing that the product meets or exceeds the requirements specified herein. The Contractor shall also provide the Engineer with documentation that the manufacturer has manufactured a minimum of 100,000 cubic yards (CY) of product meeting the requirements of this Special Provision.

LFGA Sample:

At Engineer's request, provide a 25-pound (LB) control sample of the LFGA material for every 200 CY delivered on site.

CONSTRUCTION METHODS**Delivery, Storage and Handling:**

Deliver, store, and handle materials in accordance with manufacturer's recommendations.

During all stages of manufacture, shipment, storage, and construction, minimize the amount of material moves to prevent particle breakage and physical damage. Minimize traffic on foamed glass aggregate until an adequate thickness of cover material is placed over the foamed glass aggregate.

Placement:

The area work shall be free of standing water, ice, or foreign loose particles.

Install first separation geotextile fabric at required locations shown on the Contract Drawings.

Spread LFGA material in lifts of even thickness in backfill areas shown on the Contract Drawings. Do not operate construction equipment, other than equipment required for placement and compaction, on the exposed surface of LFGA to minimize breakage of LFGA particles and over-compaction of the fill.

ITEM 153.2 (Continued)

Construction equipment, other than required for placement and compaction, shall not operate on the exposed foamed glass aggregate to minimize breakage and over-compaction of the foamed glass aggregate.

For compaction using tracked equipment, spread LFGA in uncompacted lift thicknesses of 24 inches. Compact LFGA using a tracked excavator or dozer with ground pressures of 625 to 1,025 psf. Compaction shall then be attained by lifting the blade or bucket and traveling over the layer for a total of four (4) full passes. One (1) full pass shall be defined as a minimum of 100% coverage of the tracks passing over the top of the lift.

In areas not accessible by tracked equipment (e.g., around structures, utilities or due to vertical clearance or horizontal restrictions) LFGA shall be placed in maximum uncompacted lifts of 12 inches and compacted with a plate compactor weighing 110 to 220 LBs. Compaction shall be complete after a minimum of four (4) full passes with the plate compactor. One (1) full pass is defined as a minimum of 100% coverage of the plate passing over the top of the lift.

Alternative forms of installation and compaction shall be as recommended by the manufacturer and approved by the Engineer.

Upon Engineer's approval, compaction requirements in areas not subjected to highway loading or in other areas designated in Contract Documents may be reduced.

A geotextile shall be placed as a separator between subgrade and the initial lifts of LFGA, as well as above the final lift and on side slopes to provide separation between the LFGA material and adjacent soil and capping layer. Care should be taken during placement of capping layer to prevent damage to geotextile. Adjacent panels of geotextile shall be sewn together or overlapped a minimum of 12 inches. The geotextile shall not be left exposed for longer than 14 days, or as otherwise recommended by the geotextile manufacturer.

Where required, exposed LFGA surfaces shall be protected against direct contact with excessive traffic using plywood, steel plates or similar forms of protection. All and any ruts deeper than four (inches) shall be backfilled with new foamed glass material compacted with four (4) full passes with a 110 to 220 lb plate compactor.

METHOD OF MEASUREMENT:

Item 153.2 will be measured for payment by the Cubic Yard of lightweight fill, complete in place.

BASIS OF PAYMENT:

Item 153.2 will be paid for at the Contract unit price per Cubic Yard, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 156.5

CRUSHED STONE FOR FILTER BLANKET

CUBIC YARD

The work under this Item shall conform to the relevant provisions of Subsections 150 and 983 of the Standard Specifications and the following:

The work shall include backfilling of the proposed leaching basin and for use as a bedding foundation element for the proposed leaching basin as shown on the Plans. The crushed stone shall conform to Subsection M2.01.2 of the Standard Specifications.

The crushed stone backfill shall be placed in a 1'-0" minimum width surrounding the proposed leaching basin and crushed stone shall be placed as a 1'-0" minimum depth bedding beneath the proposed leaching basin.

Method Of Measurement

Item 156.5 will be measured for payment by the Cubic Yard of the crushed stone installed, complete in place.

Basis Of Payment

Item 156.5 will be paid for at the Contract Unit Price per Cubic Yard, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 180.01 ENVIRONMENTAL HEALTH AND SAFETY PROGRAM LUMP SUM

The work shall consist of ensuring the health and safety of the Contractor's employees and subcontracting personnel, the Engineer, their representatives, the environment, and public welfare from any on-site chemical contamination present in air, soil, water and sediment.

The Contractor shall prepare and implement a site-specific Environmental Health and Safety Plan (EHASP) which has been approved and stamped by a Certified Industrial Hygienist (CIH) and includes the preparer's name and work experience. The EHASP shall include appropriate components required by OSHA Standard 29 CFR 1910.120(b) and the Massachusetts Contingency plan (MCP) 310 CMR 40.0018 and must comply with all applicable state and federal laws, regulations, standards and guidelines, and provide a degree of protection and training appropriate for implementation on the project. The EHASP shall be a dynamic document with provision for change to reflect new information, new practices or procedures, changing site environmental conditions or other situations which may affect site workers and the public. The EHASP shall be developed and implemented independently from the standard construction HASP required to work on all MassDOT construction projects.

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

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

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

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

ITEM 180.01 (Continued)

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

Method of Measurement and Basis of Payment

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

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

ITEM 180.02

PERSONAL PROTECTION LEVEL C UPGRADE

HOUR

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

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

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

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

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

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

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

ITEM 180.03 (Continued)

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

The LSP and Contractor shall be held responsible for the submission of all MCP-related documents to the Engineer at least 14 days in advance of any timeframe specified in the MCP and for the timely submission of data and tracking information as noted within this Item. All documents prepared under this Item must be reviewed and signed by the approved LSP. The Contractor and LSP shall be responsible for all fines, 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 Engineer before submittal to the DEP, except if an imminent hazard condition exists as defined in 309 CMR 4.03(4)(b).

LABORATORY TESTING IN SUPPORT OF LSP SERVICES

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

ITEM 180.03 (Continued)

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

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

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

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

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

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

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

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

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

Excavation of existing subsurface materials may include the excavation of contaminated soils. The Contractor shall be responsible for the proper coordination of characterization, transport and disposal, recycling or reuse of contaminated soils. Disposal, recycling or reuse will be referred to as “disposal” for the purposes of this specification. However, regardless of the use of the term herein, there will be no compensation under these items for reuse within the project limits. The Contractor will be responsible for coordinating the activities necessary for characterization, transport and disposal of contaminated soils. Such coordination will include the Engineer and his/her designee overseeing management of contaminated materials. Contaminated soils must be disposed of in a manner appropriate for the soil classification as described below and in accordance with the applicable laws of local, state and federal authorities. The Contractor shall be responsible for identifying disposal facility (ies) licensed to accept the class of contaminated soils to be managed and assure that the facility can accept the anticipated volume of soil contemplated by the project. The Contractor shall be responsible for hiring a Licensed Site Professional (LSP) and all ancillary professional services including laboratories as needed for this work. The Contractor will be responsible for obtaining all permits, approvals, manifests, waste profiles, Bills of Lading, etc. subject to the approval of the Engineer prior to the removal of the contaminated soil from the site. The Contractor and LSP shall prepare and submit to the Engineer for approval all documents required under the Massachusetts Contingency Plan (MCP) and related laws and environmental regulations to conduct characterization, transport, and disposal of contaminated materials.

CLASSES OF CONTAMINATED SOILS

The Contractor and its LSP shall determine if soil excavated or soil to be excavated is unregulated soil or contaminated soil as defined in this section. Such materials shall be given a designation for purposes of reuse or disposal based on the criteria of the MCP. Soils and sediments which are not suitable for reuse will be given a designation for purposes of off-site disposal based on the characterization data and disposal facility license requirements. The Classes of Contaminated Soils are defined as follows:

ITEMS 181.11 through 181.14 (Continued)

Unregulated Soil consists of soil, fill and dredged material with measured levels of oil and hazardous material (OHM) contamination at concentrations below the applicable Reportable Concentrations (RCs) presented in the MCP. Unregulated soil consists of material which may be reused (or otherwise disposed) as fill within the Commonwealth of Massachusetts subject to the non-degradation criteria of the MCP (310 CMR 40.0032(3), in a restricted manner, such that they are sent to a location with equal or higher concentrations of similar contaminants. Disposal areas include licensed disposal facilities, approved industrial settings in areas which will be capped or covered with pavement or loamed and seeded, and for purposes of this project should be reused as fill within the project site construction corridor whenever possible. The material cannot be placed in residential and/or environmentally sensitive (e.g. wetlands) areas. Under no circumstances shall contaminated soils be placed in an uncontaminated or less contaminated area (including the area above the groundwater table if this area shows no sign of contamination).

The Contractor shall submit to MassDOT the proposed disposal location for unregulated soils for approval. If such a disposal location is not a licensed disposal facility, the Contractor shall submit to the Engineer analytical data to characterize the disposal area sufficiently to verify that the unregulated material generated within the MassDOT construction project limits is equal to or less than the contaminant levels at the disposal site and meets the non-degradation requirements of the MCP. In addition, the Contractor shall provide written confirmation from the owner of the proposed disposal location that they have been provided with the analytical data for both the materials to be disposed as well as the disposal site characterization and that s/he agrees to accept this material. A Material Shipping Record or Bill of Lading, as appropriate, shall be used to track the off-site disposal of unregulated soil and a copy, signed by the disposal facility or property owner, shall be provided to the Engineer in order to document legal disposal of the unregulated material.

The cost of on-site disposal of unregulated soil within the project area will be considered incidental to the item of work to which it pertains.

ITEMS 181.11 through 181.14 (Continued)

REGULATED SOIL consists of materials containing measurable levels of OHM that are equal to or exceed the applicable Reportable Concentrations for the site as defined by the MCP, 310 CMR 40.0000. Regulated soil which meets the MCP reuse criteria of the applicable soil/groundwater category for this project area may be reused on site provided that it meets the appropriate geotechnical criteria established by the Engineer. Regulated Soil may be reused (as daily or intermediate cover or pre-cap contouring material) or disposed (as buried waste) at lined landfills within the Commonwealth of Massachusetts or at an unlined landfill that is approved by the Massachusetts Department of Environmental Protection (DEP) for accepting such material, in accordance with DEP Policy #COMM-97-001, or at a similar out-of-state facility. It should be noted that soils which exceed the levels and criteria for disposal at in-state landfills, as outlined in COMM-97-001, may be shipped to an in-state landfill, but require approval from the DEP Division of Solid Waste Management and receiving facility. An additional management alternative for this material is recycling into asphalt. Regulated Soils may also be recycled at a DEP approved recycling facility possessing a Class A recycling permit subject to acceptance by the facility and compliance with DEP Policy #BWSC-94-400. Regulated Soil removed from the site for disposal or treatment must be removed via an LSP approved Bill of Lading, Manifest or applicable material tracking form. This type of facility shall be approved/permitted by the State in which it operates to accept the class of contaminated soil in accordance with all applicable local, state and federal regulations.

HAZARDOUS WASTE consists of materials which must be disposed of at a facility permitted and operated in full compliance with Federal Regulation 40 CFR 260-265, Massachusetts Regulation 310 CMR 30.000, Toxic Substances Control Act (TSCA) regulations, or the equivalent regulations of other states, and all other applicable local, state, and federal regulations. All excavated materials classified as hazardous waste shall be disposed of at an out-of-state permitted facility. This facility shall be a RCRA hazardous waste or TSCA facility, or RCRA hazardous waste incinerator. This type of facility shall be approved/permitted by the State in which it operates to accept hazardous waste in accordance with all applicable local, state and federal regulations and shall be permitted to accept all contamination which may be present in the soil excavate. The Contractor shall ensure that, when needed, the facility can accept TSCA waste materials i.e. polychlorinated biphenyls (PCBs). Hazardous waste must be removed from the site for disposal or treatment via an LSP approved Manifest.

MONITORING/SAMPLING/TESTING REQUIREMENTS

The Contractor shall be responsible for monitoring, sampling and testing during and following excavation of contaminated soils to determine the specific class of contaminated material. Monitoring, sampling and testing frequency and techniques should be performed in accordance with Item 180.03 – LSP Services. Additional sampling and analysis may be necessary to meet the requirements of the disposal facility license. The cost of such additional sampling and analysis shall be included in the bid cost for the applicable disposal items. The Contractor shall obtain sufficient information to demonstrate that the contaminated soil meets the disposal criteria set by the receiving facility that will accept the material.

ITEMS 181.11 through 181.14 (Continued)

No excavated material will be permanently placed on-site or removed for off-site disposal until the results of chemical analyses have been received and the materials have been properly classified. The Contractor shall submit to the Engineer results of field and laboratory chemical analyses tests within seven days after their completion, accompanied by the classification of the material determined by the Contractor, and the intended disposition of the material. The Contractor shall submit to the Engineer for review all plans and documents relevant to LSP services, including but not limited to, all documents that must be submitted to the DEP.

WASTE TRACKING:

Copies of the fully executed Weight Slips/Bills of Lading/ Manifests/Material Shipping Records or other material tracking form received by the Contractor from each disposal facility and for each load disposed of at that facility, shall be submitted to Engineer and the Contractor's LSP within three days of receipt by the Contractor. The Contractor is responsible for preparing and submitting such documents for review and signature by the LSP or other appropriate person with signatory authority, three days in advance of transporting soil off-site. The Contractor shall furnish a form attached to each manifest or other material tracking form for all material removed off-site, certifying that the material was delivered to the site approved for the class of material. If the proposed disposition of the material is for reuse within the project construction corridor, the Contractor shall cooperate with MassDOT to obtain a suitable representative sample(s) of the material to establish its structural characteristics in order to meet the applicable structural requirements as fill for the project.

All material transported off-site shall be loaded by the Contractor into properly licensed and permitted vehicles and transported directly to the selected disposal or recycling facility and be accompanied by the applicable shipping paper. At a minimum, truck bodies must be structurally sound with sealed tail gates, and trucks shall be lined and loads covered with a liner, which shall be placed to form a continuous waterproof tarpaulin to protect the load from wind and rain.

DECONTAMINATION OF EQUIPMENT

Tools and equipment which are to be taken from and reused off site shall be decontaminated in accordance with applicable local, state and federal regulations. This requirement shall include, but not be limited to, all tools, heavy machinery and excavating and hauling equipment used during excavation, stockpiling and handling of contaminated material. Decontamination of equipment is considered incidental to the applicable excavation item.

ITEMS 181.11 through 181.14 (Continued)**REGULATORY REQUIREMENTS**

The Contractor shall be responsible for adhering to regulations, specifications and recognized standard practices related to contaminated material handling during excavation and disposal activities. MassDOT shall not be responsible at any time for the Contractor's violation of pertinent State or Federal regulations or endangerment of laborers and others. The Contractor shall comply with all rules, regulations, laws, permits and ordinances of all authorities having jurisdiction including, but not limited to, Massachusetts DEP, the U.S. Environmental Protection Agency (EPA), Federal Department of Transportation (DOT), Massachusetts Water Resources Authority (MWRA), the Commonwealth of Massachusetts and other applicable local, state and federal agencies governing the disposal of contaminated soils.

All labor, materials, equipment and services necessary to make the work comply with such regulations shall be provided by the Contractor without additional cost to MassDOT. Whenever there is a conflict or overlap within the regulations, the most stringent provisions shall apply. The Contractor shall reimburse MassDOT for all costs it incurs, including 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 baseplan to record this information.

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

ITEMS 181.11 through 181.14 (Continued)

Each Characterization Report will include the laboratory analytical report and Chain of Custody Record for the samples included in the Report.

II. Stockpiling, Transport, and Disposal.

At least two weeks prior to the start of any excavation activity, the Contractor shall submit, in writing, the following for review and shall not begin excavation activity until the entire submittal is acceptable to MassDOT.

Excavation and Stockpiling Protocol:

Provide a written description of the management protocols for performing excavation and stockpiling and/or direct loading for transport, referencing the locations and methods of excavating and stockpiling excavated material.

Disposal and Recycling Facilities:

1. Provide the name, address, applicable licenses and approved waste profile for disposal and/or recycling location(s) where contaminated soil will be disposed. Present information substantiating the suitability of proposed sites to receive classifications of materials intended to be disposed there, including the ability of the facility to accept anticipated volumes of material.
2. Provide a summary of the history of compliance actions for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. Material should not be sent to facilities which are actively considered by the DEP, USEPA or other responsible agency to be in violation of federal, state or local hazardous waste or hazardous material regulations. MassDOT reserves the right to reject any facility on the basis of poor compliance history.

Transportation:

The name, address, applicable license and insurance certificates of the licensed hauler(s) and equipment and handling methods to be used in excavation, segregation, transport, disposal or recycling.

III. Material Tracking and Analytical Documentation for Reuse/Disposal.

The following documents are required for all excavation, reuse and disposal operations and shall be in the format described. At least two weeks prior to the start of any excavation or demolition activity, the Contractor shall submit the tracking templates required to present the information as stipulated below. Excavation or demolition will not begin until the format is acceptable to MassDOT.

ITEMS 181.11 through 181.14 (Continued)

All soils, sediments and demolition debris must be tracked from the point of excavation to stockpiling to onsite treatment/processing operations to off-site disposal or onsite reuse as applicable.

Demolition Debris:

Demolition debris must be tracked if the debris is stockpiled at a location other than the point of origin or if treatment or material processing is conducted. Identification of locations will be based on the station-offset of the location. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations/comments, quantity, and stockpile ID/processing operation location. For each unit of material tracked, the table will also track reuse of the material on-site, providing reuse date, location of reuse as defined by start and end station, width of reuse location by offset, the fill elevation range, quantity, and finish grade for said location. For demolition debris which is not reused on site, the table will also track disposal of the material as defined by disposal date, quantity and disposal facility. The table must provide a reference to any analytical data generated for the material.

Soil/Sediment:

Soil excavation will be identified based on the station-offset of the excavation location limits. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations, quantity, and stockpile number/location. For each unit of material tracked, the table will also track reuse of the material on-site and disposal of the material off-site using the same categories identified for demolition debris above.

Method Of Measurement And Basis Of Payment

Disposal of contaminated soil shall be measured for payment by the Ton of actual and verified weight of contaminated materials removed and disposed of. The quantities will be determined only by weight slips issued by and signed by the disposal facility. The most cost-effective, legal disposal method shall be used. The work of the LSP for disposal under all of these items shall be incidental to the work with no additional compensation.

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

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

ITEMS 181.11 through 181.14 (Continued)

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

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

ITEM 182.1**INSPECTION AND TESTING FOR
ASBESTOS****LUMP SUM**

The work shall include the inspecting and testing of all materials suspected of containing asbestos. 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 Standards Regulations, (DLS) 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.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT:

Measurement and payment will be at the contract unit price per Lump Sum 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 the 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 directed to the fact that existing asbestos shall be inspected and tested prior to removal, to determine if special removal and disposal is required. The Contractor shall follow all the rules and regulations stated in "ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS". If asbestos is present, the Contractor shall follow all the rules and regulations stated in the section "REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS", under this item. The Contractor should notify and coordinate his/her efforts with the proper utility accordingly.

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

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

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

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

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

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

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

ITEM 182.2 (Continued)

Massachusetts Division of Industrial Safety 45 CMR 10.00

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

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

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

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

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

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 through the showering and decontamination facilities.
5. Removing asbestos containing material in ways that minimize release of fibers.
6. Packing, labeling, loading, transporting and disposing of contaminated material in a way that minimizes or prevents exposure and contamination.
7. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.
8. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces and entanglements in loose hoses and equipment.
9. Provisions for effective supervision and OSHA - specified personnel air monitoring for exposure during work.

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 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 184.1

DISPOSAL OF TREATED WOOD PRODUCTS

TON

Work under this item shall include the transportation and disposal of all treated existing wood product as directed by the Engineer.

The timber components of the existing structure are suspected to be treated with creosote, pentachlorophenol and/or CCA. This item shall include all costs for sampling, laboratory testing, loading, transportation and disposal of the treated wood. The Contractor is required to submit disposal manifests to the Engineer prior to the completion of the project. All aspects of this Item are to be completed in accordance with state and federal regulations.

Compensation

Measurement and payment will be by the weight, in tons, of treated timber transported and accepted at a licensed facility. The work shall be considered full compensation for all labor, tools, equipment, materials, testing, loading, transportation, approvals, and permits necessary for the completion of the work.

ITEM 205.**LEACHING BASIN****EACH**

The work under this item shall conform to the relevant provisions of Subsection 201 of the Standard Specifications and the following:

The work to be done under this Item consists of furnishing, delivering, and installing the leaching basin as shown on the Plans. Structure size and outlet elevations shall be constructed in accordance with the details shown on the Plans.

Materials

All materials shall be in accordance with Subsection 201 and M4.02.14 of the Standard Specifications. All concrete shall be air entrained.

The structure base shall be supported on a compacted level foundation of crushed stone bedding at least 12-inches thick. The crushed stone shall also be installed in a 2 foot width surrounding the leaching basin. Geotextile fabric for subsurface drainage shall be installed outside the limits of crushed stone, excluding beneath the crushed stone bedding. Backfill and bedding material shall meet the requirements of the Standard Specifications Subsection M2.01.2.

Shop Drawings

The Contractor shall submit to the Engineer for approval shop drawings for Leaching Basin to be installed. No structure shall be fabricated or shipped prior to approval of the shop drawings by the Engineer.

Method of Measurement and Basis of Payment

Item 205. will be measured and paid for pre Subsections 201.80 and 201.81, respectively, complete in place, regardless of the depth.

Crushed stone will be paid for under Item 156.5.

Frame and grate will be paid separately under Item 222.

Geotextile fabric will be paid separately under Item 698.2.

All additional materials shall be considered incidental to this Item.

ITEM 655.**CEDAR RAIL FENCE****FOOT**

Work under this item consists of furnishing and installing wood post and rail fence at the locations shown on the Plans and as required by the Engineer.

Materials

Split wood posts and split rails shall be structural lumber made of Northern White Cedar or equivalent as approved by the Engineer.

All fence posts shall be treated with a clear waterborne wood preservative suitable for the intended use that maintains the look of raw cedar.

Construction Methods

Cedar split rail fence shall be installed in accordance the manufacturers written specifications and the following:

- Post embedment shall be a minimum of 30" below grade
- Hole depth shall be a minimum 36" below grade
- A minimum of 6" of pea gravel shall be placed in the bottom of the hole before setting post
- Posts shall be set plumb and backfilled with soil
- Rails shall be overlapped in post holes a minimum of 6"

Fence sections shall be 8'-0" in length with sawn posts and rails. Fences shall be 48" exposed height with three rails per section centered at 16" above grade (bottom rail), 32" above grade (middle rail) and 48" above grade (top rail).

The clear waterborne preservative shall be applied to all sides of the posts and rails. Rails and posts shall be cut to length. Holes for rails shall be pre-cut.

Method Of Measurement

Item 655. will be measured for payment by the Foot of cedar rail fence installed, complete in place. Measurements will be taken from center to center of end posts.

Basis Of Payment

Item 655. will be paid for at the Contract unit price per Foot, which price shall include all all labor, materials, equipment, fencing, hardware, excavation, backfill, pea gravel, manufacturer recommendations, and all incidental costs required to complete the work.

Any additional work required for the installation of the fence at the proposed retaining wall shall be incidental to this item.

ITEM 657.**TEMPORARY FENCE****FOOT**

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

The work under this Item shall include furnishing, installing, maintaining and removing a 6.0 foot high chain-link fence in the location(s) indicated on the plans and/or as required by the Engineer. The fence shall be used to close off the construction area from adjacent properties.

The fencing height shall be 6.0 foot minimum. Materials need not be new, but shall be in good condition, shall not be deteriorated, nor in a condition which in any way may jeopardize the safety and security purposes intended. All fencing shall meet the approval of the Engineer.

It may be necessary to remove sections of the Temporary Fence during construction. Any removing/resetting of the Temporary Fence by the Contractor to facilitate his/her operations or site access shall be done at no additional cost to the Department. Fence fabric shall be placed to the top of the post away from the work area. A top tension wire, rather than pipe top rail, shall be used. The top edge of the fabric shall be finished with a “knuckled” salvage.

Temporary screening may be required, as directed by the Engineer, and shall also be installed to the temporary fence to provide a visual barrier between the pedestrians and the work zone. This screening shall be considered as incidental to the unit price bid per foot of temporary fence.

The Contractor is responsible for maintenance of temporary fence and responsible and cognizant that the work area remains secure and is inaccessible to the general public at all times. The Contractor shall replace and/or restore sections of fence damaged due to accidents, vandalism or in any other manner during construction.

Method Of Measurement

Item 657. will be measured for payment by the Foot of temporary fence installed.

Basis Of Payment

Item 657. will be paid for at the Contract unit price per Foot, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

No separate payment will be made for all posts including end, corner, and intermediate brace posts, all gates and gate posts, removing and resetting of temporary fence, the replacement and/or restoration of fence damaged due to construction accidents, vandalism and/or any other manner, and final removal, but all costs in connection therewith shall be included in the Contract unit price bid.

The fence shall not be removed without prior approval of the Engineer.

Payment of 80% of this item will be made upon complete installation.

The remaining 20% of this Item will be paid following complete removal.

ITEM 660.

METAL PIPE RAIL

FOOT

The work under this Item shall conform to the relevant provisions of Subsection 660 of the Standard Specifications and the following:

The work included under this Item shall consist of installing pedestrian handrail along the ADA compliant ramp system at the south approach to the bridge.

Construction Methods

Pedestrian handrail shall be installed in accordance the manufacturers written specifications and the following:

Pedestrian handrail shall be installed in such a manner that allows for a 5'-0" clear width between each railing, as shown on the Plans. Handrails shall be provided along both sides of ramp segments. Handrails shall be provided in pairs, one rail at a height between 34 inches and 38 inches, and a lower rail at a height between 18 and 20 inches, measured vertically from the surface of the ramp to top of handrail. Handrails shall be continuous without interruption, except by openings, so that a hand can move from end to end without interruption. Handrails shall extend at least 12 inches beyond the top and bottom of the ramp and shall be parallel with the floor or ground surface, except where the extension would cause a safety hazard. Handrails shall have a circular cross section with an outside diameter of 1-1/4 inches minimum and 2 inches maximum. The handgrip portion of the handrail shall be round or oval in cross-section. The gripping surface shall be free of any sharp or abrasive elements. Ends of handrails shall be either rounded or returned smoothly to floor, wall, or post. Handrails shall not rotate within their fittings. All handrail and handrail posts shall be installed and anchored per the Manufacturer's recommendations.

<u>ITEM 698.2</u>	<u>GEOTEXTILE FABRIC FOR SUBSURFACE DRAINAGE</u>	<u>SQUARE YARD</u>
<u>ITEM 698.3</u>	<u>GEOTEXTILE FABRIC FOR SEPARATION</u>	<u>SQUARE YARD</u>

The work performed under Item 698.2 shall consist of furnishing and installing geotextile fabric in conjunction with the leaching basin in accordance with the details shown on the Plans or as required by the Engineer.

The work performed under Item 698.3 shall consist of furnishing and installing geotextile fabric in conjunction with the lightweight fill (UL-FGA, see Item 153.2) behind both abutments, in accordance with the details shown on the Plans or as required by the Engineer.

Materials

The geotextile fabric used for subsurface drainage shall be selected from the MassDOT Qualified Construction Materials List at <https://www.mass.gov/service-details/qualified-construction-materials-list>. The geotextile fabric shall conform to the requirements of Subsection M9.50.0 of the Standard Specifications and AASHTO M 288, Class 1, for fabric used for subsurface drainage.

The geotextile fabric used for separation shall be selected from the MassDOT Qualified Construction Materials List at <https://www.mass.gov/service-details/qualified-construction-materials-list>. The geotextile fabric shall conform to the requirements of Subsection M9.50.0 of the Standard Specifications and AASHTO M 288, Class 2, for fabric used for separation, as well as any specific requirements of the UL-FGA manufacturer.

Construction and installation shall of all geotextile fabric be in accordance with AASHTO M 288 including Appendix A and the following.

Construction

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

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

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

ITEMS 698.2 and 698.3 (Continued)

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

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

Field monitoring shall be performed to verify that the crushed stone placement does not damage the geotextile. Any geotextile damaged during backfill placement shall be replaced as required by the Engineer, at the Contractor's expense.

The Contractor shall take care not to allow more than two weeks of exposure to direct sunlight. Fabric rolls shall not be dropped more than two feet.

Method of Measurement

Items 698.2 and 698.3 will be measured for payment by the Square Yard of geotextile fabric installed, complete in place. No additional measurement will be made for overlapping material.

Basis of Payment

Items 698.2 and 698.3 will be paid for at the Contract unit price per Square Yard, which price shall include all labor, materials, equipment, overlaps and fold-overs, and incidental costs required to complete the work.

ITEM 701.21

DETECTABLE WARNING PANEL

SQUARE FOOT

The work under this item shall conform to the relevant provisions of Subsection 701 of the Standard Specifications and the following:

Detectable Warning Panels shall be furnished and at the north end of the paved shared use path where the path intersects the Spring Street roadway, as shown on the plans.

The Contractor shall submit for approval, the complete technical data sheets for the Detectable Warning Panels. Detectable Warning Panels must be suitable for installation on hot mix asphalt pavement.

The Contractor may contact and procure the Detectable Warning Panel from one of the following companies, or an approved equal:

- ADA Solutions
- Armor-Tile
- Vanguard ADA Systems of America

Installation

The Contractor shall install the panels as directed by the manufacturer and meet ADA standards. The Contractor shall caulk all seams.

METHOD OF MEASUREMENT

Item 701.21 will be measured for payment by the Square Foot of detectable warning panel installed, complete in place.

BASIS OF PAYMENT

Item 701.21 will be paid for at the contract unit price per Square Foot, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 701.22 **DIRECTIONAL TACTILE WARNING PANEL** **SQUARE FOOT**

The work under this item shall conform to the relevant provisions of Subsection 701 of the Standard Specifications and the following:

Directional Tactile Warning Panels shall be furnished and installed on the shared use path (SUP) at the locations shown on the Plans and at all bicycle curb ramps along the shared use path as shown on the plans. The bosses / bar tiles of the panels shall be oriented longitudinally to the direction of the SUP.

The Contractor shall submit for approval, the complete technical data sheets for the Directional Tactile Warning Panels.

The Contractor may contact and procure the Directional Tactile Warning Panel from one of the following companies, or an approved equal:

- ADA Solutions
- Armor-Tile
- Vanguard ADA Systems of America

Installation

The Contractor shall install the panels as directed by the manufacturer and meet ADA standards. The Contractor shall caulk all seams.

METHOD OF MEASUREMENT

Item 701.22 will be measured for payment by the Square Foot of directional tactile warning panel installed, complete in place.

BASIS OF PAYMENT

Item 701.22 will be paid for at the contract unit price per Square Foot, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 707.4

PLANTER REMOVED AND STACKED

EACH

The work shall consist of removing and stacking the existing planter located just northeast of the existing bridge.

The Contractor shall coordinate with John Westerling of the Town of Natick DPW regarding the location in which to transport the planter. The Contractor shall accept and hold the responsibility for the removal, handling, and stacking at the designated location. Responsibility shall include protection of the planter while it is in the Contractor's possession until final delivery to the designated location and the following:

Any components lost or damaged through lack of protection or carelessness by the Contractor shall be replaced with satisfactory material in kind at their expense. Materials transported and stacked shall be stored in neat piles that will be convenient for the owner. The Engineer will have final determination on the size, location, and arrangement of the piles of stacked material.

The Contractor's responsibility will cease upon final acceptance of the work, or 60 days from the time a certified notice (with copy to Engineer) is sent by Contractor to owner of material that all material has been delivered.

METHOD OF MEASUREMENT

Item 707.4 will be measured for payment by the each planter removed and stacked.

BASIS OF PAYMENT

Item 707.4 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, removal, transportation, stacking, and all incidental costs required to complete the work.

ITEM 707.8

STEEL BOLLARD

EACH

Work under this item consists of furnishing and installing removable steel bollards as shown on the Plans and as required by the Engineer.

Materials

Steel Bollards shall be comprised of carbon steel conforming to ASTM A1011, Grade 50. The bollards shall be powder coated (safety yellow color). Retroreflective tape shall be wrapped around each steel bollard at the heights shown in the Splitter Island Details on Sheet 15 of the Plans. Each of the 2 tape bands shall be 4” in width and shall be colored white.

Bollards shall be removable and capable of being secured with an external lock. Removable bollards shall include a stainless-steel flush mount embedment sleeve.

Embedment sleeves for removable bollards shall be set in concrete and backfilled in accordance with the manufacturer’s specifications or installation instructions. Embedment sleeves shall be set so that they are flush with the adjacent surface.

Lock type for removable bollards shall be coordinated with the Town of Natick Department of Public Works. The Contractor shall provide proof of correspondence with the Town of Natick Department of Public Works and shall submit this correspondence with shop drawings of the steel bollards. A set of 2 keys for the locks shall be provided to each of the following:

Town of Natick
Fire Chief

Eversource
TBD

Town of Natick
Police Chief

Comcast Maintenance Department Manager
TBD

Town of Natick
DPW

Verizon Line Department Foreman
TBD

MassDOT
District 3 Maintenance Engineer
James Robida (508) 929-3838

Astound Maintenance Department Manager
TBD

Confirmation of the distribution of all keys shall be provided to the Engineer.

Construction Methods

The steel bollards shall be installed at the locations indicated on the Plans and as required by the Engineer. The bollards shall be installed in accordance with the manufacturer’s requirements. Any backfill materials specified in the manufacturer’s requirements, including but not limited to concrete, is considered incidental to this item. The Contractor shall also furnish a lock for each removable bollard. All locks shall be matched to the same key.

ITEM 707.8 (Continued)

METHOD OF MEASUREMENT

Item 707.8 will be measured for payment by the Each steel bollard installed, complete in place.

BASIS OF PAYMENT

Item 707.8 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, concrete foundations, rebar, embedment sleeve, locking mechanism, retroreflective tape, backfill, all keys for distribution, and all incidental costs required to complete the work.

ITEM 734.

SIGN REMOVED AND RESET

EACH

The work under this Item shall conform to the relevant provisions of Section 828 of the Standard Specifications and the following:

Work under this item shall consist of removing, stacking during construction and resetting of the Town of Natick “Permit Parking Only...” sign located near the north project limits at the intersection of Spring Street and Cochuate Avenue.

The Contractor is responsible for coordinating removal, stacking and resetting of this sign with the appropriate owner prior to the start of any work that may impact them. The new location of the sign shall be coordinated with the property owner and the Engineer. The property owner of this sign is the Town of Natick Department of Public Works.

Prior to the removal of any private signs, the Contractor shall satisfy his/her self through their own investigation as to whether these signs can be adequately removed, temporarily stacked and reset without requiring additional materials or repairs to the sign structures or their supports or whether new foundations will be required. Any additional material or work required to satisfactorily remove and reset these signs including new supports and foundations shall be considered as incidental to this Item.

Signs, attachment hardware and sign support posts lost, damaged or otherwise made unsuitable for reuse while being removed, transported, stored or reset shall be replaced with new material at no additional cost to the Department. New attachment hardware shall be furnished and installed as necessary to replace any missing or unusable existing hardware.

METHOD OF MEASUREMENT

Item 734. will be measured for payment by the Each sign removed and reset.

BASIS OF PAYMENT

Item 734. will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 734.1

SIGN REMOVED AND DISPOSED

EACH

The work under this Item consists of the removal and disposal of signs and sign posts as shown on the Contract Plans and/or as required by the Engineer. The work shall also include the excavation of the existing sign post foundations. Any holes resulting from the removal of foundations shall be backfilled with gravel and compacted and the existing surfaces restored or replaced in kind.

Signs shall only be removed following the closure of the bridge. The signs and sign posts, upon removal, will become property of the Contractor and shall be transported from the site as required by the Engineer.

METHOD OF MEASUREMENT

Item 734.1 will be measured for payment by the Each sign removed and disposed.

BASIS OF PAYMENT

Item 734.1 will be paid for at the Contract unit price per Each, which price shall include 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 740. ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) MONTH

Work under this item shall conform to the relevant provisions of Subsection 740 and the following:

Two (2) computer systems, printer system and a digital camera meeting the 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
RAM:	8 GB
Hard disk:	500GB
Optical Drive:	DVD-RW/DVD+RW/CD-RW/CD+RW
Graphics Card:	4 GB
Card Reader:	6-in-1 Card Reader, 2 total USB 3.0, audio
Network Adapter:	10/100 Mbit/s
USB Ports:	6 USB 3.0 ports
Keyboard:	Generic
Mouse:	Optical mouse with scroll, MS-Mouse compliant
OS:	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.
Monitor:	24" LED with Built-in speakers, 1920 x 1200 max resolution
Flash drives:	2 - 32GB USB 3.0
Internet access:	High speed (min. 24 mbps) internet access with wireless router.

The Multitfunction 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 compatability
- 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

ITEM 740. (Continued)

The Contractor must supply a maintenance contract for next day service, and all supplies (toner, staples, paper) necessary to meet estimated monthly usage.

A Digital Camera shall meet the following minimum criteria or better:

Resolution:	12 Megapixel
Optical Zoom:	5x
Memory:	8 GB SD Card
Screen:	3 inch Clear Photo LCD
Min Operating Temperature:	14° F
Max Depth of Water Resistance:	30 feet
Height of Shock Resistance:	5 feet
Battery Power:	2 rechargeable batteries and a battery charger
Carrying Case:	Rain-proof with shoulder strap

A four (4) foot smart level shall also be provided to the Resident Engineer as part of the equipment required under this Item.

The Engineer's Field Office and the equipment included herein including the computer system, printer, camera and smart level 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, and insurance as specified and as directed by the Engineer.

ITEM 765.451 SEEDING – PART SHADE ROADSIDE MIX POUND

Work under this item shall consist of furnishing the mix(es) specified below in the required quantity.

SUBMITTALS

- 1) Pre-Verification of Seed Availability. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species in the required quantities and for the anticipated date of seeding. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Species not expected to be available should be noted and substitutions recommended.
- 2) Final Verification of Seed Availability. No earlier than 21 days prior to ordering, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species and in the required quantities. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section. Substitutions or changes in the mix at this time must be approved by MassDOT Landscape Design Section.
- 3) Seed Worksheet provided herein shall be submitted to the Engineer prior to ordering seed to determine the number of pounds of Pure Live Seed required.
- 4) Seed Tags. The contractor shall submit original seed tags from each bag of seed used on the project or ensure that each tag is photo documented by the Engineer while on the unopened bag.

Number of tags submitted must correspond to number of bags delivered.

Species listed on the seed tag shall match the Final Verification of Seed Availability (Submittal #2) unless approved otherwise. Tag must include: variety and species name; lot number; purity; percentage of inert matter; percentage of weeds, noxious seeds, and other crop seeds; germination, dormant or hard seed; total viability; origin of seed; germination test date, net weight, and name and address of seller. The origin of seed must be listed on the seed tag for all species in the mix to provide verification of original (generation 0) seed source. The smallest known geographic area (township, county, ecotype region, etc.) shall be listed. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

- 5) Verification of Seed Delivery. Prior to payment, contractor shall submit the Seed Delivery Verification form contained within the contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this contract. The bill of lading must include variety and species name, lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

ITEM 765.451 (Continued)

- 6) Seed Sample. If requested or if seed is from a previously opened bag, the contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

The appropriate seeding seasons are:

Spring: April 1 - May 15

Fall: October 1 - December 1 for dormant seeding

PERMANENT SEED MIX(ES)

Calculating Pure Live Seed (PLS)

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed). For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy, it is calculated to be $90\% \times [78 + 10 + 2]\% = 81\%$ PLS.

Therefore, each pound of PLS would need $1 \text{ pound} / 0.81 = 1.2$ pounds of seed with a 90% purity and 90% total germination

Seed Mix(es) shall be as specified below. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

ITEM 765.451 (Continued)

765.451 Part Shade Roadside Mix			<u>% PLS by</u>
	<u>Botanical Name</u>	<u>Common Name</u>	<u>Weight</u>
Grass	Festuca rubra	Creeping Red Fescue	25.70%
	Elymus virginicus	Virginia Wild Rye	24.00%
	Schizachyrium scoparium	Little Blue Stem	22.50%
	Panicum virgatum	Switch Grass	10.00%
	Panicum clandestinum 'Tioga'	Deer Tongue 'Tioga'	7.00%
	Carex vulpinoidea	Fox Sedge	2.00%
	Agrostis perennans	Upland Bentgrass	2.00%
	Juncus effusus	Soft Rush	0.20%
			<hr/> 93.40%
Herb/Forb	Chamaecrista fasciculata	Partridge Pea	3.00%
	Penstemon digitalis	Beard-tongue	1.00%
	Zizia aurea	Golden Alexanders	0.30%
	Desmodium canadense	Showy Tick Trefoil	0.30%
	Solidago bicolor	White Goldenrod	0.20%
	Solidago caesia	Woodland Goldenrod	0.20%
	Rudbeckia hirta-VT ecotype	Black-eyed Susan-VT ecotype	0.20%
	Aster novae-angliae	New England Aster	0.20%
	Solidago odora	Licorice Scented Goldenrod	0.20%
	Aster divaricatus	White Wood Aster	0.20%
	Heliopsis helianthoides	Ox-Eye Sunflower	0.20%
	Pycnanthemum tenuifolium	Slender Mountain Mint	0.20%
	Monarda fistulosa	Wild Bergamot	0.10%
	Eupatorium perfoliatum	Boneset	0.10%
	Aster lateriflorus	Calico Aster	0.10%
	Oenothera fruticosa var. fruticosa	Sundrops	0.10%
			<hr/> 6.60%
			<hr/> 100.00%
<i>Seeding Rate: 15.0 lbs PLS/Acre</i>			

Any species substitutions shall be with a species having similar characteristics and function. Substitutions must be approved by MassDOT Landscape Design Section per the documentation submittal process.

50% Increase Adjustment for Field Conditions

Seeding under the following conditions requires a 50% increase in the permanent mix at the time of construction:

- Seeding out of season
OR
- Seeding after Compost Blanket has been applied (unless already increased for out of season).

ITEM 765.451 (Continued)

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

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

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

Method of Measurement and Basis of Payment

Item 765.451 will be measured for payment by the pound of Pure Live Seed delivered and complete in place.

Item 765.451 will be paid at the contract unit price per pound of Pure Live Seed delivered upon approval of all Seed Submittal Documentation. Overseeding required to correct poor germination or establishment shall be incidental to the item.

Application and care of native seed mix will be paid for separately under Item 765.635 Native Seeding and Establishment.

ITEM 765.451 (Continued)

NATIVE SEED WORKSHEET

Project Description: _____ Project No: _____

Contractor: _____ Contract No: _____

Seed Mix Number & Description: _____

Contractor: Complete Prior To Ordering

Pounds of Seed Required Per Contract:

_____ lbs./acre for _____ Acre(s) OR _____ SY

Additional 50% increase if required (out of season or seeding over compost blanket):

_____ **lbs. Total Seed Required**

Calculated Quantity for Pure Live Seed (PLS¹):

_____ **Total Pounds PLS**

Engineer: Verification at Time of Application

Number pounds delivered to site²: _____ Date(s): _____

Actual Seed Bag Tag/s Received or photo documented by Engineer: _____

¹ PLS=% pure seed x % viable seed (total germination, hard seed, and dormant seed).

²Quantity delivered should match pounds **Total Pounds PLS** and **Verification of Seed Delivery**. Pounds should be shown on each Seed Tag.

ITEM 765.451 (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):

ITEM 765.635 NATIVE SEEDING AND ESTABLISHMENT SQUARE YARD

Work shall conform to the relevant provisions of Subsections 765 and 767 of the Standard Specifications and the following:

The work under this item shall consist of seeding, mowing, and other care to establish a stand of grass in the areas shown on the plans or as required by the Engineer. For the purposes of these specifications, the term “grass” shall apply to all the forbs, grasses, sedges, and rushes included in the materials.

QUALIFICATIONS

Seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

SEEDING SEASON

Seeding seasons for native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%.

Seeding season for cover crops shall be grain oats January 1 – July 31 and grain rye August 1 – December 1.

MATERIAL AND SUBMITTALS

Seed Mixes and Submittals shall be per the item(s) for permanent and annual (cover crop) seed mixes.

Compost Blanket, if used, shall meet the material and submittal requirements for that item.

Hydromulch shall be wood fiber or straw applied per the Standard Specifications and at the rates specified below and per the manufacturer.

A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of hydromulch, tackifier, and seed, per 100 gallons of water and as applicable to products used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above.

Fertilizer

No fertilizers shall be applied.

ITEM 765.635 (Continued)**Water**

Water, including hose and all other watering equipment required for the work, shall be furnished by the Contractor to the site at no additional cost. Water shall be suitable for irrigation and free from ingredients harmful to plant life. All plants injured or work damaged due to the lack of water or the use of too much water shall be the Contractor's responsibility to correct.

SEEDING

Hand broadcast method shall be used for all areas smaller than half an acre and when specified on the plans for areas over half an acre.

Seeding shall occur within 72 hours of placement of loam and final grading or the Contractor shall propose a reasonable, alternative schedule that shall be approved by the Engineer.

Surface Preparation

No seeding or soil preparation shall be done if soils are muddy or dry and compacted. Bare soils shall be raked to remove large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Ruts and depressions shall be filled with additional loam or compost and the soil shall be re-graded to a relatively smooth finish corresponding to the required grades.

When seeding over existing or compacted soil or soil that has sat bare for more than 30 days, surface will be prepared by tilling or raking to a minimum depth of 2 inches prior to seeding and prior to Compost Blanket application (when applied).

Surface preparation shall be compensated for under for loam placement or topsoil rehandled and spread as appropriate to the project.

Jute or coir mesh, when specified in the contract, shall be placed after seeding and per the Standard Specifications and the manufacturer's instruction.

Surface preparation shall be approved by the Engineer prior to seeding.

Seeding over Various Substrates

Loam: Seeding shall occur within 72 hours of loam placement to prevent loss of topsoil. Seed shall be manually broadcast for areas less than half an acre (each area, not cumulative area) and when specified on the plans. Broadcasting shall be immediately followed by hydromulching as specified below. When not specified on the plans, larger areas may be hydroseeded as specified below.

Compost Blanket: Compost Blanket shall be applied as specified under that item. Seed should be hand broadcast at the same time as compost application to ensure a thin cover of compost over seed.

ITEM 765.635 (Continued)

When seeding is done after application of Compost Blanket the rate shall be increased by 50%. If the Compost Blanket is applied after December 1, seed shall be broadcast or hydroseeding over the compost in the Spring and the rate increased by 50% specified under Seed Application.

Compost Mulch over Modified Rock: Compost Mulch and seed shall be applied as specified under that item. No hydromulch is required.

Cover Crop

Cover crop shall be used when seeding out of season, when specified with the permanent native seed mix under that item, and as required to prevent erosion until the permanent seed establishes.

A cover crop should not be used with a steep slope mix or other permanent mix which already contains either cereal rye or oats in the composition of the mix. A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

Seed Application

All seed shall be mulched as specified herein.

Seed application shall be by broadcast seeding or by hydroseeding as described below.

Broadcast Seeding

Seed shall be broadcast spread using a cyclone or whirlwind seeder or hand broadcast. Small or light-seeded species such as bluestem may be mixed with approved filler to achieve an even distribution. Seed shall not be broadcast when wind velocities are greater than 15 mph.

Broadcast seeding shall be undertaken in two separate passes at ninety degrees to each other. One-half the seeding rate shall be applied in each direction (horizontally and vertically). To ensure seed to soil contact with broadcasting of seed, seeding shall be followed by rolling or tracking with equipment approved by the Engineer.

Broadcast seed shall be mulched with weed-free straw mulch unless seeding is done as part of Compost Blanket in which case it shall be as specified above under seeding with Compost Blanket application. Hydromulching shall be as specified under Hydromulching.

Hydroseeding and Hydromulching

Hydroseed and mulching shall be per the manufacturer's directions and as follows.

Hydroseeding shall only be used for sites over half an acre in size or with permission of the Engineer.

ITEM 765.635 (Continued)

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

A 2-step process shall be used for seeding in conjunction with hydromulch. Seed shall be applied with 500 lbs/acre of hydromulch in the first pass. A second pass with 1,000 lbs/ acre of hydromulch shall be applied in a second pass. Each pass shall be applied in a different direction.

Once the seed has been added to the tank mixture a one-hour time limit is set for spreading the mixture on the soil. Once the one hour has passed the excess mixture must be discarded.

For broadcast seeding, hydromulch shall be applied immediately following seeding at a rate of 1,000 lbs/acre. Tank shall be cleaned from any previous hydroseeding.

CARE DURING GERMINATION AND ESTABLISHMENT

Contractor shall care for seeded areas as necessary for successful germination. Care will include watering and weed control as necessary to achieve establishment of the specified seeded species after one growing season as specified below.

The contractor shall maintain the stand of grasses to ensure healthy growth of the seeded species. Work shall include mowing or weed-whacking for weed control, watering if necessary, and removal of invasive plants.

Watering shall be sufficient to achieve soil moisture to a depth of 2 inches or more and such moisture is uniform. Method of watering shall not erode or damage soil or grassed surfaces.

General Weed Control: Unless otherwise directed, mowing shall be as specified under Mowing for Weed Control for seed establishment. Weeds shall be mowed prior to weeds setting seed (by the end of July unless otherwise approved).

Control of Invasive and Aggressive Weeds: Invasive and aggressive weeds, including but not limited to mugwort, ragweed, knapweed, foxtail, crabgrass, and chicory must be cut or treated prior to going to seed. Herbicide treatment must be coordinated with MassDOT. Undesired species (such as chicory) introduced due to use of incorrect seed mix shall be removed at the Contractor's expense.

MOWING FOR WEED CONTROL

Mowing for weed control shall be completed after weeds have sprouted and show leaf and bud growth, but prior to setting seed, generally between July 7th and August 1st, unless directed otherwise by the MassDOT Landscape Architect and the Engineer.

ITEM 765.635 (Continued)

Mowing height shall be as needed for weed control, generally to a height of 8 inches and not below 4 inches, unless directed otherwise. Mowing shall be with a brush hog mower or string trimmer other approved equipment. Conventional lawn mowers which cannot achieve the appropriate cut shall not be used.

Contractor shall give 48-hour notice prior to mowing work. Mowing shall only occur in dry sunny weather. Litter pickup should occur prior to mowing in all areas. If required, cut grass shall be raked and removed. Litter pickup and raking and removal of grass shall be incidental to the work.

Mowing equipment shall be approved by the Engineer prior to work.

OVER-SEEDING

Areas of bare ground greater than 2-3 feet in diameter shall be over-seeded with the specified mix during the appropriate season for seeding. Where required for overseeding mowing shall be as close to the soil as possible. Soil that is compacted shall be raked or otherwise roughened prior to over-seeding.

Over-seeding rates and methods shall those specified above under Materials and Methods. Following over-seeding, soil shall be lightly tamped to ensure seed to soil contact and areas shall be mulched with straw mulch and watered with a fine mist to moisten soil to a depth of at least 2 inches.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

DETERMINING SATISFACTORY GRASS ESTABLISHMENT

A well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species (not the cover crop) will be visible. Generally:

- A minimum of 75% coverage by the specified permanent seeded species after one growing season. Of that percentage, generally, depending on the mix species:
 - At least 3 types of the permanent seeded grass species shall be visible.
 - At least 3 species of wildflowers shall be visible.
- There will be no significant gaps or bare soil (generally 2-3 feet in diameter or greater).
- There will be no more than 25% coverage by weed species.
- All soil shall be stabilized and there shall be no channeling or erosion.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (i.e., clover) due to failure to clean the hydroseeding tank or using incorrect mix.

Invasive and aggressive weeds (such as mugwort, ragweed, knapweed, and chicory) must be cut or treated prior to going to seed for Interim Acceptance. Herbicide treatment must be coordinated with MassDOT.

ITEM 765.635 (Continued)

A warm-season grass mix with perennials will not have uniform growth. A uniform stand of grass may indicate use of an incorrect mix.

ACCEPTANCE OF SEEDING AND ESTABLISHMENT WORK

Conditional Acceptance shall be based on proper application of seed as specified herein.

Interim Acceptance of Care. Seeding will be inspected by mid-July to assess germination and Establishment conditions as described above. When necessary for Interim Acceptance, areas shall be mowed prior to weed species producing seed and as specified above under Weed Control. ***Areas requiring weed control that are not mowed prior to weed seed dispersal will not be approved for Interim Acceptance.*** Seeding that shows good germination and is determined by the Engineer and Landscape Architect to not require weed control at time of inspection shall be accepted for Interim Acceptance payment.

Final Acceptance of Establishment shall be given upon satisfactory Establishment as described above.

If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Native Seeding and Establishment will be measured for payment by the square yard, complete in place.

Native Seeding and Establishment will be paid at the Contract unit price by the square yard upon Conditional, Interim, and Final Acceptances as described above. This price shall include all submittals, seeding, rolling to ensure seed-to-soil contact, weed control other than mowing, water, over-seeding, labor, materials, equipment, and all incidental costs required to complete the work of establishing a satisfactory stand of grass.

Native seed shall be compensated under the respective items.

Site preparation, including raking, tilling, removal of debris and stones, and other work to the prepare site for seeding shall be compensated under loam placement or topsoil rehandled and spread as relevant to the project. If used, Compost Blanket shall be compensated under the respective item.

Mowing for weed control will be incidental to this item.

Schedule of payment shall be as follows:

30% upon Conditional Acceptance

20% upon Interim Acceptance of Care, except this amount will be reduced to zero and final payment will be reduced accordingly when areas requiring weed control are not mowed as specified in the Interim Acceptance criteria.

50% upon Final Acceptance of Establishment

ITEM 767.121**SEDIMENT CONTROL BARRIER****FOOT**

The work under this item shall conform to the relevant provisions of Subsections 670, 751 and 767 of the Standard Specifications and shall include the furnishing and placement of a sediment control barrier. Sediment control barrier shall be installed prior to disturbing upslope soil.

The purpose of the sediment control barrier is to slow runoff velocity and filter suspended sediments from storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent upgradient water or water off road surfaces from flowing into a work zone. Contractor shall be responsible for ensuring that barriers fulfill the intent of adequately controlling siltation and runoff.

Twelve-inch diameter (after installation) compost filter tubes with biodegradable natural fabric (i.e., cotton, jute, burlap) are intended to be the primary sedimentation control barrier. Photo-biodegradable fabric shall not be used.

For small areas of disturbance with minimal slope and slope length, the Engineer may approve the following sediment control methods:

- 9-inch compost filter tubes
- Straw bales which shall be trenched

No straw wattles may be used. Additional compost filter tubes (adding depth or height) shall be used at specific locations of concentrated flow such as at gully points, steep slopes, or identified failure points in the sediment capture line.

When required by permits, additional sediment barrier shall be stored on-site for emergency use and replacement for the duration of the contract.

Where shown on the plans or when required by permits, sedimentation fence shall be used in addition to compost filter tubes and straw bales and shall be compensated under that item.

Sediment control barriers shall be installed in the approximate location as shown on the plans and as required so that no excavated or disturbed soil can enter mitigation areas or adjacent wetlands or waterways. If necessary to accommodate field conditions and to maximize effectiveness, barrier locations may be shifted with approval from the Engineer. Barriers shall be in place prior to excavation work. No work shall take place outside the barriers.

MATERIALS AND CONSTRUCTION

Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans and adjust placement to ensure that the placement will provide maximum effectiveness.

Barriers shall be staked, trenched, and/or wedged as specified herein and according to the Manufacturer's instructions. Barriers shall be securely in contact with existing soil such that there is no flow beneath the barrier.

ITEM 767.121 (Continued)**Compost Filter Tube**

Compost material inside the filter tube shall meet M1.06.0, except for the following: no peat, manure or bio-solids shall be used; no kiln-dried wood or construction debris shall be allowed; material shall pass through a 2-inch sieve; and the C:N ratio shall be disregarded.

Outer tube fabric shall be made of 100% biodegradable materials (i.e., cotton, hemp or jute) and shall have a knitted mesh with openings that allow for sufficient water flow and effective sediment capture.

Tubes shall be tamped, but not trenched, to ensure good contact with soil. When reinforcement is necessary, tubes shall be stacked as shown on the detail plans.

Straw Bales

Straw bales shall be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

Bales should be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. All bales should be either wire-bound or string-tied. Straw bales should be installed so that bindings are oriented around the sides (rather than along the tops and bottoms) of the bales in order to prevent deterioration of the bindings.

The barrier should be entrenched and backfilled. A trench should be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. The trench must be deep enough to remove all grass and other material which might allow underflow. After the bales are staked and chinked (filled by wedging), the excavated soil should be backfilled against the barrier. Backfill soil should conform to the ground level on the downhill side and should be built up to 4 inches against the uphill side of the barrier.

Each bale should be securely anchored by at least 2 stakes or re-bars driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together. Stakes or re-bars should be driven deep enough into the ground to securely anchor the bales. For safety reasons, stakes should not extend above the bales but should be driven in flush with the top of the bale.

The gaps between the bales should be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency. Wedging must be done carefully in order not to separate the bales.

When used in a swale, the barrier should be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the barrier but not around it.

ITEM 767.121 (Continued)**Sedimentation Fence**

Materials and Installation shall be per Section 670.40 and 670.60 of the Standard Specifications and the following:

Sedimentation fence shall only be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

When used with compost filter tubes, the tube shall be placed on a minimum of 8 inches of folded fabric on the upslope side of the fence. Fabric does not need to be trenched.

When used with straw bales, an 8-inch deep and 4-inch wide trench or V-trench shall be dug on the upslope side of the fence line. One foot of fabric shall be placed in the bottom of the trench followed by backfilling with compacted earth or gravel. Stakes shall be on the down slope side of the trench and shall be spaced such that the fence remains vertical and effective.

Width of fabric shall be sufficient to provide a 36-inch high barrier after fabric is folded or trenched. Sagging fabric will require additional staking or other anchoring.

MAINTENANCE

Maintenance of the sediment control barrier shall be per Section 670.60 of the Standard Specifications or per the Stormwater Pollution Prevention Plan (SWPPP), whichever is more restrictive.

The contractor shall inspect the sediment barrier in accordance with relevant permits. At a minimum, barriers shall be inspected at least once every 7 calendar days and after a rain event resulting in 0.25 inches or more of rainfall. Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively for all phases of the Contract.

Barriers that decompose such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost within the fabric tube is sufficiently intact (despite fabric decay) and continues to provide effective water and sediment control, barrier does not necessarily require replacement.

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed, as required, when construction work is complete and upslope areas have been permanently stabilized and after receiving permission to do so from the Engineer.

Regardless of site context, nonbiodegradable material and components of the sediment barriers, including photo-biodegradable fabric, plastic netting, nylon twine, and sedimentation fence, shall be removed and disposed off-site by the Contractor.

ITEM 767.121 (Continued)

For naturalized areas, biodegradable, natural fabric and material may be left in place to decompose on-site. In urban, residential, or other locations where aesthetics is a concern, the following shall apply:

- Compost filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (as would be done with a soil amendment or mulch). No more than a 2-inch depth shall be left on soil substrate.
- Straw bales shall be removed and disposed off-site by the Contractor. Areas of trenching shall be raked smooth and disturbed soils stabilized with a seed mix matching adjacent seeding or existing grasses (i.e., lawn or native grass mix).
- Sedimentation fence, stakes, and other debris shall be removed and disposed off-site. Site shall be restored to a neat and clean condition.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.121 will be measured and paid for at the contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

Additional barrier, such as double or triple stacking of compost filter tubes, will be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damaged by construction activities shall be repaired or replaced as directed by the Engineer at the Contractor's expense.

ITEM 783.057 SHAD TREE – DOWNY CUMULUS 7-8 FEET CLUMP EACH

The work under these items shall conform to the applicable requirements of Subsection 771, PLANTING TREES, SHRUBS AND GROUNDCOVER, of the latest edition of the Standard Specifications.

Trees shall be field located as directed by the Engineer or MassDOT Landscape Architect.

Tree trunk guards shall be supplied and installed at all deciduous trees. Tree trunk guards shall be expandable, made of corrugated plastic, 2 feet in length and a diameter that is a minimum of one-half inch larger than the caliper of the tree. Tree trunk guards shall not be tied or otherwise secured in a manner that does not allow for expanded tree trunk growth. Tree guards shall be incidental to this item.

Planting

As shown in the Details, soil shall be carefully removed to expose the root flare of all B&B and container plants. Container plants shall be scored and girdled roots shall be teased out and pruned as necessary.

Plants planted incorrectly (too deep, girdled roots, root balls not scored) shall be deemed unacceptable for payment. The problem shall be remediated, and the plants re-planted to the satisfaction of the Engineer or Landscape Architect. Plants with root systems that cannot be untangled or that require such severe pruning that the plant is compromised shall be rejected on site and replaced at the contractor's expense.

Plants shall be watered prior to backfilling of planting pits and again after backfilling.

Watering

Watering shall meet the requirements for the MassDOT Standard Specifications. In addition, a Watering Log (available online: [Watering Log for MassDOT Plantings](#)) shall be submitted to the Engineer at the end of each week or as requested by the Engineer. Watering and submitting of the weekly Watering Log shall commence immediately following planting and shall continue until the end of the plant warranty. The Engineer shall be notified prior to watering.

Failure to submit the watering log and/or notify the Engineer will result in deductions or non-payment for plants at the Interim and Final Acceptance inspections. This may include rejection of plants that have healthy foliage at the time of inspection but have been compromised (root system loss) due to lack of water during establishment.

Acceptance of Planting and Plant Establishment

Inspections and acceptance of planting and plant establishment shall be as follows:

ITEM 783.057 (Continued)**Conditional Acceptance**

Following planting, the Contractor shall request an inspection for Conditional Acceptance of the plants and planting beds. The Engineer, the MassDOT Landscape Architect, and the Contractor shall inspect the plants, planting methods, and planting beds. Approval of plants and planting shall mark the beginning of the Plant Establishment Period and the one-year warranty period. Plants shall be watered and cared for as specified in the MassDOT Standard Specifications.

Interim Acceptance

Following Conditional Acceptance, plants and planting beds shall be cared for as specified in the standard specifications. Plants shall show healthy growth per the Standard Specifications. All weeds shall be removed (including roots) or, if approved by the Landscape Architect, weed-whacked. Watering log submissions shall be submitted and reviewed.

Plants that are dead or that fail to show healthy growth will not be approved for Interim Acceptance. As determined by the Engineer, those plants shall be immediately replaced, or shall be deducted from the contract and there shall be no further payments made.

Inspections for Interim Acceptance shall be conducted by the Contractor, the Engineer, and the MassDOT Landscape Architect and shall be according to the following schedule:

Spring Planting: Plants and planting beds shall be inspected following the first full growing season (June – August) after planting.

Fall Planting: Plants and planting beds shall be inspected the following spring (April– June) for Spring Interim Acceptance. Plants and planting beds shall be inspected again at the end of the growing season for Fall Interim Acceptance. This inspection shall take place between August 15 - September 10 or as otherwise determined by the Engineer, in order to allow for place replacements.

Final Acceptance: One year following Conditional Acceptance (end of the plant warranty period), plants shall be inspected by the Contractor, MassDOT Landscape Architect and the Engineer. Plants shall show healthy growth meeting the MassDOT Standard Specifications and planting beds shall be free of weeds. Formal planting beds shall be weed-free (no roots) and have a neat appearance.

No payment will be made for plants that are dead or that fail to show healthy growth.

Payment Schedule

Upon approval of plants at each inspection, payment shall be as follows:

ITEM 783.057 (Continued)

Spring Planting:

- 40% upon Conditional Acceptance
- 40% upon Interim Acceptance which will include submission and approval of watering logs
- 20% upon Final Acceptance

Fall Planting:

- 35% upon Conditional Acceptance
- 10% upon Spring Interim Acceptance
- 35% upon Fall Interim Acceptance which will include submission and approval of watering logs
- 20% upon Final Acceptance

Basis Of Payment And Measurement

The quantity of trees measured will be paid for at the contract unit prices per each for planting of the types, species and sizes called for in the bid schedule. The unit price per planting item shall include furnishing and delivering all plants, furnishing and delivering prepared backfill soil, mulch, fertilizer, excavation for plant pits, backfilling, planting, pruning, guying and staking, tree trunk guards, mulching, weeding, watering, cleanup, plant establishment work and care including replacements, and for all labor, equipment, tools and incidentals necessary to complete the work prescribed in this section.

Mulching will be paid for under Item 767.6 Aged Pine Bark Mulch.

ITEM 800.4**TEMPORARY CAISSON****EACH**

The work under this item shall conform to the relevant provisions of Subsections 150 and 940 of the Standard Specifications and the following:

Temporary caissons shall be used for temporary utility poles to be located on the slopes adjacent to the bridge at the locations shown on the Plans. The caisson design is to be based on loads provided by Eversource, based on soil type at the locations indicated on the drawings. Contractor is responsible for soil type determination. The design shall be performed by a Professional Engineer licensed in the Commonwealth of Massachusetts.

Utility pole caissons shall be protected until the utility poles are installed and throughout the duration of the excavation work for the proposed abutments.

Submittal

Forty-five (45) days prior to installing the caissons the Contractor shall submit for review and approval by the Engineer the shop drawings and installation plan which shall include but not be limited to the following:

1. A description of the equipment to be used including drilling equipment and cranes, as required.
2. A description of the overall pile installation operation and sequence.
3. Details of concrete formwork attachment to piles.
4. Splice details and approved welding procedure as required.

The Contractor shall not begin drilling operations until written approval of the above submittals has been received from the Engineer, including a schedule of their proposed methods and equipment for all related installation procedures.

Following relocation of the overhead wires from the temporary poles to the final proposed poles, the caissons shall be removed from the site and will become property of the Contractor. The areas in which the caissons are located shall be restored to their pre-construction condition, including but not limited to backfilling of the holes with suitable material meeting MassDOT standards.

METHOD OF MEASUREMENT

Item 800.4 will be measured for payment by the Each temporary caisson furnished, installed, and removed.

BASIS OF PAYMENT

Item 800.4 will be paid at the Contract unit price per Each, which price shall include all labor, materials, equipment, excavation and backfilling, furnishing, installing, maintaining and removal of the caissons following relocation of the overhead wires to their final locations, and all incidental costs required to complete the work.

No separate payment will be made for pre-drilling for caisson, drill through and/or remove obstruction(s), provide specified clearance necessary for driving the caisson within the specified tolerance and without damage, test borings, submission, shop drawings, concrete to secure pole in place, but all costs in connection therewith shall be included in the Contract unit price bid. Excavation and backfilling shall be incidental to this item.

<u>ITEM 804.11</u>	<u>1 INCH ELECTRICAL CONDUIT - HDPE</u>	<u>FOOT</u>
<u>ITEM 804.4</u>	<u>4 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC -(UL)</u>	<u>FOOT</u>
<u>ITEM 811.31</u>	<u>PULL BOX 12 X 12 INCHES - SD2.031</u>	<u>EACH</u>

The work under these Items shall conform to the relevant provisions of Subsection 801 of the Standard Specifications and the following:

Work under these items shall consist of furnishing and installing PTC conduits as shown on the Plans. All pull ropes, duct plugs and other appurtenances required for the installation of the conduits are considered incidental to Item 804.11.

Installation of the conduit shall be in accordance with the requirements and design specifications of the utility owner (MBTA). All materials procured for the work shall be from a supplier approved by the utility owner, or from an approved equal supplier whose products meet all specifications of the utility owner. No design of the conduits themselves (expansion joint locations, anchors, adapters, elbows, etc.) has been performed at this time. The Contractor is responsible for coordination of any design and approval of the chosen conduit system through the utility owner or material suppliers. No additional payments will be made for material or installation which is rejected by the utility owners for failure to comply with their specifications.

Conduits

The ductbank shall consist of a 4" Schedule 80 PVC or HDPE conduit. Within the 4" conduit there shall be two (2) 1" HDPE inner ducts; one inner duct for the backbone fiber and one vacant duct for future expansion. Pull ropes shall be installed in the empty inner duct and secured in all pull boxes / hand holes. Single cable fiber optic duct plugs shall be installed at each cable occupied inner duct end and an inner duct plug with pull rope attachment eyelet shall be installed in the ends of the empty spare inner duct in all boxes. Inner duct shall be of different color. The Contractor shall propose how to transition the fiber cable from the main duct bank to laterals for accessing the wayside locations. Lateral conduits shall be 4" minimum Schedule 80 PVC/HDPE.

Pull Boxes

Work performed under Item 811.31 'Pull Box 12 X 12 Inches – SD2.031' shall conform to the relevant provisions under Section 801 of the Standard Specifications. The Contractor shall coordinate with the MBTA to determine that the pull box covers meet their standards prior to ordering any materials.

Required Documentation

The Contractor shall be responsible for providing the MBTA with the following information:

- Provide cut sheets for all equipment and material that is being provided to the MBTA.
- Supply the MBTA PTC Program with a copy of as-built drawings with all directional bore depths, pull box / hand hole, duct and proposed cable locations.
- Provide the MBTA PTC Program with the final routing and installation drawings as part of the as-built submittals.

ITEMS 804.11, 804.4, and 811.31 (Continued)

Fiberoptics

Keolis shall be responsible for furnishing and installation of the PTC line and connection to the existing system, as well as providing all necessary documentation for the PTC fiberoptics as described in the MBTA PTC Infrastructure Change Requirements.

Contacts

CSX operates on the Worcester Line. The Contractor shall coordinate with Michael Sliper (Michael_Sliper@csx.com) regarding CSX's schedule and other related matters to complete the work. The Contractor shall coordinate with Terrence McCarthy (TPMcCarthy@MBTA.com) prior to start of utility work on MBTA property. MBTA licensing can be found at www.mbtarealty.com/licenses.

METHOD OF MEASUREMENT

Items 804.11 and 804.4 will be measured by the Foot of conduit installed, complete in place.

Item 811.31 will be measured by the Each pull box installed, complete in place.

BASIS OF PAYMENT

Items 804.11 and 804.4 will be paid for at the Contract Unit Price per Foot, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

Item 811.31 will be paid for at the Contract Unit Price per Each, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 821.01**HIGHWAY LIGHTING****LUMP SUM**

The work under this Item shall conform to the relevant provisions of Subsection 820 of the Standard Specifications and the following:

The work for the existing lighting north of the bridge shall include carefully removing the existing highway lighting bracket arm and luminaire designated to be removed on the Plans. The Contractor shall reset the existing highway lighting bracket arm and luminaire following the installation of the proposed utility poles by the utility company. The arm and luminaire shall be cleaned and the arm with luminaire installed on the new pole. Cleaning of the luminaire shall consist of cleaning the exterior housing and light detector as well as interior housing, reflector, refractor or door glass, and mounting device. The Contractor shall coordinate with the electric company to reconnect the streetlight at the bottom of the bracket to the new service.

The work for the proposed lighting south of the bridge shall include the furnishing and the installation of a Highway Lighting Bracket Arm and Luminaire to be mounted on the utility pole located at STA. 0+98 as shown on the Plans and/or as directed by the Engineer. All davit arms shall be from a single manufacturer. Luminaire attachment on to mounting arm supports shall comply with luminaire mounting requirements.

All luminaires specified in this section shall be delivered and clearly marked with the manufacturer's name, catalog number, voltage, source type, maximum wattage, and driver type.

Fixtures shall be grounded in accordance with Massachusetts Electric Code.

The work shall include furnishing and installing a Leotek GCJ4 highway lighting luminaire, or an approved equivalent. Stated lumens in the following sections refer to a nominal lumen package; actual lumen output of luminaire will vary from the actual luminaire manufacturer supplied. The lumen package is representative of the nominal lumens needed for the intended use of the luminaire.

All luminaires shall be in accordance with MassDOT manufacturing and submittal standards.

All materials and construction procedures shall conform to information contained in these Specifications and to the requirements and standard practices of the Massachusetts Department of Transportation.

All poles shall comply with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including the most recent interim revisions. It will be the Contractor's responsibility to provide the pole owner with all proposed bracket, connection, and luminaire data (including expected pole loads and mounting location/height) so that the owner can verify all expected loading on the poles. The Contractor shall consult the Engineer if the pole owner shows that the proposed bracket arms and luminaires cannot be supported on their Utility Poles.

The Contractor shall be responsible for coordinating and paying for all permits and/or work orders required by the utility company.

ITEM 821.01 (Continued)**Submittals**

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

Manufacturer's data for the following:

- Mounting arms

Shop drawings for all Lighting Bracket Arms, including dimensions, wind loading calculations, and other applicable information. Wind loads shall be calculated using a design wind speed of 110 MPH. Wind loading calculations shall be stamped by a Registered Professional Structural Engineer in the Commonwealth of Massachusetts.

The Contractor shall not order any materials prior to approval of all shop drawings and product cut sheets.

Pole submittals shall include the following:

- Product Data: For each type of bracket arm indicated, arranged in order of lighting unit designation. Include data on accessories, finishes, and the following:
 - Means of attaching luminaires and arms/brackets with indication that the pole is suitable for the equipment being attached.
- Design calculations, certified by a Massachusetts Registered Professional Engineer, indicating strength of mounting connections. Calculations shall be signed and stamped by the owner of the Utility Poles.
- Product Certificates: Signed and Stamped by the owner of the Utility Poles, certified calculations shall be provided on the following:
 - Products are designed for load requirements in AASHTO and MassDOT Standards that load imposed by luminaire and accessories has been included in design. Calculations to be provided are outlined in AASHTO.
- Detailed shop drawings, signed and stamped by a MA Professional Engineer. Depicting all aspects of bracket arm assembly, construction, certification, welds, hardware, arms, connections to poles, nuts, washers, and finishes.
- Manufacturer Experience Record documentation.
- Work Plan as described above.

Submit complete Shop Drawings for approval of highway lighting luminaires including:

- Full details and materials descriptions for luminaires, LEDs, PCBs, drivers, materials, protection devices, certificates, calculations, testing reports, and wiring connections, as well as all accessories and incidentals.
- Design calculations and Shop Drawings submitted to the Department for review and approval shall be stamped by a Professional Engineer registered in Massachusetts.

ITEM 821.01 (Continued)

Luminaire submittals shall include the following:

- Product Data: For each luminaire, arranged in the order of lighting unit designation. Include data on features, accessories, finishes, and the following:
 - Physical description of fixture, including dimensions and verification of indicated parameters. Including descriptive literature and catalogue cuts for but not limited to luminaire, LED driver, and surge protection device.
 - Luminaires' weight, effective projected area, details of attaching luminaires, accessories, and installation and construction details.
 - Manufacturer's recommended replacement parts list.
 - LED Driver/Power Supply: description, operating characteristics, electrical data, component/capacitor temperature rating and reliability testing report from an independent laboratory including mean-time-between-failure (MTBF).
 - LEDs and Printed Circuit Board Construction.
 - LED type, ratings and description including heat dissipation design indicating margin between the maximum rated LED junction temperature and the junction temperature at operating current.
 - Light Loss Factors (lumen depreciation as a function of operating current, temperature and operating hours): Provide measurement bases for these factors.
 - Photometric report illustrating iso-illuminance for the project mounting height, classification type and cutoff characteristic. All photometric files presented shall be prepared and certified by an independent testing laboratory.
 - Independent laboratory IESNA LM-79 and LM-80 Reports. The test laboratory must hold National Voluntary Laboratory Accreditation Program (NVLAP) accreditation for the IES LM-79 test procedure or must be qualified, verified, and recognized through the U.S. Department of Energy's CALiPER program.
 - Luminaire IESNA distribution classification and TM-15 BUG rating.
 - All components shall be submitted with a list of all standards to which the product conforms. Submittals shall include proper Ingress Protection (IP) and UL Listing documentation for all the submitted products.
 - Vibration Characteristics Test Reports as specified within this section.
 - Written Warranty that complies with this section.
- Shop Drawings: Catalog cuts and manufacturers drawings.
- Wiring Diagrams: Power, and control wiring.
- Coordination Drawings
- Mounting and connection details, drawn to scale, for exterior luminaires with all requirements specified here within.
- Weight of the fixture inclusive of the LED Driver.
- Mounting and installation details drawn to scale.
- Operation and Maintenance Data: For luminaires to include in maintenance manuals.
- Calculation(s) to be completed using the design drawings as the basis for the pole placement and mounting height. Calculations are to include average, maximum, minimum, maximum/minimum and average/minimum for maintained luminance and illuminance on an R3 roadway surface as required. Calculations shall comply with IESNA. Software used shall be industry recognized for performing roadway calculations. The Contractor shall demonstrate through the calculations specified above that all equal luminaires submitted conform to the criteria here within with total light loss factor as defined in luminaire submittal requirements.

ITEM 821.01 (Continued)

- Samples: Provide (1) operable fixture for each fixture type, supplied with a 120V driver and a cord and plug for tabletop review and operation. This sample will remain the property of the Authority to be used by the engineer for quality assurance purposes during and after the project installation.
- Luminaire for each type and size.
- LED drivers of each type and size.
- Fuses of each type and size

Materials

While the intent is to reuse the existing arm bracket and luminaire to the maximum extent possible, it should be anticipated that the connection hardware, such as clamps, bolts, nuts and washers, will require replacement. If any other part of the arm or luminaire is damaged, and such damage was not caused by the Contractor, the arm and luminaire shall be either fully removed and stored or secured to the existing pole and the Engineer shall be notified. Any damage caused by the Contractor's operations shall be replaced with the bracket arm and/or luminaire specified in this special provision for the proposed lighting, at no additional cost to the Department.

The single davit arm shall be a separate section which fits to the utility pole shaft. The davit arm shall be provided with a 2-3/8 inches outside diameter street tenon for mounting the luminaire. The davit arm tenon shall accommodate the luminaire slip fitter. Provisions shall be made for dissimilar metals where required. The maximum angle above horizontal of the arm shaft at the point of luminaire attachment shall be three degrees. Contractor shall coordinate mounting requirements with the luminaire manufacturer.

Luminaires shall consist of a cast aluminum housing and door frame assembly, removable driver assembly, gasketed optical system and adjustable mounting arm assembly. In addition, the luminaire shall meet the following performance requirements and standards:

- ANSI/NFPA 70, National Electrical Code
- IEEE C62.41, Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits
- FCC 47 CFR Part 15, Federal Code of Regulation (CFR) testing standard for electronic equipment
- NEMA SSL 3-2010, High-Power White LED Binning for General Illumination
- IESNA LM-79, Optical and Electrical Measurements of Solid-State Lighting Products
- IESNA LM-80, Approved Method for Measuring Lumen Maintenance of LED Light Sources
- IESNA TM-15, Luminaire Classification System for Outdoor Luminaires
- IESNA TM-21-11, Projecting Long Term Luminous, Photon and Radiant Flux Maintenance of LED Light Sources
- UL1598, Luminaires
- Wet location rated: UL-1598
- Ingested Protection rated: IP66
- Drivers all RoHS Compliant
- Vibration Testing: CAL Trans 611

ITEM 821.01 (Continued)

- 3G Vibration Rating: ANSI C136.31
- Weather ability testing: ASTM Designation - B117
- Manufacturer's Warranty: 10 years

Luminaires shall include a mounting system capable of accommodating 1¼ inch to 2-inch ID (2-3/8" OD) pipe for slipfitter. The system shall be manufactured to provide a minimum adjustment of 3 degrees above and below horizontal. The mounting opening of the luminaire shall be provided with a cover to prevent insect infiltration into the luminaires. Highway Luminaires shall have a four (4) bolt (two clamps) universal slip fitter. The mounting clamp design shall also provide "teeth" or a "saw cut" in the fitter clamp to lock the luminaire into position. The Contractor shall torque the clamping bolts according to the manufacturer's recommendations. Care must be followed as to not under or over tighten.

Adequate provisions shall be provided to the luminaire for the dissipation of heat radiated from the driver.

Housing and door shall be aluminum with a nominal 2.5 mil thick paint finish able to withstand a 3000-hour salt spray test as specified in ASTM Designation - B117.

Each refractor or lens shall be made from UV inhibited optical grade material and be resistant to scratching.

Provide a NEMA lamp wattage decal inside fixture per ANSI C136.22 and a NEMA lamp wattage decal on the outside of the fixture per ANSI C136.15.

All exposed hardware shall be manufactured of stainless steel.

Each luminaire shall comply with the following:

- All luminaires shall utilize LEDs from well-known and reputable LED manufacturers: Nichia, CREE, Philips. As part of the submittal package, the manufacturer shall supply all testing and data sheets for the supplied LEDs.
- Each Luminaire shall consist of an assembly that utilizes LEDs as the light source. In addition, a complete luminaire shall consist of a housing, LED array, and electronic driver (power supply).
- Photometry must be compliant with IESNA LM-79.
- Each luminaire shall meet all parameters of this specification throughout the minimum operational life when operated at the average nighttime temperature.
- Luminaire shall be constructed such that LED drivers and surge modules may be replaced or repaired without replacement of whole luminaire.

Miscellaneous Hardware

All screws, nuts, bolts, washers and associated small hardware, except high strength bolts, shall be of Type 316 stainless steel.

ITEM 821.01 (Continued)**Warranty**

For Lighting Bracket Arms, provide written documentation stating that the manufacturer's warranty conforms to the warranty specified in this Section.

1. Protection of Metal from Corrosion: Warranty against perforation or erosion of finish due to weathering.
2. Color Retention: Warranty against fading, staining, and chalking due to effects of weather and solar radiation.
3. Warranty Period: Manufacturer's standard, but not less than 10 years from date of Substantial Completion to repair or replace any supplied items which fail to meet the specifications as the result of defects of materials or workmanship.

The manufacturer's warranty, as stated above, shall be valid for all installations of procured products, regardless of the Installation Contractor. The Manufacturer will be allowed to inspect, at no cost to the Authority and with the Engineer present, the installation of the product for the final issuance of the warranty specified in this Section. Should any modifications be required regarding the installation of the product(s), it will be at the Installation Contractor's expense. Once all modifications are accepted by the Manufacturer, the product warranty will become effective and will be supported by the Manufacturer in accordance with this Section.

The luminaire manufacturer shall comply with the following warranty for all LED Luminaires:

- The Manufacturer warrants that the design, material and workmanship incorporated in each luminaire shall be of the highest grade and consistent with established, and generally accepted, standards for lighting application.
- The Manufacturer agrees that this warranty (non-prorated warranty) shall commence with the acceptance of the luminaires, whether a defect is patent or latent, and shall continue for a period of ten (10) years after acceptance by the MASSDOT.
- The warranty by the Manufacturer shall be valid for all installations of procured products, regardless of the Installing Contractor. The Manufacturer will be allowed to inspect, at no cost to the Department and with the Engineer present, the installation of the product in order for the final issuance of the warranty specified above. Should any modifications be required regarding the installation of the product(s), it will be at the expense of the contractor. Once all modifications are accepted by the Manufacturer, the product warranty will become effective and supported by the Manufacturer.
- Any claims against the warranty will be valid regardless of who performs the installation. The Manufacturer will be allowed to inspect after the time the repair has been made, at no cost to the Department and with the Engineer present, the installation of the product in order for the final issuance of the warranty specified above.

Installation

Contractor is required to provide all miscellaneous hardware required to install the above items which are not noted on drawings or specification. All hardware unless otherwise noted shall be stainless steel.

ITEM 821.01 (Continued)

Adjust all luminaires to the satisfaction of the Engineer. Adjustments required at night shall be done at no additional cost to the contract. Provide all equipment needed (for adjustment and for Engineer's inspection) including scaffolding and bucket truck, if required.

The Contractor shall provide a witness test in the presence of the Engineer to ensure that installed circuiting is verified against the Contract Documents. This testing may be witnessed by the Engineer of record and/or a MassDOT representative.

Electrical Requirements

- The highway luminaire driver compartment must be accessible from the bottom of the fixture via a tool-less entry and a tool-less removal of the driver and/or driver tray itself. Quick disconnect electrical connections must be on all wires to and from the driver.
- Operation Voltage: The luminaire shall operate from a 60 HZ \pm 3 HZ AC line over a voltage ranging from 108 VAC to 305 VAC. The fluctuations of line voltage shall have no visible effect on the luminous output.
- Power Factor: The luminaire shall have a power factor of 0.9 or greater.
- THD: Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 20 percent.
- Surge Suppression: The luminaire onboard circuitry shall include surge protection devices (SPD) to withstand high repetition noise transients as a result of utility line switching, nearby lightning strikes, and other interference. The SPD protects the luminaire from damage and failure for common and differential mode transient peak currents up to 10 kA (minimum). SPD shall conform to UL 1449 and be certified as such. SPD performance has been tested per procedures in ANSI/IEEE C62.41-2:2002 category C high exposure and ANSI C136.2 10kV BIL. The SPD shall fail in such a way as the Luminaire will no longer operate. The SPD shall be field replaceable.
- LED Driver Protection: Fixture shall include a protection device prior to the driver to ensure that an over voltage condition due to a lost neutral will not exceed the maximum allowed voltage to the driver. Manufacturer to provide test results to confirm conformance to this requirement.
- Operational Performance: The LED circuitry shall prevent visible flicker to the unaided eye over the voltage range specified above.
- RF Interference: LED Drivers must meet Class A emission limits referred in Federal Communications Commission (FCC) Title 47, Subpart 15 regulations concerning the emission of electronic noise.

Photometric Requirements

- Optical Assemblies: LEDs shall be provided with discreet over optical elements to provide an IESNA Type III distribution. Luminaire and optical assemblies shall be mounted parallel to the ground. Each LED shall provide the same optical pattern such that catastrophic failures of individual LEDs will not constitute a loss in the distribution pattern.
- No more than 3.0% of the total luminaire lumens shall be in the 80° to 90° range and no lumens will be emitted above 90°. BUG rating shall not exceed B3-U0-G4.
- Light Color/Quality: The luminaire shall have a correlated color temperature (CCT) of 3,985K \pm 275K. The color rendition index (CRI) shall be greater than 70.

ITEM 821.01 (Continued)

- The minimum percentage luminaire lumens to the street side of the luminaire shall be greater than 75%.
- The optical assembly of the luminaire shall be protected against dust and moisture intrusion per the requirements of IP-66 (minimum) to protect all optical components.

Thermal Management Requirements

- The thermal management (of the heat generated by the LEDs) shall be of sufficient capacity to assure proper operation of the luminaire over the expected useful life.
- The LED manufacturer's maximum thermal pad temperature for the expected life shall not be exceeded.
- Thermal management shall be passive by design. The use of fans or other mechanical devices shall not be allowed.
- The luminaire shall have a minimum heat sink surface such that LED manufacturer's maximum junction temperature is not exceeded at maximum rated ambient temperature.
- The heat sink material shall be aluminum.
- The driver Tcase temperature shall not exceed 70°C at a 40°C ambient operating temperature. Submit testing with approval submittal.

The Luminaire shall have an IESNA Distribution Type III. Luminaire shall have Initial minimum 12,600 Lumens. Averaged rated Life: >100,000hr to 70% of Initial output at 15 Degree Celsius (57 degree of F); Averaged rated of Driver of >100,000hr, Minimum 70 CRI, 4000 Kelvin

The lighting system shall provide 0.9 average maintained footcandles on roadway. The lighting system shall be based on the light poles layout shown on the Plans and luminaires rated as shown on the Plans.

The electrical subcontractor shall submit calculations based on the following parameters:

LLF = LLD x LDD x LATF, where

LLD: Lamp Lumen Depreciation. Use minimum 0.86, or use chart from manufacturer.

LDD: Luminaire Dirt Depreciation. Use 0.9 (from 2012 FHWA Roadway Design Handbook)

LATF: Luminaire Ambient Temperature Factor. Use 1.02 or 1.025 for 15 Degree Celsius Zone.

BASIS OF PAYMENT

Item 821.01 will be paid for at the Contract unit price Lump Sum, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 852.11
ITEM 852.12**TEMPORARY PEDESTRIAN BARRICADE**
TEMPORARY PEDESTRIAN CURB RAMP**FOOT**
EACH**Description**

Work under these items consist of furnishing, deploying, maintaining in proper operating conditions, and removing temporary pedestrian barricades and temporary pedestrian ramps as part of a Temporary Pedestrian Access Route (TPAR) in order to guide pedestrians around a fully- or partially-closed sidewalk. These devices are intended to prevent pedestrians from entering the work area and to prevent pedestrians from inadvertently entering the vehicle travel lane by providing visual and physical separation between each space.

Materials

The Temporary Pedestrian Barricade shall have a continuous bottom rail or edge no more than two (2) inches above the ground and eight (8) inches in height (minimum) to accommodate cane users, have a smooth and continuous hand railing along the top edge no less than 32 inches above the ground and not obstruct or project into the pedestrian path of travel. Barricade walls shall be nearly vertical and generally within the same plane.

If exposed to traffic, Temporary Pedestrian Barricades shall be crashworthy.

The Temporary Pedestrian Curb Ramp shall provide a 48 inch minimum width, with a firm, stable, and non-slip surface. Protective edging with a two (2) inch minimum height shall be installed when the curb ramp or landing platform has a vertical drop of six (6) inches or greater.

The Temporary Pedestrian Curb Ramp walkway and landing area surface shall be of a solid, continuous, contrasting color abutting up to the existing sidewalk.

If a Temporary Pedestrian Curb Ramp leads to a crosswalk, a detectable warning pad must be used at the base of the ramp; if it leads to a protected path that does not conflict with vehicular traffic then a detectable pad shall not be used.

Construction Methods

The Temporary Pedestrian Barricade shall be placed in an area that will provide pedestrians with a TPAR on a smooth, continuous hard surface for its entirety. The geometry and alignment of the facility shall meet the applicable requirements of the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities” and the Massachusetts Architectural Access Board.

The recommended width of the TPAR is 60 inches, but if constraints exist a minimum clear width of 48 inches shall be provided along its entirety. If a 60 inch width cannot be accommodated in full, a 60 inch by 60 inch passing space shall be provided every 200 feet or less along the TPAR.

ITEMS 852.11 and 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 Barricades will be made at the contract price per foot installed in place, including all incidental items. This price shall include the cost of furnishing, installing, resetting, removal, and maintaining in good working condition.

Payment for Temporary Pedestrian Curb Ramps will be made at the contract price per each unit installed in place, including all incidental items. This price shall include the cost of furnishing, installing, resetting, removal, and maintaining in good working condition.

ITEM 874.1

STREET SIGN REMOVED AND RESET

EACH

The work under this item shall conform to the relevant provisions of Subsections 828 and 840 of the Standard Specifications and the following:

Work includes the dismantling, removal, transporting and resetting of the existing street name signs at the locations indicated on the Plans. The work also includes the removal and disposal (if not reused) of the existing sign supports and foundations. Street name signs to be removed and reset for reuse during various stages of construction at locations shown on the Plans shall be removed and disposed once a new proposed street sign has been installed as indicated on the Plans.

The Contractor shall exercise particular care in the dismantling, removal, transporting and resetting of the existing signs designated to be reused. Any sign panel damaged through carelessness or lack of protection by the Contractor shall be replaced at the Contractor's expense.

The Contractor will be held responsible for sign panels to be removed and reset and he shall replace or repair any damage due to his operation at his own expense. Any new materials shall be equal and similar to the present signs, including painting and lettering.

New supports shall be provided for all signs designated to be removed and reset. Payment of the new supports shall be paid under this Item.

The work shall include removing the supports, excavating of the existing foundations to a depth of 6 inches below finish grade, the disposal of the concrete foundations, backfilling with compacted gravel of the holes resulting from the excavation and the removal of the supports and the replacement, in kind, of any surface material disturbed.

The existing signs shall not be removed and reset without permission of the Engineer.

METHOD OF MEASUREMENT

Item 874.1 will be measured for payment by the Each sign removed and reset.

BASIS OF PAYMENT

Item 874.1 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, supports, backfill, area restoration and all incidental costs required to complete the work.

ITEM 908.40**REPOINTING****SQUARE YARD**

The work performed under this item shall consist of removing loose mortar from joints and repointing the joints of the existing stone masonry abutments and wingwalls to the satisfaction of the Engineer.

The Contractor shall review the extents of repointing anticipated/required with the Engineer prior to starting work.

It may be necessary to work within the foul zone of the tracks, particularly at the South abutment. The Contractor must get approval from MBTA before fouling tracks. See additional notes and contact information under the heading “MBTA Flagging” near the beginning of this document.

Mortar shall meet the requirements of Subsection M4.02.15 of the Standard Specifications.

Cleaning and repointing work shall be performed by skilled masons with a minimum of five (5) years of experience restoring masonry structures. The Contractor shall provide the Engineer with documentation of each mason’s experience.

All existing pointing mortar to be removed shall be removed to a minimum uniform depth of 2 inches or 2.5 times the joint width, whichever is greater. The face of stones shall be cleaned to remove existing mortar smears and plastered over areas, exposing the natural stone faces. The mortar removal shall be accomplished using hand tools and small pneumatically-powered chisels. Once the bulk of the mortar has been removed to the satisfaction of the Engineer, a light abrasive blast cleaning shall be utilized to remove chisel marks and any remaining cement film.

After cleaning and removal work is complete, the joints shall be rinsed with water and brushed out to remove any loose particles and dust. The rinsing action should not scour additional bedding mortar material out of the joint.

All pointing mortar shall be placed by hand. Where the existing mortar has been removed to a depth greater than 2 inches, these deeper areas shall be filled first, compacting mortar to fill all voids. Once a uniform joint depth is attained, the joint shall be filled by applying several layers of mortar, packing it back well into the back corners. The thickness of the individual layers shall not exceed ½” and each successive layer of mortar shall be permitted to reach thumb-print hardness before the application of the next layer. The final layer of mortar shall be slightly recessed behind the face of the stones and finished with an approved flat pointing tool. After the mortar has dried, excess mortar shall be removed from the edge of the joint by brushing with a natural bristle or nylon brush.

METHOD OF MEASUREMENT

Item 908.40 will be measured for payment by the Square Yard of repointing.

Measurements will be based on the area of the wall faces in square yards repointed regardless of the extent of repointing required, size of the gaps between stones, and depth of mortar required.

BASIS OF PAYMENT

Item 908.40 will be paid for at the Contract unit price per Square Yard, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 912.4**DRILLED AND GROUTED #4 DOWELS****EACH**

The work under this Item shall conform to the relevant provisions of Section 901 of the Standard Specifications and the following:

The work to be done under this Item shall consist of drilling holes in the existing concrete, installing dowels, and grouting of steel dowel reinforcement at the existing abutments as shown on the Plans for construction of new concrete abutment caps or as required by the Engineer. The dowel embedment must be adequate to develop the yield strength of the bar. The embedment length, the method and equipment used to drill the dowel holes, and the diameter of the drilled hole shall at a minimum conform to the recommendations of the manufacturer and the contract plans and be submitted to the Engineer for approval.

Materials

The grout to be used for these dowels shall be selected from the MassDOT Qualified Construction Materials List for its specific application. Reinforcing steel dowels shall meet the requirements of AASHTO M 31 Grade 60. All reinforcing steel dowels shall be epoxy coated in accordance with ASTM A755 or shall be galvanized in accordance with ASTM A767. Reinforcing steel dowels shall be incidental to the work under this Item.

CONSTRUCTION METHODS

All dowel holes shall be air drilled provided that the minimum edge distance of 6 inches is observed. Should, in the Engineer's opinion, air drilling be inappropriate due to concerns of damaging the existing stone masonry or insufficient edge distance, the dowel holes shall be diamond core drilled. The inner surfaces of the diamond core drilled dowel hole's inner surfaces shall be subject to the approval of the Engineer. The diameter of the drilled dowel holes shall be in accordance with the recommendations of the grout manufacturer. The holes shall be blown clear of any debris and shall have the approval of the Engineer prior to the placement of any grout material. The drilling operation shall be performed without damage to any portion of the existing structure that is to remain in place. Any damage to any portion of the existing structure that is to remain in place shall be repaired to a condition equal to or better than that existing prior to the beginning of the Contractor's operations and shall be repaired at the Contractor's expense.

The Contractor shall strictly follow the recommendations of the manufacturer for mixing and placing the grout material prior to the placement of the dowel. The Contractor shall adhere to the recommendations of the manufacturer regarding minimum and maximum temperatures while placing the grout. Any excessive grout around the hole after placement of the dowel shall be struck off smooth while the grout is still fresh.

Two (2) test dowel bars shall be installed in the existing stone masonry abutments and tested by the Contractor for pullout. The test shall be performed in the presence of and to the satisfaction of the Engineer. The testing, including the necessary material and equipment to perform the test, is incidental to the work under this Item. The test load shall reach 50% of the yield strength of the bar, at which point the test can be terminated. If the test bar pulls out or if the surrounding stone masonry shows signs of fracture, the Contractor shall stop the test and adjust the hole diameter, embedment length, and/or grout material to meet this requirement.

ITEM 912.4 (Continued)

The method of applying the tension load to the dowels shall conform to ASTM E488. Details of the test procedure, materials, and equipment shall be submitted to the Engineer for review and approval prior to commencement of the test. Dowels shall not be ordered until the embedment lengths have been approved by the Engineer.

The Contractor shall arrange with the material's manufacturer or distributor to have the services of a competent field representative available for consultation prior to any drilling of the proposed dowel holes to instruct the work crews in proper dowel installation procedures. The field representative shall remain available after work commences and continue to instruct until the representative, the Contractor, and Engineer are satisfied that the crew has mastered the technique of installing the dowels successfully. The manufacturer's field representative must be fully qualified to perform the work and shall be subject to the approval of the Engineer.

The Contractor shall be completely responsible for the expense of the service of the required field representative and the contract unit price shall be considered full compensation for all costs in connection therewith.

METHOD OF MEASUREMENT

Item 912.4 will be measured for payment by the Each dowel installed, complete in place.

BASIS OF PAYMENT

Item 912.4 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, drilling holes, dowels, grouting the dowels regardless of the diameter or depth of the hole, and all incidental costs required to complete the work.

ITEM 964.3 **ELASTOMERIC PROTECTIVE COATING** **SQUARE FOOT**

The work to be done under this Item shall consist of applying a minimum of two coats of an elastomeric acrylic protective coating to the exposed faces of the proposed abutment caps, curtain walls, backwalls and railing transitions. A total dry film thickness (DFT) of 16 mils shall be required.

The acrylic protective coating shall be breathable, durable, flexible, and color retentive. It shall provide protection and be resistant to weathering, carbon dioxide, chlorides, UV light, wind driven rain, dirt pick up and mildew. It shall also bridge hairline cracks up to 1/32". The acrylic protective coating system shall be one of the following or an approved equal:

1. SikaGard 550W Elastocolor by Sika Corp.
2. Flexxide Elastomer by Carboline
3. Colorlastic by ChemMasters

The proposed coating product shall be submitted to the Engineer for approval. The Contractor shall submit the proposed application procedures and Manufacturer's Product Data Sheet(s) that completely describe the product. The color of the coating(s) shall be selected by the District Bridge Engineer.

Actual product color samples shall be provided for color testing/selection.

All surfaces to be coated shall be prepared in accordance with the chosen manufacturer's written specifications and must be dry, clean, sound and free of all contaminants that could interfere with adhesion of the coating. All loose material shall be removed. If directed by the Engineer, the contractor shall repair any holes and any spalled and damaged concrete prior to applying the coating. The Contractor shall pressure wash all concrete surfaces to be coated. The pressure washer shall operate at a minimum of 3,000 psi. The protective coating shall not be applied until the surface has been prepared according to the chosen manufacturer's written specifications and has been approved by the Engineer.

Application shall be done by airless sprayer or roller or a combination of both and in accordance with the manufacture's recommendations. The use of a primer shall not be required unless stipulated for that particular coating by the manufacturer. A minimum of two coats shall be applied to achieve a total DFT of 16 mils. The recommended minimum wet film thickness (WFT) must be maintained during each application. The manufacturer's specified temperature and weather limitations for the application shall be strictly adhered to.

METHOD OF MEASUREMENT

Item 964.3 will be measured by the Square Foot for all concrete surfaces to which the coating is applied, complete in place.

BASIS OF PAYMENT

Item 964.3 will be paid for at the Contract unit price per Square Foot, which price shall include all labor, materials, tools, equipment, pressure washing, wet/dry film thickness gauge for the use of the Engineer, and all incidental costs required to complete the work.

ITEM 993.31**TEMPORARY UTILITY BRIDGE****LUMP SUM**

The work to be done under this Item shall consist of the design of the Temporary Utility Bridge, including superstructure and foundation, as well as furnishing all materials, tools, equipment and labor necessary to construct the temporary bridge.

The intention is to construct a single-span temporary bridge that will span over the MBTA tracks and clear the existing substructure (the temporary bridge foundation shall not rest on the existing substructure). The temporary bridge will be located as shown on the Plans, West of the existing bridge.

The Contractor is responsible for complete design of the foundation and all required site preparation, excavation, installation, erection and complete removal of the temporary bridge. The temporary bridge shall also provide a minimum overhead vertical clearance of 18'-6" above the MBTA tracks (same requirement as the proposed bridge).

The temporary foundations (abutments) shown on the Plans are conceptual only. The location and details of the foundations shall fall within the proposed easement areas. The calculations shall be developed specifically for this project and site conditions and stamped by a Professional Structural Engineer Registered in the Commonwealth of Massachusetts. The design costs for the foundations shall be the responsibility of the Contractor. No Contract Time Extension will be granted as a result of modified temporary foundation or superstructure designs. All concrete foundations for the temporary bridge are to be removed in their entirety after the temporary bridge is removed.

The Contractor shall select and design the system he/she proposes for the temporary bridge superstructure. The Contractor shall verify the design of the foundation to handle the loads from the proposed temporary bridge by calculating the loading from the bridge. The calculations shall be developed specifically for this project and site conditions and stamped by a Professional Structural Engineer Registered in the Commonwealth of Massachusetts.

After complete removal of the temporary bridge, foundations and approaches, the disturbed site should be returned to a minimum of preconstruction conditions as approved by the Engineer.

The Contractor is also responsible for the inspection and maintenance of the temporary bridge and while they are in service.

Utility supports shall be per utility owner specifications. The contractor shall provide connection details for the utility supports on the utility bridge to the Engineer for review.

Item 993.31 (Continued)**Required Submittals**

The Contractor shall submit to the Engineer and to the MBTA, at a minimum, the following information prior to the start of construction:

1. Shop drawings and design calculations of the temporary bridge and foundation, which shall illustrate the work to be performed, shall be developed specifically for this project and site conditions and stamped by a Professional Structural Engineer Registered in the Commonwealth of Massachusetts. The drawings shall include details of all connections, brackets and fasteners. The bridge shall be designed in accordance with the latest edition of the AASHTO LRFD Bridge Construction Specifications.
2. The Contractor shall submit for review the design calculations and other associated construction documents for the erection of the proposed temporary bridge in conformance with Subsection 960.61D of the Standard Specifications. The design calculations and construction documents shall be stamped by a Professional Structural Engineer Registered in the Commonwealth of Massachusetts, for conformance to the Contract Documents, prior to construction of the structure.
3. A demolition plan for the removal of the temporary bridge after it is no longer required shall also be submitted for review and approval in accordance with Section 112 of the Standard Specifications. The plan shall be prepared and stamped by a Professional Engineer Registered in the Commonwealth of Massachusetts. If the temporary bridge is to be used for any of the demolition or lifting operations, calculations will be required to verify the adequacy of the bridge components at inventory stress levels.
4. No portion of the proposed temporary bridge shall be constructed or removed until the Contractor has approval from both the Engineer and MBTA to proceed.

Materials

Structural composite lumber and sawn lumber shall comply and conform to the requirements of ASTM D-5456 and AASHTO M168, respectively. The minimum thickness of the structural composite lumber shall be ¾". Anchor bolts at the bearing locations shall conform to ASTM F1554 Grade 105.

All structural steel shall conform to AASHTO M270 Grade 36.

The concrete for the temporary abutments shall be 5000 psi, HP cement concrete conforming to Section 901 of the Standard Specifications. All reinforcing steel shall conform to AASHTO M31 Grade 60 and be epoxy coated.

Item 993.31 (Continued)

Fabrication

All work including fabrication and shop connections shall be in accordance with the latest edition of the AASHTO LRFD Bridge Construction Specifications. Pre-qualified and certified welders shall perform all welding.

BASIS OF PAYMENT

Item 993.31 will be paid for at the Contract unit price Lump Sum, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

Payment of 75% of the lump sum price of this Item will be made upon complete installation. The remaining 25% of the lump sum price of this Item will be paid following complete removal, as determined by the Engineer, of the temporary bridge from the project.

ITEM 994.01**TEMPORARY PROTECTIVE SHIELDING**
BRIDGE NO. N-03-007 (29N)**LUMP SUM**

The work to be done under this Item shall prevent dust and debris from falling on the MBTA right-of-way and adjacent sloped areas below the bridge. This shall be accomplished by using adequate shielding placed beneath the existing superstructure prior to demolition, in accordance with MBTA requirements and as directed by the Engineer. See section IX “Temporary Protection Shields for Demolition and Construction” of the MBTA Railroad Operations Directorate: Guidelines and Procedures for Construction on MBTA Railroad Property. At a minimum, shielding shall extend the full length of the bridge and a sufficient distance beyond the deck. Vertical shielding shall be required if the means and methods of the superstructure and partial substructure demolition presents the risk of debris falling onto the tracks below. If approved by the MBTA, direct track protection may be used, instead of shielding attached directly to the existing structure.

All shielding shall meet the following requirements:

1. The Contractor is responsible for designing, furnishing, installing and maintaining the shielding. When directed by the Engineer, the Contractor shall remove and dispose of the shielding to the satisfaction of the Engineer.
2. The Contractor shall submit drawings and calculations, bearing the stamp of a Professional Engineer registered in the Commonwealth of Massachusetts, for the proposed shielding to the Engineer and MBTA for approval prior to installation. The drawings shall include details of all connections, brackets and fasteners.
3. No portion of the existing superstructure or substructure shall be removed until the Protective Shielding is completely in place and the Contractor has approval from both the Engineer and MBTA to proceed.
4. All spaces along the perimeter of the shielding and at the seams shall be sealed to prevent dust and debris from escaping and falling onto MBTA tracks and adjacent sloped areas below the bridge. All debris, including any water used during construction work, shall be collected and legally disposal of.
5. Shielding shall be designed to safely withstand all loads that it will be subjected to during demolition operations. The allowable design stresses shall be in accordance with the AASHTO Standard Specifications for Highway Bridges, 17th Edition, 2002 or the AASHTO LRFD Bridge Design Specifications, 9th Edition, 2020. The design shall include a complete description of equipment and construction methods proposed for the superstructure removal. If shielding is supported by the bridge, it shall be verified that the bridge can support the weight of the shielding and debris. Note Section IX of the MBTA reference listed in the summary, requires the horizontal shielding to be designed for a live load of 100 psf or a single concentrated load of 2,000 lbs and the horizontal shielding designed for 30 lb/ft.

ITEM 994.01 (Continued)

6. The shielding shall not decrease the minimum existing vertical bridge clearance to the MBTA railroad tracks, nor impede the flow of trains below the bridge, unless otherwise approved by the Engineer.
7. The shielding shall remain the property of the Contractor and shall be removed by him/her from the site when no longer needed.

Any temporary lighting that is required to complete this work is considered incidental to this Item.

BASIS OF PAYMENT

Item 994.01 will be paid for at the Contract unit price Lump Sum, which price shall include all labor, materials, equipment, removal and disposal all debris, shielding installation, maintenance, final removal upon completion of repair work, and all incidental costs required to complete the work.

Payment of 75% of the Lump Sum Bid Price of this Item will be made upon complete installation.

The remaining 25% of the Lump Sum Bid Price of this Item will be paid following proper removal and disposal of the shielding from the project.

If direct track protection is used instead of shielding attached to the existing structure, the removal and resetting of the track protection system shall be considered as included in the cost for the work required for this item.

ITEM 995. BRIDGE SUPERSTRUCTURE, BRIDGE NO. N-03-007 (29N) LUMP SUM

The work under this Item shall conform to the applicable provisions of Subsection 995 of the Standard Specifications and the specific requirements stipulated below for the component parts of this Item. For those component parts where no specific requirement is stipulated, the Standard Specifications shall apply, except for payment.

Work under this Item shall include all materials, equipment and labor needed to construct the following: reinforced concrete work with coated steel reinforcement for the abutment caps, approach slabs, curtain walls and backwalls, bridge deck, curbs and railing transitions; damp-proofing; hot poured joint sealer; prefabricated tubular steel truss superstructure including, bearings, cover plate, rub-rails and wire mesh fence system.

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of this bridge structure or which may be incidental to its construction and are not specifically included for payment under another Item shall be considered incidental to the work performed under this Item and shall be included in the unit price of the component of which they are a part.

Any temporary lighting that is required to complete this work is considered incidental to this Item. It shall be included in the unit prices of any components that require lighting for installation.

5000 PSI, HP CEMENT CONCRETE

The work to be done under this heading shall conform to the relevant provisions of Subsection 901 of the Standard Specifications and the following:

5000 PSI, HP Cement Concrete shall be used to construct the bridge deck, curbs, railing transitions, abutment stems, backwalls, curtain walls and approach slabs.

EXPOSED CONCRETE DECK CRACK SEALING

Concrete crack sealing shall only be performed on concrete decks whose surface is to remain exposed as called for on the Plans. Concrete crack sealing shall not be performed on any concrete decks where any waterproofing membrane with an asphalt wearing surface shall be installed, since the waterproofing membrane seals any cracks present in the concrete deck surface from water infiltration.

After the 14 day concrete bridge deck curing period has been completed and prior to the application of loaded vehicles, the Engineer shall survey the entire deck to determine if there are any cracks present. The Engineer shall determine width of cracks found using a crack width indicating comparator card made of clear plastic with lines of specified width on the cards. These cracks are assumed to be non-moving and to have been caused by inadequate control of shrinkage or temperature stresses during curing. Cracks that are of structural concern shall be repaired by other

ITEM 995. (Continued)

methods determined by the Engineer. All required crack sealing and crack repairs shall be performed by the Contractor without additional compensation. The Contractor shall be required to seal cracks even if the environmental conditions during placement and curing satisfied specification requirements.

The type of Cement Concrete crack sealing required shall be determined as a function of the surface type and maximum crack width as follows:

Top surfaces of exposed concrete bridge decks with slopes up to and including 15%:

- Cracks less than 0.006" (0.15 mm) wide shall be ignored;
- Cracks greater than or equal to 0.006" (0.15 mm) wide and less than 0.020" (0.50 mm) wide shall be sealed with an approved methacrylate;
- Cracks greater than or equal to 0.020" (0.50 mm) wide shall be sealed using either epoxy injection or methacrylate with a sand filler.

Undersides of bridge decks and top surfaces of exposed concrete bridge decks with slopes greater than 15%:

- Cracks less than 0.006" (0.15 mm) wide shall be ignored;
- Cracks greater than or equal to 0.006" (0.15 mm) wide and less than 0.020" (0.50 mm) wide shall be sealed with an approved silane sealer;
- Cracks greater than or equal to 0.020" (0.50 mm) wide shall be sealed using epoxy injection.

Before sealing, the concrete must be clean, sound, and free of any contaminants and surface moisture. Any other surface contaminants shall be removed by abrasive blast cleaning. Once all concrete surface contaminants are removed, the concrete shall be swept clean and blown off using oil-free compressed air immediately prior to applying the sealer.

Crack sealing materials shall be applied by skilled applicators under a supervisor with proven successful experience in applications with a similar scope of work. All crack sealing materials shall be applied strictly in accordance with the manufacturer's instructions within the allowable ambient temperature range restrictions. If a heated enclosure is used to accomplish this, the heating units shall be properly vented to the outside of the enclosure to prevent products of combustion from exhausting within the enclosure.

Silane Crack Sealer shall consist of a clear, breathable, high-performance, 100 percent solids by weight Silane sealer for protecting new and existing concrete surfaces. It must penetrate deeply, sealing out water, chloride ions, and acids, and prevent damage from freeze/thaw cycles. The Silane Crack Sealer material shall be listed on the MassDOT QCML.

ITEM 995. (Continued)

The methacrylate crack sealer shall consist of a high molecular weight low viscosity methacrylate monomer. The methacrylate material shall, as a minimum, provide the following as applied properties:

Property	Value	Test
Viscosity	< 25 cps	ASTM D2393-86
Bond Strength	> 1500 psi	ASTM C882
Tensile Elongation	> 3%	ASTM D638

A dam shall be created on either side of the crack with silicone caulk. Methacrylate shall then be poured into the valley created by this dam. The methacrylate shall be refilled as necessary as it seeps into the crack to ensure the crack is completely filled. If large quantities of methacrylate are used and the crack is not getting filled, the crack should be filled with pre-bagged dried silica sand filler and the crack shall then be re-filled with methacrylate. Once the methacrylate stops seeping into the crack, the Contractor shall remove the silicone caulk dams and any remaining methacrylate contained within with a putty knife or other tool that can scrape them off the concrete surface.

Epoxy injection crack sealing shall be performed using an Epoxy-Resin for Cement Concrete Crack Injection that conforms to AASHTO M235, Type IV, Grade I. The cracks shall be cleaned with compressed air. Surface mounted injection ports shall then be installed over the centers of the cracks and mounted with rapid setting epoxy material. The spacing of these ports shall be contingent upon the crack sealing material and the injection equipment chosen. Socket porting shall be allowed provided that a hollow drill bit and vacuum system is used to prevent debris from entering the cracks. The crack widths shall be noted during port installation. After the ports are installed, the crack surfaces shall be sealed with a high modulus, 100% solids, moisture tolerant epoxy paste adhesive. This material shall be capped with fine sand before it is cured. After the capping material has cured, the cracks shall be injected with the epoxy resin compound. The injection pressure used to seal the cracks shall be based upon a number of factors including crack width, crack depth, and the epoxy material used. Injection shall be accomplished using a metered system. The system shall be equipped with a pressure gauge accurate for the pressures anticipated for this work. Injection shall start at the widest point of the crack and shall continue until the narrowest portions of the crack have been filled. Injection shall continue until refusal. If epoxy is observed at adjacent ports, the adjacent port shall be capped and injection shall continue until refusal occurs. Once refusal occurs, injection shall continue at the next wet port until refusal is reached.

After the methacrylate and/or epoxy injection crack sealing has been completed and prior to cutting grooves in the concrete deck surface in accordance with Subsection 901.66 H 2 of the Supplemental Specifications, those deck areas where the repairs were made shall be ground down to the clean concrete substrate using a grinder in order to remove any cured methacrylate and/or epoxy paste remaining on top of the bridge deck surface. All surface mounted injection ports shall also be removed or ground down to the level of the surface of the bridge deck.

ITEM 995. (Continued)**PREFABRICATED TUBULAR STEEL TRUSS SUPERSTRUCTURE****DESCRIPTION**

These specifications are for a fully engineered steel truss superstructure and shall be regarded as minimum standards for design and construction. This item includes stay-in-place forms, wire mesh fencing, self-supported fence along the West curb, timber rub rails, anchor bolts and bearing assemblies. The cast-in-place reinforced concrete deck is included under sub-item 904.3.

Bridge System Type

The truss design shown on the plans (both elevation and cross-section) is conceptual, however the general design shall satisfy the following requirements:

- The overall shape shall be of a “pratt” style.
- Utilize an underhung configuration where the floor beams are located below the bottom chord, to minimize superstructure depth.
- One (1) diagonal per panel and plumb end verticals. Interior vertical members may be either plumb or perpendicular to the chord faces.
- The height of the truss (bottom of floor beam to top of top chord) shall be approximately 7’-0” or greater.
- The color shall be Federal Standard 595 Color No. 27038 (“Black”).

DESIGN

The Contractor shall submit design computations for the prefabricated HSS tubular steel truss, reinforced concrete deck, anchor bolts, bearings, wire mesh fence, self-supported fence along the West curb and rub rails to the Engineer for review and approval. The computations shall be prepared in accordance with the latest AASHTO LRFD Guide Specifications for the Design of Pedestrian Bridges for the prescribed pedestrian load and H10 truck. Equestrian Load shall not be considered in the design.

Two independent sets of design computations shall be submitted for approval. To expedite the review and approval process, submissions containing computer computations shall include electronic copies of the actual input and output files. The design computations shall consider all loadings as are appropriate for each stage of fabrication, shipment, construction, and upon completion. Design computations and shop drawings shall be prepared by a Professional Engineer licensed to practice in the Commonwealth of Massachusetts.

ITEM 995. (Continued)**FABRICATION**

1. All HSS Structural Tubes shall conform to the requirements of ASTM A1085 Grade A (50 ksi yield strength) with Supplemental Requirement S1 Heat Treatment and shall be hot-dipped galvanized, with best practices to limit heat related cracking in the corners, and painted in accordance with the Special Provisions below.
2. The shop drawings shall indicate Fracture Critical Members (FCM). The AASHTO/AWS Fracture Control Plan of Non redundant Members contained in AASHTO/AWS D1.5, Section 12, shall be applied to tubular members (HSS members), where required by AASHTO LRFD Articles 6.6.2 and C6.6.2.
3. All welding and preparation and assembly of material for welding of non-FCM tubular steel members shall conform to the latest edition of the ANSI/AWS D1.1 Structural Steel Welding Code. Only low hydrogen filler metal shall be used.
4. All welding and preparation and assembly of material for welding of FCM designated tubular steel members shall conform to the latest edition of the ANSI/AWS D1.1 Structural Steel Welding Code and the latest ANSI/AASHTO/AWS D1.5 Bridge Welding Code as indicated below:
 - ASTM A1085 shall be added to those standards listed in Article 12.4.1 of AASHTO/AWS D1.5.
 - For the purpose of determining preheat and interpass temperatures, the values for AASHTO M270M/M 270 or ASTM A709 Grade 50 shall be used.
 - For the purposes of Charpy V-notch requirements of the filler metal, the filler material shall be treated as M270 and conform to the requirements of AASHTO/AWS D1.5 Table 12.1.
 - Welding details for cyclically loaded tubular members specified by ANSI/AWS D1.1 shall be used.
 - All welds require qualification using AWS D1.1 Clause 9, Part C.
5. All welds shall be tested as follows:
 - 100% of all CJP welds for FCM members shall be tested with UT in accordance with AASHTO/AWS D1.5.
 - 100% of all CJP welds in tension or reversal of stress for non-FCM members shall be tested with UT in accordance with AASHTO/AWS D1.5.
 - 25% of all CJP welds in compression shall be tested with UT in accordance with AASHTO/AWS D1.5.
 - 10% of all PJP and fillet weld joining primary members shall be MT in accordance with AASHTO/AWS D1.5.
 - All repair welds of FCM members shall be tested in accordance with Clause 12 of AASHTO/AWS D1.5.
6. Fabricator of prefabricated steel truss bridge shall be certified by American Institute of Steel Construction (AISC) Quality Certification Program for Intermediate Bridges and shall be a MassDOT approved Fabricator.
7. All non-HSS Structural Steel shall conform to AASHTO M 270, Grade 50, and shall be hot-dipped galvanized and painted in conformance with the Special Provisions below.

ITEM 995. (Continued)

8. Bolts shall conform to the ASTM F3125 Grade A325. Nuts and Washers shall be as recommended by A3125 and shall be hot-dip galvanized or mechanically galvanized and painted in accordance with the Special Provisions below.
9. Wire Mesh Fencing shall conform to provisions M8.09 and M8.09.1 of the Standard Specifications. The color shall match the truss color.

COATING OVER GALVANIZING**General**

Surface preparation and application of the coating system shall be completed within 14 calendar days of galvanizing.

Surface Cleaning

All galvanized pieces shall be visually inspected to determine the cleanliness of the surface. All visible soluble contaminants shall be removed from galvanized surface by solvent cleaning in accordance with SSPC SP-1. All material shall be checked for wet storage stain. Wet storage stain shall be removed prior to abrasive blasting in accordance with SSPC SP-16 Appendix A. Prior to surface preparation of the galvanized surfaces all components shall have a finish that is reasonably smooth and uniform. The surface shall be free of sharp spikes, thick edges, lumps and edge tears and meet the requirements of ASTM A123 section 6.2

Surface Preparation

The surface shall be abrasive blast cleaned immediately before painting. Surfaces to be painted shall be blast cleaned in accordance with requirements of SSPC SP16 "Brush-off Blast Cleaning Non-Ferrous Metals" producing a minimum surface profile of 1 mil. Blast profile shall be measured in accordance with ASTM D4417 Method B.

The thickness of the galvanizing shall be checked before and after the completion of abrasive blasting using SSPC PA-2 to confirm that prepared surfaces still have the minimum thickness requirements of AASHTO M111 or AASHTO M232 as applicable. Surface preparation shall not loosen, cause flaking or disbonding of the galvanized surface. Unacceptable thickness and damage shall be cause for rejection of the entire piece. Surfaces unacceptable after abrasive blasting and approved for repair shall be repaired in accordance with ASTM A780.

Surface preparation of approved repair areas shall be done in accordance with SSPC SP-10 or SP-11. Repairs to the galvanized surface in excess of one percent of the total surface area of the piece being repaired are not allowed. The repair coating shall be a zinc rich primer as specified by the coating manufacturer compatible with the coating system approved.

ITEM 995. (Continued)**Application**

Coating shall be applied within six hours after surface preparation has been completed and accepted.

The Contractor shall take all necessary measures to ensure that prepared parts are kept clean and not exposed to dirt, dust, grease, or oil while being handled or staged prior to application of the coating.

Final acceptance of the coating system will occur at the jobsite after erection of the coated items, and after all required repairs have been completed.

The coating system shall consist of a polyamide epoxy and a catalyzed aliphatic urethane. All coating shall be applied in accordance with the MassDOT specifications and the coating manufacturer's product datasheet.

ATTACHMENTS

Wire mesh fence with 2" maximum openings shall extend 9'-0" above the deck. This Item shall conform to the relevant provisions of Section 644 of the Standard Specifications. The connection of the fence at the East curblin to the truss shall be designed by the truss manufacturer. The contractor shall coordinate with the truss manufacturer on the connection of the horizontal timber rub rails to the truss. The post and fence connection at the West curblin shall be designed by the contractor (a conceptual design is presented on the plans). The timber rub rails shall conform to the relevant provisions of Section 955 of the Standard Specifications. Both fences and railings shall be designed for lateral and vertical loads as required by the *AASHTO LRFD Guide Specifications for the Design of Pedestrian Bridges*. The color shall match that of the steel truss members. The last fence post at the railing transitions may consist of an extension of the vertical truss member, as shown on the plans, or a separate support attached to the truss.

BEARING ASSEMBLIES

The contractor shall be responsible for the complete design of the bearing assemblies, including anchor bolts, through coordination with the prefabricated bridge manufacturer. The work to be done under this heading shall conform to the following:

- The bearings shall be designed per the design codes listed on the Plans.
- If elastomeric pads are used, they shall be designed per MassDOT LRFD Bridge Manual, Section 3.5.7.
- Bearing assembly and anchorage must be designed and stamped by a Massachusetts Professional Engineer and submitted to the engineer for review and approval prior to installation.
- The plans show "fixed" bearings at the South Abutment and "expansion" bearings at the North Abutment. An alternative bearing arrangement (such as elastomeric expansion bearings at both abutments) requires approval by the Engineer.

ITEM 995. (Continued)

- The bearings shall resist all lateral loads on the superstructure including loads due to thermal expansion/contraction, wind loads and seismic loads.
- Per guidelines given in the MassDOT LRFD Bridge Manual – Part I, Chapter 3, and the classification of Seismic Design Category A, the bridge bearings shall be designed for a seismic load equal to 25% of the permanent tributary load. Therefore, the South Abutment fixed bearings shall be designed for 25% of the permanent load of the entire superstructure.
- Relevant provisions of the Standard Specifications including Subsection M9.14.5 if elastomeric pads are used (and other provisions of the Standard Specifications if other bearing types are used) and Subsection M8.01.5 for anchor bolts.
- **Length of bridge beyond the centerline of bearing shall be coordinated with the bridge manufacturer, and approved by the Engineer, prior to construction of the abutment stem (and prior to approval of rebar shop drawings). The height of the bearing in conjunction with the truss height will also determine the backwall height.** The anchor bolts shall be cast-in-place into the abutment cap. The contractor must confirm the locations with the truss fabricator.

ERECTION

1. Complete erection and maintenance instructions shall be provided by the Fabricator.
2. Contractor shall be responsible for the final erection of the structure.
3. A qualified Professional Engineer, registered in the Commonwealth of Massachusetts, from the fabricator, shall be made available to advise the Contractor on site during erection for at least two (2) days.
4. Trusses too long to be shipped in one piece shall be supplied in two or three pieces that must be field connected with bolts before erection. Field connections shall be made in strict accordance with the plans and written instructions supplied with each truss bridge. All field connections of the trusses must be supervised by a qualified Professional Engineer registered in the Commonwealth of Massachusetts.
5. The Contractor shall be responsible for field touch-up of any galvanized coating and paint that is damaged during shipping and erection.
6. The use of cranes and other overhead equipment may be limited. A horizontal launch of the truss is proposed on the plans, however, the Contractor is responsible for the means and methods of erection, and the design, calculation and analysis of all temporary supports, for all anticipated loads throughout all stages of construction. Lifting requirements and cantilever limits of the partial truss segments shall be in accordance with the recommendations of the truss manufacturer (**note that the truss design would likely need to be adjusted by the fabricator to account for a truss launch if this method is used for erection**).
7. The method and sequence of erection shall be the responsibility of the Contractor. Installation of prefabricated steel truss bridge shall include steel truss, concrete deck, fence and railing, bearing devices, as well as all labor, tools and equipment necessary for furnishing and erecting the bridge and any other items considered incidental to complete the work.

ITEM 995. (Continued)

8. The Contractor shall also be responsible for coordinating and scheduling with Utility companies for the protection and shielding of utilities as required for bridge erection. Erection work involving utilities is subject to scheduling and work window limitations defined by the Utility Owners. See the additional requirements and limitations specified in Subsection 8.14.
9. The south approach, between the bridge and Middlesex Avenue, may be used to store construction equipment and materials. There is limited space on the north approach, between the bridge and Cochituate Street, as the adjacent parking lot to the East must remain accessible to vehicular traffic throughout the project.

The Contractor shall prepare and submit a plan indicating his/her proposed erection procedures and methods to be used including equipment, tools, crane capacity and location, schedule of operations, methods of utility and track protection, etc., to the Engineer and MBTA for approval. The requirements for equipment and all procedures utilized shall be in conformance with Subsection 960. of the Standard Specification, and AASHTO LRFD Bridge Construction Specifications. The Erection procedures and any necessary calculations and drawings shall be stamped by a Professional Engineer, registered in the Commonwealth of Massachusetts, certifying that all structural members are suitably braced and supported throughout the erection process. The erection may not commence until the Engineer has given written approval. MBTA Guidelines/Requirements must be followed during superstructure installation.

CERTIFICATION

Fabricator shall certify the following:

1. All welding shall be completed by certified welders. Copies of certification reports shall be made available on request.
2. All welding procedures and welding materials shall be in compliance with ANSI/AWS D1.1 Structural Steel Welding Code or ANSI/AASHTO/ AWS D1.5M/D1.5 BRIDGE WELDING CODE as appropriate, published by the American Welding Society.
3. All welds shall be visually inspected by qualified inspectors for size, continuity, absence of defects, etc., during the fabrication process.
4. All HSS Structural Tubes shall conform to the requirements of ASTM 1085 including Supplemental Requirement S1 and shall be hot-dipped galvanized and painted as noted above.
5. All non-HSS Structural Steel shall conform to AASHTO M 270 grade 50, and shall be hot-dipped galvanized and painted as noted above.
6. All connection bolts shall be ASTM F3125 grade A325 hot-dip galvanized high strength bolts.
7. The fabricator's facility shall be open for inspection by The Department or his/her designated representative at any time during process of manufacture.

ITEM 995. (Continued)

COVER PLATE SYSTEM

The cover plate system shall be in accordance with applicable provisions of Subsection 960 and 972 of the Standard Specifications and the details on the contract plans. The work shall consist of designing the joint system based on the concept shown on the plans and furnishing and installing the cover plate systems. This system shall consist of neoprene rubber compression seals, structural steel components, bolts, nuts, washers, lock washers and expansion anchors, all combined in the manner required by the Contract Documents so that a fully operational system will cover the joint over which it is installed. The Contractor shall carefully sequence the work to ensure the cover plate system is properly seated and flush with the surrounding concrete surface at the profile grade.

SCHEDULE OF BASIS FOR PARTIAL PAYMENT

Within ten (10) days after the date of the Notice to Proceed, the Contractor shall submit, in duplicate, for the approval of the Engineer, a schedule of unit prices for the major components of the bridge structure Bridge No. N-03-007(29N). The bridge structure Lump Sum breakdown quantities provided below are estimated and not guaranteed. The total of all partial payments to the Contractor shall equal the Lump Sum contract price regardless of the accuracy of the quantities furnished by the Engineer for the individual bridge components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 995.01 and no further compensation will be allowed.

ITEM 995. ESTIMATED LUMP SUM BREAKDOWN QUANTITIES
(NOT GUARANTEED)

<u>SUB-ITEM NO.*</u>	<u>ITEM</u>	<u>QTY.</u>	<u>UNIT</u>	<u>UNIT PRICE</u>	<u>TOTAL</u>
904.3	5000 PSI, ¾ INCH, 685 HP CEMENT CONCRETE	58	CY		
910.1	STEEL REINFORCEMENT FOR STRUCTURES – EPOXY COATED	13000	LB		
955.1	TIMBER RUB RAILING	266	FT		
960.01	PREFABRICATED TUBULAR STEEL TRUSS SUPERSTRUCTURE	1	EA		
970.	DAMP-PROOFING	500	SF		
972.1	COVER PLATE SYSTEM	28	FT		

Total Lump Sum Cost of Item 995. =

The above schedule applies only to Bridge Superstructure, Bridge No. N-03-007(29N). Payment for similar materials and construction at locations other than at this bridge structure shall not be included under this Item.

* - Sub-Item numbering is presented for information only in coordination with MassDOT Standard Nomenclature.

ITEM 996.003**WALL STRUCTURE – PRECAST CONCRETE
MODULAR RETAINING WALL****SQUARE FOOT****GENERAL**

This item shall conform to the requirements of all relevant Sections of the Standard Specifications and Supplemental Specifications and the following.

The work under this Item shall consist of design, fabrication, furnishing, transportation, and erection of prefabricated modular (PM) block gravity retaining wall system of the required type, including foundation excavation, leveling pad, drainage, backfill, and miscellaneous items necessary for a complete installation.

The PM block wall system shall be a gravity wall system consisting of architectural precast concrete block units supported on cast-in place unreinforced concrete footing or crushed stone leveling pad conforming to the accepted manufacturer's specifications and select backfill. The wall structures shall be dimensioned to achieve the design criteria shown on the Plans and specified herein. The PM block wall design shall follow the general dimensions of the wall envelope shown in the contract plans.

Prefabricated modular (PM) block gravity retaining wall system shall be designed and constructed as specified herein. The design shall be subject to review and acceptance by the Engineer. Acceptability of the PM block gravity wall design shall be at the sole discretion of the Engineer. Any additional design, construction, or other costs arising as a result of rejection of a retaining wall design shall be borne by the Contractor.

Also included are the final detailing, fabrication, furnishing, transportation, and construction of concrete moment slabs, precast or cast-in place concrete copings, precast highway guardrail transitions, S3-TL4 bridge railing, including all associated components, as shown on the Plans.

Acceptable PM block gravity retaining wall systems are:

- Redi Rock Retaining Wall™ by Michie Corporation/Capital Concrete Products
- Stone Strong Retaining Wall by MBO Precast
- Unilock Sienna Stone Retaining Wall by Unilock

Alternative PM block gravity wall systems shall be an accepted equal upon approval of the Engineer.

An anti-graffiti coating shall be applied to all exposed concrete surfaces of the retaining walls that are abutting traffic.

Value engineering is not applicable to the work of this Item.

ITEM 996.003 (Continued)**QUALITY ASSURANCE**

Quality Assurance shall conform to the requirements of all relevant Sections of the Standard Specifications and Supplemental Specifications and the following.

Fabricator Quality Control

Precast concrete requirements regarding the precast concrete Fabricator's Quality Control (QC), the fabrication plant, personnel, laboratory, testing equipment, inspection, temperature monitoring of the concrete, sampling and testing of concrete, certificate of compliance, and QC documentation shall conform to Section M4.02.14, Precast Concrete Highway Units of the Standard Specifications.

Contractor Quality Control

The Contractor installing the PM block retaining wall shall have a minimum of 5 years' experience constructing the chosen prefabricated block wall system and shall use personnel having demonstrated experience in the installation procedures recommended by the manufacturer and as specified herein.

A qualified representative (minimum 2 years demonstrated experience) from the wall design-supplier shall be present during construction of the PM block walls. The services of the qualified representative shall be at no additional cost to the project. The Contractor shall make the necessary arrangements with the wall supplier to have the technical representative on the project. The qualified experienced technical representative will advise the Contractor and Engineer concerning proper installation procedures. The services of a qualified technical representative shall be incidental to this item.

Quality control and testing shall comply with Section M4.02.14. Acceptance of a production lot will be as specified in Section M4.02.14 Precast Concrete Highway Units.

Acceptance

Final Acceptance for the prefabricated modular wall system shall be determined by MassDOT.

MassDOT will perform Acceptance inspection and sampling and testing in accordance with Section M4.02.14.

Precast modular block wall units for PM block walls shall be manufactured in a concrete products plant with MassDOT approved facilities.

ITEM 996.003 (Continued)**MATERIALS**

All materials used in the construction of the prefabricated block retaining walls shall meet the relevant requirements as specified in Division III, Materials Specifications of the MassDOT Standard and Supplemental Specifications, and as specified herein.

Materials not conforming to requirements of the referenced specifications or from sources not listed in the Contract Documents shall not be used without written consent from the Engineer.

The PM block wall units shall be fabricated in accordance with Section M4.02.01 Precast Concrete Highway Units and Section 901. with the following exceptions and additions:

All PM block wall units shall be wet-cast units conforming to ASTM C1776.

The PM wall units shall be manufactured of 5,000 psi, 3/4 inch, 685 HP, air-entrained cement concrete, from a MassDOT approved precaster.

Finishing, Protection, and Curing of Precast Concrete

Unless otherwise indicated on the plans, the concrete surfaces shall be finished in accordance to relevant requirements of Section 901 of the Standard and Supplemental Specification and as modified herein.

The blocks shall be cast on a flat area. Each block shall be cast as a unit. No horizontal joints are permitted in a block.

Steel Reinforcement

Steel Reinforcement for PM wall units shall be furnished in accordance with the relevant requirements of Section M8 of the Standard and Supplemental Specifications.

Shear Keys

Precast shear keys shall be made of the same concrete mix as the prefabricated modular units and cured in the same manner. The shear keys are to be designed and detailed by the prefabricated wall manufacturer.

Backfill

All backfill materials used for PM block walls shall be gravel borrow and shall conform to Section 150 of the Standard Specifications. Backfill material used in PM block walls shall also meet the quality of material and gradation requirements of the PM block manufacturer.

ITEM 996.003 (Continued)

Additional backfill requirements:

- A. Soundness: The material shall be substantially free of shale or other soft, poor durability particles. The materials shall have a magnesium sulfate soundness loss, as determined by AASHTO T104 (ASTM C88), of less than 30 percent after four cycles.

Limits of backfill included under this Item shall be from the back face of the blocks to a vertical plane 12 inches beyond the rear most edge of the PM block walls. See Plans for diagrammatic details of the payment limits.

Anti-Graffiti Coating

For retaining walls that are abutting traffic, two coats of anti-graffiti coating shall be applied by airless spray, brush, or roller to all exposed concrete surfaces of the prefabricated retaining walls. The Contractor may not proceed with any production coating operations until the samples and mock-ups are approved. All manufacturer's recommendations and procedures shall be strictly adhered to. Approved manufacturer's authorized representatives shall provide additional job site training in the proper mixing and application procedures of the anti-graffiti coating. The cost for sufficient involvement of the authorized representatives shall be considered incidental to this Item. All State, Federal and local safety and environmental protection requirements shall be strictly adhered to.

The anti-graffiti coating shall be a clear, non-yellowing, chemical and scratch resistant, fast curing, water-based, one-component silicone elastomer specifically formulated to protect surfaces subject to repeated graffiti attacks. It shall have no effect on the color of the concrete.

Leveling Pad

The leveling pad shall consist of crushed stone or cement concrete, meeting the requirements of the wall manufacturer and approved by the Engineer. Concrete leveling pads shall be constructed of 5000 psi cement concrete approved mix as specified in Section M4, or other foundation material as approved by the Engineer.

ACCEPTANCE OF MATERIALS

The Contractor shall furnish to the Engineer a Certificate of Compliance certifying that the above materials comply with the applicable contract specifications. A copy of all test results performed by the Contractor necessary to assure contract compliance shall also be furnished to the Engineer. Acceptance will be based on the Certificate of Compliance, accompanying test reports, and visual inspection by the Engineer.

ITEM 996.003 (Continued)**DESIGN REQUIREMENTS**

The PM block gravity wall system shall be designed to provide a prefabricated modular block retaining wall system that acts as a gravity wall without the need for external reinforcing straps, grids, mesh, tiebacks, deadmen, etc. behind the wall system to provide external stability that would conflict with existing and proposed utilities and drainage structures, including future maintenance and repair of utilities. For this reason, MSE type wall systems will not be considered. Prefabricated modular block gravity wall systems that provide stability within the wall envelope limits as shown on the Plans are permitted.

Design Specifications

The PM block retaining walls shall be designed to provide the grade separation shown on the Plans with a service life of not less than 75 years.

All calculations and Shop Drawings shall be signed and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts and experienced in prefabricated modular block retaining wall design and construction.

The PM block gravity wall system shall be designed in accordance with:

1. The manufacturer's requirements.
2. The Contract Plans.
3. The requirements as specified herein.
4. AASHTO LRFD Bridge Design Specification, current edition. Herein referenced as AASHTO LRFD.
5. AASHTO LRFD Bridge Construction Specifications, current edition.

Where conflicting requirements occur, the more stringent shall govern. Design shall consider Service, Strength, and Extreme Limit- States, and external and internal stability.

If stated on the Contract Drawings, the wall shall be designed for seismic forces according to the AASHTO Guide Specifications for LRFD Seismic Bridge Design, current edition.

The PM block wall shall be dimensioned so that the maximum bearing pressure does not exceed the factored bearing resistance of the foundation soils, as shown in Table 1 below (per the final Geotechnical Report dated 10/7/2024). The factored bearing pressure stated assumes a uniform pressure distribution.

ITEM 996.003 (Continued)*Table 1: Strength Limit State Bearing Resistance*

Effective Footing Width, B' (ft)	Nominal Bearing Resistance, q_n (ksf)	Factored Bearing Resistance, q_R (ksf)
3.0	16.6	7.4
3.5	17.4	7.8
4.0	18.4	8.2
4.5	19.2	8.6
5.0	20.1	9.0
5.5	21.1	9.4
6.0	21.8	9.8

Resistance Factor = 0.45

The PM block walls shall be designed to account for drainage required for walls below established groundwater levels and seasonal levels.

The prefabricated block retaining wall design shall follow the general dimensions of the wall envelopes shown on the Plans. Top of leveling pad or footing elevations shall be as shown on the Plans, or may be lower. All wall elements shall be within the right-of-way limits shown on the Plans. The PM block wall units shall be placed so as not to interfere with guardrail posts, drainage or other utilities, or other potential obstructions.

All appurtenances behind, in front of, over, under, mounted upon or passing through the wall (such as drainage structures), or other appurtenances shown on the Plans shall be accounted for in the stability design of the prefabricated block retaining wall system.

The PM block retaining wall system shall be supported on cast-in-place unreinforced concrete leveling pad, or other foundation materials as approved by the Engineer. The top of the leveling pad shall be located at or below the theoretical leveling pad elevation. The minimum wall embedment shall be 4.0 feet as measured to the top of the leveling pad, or as shown on the Plans, whichever is greater. The leveling pads are incidental to this item.

If steps at the bottom of the wall are required, they shall be kept at or below the footing elevation shown on the Contract Drawings. Steps in addition to those shown on the Contract Drawings will be permitted at no additional cost to the Department.

If additional soils information is required by the Contractor's wall designer, it must be obtained by the Contractor and will not be reimbursed by the Department.

ITEM 996.003 (Continued)**PRE-CONSTRUCTION SUBMITTALS**

Design computations demonstrating compliance with the criteria specified herein and shown on the Plans shall be prepared, signed, and stamped by a registered professional engineer licensed in the Commonwealth of Massachusetts and with a minimum of 5 years of experience in the design and construction of prefabricated retaining walls.

A. The design calculations shall include:

1. Statement of all assumptions made, and copies of all references used in the calculations. Calculations shall be performed in English units.
2. Analyses demonstrating compliance with all applicable earth, water, surcharges, seismic, or other applicable loads, as specified herein and required by the reference AASHTO LRFD. The design calculations shall include all applicable references to the LRFD code.
3. Analyses or studies demonstrating durability and corrosion resistance of the prefabricated retaining wall system for the proposed location and environment. The Contractor/Designers shall provide all corrosion protection devices necessary for the retaining wall to have a minimum service life of 75 years in the proposed location and environment.
4. Analyses demonstrating adequacy of design for external stability of the PM block wall system. Sliding, overturning, and bearing pressures shall be evaluated for conformance with stipulated design requirements.

B. A detailed resume of the wall designer shall be provided, listing similar projects and demonstrating necessary experience to perform the retaining wall designs, including a brief description of each project that is similar in scope shall be provided for acceptance. A reference shall be included for each project listed. As a minimum, the reference shall include an individual's name, address, and current phone number.

C. A detailed listing of the relevant type of PM block retaining walls that the Contractor has constructed shall be provided, including a brief description of each project and a listing of personnel who will construct the walls demonstrating their experience in construction of PM retaining walls. A reference shall be included for each project listed. As a minimum, the reference shall include an individual's name, address, and current phone number.

D. Manufacturer's product data for the PM block retaining wall system shall be provided, including material, manufacture and erection specifications, all specified erection equipment, details of buried wall elements, structures design properties, type of backfill, and details for connections between wall units.

E. Concrete mix design shall be in accordance with Section M4.

F. Provide Shop Drawings showing the configuration and all details, dimensions, quantities, and cross-sections necessary to construct the prefabricated block retaining walls, including but not limited to the following:

ITEM 996.003 (Continued)

1. A plan view of the wall, which shall include contract limits, stations and offsets, and the face of wall line as shown on the Plans.
2. An elevation view of the wall, which shall include the elevation at the top of the wall at all horizontal and vertical break points and at least every 25- feet along the face of the wall, all steps in the wall footings, the designation as to the type of retaining wall system, and an indication of the final ground line and maximum calculated bearing pressures. The theoretical face of wall as shown on the Plans shall be indicated.
3. A typical cross section or cross sections showing the elevation relationship between existing ground conditions and proposed grades, and the proposed wall configuration. The sections shall also indicate the location of the theoretical face of wall as shown on the Plans.
4. General notes pertaining to design criteria and wall construction.
5. A listing of the summary of material quantities for each wall.
6. Details of sleeves and pipes and other embedded items to be installed through the walls, if applicable. Annular space around the pipe shall be filled and sealed with closed cell foam.
7. Clearly indicate details for construction of walls or reinforcing elements around drainage, foundations, utilities or any other potential obstructions, where applicable.
8. Details of the finished surface treatment for the face of PM block wall units.
9. Drainage design detail and design scheme, where applicable.
10. Location of utilities, where applicable.
11. Sequence and schedule of construction, including overall construction schedule.
12. Methods of excavation and backfill.
13. Method of maintaining stability of excavated trenches, where applicable.
14. Method of monitoring plumbness and deviation of wall.
15. Any acceptance testing and frequency.
16. Details and location of all necessary construction and expansion joints.
17. Details of impermeable membrane connection to PM wall units and to runoff collection system.
18. Details of maintaining the stability, rigidity and alignment of the wall during construction, prior to wall construction completion, and prior to backfilling behind the top of the wall and roadway construction at the top of the wall.
19. Groundwater elevation.

CONSTRUCTION METHODS – PLANT FABRICATION

Fabrication of the precast concrete wall elements shall conform to Section M4.02.14 with the following additions.

All provided walls shall be from one single manufacturer. The same PM block wall system shall be used for all prefabricated modular block retaining walls on this project.

The date of manufacture, production lot number, and the piece mark shall be clearly scribed on an unexposed face of each PM wall unit.

ITEM 996.003 (Continued)**PM Block Wall Unit Fabrication Tolerances**

Dimension tolerances for precast modular block units shall be ½ inch or the manufacturer's published tolerances, whichever is less. Units not meeting the specified tolerances will be rejected.

Architectural Form Liners

Exposed PM wall unit face shall be cast using custom architectural form liners. The unit face rustification shall be Ashlar Stone surface.

Form liners shall be manufactured by one of the following form liner manufacturers, or other manufacturers as approved by MassDOT:

1. Greenstreak Form Liners, by Greenstreak, St. Louis, Missouri.
2. Symons Form Liner, by Symons Corp., Des Plaines, Illinois.
3. Lithotex Formliner, by L.M. Scofield Co., Los Angeles, California.
4. Custom Rock Form Liners, by Custom Rock, St. Paul, Minnesota.

Lifting Devices and Threaded Inserts

Lifting sleeves and inserts shall be provided for the purpose of handling and placing. Care shall be taken during storage, transporting, hoisting, and handling to prevent cracking or damaging the precast units.

Repairs and replacement of PM wall units shall be in accordance with Section M4.02.14, *Repairs and Replacement for Proprietary Retaining Wall Systems*. Variations in the exposed face that substantially deviate from the approved architectural model unit as to color, texture, and reveal will be considered a Category 3 Rejectable Defect.

Storage and Shipping

The precast units shall be stored, shipped, and installed as specified in Section M4.02.14 Precast Concrete Highway Units.

CONSTRUCTION METHODS

Prefabricated modular block gravity retaining walls shall be built in accordance with the Plans and accepted Shop Drawings for the proposed wall system.

The PM block retaining walls shall be constructed in accordance with these specifications and in reasonably close conformance with the lines, grades, design criteria, and dimensions shown on the Plans or as established by the Engineer. The Contractor is responsible for coordination with installation of fence and sidewalks.

ITEM 996.003 (Continued)

The Contractor shall be responsible for the purchase or manufacture of the concrete modular block wall units of the PM block walls, plus all other necessary components, aggregate backfills, joint fillers, geotextile fabric, bearing pads, and membranes for a complete installation.

Delivery, Storage, and Handing

The Contractor shall check the material upon delivery to assure that the proper material has been received. A product certification should be provided with each shipment.

All wall materials and PM block wall units shall be stored elevated from the ground and protected to prevent all mud, wet cement, epoxy and like substances, which may affix themselves to the PM block wall units. For storage exceeding 30 days in duration, all materials shall be stored in or beneath a trailer or covered with a colored tarpaulin to prevent long-term exposure.

Wall Excavation

Earth excavations shall be in accordance with the requirements of Section 120 and in close conformity to the limits shown on the Plans. Sections 120.80, 120.81, and 120.82 do not apply to the work covered in this section. Excavation and incidentals to complete the excavation for prefabricated retaining walls shall be included in the Prefabricated Modular Block Gravity Retaining Wall Item.

Foundation Preparation

The foundation for prefabricated block retaining walls shall be graded level for a width equal to the width/depth of each course of wall unit plus 1-foot. Prior to wall construction, the foundation shall be compacted with at least 10 passes of an appropriate roller, weighing a minimum of 10,000 lbs. Compact the foundation area to provide a hard and level surface to support wall units. Any foundation soils found to be unsuitable shall be removed and replaced with Gravel Borrow for Bridge Foundation per Sections 120, 140, and 170. The foundation for the structure shall be approved by the Engineer before erection is started.

In areas below the existing groundwater level, backfill shall consist of Crushed Stone for Bridge Foundations as per Section 150.

Wall Erection

The precast modular block wall units shall be installed in accordance with approved manufacturer's recommendations. Special care shall be taken in setting the bottom course of units to true line and grade. While erecting each subsequent course, line and grade shall be examined and deviations shall be corrected to prevent accumulative inaccuracies in alignment. Joint filler and rubber pads shall be installed. Joints at corners or angle points shall be closed.

ITEM 996.003 (Continued)

All wall units above the first course shall interlock with the lower courses. Vertical joints shall be staggered with each successive course or as approved on the Shop Drawings. The maximum offset in any unit horizontal joint shall be $\frac{1}{4}$ inch.

The overall tolerance of the wall (top to bottom) shall not exceed $\frac{3}{4}$ inch per 10 feet in vertical alignment and horizontal alignment.

Backfill Placement

Backfill placement for PM block walls shall follow erection of each course of modular wall units. Backfill shall be placed in such a manner as to avoid any damage or disturbance to the wall materials or misalignment of the modular wall units. Any wall materials, which become damaged or disturbed during backfill placement, shall be removed and replaced at the Contractor's expense. Any misalignment or distortion of the modular units due to placement of backfill outside specified limits shall be corrected.

Compaction of backfill material shall adhere to the following criteria unless approved otherwise on the Shop Drawings:

- A. Backfill material conforming to the requirements specified herein shall be placed and compacted simultaneously with the placement of the modular units.
- B. Backfill lift shall be a maximum of 12 inches, uniform in thickness and compacted within the limits shown on the Plans. The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density.
- C. Placement and compaction shall be accomplished without distortion or displacement of the modular units.
- D. Backfill placement shall closely follow the erection of each row of PM block units.
- E. The compaction shall take place in a direction that is parallel to the wall.
- F. The specified compaction of the backfill material shall be accomplished by use of large, smooth drum, vibratory rollers with the exception of the 5-foot zone directly behind the wall face of the modular units.
- G. Backfill shall be compacted to 95 percent of the maximum density as determined by AASHTO T 99, Method C or D (with oversize corrections as outlined in Note 7 of that test).
- H. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. Backfill materials shall have a placement moisture content less than or equal to the optimum moisture content. Backfill material with a placement moisture content in excess of the optimum moisture content shall be removed and reworked until the moisture content is uniformly acceptable throughout the entire lift.
- I. Within 5 feet of the wall face, small, single or double drum, hand operated, walk-behind vibratory rollers, or walk-behind vibrating plate compactors shall be used, and at least three passes shall be made.
- J. When there is evidence of wall displacement or disturbance, compaction shall be accomplished by use of a smooth drum static roller.
- K. At the end of each day's operation, the Contractor shall slope the last placed level of backfill away from the wall face to rapidly direct runoff of rainwater from the wall face. The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

ITEM 996.003 (Continued)**METHOD OF MEASUREMENT**

Item 996.003 will be measured by the Square Foot of retaining wall structure, according to the dimensions shown on the Plans. The vertical area of retaining wall structure is defined as the area, measured at the wall face, bounded by the top of leveling pad or footing directly under the wall, ends of wall, and top of wall.

BASIS OF PAYMENT

Item 996.003 will be paid for at the Contract Unit Bid Price per square foot for design, fabrication, transportation, erection, and installation of prefabricated retaining wall, including backfill and miscellaneous items required for a complete installation, which price and payment will be full compensation for all labor, tools, equipment, materials and incidental expense necessary to complete this Item and accepted by the Engineer.

The unit price for Prefabricated Modular Block Gravity Retaining Wall shall include costs for:

- A. All design work, preparation of written submittals and detailed construction drawings, revision of submittals, sample submittals and any other necessary preliminary work prior to and after acceptance of the retaining wall system by the Engineer.
- B. All materials, including transportation, for the PM block retaining walls. For PM block walls this, includes concrete modular units, bearing blocks and shims, joint materials, cement concrete, reinforcing steel, aggregate backfill, anti-graffiti coating, and incidentals.
- C. All labor and equipment required to prepare the wall foundation; erect the retaining walls to the lines and grades shown on the Plans; install the joint materials; install wall drainage; provide and install steel pipe sleeves for utility penetrations; provide, place, and compact backfill within wall units or backfill behind the wall units; and design, detail and construct any other items necessary to complete the prefabricated retaining walls.
- D. As required and approved by the Engineer, excavation and replacement of any unsuitable materials beyond the retaining wall payment limits shown on the Plans will be measured and paid for as defined in Sections 120 and Items 151.1 or 151.2.
- E. PM Wall Representative shall be incidental to this line Item.
- F. Anti- Graffiti Coating shall be incidental to this line item.

The timber fence along the top of the PM wall is paid for separately under Item 655. Cedar Rail Fence.

Design, installation, and removal of temporary earth supports shall be considered incidental to this Item.

*** END OF DOCUMENT ***

DOCUMENT A00802

DETAIL SHEETS

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THE COMMONWEALTH OF MASSACHUSETTS
MassDOT - HIGHWAY DIVISION
TEN PARK PLAZA, BOSTON, MA

PRELIMINARY ESTIMATE OF QUANTITIES - DETAIL SHEETS

TOWN-CITY	<u>Natick, MA</u>	ROAD	<u>Shared Use Path/Spring Street</u>
FISCAL YEA	<u>2024</u>	CLASS	_____
STA.	<u>0+16.90 to 3+64.47</u>	DATE	<u>December 7, 2024</u>
Type of Project	<u>Bridge Replacement</u>		

Excavation
Earth Excavation 400 CY
Bridge Excavation 330 CY
Class "B" Trench Excavation 30 CY

Class "A" Rock Excavation 20 CY
Class "B" Rock Excavation 65 CY

Embankment
Gravel Borrow 350 CY
Ordinary Borrow 20 CY
Gravel Borrow for Backfilling Structures and Pipes 45 CY
Lightweight Fill 310 CY

PAVEMENT NOTES

PROPOSED FULL DEPTH ROADWAY CONSTRUCTION

AREA= 450 SY

SURFACE: 1 1/2" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5)
INTERMEDIATE: 2" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5)
BASE: 4" SUPERPAVE BASE COURSE - 37.5 (SBC-37.5)
SUBBASE: 4" DENSE GRADED CRUSHED STONE FOR SUBBASE OVER
 8" GRAVEL BORROW (TYPE b)

PROPOSED FULL DEPTH SHARED USE PATH CONSTRUCTION

AREA= 148 SY

SURFACE: 1 1/2 " SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5)
INTERMEDIATE: 2 1/2 " SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5)
SUBBASE: 8" GRAVEL BORROW (TYPE b)

**PROPOSED CEMENT CONCRETE SIDEWALK / RAMP/
PATH / SPLITTER ISLAND**

AREA= 356 SY

SURFACE: 4" CEMENT CONCRETE, AIR ENTRAINED
 (4000 PSI, 3/4 IN., 610 CEMENT CONCRETE)
BASE: 8" GRAVEL BORROW (TYPE b)

PROPOSED HOT MIX ASPHALT DRIVEWAY APRON

AREA= 14 SY

SURFACE: 1 1/2 " SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5)
INTERMEDIATE: 2 1/2 " SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5)
SUBBASE: 8" GRAVEL BORROW (TYPE b)

ITEM 101. **CLEARING AND GRUBBING**

To be used for clearing and grubbing between the edge of the existing road/sidewalk to the limit of slope work and clearing limits shown on the Plans.

ITEM 102.1 **TREE TRIMMING**

To be used tree for trimming along the limits of clearing and grubbing as directed by the Landscape Architect, where approved by the Engineer.

ITEM 102.511 **TREE PROTECTION – ARMORING AND PRUNING**

To be used for protection of existing trees which are to be retained and are located within the limits of clearing and grubbing when construction activities are likely to occur within the canopy of individual trees or where there may be any risk of damage to trees as shown on the Plans or as directed by the Engineer.

ITEM 102.521 **TREE AND PLANT PROTECTION FENCE**

To be used along limits of clearing and grubbing within wooded areas as directed by the Landscape Architect, where approved by the Engineer.

ITEM 121. **CLASS A ROCK EXCAVATION**

To be used as a contingency for material to be excavated under Item 120. Earth Excavation.

ITEM 141.1 **TEST PIT FOR EXPLORATION**

To be used as a contingency for any required subsurface exploration as approved by the Engineer.

ITEM 142. **CLASS B TRENCH EXCAVATION**

To be used for excavation associated with the installation of PTC conduits on MBTA property and drainage pipes.

ITEM 451. **HMA FOR PATCHING**

To be used as a contingency for any pavement patching required during paving as directed by the Engineer.

ITEM 472. **TEMPORARY ASPHALT PATCHING**

To be used for temporary surface patching of test pits, pavement transitions at drop offs, and as otherwise directed by the Engineer.

ITEM 580. **CURB REMOVED AND RESET**

To be used for removal, relocation and resetting of the existing straight granite curb transitions on Spring Street and Cochituate Street. Existing granite curbing shall be reused and reset wherever possible.

ITEM 655. **CEDAR RAIL FENCE**

To be used for installation of proposed cedar rail fence at the following locations:

Start Station	End Station
0+29 LT	1+10 LT
1+85 LT	3+48 LT
1 +85 RT	2+00 RT

ITEM 660. **METAL PIPE RAIL**

To be used for metal handrails along the pedestrian ramp at the following locations:

Start Station	End Station
0+23 RT	1+05 RT
1+23 RT	1+10 RT

ITEM 707.8 **STEEL BOLLARD**

To be used for the proposed removable Steel Bollards at the following locations:

Station
0+24
2+05

ITEM 767.6 **AGED PINE BARK MULCH**

To be used for all Aged Pipe Bark Mulch at all proposed trees and at the following location:

Start Station	End Station
1+34 RT (Middlesex Ave.)	1+50 RT (Middlesex Ave.)

ITEM 783.057 **SHAD TREE – DOWNY CUMULUS 7-8 FEET CLUMP**

To be used for all proposed tree plantings, to be field located as approved by the Engineer.

*** END OF DOCUMENT ***

DOCUMENT A00808

PROJECT UTILITY COORDINATION FORM

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Project Utilities Coordination (PUC) Form

CONTACTS AND GENERAL UTILITY INFORMATION

Revision	
Date:	

10/18/2024
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City/Town: Natick	Project File #: 610869	Utility Pole Set: Eversource Electric
Route/Street: Spring Street over MIBTA	Resident Engineer: 7BD	Scheduled Ad Date: 12/7/2024
Consultant: WSP	Office #: 508-980-7178	Total Poles Relocated: 2 Temp, 2 Perm

Utility Company	Contact	Office #	Cell #	Email	Scope, Budget, Duration Submitted		Reimbursement		Email		Utilities On		Utilities Underground (UG) /Aerial (OH)	
					Yes	No	Non-Reimb. li	Notes	Potential for District Initiated Early Relocation *	YES	NO	YES	NO	UG
Eversource Electric	Ned Sadowski		413-537-6594	ned.sadowski@eversource.com	X		50%				X			X
Astound/RCN	Bryan Connors	617-709-3388		bryan.connors@astound.com	X		50%				X			X
Crown Castle	Christopher Stevens	508-621-1874	978-881-4543	christopher.stevens@crowncastle.com		n/a	n/a				X			X
Comcast	Wendy Brown	978-848-5163		Wendy_Brown@comcast.com	X		50%				X			X
AT&T	Erica Hudson	781-221-8400		erica.hudson@sienaengineeringgroup.com		n/a	n/a				X			X
Natick Fire Alarm	Ken Mitchell		508-907-0070	kmitchell@natickma.org		X		X			X			X
Verizon	Paul Styspeck	413-787-1845	413-575-7058	paul.m.styspeck@verizon.com	X		50%				X			X
Eversource Gas	Jeffrey Evans-Mongeon	508-305-6970		Jeffrey.Evans-Mongeon@eversource.com	X		50%				X			X
MBTA	Christine Bresnahan		617-455-7087	CBresnahan@MBTA.com										
MBTA	Terrence McCarthy		617-913-9638	tpmccarthy@mbta.com										
Natick DPW (Water & Sewer)	William McDowell	508-647-6400 x2015		wmcdowell@natickma.org		n/a	n/a				X			X
Natick Town Engineer	John Westelling	508-647-6550		dpw@natickma.org		n/a	n/a							

Utility Relocation Notes for MassDOT Contractor
 Unless otherwise noted by Contract, the MassDOT Contractor is to provide the District Construction Office with 7 Calendar Days advance notification in order to validate the current progress and provide the required 30 Days advance notice-to-proceed for the first Utility - and each subsequent Utility. These advance notifications are to be identified in the Contractor's Schedules (Pre-Con preparation, Baseline, Subnets, and Updated/Monthly Schedules) as specified in Subsection 8.02. Note: The durations included below do not include these lead-times. See Additional 'Important Basis notes for Contractor' - on last PUC Form page.
 Additional notes:
Suggested Sequence of Relocation / Based on Consultant proposed construction staging
 The sequence as detailed on the following pages is based on the consultants proposed staging plan. This information was compiled through meetings that included all of the utilities listed below along with the designer and the Town/City. 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	

10/18/2024
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RESPONSIBLE PARTY	DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by Utilities (Lead time not included)				Concurrent / Exclusive Utility Work				Access Restraint & Limitations of Operations Notes	
		Utility working with no other utilities in vicinity	Utility working with other utilities on site	Concurrent Utilities	Contractor Off-Site (While physical construction operations on-site (While Utility is working))	Contractor and Utility are working on-site but NOT in the same vicinity	Contractor Concurrent	Contractor Off-Site (While physical construction operations on-site (While Utility is working))	Contractor Concurrent		
Stage 1	Enabling work by the Contractor - Prior to overhead utility relocations, contractor will need to perform any necessary grading, clearing & grubbing, and tree removal. Coordinate with MassDOT Survey to locate pole locations. Schedule a utility walk-through after pre-construction meeting. Contractor to coordinate with Eversource Electric for the design, installation & removal of caissons for temporary utility poles (see contract drawings and special provisions). Poles must be relocated prior to demolition. Remove & dispose existing, inactive, water main carried by existing bridge as part of bridge demolition. Coordinate relocation of PTC cables with MBTA/Keolis. Contractor to begin access coordination with MBTA immediately after NTP. Contractor is responsible for the relocation of existing street lights. Complete design and installation of Temporary Utility Bridge for the temp. relocation of existing gas. Coordinate with Eversource Gas for required utility supports on temp. bridge. MassDOT contractor to provide and install temp bridge and gas supports. Eversource gas to supply rollers, pipe & casing. Contractor to install rollers & casing on bridge. Eversource Gas to make connections at each approach to the bridge per plan. Remove gas main from existing bridge once it is deactivated as part of bridge demolition.										
C	OVERHEAD OPERATIONS										
Task: 1	Eversource Electric										
	U Install 2 50' poles with caissons at temporary location during bridge work (Eversource will set poles, MassDOT contractor will put in caissons at each pole location)	2	X					X			N
	U Framing at four locations	2	X					X			N
	U Install two guy/anchors at temporary location during bridge work	1	X					X			N
	U Relocate two overhead transformers to temporary location during bridge work	1	X					X			N
	U Install new 3-477 spacer (3 sections)	2	X					X			N
	U Install new 3-1/0 open wire primaries (3 sections)	2	X					X			N
	U Install new 4/0 triplex secondaries (3 sections)	1	X					X			N
	U Remove three sections of overhead primaries and secondaries (original location wire)	1	X					X			N
	Sub-Total	11									
Task: 2	Astound/RCN										
	U Run new cable	5	X					X			N
	U Splice new cables	5	X					X			N
	U Remove old cable	5	X					X			N
	Sub-Total	15									
Task: 3	Comcast										
	U Relocation of stand only from old aerial attachment to temporary pole set attachment. Railroad flagman will be needed.	8	X					X			N
	Sub-Total	8									
Task: 4	Natick Fire Alarm										
	U Relocate facilities to temporary poles	2	X					X			N
	Sub-Total	2									
Task: 5	Verizon										
	U Place anchor guys on temporary poles.	1	X					X			N
	U Place temporary aerial fiber cable on temporary poles.	2	X					X			N
	U Splice temporary aerial fiber cable.	3	X					X			N
	U Trimout existing fiber cable.	1	X					X			N
	U Remove existing fiber cable from existing poles.	1	X					X			N
	Sub-Total	8									
Task: 6	Eversource Electric										
	U Remove 2 original poles (Eversource)	1	X					X			N
	Sub-Total	1									
Task: 7	UNDERGROUND OPERATIONS										
	Eversource Gas										
	U Required Notice to Eversource Gas (days prior to Mobilizing)	2	X					X			N
	U Mobilize & Materials Delivery and Project Planning	15	X					X			N
	U FORCED ACCT. install 250' of 8" CS LP Temporary gas main on Temporary Utility Bridge over the Spring St Bridge Crossing, Natick. (STA 0+75) to Spring St. (STA 2+25)	5	X					X			N
	U Main Connection and nitrogen purge new main into service	1	X					X			N
	U Pressure test new Main	1	X					X			N
	U Site Restoration, Clean-up and Demobilize	1	X					X			N
	Sub-Total	24									

DESCRIPTION - Utility Relocation Phases, Tasks and Activities

RESPONSIBLE PARTY	DESCRIPTION	Estimated Duration (Work Days) by Utilities (Lead time not included)	Concurrent / Exclusive Utility Work Provisions:				Access Restraint & Limitations of Operations Notes	
			Utility working with other utilities in vicinity	Utility working with other utilities on site	Contractor Off-Site Operations on-site (while utility is working)	Contractor Concurrent working on-site but NOT in the same vicinity	Potential Access Restraint (Yes/No)	Reason/Note (Optional)
C = Contractor U = Utility	Stage 2 Enabling work by the Contractor - Construct bridge as shown in plans. Relocate existing street lights and install new street light on south side of bridge onto new permanent poles, per contract documents. Coordinate with Eversource for installation of new gas main onto the new bridge. Eversource gas to supply rollers, pipe & casing. Contractor to install rollers & casing on bridge. Contractor to aid Eversource in installation of gas main as necessary. Eversource Gas to make permanent connections at each approach to the bridge per plan. Contractor to remove & dispose of temporary gas main once it has been deactivated. Contractor to remove temporary utility bridge once new gas main is in place.							
	OVERHEAD OPERATIONS							
	Eversource Electric							
Task: 1	U Install 2 poles at permanent location upon completion of bridge work (Eversource)	2	X					N
	U Framing at two locations	1	X					N
	U Install two guy/anchors at permanent location upon completion of bridge work	1	X					N
	U Relocate two overhead transformers to permanent location upon completion of bridge work	1	X					N
	U Transfer wire at two poles to permanent location upon completion of bridge work	1	X					N
	U Remove three sections of overhead primaries and secondaries (temporary location wire)	7	X					N
	Sub-Total							
Task: 2	Astound/RCN							
	U Return Cables back to original poles	1	X					N
	U Move slack and re-lash cable	1	X					N
	U Remove hardware from temp poles	1	X					N
	Sub-Total							
Task: 3	Comcast							
	U Relocation of strand only from temporary pole set attachment back to permanent attachment. Railroad Flagman will be needed.	8	X					N
	Sub-Total							
Task: 4	Natick Fire Alarm							
	U Relocate facilities to permanent poles	2	X					N
	Sub-Total							
Task: 5	Verizon							
	U Place permanent aerial fiber cable on permanent poles.	2	X					N
	U Splice permanent aerial fiber cable.	3	X					N
	U Trimout temporary fiber cable.	1	X					N
	U Remove temporary aerial fiber cable from temporary poles.	1	X					N
	U Remove anchor guys from temporary poles.	1	X					N
	Sub-Total							
Task: 6	Eversource Electric							
	U Remove two temporary poles (Eversource)	1	X					N
	Sub-Total							
Task: 7	UNDERGROUND OPERATIONS							
	Eversource Gas							
	U Required Notice to Eversource Gas (days prior to Mobilizing)							
	U Mobilize & Materials Delivery and Project Planning	2	X					N
	U FORCED ACCT. Install 250" of 8" CS LP permanent gas main crossing over the Spring St Bridge. Natick after completion of bridge install.	20	X					N
	(STA 0+75) to Spring St (STA 2+25).							
	U Tie-in Permanent 8" to Existing Main	4	X					N
	U Pressure test new Main	1	X					N
	U Main Connection and nitrogen purge new main into service	1	X					N
	U Site Restoration, Clean-up and Demobilize	1	X					N
	Sub-Total							

IMPORTANT BASIS NOTES - FOR CONTRACTOR	
1	Unless otherwise specified in the MassDOT Construction Contract, or unless specifically noted within this PUC form, the Utility durations shown herein are to be planned (within the CTD and by the Contractor) as unimpeded access to the Utility company to perform Utility relocations.
2	"Concurrent Utilities" operations noted herein, are to signify those Utility Company operations that can be worked concurrently - 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 noted).
5	Access - Unless otherwise noted in the Contract, and in addition to the 'enabling' notes above, the Contractor must provide safe and unimpeded access (for trucks, lifts, cranes, etc.) to the Utilities, to allow for the proposed relocation(s) - including but not limited to snow removal, clearing and grubbing, guard rail removal, barrier removal, tree removal, and grading.
6	For all MassDOT construction contracts issued after January 2014, the new Utility Coordination/documentation specification is required. This is Section 8.14 in Design-Bid-Build Contracts (see Design-Build index reference for applicable section #).
7	Prior to starting any and all enabling work for Utilities, the Contractor is to plan in advance with submittals and approved durations.

RESPONSIBLE PARTY	DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Utilities (Lead time not included)		Concurrent / Exclusive Utility Work				Access Restraint & Limitations of Operations Notes	
		Estimated Duration (Work Days) by Utilities (Lead time not included)	Utility working with no other utilities on site	Utility working with other utilities on site	NO Contractor physical construction on-site (while utility is working)	Contractor and Utility are working on-site but NOT in the same vicinity	Contractor Off-Site	Contractor Concurrent	Potential Access Restraint (Yes/No)
C = Contractor U = Utility	DESCRIPTION - Utility Relocation Phases, Tasks and Activities		Utility working with no other utilities on site	Utility working with other utilities on site	NO Contractor physical construction on-site (while utility is working)	Contractor and Utility are working on-site but NOT in the same vicinity	Contractor Concurrent		
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 this 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.								

DOCUMENT A00809

WATERING LOG
for
MassDOT Plantings

Watering Log for MassDOT Plantings

Project Description:

Contract No.:

Plant Locations/s: (Attach planting plan/s as necessary)

Project No.:

Notes:

	<p>Separate logs shall be kept to track areas or plants with different watering schedules. Trees shall receive a minimum of 10 gallons with each watering and shrubs a minimum of 5 gallons. Provide note that if watering is not performed as scheduled due to rain. Record date of rainfall and amount.</p>											
Date Watered												
Landscape Contractor Initial												
Prime Contractor Initial												
Date Watered												
Landscape Contractor Initial												
Prime Contractor Initial												

Each week, following watering, Log shall be submitted to the MassDOT Engineer.
6/15/2018

DOCUMENT A00810

MassDOT Herbicide Use Report

MassDOT Herbicide Use Report

Date Submitted:

Use multiple sheets for multiple application techniques or sites as needed.

Contractor Performing Work: **Project or Contract No:**

Town/s: **Associated Route:**

Project Description:

MDAR ALERT*:

Treatment Description:

Area Treated (as applicable)
Acres: **Sq Yds:** **Miles:**

Weeds Targeted:

Gallons Formula Used:

Application Method:

Date/Time Began:

Date/Time End:

Product Used:

Name: _____ EPA Reg. No: _____ % Active Ingredient Dry: _____ Liquid: _____ Formulation (dilution rate): _____	Name: _____ EPA Reg. No: _____ % Active Ingredient Dry: _____ Liquid: _____ Formulation (dilution rate): _____	Name: _____ EPA Reg. No: _____ % Active Ingredient Dry: _____ Liquid: _____ Formulation (dilution rate): _____
---	---	---

Additional products used (surfactants, etc.) or other information:

Applicators:

License Numbers:

* Please note:
 EDRR Species (MAM, Hogweed, Pepperweed, Kudzu, etc.)
 Tree of Heaven 1) stands of >20 trees; 2) >5 trees near nursery, landscape company, or highway rest area where trucks stop

Upon completion, please submit form to MassDOT District Engineer and Landscape Design Section in Boston office.

DOCUMENT A00811

**MASSACHUSETTS BAY
TRANSPORTATION AUTHORITY
RAILROAD OPERATIONS DIRECTORATE**

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**MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY**

RAILROAD OPERATIONS DIRECTORATE

The attached Specifications are required for any construction and/or related activities on, over, under, within or adjacent to railroad property owned or controlled by the Massachusetts Bay Transportation Authority. They are intended to provide general guidelines and safeguards. Attachment "A" of Construction Guidelines and Procedures contains a summary of MBTA Railroad Operations Specifications which may be required. It is the responsibility of the Contractor to obtain all the necessary specifications for each project.

AUGUST 2014



**MASSACHUSETTS BAY
TRANSPORTATION
AUTHORITY**

RAILROAD OPERATIONS DIRECTORATE



GUIDELINES AND PROCEDURES
FOR CONSTRUCTION ON
MBTA RAILROAD PROPERTY

AUGUST 2014

SECTION 1. SCOPE

- 1.01 These specifications provide general safeguards to railroad property owned or controlled by the Massachusetts Bay Transportation Authority and to railroad operations upon that property during the performance of construction and/or related activities on, over, under, within or adjacent to the railroad property. They are intended as guidelines and do not represent all legal requirements which are or may be associated with construction and/or related activities. The MBTA reserves the right to require additional information and clarification and to make unilateral changes to these specifications at any time, at its sole discretion.

SECTION 2. DEFINITIONS

MBTA

Massachusetts Bay Transportation Authority; Massachusetts Realty Group, Designated Representative of MBTA Real Estate

RAILROAD COMPANY

The particular reference for the purpose of these specifications is the railroad company which maintains and/or operates or has trackage rights on the subject MBTA Railroad Property, including, but not limited to:

- Massachusetts Bay Transportation Authority (MBTA")
- Keolis Commuter Services
- Providence and Worcester Railroad (PW)
- National Railroad Passenger Corporation ("Amtrak")
- CSX Transportation ("CSX")
- Pan Am Railways (PAR) and subsidiaries The Boston and Maine Corporation (BM), The Springfield Terminal Railway Company (ST), its affiliates, successors and assigns
- Bay Colony Railroad Corporation (BLCR)

MBTA RAILROAD PROPERTY

All railroad rights of way and adjacent owned and/or controlled by the MBTA.

OWNER

The individual, utility, government, or corporation having title to the structure to be constructed upon, over or adjacent to the railroad property owned or controlled by the MBTA.

UTILITY

Public or private communication, water, sewer, electric, gas and petroleum companies or other entity governed by the Massachusetts Department of Public Utilities.

GOVERNMENT

Federal, State, Town, City, County and other forms of government.

CORPORATION

Any firm duly incorporated under laws of a state government.

INDIVIDUAL

Any party not defined by "Owner, Utility, Government or Corporation".

CONTRACTOR

The individual, partnership, firm, corporation or any combination thereof, or joint venture, contracting with a Utility, Government, Firm, Company, Corporation or Individual for work to be done on, over, under, within or adjacent to MBTA Railroad Property.

OWNER OR ITS CONTRACTOR

As used in these specifications, does not affect the responsibilities of either party for work conducted on, over, under, within or adjacent to MBTA Railroad Property.

CONSTRUCTION DRAWINGS

Original drawings, submitted to the Engineer by the Contractor pursuant to the Work, including, but not limited to: stress sheets, working drawings, diagrams, illustrations, schedules, performance charts, brochures, erection plans, falsework plans, framework plans, cofferdam plans, bending diagrams for reinforcing steel, or other supplementary plans or similar data which are prepared by the Contractor or a Subcontractor, manufacturer, supplier or distributor, and which the Contractor is required to submit for review and approval by the MBTA. Working Drawings: Contractor prepared plans for temporary

structures and facilities. Working Drawings for elements of work which may affect safety of persons or property included but are not limited to Contractor's plans for temporary structures such as decking, temporary bulkheads, support of utilities, and for such other work as may be required for construction but which do not become an integral part of completed project.

SECTION 3. SUBMITTALS

3.01 INITIAL CONTACT

- A. The MBTA owns the majority of the railroad lines in eastern Massachusetts. Many of these railroad lines are operated for passenger service, using a Railroad Company as an operating and maintaining Contractor. Some of the railroad lines are used for freight-only service, operated and maintained by other Railroad Company(s). In most instances, both passenger and freight service are operated over the same railroad lines.
- B. All of the MBTA railroad lines are maintained by a designated Railroad Company(s), excepting rapid transit and light rail lines. The maintaining Railroad Company(s) has rights and responsibilities, in addition to the MBTA's property owner's rights.
- C. To obtain further information concerning License Agreements, Easements, Licenses for Entry and performance of construction related activities which affect MBTA Railroad Property, a written request may be forwarded to:

License Administrator
Massachusetts Realty Group
20 Park Plaza, Suite 1120
Boston, MA 02116

or you may access the website at www.mbtarealty.com

The License Administrator is also the contact person for information concerning rapid transit and light rail lines.

SECTION 4. PLANS AND SPECIFICATIONS

- 4.01 SCOPE: It is the intent of the MBTA to eliminate or minimize any risk involved with construction or related activities on, over, under, within or adjacent to MBTA Railroad Property. Therefore, MBTA approval and

frequently one or more Railroad Company(s) approval of construction plans and specifications for all phases of a proposed project affecting MBTA Railroad Property is required.

- 4.02 GENERAL: If requested by the License Administrator, the applicant must provide six (6) sets of plans and specifications to the License Administrator. These plans and specifications must meet the approval of the Railroad Company(s) and the MBTA prior to the start of construction. These plans are to be prepared in sizes as small as possible (no smaller than 11" x 17") and are to be folded to an 8-1/2 inch by 11 inch size (folded dimensions) with a 1-1/2 inch margin on the left side and a 1 inch margin on the top.
- A. After folding, the title block and other identification of the plans shall be visible at the lower right corner, without the necessity of unfolding. Each plan shall bear an individually identifying number and an original date, together with subsequent revision dates, clearly identified on the plan.
 - B. All plans are to be individually folded or rolled and where more than one plan is involved, they shall be assembled into complete sets before submission to the MBTA.
- 4.03 PLANS: The plans are to show all the work which may affect MBTA Railroad Property, and contain a location map and plan view of the project, with appropriate cross sections and sufficient details. The proposed construction or related activities must be (orated with respect to top of rail (vertical) and center line of track (horizontal). The plan must also include railroad stationing, property lines and subsurface soil conditions. The subsurface information is to be in the form of boring logs with the borings located on the plan view. The plans must be stamped by a Professional Engineer registered in the state of Massachusetts. (The purchase of railroad valuation plans may be arranged by contacting MBTA Engineering offices at (617) 222-6178).
- 4.04 SPECIFICATIONS: The specifications summarized on Attachment "A" attached hereto are the Standard Specifications of the MBTA Railroad Operations Department and apply to all types of construction work affecting MBTA Railroad Property.
- A. In addition to "Maintenance and Protection of Railroad Traffic" and "Insurance Specifications" which are required for all work on, over, under, within or adjacent to MBTA Railroad Property, certain other Specifications contained in Attachment "A" shall be incorporated into construction/engineering submittals when deemed necessary by the MBTA and/or Railroad Company(s). (The purchase

of additional specifications may be arranged by contacting MBTA offices at (617) 222-3448 or visiting Massachusetts Realty Group website at www.mbtarealty.com.

SECTION 5. SUBMISSION REVIEW

- 5.01 An initial submission of six (6) sets of plans and specifications for MBTA review must be forwarded to the License Administrator, along with a completed MBTA Application for Entry (Attachment "B"). The submission will be circulated for review and comment to MBTA departments which may be impacted by the proposed project. If approved by the MBTA, the Railroad Company(s) will review.
- 5.02 The applicant is advised that the MBTA's initial review process requires a minimum forty-five (45) day period, prior to the Railroad Company(s) involvement, and additional processing time may be required for specific documents (See Section 9).

SECTION 6. INSPECTIONS/PAYMENTS

- 6.01 The MBTA may inspect all projects affecting MBTA Railroad Property at least twice, at the applicant's sole expense. The actual number of MBTA inspections will depend on the size and complexity of the project.
- 6.02 The MBTA may utilize Railroad Company inspectors and flagmen for daily inspection and protection of rail traffic during the term of the construction period or related activities. The Owner or Contractor will be responsible for advance payment of all associated fees.
- 6.03 Advance payments to the MBTA for construction/engineering review of plans and specifications by MBTA staff must be submitted when initial contact is made with the License Administrator. Payments shall be in the form of check or money order, made payable to the Massachusetts Bay Transportation Authority.
- 6.04 Advance payments covering the services for Railroad Company(s) construction/engineering review of plans and specifications, or services of an inspector or flagman, will be paid directly to the Railroad Company(s). The MBTA will advise when such services are required, and the Railroad Company(s) will advise of the amount of the required advance payment.

SECTION 7. EXAMINATION OF PLANS OR PROPERTY

- 7.01 The Contractor/Applicant shall have no claim for any differences between MBTA valuation plans and the actual conditions encountered in the field.

SECTION 8. INSURANCE AND INDEMNIFICATION

- 8.01 Prior to entry upon MBTA Railroad Property, insurance will be provided to and approved by the MBTA and affected Railroad Company(s), as outlined in "Insurance Specifications."
- 8.02 Additionally, all MBTA Licenses and Letters of Authorization contain a clause for Indemnifying MBTA and the Railroad Company(s) from and against any and all liabilities, losses, damages, costs, expenses, causes of action, suits, claims, demands and/or judgments of any nature whatsoever that may be imposed upon or incurred by or asserted against the MBTA or the Railroad Company(s).

SECTION 9. LEGAL DOCUMENTS FOR TEMPORARY AND PERMANENT INSTALLATIONS

- 9.01 The nature of entry upon or installation within MBTA Railroad Property will determine the authorizing document to be issued. Listed below are brief descriptions of MBTA documents:
 - A. **License for Entry:** Authorizes short-term entry for purposes of survey, inspection, test borings, access, etc. One time administrative/engineering/legal review and access fees.
 - B. **License Agreement:** Authorizes installations, subject to termination clause, if Applicant chooses not to pursue an Easement. One time administrative/engineering/legal review fee as well as annual rental fee.
 - C. **Easement:** Authorizes permanent installations in form suitable for recording at Registry Deeds. All easements are non-exclusive and subject to relocation at the Owner's expense, for Mass transportation purposes:
 - 1. Easements must receive MBTA Board of Directors approval, which involves considerable time. Once approved by the Board of Directors and upon payment in full to the MBTA, a License for Construction is issued. Upon final inspection and acceptance of the installation by the MBTA the Easement document is issued.
 - 2. Permanent Subsurface Easement widths are limited to a maximum three-foot distance on either side of the occupation.

3.
 - a) A one-time administrative/engineering/legal review fee, in addition to value of easement, as established by independent appraisal conducted at the Applicant's expense.
 - b) If easement size is minimal, as determined by the MBTA, a fixed fee, encompassing administrative/engineering/legal review fee.
- D. **Letter of Authorization**: Authorizes installations and construction activities in association with Master License Agreements. One-time administrative/engineering/legal review as well as access and/or annual fees.

ATTACHMENT "A"

SUMMARY OF MBTA RAILROAD OPERATIONS SPECIFICATIONS

I. GUIDELINES AND PROCEDURES FOR CONSTRUCTION ON MBTA RAILROAD PROPERTY

This general specification outlines the immediate design requirements and methodology for progressing construction activities on MBTA Railroad Property.

II. MAINTENANCE AND PROTECTION OF RAILROAD TRAFFIC

This specification will be included in ALL work requirements on MBTA Railroad Property, and covers rules, requirements, and protective services or any construction-related activity on MBTA Railroad Property. Supplemental specifications are listed below.

III. INSURANCE SPECIFICATIONS

This specification details the required insurance coverages and limits of the MBTA and Railroad Company(s).

IV. PIPELINE OCCUPANCY SPECIFICATIONS

This specification details requirements for all pipeline borings/jacking's and open cuts on or adjacent to MBTA Railroad Property, as well as requirements for Drawing submittals.

V. SPECIFICATIONS FOR WIRE CONDUIT AND CABLE OCCUPATIONS

This specification details requirements for clearances and installations of parallel and overhead crossings on MBTA Railroad Property, as well as requirements for Drawing submittals.

VI. BRIDGE ERECTION DEMOLITION AND HOISTING OPERATIONS

This specification details plan preparation for demolition and/or hoisting and erection of structures on and over MBTA Railroad Property.

VII. TEMPORARY SHEETING AND SHORING

This specification details requirements for plan preparation and calculations necessary for sheeting and shoring for construction on or adjacent to MBTA Railroad Property.

VIII. BLASTING SPECIFICATIONS

This specification outlines submittals, details and requirements for blasting on or adjacent to MBTA Railroad Property.

IX. TEMPORARY PROTECTION SHIELDS FOR DEMOLITION AND CONSTRUCTION

This specification outlines criteria for plan preparation related to protection of MBTA Railroad Property when work takes place on overhead structures.

X. INDUSTRIAL SIDE TRACK SPECIFICATIONS

This specification outlines minimal requirements for materials and installation submission for private railroad side tracks up to MBTA property line and/or clearance point. Other provisions, site-specific, may be required, including signal protection maintenance and protection of railroad traffic.

XI. RIGHT OF WAY FENCING SPECIFICATIONS

This specification details the requirements for the materials, construction and installation of standard right of way fence.

XII. TEST BORING SPECIFICATIONS

This specification outlines procedures and requirements for the performance of test borings on MBTA Railroad Property.

XIII. FIBER OPTIC CABLE SPECIFICATIONS

This specification details requirements for design and installation of fiber optic cables on MBTA Railroad Property; and is modified by site-specific requirements, including the construction methodology, location and type of fiber optic cables and protection conduits.

XIV. RAILROAD OPERATIONS BOOK OF STANDARD PLANS, TRACK AND ROADWAY, MW-I SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF TRACK

Certain construction activities may require obtaining this comprehensive package if rail construction details and requirements are related to the track operation.

XV. COMMUTER RAIL DESIGN STANDARDS

ATTACHMENT "B"

**MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
APPLICATION FOR ENTRY UPON MBTA RAILROAD, TRANSIT,
OR OTHER PROPERTY**

Date_____

1. Name of Applicant: _____

2. Type of Entity (Partnership, Corporation, Proprietorship, Public Authority, etc.):

3. Mailing Address: _____

4. Contact info:_____

5. If incorporated, state of incorporation:_____

6. Proposed license term commencement date:_____

7. Agents for applicant for service of notice or process: _____

8. Administrative Fee: 1,000.00 paid with application

9. If plan reviews by The MBTA Design and Construction are deemed necessary the following fee shall apply:

Design and Construction Plan Review Fee: 1,600.00 Paid with Application Fee

10. Applicant shall submit Drawings in pdf form and one set of paper Drawings to License Administrator

11. If applicant is self-insured, please provide limits of self-insurance and attach copies of authorizing legislation or certification thereof: _____

12. If applicant is authorized by public authority to enter into such license agreement, please provide:

Motion, Resolution, or Ordinance No.: _____

Date of Adoption: _____

Adopted by: _____

13. Is the applicant seeking permission to perform environmental testing and/or assessment on Authority property?

a) Is the proposed testing and/or assessment required by the Massachusetts Contingency Plan ("MCP")?

b) What is the Release Tracking number and current status of the MCP work?

14. Name, title and email of applicant's officer authorized to sign agreement: _____

Project Description

1. Brief description of construction (including types of pipes and other attachments or ancillary facilities to be installed on MBTA Railroad Property): _____

2. Brief description of purpose of entry and/or installation: _____

Space Requirements
[To Be Provided]

Technical Information

- 1. Is this occupancy within the limits of a public road? _____
Attach copies of applicant's franchise to occupy such space.
- 2. If occupancy is under, over, through, or attached to undergrade or overhead bridge, who owns such bridge? _____

3. Type of occupancy (facility):
a) Exact Length of MBTA Railroad Property to be burdened by occupancy: _____

b) Width of excavation facility on MBTA Railroad Property:

c) Number of manholes: _____

A. Aerial or underground wire and cable:

(1) Telephone and other communication cables:

Number of cables: _____

Number of pairs/cable: _____

Are these composite coaxial cables? _____

(2) Power Cables:

Number of cables/size: _____

Number of volts per conductor: _____

Are these pipe-type cables consisting of one or more high voltage cables encased in steel pipe under inert oil pressure? _____

(3) Fiber optic cables:

Number of cables: _____

Number of distribution cables: _____

Number of transmission cables: _____

Number of strands in each cable: _____

Number of repeater stations on MBTA Railroad Property: _____

Systems (check one):

Transmission _____

Distribution _____

Sensor _____

(4) Number of spare or unoccupied ducts to be installed: _____

B. Pipes and Sewers

(1) Circular line carrying no pressure:

Number of pipes: _____

Number of inches of inside nominal diameter per pipe: _____

(2) Circular lines under pressure and carrying non-flammable, non-explosive, or non-combustible supporting materials, except coal and slurry:

Number of pipes: _____

Number of inches of inside nominal diameter per pipe: _____

(3) Circular lines under pressure and carrying flammable, explosive, or combustible supporting material:

Number of pipes: _____

Number of inches of inside nominal diameter per pipe: _____

(4) Non-circular pipe: _____

(5) Will a pipe tunnel be constructed? _____

(6) Will pipe be supported by MBTA structures, bridges, etc.? _____

Explain: _____

(7) Will pipe be attached to MBTA structures, bridges, etc.? _____

Explain: _____

C. Ancillary Facilities

Number of wooden poles to be installed on MBTA Railroad Property:

Other wooden supporting structures: _____

Steel supporting structures: _____

Explain: _____

Number of braces, stub poles: _____

Number of guy wires anchored on MBTA Railroad Property: _____

Number of span guy wires crossing MBTA Railroad Property: _____

D. Attachments

(1) Attachment of aerial wires and cables to poles or other structures of MBTA used in wire line construction or support:

Number of wires attached to MBTA cross-arm: _____

Voltage of wire: _____

Number of wires attached to applicant's cross-arm or bracket: _____

Voltage of wire: _____

Number of cross-arms or brackets attached to MBTA poles: _____

(2) Attachment of aerial wires and cables to building or structures other than those used in wire line construction or support:

Number of wires or cables attached to MBTA's building or structures:

(3) Attachment of cable terminals to poles, buildings, or structures including highway bridges, railroad bridges over highways, or other bridges of MBTA:

Number of cable terminals, loading coils, transformers, or like devices attached:

Explain: _____

E. Guy wire crossings and overhanging cross-arms and power wires of pole lines outside MBTA right-of-way.

Number of guy wires crossing MBTA Railroad property but not anchored thereon: _____

Number of cross-arms overhanging MBTA Railroad Property from poles located outside thereof: _____

Number of cross-arms on any poles: _____

It is hereby understood and agreed that the undersigned applicant will bear any and all costs associated with MBTA's preliminary and final engineering review in connection with this application. Any charges in excess of the initial advance payment will be billed directly to the address indicated in Item #3 above.

Agent: _____

For: _____
Name of Applicant

By: _____
(Title)

(Date)

REVENUE ENFORCEMENT AND PROTECTION PROGRAM CERTIFICATION

Pursuant to M.G.L. Ch. 62C, Sec. 49A, I certify under penalties of perjury that I (my company), to my best knowledge and belief, have (has) filed all state tax returns and paid all state taxes required under law.

Social Security Number or
Federal Identification Number

Signature of Individual or Corporate Name

By: _____
Corporate Officer
(If applicable)

Date: _____

EMPLOYER'S CERTIFICATE OF COMPLIANCE WITH
MASSACHUSETTS EMPLOYMENT SECURITY LAW

Pursuant to G. L. C. 151A, Sec. 19A (b), I _____

on behalf of (Name of Employer) _____,

D.E.T. ID Number _____, certify under the penalties of perjury¹ that the
aforementioned employer has complied with all laws of the Commonwealth relating to contributions
and payments in lieu of contributions.

Signed under the penalties of perjury this _____ day of _____, 20__.

Name of Employer

Signature

Name (Printed)

Title (Printed)

¹ _____
The employer may certify its compliance if it has entered into and is complying with a
repayment agreement satisfactory to the Commissioner or there is a pending adjudicatory
proceeding or court action contesting the amount due pursuant to G. L. C. 161A, Sec.
19A(c).

STATEMENT REGARDING BENEFICIAL INTEREST

In compliance with the provisions of Chapter 7, Sec. 40J of the General Laws, I hereby state, under the penalties of perjury, that the true names and addresses of all persons who have or will have a direct or indirect beneficial interest in the real property subject to this Application dated

_____, 20___,

between _____ as applicant/tenant, for premises in the building (on the site) know as _____, and located at _____

_____ are listed below.

Name and residence of all persons with beneficial interests:

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____

Signed: _____

Title: _____

Date: _____

ATTACHMENT "C"

REFERENCED STANDARDS AND SPECIFICATIONS

- A. Wherever standards or specifications issued by a recognized industry association or regulatory body are referenced in these Specifications, the reference shall be interpreted as incorporating the referenced standard or specification in total into these Specifications as applicable. In the event of a difference between referenced standard or specifications and these Specifications, the latter shall govern.
- B. Technical Reference Abbreviations - References are made to recognized standards by use of the acronyms listed below. Addresses are included for convenience, and the accuracy of the addresses is not warranted:

AA	The Aluminum Association 900 19th Street NW Washington, DC 20006
AAR	The Association of American Railroads American Railroads Building 50 F Street NW Washington, DC 20001
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street NW Suite 249 Washington, DC 20001
ACGIH	American Conference of Governmental Industrial Hygienists 1330 Kemper Meadow Drive Cincinnati, OH 45240
ACI	American Concrete Institute P. O. Box 19150 Detroit, MI 48219
AFPA	American Forest and Paper Association 1111 19th Street, NW Suite 700 Washington, DC 20036

AIA	American Insurance Association 1130 Connecticut Avenue NW Washington, DC 20036
AISC	American Institute of Steel Construction Inc. 1 East Wacker Drive Suite 1300 Chicago, IL 60601
AISI	American Iron and Steel Institute 1101 17th Street NW Suite 1300 Washington, DC 20036-4700
AITC	American Institute of Timber Construction 7012 South Revere Parkway Suite 140 Englewood, CO 80112
ANSI	American National Standards Institute 11 West 42nd Street New York, NY 10036
APA	American Plywood Association P. O. Box 11700 Tacoma, WA 98411
APHA	American Public Health Association 1015 15th Street NW Washington, DC 20005
AREA	American Railway Engineering Association 50 F Street NW Washington, DC 20001
ASCE	American Society of Civil Engineers 345 East 47th Street New York, NY 10017
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017

ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWPA	American Wood Preservers' Association P. O. Box 286 Woodstock, MD 21163-0286
AWS	American Welding Society 550 NW 42nd Avenue Miami, FL 33126
AWWA	American Water Works Association, Inc. 6666 W. Quincy Avenue Denver, CO 802350
CSI	Construction Specifications Institute 601 Madison Avenue Alexandria, VA 22314-1791
FHA	Federal Highway Administration 400 7th Street SW Washington, DC 20590
FRA	Federal Railroad Administration 403 7th Street SW Washington, DC 20590
ICBO	International Conference of Building Officials 5360 Workman Mill Road Whittler, CA 90601
IIA	Incinerator Institute of America 60 East 42nd Street New York, NY 10017



**MASSACHUSETTS BAY
TRANSPORTATION
AUTHORITY**

RAILROAD OPERATIONS DIRECTORATE

||

MAINTENANCE AND PROTECTION OF RAILROAD TRAFFIC

AUGUST 2014

SECTION 1. GENERAL

- 1.01 The Contractor should note that these specifications govern proposed work that involves construction on, over, under, within or adjacent to MBTA Railroad Property. Requirements must be strictly observed whenever the tracks, structures, or properties of the MBTA are involved or affected.
- 1.02 If the tracks or other facilities of the MBTA are endangered, the Contractor shall immediately perform such work as directed by the Railroad Company(s), and upon failure of the Contractor to carry out such orders immediately, the Railroad Company(s) may take whatever steps are necessary to restore safe conditions. The cost and expense to the Railroad Company(s) and/or MBTA of restoring safe conditions or of any damage to the MBTA's trains, tracks, or other facilities caused by the Contractors' or subcontractors' operations, shall be at the sole expense of the Contractor and will be collected as appropriate. This cost shall be paid for by the Contractor and may be deducted from any monies due and that may become due to the Contractor.
- 1.03 Before entering upon MBTA Railroad Property:
- A. The Owner or its Contractor shall be fully informed of all requirements of the MBTA pertaining to the specific project and shall conduct all their work accordingly. Any questions relating to the requirements of the MBTA should be directed to the Director of Engineering for MBTA Railroad Operations or their authorized representative.
 - B. The Owner or its Contractor shall execute an MBTA License for Entry, and shall provide the MBTA and Railroad Company(s) with the information required in the "Insurance Specifications".
 - C. The Owner or its Contractor shall take note that if an excavation is to be made within a 2 to 1 slope line commencing 5.5 feet from the centerline of track, they shall be required to submit the proposed method of soil stabilization for approval by the Director of Engineering for MBTA Railroad Operations.
 - D. The Owner or its Contractor shall furnish detailed plans for falsework, bracing, sheeting, or other supports adjacent to the tracks for approval by the Director of Engineering for MBTA Railroad Operations and the Railroad Company(s), and the work shall be performed in accordance with temporary "Sheeting and Shoring". All plans and calculations shall be stamped by a Registered Professional Engineer.
 - E. The Owner or its Contractor shall give written notice to the Director of Engineering for MBTA Railroad Operations and the applicable

Railroad Company(s) at least 21 days in advance of starting work or locating equipment at the site.

- F. The Owner or its Contractor shall make all necessary arrangements with the MBTA before entering upon MBTA Railroad Property.

1.04 After entering upon MBTA Railroad Property:

- A. The Owner or its Contractor shall have, in their possession on the job site, the contract plans and specifications which bear the stamp of approval of the Director of Engineering for MBTA Railroad Operations or Railroad Company(s). The Owner or its Contractor shall conduct all their work according to these plans and specifications.
- B. All work shall be performed and completed in a manner fully satisfactory to the MBTA Chief Engineering Officer or authorized representative(s). Railroad Company(s) inspection of the work shall be conducted at any time and the Owner or its Contractor shall cooperate fully with the MBTA and Railroad Company(s) representatives.
- C. All equipment used by the Owner or its Contractor on MBTA Railroad Property may be inspected by the Railroad Company(s) and shall not be used if considered unsatisfactory by the Railroad Company(s) representative. Equipment of the Owner or its Contractor to be used adjacent to tracks shall be in first class condition so as to positively prevent any failure that would cause delay in the operation of trains or damage to MBTA or railroad facilities. Equipment shall not be placed or put into operation adjacent to a track without first obtaining the permission of the Railroad Company(s).
- D. Operators of such equipment must be properly licensed and may be examined by the Railroad Company(s) representative to determine their fitness. If it is determined that they are unfit to work, then the Owner or its Contractor shall remove them from MBTA Railroad Property.
- E. If the Director of Engineering for MBTA Railroad Operations deems it necessary, the Owner or its Contractor shall furnish and erect in close proximity to the site of the work a suitable, furnished shelter with lights, heat, telephone, etc., for use by Railroad Company(s) personnel providing services to the Owner's or Contractor's work.
- F. The Owner or its Contractor's work shall be performed in such manner that the tracks, train operations and appurtenances of the MBTA and the Railroad Company(s) will be safeguarded.

- G. Open excavations shall be suitably planked and safeguarded when construction operations are not in progress.
- H. Blasting will be permitted under or adjacent to tracks only after proof that blasting is required and all methods have been approved by the Director of Engineering for MBTA Railroad Operations and the Railroad Company(s). All blasting operations must comply with the MBTA's "Blasting Specifications".
- I. The Owner or its Contractor shall be fully responsible for all damages arising from their failure to comply with the requirements of these specifications. Failure to comply may result in their removal from MBTA Railroad Property, at the MBTA's sole discretion.

SECTION 2. RULES, REGULATIONS, AND REQUIRMENTS.

- 2.01 Railroad traffic shall be maintained at all times with safety and continuity, and the Contractor shall conduct all operations on, over, under, within or adjacent to MBTA Railroad Property within the rules, regulations, and requirements of the Railroad Company(s) and/or MBTA. The Contractor shall be responsible for acquainting themselves with such requirements as the Railroad Company(s) and/or MBTA may demand.
- 2.02 The Contractor shall obtain verification of the time and schedule of track occupancy from the Railroad Company(s) before proceeding with any construction or demolition work on, over, under, within or adjacent to MBTA Railroad Property. The work shall not proceed until the plans and method of procedure have been approved by the Director of Engineering for MBTA Railroad Operations or their authorized representative.
- 2.03 All work to be done on, over, under, within or adjacent to MBTA Railroad Property shall be performed by the Contractor in a manner satisfactory to the MBTA and the Railroad Company(s), and shall be performed at such times and in such manner, as to not interfere with the movement of trains or operations upon the tracks of the MBTA. The Contractor shall use all necessary care and precaution in order to avoid accidents, delays or interference with the MBTA's trains or other property.
- 2.04 The Contractor shall give written notice to the Railroad Company(s) at least twenty- one (21) days prior to the commencement of any work, or any portion of the work, by the Contractor or their subcontractors on, over, under, within or adjacent to MBTA Railroad Property, in order that necessary arrangements may be made by the Railroad Company(s) to protect railroad operations.

- 2.05 If deemed necessary by the Railroad Company(s), it may assign an inspector and/or engineer who will be placed on the work site during the time the Contractor or any subcontractor is performing work on, over, under, within or adjacent to MBTA Railroad Property. The cost and expense will be paid directly by the contracting party with an advance deposit to the Railroad Company(s), unless otherwise approved.
- 2.06 Before proceeding with any construction or demolition work, on, over, under, within or adjacent to the MBTA's Railroad Property, a pre-construction meeting shall be held at which time the Contractor shall submit for approval of the MBTA and Railroad Company(s), Drawings, computations, and a detailed description of the method for accomplishing the construction work, including methods of protecting railroad operations. Such approval shall not serve in any way to relieve the Contractor of complete responsibility for the adequacy and safety of the referenced methods.
- 2.07 During any demolition procedure, the Contractor must provide an approved shield to prohibit all debris from falling onto MBTA Railroad Property. A protective fence must be erected at both ends of the project to prohibit trespassers from entering MBTA Railroad Property.
- 2.08 Cranes, shovels, or any other equipment shall be considered to be fouling the track when located in such position that failure of same with or without load brings the equipment within the fouling limit. The Contractor's employees and equipment will not be permitted to work near overhead wires or apparatus.
- 2.09 The Contractor shall conduct their work and handle their equipment and materials so that no part of any equipment should foul an operated track or wire line without the written permission of the Railroad Company(s). When it becomes necessary for the Contractor to foul any track, they must give the Railroad Company(s) written notice of their intentions twenty-one (21) days in advance, so that if approved, arrangements may be made for proper protection of the Railroad Company(s).
- 2.10 The Contractor's equipment shall not be placed or put into operation adjacent to tracks without first obtaining permission from the Railroad Company(s). Under no circumstances shall any equipment or materials be placed or stored within fifteen (15) feet from the centerline of the closest track.
- 2.11 Materials and equipment belonging to the Contractor shall not be stored on MBTA Railroad Property without first having obtained permission from the Railroad Company(s), and such permission will be on the condition that the MBTA and/or Railroad Company(s) will not be liable for damage to such materials and equipment from any cause. The Contractor shall keep the

tracks adjacent to the site clear of all refuse and debris that may accumulate from construction operations, and shall leave the MBTA Railroad Property in the condition existing before construction commencement. Equipment repair, refueling or extended storage is prohibited on MBTA Railroad Property.

- 2.12 The Contractor shall consult the Railroad Company(s) in order to determine the type of protection required to insure safety and continuity of railroad operations. The railroad field engineer may assign track foremen, flagmen, signalmen or other employees deemed necessary for protective services by the Railroad Company(s), to insure the safety of trains and MBTA Railroad Property. The cost of same shall be paid directly by the contracting party with an advance deposit to the Railroad Company(s), unless otherwise approved.
- 2.13 The provision of such protective services, and other precautionary measures, shall not relieve the Contractor from liability for the cost of any and all damages caused by their operations.
- 2.14 The Railroad Company(s) will require protection during all periods when the Contractor is working on, over, under, within or adjacent to MBTA Railroad Property or as may be deemed necessary. When protection is required, the Contractor shall make the request in writing to the Railroad Company(s) at least twenty-one (21) days before such protection is required.
- 2.15 The Contractor shall not bill the Railroad Company(s) or MBTA for any work which they are proposing to perform, unless the Railroad Company(s) or MBTA authorizes the said work in writing. This work must be to the benefit of the MBTA or Railroad Company(s).
- 2.16 The Contractor, subcontractor and respective employees who will come within the limits of the MBTA Railroad Property, must first attend the Railroad Company(s) Safety Orientation Class. They are required to comply with the Railroad Company(s) Safety Requirements throughout the entire construction period. All costs associated with compliance of the Railroad Company(s) Safety Requirements will be at the sole expense of the Contractor and subcontractors.
 - A. The Contractor for the project must appoint a qualified person who will be designated as a Safety Representative. They must be approved by the Railroad Company(s) Safety Representative. The Contractor's designee will be responsible to give Safety Orientation to the Contractor's/subcontractor's employees who will come onto the MBTA's Railroad Property for short periods of time after the initial Safety Orientation Class has been given by the Railroad Company(s). The Contractor's designee will keep the Railroad Company(s) Safety Representative informed of the temporary employees who received Safety Orientation. The Railroad Company(s)

Safety Orientation Class will be repeated when employee turnover or groups of Contractor's and subcontractor's employees are such that another Railroad Company(s) Safety Orientation Class is justified.

- B. All Contractors shall follow established safety procedures and remain 15 feet or more from the closest rail of the closest track. When it becomes necessary for Contractors to encroach on this 15 foot limitation, the proper fouling procedures will be arranged with the Railroad Company(s).
 - C. Contractors will establish the 15 foot foul line by installing stakes and taping off the area prior to beginning work.
- 2.17 Upon completion of the work, the Contractor shall remove from the MBTA Railroad Property, all machinery, equipment, surplus materials, falsework, rubbish, temporary buildings and other property of the Contractor, or any subcontractor, and shall leave MBTA Railroad Property in a condition satisfactory to the MBTA and Railroad Company(s). Failure to comply will result in Railroad Company(s) forces restoring MBTA Railroad Property at the Contractor's expense.
- 2.18 The Contractor will pay the Railroad Company(s) directly, for all protective services unless otherwise approved. The services are performed to insure safe operation of trains when construction work would, in the Railroad Company(s) opinion, be a hazard.

SECTION 3. DEFINITION OF HAZARD

- 3.01 Protection Services will be required whenever the Contractor is performing work on, over, under, within or adjacent to MBTA Railroad Property. This will include excavating, sheeting, shoring, erection, removal of forms, handling material, using equipment which by swinging or by failure could foul the track, and when any other type of work being performed, in the opinion of the Railroad Company(s), requires such service.
- 3.02 Railroad operations will be considered subject to hazard when explosives are used in the vicinity of MBTA Railroad Property during the driving or pulling of sheeting for footings adjacent to a track, when erecting structural steel across or adjacent to a track, when operations involve swinging booms or chutes that could in any way come closer than 5 feet to the center line of a track or wire line. None of these or similar operations, shall be carried on without Railroad Company(s) protective services personnel on site.
- 3.03 A signal line or communication line shall be considered fouled and subject to hazard when any object is brought closer than ten (10) feet to any wire or cable. An electrical supply line shall be considered fouled and subject to hazard when any object is brought closer than ten (10) feet to any

wire of the line.

- 3.04 As excavation approaches pipes, conduits, or other underground structures on or adjacent to MBTA Railroad Property, digging by machinery shall be discontinued and the excavation shall continue by means of hand tools. All existing pipes, poles, wires, fences, property line markers, and other structures, which the MBTA and/or Railroad Company(s) decides must be preserved in place, shall be carefully protected from damage by the Contractor or its Owner. Should such items be damaged, they shall be restored by the Railroad Company(s), at the Owner's or Contractor's sole expense to the original condition prior to construction commencement. If any excavation is taken beyond the work limit indicated on the approved Drawings or prescribed herein, the Owner or its Contractor shall backfill and compact to the satisfaction of the Railroad Company(s) at the Contractors expense.

SECTION 4. BACKFILL

4.01 Backfilling

- A. All backfill material adjacent to any Railroad Company(s) facility shall be approved by the Railroad Company(s). Backfill material shall be free from hard lumps and clods larger than 3 inches in diameter, and free from large rocks or stumps. Uniformly fine material shall be placed next to any pipe liable to dent or break.
- B. All backfill material shall be compacted at or near optimum moisture content, in layers not exceeding 6 inches in compacted thickness by pneumatic tampers, vibrator compactors, or other approved means to the base of the railroad subgrade. Material shall be compacted to not less than 95 percent of AASHTO T 99, Method C. The Contractor will be required to supply to the job site, ballast stone (AREA #4) to be installed by the Railroad Company(s).

4.02 Certification

The Owner or its Contractor shall provide testing, through the use of a testing lab or Professional Engineer, to insure that the in place density of the backfill meets or exceeds the requirements of Section 4.01(B). Written certification of the tests shall be given to the Railroad Company(s) immediately upon completion of the test.

4.03 Alternate

In the case of an open cut crossing of the MBTA Railroad Property, the Owner or its Contractor may backfill with concrete having a three-day compressive strength of 1000 psi to the base of the track subgrade. This

may be used in lieu of providing the certification of proper compaction when using gravel backfill. The Owner or its Contractor will be required to supply to the job site, ballast stone (AREA #4) to be installed by the Railroad Company(s).

SECTION 5. CLEARANCES

- 5.01 Staging falsework or forms shall at all times be maintained with a minimum vertical clearance of 226" above top of the high rail and a minimum horizontal clearance of 15' from the center line of track.

SECTION 6. PROTECTION SERVICES

- 6.01 The MBTA shall require railroad inspection and may require railroad flagging. Prior to the start of any work on MBTA Railroad Property, the Owner or its Contractor shall submit a deposit to the amount required by the Railroad Company(s). If Railroad Company(s) expenses are greater than the amount of deposit, the Owner or its Contractor shall reimburse the Railroad Company(s) for the balance when billed, and, if the Railroad Company(s) expenses are less than the amount of deposit, the Railroad Company(s) will refund the balance to the Owner or its Contractor. The Railroad Company(s) reserves the right to request additional deposits as project work progresses.
- 6.02 If the MBTA or Railroad Company(s) determines that flagmen are necessary, the number required shall be on duty at the site during the hours of hazard described under Section 3. No work shall be performed if flagmen are required but are not on duty.
- 6.03 It shall be the responsibility of the Owner or its Contractor to keep the MBTA and Railroad Company(s) informed at all times when the Owner or its Contractor shall be working on, over, under, within or adjacent to MBTA Railroad Property and creating the hazards described under Section 3. Failure of the Owner or its Contractor to give the MBTA and Railroad Company(s) suitable advance notice of hazardous operation shall result in the shutdown of the work by the Railroad Company(s), until such time as sufficient numbers of flagmen are on duty at the site. If this becomes a repeat occurrence, the Contractor will be removed from the project.
- 6.04 The Railroad Company(s) will make its best effort to provide protective services personnel. Should the situation arise where such personnel are not available, Contractor operations must cease. The Railroad Company(s) is not liable for any monetary claims incurred during the absence of protective services personnel.

SECTION 7. INSPECTION

7.01 If deemed necessary by the Director of Engineering for MBTA Railroad Operations, the MBTA will furnish and assign an engineer(s) for inspection and the Railroad Company(s) will furnish an appropriate inspector for general inspection purposes or for general protection of MBTA Railroad Property and operations during construction. All protection services will be at the expense of the Owner or its Contractor.

SECTION 8. EXTRA-CONTRACT SERVICES

8.01 Temporary and permanent changes of tracks and all railroad utilities made necessary by the work of the Contractor, will be made by the MBTA or Railroad Company(s) at the expense of the Owner or its Contractor.

8.02 All other changes made or services furnished by the Railroad Company(s), at the request of the Owner or its Contractor, will be at the Owner's or its Contractor's expense.



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INSURANCE SPECIFICATIONS

The insurance outlined in these Specifications is required of the Owner or Contractor, and shall be provided by or in behalf of all subcontractors performing any portion of the work. The Owner or Contractor shall be responsible for any modifications, deviations or omissions of the required insurance as it applies to subcontractors.

All insurance policies, unless otherwise specified under Railroad Protective Liability Insurance, are to be written either on an occurrence basis or, if a claims-made form, applicable renewals must have a date retroactive to the construction start date and shall be maintained in force for one year following the acceptance of the work by the MBTA or its duly authorized representative.

With the exception of Railroad Protective Liability Insurance, all insurance policies must name the MBTA as an additional insured as its interest appears and waive any rights of subrogation against the MBTA.

Certificates of Insurance evidencing (1) either the claims-made or occurrence form coverage, (2) work description/location, (3) Owner or Contractor's corporate name, and (4) individual, company, government agency or municipality for which the work is being performed, are to be furnished to the MBTA prior to work commencement, and within fifteen (15) days of expiration of the insurance coverage, when applicable.

All policies must contain a minimum thirty (30) day written notice of cancellation clause, and provide that the Insurance Company shall notify the Owner, Contractor, MBTA and Railroad Company(s), via registered mail, of any cancellation, change or expiration of the policy.

Original Insurance Certificate(s) shall be received and approved by the MBTA before the Owner or Contractor will be allowed entry upon MBTA Railroad Property. Certificates, including any required endorsements, shall be furnished to the MBTA, c/o Risk Manager, Office of the Treasurer-Controller, Ten Park Plaza, Room 8450, Boston, MA 02116, and shall provide stated coverage and a provision that Notice of Accident (occurrence) and Notice of Claim shall be given to the Insurance Company as soon as practicable after notice to the insured(s).

Original Insurance Binders reflecting Railroad Protective Insurance shall be received and approved by the MBTA and the appropriate Railroad Company(s) prior to entry upon MBTA Railroad Property. Mailing addresses for transmittal of original Insurance Binders to the named insured Railroad Company(s) are contained on Page Four of these Specifications.

The Owner or Contractor shall indemnify, defend and save harmless the MBTA and the appropriate Railroad Company(s) from and against any and all liabilities, losses (including losses of revenue), claims, costs, damages and expenses (including reasonable attorney's fees and expenses) that may be asserted against or incurred by the MBTA and the Railroad Company(s) arising from or as a result of the Owner or Contractor's work, or its use of adjacent land. Said indemnification shall include claims, whether covered by insurance or not, including, but not limited to

Workers Compensation and similar insurance.

The Owner or Contractor shall maintain, during the life of the contract, from company (s) authorized to do business in the Commonwealth of Massachusetts and satisfactory to the MBTA:

A. COMMERCIAL GENERAL LIABILITY INSURANCE for personal injury, bodily injury and property damage in an amount not less than \$1,000,000 per occurrence and \$3,000,000 in the aggregate covering all work performed on over or adjacent to MBTA Railroad Property (the "work"), including:

1. All operations;
2. Contractual liability;
3. Coverage for the so-called "X, C, U" hazards, i.e., collapse of building, blasting, and damage to underground property;
4. Asbestos abatement, when applicable.

B. AUTOMOBILE LIABILITY INSURANCE including the use of all vehicles owned, non-owned, leased and hired, in an amount not less than \$1,000,000 combined single limit covering all the work.

C. WORKER'S COMPENSATION INSURANCE including Employees, Liability Insurance, as provided by Massachusetts General Laws, Chapter 152, as amended, covering all the work.

D. UMBRELLA LIABILITY COVERAGE in an amount not less than \$10,000,000 per occurrence covering all the work.

E. HAZARDOUS MATERIALS INSURANCE if the work involves hazardous materials, the following coverage is required:

1. **Pollution Liability insurance** for sudden and gradual occurrences in an amount not less than \$1,000,000 per occurrence and \$5,000,000 in the aggregate arising out of the work, including but not limited to all hazardous materials identified in the contract.
2. When applicable, the Owner or Contractor shall designate the disposal site and furnish a Certificate of Insurance from the Disposal Facility for Environmental Impairment Liability Insurance for (a) sudden and accidental occurrences in an amount not less than \$3,000,000 per occurrence and \$6,000,000 in the aggregate and (b) non-sudden occurrences in an amount not less than \$5,000,000 per occurrence and \$10,000,000 in the aggregate.

3. Certificates of insurance shall clearly state the hazardous materials exposure work being performed.

F. RAILROAD PROTECTIVE LIABILITY INSURANCE is specifically designed for insuring Railroads, and is purchased by the Owner or Contractor in the name of the MBTA and the Railroad Company(s). **The Railroad Company(s) is the named insured on the policy.** Railroad Protective Liability Insurance is required for any work performed within fifty (50) feet from center line of the nearest railroad track; it is not a substitute for any types of insurance outlined in these Specifications. Required limits are:

Bodily injury: not less than \$5,000,000 for all damages arising out of bodily injuries to or death of one person, and subject to that limit for each person, a total limit of \$6,000,000 for all damages arising out of bodily injury to or death of two or more persons in any one accident;

Property Damage: not less than \$10,000,000 or all damages arising out of injury to or destruction of MBTA property in any one accident, and subject to that limit per accident, a total of \$10,000,000 in the aggregate for all damages arising out of injury to or destruction of MBTA property.

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

Questions regarding train counts and train speeds should be directed to the appropriate Railroad Company(s) listed on Page Four.

PROOF OF INSURANCE

MAILING ADDRESSES:

MBTA

Risk Manager
c/o Treasurer-Controller
10 Park Plaza
Boston, MA 02116
cc: Massachusetts Realty Group

National Railroad Passenger Corporation (Amtrak)

Boston Division Office
c/o Division Engineer
2 South Station 5th Floor
Boston, MA 02110

CSX Transportation Inc.

500 Water St.
Jacksonville, FL 32202

Bay Colony Railroad Corporation

General Manager
4 Freight House Road
East Wareham, MA 02571

Boston and Maine Corporation
and Springfield Terminal Railway
Co.

Chief Engineer
402 Amherst Street
Suite 300
Nashua, NH 03063-1287

Providence and Worcester
Railroad Company

P. O. Box 1188
Worcester, MA 01601

Keolis Commuter Services

Chief Engineering Officer
470 Atlantic Ave.
Boston, MA 02110



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IV

PIPELINE OCCUPANCY SPECIFICATIONS

INDEX

<u>SUBJECT</u>	<u>PAGE</u>
<u>SECTION 1. GENERAL REQUIREMENTS</u>	
1.01 Description of Work and Location	1
1.02 License to Enter Railroad Company(s) Property	1
1.03 Work on Railroad Property	1
1.04 Coordination	3
1.05 Layout of Work	3
1.06 Indemnification	3
1.07 Scientific or Historic Artifacts	3
1.08 Record Documents	4
<u>SECTION 2. SUBMITTALS</u>	
2.01 Application for Occupancy	4
2.02 Submission of Construction Drawings and Specifications	4
<u>SECTION 3. TEMPORARY FACILITIES AND CONTROLS</u>	
3.01 Requirements of Regulatory Agencies	7
3.02 Installation and Coordination - General	7
3.03 Sanitary Facilities	8
3.04 Light and Power	8
3.05 Temporary Water	8
3.06 Temporary Traffic Controls	8

<u>SUBJECT</u>	<u>PAGE</u>
3.07 Temporary Work and Storage Areas	8
3.08 Pollution Abatement Controls	9
3.09 Protection of Persons and Properties	10
3.10 Vermin Control	11
3.11 Rubbish and Debris Removal	11
<u>SECTION 4. PIPELINE OCCUPANCY GENERAL CRITERIA</u>	
4.01 Method of Installation	12
4.02 General Requirements	13
4.03 Inspection and Testing	14
4.04 Cathodic Protection	14
4.05 Soil Investigations	15
4.06 Ground Stabilization	16
4.07 Support of Tracks	16
4.08 Geotechnical Monitoring	17
4.09 Pipelines On Bridges	18
4.10 Bonding and Grounding of Pipelines In Electrified Territory	18
4.11 Abandoned Pipelines or Facilities	19
4.12 Drainage	19
<u>SECTION 5. CARRIER PIPE</u>	
5.01 Design Criteria - General	20
5.02 General - Products	20

5.03	Oil and Gas Pipes	21
5.04	Cast Iron Pipe	21
5.05	Vitrified Clay Pipe	21
5.06	Corrugated Metal Pipe	21
5.07	Asbestos Cement Pipe	21
5.08	Other	22
5.09	Shut-Off Valve	22
5.10	Signs	22
5.11	Installation - Execution	22

SECTION 6. CASING PIPE

6.01	Design Criteria - General	23
6.02	Protection at Ends of Casing	24
6.03	Vents	24
6.04	Steel Pipe - Products	25
6.05	Cast Iron Pipe	25
6.06	Corrugated Metal Pipe and Corrugated Structural Plate Pipe	25
6.07	Reinforced Concrete Pipe	25
6.08	Tunnel Liner Plates	25
6.09	Depth of Installation - Execution	26
6.10	Method of Installation	26
6.11	Construction	27

<u>PLATES</u>	<u>PAGE</u>
Plate I Pipe Crossing	33
Plate II Pipe Crossing	34
Plate III Longitudinal Occupancy	35
Plate IV Pipe Crossing Data Sheet	35
Plate V Table of Minimum Wall Thickness	37

SECTION 1. GENERAL REQUIREMENTS

1.01 DESCRIPTION OF WORK AND LOCATION

These specifications apply to the design and construction of pipelines carrying flammable and non-flammable substances and to casings over 4-inches in diameter containing wires and cables, under, across or along MBTA Railroad Property, facilities and tracks.

1.02 LICENSE TO ENTER RAILROAD PROPERTY

- A. Entry upon MBTA Railroad Property for the purpose of conducting surveys, field inspections, obtaining soil information, or any other purpose associated with the design and engineering of the proposed occupancy, will be authorized by an MBTA License for Entry (See "Guidelines and Procedures for Construction on MBTA Railroad Property").
- B. Issuance of the License does not constitute authority to proceed with the actual construction.

1.03 WORK ON RAILROAD PROPERTY

- A. The safety and continuity of train operations shall be the first priority. The Applicant shall arrange the work so that the trains will be protected and safeguarded at all times. Whenever the work may affect the safety and movement of trains, the method, sequence and time schedule of performing such work shall be submitted to the Director of Engineering for MBTA Railroad Operations or their authorized representative for approval.
- B. The Applicant waives all claims against the Railroad Company(s) and/or the MBTA for delays or any interference occasioned by railroad traffic or railroad maintenance.
- C. All Applicant-designed temporary construction on MBTA Railroad Property shall be designed in accordance with the appropriate railroad criteria and all construction performed on, over, under, within or adjacent to MBTA Railroad Property will be subject to the inspection and approval of the Railroad Company(s) and/or MBTA.
- D. A minimum of fourteen (14) days advance written notice shall be given to the Railroad Company(s) prior to construction related activities.
- E. The Railroad Company(s) will furnish such qualified flagmen, signalmen or protection men as may be required to insure complete

protection of train operations and railroad facilities. The need for this type of service will be determined by the Railroad Company(s) on the basis of railroad regulations and the Applicant's approved construction schedule. No work shall proceed without proper protection on the site.

- F. All expenses incurred in connection with protection of railroad facilities by Railroad Company(s) employees will be borne by the Applicant. Billings for such service or expense, including labor, materials and equipment will be made directly to the Applicant for payment.
- G. During construction, railroad traffic shall be maintained at all times without interruption, except when approved in advance, in writing, by the Director of Engineering for MBTA Railroad Operations or their authorized representative.
- H. All construction operations shall be conducted so as not to interfere with, interrupt, or endanger the operation of trains, nor damage, destroy, or endanger the integrity of railroad facilities. All work on or near MBTA Railroad Property shall be conducted in accordance with the Railroad safety rules and regulations. The Applicant shall secure and comply with the Railroad safety rules and shall give written acknowledgment to the Railroad Company(s) that they have been received, read, and understood by the Applicant and their employees. Construction operations will be subject to Railroad Company(s) inspection at any and all times.
- I. All cranes, lifts, or other equipment that will be operated in the vicinity of the MBTA's electrification and power transmission facilities shall be electrically grounded as directed by the Railroad Company(s).
- J. At all times when the work is progressing, a field supervisor for the work with no less than twelve (12) months experience in the operation of the equipment being used shall be present. Certification of the above must be submitted to the Railroad Company(s).
- K. Whenever equipment or personnel are working closer than fifteen (15) feet to the closest rail of an adjacent track, that track shall be considered as being obstructed. As best possible, all construction operations shall be conducted no less than this distance. Construction operations closer than fifteen (15) feet to the closest rail of a track shall be conducted only with the permission of, and as directed by, a qualified Railroad Company(s) employee present at the work site.
- L. Crossing of tracks at grade by equipment and personnel is prohibited except by prior arrangement with, and as directed by, the Director of

Engineering for MBTA Railroad Operations or their authorized representative.

- M. All tunneling, jacking and boring operations within railroad influence lines will be done on a 24 hour per day basis to minimize Railroad exposure to construction hazards.

1.04 COORDINATION

The Applicant shall coordinate the work with their Contractors, subcontractors, utility companies, governmental units, and any affected Railroad Company(s) with regard to site access, establishment and use of temporary facilities, work schedules, and other elements of the specified work which require interfacing with others.

1.05 LAYOUT OF WORK

The Applicant shall lay out their work true to lines and grades indicated on the Drawings and shall be responsible for all measurements in connection therewith. The Applicant will be held responsible for the execution of the work to such lines and grades indicated on the approved construction Drawings or such other lines and grades as may be directed or established by the Director of Engineering for MBTA Railroad Operations or their authorized representative.

1.06 INDEMNIFICATION AND INSURANCE

See requirements in "Guidelines and Procedures for Construction on MBTA Railroad Property" and "Insurance Specifications."

1.07 SCIENTIFIC OR HISTORIC ARTIFACTS

The Applicant shall immediately notify the Director of Engineering for MBTA Railroad Operations of the discovery of scientific or historical artifacts and shall protect same until identified and removed by the appropriate Authorities exercising jurisdiction.

1.08 RECORD DOCUMENTS

- A. The Applicant shall furnish the Railroad Company(s) and the MBTA with one reproducible "As Built" copy of each approved Construction Drawing, marked to indicate all changes and deviations from same.
- B. All project record documents shall be received and accepted by the MBTA and the Railroad Company(s) prior to final inspection.

SECTION 2. SUBMITTALS

2.01 APPLICATION FOR OCCUPANCY

The Applicant must agree, upon approval of the construction details by the Director of Engineering for MBTA Railroad Operations, to execute the MBTA Pipeline Occupancy Agreement and pay any required fees and/or rentals outlined therein. Refer to "Guidelines and Procedures for Construction on MBTA Railroad Property" for application policy.

2.02 SUBMISSION OF CONSTRUCTION DRAWINGS AND SPECIFICATIONS

- A. Six (6) sets of Drawings and specifications for proposed pipeline occupations shall be submitted to the AGM for Real Estate and Asset Development and meet the approval of the Railroad Company(s) and the MBTA prior to the start of construction. These plans are to be prepared in sizes as small as possible and are to be folded to an 8-1/2 inch by 11-inch size (folded dimensions) with a 1-1/2 inch margin on the left side and a 1-inch margin on the top.
1. After folding, the title block and other identification of the Drawings shall be visible at the lower right corner, without the necessity of unfolding. Each Drawing shall bear an individually identifying number and an original date, together with subsequent revision dates, clearly identified on the Drawing.
 2. All Drawings are to be individually folded or rolled and where more than one Drawing is involved, they shall be assembled into complete sets before submission to the MBTA.
- B. Drawings shall be to scale and show the following (see attached Plates).
1. Plan view of proposed pipeline in relation to all railroad facilities.
 2. Location of pipe (in feet) from nearest railroad milepost, centerline of a railroad bridge (giving bridge number), or centerline of an existing or former passenger station, or other fixed point. In all cases, the name of the City or Town and County in which the proposed facilities are located must be shown.
 3. Profile of ground on centerline of pipe from field survey showing relationship of pipe and casing to ground level, tracks and other facilities. For longitudinal occupations, the profile of adjacent track(s) must be shown.

4. All MBTA property lines. If pipeline is in a public highway, the limits of the right-of-way for the highway shall be clearly indicated with dimensions from centerline.
 5. The angle of crossings in relation to centerline of tracks.
 6. Location of valves or control stations of the pipeline.
 7. "Pipe Crossing Data Sheet" completed and out on Plan.
- C. The Drawing must be specific (both on MBTA Railroad Property and under tracks that are not on MBTA Railroad Property) as to:
1. Method of installations.
 2. Size and material of casing pipe.
 3. Size and material of carrier pipe.

These items shall not have an alternative.

- D. Once an application is approved by the Director of Engineering for MBTA Railroad Operations or their authorized representative, proposed variances from the approved plans, specifications, method of construction, etc., will be resubmitted for approval.
- E. Location and dimensions of jacking, boring, or tunneling pits shall be shown with details of their sheeting and shoring. If the bottom of the pit excavation nearest the adjacent track intersects a line from a point 5.5 feet horizontally from center line of adjacent track at the plane of the base of fall drawn on a slope of 2 horizontal to 1 vertical, submit design and details of the pit construction to the MBTA for approval complete with computations prepared by a Registered Professional Engineer. In any event, the face of the pit shall be no less than 25 feet from adjacent track, unless otherwise approved by the Director of Engineering for MBTA Railroad Operations or their authorized representative. Pits shall be fenced, lighted, and otherwise protected as directed by the Railroad Company(s).
- F. All Drawings and computations, including those submitted by Contractors, must bear the seal of a Registered Professional Engineer.
- G. Computations for all structures involving the support or protection of railroad track, embankment and facilities must be prepared by and bear the seal of a Registered Professional Engineer and shall be submitted within the construction Drawings.
- H. When computer calculations are included with design calculations, the following documentation shall be furnished:

1. A synopsis of the computer program(s) stating briefly required input, method of solution, approximations used, second order analysis incorporated, specifications or codes used, cases considered, output generated, extent of previous usage of certification of program(s) and program(s) author.
 2. Identification by number, indexing and cross-referencing of all calculation sheets, including supplemental "long-hand" calculation sheets.
 3. Fully identified, dimensioned, and annotated diagram of each member or structure being considered.
 4. Clear identification and printing of all input and output values, including intermediate values if such values are necessary for orderly review.
 5. Identification of the processing unit, input/output devices, storage requirements, etc., if such supplemental information is significant and necessary for evaluation of the submittal.
- I. Specifications shall conform to Construction Specifications Institute (CSI) 16 Division, 3-part Section Format.
- J. If other than American Railway Engineering Association (AREA), American Society for Testing and Materials (ASTM), or American National Standards Institute (ANSI) specifications are referred to for design, materials or workmanship on the Construction Drawings and specifications for the work, then copies of the applicable sections of such other specifications referred to shall accompany the Construction Drawings and specifications for the work.

SECTION 3. TEMPORARY FACILITIES AND CONTROLS

3.01 REQUIREMENTS OF REGULATORY AGENCIES

Applicant shall:

- A. Obtain and pay all costs for required permits for installation and maintenance of temporary facilities and controls.
- B. Comply with all applicable Federal, State and local codes, regulations and ordinances.
- C. Comply with regulations and requirements of all utility or service companies from which temporary utilities or services are obtained, and pay all costs incurred therewith.

3.02 INSTALLATION AND COORDINATION - GENERAL

Applicant shall:

- A. Install all temporary facilities and controls in a neat and orderly manner.
- B. Make all temporary facilities structurally and functionally sound throughout.
- C. Construct temporary facilities and controls to give continuous service and to provide safe working conditions.
 - 1. Enforce conformance with applicable standards
 - 2. Enforce safe practices.
- D. Modify, extend or relocate temporary facilities and controls as work progress requires.
- E. Locate temporary facilities and controls to avoid interference with, or hazards to:
 - 1. Work or movement of railroad personnel or traffic.
 - 2. Vehicular traffic.
 - 3. General Public.
 - 4. Work of other contracts.
 - 5. Railroad Passengers.
- F. Obtain easements as may be required across non-MBTA Railroad Property.
- G. Provide materials for temporary facilities and controls for the purpose intended and shall not violate requirements of applicable codes and shall not create unsafe conditions.

3.03 SANITARY FACILITIES

Prior to the start of work, the Applicant shall furnish necessary toilet conveniences, secluded from public observation. They shall be kept in a clean and sanitary condition and comply with the requirements and regulations of the area in which the work is performed.

3.04 LIGHT AND POWER

Applicant shall make their own arrangements for obtaining temporary light and power as required for the work, and shall maintain such temporary facilities in a proper and safe condition, including compliance with applicable codes.

3.05 TEMPORARY WATER

Applicant shall make their own arrangements for obtaining all temporary water service as required for the work.

3.06 TEMPORARY TRAFFIC CONTROLS

Applicant shall cooperate with the directives of the MBTA and/or Railroad Company(s) regarding vehicular traffic control and provide any temporary controls or devices required to eliminate or minimize congestion or obstruction of vehicular traffic caused by the work, including use of designated routes of ingress and egress from the work area.

3.07 TEMPORARY WORK AND STORAGE AREAS

- A. The areas designated by the MBTA as the temporary parking, work and storage area(s) will be provided to the Applicant in accordance with the terms of the MBTA License Agreement.
- B. All designated temporary parking, work and storage areas used by the Applicant shall be restored to their original condition prior to completion of the work, subject to inspection and approval of the MBTA and the Railroad Company(s).

3.08 POLLUTION ABATEMENT CONTROLS

Applicant shall:

- A. Conduct operations in a manner to minimize pollution of the environment surrounding the area of work by every means possible. Specific controls shall be provided as follows:
 - 1. Vehicles: All vehicles and material transport trucks leaving the site and entering paved public streets shall be cleaned of mud and dirt clinging to the body and wheels of the vehicle. Trucks arriving at or leaving the site with materials shall be loaded in a manner which will prevent dropping of materials or debris on the streets. Spills of materials in public areas shall be removed immediately at no cost to the MBTA or Railroad Company(s).

2. Waste Materials: No waste or erosion materials shall be allowed to enter natural or man-made water or sewage removal systems. Erosion materials from excavations, borrow areas or stockpiled fill shall be contained within the work area. The Applicant shall develop methods for control of waste and erosion which shall include such means as filtration, settlement and manual removal to satisfy the above requirements. Do not dispose of machinery lubricants, fuels, coolants and solvents on the site. If hazardous waste is encountered, the Applicant shall dispose of it in accordance with all federal, state and local codes. Verification of proper disposal must be provided, in writing, to the MBTA and the Railroad Company(s).
 3. Burning: No burning of waste shall be allowed without prior written permission. In cases where permission is granted, burning shall be conducted in accordance with the regulations of the appropriate jurisdictional agency.
 4. Dust Control: The Applicant shall at all times control the generation of dust by their operations. Control of dust is mandatory and shall be accomplished by water sprinkling or by other methods approved by the MBTA or Railroad Company(s).
 5. Noise Control: The Applicant shall take every action possible to minimize the noise caused by their operation. When required by agencies having jurisdiction, noise producing work shall be performed during less sensitive hours of the day or week as directed by the MBTA or Railroad Company(s) or as required by local ordinance.
 6. Environmental: All local and state environmental laws will be strictly adhered to. All applications, permits, licenses, approvals, etc., will be the sole responsibility of the Applicant.
- B. Submit a program for pollution control with applicable licenses and permits for all piping carrying non-potable liquids, gases or other pollutants.

3.09 PROTECTION OF PERSONS AND PROPERTY

A. Safety Requirements

1. The Applicant must adhere to the most stringent provisions of the applicable statutes and regulations of the political subdivision in which the work is being performed. The Applicant must also observe the Department of Labor-

Occupational Safety, Health Administration provision, pertaining to the safe performance of the work, and further, the methods of performing the work must not involve undue danger to the personnel employed thereon, Railroad Company(s) employees, the public, or to public and private property. Should charges of violation of any of the above be issued to the Applicant in the course of the work, a copy of each charge shall immediately be forwarded to the Railroad Company(s). The Applicant shall pay all fines and penalties levied against him.

2. The Applicant shall erect and maintain, as required by existing conditions and progress of the work, all reasonable safeguards for safety and protection. This includes posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

B. Safety of Persons and Property - The Applicant shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:

1. All employees on the work site and all other persons who may be affected.
2. All materials and equipment, whether in storage on or off the site, under the care, custody or control of the Contractor or any of their subcontractors.
3. Other property at the site or adjacent thereto, including walks, pavements, roadways, structures, and utilities not designated for removal, relocation or replacement in the course of construction. Any damage to such items shall be restored to original condition by the Applicant at no cost to the MBTA or Railroad Company(s).

C. First Aid

The Applicant shall maintain adequate first aid supplies at the site as prescribed by Federal, State or Local codes and regulations.

D. Use of Explosives

Non blasting methods are preferred. See "Blasting Specifications."

E. Site Security

The Applicant shall:

1. Maintain a secure work site protecting the MBTA and the Railroad Company(s) interests and property from claims arising from trespass, theft and vandalism.
2. Permit access to the work site only to employees, Contractors and those persons having business related to the work.
3. Provide security measures as required to protect Contractor or subcontractor's tools, equipment and property from damage, theft or vandalism.
4. Assume all costs for any MBTA and/or local police details required by the work.

3.10 VERMIN CONTROL

- A. Do not permit food scraps, lunch bags, food wrappers or other items which would attract rats or other vermin to be left lying around the site. Deposit such items in closed, rat-proof metal containers for disposal on a regular basis.
- B. The Applicant must provide vermin control as required by the MBTA or Railroad Company(s).

3.11 RUBBISH AND DEBRIS REMOVAL

- A. Rubbish and debris resulting from the work must be neatly piled in a single location and legally disposed of at least once a week. If rubbish or debris interferes with railroad activities, or creates a fire or safety hazard, it must be removed on a more frequent basis.
- B. Volatile waste such as mineral spirits, oil, or paint thinner shall not be disposed of in storm or sanitary drains, streams or waterways or any location upon the site.

SECTION 4. PIPELINE OCCUPANCY GENERAL CRITERIA

GENERAL:

4.01 METHOD OF INSTALLATION:

- A In a public way:
 1. No work shall be done without a Railroad Company(s) Inspector present.
 2. Open cuts will not be allowed in or immediately adjacent to an at

grade crossing. Sleeves will be installed by the jerking method, unless otherwise approved by the Director of Engineering for MBTA Railroad Operations.

3. Jerking is the preferred method of installation in or immediately adjacent to and at grade crossing. The sleeve may be installed by the open cut method with the Applicant paying for the complete rebuilding of the crossing, pending approval of the Director of Engineering for MBTA Railroad Operations. Approval will be given only under very unusual circumstances.
4. Jacking is the preferred method of installation in or immediately adjacent to and at grade crossing scheduled for rebuilding. The sleeve may be installed by the open cut method within seven (7) calendar days of the scheduled date of the crossing reconstruction. In the case of any open cut, strict adherence shall be made to the backfill specifications which provide the MBTA with written certification from a testing lab or Professional Engineer, that the backfill density requirements of the MBTA specifications have been met or exceeded.

B. Not within a Public Way:

The preferred method of crossing the railroad is by jacking of a pipe sleeve under the railroad. Only upon written request, will an alternate of open cut be given consideration. The engineering decision shall be based upon, but not limited to, the following: (1) track usage, (2) depth of cut, (3) soil conditions, (4) physical restraints. In the event an open cut is allowed, the following items shall be adhered to, and (5) any other circumstances which may necessitate an open cut.

1. The installation is to be a continuous operation and performed according to an MBTA approved schedule.
2. No work shall be done without a Railroad Company(s) Inspector present.
3. MBTA backfill specifications by the Owner or its Contractor.
4. The Owner or its Contractor may be required to provide a non-refundable lump sum payment for "after the fact maintenance." The determination of this amount is based on the individual situation. No work will be allowed until this payment is received. This payment is not to be confused with payments for Drawings and specification review, flagging, inspection, etc. (also required from the Owner or its Contractor before they enter upon MBTA property.)

4.02 GENERAL REQUIREMENTS

- A. Pipelines under or across MBTA tracks on rights-of-way shall be encased in a larger pipe or conduit called the casing pipe as indicated in Plate II.
- B. Casing pipe will be required for all pipelines carrying oil, gas, petroleum products, or other flammable, highly volatile substances which, from their nature or pressure, might cause damage if escaping on or near MBTA Railroad Property.
- C. For non-pressure sewer or drainage crossings where the installation can be made without interference to railroad operations, the casing pipe may be omitted when the pipe strength is capable of withstanding railroad loading. This type of installation must be approved by the Director of Engineering for MBTA Railroad Operations.
- D. The casing pipe shall be laid across the entire width of the right-of-way. Casing pipe shall extend beyond the right-of-way when the right-of-way line on either side of the tracks is less than the minimum length of casing specified in Section 6, Para. 6.01(E).
- E. Pipelines laid longitudinally on railroad right-of-way shall be located in accordance with Plate III. If located within 25 feet of the closest rail of any track or closer than 45 feet to nearest point of any bridge, building or other structure, the carrier pipe shall be encased.
- F. Where practicable, pipelines shall be located to cross the tracks at approximate right angles, but preferably at not less than 45 degrees.
- G. Pipelines shall not be placed within a culvert, under railroad bridges, or closer than 45 feet to any portion of a railroad bridge, building, or other structure, except in special cases, and then by special design, as approved by the Director of Engineering for MBTA Railroad Operations.
- H. Pipelines carrying liquefied petroleum gas shall, where practicable, cross the railroad where tracks are carried on embankment.
- I. Any replacement or modification of an existing carrier pipe and/or casing shall be considered a new installation, subject to the requirements of these Specifications.
- J. Where laws or orders of public authority prescribe a higher degree of protection than specified herein, the higher degree so prescribed shall be deemed a part of these Specifications.

- K. Pipelines and casings shall be suitably insulated from underground conduits carrying electric wires on MBTA Railroad Property.

4.03 INSPECTION AND TESTING

For pipelines carrying flammable or hazardous materials, ANSI Codes B 31.8 and B 31.4, current at time of constructing the pipeline, shall govern the inspection and testing of the facility on MBTA Railroad Property, except that proof-testing of strength of carrier pipe shall be in accordance with the requirements of ANSI Code B 31.4, as applicable, for all pipelines carrying all liquefied petroleum gas, natural or manufactured gas, and other flammable substances.

4.04 CATHODIC PROTECTION

- A. Cathodic protection shall be applied to all pipelines and casings carrying flammable substances.
- B. Where casing and/or carrier pipe is cathodically protected by other than anodes, the Director of Engineering for MBTA Railroad Operations shall be notified and suitable testing shall be made. This testing shall be witnessed by the Railroad Company(s) to insure that other railroad structures and facilities are adequately protected from the cathodic current in accordance with the recommendations of Reports of Correlating Committee on Cathodic Protection, current issue by the National Association of Corrosion Engineers.

4.05 SOIL INVESTIGATIONS

- A. Soil borings (or other soil investigations approved by the Railroad Company(s)) will be performed to determine the nature of the underlying material for all pipe crossings under tracks. See Test Boring Specifications.
- B. Borings shall be made on each side of the tracks, on the centerline of the pipe crossing, and as close to the tracks as practicable.
- C. Soil borings shall be in accordance with the current issue of the American Railway Engineering Association Specifications, Chapter 1, Part 1, "Specifications for Test Borings". Soils shall be investigated by the split-spoon and/or thin-walled tube method and rock shall be investigated by the Boring method specified therein.
- D. Soil boring logs shall clearly indicate all of the following:
 - 1. Boring number as shown on boring location Drawing.

2. Elevation of ground at boring, using same datum as the pipeline Construction Drawings.
 3. Description or soil classification of soils and rock encountered.
 4. Elevations or depth from surface for each change in strata.
 5. Identification of where samples were taken and percentage of recovery.
 6. Location of ground water at time of sampling and, if available, subsequent readings.
 7. Natural dry density in lbs./sq.ft. for all strata.
 8. Unconfined compressive strength in tons/sq.ft., for all strata.
 9. Water content (percent). Liquid limit (percent) and plastic limit (percent).
 10. Standard penetration in blows/ft.
- E. The location of the carrier pipe and casing shall be superimposed on the boring logs before submission to the Director of Engineering for MBTA Railroad Operations.
- F. Soil investigation by auger, wash, or rotary drilling method is not acceptable.
- G. Soil boring logs shall be accompanied by a Drawing drawn to scale showing location of borings in relation to the tracks and the proposed pipe location, the elevation of around surface at each boring, and the elevation of the base of rail of the tracks.

4.06 GROUND STABILIZATION

Soil stabilization shall take place prior to the start of jacking. Stabilization shall be achieved by dewatering, grouting or a combination of both to maintain the stability of the face of the heading.

- A. The Owner or its Contractor shall lower and maintain the ground water level a minimum of two (2) feet below the invert at all times during construction by well points, vacuum well points, or deep wells to prevent inflow of water and/or soil into the heading. Ground water observation wells shall be installed in the area to be dewatered to demonstrate that the dewatering requirements are being complied with.
- B. The grouting Contractor shall be a specialist in the field with a minimum

of five (5) continuous years of successfully grouting soils. All granular soils (silty sands, sand or sand and gravel) shall be stabilized by injection of a cement or chemical grout from the ground surface or from the pipe heading. The stabilization shall extend as far as necessary outside the periphery of the casing pipe in order to maintain a stable face at the heading.

- C. Railroad Company(s) forces will survey the crossing prior to, during and after construction. If it is necessary to align or surface the tracks as a result of construction, the Railroad Company(s) will perform the work at the expense of the Owner or the Owner's Contractor.

4.07 SUPPORT OF TRACKS

- A. When jacking, boring, or tunneling, temporary track support structures shall be installed. The track support structures shall be provided by the Applicant and installed by the Railroad Company(s) at the Applicant's expense. The Contractors proposed type of temporary track support structures shall be subject to the approval of the Railroad Company(s)
- B. All work involving rail, signals, ties and other track material will be performed by the Railroad Company(s) at the Applicant's expense.
- C. The Applicant shall deliver the track support structures to a site approved by the Railroad Company(s). Provisions for unloading shall be provided by the Applicant at no expense to the Railroad Company(s) and the Applicant shall provide the necessary labor to handle the material for pre-installation inventory.

4.08 GEOTECHNICAL MONITORING

THE FOLLOWING SPECIFICATIONS ARE REQUIRED FOR ALL PIPE JACKING OPERATIONS.

- A. Jacking shall be performed on a continuous basis, 24 hours per day, and 7 days per week.
- B. The monitoring points shall be set up one week before the jacking operation begins. The MBTA and Railroad Company(s) shall be notified. Elevation readings shall begin two days prior to the start of jacking and continue for a minimum of two weeks after the completion of the jacking operation. Initial readings immediately after any surfacing operations shall serve as new baseline figures. All future elevation readings shall be compared to the adjusted baseline. If the

track deviates to a condition not acceptable to the MBTA or Railroad Company(s), corrections shall be made at the proponent's expense.

- C. Elevation readings shall be taken from the top rail of each track.
- D. Elevation readings shall be taken every four hours or two times per shift, i.e., six times per day. The readings shall be faxed to the MBTA and Railroad Company(s) on a daily basis and all information is to be presented in legible print. Additional readings may be required by the MBTA or Railroad Company(s).
- E. Stations shall be spaced at 15-1/2 foot intervals. The number of stations required shall be determined by the depth of the pipe. There shall be a minimum of two stations on either side of the centerline jacking. Additional stations may be required at the discretion of the MBTA or Railroad Company(s),
- F. Elevation readings must show the date, time, weather conditions and temperature. Each reading must also provide the following information: track number, compass direction, station number, base elevation (with date), static elevation, change in elevation (recorded in hundredths and in inches), dynamic reading and total deflection in inches. See sample sheet attached.
- G. Station "0" shall be located at the centerline of the pipe jacking with Stations 1 and being to the right and Stations -1 and -2 being to the left when standing in the gauge of the near track and looking at the receiving pit. In multiple track areas the stations as determined herein are to be carried across each track perpendicular to the near track.
- H. Elevation readings taken from the top of the rail for static measurement and the dynamic readings shall be combined and the sum compared to the adjusted baseline. This reading will demonstrate the difference in elevation caused by the jacking operation.
- I. The MBTA requires that the truck be maintained at all times within established criteria for the specific track classification. At the completion of the project the requirement for tamping and realigning the tracks, caused by the settlement from the construction activity, remains with the Contractor for the duration as specified by the MBTA in their initial review of the work plans. This tamping and track realignment will be performed by the MBTA or Railroad Company(s) at the sole expense of the Contractor.

4.09 PIPELINES ON BRIDGES

- A. Pipelines carrying flammable or non-flammable substances which by their nature might cause damage if escaping on or near railroad facilities or personnel shall not be installed on bridges over railroad tracks or bridges carting railroad tracks.
- B. The Director of Engineering for MBTA Railroad Operations may approve such an installation when it is demonstrated that no practicable alternative is available.
- C. When allowed by the Director of Engineering for MBTA Railroad Operations, pipelines on bridges shall be located in a way to minimize the possibility of damage from vehicles, railroad equipment, vandalism and other external causes. Pipelines on bridges may be installed in a utility bay that is constructed between the girders of the bridge. The utility bay shall be protected from the environment by a removable shield bolted to the girders. This will allow utility companies to comply with the Code of Federal Regulations for Periodic Inspection.
- D. In the event of pipe relocation due to the reconstruction of a bridge, the installation of the new pipe must comply with the requirements in these Specifications.

4.10 BONDING AND GROUNDING OF PIPELINES IN ELECTRIFIED TERRITORY

- A. Carrier pipe shall be enclosed in a metal casing that is isolated from carrier pipe by approved insulators having a dielectric value of not less than 25 kV that provide an air gap between carrier pipe and casing of not less than 2 inches.
- B. Carrier pipe supporting hangers, mountings or cradles shall provide an insulation value of not less than 25 kV and an air gap of not less than 2 inches between casing and any portion of mounting assembly.
- C. Any grounding or isolation methods used must have a minimum dielectric of 25,000 volts.

4.11 ABANDONED PIPELINES OR FACILITIES

- A. For all pipeline occupations on the railroad right-of-way, the owner of the pipeline shall notify the MBTA, in writing, of the intention to abandon the pipeline. Upon abandonment the carrier pipe shall be removed and the casing shall be filled with cement grout, compacted sand or other material approved by the Director of Engineering for

MBTA Railroad Operations. If it is impractical to remove the carrier pipe, then the carrier must be filled along with the annular space between the casing and carrier.

- B. Facilities other than pipelines shall be removed or altered at abandonment to the satisfaction of the Director of Engineering for MBTA Railroad Operations.

4.12 DRAINAGE

- A. Occupancies shall be designed, and constructed, so that adequate and uninterrupted drainage of railroad right-of-way is maintained. If it becomes necessary to block a ditch, pipe or other drainage facility, the applicant shall install temporary pipes, ditches or other drainage facilities as required to maintain adequate drainage, as approved by the MBTA or Railroad Company(s). Upon completion of the work, the temporary drainage facilities shall be removed and the permanent facilities restored.
- B. Water may not be pumped or disposed of onto railroad rights-of-way unless discharged into an existing drainage facility, providing discharge does not cause erosion or leave sediment.
- C. When water runoff is disposed of onto MBTA Railroad Property, it must be demonstrated to the Railroad Company(s) that the existing drainage facility can accommodate the increased runoff. Drainage calculations stamped by a Registered Professional Engineer must accompany all requests to use railroad culverts or drainage ditches.
- D. If in the estimation of the Director of Engineering for MBTA Railroad Operations or their authorized representative, the railroad culvert or drainage ditch has to be cleaned in order to allow the increased flow to safely pass through the culvert, it must be cleaned at the expense of the applicant.

SECTION 5. CARRIER PIPE

GENERAL:

5.01 DESIGN CRITERIA

- A. If the maximum allowable stress in the carrier pipe on either side of the occupancy of MBTA Railroad Property is less than specified herein, the carrier pipe on MBTA Railroad Property shall be designed at the same stress as the adjacent carrier pipe.

- B. Requirements for carrier pipe under railroad tracks shall apply for a minimum distance equal to that of the casing pipe.
- C. Carrier pipes within a casing shall be designed for railroad live loads as if they were not encased.
- D. All pipes, ditches and other structures carrying surface drainage on MBTA Railroad Property and/or crossing under railroad tracks shall be designed to carry the run-off from a one hundred (100) year storm. Computations indicating this design and suitable topographic plans, prepared by a Registered Professional Engineer, shall be submitted to the Director of Engineering for MBTA Railroad Operations, or their authorized representative, for approval. If the drainage is to discharge into an existing drainage channel on railroad right-of-way and/or under railroad tracks, the computations should include the hydraulic analysis of any existing structures. Submitted with the computations should be formal approval of the proposed design by the appropriate governmental agency.

PRODUCTS:

5.02 GENERAL

- A. All pipes shall be designed for the external and internal loads to which they will be subjected. The dead load of earth shall be considered 120 pounds per cubic foot. Railroad live loading shall be Cooper's E-80 with 50% added for impact. On railroad right-of-way or where railroad loading will be experienced, the following shall be the minimum requirements for carrier pipes:
 - 1. Reinforced concrete pipe - ASTM Spec. C-76, Class V, Wall C.
 - 2. Ductile Iron Pipe - For Culverts and Gravity Sewers - ASTM Spec, A-142 Extra Heavy.

5.03 OIL AND GAS PIPES

- A. Pipelines carrying oil, liquefied petroleum gas, natural or manufactured gas and other flammable products shall conform to the requirements of the current ANSI B 31.4, with Addenda, "Liquefied Petroleum Transportation Piping Systems," ANSI B 31.8, "Gas Transmission and Distribution Piping Systems," and other applicable ANSI codes, except that the minimum allowable stresses for the design of steel pipe shall not exceed the following percentages of the specified minimum yield strength (multiplied by the longitudinal joint factor) of the pipe as defined in the ANSI Codes:

1. Steel pipe within a casing under, across and longitudinally on MBTA Railroad Property. (The following percentages apply to hoop stress):
 - a. Seventy-two percent for installation on oil pipelines.
 - b. Fifty percent for pipelines carrying liquefied petroleum gas and other flammable Liquids with low flash point.
 - c. Sixty percent for installations on gas pipelines.
 2. Steel pipe without a casing laid longitudinally on MBTA Railroad Property. (The following percentages apply to hoop stress):
 - a. Sixty percent for installations on oil pipelines.
 - b. Forty percent for pipelines carrying liquefied petroleum gas and other flammable Liquids with low flash point.
 - c. Forty percent for installations on gas pipelines.
- B. Design computations showing compliance with the requirements of Paragraph 5.03(A) above, and prepared by a Registered Professional Engineer, shall accompany the application for occupancy.
- 5.04 CAST IRON PIPE: For water and other materials under pressure shall conform to the current ANSI specifications A-21 Series 21/45 Iron strength with plain end, compression type or mechanical joints. The strength to sustain external railroad and other loadings shall be computed in accordance with the current ANSI A-21.1 "Thickness Design of Cast Iron Pipe."
- 5.05 VITRIFIED CLAY PIPE: ASTM Spec C-700, Extra Strength.
- 5.06 CORRUGATED METAL PIPE: AREA Spec Chapter I, Part 4
- 5.07 ASBESTOS CEMENT PIPE (Non-pressure): ASTM Spec. C-428, C1. 5000 Min. Pressure: AWWA Spec. C400, C1. 150 Min.
- 5.08 OTHER: Other miscellaneous piping not specified above shall be submitted to approval by the Director of Engineering for MBTA Railroad Operations.
- 5.09 SHUT-OFF VALVE
- A. Provide accessible emergency shut-off valves at each side of the railroad within distances and at locations as directed by the Chief Engineering Officer.

- B. Where pipelines are provided with automatic control stations and within distances approved by the Director of Engineering for MBTA Railroad Operations, no additional valves will be required.

5.10 SIGNS

- A. Prominently identify all pipelines at rights-of-way by durable, weatherproof signs located over the centerline of the pipe. Mark pipelines at under crossings on both sides of track. Signs shall display the following:
 - 1. Name and address of pipeline Owner.
 - 2. Contents of Pipe.
 - 3. Pressure in Pipe.
 - 4. Depth below grade at point of sign.
 - 5. Emergency telephone in event of pipe rupture.
 - 6. Railroad File Number.
- B. For pipelines running longitudinally on MBTA Railroad Property, place signs over the pipe (or offset and appropriately mark) at all changes in direction the pipeline. Locate signs so that when standing at one sign, the next adjacent marker in either direction is visible. In no event shall pipeline identification signs be placed more than 500 feet apart, unless otherwise directed by the Director of Engineering for MBTA Railroad Operations.
- C. Submit details of signs (materials, size, methods of support, etc.) to the Director of Engineering for MBTA Railroad Operations for approval.

EXECUTION:

5.11 INSTALLATION:

- A. Install carrier pipes in accordance with approved Construction Drawings, requirements of this specification, and all applicable codes and ordinances.
- B. Install carrier pipes with sufficient slack so they are not in tension.

SECTION 6. CASING PIPE

GENERAL:

6.01 DESIGN CRITERIA

- A. Casing pipe and joints shall be of metal and of leak-proof construction.
- B. Casing pipe shall be designed for the earth and/or other pressures present, and for railroad live load. The dead load of earth shall be considered 120 pounds per cubic foot. Railroad Live load shall be Cooper E-80 with 50g added for impact.
- C. The inside diameter of the casing pipe shall be such as to allow the carrier pipe to be removed subsequently without disturbing the casing or the roadbed. For carrier pipe less than six (6) inches in diameter, the inside diameter of the casing pipe shall be at least two (2) inches greater than the largest outside diameter of the carrier pipe joints or couplings. For carrier pipe six (6) inches and over in diameter, the inside diameter of the carrier pipe shall be at least four (4) inches greater than the largest outside diameter of the carrier pipe joints or couplings.
- D. For flexible casing pipe, a minimum vertical deflection of 3 percent of its diameter, plus 1/2 inch, shall be provided so that no loads from the roadbed, track, traffic or casing pipe itself are transmitted to the carrier pipe. When insulators are used on the carrier pipe, the inside diameter of the flexible casing pipe shall be at least two (2) inches greater than the outside diameter of the carrier pipe for pipe less than eight (8) inches in diameter; at least 3-1/4 inches greater for pipe 8 to 16 inches in diameter, and at least 4-1/2 inches greater for pipe 18 inches and over in diameter. In no event shall the casing pipe diameter be greater than is necessary to permit the insertion of the carrier pipe.
- E. Casing pipe under railroad tracks and across MBTA Railroad Property shall extend the greater of the following distances, measured at right angles to centerline of track:
 - 1. Across the entire width of MBTA Railroad Property.
 - 2. Two (2) feet beyond ditch line.
 - 3. Three (3) feet beyond toe of slope.
 - 4. A minimum distance of 25 feet each side from centerline of outside track when casing is sealed at both ends.
 - 5. A minimum distance of 45 feet from centerline of outside track when casing is open at both ends.

F. If additional tracks are constructed in the future, the casing shall be extended at the expense of the Applicant.

G. Table of Live Loads

LIVE LOADS, INCLUDING IMPACT, FOR VARIOUS HEIGHTS OF COVER
FOR COOPER E- 80

COVER (FT)	LOAD (PSF)	COVER (FT)	LOAD (PSF)	COVER (FT)	LOAD (PSF)
2	3800	10	1100	20	300
5	2400	12	800	30	100
8	1600	15	600		

6.02 PROTECTION AT ENDS OF CASING

- A. Casings for carriers of flammable substances shall be sealed to the outside of the carrier pipe. Details of seals shall be shown on the Drawings.
- B. Casings for carriers of non-flammable substances shall have both ends of the casing blocked in such a way as to prevent the entrance of foreign material, but allowing leakage to pass in the event of a carrier break.
- C. Where ends of casing are at or above ground surface and above high water level, they may be left open, provided drainage is afforded in such a manner that leakage will be conducted away from railroad tracks and structures.

6.03 VENTS

- A. Sealed casings for flammable substances shall be properly vented. Vent pipes shall be of sufficient diameter, but in no case less than two (2) inches in diameter, and shall be attached near each end of the casing and project through the ground surface at right-of-way lines or not less than 45 feet (measured at right angles from centerline of nearest track).
- B. Vent pipes shall extend at least four (4) feet above the ground surface. Top of vent pipe shall have a down-turned elbow, properly screened, or a relief valve. Vents in locations subject to high water shall be extended above the maximum elevation of high water and shall be supported and protected in a manner approved by the Director of Engineering for MBTA Railroad Operations.
- C. Vent pipes shall be at least four (4) feet from the closest aerial electric

wires.

- D. When the pipeline is in a public highway, street-type vents shall be installed.

PRODUCTS:

6.04 STEEL PIPE

The minimum yield strength for steel pipe shall be 35,000psi. Smooth wall pipes with a nominal diameter greater than 70 inches require special approval by the Director of Engineering for MBTA Railroad Operations. See Plate V, "Table of Minimal Wall Thickness for Steel Casing Pipe."

6.05 CAST IRON PIPE

May be used for a casing, provided the method of installation is by open trench. Cast iron pipe shall conform to ASTM Specification A-142, Extra Heavy. The pipe shall be of the mechanical joint type or plain end type with compression type couplings.

6.06 CORRUGATED METAL PIPE AND CORRUGATED STRUCTURAL PLATE PIPE

May be used for casing only when emplaced by the open-cut method. Jacking or boring through railroad embankment is not permitted. Pipe shall be bituminous coated and shall conform to AREA Specifications Chapter 1, Part 4.

6.07 REINFORCED CONCRETE PIPE

Shall conform to ASTM Specification C 76, Class V, Wall C. It shall be used only in the open cut and jacking methods of installation. If concrete pipe is to be jacked into place, grout holes tapped for at least 1-1/2 inch pipe spaced at approximately 8 feet around the circumference and approximately 4 feet longitudinally shall be cast into the pipe at manufacture. Immediately upon completion of jacking operations, the installation shall be pressure grouted.

6.08 TUNNEL LINER PLATES

Shall be four flange and otherwise conform to American Railway Engineering Association Specifications Chapter 1, Part 4. In no event shall the liner plate thickness be less than 0.1046 inches. Tunnel liner plates are to be used only to maintain a tunneled opening until the carrier pipe is installed. After installation the annular space between the carrier and liner must be filled

with 1:6 cement grout or lined with 6 inches of concrete, reinforced with 6x6-6/6 wire mesh for tunnels up to 108 inches in diameter. Required thickness of lining for larger tunnels shall be determined by span and structural analysis. Manufacturer's Shop Detail Drawings and manufactures computations showing the ability of the tunnel liner plates to resist the jacking stresses shall be submitted to the Director of Engineering for MBTA Railroad Operations for approval.

EXECUTION:

6.09 DEPTH OF INSTALLATION:

- A. Casing pipe under railroad tracks and across MBTA Railroad Property shall be at least 6-1/2 feet from top of rail to top of casing at its closest point. Under secondary or industrial tracks this distance shall be at least 5-1/2 feet. On other portions of MBTA Railroad Property where casing is not directly beneath any track, the depth from ground surface or from bottom of ditches to top of casing shall be at least four (4) feet, unless otherwise specified herein.
- B. Pipelines laid longitudinally on MBTA Railroad Property 50 feet or less from centerline of track shall be buried not less than five (5) feet from ground surface to top of pipe. This applies to all pipelines carrying oil, gas, petroleum products, or other flammable or highly volatile substances under pressure, and all non-flammable substances which by their nature or presence in the judgment of the Director of Engineering for MBTA Railroad Operations may be hazardous to life or property. For pipelines carrying water, sewage and non-flammable substances, the distance from surface of ground to top of pipe shall not be less than four (4) feet.
- C. Pipelines located within the line of track live load influence (as shown on Plates II and III) are subject to railroad loading and require a casing or are to be of special design approved by the Director of Engineering for MBTA Railroad Operations. All longitudinal occupation locations must be approved by the Chief Engineering Officer.
- D. The minimum cover shall be at least three (3) feet when pipeline is laid more than 50 feet from center line of track.
- E. Pipelines installed under or adjacent to any overhead structure must be a minimum of 29 feet from the bottom of the structure to the top of the casing. Such installations must comply with the above requirements.

6.10 METHOD OF INSTALLATION

- A. The Owner or its Contractor shall submit to the Director of Engineering for MBTA Railroad Operations, data and information demonstrating that the Contractor or their subcontractors have had successful previous experience in jacking, or using the proposed method of installation, in similar situations.
- B. Before any work is begun within the limits of jacking, the Owner or its Contractor shall have assembled all tools, materials, and equipment which will be required. When the Owner or its Contractor has started the jacking operation, they shall proceed in a continuous operation without stopping. This will minimize the tendency of the material to freeze around the pipe.
- C. A jacking shield shall be used and jacked ahead of the casing pipe. The excavation within the jacking pipe should not advance beyond the head of the pipe shield. If the stability at the face needs to be maintained from raveling or running soil, suitable temporary bulkheads, struts, and bracing shall be required. After completion of the sleeve installation the annular space around it shall be completely grouted with cement grout under pressure.
- D. Casing pipe ends shall be beveled with a single V-groove toe field welding. Pipe joints shall be butt welded and shall be a full penetration on the outside circumference of the pipe. The single V-groove butt weld shall conform to the latest A.W.S. Welding Code. All joints of the casing pipe shall be butt welded, by a certified welder, prior to being subject to the jacking operation.

Alternate method: The casing pipe may be jacked without being butt welded through the use of a continuous 1/2"x12" interior collar plate. The collar plate shall be welded completely upon completion of the jacking operation. All welding shall conform to the latest A.W.S. Welding Code, and shall be performed by a certified welder.

6.11 CONSTRUCTION:

- A. The casing pipe shall be constructed so as to prevent leakage of any substance from the casing throughout its length, except where the ends are left open, or through vent pipes when the ends are sealed. The casing shall be installed so as to prevent the formation of a waterway under the railroad, shall have an even bearing throughout its length, and shall slope to one end (except for longitudinal occupancy).
- B. Casing pipes shall be installed by the following methods:

1. Jacking

- a. This method shall be in accordance with the most current edition of the American Railway Engineering Association Specifications, "Jacking Culvert Pipe Through Fills." This operation shall be conducted without hand mining ahead of the pipe and without the use of any type of boring, auguring, or drilling equipment.
- b. Bracing and backstops shall be designed and jacks of sufficient rating used so that the jacking will be continuous.

2. Drilling

This method employs the use of an oil field type rock roller bit or a plate bit made up of individual roger cutter units which are welded to the pipe casing being installed and which are turned as it is advanced. The pipe is turned for its entire length from the drilling machine to the ground being drilled. A high density slurry is injected through a small supply line to the head which acts as a cutter lubricant. This slurry is injected at the rear of the cutter units to prevent any jetting action ahead of the pipe. The drilling machine runs on a set of steel rails and is advanced (thus advancing the pipe) by a set of hydraulic jacks. The method is the same whether earth or rock is being drilled. Any other drilling methods shall be submitted to the Director of Engineering for MBTA Railroad Operations for approval.

3. Tunneling

- a. Tunneling operations shall be conducted as approved by the Railroad Company(s). Care shall be exercised in trimming the surface of the excavated section in order that the steel liner plates fit snugly against the undisturbed material. Excavation shall not be advanced ahead of the previously installed liner plates any more than is necessary for the installation of the succeeding liner plate. The vertical face of the excavation shall be supported as necessary to prevent sloughing. At any interruption of the tunneling operation, the heading shall be completely bulkheaded. Tunneling shall be conducted continuously, on a 24 hour basis until the tunnel liners extend at least one foot beyond the railroad line of influence.
- b. When tunneling, tight breasting must be maintained around the entire face. On any shutdowns (under or beyond railroad influence line, see Plate II), the entire

face shall be fully breasted and packed with hay.

- c. The tail void shall be filled with pea stone (or other approved material) simultaneously with each advancement of the shield.
- d. An ample supply of hay and/or sandbags must be kept at the site to fill any voids caused by the removal of large stones or other obstructions extending outside the shield.
- e. A uniform mixture of 1:6 cement grout shall be placed under pressure behind the liner plates, in addition to the previously placed pea stone. Grout holes, tapped for at least 1-1/2 inch pipe and spaced 3 feet around the tunnel liner, shall be placed in every other ring. Grouting shall start at the lowest dole and proceed upwards. A threaded plug shall be installed in each grout hole as the grouting is completed at that hole.
- f. Grouting shall be kept as close to the heading as possible, using grout stops behind the liner plates. If necessary, grouting shall proceed as directed by the Railroad Company(s), but in no event shall more than six lineal feet of tunnel be progressed beyond the grouting.

4. Tunneling Shields

- a. All pipes 70 inches and larger in diameter shall be emplaced with the use of a tunneling shield, unless otherwise approved by the Director of Engineering for MBTA Railroad Operations. Pipes of smaller diameter may also require a shield when, at the sole discretion of the Director of Engineering for MBTA Railroad Operations, soil, or other conditions indicate its need.
- b. The shield shall be of steel construction, designed to support railroad track loading as specified in Paragraph 6.01 B herein, in addition to other loadings it must sustain. The advancing face shall be provided with a hood, extending no less than 20 inches beyond the face and extending around no less than the upper 240 degrees of the total circumference. Installations made with liner plates shall be provided with a full 360 degree shield. It shall be of sufficient length to permit the installation of at least one complete ring of liner plates within the shield before it is advanced for the installation of the next ring of liner plates, It shall conform to and not exceed the outside dimensions of the pipe being emplaced by more than one inch at any point in the periphery.

- c. The shield must be adequately braced and provided with necessary appurtenances for completely bulkheading the face with horizontal breastboards, and arrange so that the excavation can be benched as may be necessary. Excavation shall not be advanced beyond the edge of the hood, unless otherwise approved by the Railroad Company(s).
 - d. Manufacturer's Shop Detail Drawings and computations showing the ability of the tunnel liner plates to resist the jacking stresses shall be submitted to the Director of Engineering for MBTA Railroad Operations for approval.
 - e. For jacking reinforced concrete pipe, the shield shall be fabricated as a special section of reinforced concrete pipe with the steel cutting edge, hood, breasting attachments, etc., cast into the pipe. The wall thickness and reinforcing shall be designed for the jacking stresses.
 - f. Grout holes tapped for no less than 1-1/2 inch pipe, spaced at approximately 3 foot centers around the circumference of the shield (or the aforementioned special reinforced concrete section) and no more than 4 foot centers longitudinally shall be provided.
 - g. Detail Drawings sufficient to determine the adequacy of the shield, accompanied with design calculations prepared by a Registered Professional Engineer, shall be submitted to the Director of Engineering for MBTA Railroad Operations for approval and no work shall proceed until such approval is obtained.
5. Boring
- a. This method consists of pushing the pipe into the fill with a boring auger rotating within the pipe to remove the spoil. When augers, or similar devices, are used for pipe emplacement, the front of the pipe shall be provided with mechanical arrangements or devices that will positively prevent the auger and cutting head from leading the pipe so that there will be no unsupported excavation ahead of the pipe. The auger and cutting head arrangement shall be removable from within the pipe in the event an obstruction is encountered. The over-cut by the cutting head shall not exceed the outside diameter of the pipe by more than one-half inch. The face of the cutting head shall be arranged to provide reasonable obstruction to the free flow of soft or poor material.
 - b. Drawings and descriptions of the auger stop arrangement to be used shall be submitted to the Director of Engineering for MBTA Railroad Operations for approval,

and no work shall proceed until such approval is obtained and the arrangement is inspected in the field by the Railroad Company(s).

- c. The use of water or other Liquids to facilitate casing emplacement and/or spoil removal is prohibited.
 - d. Any method which employs simultaneous boring and jacking or drilling and jacking for pipes over 8 inches in diameter which does not have the above approved arrangement WILL NOT BE PERMITTED. For pipes 8 inches and less in diameter, augering or boring without this arrangement may be considered for use only as approved by the Director of Engineering for MBTA Railroad Operations.
- C. If an obstruction is encountered during the installation which stops the forward action of the pipe, and it becomes evident that it is impossible to advance the pipe, operations shall cease and the pipe shall be abandoned in place and filled completely with grout, in accordance with Section 4, Paragraph 4.10.
- D. Bored or jacked installations shall have a bored hole essentially the same as the outside diameter of the pipe plus the thickness of the protective coating. If voids should develop or if the bored hole diameter is greater than the outside diameter of the pipe (plus coating) by more than 1 inch, grouting or other methods approved by the Railroad Company(s) shall be employed to fill such voids.
- E. Pressure grouting or freezing of the soils before or during jacking, boring, or tunneling may be required at the direction of the Railroad Company(s) to stabilize the soils, control water, prevent loss of material and prevent settlement or displacement of the embankment and/or tracks. Grout shall be cement, chemical or other special injection material selected to accomplish the necessary stabilization.
- F. The materials to be used and the method of injection shall be prepared by a Registered Professional Engineer (Geotechnical), or by an experienced and qualified company specializing in this work and submitted for approval to the Railroad Company(s) before the start of work. Proof of experience and competency shall accompany the submission.
- G. When water is expected to be encountered, pumps of sufficient capacity shall be provided and maintained at the site, and continually attended on a 24-hour basis, until in the sole judgment of the Railroad Company(s), their operation can be safely halted.

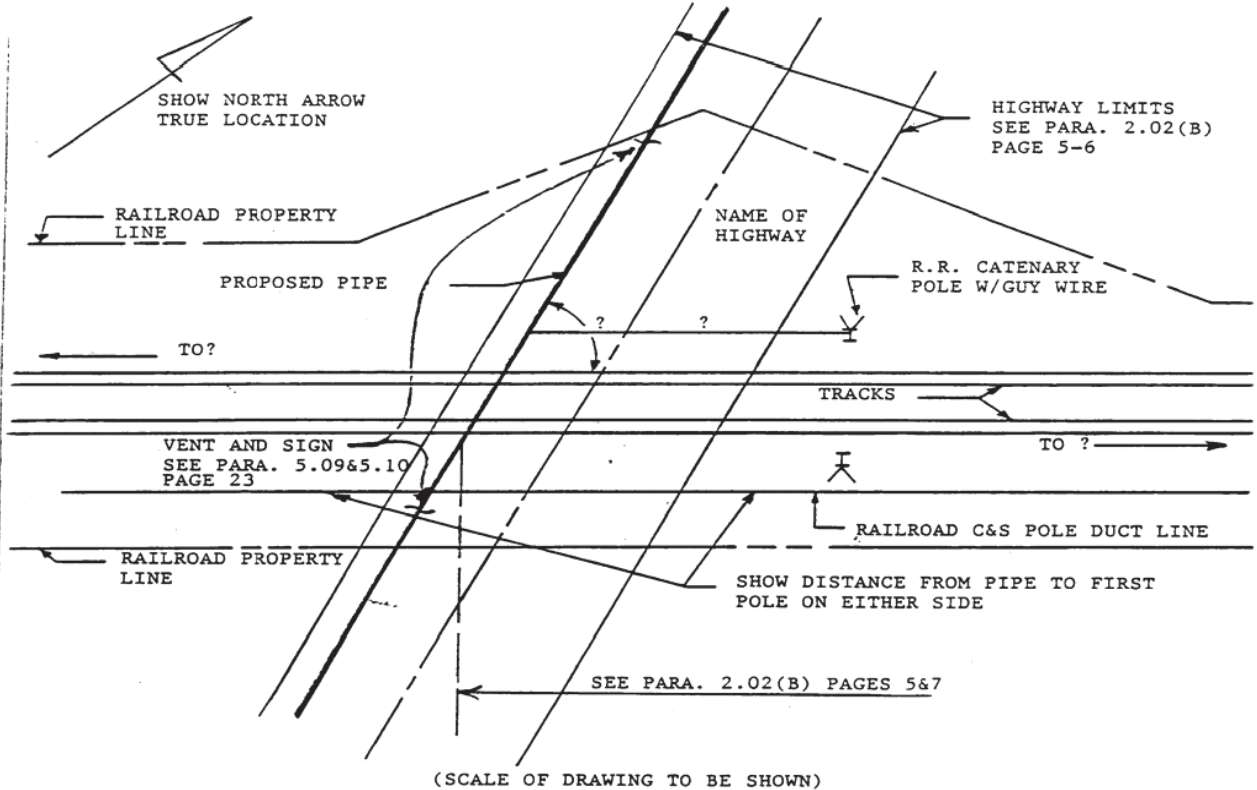
When dewatering, close observation shall be maintained to detect any settlement or displacement of railroad embankment, tracks, and facilities.

- H. Proposed methods of dewatering must be submitted to the Railroad Company(s) for approval prior to implementation. The discharge from the dewatering operations in the vicinity of the railroad shall be carefully monitored. If in the opinion of the Railroad Company(s), there is an excessive loss of fine soil particles at any time during the dewatering process, the dewatering shall be halted immediately. The dewatering operation cannot resume until the unsatisfactory condition is remedied to the satisfaction of the Railroad Company(s).

PLATE I

PIPE CROSSING

INFORMATION TO BE SHOWN ON PLAN SECTION OF DRAWING



NOTE:

IF MANHOLES ARE PLACED ON MBTA RAILROAD PROPERTY, DETAILS OF SAME, WITH CLEARANCES TO THE CENTERLINE OF THE NEAREST TRACK ARE TO BE SHOWN ON THE DRAWINGS.

IF THE PROPOSED PIPE IS TO SERVE A NEW DEVELOPMENT, A MAP SHOWING THE AREA IN RELATION TO ESTABLISHED AREAS AND ROADS IS TO BE SENT WITH THE REQUEST.

THE PROPOSED PIPE IS NOT WHOLLY WITHIN HIGHWAY LIMITS, THE SAME INFORMATION IS REQUIRED AS SHOWN ON THIS PLATE.

PLATE II

PIPE CROSSING

INFORMATION TO BE SHOWN ON PROFILE SECTION OF DRAWING

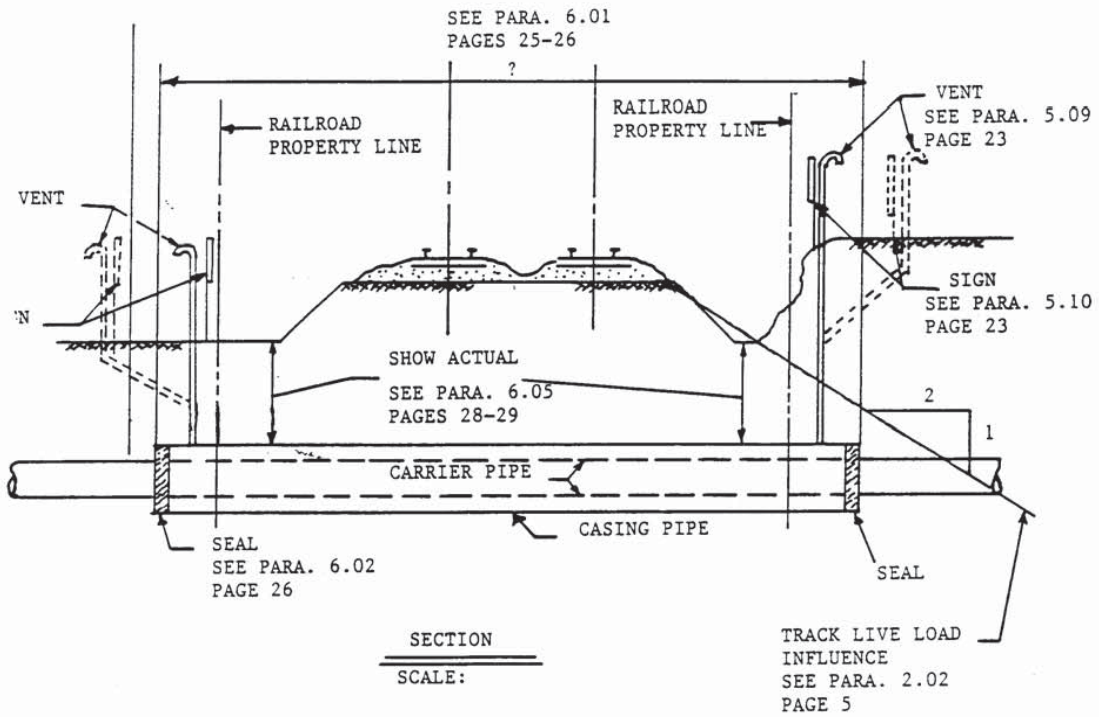
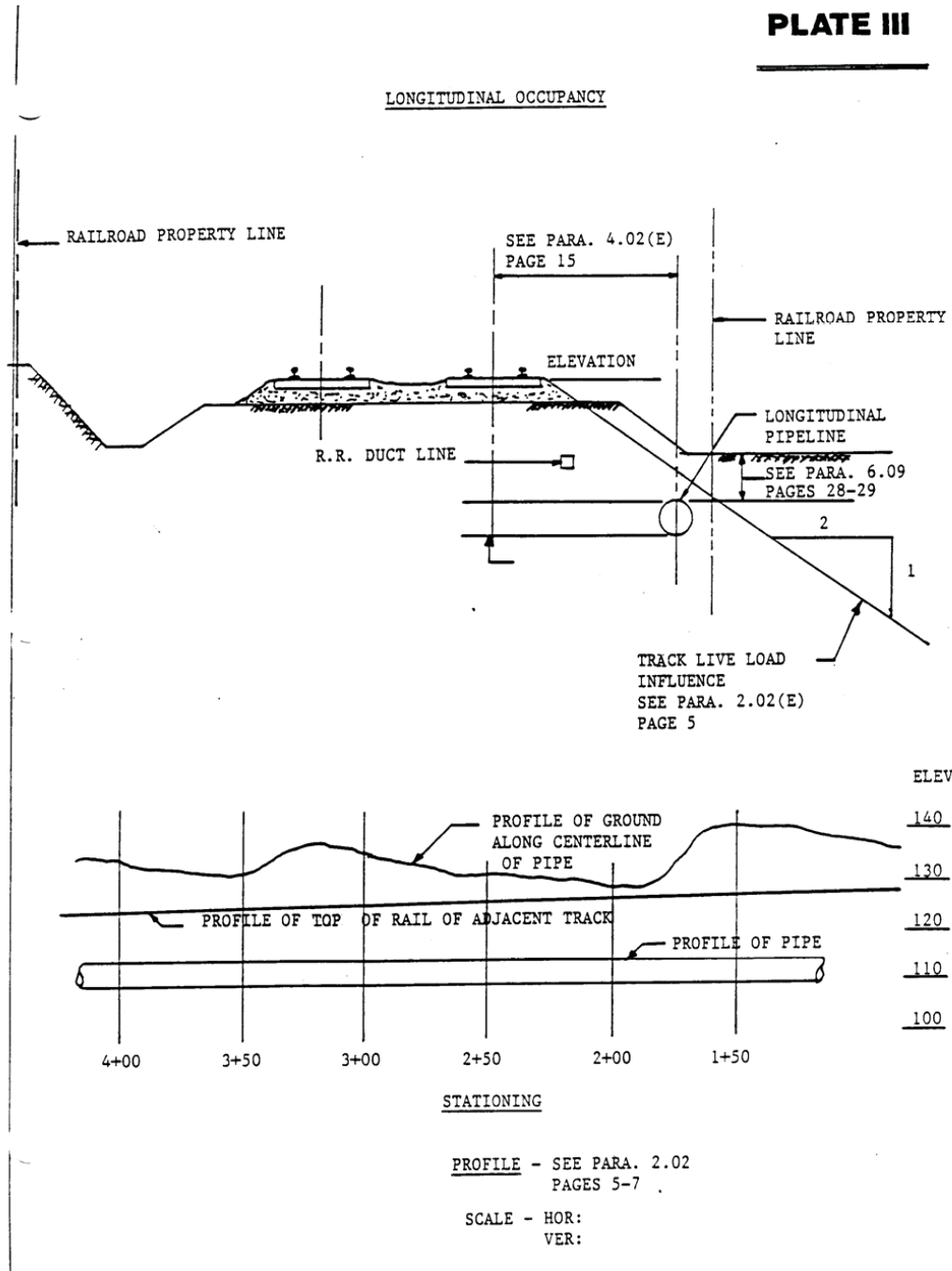


PLATE III

LONGITUDINAL OCCUPANCY



PIPE CROSSING DATA SHEET

PLATE IV

In addition to plan and profile of crossing, Drawings submitted for the Railroad Company(s) approval shall contain the following information:

	<u>Pipe Data</u>	
	<u>Carrier Pipe</u>	<u>Casing Pipe</u>
Contents To Be Handled	_____	_____
Normal Operating Pressure	_____	_____
Normal Size of Pipe	_____	_____
O.S. Diameter	_____	_____
I.S. Diameter Wall	_____	_____
Thickness Weight	_____	_____
Per Foot Material	_____	_____
Process of Manufacture	_____	_____
Specification	_____	_____
Grade or Class	_____	_____
Test Pressure	_____	_____
Type of Joint	_____	_____
Type of Coating	_____	_____
Details of Cathodic Protection	_____	_____
Details of Seal or Protection at Ends of Casing:	_____	_____
Method of Installation	_____	_____
Character of Subsurface: Material At the Crossing Location	_____	_____
Approximate Ground Water Level	_____	_____
Source of Information on Sub-surface conditions (Test Pits, Borings or Other)	_____	_____

NOTE: Any soil investigation made on MBTA Railroad Property, or adjacent to tracks shall be carried on under the supervision of the Railroad Company(s).

PLATE V

TABLE OF MINIMUM WALL THICKNESS FOR STEEL CASING PIPE
(FOR INFORMATION ONLY)

PROTECTED WALL THICKNESS

PIPE SIZE (INCHES)	WALL THICKNESS (PROTECTED)
10	0.375
12	0.375
14	0.375
16	0.375
18	0.375
20	0.375
22	0.375
24	0.375
26	0.375
28	0.406
30	0.469
32	0.501
34	0.532
36	0.532
38	0.569
40	0.569
42	0.569
44	0.594
46	0.688
48	0.688
50	0.688
52	0.813
54	0.813
56	0.876
58	0.876
60	0.876
62	0.876
64	0.876
66	0.876
68	0.876
70	0.906

NOTE: - FOR UNPROTECTED PIPE 26" AND UNDER ADD 0.032" TO PROTECTED WALL THICKNESS. FOR UNPROTECTED PIPE 28" AND OVER, ADD 0.063" TO PROTECTED WALL THICKNESS.



**MASSACHUSETTS BAY
TRANSPORTATION
AUTHORITY**

RAILROAD OPERATIONS DIRECTORATE

V

SPECIFICATIONS FOR WIRE CONDUIT AND CABLE
OCCUPATIONS

SECTION 1. SCOPE

- 1.01 These specifications apply to the design of electric transmission wires and cables (power and communication) which are to be located over, under, across or upon property, facilities, and tracks owned by the MBTA.

SECTION 2. LICENSE TO ENTER MBTA RAILROAD PROPERTY

- 2.01 Individuals, corporations, or municipalities desiring wire or cable occupations must agree, upon approval of the construction details by the Director of Engineering for MBTA Railroad Operations, to execute an appropriate occupational agreement and pay any required fees and/or rentals outlined therein.

- 2.02 Application for an occupancy shall be submitted in writing to:

AGM for Real Estate and Asset Development
MBTA, 10 Park Plaza
Boston, Massachusetts 02116

See "Guidelines and Procedures for Construction on MBTA Railroad Property."

- 2.03 All applications shall be accompanied with six (6) copies of all Construction Drawings, specifications and computations concerning the proposed occupancy.

SECTION 3. APPROVAL OF DRAWINGS

- 3.01 Entry upon MBTA Railroad Property for the purpose of conducting surveys, field inspections, obtaining soil information, or any other purpose associated with the design and engineering of the proposed occupancy will be permitted only with a proper entry permit prepared by the MBTA Real Estate Department. The issuance of such a permit does not constitute authority to proceed with the actual construction. Construction cannot begin until the proper insurance certificate is received and a formal agreement is executed by the MBTA and permission is received by the Railroad Company(s).

- 3.02 Drawings shall be drawn to scale and show the following: (See attached plates I -VI)

- A. Plan view of crossing or occupation in relation to all Railroad Company(s) facilities. (See Plate 1)
- B. Location of wire or cane (in feet) from nearest railroad mile post, center line of a railroad bridge (giving bridge number), or center line of a passenger station. In all cases, the name of the County and City or

Town in which the proposed facilities are located must be shown.

- C. Profile of ground on center line of pole or tower line, showing clearances between top of rail and bottom of sag, as well as clearances from bottom wire or cable to top wire or cable of the MBTA's transmission, signal and communication lines and catenary. If none of these facilities are in existence at the point of crossing, the plan should so indicate. Actual under-clearances are to be shown. (See Plate V for the required clearances).
- D. Show all known property lines. If wires, cables or conduits are within public highway limits, such limits should be clearly indicated with dimensions from center line.
- E. The Drawing must be specific as to:
 - 1. Base diameter, height, class and bury of poles. Poles shall be set no closer than 13' 6" from face of pole to center line of nearest track. When necessary, however, each location will be analyzed by the MBTA to consider speed, traffic, access, etc.
 - 2. Number, size and material of power wires, as well as number of pairs in communication cables.
 - 3. Nominal voltage of line, type of current and frequency.
 - 4. Number, location, size and material of anchors and all guying for poles and arms.

NOTE: Double cross-arms are required on poles adjacent to track. Any tower designs must be accompanied by engineering computations and data.

SECTION 4. CONSTRUCTION REQUIREMENTS

- 4.01 Power and communication lines shall be constructed in accordance with "Safety Rules for the Installation and Maintenance of Electric Supply and Communication Lines, National Electrical Safety Code Handbook, Part 2" (current issue), with the following exceptions:
 - A. Item 3 (c), page 2.
 - B. Casing pipes to contain power or communication wires or cables having an outside diameter of over four (4) inches shall be constructed in accordance with the current issue of MBTA Railroad Operations "Pipeline Occupancy Specifications".

SECTION 5. LONGITUDINAL OCCUPATIONS

- 5.01 Wires and cables running longitudinally along railroad right-of-way shall be

constructed as close to MBTA property lines as possible in accordance with Plate III. For electrical power lines and cables with voltages of 34,500 or over and communication canes containing over 180 pairs, the following information must be submitted in addition to the detail of the pole top configuration as called for on Plate IV of these specifications:

- A. Voltage of circuit(s) or number of pairs. B. Phase of electrical circuit(s).
 - B. Number of electrical circuits.
 - C. Size (AWG or CM) and material of wires and cables.
- 5.02 Any facilities overhanging MBTA Railroad Property must have approval of the MBTA and appropriate rental charges will be applied.

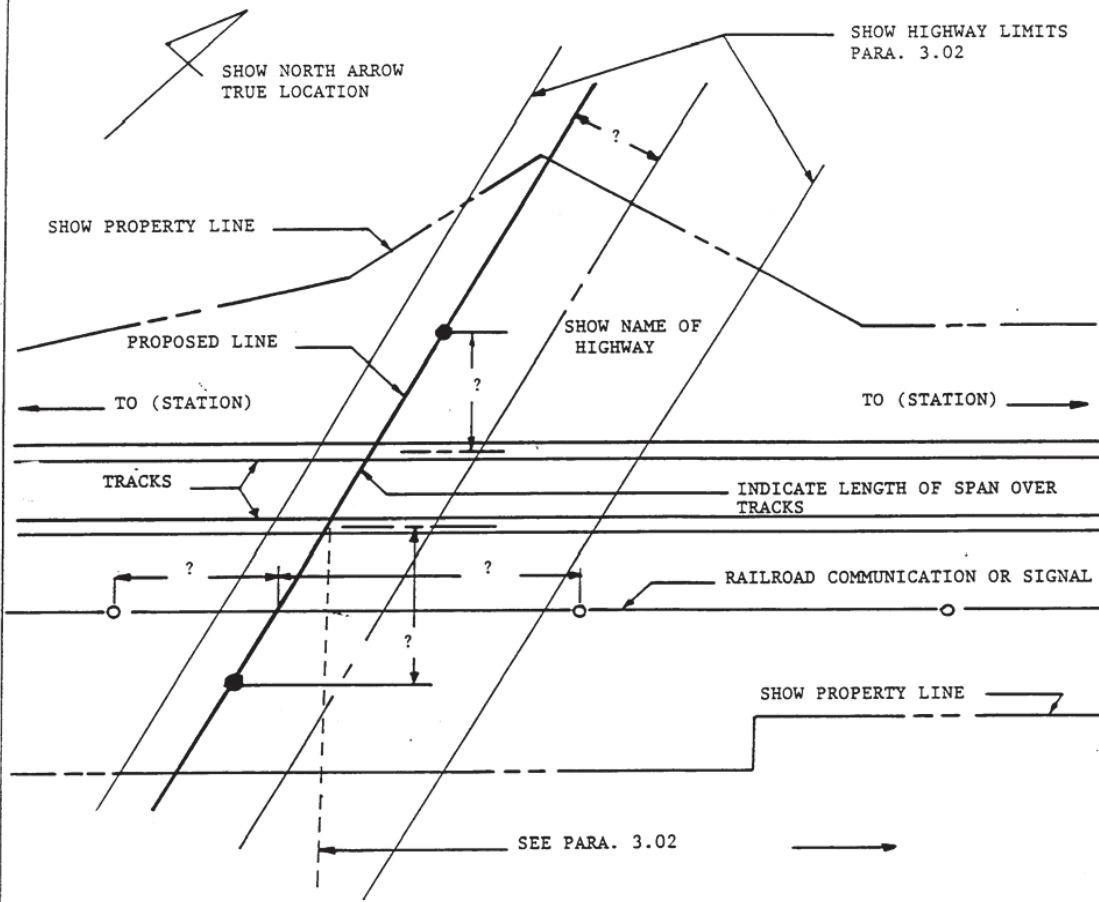
SECTION 6. INDUCTIVE INTERFERENCE

- 6.01 On agreements covering longitudinal occupations, provisions shall be included that hold the Applicant responsible to provide appropriate remedies, at their own expense, to correct any inductive interference with MBTA facilities.

PLATE I

PLAN VIEW

INFORMATION TO BE SHOWN ON PLAN SECTION OF DRAWINGS
WHEN FACILITY IS A CROSSING



SCALE OF DRAWING TO BE SHOWN

NOTE:

IF THE PROPOSED LINE IS TO SERVE A NEW DEVELOPMENT, A MAP SHOWING THE AREA IN RELATION TO ESTABLISHED AREAS AND ROADS IS TO BE SENT WITH THE REQUEST.

IF THE PROPOSED LINE IS NOT WHOLLY (OR PARTIALLY) WITHIN HIGHWAY LIMITS, THE SAME INFORMATION IS REQUIRED AS SHOWN ON THIS PLATE.

PLATE II

PIPE CROSSING

INFORMATION TO BE SHOWN ON PROFILE SECTION OF DRAWING

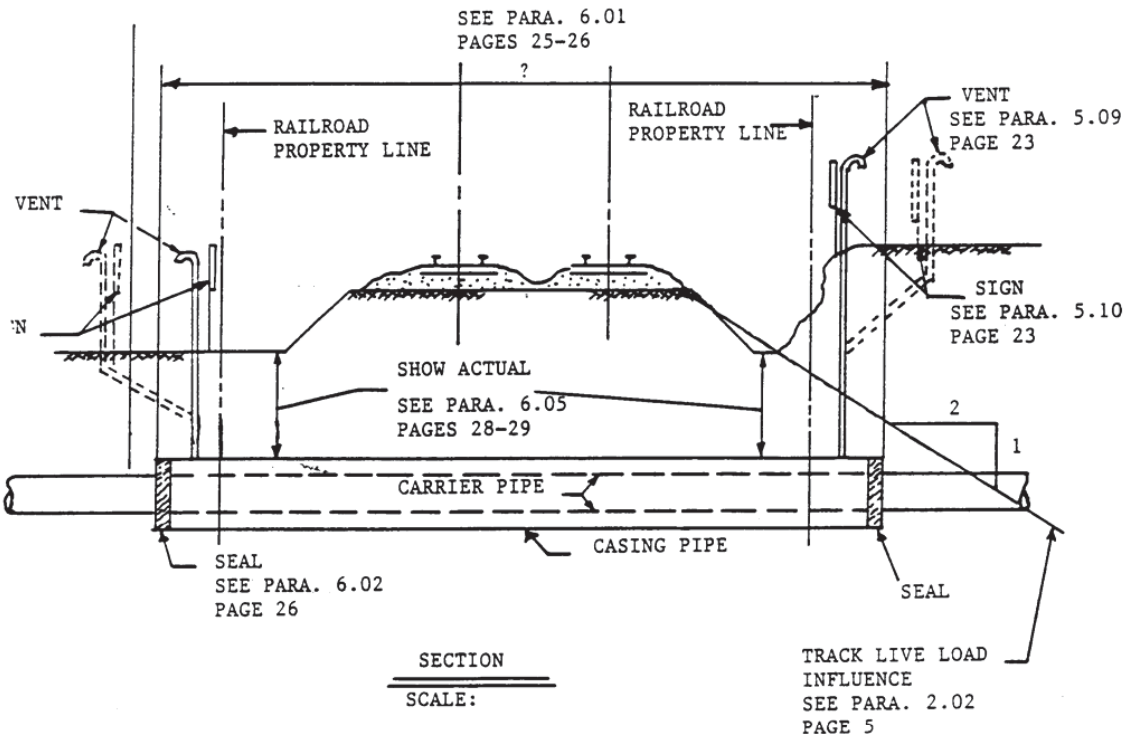
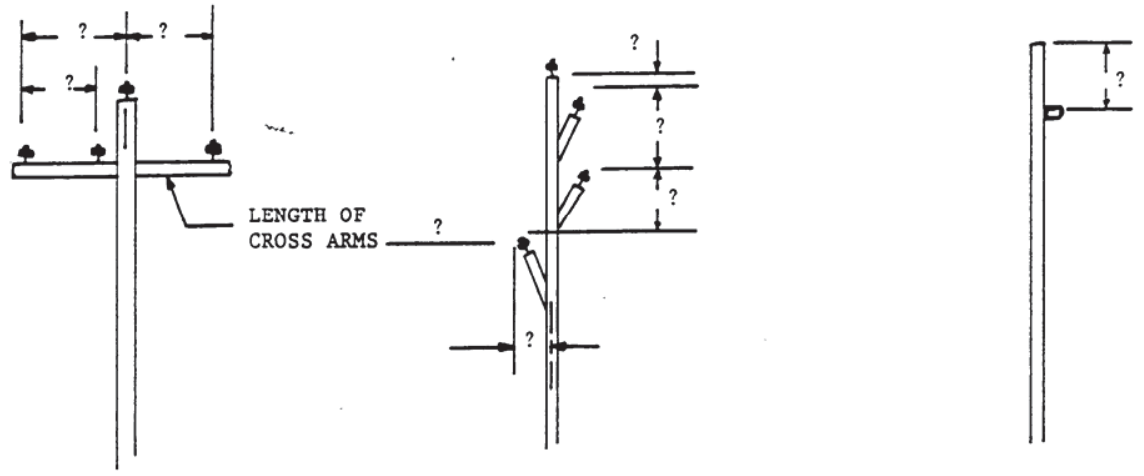
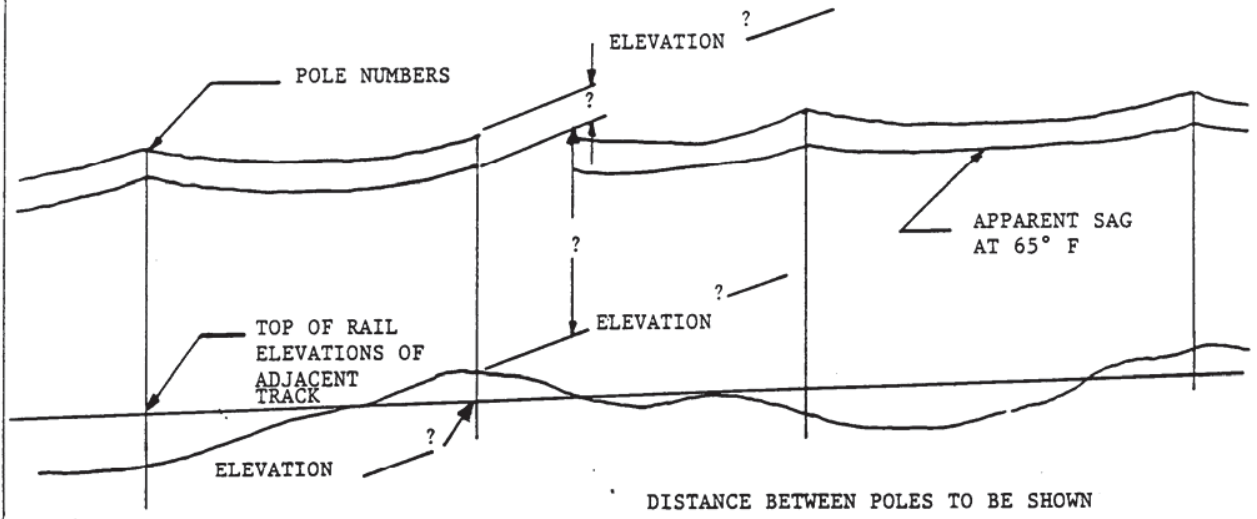


PLATE III

PROFILE VIEW

INFORMATION TO BE SHOWN ON PROFILE SECTION OF DRAWINGS
IN CASES OF LONGITUDINAL OCCUPATIONS



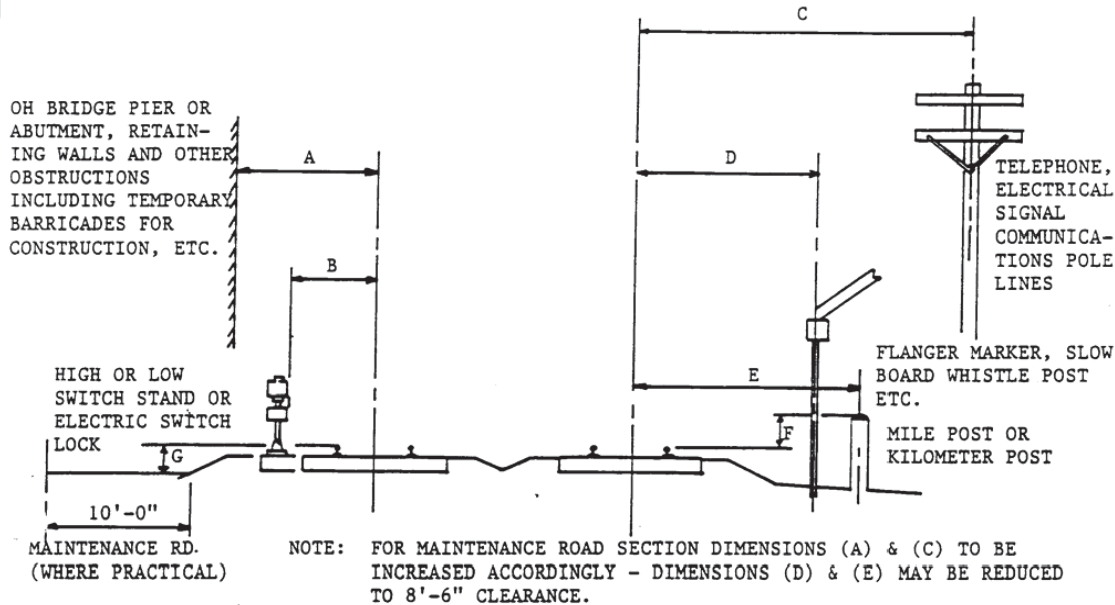
POLE TOP CONFIGURATION TO BE SHOWN SIMILAR TO SAMPLES ABOVE

NOTE: IF POWER LINE CROSSES ANY TRACK, THEN INFORMATION SHOWN ON PLATE II IS ALSO REQUIRED.

PLATE IV

STANDARD SIDE CLEARANCES - TANGENT TRACK

(FOR OBSTRUCTIONS OTHER THAN PASSENGER STATIONS)



DIMENSION	DESCRIPTION	
A	GENERAL MINIMUM SIDE CLEARANCE	8'-6"
	OVERHEAD BRIDGE PIERS & ABUTMENT, RETAINING WALLS & OTHER EXISTING STRUCTURES	8'-6"
B	LOW SWITCH STANDS (3'-0" MAX HEIGHT)	6'-6"
	HIGH SWITCH STANDS (OVER 3'-0" HEIGHT)	9'-0"
	ELECTRIC SWITCH LOCKS	6'-6"
C	POLE LINES - TELEPHONE, ELECTRIC, SIGNAL COMMUNICATIONS (MIN)	13'-6"
D	CENTERLINE WHISTLE POSTS, FLANGER MARKERS, SLOW OR SPEED BOARDS AND OTHER WAYSIDE SIGNS	12'-0"
	AUTOMATIC HIGHWAY CROSSING PROTECTION (MIN)	8'-6"
	AUTOMATIC HIGHWAY CROSSING PROTECTION (DESIRED)	15'-0"
E	MILE POSTS - HORIZONTAL	13'-6"
F	MILE POSTS - VERTICAL	7'-0"
G	DEPRESSION OF MAINTENANCE ROAD	

PLATE V

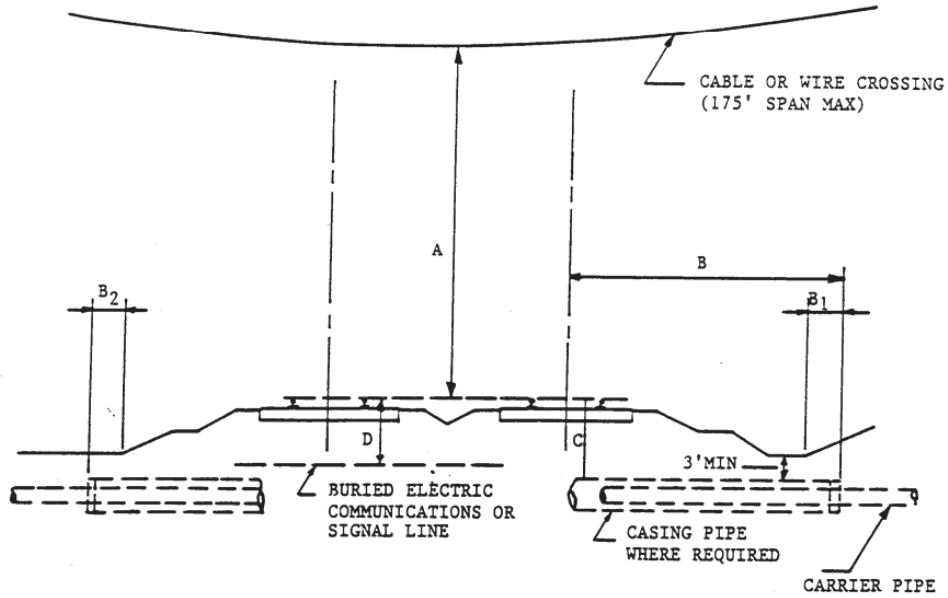
<u>VOLTAGE</u>	<u>OVERHEAD CLEARANCE</u> (Top of Rail to <u>Bottom of Sag</u>)	
0- 750	27'0"	} At 120°F Ambient Temperature
750- 15,000	28'0"	
15,000 - 50,000	30'0"	
69,000	30'8"	
115,000	32'2"	
138,000	33'0"	
345,000	39'10"	
500,000	45'0"	
745,000	53'2"	
765,000	53'10"	
Other than power lines	27'0"	

(Calculation is 30'0" + 0.4" per 1,000 volts over 50,000 volts)

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CLEARANCES FOR OVERHEAD AND BURIED UTILITY CROSSINGS

PLATE VI



DIMENSION	DESCRIPTION		
A	POWER LINES 0 TO 750V	27'-0"	} At 120°F Ambient Temperature
	POWER LINES 750V TO 15,000V	28'-0"	
	POWER LINES 15 TO 50KV	30'-0"	
	OTHER THAN POWER LINES	27'-0"	
B	SEALED ENDED CASINGS	25'-0"	
	OPEN ENDED CASINGS	45'-0"	
B ₁	END CASING BEYOND DITCH	2'-0"	
B ₂	END CASING BEYOND SLOPE	3'-0"	
C	CARRYING PIPE	4'-6"	
	CARRYING PIPE WITHOUT CASING	6'-6"	
D	BURIED ELECTRIC LINES	6'-6"	
	RAILROAD SIGNAL LINES (220V)	2'-6"	
	COMMUNICATIONS LINES	3'-6"	



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VI

**BRIDGE ERECTION, DEMOLITION AND HOISTING
OPERATIONS**

Submittals for bridge erection, demolition, or other hoisting operations shall be prepared and stamped by a Registered Professional Engineer and must include the following:

1. Plan view showing locations of crane or cranes, operating radii, with delivery or disposal locations shown.
2. Crane rating sheets showing cranes to be adequate for 150% of the lift. Crane and boom nomenclature is to be indicated.
3. Drawings and computations showing weight of picks.
4. Location plan showing obstructions, indicating that the proposed swing is possible.
5. Data sheet listing type and size of slings or other connecting equipment. Include copies of catalog cuts or information sheets of specialized equipment. The method of attachment must be detailed on the erection plan. All lifting components must be adequate for 150% of the lift.
6. A complete procedure indicating the order of lifts and any repositioning or re-hitching of the crane or cranes.
7. Drawings detailing temporary support of any components or intermediate stages.
8. A time schedule (by hour and day) of the various stages, as well as a schedule for the entire lifting procedure.



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VII

TEMPORARY SHEETING AND SHORING

The following items are to be included in the design and construction procedures for all permanent and temporary facilities on, over, under, within or adjacent to MBTA Railroad Property:

1. Footings for all piers, columns, walls or other facilities shall be located and designed so that any temporary sheeting and shoring for support of adjacent track or tracks during construction will not be closer than toe of ballast slope. (See dimensions in the MBTA's Book of Standard Plans, #1000 and #1002 for tangent and curved track). Sheeting shall be required when excavation is inside of a line which extends horizontally from 5.5 feet off center line of adjacent track, then on a 2 (horizontal) to 1 (vertical) slope. This is known as the zone of influence.
2. Where physical condition of design impose insurmountable restrictions requiring the placing of sheeting closer than specified above, the matter must be submitted to the Director of Engineering for MBTA Railroad Operations for approval of any modifications.
3. When support of track or tracks is necessary during construction of above mentioned facilities, interlocking steel sheeting adequately braced and designed to carry E-80 live load plus 50% impact is required. Soldier piles and lagging will be permitted for supporting adjacent track or tracks only when required penetration of steel sheet piling cannot be obtained or when in the opinion of the Director of Engineering for MBTA Railroad Operations, or their authorized representative, steel sheet piling would be impracticable to place.
4. Exploratory trenches, three (3) feet deep and fifteen (15) inches wide in the form of an "H" with outside dimensions matching the outside of sheeting dimensions are to be hand dug, prior to placing and driving steel sheeting, in areas where railroad underground installations are known to exist. These trenches are for exploratory purposes only and are to be backfilled and compacted immediately. This work must be done in the presence of a railroad inspector.
5. Absolute use of track is required while driving sheeting adjacent to any track. Procedure for arranging the use of track shall be through the Railroad Company(s) representative on the project.
6. Cavities adjacent to sheet piling, created by driving of sheet piling, shall be filled with sand and any disturbed ballast must be restored and tamped immediately as required by the Railroad Company(s).
7. Sheet piling shall be cut off at top of tie during construction. After construction and backfilling has been completed, the piling within twelve (12) feet from centerline of track shall be cut off 24" below bottom of tie or 24" below finished grade, whichever is greater. Sheeting, used as a form on a permanent

structure, shall be cut as directed by the Railroad Company(s).

8. The excavation adjacent to the track shall be covered and protected by handrails and barricades, warning lights shall be provided by the Contractor as directed by the Railroad Company(s).
9. Graded backfill material shall be compacted at near optimum moisture content, in layers not exceeding 6 inches in compacted thickness, by pneumatic tampers, vibrator compactors, or other approved means to the base of the railroad subgrade. Material in the vicinity of sheet pile shall be compacted to not less than 95 percent of AASHTO T 99, Method C. The Contractor shall be required to supply, to the job site, ballast stone as prescribed herein to be installed by the Railroad Company(s).
10. The Contractor is to advise the Railroad Company(s) of the time schedule of each operation and obtain approval of the Railroad Company(s) for all work to be performed adjacent to MBTA tracks so that it may be properly supervised by railroad personnel.
11. All Drawings for temporary sheeting and shoring shall be prepared and stamped by a Registered Professional Engineer and shall be accompanied by complete design computations when submitted for approval.
12. Particular care shall be taken to avoid erosion or filling of the Railroad Company(s) drainage facilities. Erosion and sediment control in the vicinity of the railroad shall be as approved by the Director of Engineering for MBTA Railroad Operations. Correction of disrupted Railroad Company(s) drainage facilities shall be at the Contractor's sole expense.

MBTA REQUIREMENTS FOR GEOTECHNICAL MONITORING

THE FOLLOWING SPECIFICATIONS ARE REQUIRED FOR ALL PILE DRIVING/EXCAVATING OPERATIONS:

1. Pile driving shall be on a continuous basis for each pile driven. Once a pile is started, it shall be driven or cut off at an elevation not to exceed the plane across the top of the rails of any track within 8'-6" plus 2" for each degree of curvature from centerline of track to the closest edge of the edge or excavation.
2. The monitoring points shall be set up one week before the pile driving or excavation operations begin. The MBTA and the Railroad Company(s) shall be notified. Elevation readings to establish the initial baseline reading shall begin two days prior to the start of driving. Readings shall be for a minimum of two weeks after the completion of the driving or backfilling of the excavation, whichever is longer. Initial readings immediately after any surfacing operations shall serve as new baseline figures. All future elevation readings shall be compared to the adjusted baseline. If the track deviates to a condition that is unacceptable to the MBTA or Railroad Company(s), corrections shall be made at the Contractor's expense.
3. Elevation readings shall be taken from the top of each rail of each track within the "zone of influence" the excavation. See Section 1, Page 1 of this specification.
4. Elevation readings will be taken once per eight hour shift. The readings shall be faxed to the MBTA Railroad Company(s) on a daily basis and all information is to be presented in legible print. During excavation within the sheet pile protected area, the top of rail elevations shall be checked every hour. Additional readings may be required by the MBTA or Railroad Company(s).
5. Stations shall be spaced at 15-1/2 foot intervals. The number of distractions required will be determined by the length of the excavation parallel to the tracks. There will be four additional stations on each end of the pile driving/excavation operation along the track. Extra stations may be required by the MBTA or Railroad Company.
6. Elevation readings must show the date, time, weather conditions and temperature. Each reading must also provide the following information: track number, compass direction, station number, base elevation (with date), static elevation, change in elevation (recorded in hundredths and in inches), dynamic reading and total deflection in inches. See sample sheet attached.
7. Station "0" will be located at the centerline of the project with Stations 1, 2, 3, etc., being to the right and Stations -1, -2, -3, etc., being to the left when

standing on the near track and looking at the work. In multiple track areas the stations as determined herein are to be carried across each track located within any part of the zone of influence. See Plate I.

8. At each monitoring station a dynamic load measurement shall be taken. The dynamic load measurement device shall consist of a wooden stake placed firmly in the ballast and in initially in contact with the bottom of the rail. The loaded measurement is the resultant gap between the bottom of the rail and the top of the stake caused by the deflection of the rail under the load of a passing train. Based on field observations of the excavation, and at the option of the MBTA or railroad company(s), this requirement may be reduced.
9. Elevation readings taken from the top of rail for static measurement and the dynamic reading shall be combined and the sum compared to the adjusted baseline. This reading will demonstrate the difference in elevation caused by the excavation.
10. The MBTA requires that the track be maintained at all times within established criteria for the specific track classification. At the completion of the project the requirement for tamping and realigning the tracks, caused by the settlement from the construction activity, remains with the Contractor for the duration as specified by the MBTA in their initial review of the Construction Drawings. This tamping and track realignment will be performed by the MBTA or railroad company(s) at the sole expense of the Contractor.



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VIII

BLASTING SPECIFICATIONS

Blasting on, over, under, within or adjacent to MBTA Railroad Property will be permitted only in special cases where it is demonstrated to the Director of Engineering for MBTA Railroad Operations that there is no practicable alternative to perform the work.

In such cases when blasting is permitted, the Contractor must submit a detailed blasting program to the MBTA and Railroad Company(s) for approval prior to the commencement of any work. The blasting program must contain the following information:

- a. Site plan with location of nearest MBTA structure.
- b. Plan of each blast showing hole spacing and delay pattern.
- c. Diameter and depth of each hole.
- c. Amount of explosives per hole.
- d. Total pounds of explosives per day.
- e. Total amount of explosives per blast.
- f. Type of non-electric delays to be used.
- h. Amount of stemming in each hole.
- g. Type of explosive to be used.
- h. Soil and rock profile in blast zone.
- i. Scaled distance to the nearest MBTA facility.
- j. Type and location of seismograph to be used.
- m. Size of blasting mats to be used.
- k. Safety precautions to be followed.

The following general requirements are to be adhered to:

- a. Obtain the services of a qualified vibration and blasting consultant to monitor the blasting.
- b. Use a non-electric detonation system whenever possible. If electric caps are used, a check must be made for stray currents, induced current and radio frequency energy to insure that this hazardous extraneous electricity is at an acceptable safe level.
- c. Provide an open face for maximum relief of burden.
- d. Limit the maximum peak particle velocity to 1 inch per second. Depending on existing conditions, this may be modified to 2 inches per second.
- e. Maintain an initial scale distance of 60 ft. per 1-1/2 lbs. After initial blasting, scale distance may be modified to a minimum of 50 ft. per 1-1/2 lbs., if conditions permit.

Scale distance -- Distance from blast to structure (in feet)

Weight of explosives per delay (in pounds)

The Contractor shall provide for a pre-blast and post blast survey, including photographs. An inspection of all nearby MBTA facilities shall be made to determine any changes that may occur due to blasting operations.

The Contractor shall coordinate all blasting with the MBTA and Railroad Company(s) in advance to determine when the charges may be set. The Contractor is advised that the MBTA and Railroad Company(s) use two way radios for train control. The radios operate in the 160 MHz area. These radios cannot be turned off at any time.



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IX

**TEMPORARY PROTECTION SHIELDS FOR DEMOLITION AND
CONSTRUCTION**

The Railroad Company(s) will determine when and where protection shields are required. The designated construction of temporary protection shields must adhere to the following specifications:

1. The construction of temporary protection shields shall be designed to prevent any dust, debris, concrete, formwork, paint, or tools from falling on MBTA Railroad Property below.
2. The temporary protection shields shall be erected prior to the start of work. The Railroad Company(s) will determine whether or not sufficient protection has been provided to perform the work over any particular area.
3. The temporary protection shields shall remain in place until all work over the railroad has been completed and shall be removed only when ordered by the Railroad Company(s).
4. To minimize the inconvenience to the users of any properties below and adjacent to the project, the Contractor shall be required to complete the actual erection and removal of the temporary shields within time limits acceptable to the Railroad Company(s).
5. The erected temporary protection shields shall not infringe on any existing minimum vertical clearance.
6. The Contractor shall be required to obtain the approval of the Railroad Company(s) before commencing any work beneath the shield. In certain areas, depending on the nature of the work, the Railroad Company(s) may require a specific method of protection.
7. The horizontal shield shall be designed to carry a live load of 100 pounds per square foot and a single concentrated load of 2,000 pounds located to produce maximum stress. The vertical shield shall be designed to carry a wide load of 30 pounds per square foot.
8. Prior to the start of construction, the Contractor shall be required to submit the details of the temporary protection shield to the Railroad Company(s), who will review and approve the details only as to the methods of erection and as to whether or not the proposed installation will provide the level of protection required at the various locations. It is the Contractor's responsibility to design these protections so that they are in conformance with all existing laws, regulations and specifications that govern this type of work. Shield plans must include a material list and shall be designed by a Registered Professional Engineer. The Drawings and calculations must bear their seal when they are submitted to the Railroad Company(s).
9. If during the actual construction, the Railroad Company(s) deems that the shield is not providing the desired level of protection or that the Contractor has failed to properly maintain the shield, all work at the

affected location shall cease until corrective measures acceptable to the Railroad Company(s) are instituted.

10. All temporary shields shall be constructed using new material.



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X

INDUSTRIAL SIDE TRACK SPECIFICATIONS

SECTION 1. GENERAL

- 1.01 All railroad track construction shall be performed under competent supervision of personnel experienced in railroad construction and shall conform to the standards of the MBTA. The MBTA and Railroad Company(s) will inspect and approve all side tracks prior to being put in service. This specification shall be used for side tracks directly on or within 15 feet of the MBTA property line. Any construction outside of the MBTA property line shall be in compliance with the standards of the serving freight railroad.

SECTION 2. MATERIALS

2.01 MATERIAL

Rails, ties, switches, frogs, etc. shall conform to the standards of the MBTA for various types of turnouts and track installations thereby insuring replacement availability.

2.02 RAIL

The rails shall be 100# ASCE Section or of a heavier rail section in common use, new or relay. Relay rails shall not have more than 1/4" top wear measured vertically along center line of rail and not more than 3/8" side wear measured horizontally 3/4" below the normal top of rail. Rails shall be free from kinks, excessive rust and excessive head flow. Rails having line or surface bends that cannot be spiked will be rejected. Rail shall be free of internal defects. Rail used on the limits of MBTA Railroad Property shall be equal in weight and in section to the attached main line.

2.03 CROSS TIES

Cross ties shall conform to MBTA specifications, minimum size shall be 7" x 8" x 8'6" and shall be treated with creosote in accordance with MBTA specifications. Relay ties may be approved after inspection by the MBTA and Railroad Company(s) prior to installation.

2.04 SWITCH TIMBER

Switch timber shall be new hardwood and conform to MBTA specifications 7" x 9" and of lengths required by MBTA standard turnout bill of materials. All timber shall be creosote treated as specified for cross ties. Relay timber as above.

Tie plates shall be new or relay at least 7-1/2" x 10-3/4", 1/2" thick,

double shoulder and should be canted. Tie plates must conform to MBTA specifications. Damaged plates or plates showing more than 25% reduction in section due to corrosion or wear will be rejected.

2.06 JOINT BARS

Joint bars shall be new or relay, 100% toeless, 24" long or equal and conform to MBTA specifications. Relay bars must be free from appreciable wear. Joint bars shall have a minimum of four holes and the holes are to fit the punching's of the rail. Holes to have a clearance of 1/16". Joint bars that cannot be drawn up to give a tight fit will be rejected. No fewer than 4 bolts per joint will be allowed.

2.07 BOLTS, NUTS AND WASHERS

Bolts and nuts shall be new and of a size to fit the rail punching's. They shall conform to AREA specifications for low carbon steel track bolts and nuts. Washers shall be new spring type of appropriate size and shall conform to MBTA specifications.

2.08 TRACK SPIKES

Track spikes shall be 6" long, 5/8" square with an oval head and conform to MBTA specifications for soft steel track spikes. Tangent track shall have at least 2 rail holding spikes per tie plate and all curves over 3" shall have 3 spikes per tie plate.

2.09 BALLAST

Ballast shall conform to MBTA Material Specification 9248.

2.10 BUMPING POSTS

Bumping posts shall be Hayes type, Durable "D" or equal, unless otherwise specified, and will conform to MBTA Material Specification 9206.

2.11 DERAIL

Type and quality of derail shall be specified for each individual side track requirement. Derail shall be connected into the railroad signal system, which will be performed by the Railroad Company(s) at the Owner's expense. Two pairs of insulated joints shall be installed by the Contractor at a location to be determined by the MBTA. Side tracks with a descending grade toward the main track shall require a split switch type derail.

SECTION 3. INSTALLATION

- 3.01 The track shall be properly installed with a standard gauge of 4'8-1/2" except on sharp curves. In cases of sharp curves, gauge will be specified by the MBTA or the Railroad Company(s).
- 3.02 Ballast shall be installed on top of subgrade for a depth of at least 6" below the bottom of tie and brought up to the top of the tie at the center and slope off to 1" below top of tie at the ends. It shall then extend 1' beyond the end of the tie at that height, at which point it shall slope off at a rate of 2:1 to the sub- ballast.
- 3.03 Cross ties shall be placed not more than 24" on center on tangent track and 19 ½ " on center on curved track. When relay rails are used the unworn side shall be placed on the gauge side. Tie plates shall be installed on each cross tie. The center of the joint shall be installed so as to be suspended by two ties.
- 3.04 It shall be the responsibility of the builder of that portion of track designated as "property line to end" to connect to that portion of track designated as "clearance to property line" and provide the necessary joints or compromise joints with bolts as the weights of rail would dictate.

SECTION 4. BONDING

- 4.01 Where track bonding is necessary, it will be performed by the Railroad Company(s) in accordance with MBTA standards.

SECTION 5. APPROVAL

- 5.01 Plans for track installation must be approved by the MBTA and Railroad Company(s) before the design of the facility to receive rail service is finalized.

SECTION 6. CURVATURE OF TRACK

- 6.01 The recommended curvature shall be 8⁰ or less. The maximum allowable degree of curve is not to exceed 12⁰ 30', unless approved by the Director of Engineering for MBTA Railroad Operations.

SECTION 7. GRADE OF TRACK

- 7.01 The maximum allowable grade for all tracks shall not exceed 1.5% descending towards mainline or 3% descending from mainline using 100 foot vertical curves.

SECTION 8. ELEVATION

8.01 Super elevation shall not exceed 1 inch.

SECTION 9. SUBGRADE

9.01 Subgrade shall be prepared to a grade 18" - 20" below the proposed top of rail and shall be of a material that is compacted to 95% and provides for adequate drainage.

SECTION 10. ACCEPTANCE

10.01 Before track is placed into service to receive cars, it shall be inspected and approved by a qualified track inspector from the MBTA, the Railroad Company, and the freight carrier.

10.02 No exceptions to these specifications are authorized without the written approval of the Director of Engineering for MBTA Railroad Operations.



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RAILROAD OPERATIONS DIRECTORATE

XI

RIGHT OF WAY FENCING SPECIFICATIONS

SECTION 1. GENERAL

1.01 DESCRIPTION

This section specifies the furnishing and installing of new Type I galvanized steel or Type II aluminum coated steel chain link fence. Right of way fence shall be 6', 8' or 10' as required by site specific conditions.

1.02 SUBMITTALS

Shop Drawings

1. Include cross sectional dimension of posts, braces, rails, fittings, accessories and gate frames, design of gates, and details of gate hardware.
2. Include a layout drawing showing the spacing of posts and location of all gates, abrupt changes in grade, and all corner, gate, anchor, end and pull posts.

SECTION 2. PRODUCTS

2.01 MATERIALS

A. General

1. Steel pipe dimensions and weights: ASTM A-53, Schedule 40 (except the hydrostatic testing requirement is waived). Dimensions specified are outside diameter (O.D.).
2. Provide post with accepted semi-steel or pressed steel tops, so designed as to fit securely over post and carry top rail or spring tension wire; the base of post top fitting shall fit over the outside of post and shall exclude moisture from post. All fittings and accessories shall be hot dipped galvanized in accordance with ASTM A-53.

B. Line Post: For all post heights, unless otherwise noted, Schedule 40, 2.375" O.D. pipe weighing 3.65 lbs./ft. ASTM A-53 with a 2 oz. hot dipped galvanized coating shall be used.

C. Gate post: Furnish post to support single gate leaf, or one leaf of a double gate installation, for the following gate widths:

<u>Leaf Width</u>	<u>Gate Post</u>	<u>Sch. 40</u>
up to 6'	2.875" O.D.	5.79 lb./ft.
6' to 12'	4.000" O.D.	9.11 lb./ft.
12' to 18'	6.625" O.D.	18.97 lb./ft.
18' to 32'	8.625" O.D.	28.55 lb./ft.

D. End, Corner and Intermediate Posts

For all post heights, unless otherwise noted, Schedule 40, 2.875" O.D. pipe weighing 5.79 lbs./ft. ASTM A-53 with a 2 oz. hot dipped galvanized coating shall be used.

E. Top rail and Spring Tension Wire

1. Top Rail

- a. Schedule 40, 1.66" O.D, pipe weighing 2.27 lbs./ft. ASTM A-53 with a 2 oz. hot dipped galvanized coating.
- b. Couplings and expansion sleeves: Outside sleeve type, minimum six inches long.

2. Spring tension wire: shall be marcelled (spiraled or crimped) #7 gauge (.177 inches) plus or minus 0.005 inches in diameter. ASTM A-824. 1.2 oz. zinc per sq. ft.

F. Braces and Tension Rods

1. Compression braces: Same type and size as top rail.
2. Tension rods: 3/8" round rods with drop forged turnbuckles or other approved type of adjustment.

G. Fence Fabric

1. Type I galvanized steel ASTM A-392 Class 2 coating 2 oz.
 - a. Typical-2" diamond mesh 6 gauge (192") 2 oz.
 - b. Hot dipped galvanizing after weaving.
2. Type II aluminum coated steel ASTM A-491 size 2. 3/8" mesh.
3. Selvages: All types
 - a. Fabric shall be knuckled at both selvages.
 - b. Fabric over 60 inches high: knuckled at one selvage and twisted and barbed at the other.

H. Fabric Bands, Brace Bands and Stretcher Bars

1. Fabric Bands: 12 gauge pressed steel 7/8 inch wide.
2. Brace Bands: 11 gauge pressed steel 1 inch wide.
3. Stretcher Bars: 3/16" x 3/4" galvanized steel.

- I. Tie wire and miscellaneous Items
 - 1. Tie Wire: Galvanized steel 6 gauge (.192") for post and rails.
 - 2. Hog rings: Galvanized steel 6 gauge (.192") for spring tension wire.
 - 3. Rail and Truss Cups: Galvanized semi-steel or pressed steel.

- J. Barbed Wire and Extension Arms
 - 1. Barbed Wire; ASTM A121, 12-1/2 gauge, 4-point round barbs, Class 3 coating.
 - 2. Extension Arms: Projecting at an angle of approximately 45 degrees, fitted with clips or other means of attaching three strands of barbed wire, the top outside wire approximately 12 inches from the fence line and the other wires spaced uniformly between the top outside wire and the fence fabric.

- K. Gates
 - 1. General: Furnish gates complete with necessary hinges, latches, and drop bar locking devices; corners shall be welded or fastened and reinforced with suitable fittings.
 - 2. All gates fabricated from 1.90" O.D. Schedule 40 pipe weighing 2.72 lbs./ft. with a 2 oz. hot dipped galvanized coating.

- L. Concrete: Class 2500 psi concrete consisting of aggregate passing the No. 8 sieve.

SECTION 3. EXECUTION

3.01 INSTALLATION

- A. Place terminal post at each end, corner, gate post, pull post (minimum 500'), or any change in grade or direction greater than 30 degrees.

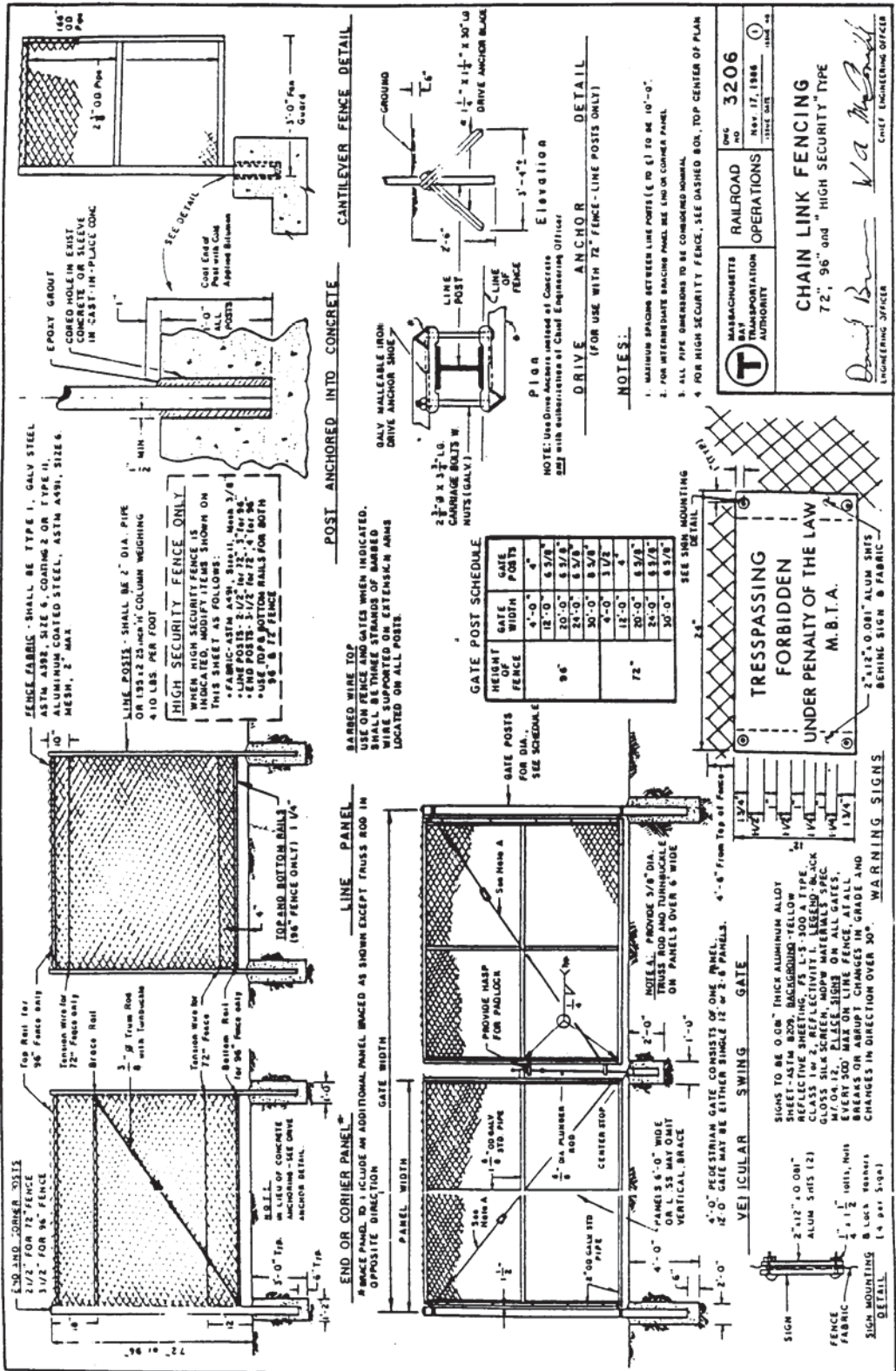
- B. Line posts shall be spaced on a maximum of 10 foot centers. In determining the post spacing, measure parallel to slope of finished grade. All posts to be set plumb and in line. Post spacing on radius as follows:

200'- 500' radius 8' O.C.
100' - 200' radius 6' O.C.
less than 100' radius 5' O.C.

- C. When fencing is installed on the top of concrete structures, use galvanized sleeve and grout posts or install with suitable galvanized flange casing and galvanized anchor bolts. Set all other posts permanently in concrete.
- D. Excavate post hole footings at least 12" in diameter for line post and 16" for terminal and gate posts up to 4" O.D. Larger gate posts require 18" diameter footings. All footings excavated to a depth of 42" with a minimum post embedment of 36". Crown top of concrete to shed water and allow curing for not less than 72 hours before proceeding with further work on the post.
- E. Brace end, corner pull, and gate posts to the nearest line post with diagonal or horizontal brace rails used as compression chambers, and with truss rods with turnbuckles used as tension members. Brace line posts horizontally and truss in both directions as required, at approved intervals.
- F. Install fabric on post side which best secures MBTA's Railroad Property. Pull fabric taut and tie to all line posts, rails, braces and spring tension wire spacing all ties at 12" intervals. Use hook shaped steel ties confined to the diameter of the pipe to which it is attached, clasping pipe and fabric firmly with both ends twisted at least 2 turns.
- G. Barbed wire and tension wire must be taut and properly secured with brace bands at each terminal and gate post.
- H. Electric Ground: Where a power line carrying more than 600 volts passes over fence, install ground rod at the nearest point directly below each point of crossing. Ground all substation fences and gates and perform other electrical grounding as indicated.

3.02 TOUCH-UP AND REPAIR WORK

Remove and replace fencing which is improperly located or is not true to line, grade and plumb within tolerances as indicated.





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XII

TEST BORINGS SPECIFICATIONS

SECTION 1. GENERAL

All borings on MBTA Railroad Property are to be performed according to the following requirements:

- 1.01 Work on MBTA Railroad Property must be performed with a Railroad Company(s) inspector and/or flagman present.
- 1.02 Where access can only be gained by crossing the tracks, a temporary crossing must be used. This crossing shall adhere to the following:
 - A. The location and material must be approved in advance by the Chief Engineering Officer or Railroad Company(s).
 - B. The crossing will be constructed by Railroad Company(s) forces at the Contractor's expense.
 - C. The crossing must be protected at all times when not in use. Access shall be prohibited through the use of right-of-way gates which will be constructed by Railroad Company(s) forces at the Contractor's expense.
 - D. No crossing of the track shall be made without a railroad flagman and/or inspector present.
 - E. The crossing of tracks shall be kept to a minimum.
- 1.03 Boring locations, including positioning of the boring rig, shall be kept at least 8'-6" from the center line of track.
- 1.04 All borings must be cased to insure adequate return (of mud and water) and to avoid undermining of the track.
- 1.05 All holes shall be backfilled with cement grout to fill the voids and protect against an artesian condition.
- 1.06 The location of all utilities owned or private, shall be located and suitably marked by the Railroad Company(s) and/or the private owner at the Contractor's expense to avoid damage to the utility and/or track structure.
- 1.07 Prior to entry upon the MBTA Railroad Property, all necessary contracts, insurance policies and financial obligations shall be provided in a form acceptable to the Railroad Company(s).
- 1.08 Work within the operating right-of-way that has potential to foul the tracks, shall be restricted to periods of non-peak passenger operations.

- 1.09 While performing the work, full cooperation with the inspector and flagman is essential. The work will be terminated immediately if the safety of all traffic and personnel is jeopardized in any way.

SECTION 2. TESTING

- 2.01 Soil borings shall be in accordance with the current issue of the American Railway Engineering Association Specifications, Chapter 1, Part 1, "Specifications for Test Borings". Soils shall be investigated by the split-spoon and/or thin-walled tube method and rock shall be investigated by the Coring method specified therein.
- 2.02 Soil boring logs shall clearly indicate all of the following:
1. Boring number as shown on boring location plan.
 2. Elevation of ground at boring.
 3. Description or soil classification of soils and rock encountered.
 4. Elevations or depth from surface for each change in strata.
 5. Identification of where samples were taken and percentage of recovery.
 6. Location of ground water at time of sampling and, if available, subsequent readings.
 7. Natural dry density in lbs./sq. ft. for all strata.
 8. Unconfined compressive strength in tons/sq. ft. for all strata.
 9. Water content (percent). Liquid Limit (percent) and plastic limit (percent).
 10. Standard penetration in blows/ft.
- 2.03 Soil boring logs shall be accompanied by a plan drawn to scale showing location of borings in relation to the tracks, the elevation of ground surface at each boring, and the elevation of the top of rail of the tracks.
- 2.04 Soil investigation by auger, wash, or rotary drilling method is not acceptable.
- 2.05 Borings shall be taken no more than two (2) feet from the field stake which marks the boring location. The stake should not be disturbed during boring operations. Lost stakes shall be reinstalled.
- 2.06 Unless a boring hole is actively being worked, it shall be securely covered or otherwise protected until permanently filled. When work at each boring hole is completed, the hole shall be properly filled.
- 2.07 Access to the boring locations must be approved by the Railroad

Company(s). When possible, access shall be from public roads. Licenses for Entry, Insurance and Flag Protection must be obtained by the Contractor in accordance with all applicable MBTA Specifications.

- 2.08 Boring operations shall be confined to each boring location to the extent possible.

The Contractor shall take necessary precautions to prevent damage to structures and facilities. The site shall be restored to a condition satisfactory to the Railroad Company(s).



**MASSACHUSETTS BAY
TRANSPORTATION
AUTHORITY**

RAILROAD OPERATIONS DIRECTORATE

XIII

FIBER OPTIC CABLE SPECIFICATIONS

SECTION 1. GENERAL

- 1.01 The purpose of the following standards is to provide basic information about the MBTA's requirements with respect to the design and construction of fiber optic cables on MBTA Railroad Property to fiber optic cable companies and their Contractors.
- 1.02 All work performed on or affecting MBTA Railroad Property must be designed and constructed in accordance with the Commuter Rail Design Standards (Vol. I and II), MBTA Book of Standards, Railroad Operations Specifications and the following standards. Additional job specific requirements will be contained in the MBTA's Fiber Optic License Agreement and can be obtained by contacting:

AGM for Real Estate and Asset Development
Ten Park Plaza
Boston, MA 02116

The Director of Engineering for MBTA Railroad Operations or their designated representative will be responsible for the approval of all work. No modifications, changes or deletions will be made without their approval.

SECTION 2. PROJECT REVIEW AND COORDINATION

- 2.01 All Drawings and specifications shall be reviewed and approved by the MBTA and Railroad Company(s) prior to construction. The MBTA must approve the construction schedule and sufficient Railroad Company(s) personnel must be available before work begins.
- 2.02 If another fiber optic cable company has previous or exclusive rights along the proposed route, the alignment and cable location must be approved in accordance with existing agreements.
- 2.03 The fiber optic cable companies must coordinate the construction with others to minimize the disruptions to the MBTA railroad operations.

SECTION 3. CONDUCT OF WORK

- 3.01 In order to minimize the manpower requirements of the Railroad Company(s) and afford better control, supervision, and protection, the Contractor will conduct their work sequentially and minimize the number of crews and their proximity. Crews should be confined geographically to an area that can be covered easily by a minimum number of Railroad Company(s) personnel. This can be accomplished by a block method of construction. A construction block will be used and is a 1-4 mile segment of right of way in which up to 3 fiber optic cable installation crews can work. The crews can work within the construction block, but cannot work outside of it. The construction block

must move as a unit along the right of way. The crews cannot work two blocks concurrently.

SECTION 4. CONSTRUCTION SCHEDULE

- 4.01 The fiber optic company or its Contractor will submit a schedule of work to the MBTA for approval. The schedule will be based on methods of construction acceptable to the MBTA and Railroad Company(s). No work shall begin prior to approval by the MBTA.
- 4.02 Any changes or modifications to the schedule proposed by the fiber optic company or its Contractor must be submitted to and approved by the MBTA prior to implementation. The MBTA, however, may be required to change or modify the construction schedule on account of its operations, maintenance requirements, or manpower shortages. In this event, the MBTA will give the fiber optic cable company as much advance notice as possible.
- 4.03 Construction schedules will be reviewed and updated every two (2) weeks or as required.

SECTION 5. ESTIMATE OF EXPENSES

- 5.01 An estimate of anticipated expenses will be provided based on durations provided by the fiber optic cable company or their Contractor and construction schedules approved by the Railroad Company(s). Any changes in the schedule will cause the estimate to be revised. The fiber optic cable company or their Contractor will be responsible for all of the costs incurred by the MBTA and Railroad Company(s) in support of the construction activities. This includes design review, engineering support, administration and supervision.

SECTION 6. BILLING

- 6.01 The fiber optic cable company or its Contractor will be required to pay for railroad protective services in advance of costs incurred.

DOCUMENT A00812

**MASSACHUSETTS BAY
TRANSPORTATION AUTHORITY
FLAGGING REQUEST FORM**

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Flagging Request

Date: _____

Company/Agency: _____

Project Name: _____

Project Location: _____

Point of Contact: _____

Email: _____ Phone: _____

Project Number: _____ Funding Source: _____

RAILROAD OPERATIONS TRACKING NUMBER _____

Date Needed: _____

Start/Finish: _____

Flaggers Required: _____

Scope of Work:

(Attach additional SOW, if necessary.)

Schedule:

(Attach additional info, if necessary.)

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DOCUMENT A00813

**MASSACHUSETTS BAY
TRANSPORTATION AUTHORITY**

**SPECIAL INSTRUCTIONS
AND
CONSTRUCTION SAFETY**

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MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 1

APPENDIX M

MBTA SPECIAL INSTRUCTIONS

MARCH 2003

Table of Contents

LETTER OF TRANSMITTAL REGARDING SPECIAL INSTRUCTIONS.....2

1. ACCESS TO AUTHORITY PROPERTY..... 2

2. INSURANCE REQUIREMENTS.....6

3. SUBMITTAL OF SPECIFICATIONS, DRAWINGS, DESIGN AND METHODS OF CONSTRUCTION.....6
(Applies to non-MBTA Construction Contracts. MBTA Construction Contracts are covered under Division I)

4. OPERATIONAL RESTRICTIONS..... 7

5. PROTECTION SERVICES.....10

6. ANNUAL CERTIFICATION OF HI-RAIL EQUIPMENT.....11

MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 2

MBTA SPECIAL INSTRUCTIONS

APRIL 2003

LETTER OF TRANSMITTAL REGARDING SPECIAL INSTRUCTIONS

The Subway Operations, Bus Operations, Safety, Systemwide Maintenance & Improvements, Operations Support, and the Design and Construction Departments of the MBTA have determined that certain limitations regarding Contractor's activities are required while working on a construction project.

These Supplementary Conditions are included herein to augment the MBTA Standard Specifications, Division I - General Requirements, Section 00700 General Conditions, Article 6 - Prosecution and Progress, Paragraph 6.04 Limitations of Operations with additional information, which is applicable to construction projects.

However, for non-MBTA construction projects where Division I does not apply, such as in the case of rights to construct on MBTA property granted under a lease or license agreement, the enclosed Special Instructions are still applicable unless otherwise directed.

Contract drawings and specifications for non-MBTA construction projects, relative to all work that will be performed within or directly adjacent to MBTA property, must be submitted to the Authority's Chief Engineer of Design and Construction, Director of Subway Operations, Director of Bus Operations, Director, of Systemwide Maintenance & Improvements, Director of Operations Support, Director of Safety, and the Director of Real Estate. The addresses and phone numbers are listed on the next page. The special instructions contain information to be complied with by the owner, contractors, and others associated with the project.

Applicable provisions of the special instructions plus additional requirements from other MBTA departments must be included in the contract specifications as instructions to the contractor when performing work on or adjacent to MBTA property. Permission to perform work on MBTA property will be granted by the Director of Real Estate only when contract plans and specifications are approved by the MBTA.

The enforcement of any of the following conditions shall not be construed as waiving any of the rights of the Authority in any of the other conditions of an MBTA contract.

A meeting to further discuss MBTA requirements may be arranged by contacting the offices of those listed in Article 1.a. and/or b. herein.

1. ACCESS TO AUTHORITY PROPERTY

- A. For MBTA Contractors Only: An owner or Contractor who wishes permission to enter upon or perform work over, on, under or adjacent to Authority property shall submit to the offices of the Authority's Chief Engineer of Design and Construction, the Director of Bus Operations, the Director of Subway Operations, Director of Systemwide

MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 3

Maintenance & Improvements, and the Director of Operations Support, a request in writing, a minimum of forty-two (42) days prior to the owner or the Contractor's planned commencement of any of the above stated activities. Addresses of the above are as follows:

MBTA's Chief Engineer of Design and Construction
6th Floor
10 Park Plaza
Boston, MA 02116
617 222-3116

Director of Systemwide Maintenance & Improvements
500 Arborway
Jamaica Plain, MA 02130
617 222-5454

Director of Subway Operations
10th Floor
45 High Street
Boston, MA 02110
617 222-4554

Director of Bus Operations
10th Floor
45 High Street
Boston, MA 02110
617 222-3368

Director of Operations Support
10th Floor
45 High Street
Boston, MA Q2110
617 222-5460

Director of Safety
2nd Floor
21 Arlington Avenue
Charlestown, MA 02129
617 222-4244

- B. Non-MBTA Construction Contractors For Lessees or Licenses of the MBTA Only: An owner or Contractor who wishes permission to enter upon or perform work over, on, under or adjacent to Authority property shall submit to the offices of the MBTA's designated representative for real estate listed below, a request in writing, a minimum of forty-two (42) days prior to the owner or the Contractor's planned commencement of any of the above stated activities. The designated representative will distribute plan sets to the above MBTA departments and will coordinate departmental approvals. Application forms and instructions for obtaining access to MBTA property

MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 4

can be obtained by visiting the designated representative's website listed below and selecting "MBTA" and "Licensing."

License Administrator
Massachusetts Realty Group
20 Park Plaza, Suite 1120
Boston, MA 02116
617-316-1654
www.mbtarealty.com

The designated representative reports directly to:

MBTA Director of Real Estate
5th Floor
10 Park Plaza
Boston, MA 02116
617 222-3255

- C. Requests shall specify the name of the owner or the contractor, the reasons for entering the property, where the property will be entered, each individual location where work of a different nature is to be performed, the nature of such work, and the number of days, including time schedule, the owner or the contractor intends to remain on the property at each location. The Authority will process such requests and meet with the owner or contractor to work out a schedule and phasing for the work plus other arrangements including financial. The Authority shall request a list of the names of each individual who will enter upon or perform work on Authority property.
- D. The owner or contractor shall notify the representative of the Design and Construction Department and the appropriate Operations Director at least seventy-two (72) hours prior to entering the property as agreed upon earlier with the Authority. The owner or contractor shall notify the Design and Construction, and Operations Departments immediately if the job is to be closed down unexpectedly and shall again notify the Authority as specified above when work will commence.
- E. The owner or contractor shall make all necessary arrangements with the Authority before entering upon the property and perform the work in accordance with an MBTA approved work schedule. The owner or contractor shall not enter MBTA property or perform any work on Authority property without the presence of an assigned MBTA representative from the Design and Construction Department or the Operations Department who is responsible for monitoring the work of that owner or contractor for the Authority. Working on Authority property without an assigned MBTA representative present shall be cause for immediate eviction from the property.
- F. The owner or contractor must have in place a method of payment for all Authority support services such as flagging, work trains, power shut offs, etc., prior to commencement of any work. This will be processed through a written force account agreement between the Authority and the owner or contractor prior to commencement of work. Direct billing to contractors for Authority support services requires the contractor's authorized representative to agree in writing that the company will reimburse the Authority for those support services, including overhead and fringe benefits. Once the Authority receives the signed statement from the contractor, the General Accounting

MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 5

Office will open a reimbursable account for specific Authority department(s) to charge costs, and the contractor will be billed directly.

- G. The work associated with this project, except as hereinafter expressly provided, will be done without interruption of or change in the regular work or operation of vehicles of the Authority. No work shall be done affecting the operations of vehicles or operations of stations until the contractor has submitted details of his procedures to the Design and Construction and the applicable Operations representatives thirty (30) working days prior to start of work and has secured written permission to proceed.
- H. The Authority reserves the right to require work affecting the safety of the operations to be performed at prescheduled non-operating periods from approximately 1:30 a.m. to 5:00 a.m. daily (1:30 a.m. - 4:30 a.m. effective); 1:30 a.m. to 6:00 a.m. Sunday (1:30 a.m.-5:30 a.m. effective). The contractor will not be permitted to remain within the track right-of-way after 5:00 am. (6:00 a.m. Sunday). The Authority may, during emergencies or at times when the Authority work forces are required to work in the area of the contractors work, order the contractor to cease work and remove his work forces and equipment from the property leaving the right-of-way in a safe operating condition. The Authority also reserves the right to stop or postpone any contractor's previously approved work if, in the Authority's opinion, such work is being performed in a manner that will endanger and/or delay the Authority's regular work or operations.
- I. The owner or contractor shall make their own provisions for electric power, compressed air, water, ventilation, and disposal of seepage water. No use of existing MBTA utilities will be permitted unless approved in advance by the Authority.
- J. The owner or the contractor's attention is directed to other projects that will be ongoing simultaneously in the work area. The Authority will determine priorities for site access between this project and others.
- K. The Authority reserves the right to deny the contractor access to the right of way because of operational requirements, adverse weather conditions or emergency track, signal, and power repairs. The contractor shall reasonably expect to be denied access to the site a total of 10 (ten) days per calendar year, this does not include the following holidays; New Year's Day, President's Day, Patriot's Day, Memorial Day, Bunker Hill Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Thanksgiving Day, and Christmas Day. In addition, right of way access may be denied on days when various Special Events impact service as well as during Red Sox home games on the Green Line.

Furthermore, the contractor shall also expect to have his access to the site delayed a total of 4 (four) times per month. Each delay shall be 60 (sixty) minutes or less. The contractor shall make allowances for these possible events in their bid. Due to increased stopping distances associated with slippery rail conditions, non-emergency access will not be allowed within ten (10) feet of the centerline of the track under adverse weather conditions.

- L. The contractor shall perform his work at all times so as to cause no interruption of service during operating hours and shall at all times after performing work during either operating hours or non-operating hours leave the Authority's property in a clean and safe operating condition.

MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 6

- M. On occasion, the Authority will operate work cars, test trains, security trains, and/or hirait Vehicles in, the area of the work. At no time during these occurrences will the contractor be allowed to work on the right-of-way, except with the approval of the Authority or the Authority personnel providing protection services as defined in Protection Services.

2. INSURANCE REQUIREMENTS

- A. The owner or Contractor's for MBTA Construction Contracts insurance requirements shall conform to the latest version of MBTA Standard Specifications, Division 1 - General Requirements, Section 00700 .General Conditions, Article 5 .Legal Relations and Responsibility to the Public, Paragraph 5.04 . Insurance Requirements. Owners or Contractors under a lease or license agreement with the MBTA shall provide insurance in accordance with the requirements of said agreement.

3. SUBMITTAL OF SPECIFICATIONS DRAWINGS, DESIGN AND METHODS OF CONSTRUCTION

(Applies to non-MBTA Construction Contracts. MBTA Construction Contracts are covered under Division I)

- A. An owner or contractor or others performing a non-MBTA construction contract that requires performing construction over, on, under or adjacent to the Authority's property shall submit to both the Design and Construction Department and to the appropriate Operations Department two (2) sets each of contract drawings and specifications at the 30%, 60%, 90% and 100% phases of design of the project. 100% drawings and specifications must be submitted forty-two (42) days prior to the planned commencement of any work.
- B. The contractor's drawings and specifications shall define the work in detail and a Professional Engineer registered in the Commonwealth of Massachusetts shall stamp the final drawings. The contractor or owner shall also submit a crane or heavy equipment location, if used, with dimensions to the face of abutments and structures and calculations of crane equipment loading on Authority structures showing no adverse effect on any structures. All calculations shall be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. The drawings must include any excavation support systems, shoring, underpinning, protective shielding, or any work required for the protection of MBTA property.
- C. Unless otherwise agreed to in advance, the owner or contractor's structures shall not attach to, be placed against, pass through, or impose any loads upon any structures or facilities owned by the MBTA.
- D. All construction work shall be performed in strict conformity with final plans and specifications that have been reviewed and approved by the MBTA. Any changes requested by the owner or contractor which affect MBTA property or operations must be submitted to the MBTA for review and approval at least 30 days prior to the planned commencement of the work. Approvals or rejections shall be submitted by the MBTA within thirty (30) days following submission to the MBTA for review.

MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 7

- E. The owner or the contractor performing construction work over, on, under, or adjacent to Authority property shall submit to the Director of Design four (4) sets each of the design, drawings and specifications of any earth support system, shoring, underpinning, protective shielding, or any work required for the protection of the Authority's facilities and property, a minimum of forty-two (42) working days prior to the planned commencement of any of the above work. The design, drawings and specifications shall define in detail the methods of construction and materials to be used. The design and drawings shall be stamped and signed by a Professional Engineer registered in the Commonwealth of Massachusetts.
- F. Unless otherwise agreed to in advance, earth support structures or shoring systems shall not be attached to any structure owned by the MBTA, nor shall MBTA structures be use to support loadings or be used for excavation support.
- G. Engineering drawings of MBTA structures are available for reference or duplication at the MBTA Plan Room, 500 Arborway, Jamaica Plain, MA 02130. For information call the Technical Librarian at 617-222-5285.

4. OPERATIONAL RESTRICTIONS

- A. The owner or contractor is made aware that the work will be performed adjacent to or over operating tracks, signal lines, communication lines, power lines, cables and other facilities belonging to the Authority. The owner or contractor is to take all due precautions to protect the Authority's facilities, utilities, and operations during the course of his work. When in the opinion of the Authority's Chief Engineer of Design and Construction, Director of Subway Operations, Director of Systemwide Maintenance & Improvements, Director of Operations Support, or their representatives, the contractor's work would cause hazard to the Authority's facilities, infrastructure, or to the safe operation of the transit system, the Authority will assign qualified personnel deemed necessary to protect the property, facilities and operations, all at the expense of the contractor.
- B. The contractor is specifically prohibited from conducting any operations next to or over the right-of-way that have the potential to adversely impact the operations of Authority revenue service during normal operating hours (approximately 5:00 a.m. to 1:30 a.m.). Certain work adjacent to the right-of-way, described below as hazardous work, may take place during restricted revenue hours at the discretion of the Chief of Orange, Red, Green, or Blue Line Operations as applicable and require flagmen present.
- C. Access to the MBTA right-of-way, which encompasses all MBTA property (fence to fence, wall to wall, and property line to property line over which Authority vehicles operate, including sidings and yards), is. contingent upon Owner or Contractor compliance with the "MBTA Right-of-Way Safety Rulebook" that outlines Right-of-Way Safe Practices for Access on or Near the Right-Of-Way.

As specified in the Right of Way Safety Rulebook, all persons who access the MBTA right of way must attend a one-day, eight-hour training class conducted by Subway Operations Training and the Safety Department Attendees must successfully complete the Right of Way Safety Training in order to

MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 8

receive a Right of Way license. The license is valid for a two-year period after which the person must attend the Authority's Right of Way re-certification class. To register for the "Right of Way Safety" class, contact:

Supervisor and Chief Rules Examiner of Training
Cabot RTL Training
275 Dorchester Avenue, 2nd floor
South Boston, MA 02127
Telephone: (617) 222-5377

D. The Authority will consider the property; facilities and operations fouled or subject to hazard when the following occurs:

1. When any object or operation is or can be brought nearer than ten (10) feet to the centerline of operating track.
2. When an object or excavation is brought nearer than four (4) feet to a signal or communication line.
3. When an object or excavation is brought nearer than ten (10) feet to a power line or cable.
4. When explosives are used in the vicinity of the premises. Explosives shall not be used on or adjacent to the Authority's property or facilities without written consent of the Authority's Chief Engineer of Design and Construction and then shall be used only by a licensed blaster, licensed in the Commonwealth of Massachusetts, at times and under conditions acceptable to the Authority.
5. When cranes, trucks, power shovels, pile driver or any other equipment are working in positions that failure with or without load could occur nearer than 10 feet to the centerline of an operating track.

It shall be the responsibility of the contractor to inform the Chief of Orange, Red, Green, or Blue Line Operations as applicable in writing thirty (30) working days prior to all times when they intend to perform hazardous work as described above. Submittal must include a site plan, the reasons for entering the property, where the property will be entered, each individual location where work of a different nature is to be performed, the nature of such work, and number of days, including time schedule, the contractor intends to remain on the property at each location. Failure of the contractor to provide the appropriate Line Chief with the specified advanced notice of hazardous work will result in the stoppage of work by the Authority.

D. The Contractor will be allowed on the right-of-way only after normal revenue service (approximately 1:30 a.m. to 5:00 a.m.). On occasion, the Authority will operate work cars in the area of the project work during non-revenue hours. At no time during these occurrences will the contractor be allowed to work on the right-of-way except with the approval of the Authority. The contractor shall coordinate their schedule at least twenty-four (24) hours in advance with the Authority.

E. No weekday/weekend transit service interruptions will be allowed on this project. The contractor must schedule all work requiring a shutdown of revenue service and/or station and/or platform operations during non-revenue hours.

MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 9

- F. Prior to the contractor leaving any work site, at the completion of each workday, the contractor shall ensure that the site is in proper condition to permit normal transit operations to resume. If, in the opinion of the Authority, the site is not suitable for normal transit operations due to conditions caused by the contractor, the Authority will allocate a suitable number of personnel to rectify the site. The owner or his contractor shall be charged full costs of such personnel and necessary equipment, including the full cost of replacement services during the cleanup period.

- G. In the event that the contractor does not adhere to the work period limitations of the special conditions and causes delay in returning the right-of-way to revenue service at the end of any work period, the owner or his contractor shall pay the Authority for substitute bus service a sum not to exceed \$120.00 per hour per bus for the entire duration of the delay and including mobilization and demobilization of the bus service. The minimum charge shall be (3) hours per bus per delay... The owner or the contractor will reimburse the Authority for the hourly costs of personnel used during such delays (egg., supervisors, officials, gatepersons, flagpersons, and automotive). The required number of buses to adequately accommodate all Authority customers who are inconvenienced by the delay shall be at the sole discretion of the Authority's Bus Operations Department. Whatever sum of money may become due and payable to the Authority by the owner or his contractor under this article may be retained out of money belonging to the contractor in the hand and possession of the Authority. This article shall be construed and treated by the parties to the contract not as imposing a penalty upon the contractor for failing fully to complete the work within the periods as specified herein, but as liquidation damages to compensate the Authority for additional costs incurred by the Authority because of the failure of the contractor to fully complete said work within the work periods specified.

- H. The contractor shall assume full responsibility for the safety of all their work. They shall perform the work in a manner that will ensure the safety of both personnel and property. The contractor shall prevent against safety hazards, and the exposure of persons and equipment to hazardous and/or potentially hazardous conditions. All, work in the construction of the project shall comply with the requirements of the Authority, Department of Labor, Occupational Safety and Health Administration (OSHA) provisions, as well as those of state and local regulations. Safe breathing levels must conform to the Massachusetts Department of Environmental Protection (DEP) standards. In the case of conflict of regulations, the most stringent will apply. If the standards are not met, the Authority has the right to stop the work until such time as the contractor is in compliance with standards.

5. PROTECTION SERVICES

- A. When the contractor is performing work in the vicinity of Authority rights-of-way or public areas, the Authority will require the contractor to have at the site such authorized and qualified personnel as may be required to adequately protect the Authority's customers, employees, property, facilities and operations from hazardous conditions.

- B. The need for protection services is outlined and described in the Authority's Right-of-Way Safety Rulebook. The appropriate Line Chief, or their representative, shall determine what protection services are required and assign flagging personnel, officials, supervisors, coordinators or any other such personnel as may be required to ensure the safety of the Authority's operations. Personnel shall be provided from the Authority's workforce in such numbers as the Line Chief determines.

MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 10

Costs for all protection services and supplies shall be the responsibility of the owner or contractor. No work will be allowed if flagmen are required, but not on duty.

- C. When it is determined that protection services are required, the contractor must notify the Authority twenty-four (24) hours in advance and before 10.00 a.m. on the workday preceding the day that protection services will be required. Requests for protection services for weekends and/or holidays, must be made on the preceding Friday before 10.00 a.m., or before 10.00 a.m. on the workday preceding the holiday.

Requests for protection services for Non-Operating hours 1.30 a.m.—5.00 a.m. and in order for the work to be included on the Night Orders you must contact the:

Planning and Scheduling Coordinator
Maintenance of Way
617-222-5419.

Requests for protection services for Operating hours 5.00 a.m.-1.30 a.m. and in order for the work to be included on the Day Orders, you must contact:

Orange, Red, Green, or Blue Line Superintendent as applicable.
617-222-5844 (Orange); 617-222-5099(Red);
617-222-5982 (Green); 617-222-5532 (Blue).

It will be at the sole discretion of the Authority whether the contractor will be allowed to perform work on any particular day or night.

- D. The contractor will be required to provide each flagperson on duty with properly functioning safety equipment as approved by the Authority's Safety Department. This equipment includes but is not limited to: orange safety cones, red, yellow, and green flags, airhoms, hardhats, safety goggles, and hearing protection. The contractor will not be allowed on or adjacent to the right-of-way if flagging personnel are not equipped with required safety personal protective equipment.
- E. The contractor will supply properly functioning Authority-frequency portable radios to each flagperson on duty on a daily basis.. The contractor will be responsible for storing and maintaining radios throughout the life of the contract.
- F. All workers employed by the contractor who are to work within the Authority's stations, track area, right-of-way or adjacent to the traction power system or any high voltage electrical cables, shall be required to attend a safety awareness course at the Authority's Subway Operations Training School. The course is to make the contractor's personnel aware of the particular hazards related to the Authority's operations.
- G. All personnel working on the project site in the immediate vicinity of, or within the right-of-way, are required to wear orange reflective safety vests, similar to standard Authority equipment as specified in the Right-of-Way safety Rulebook.
- H. Work activities necessitating the traction power system (third rail and catenary) deenergization will require the services of an Authority power lineperson on site at all times and the contractor is responsible for any. costs incurred by the Authority as. a result of this action.

MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 11

- I. Prior to the implementation of the contracted work, and throughout the life of the contract, the contractor will be required to supply professionally rendered signs, as directed by the Authority's Marketing Department. These signs will include, but are not limited to, the following:
 - 1. Informational signs for revenue service diversion.
 - 2. Station directional and stairway, platform, exit closing signs.
 - 3. General project informational signs for Authority customers.

- J. Upon the direction of the Authority's Chief Engineer of Design and Construction, Director of Safety, and or Director of Subway Operations or their representatives, the contractor will be required to supply and install partitions and wooden barricades to cordon off the work site; such partitions and barricades shall be maintained and remain graffiti free by the contractor for the duration of the project.

- K. Upon direction from the Authority's Chief Engineer of Design and Construction and / or Director of Subway Operations or their representatives, the contractor will supply the following when site conditions warrant:
 - 1. Emergency and temporary lighting.
 - 2. Exhaust fans of sufficient size and numbers to adequately ventilate the work site, tunnel and or adjacent stations.
 - 3. Fire and / or garden hose for the purpose of dust control.

- L. It shall be the responsibility of the contractor to keep the Authority informed prior to all times when they intend to perform hazardous work. Failure of the contractor to provide the Authority with suitable advance notice of hazardous work will result in the stoppage of the work by the Authority until such time as sufficient numbers of protection personnel are on duty at the site.

6. ANNUAL CERTIFICATION OF HI-RAIL EQUIPMENT

- A. All equipment used by the contractor on Authority property shall be inspected by the Maintenance of Way engineer and/or the MBTA Safety Department for clearance and safety standards, and shall not be used if considered unsafe. All contractor/ subcontractor equipment (including hi-rail) operators must be trained, certified, and properly licensed. Documentation of same must be readily available and provided to the Authority upon request. If the contractor equipment is involved in a derailment or near miss incident or an accident, which caused injury or exposed personnel to injury and or caused damage to Authority property, that equipment will be subject to the Impound Policy Procedure.

- B. Contractor equipment to be used on or in the vicinity of the track shall be in first class condition, so as to positively prevent any failure that would cause delay in Authority operations or damage to its property or compromise the health and safety of personnel working on the project. Equipment shall not be placed or operated within the fouling distance of track without first obtaining the permission of the Authority.

- C. The contractor shall not, at any time, operate equipment or machinery over Authority's right-of-

MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 12

way without the use of hi-rail gear. All equipment that the contractor proposes to operate shall 'be modified to operate over the Authority's track and special work (e.g., switches, crossover frogs third rail, and restraining rail). Qualified Authority personnel shall control the movement of all hi-rail equipment at all times while operating on the Authority right-of-way. The contractor shall supply a portable radio for each hi-rail vehicle entering the Authority's right-of-way. No hi-rail equipment will be allowed on Authority's property without a functioning portable radio tuned to an Authority frequency.

- D. The contractor shall furnish hi-rail equipment capable of operating within the strict confines of the right-of-way. No Authority owned equipment is available for the contractor's use. In addition to equipment necessary to complete the work on a regular basis, the contractor shall be required to have on site sufficient standby equipment capable of: a) removing disabled equipment from the right-of way, and b) replacing disabled equipment in order to return the right-of-way to normal operating status by the end of the designated work period. As part of the pre-qualification statement, the contractor shall furnish an itemized list of all equipment to be used on the project, including:
1. Type of equipment (e.g., pickup, flatbed or dump trucks, excavator, cranes, etc.).
 2. Make, model and date of manufacture.
 3. Ownership.
 4. Present use and date of availability.
 5. Location where equipment may be inspected by Authority personnel during the prequalification period.
- E. The contractor shall have proof of competency for hi-rail operators (e.g., documentation, that the operator of hi-rail equipment is certified to operate that specific piece of equipment). The Authority reserves the right to review the lesson plan and audit the training class. The hi-rail operator will be responsible for ensuring and documenting that the vehicle is safe for operation and that all required equipment is present and properly secured. This must be done on a daily basis prior to operating the equipment.
- F. The contractor is required to have an Annual Certification of hi-rail equipment (separate form the Registry Inspection) signed by a competent person (e.g. Manufacturer's representative) asserting to the fact that the equipment is Original Equipment Manufacturer (OEM), that it conforms to the latest standards, was installed per the manufacturer's specification, and is functioning properly.
- G. The contractor must keep a copy of the Manufacturer's Operating Manual or instructions onboard the hi-rail equipment at all times.
- H. The operator shall operate the hi-rail equipment at a reasonable speed for the existing conditions, being alert for another vehicle (or any other obstruction along the right of way). In addition, said operator must maintain a safe spacing of traveling equipment.
- I. The contractor's hi-rail vehicles must be equipped with a horn (warning device), and an exhaust gas purifier.
- J. All equipment when used in tunnels and or darkness must conform to the Authority's standards for

MBTA SPECIAL INSTRUCTIONS

April 1, 2003

PAGE 13

headlights and marker lights. In addition, when vehicles are operating in tandem such as rail carts; flat cars, etc., such vehicles must be equipped with a flashing/strobe light when the lead vehicle is other than the operating vehicle. Diesel powered equipment only will be allowed in the tunnel and shall be removed from the tunnel each night unless otherwise permitted by the Director of Subway Operations.

K. Contractors must comply with the Authority's Propane Gas policy.

L. Contractor's doing "hot work" must have appropriate permits and follow all applicable rules and procedures for same.

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SECTION 01568

CONSTRUCTION SAFETY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section specifies requirements to establish a practical, sound, and effective program for the prevention of construction accidents, and to assign specific responsibilities to Contractors for program compliance.
- B. Contractors and their supervisors must control hazardous activities and conditions within their respective areas of contract responsibility.

1.2 SUBMITTALS

- A. Safety and Health Plan: The contractor shall, within thirty (30) days after receipt of the award of a contract, submit for approval to the MBTA, a detailed operational Safety and Health Plan.
- B. Safety Supervisor: The Contractor shall within thirty (30) days after receipt of the award of a contract submit the resume of the qualifications and work experience of the designated Safety Supervisor proposed for assignment to the Project. No construction work shall begin until the project Safety Supervisor has been approved by the MBTA. The Safety Supervisor shall have a minimum of 5 years of experience in construction safety or a related field.
- C. Monthly Accident Experience Summary: The Contractor shall submit an Accident Experience Report monthly during the course of construction to the MBTA.
- D. Industrial Industry Records: Prior to start of work, the Contractor shall submit their Injury/Illness Records for the previous 3 years. In addition, the Contractor shall submit annually to the MBTA all subsequent Illness/Injury Reports for the duration of the project.

PART 2 - PRODUCTS

None

PART 3 - EXECUTION

3.1 SAFETY AND HEALTH PLAN

- A. The Contractor shall submit a project Safety and Health Plan. At a minimum, the plan shall include the following sections:
- i. Emergency Action Plan
 - ii. First Aid Facilities
 - iii. Serious Accidents
 - iv. Emergency Telephone Numbers
 - v. Protection of the Public
 - vi. Site Visits
 - vii. Substance Abuse/Prevention/Testing

3.2 SAFETY SUPERVISOR

- A. Complete daily safety inspections of the job site and contiguous public areas, and take any corrective actions to eliminate unsafe conditions.
- B. Establish and implement a project safety training program for supervisors and employees as applicable to their job.
- C. Attend project safety meetings.
- D. Review Foreman accident and investigation reports, and initiate corrective action to prevent reoccurrence.
- E. Maintain copies of all Contractor Safety Reports.
- F. Assist Foremen in accident investigations.
- G. Encourage establishment of incentive programs designed to recognize individual employee safety efforts and contributions towards improved safety.
- H. Prepare a Safety Audit Checklist and complete the checklist each week during the course of construction. The completed Audit Checklists shall be submitted to the Authority weekly.
- I. The Safety Supervisor needs to be on the project site when major work tasks are being performed. During work periods when the Contractor is not performing contract work, the Safety Supervisor can be absent from the project site with permission from the Authority.

3.3 ACCIDENT INVESTIGATION

- A. Serious accidents shall be reported immediately to the MBTA Resident Engineer. Contractors shall issue standing orders to all supervisors directly in charge of operations that the scene of the accident shall not be disturbed, except for rescue or other emergency measures, until otherwise directed. Contractor's forces either witnessing or party to the accident shall be detained at the site to provide detailed accounting of facts.
- B. All reports shall be submitted to the MBTA. The accident investigation shall generate appropriate recommendations for corrective actions to prevent similar recurrence of similar accidents.
- C. The requirements of MBTA Safety Procedure 7.3 Contractor Safety Violation Program shall be followed by the Contractor when completing an accident report.

3.4 FIRST AID FACILITIES

- A. In formulating the Health and Safety Plan, the Contractor shall provide for the establishment and staffing of appropriate first aid facilities for the treatment of on the job injuries.
- B. Off-site medical treatment of employee injuries shall be performed at medical facilities named in the Contractor's Safety Submittal.

3.5 EMERGENCY TELEPHONE NUMBERS

To ensure that emergency actions are promptly taken, Contractors shall post emergency telephone numbers in conspicuous places.

3.6 ORIENTATION PROGRAM

- A. The Contractor shall establish and maintain an orientation program for new employees which shall include:
 - i. For each individual the hazards present in their work assignment and in the general area in which he will be working.
 - ii. Personal protective equipment required.
 - iii. Instruction in the proper procedure for reporting unsafe job conditions which he/she may encounter.

3.7 RIGHT OF WAY SAFETY AWARENESS

- A. All Contractor and sub-contractor personnel shall complete either the MBTA Rapid Transit right-of-way safety training or the MBCR Commuter Rail right-of-way safety training prior to entering the project site. ROW safety training will be required on all MBTA property including the RR track, stations, parking garages and maintenance car houses. Personnel will not be allowed on the job site unless they have attended a Right-of-Way Safety Awareness training session. Workers are required to carry their certification card while on site.

3.8 OSHA

- A. The Contractor shall comply with the OSHA 1926 Construction Safety Standards that apply to the project work. The Contractor shall meet the reporting requirements, and employers with eleven (11) or more employees must meet recordkeeping requirements.
- B. All Contractor and Sub-Contractor personnel shall possess an OSHA 10 Hour Certification card when working on the project site.
- C. All fatality cases and/or serious accidents and illness shall be reported to OSHA immediately by phone to an Occupational Safety and Health Area Office. Employers must report immediately all blasting accidents.
- D. Part of the OSHA requirements is that each employer must post in a prominent location the "Safety and Health Protection on the Job" poster. The poster briefly states the intent and coverage of the Act. Failure to post this document is a citable offense under the Act.

3.9 PROSECUTION OF THE WORK

- A. The Contractor shall take all reasonable precautions in the performance of the work to protect the safety and health of its employees and members of the public and shall comply with all applicable MBTA, Local, State and Federal safety and health regulations and associated reporting requirements.
- B. The Contractor Safety Supervisor is charged with sole responsibility of on-site safety management under the direction of the Contractor Project Superintendent. All potential safety hazards identified shall be promptly corrected. The Safety Supervisor shall complete daily reviews of the project site and document then results on the inspection.
- C. The MBTA shall notify the Contractor of any non-compliance and of the corrective action required. This notice, when delivered the Contractor or the Contractor's representative at the site of the work, shall be deemed sufficient notice of the non-compliance and corrective action required after receiving the notice, the contractor shall immediately take corrective action. If the contractor fails or refuses to take corrective action promptly, the MBTA may, without prejudice to other legal or contractual rights, issue an order stopping all or part of the work; and may subject contractor to safety violation assessments as deemed appropriate by the MBTA. Resumption **of work** may be issued by the MBTA Safety Department.
- D. The Contractor shall maintain an accurate record of exposure data on all accidents and incidents occurring under this contract and report this data in a manner prescribed by the MBTA.
- E. The Contractor shall be responsible for all its lower-tier sub-contractor's and vendor's compliance.
- F. Contractor management shall make a commitment for accident prevention and fire prevention. Safety shall take precedence over schedule and production. Enforcement action is mandatory.

3.10 WORK AUTHORIZATIONS

A. The following work authorizations will be issued by the MBTA:

- i. Excavation
- ii. Hot Work
- iii. Confined Space Entry
- iv. Cranes and Suspended Platforms

3.11 WORKING NEAR THE THIRD RAIL

A. When working on or near the third rail, when the power is off, the contractor must have a third rail high-voltage warning device on the job site approved by the MBTA Power Department. This device will warn work crews if the third rail becomes energized at any time during work activity involving the right-of-way.

3.12 HAZARDOUS SUBSTANCES

A. Any Contractor who uses substances on the hazardous substances list to which workers might be exposed under either normal work conditions or reasonable foreseeable emergency conditions resulting from work place operations must provide those workers with the required hazardous substance information.

3.13 PERSONAL PROTECTIVE EQUIPMENT

A. All Contractor personnel must wear the required personal protective equipment when on the job site. Personal protective equipment includes hard hats, safety vest, safety glasses and proper footwear.

3.14 PROTECTION OF THE PUBLIC

- A. All necessary precautions to prevent injury to the public or damage to property of others shall be taken. The public is defined as all persons not employed by or under contract or subcontract to the MBTA. Installation of temporary barriers and/or fencing designated to protect the public shall be reviewed and approved by the MBTA. Precautions shall include but not be limited to the following:
 - B. Work shall not be performed in any area occupied by the public unless specifically permitted by the contract or in writing by the MBTA.

3.15 SUBSTANCE ABUSE/PREVENTION/TESTING PROGRAM

A. The Contractor shall establish a substance abuse policy and testing program that includes the following elements:

- Deterrence

- Treatment and Rehabilitation
- Detection
- Enforcement

The MBTA reserves the right to approve the proposed substance abuse program prior to commencing the contract.

3.16 CONDUCT OF TOURS


- A. Group tours must be cleared through the MBTA, allowing maximum advance notice and in compliance with MBTA Policy and Procedures.
- B. MBTA will coordinate the tour arrangements and ensure notification to the Contractors Project Manager.

3.17 HOUSEKEEPING

- A. A basic concept in any effective accident prevention program is "good housekeeping." No one item has a great impact on the overall success of a safety program for a construction project. The importance of good housekeeping is such that it must be planned from the beginning of the job and carefully supervised through the final cleanup.
- B. During the course of construction, work areas, passageways and stairs, in and around buildings and structures, shall be kept clear of debris. Construction materials shall be stored in an orderly manner. Storage areas and walkways on the site shall be maintained free of depressions, obstructions and debris.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for work required under this Section.



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A to Z Index | En español | Contact Us | FAQs | About OSHA

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What's New | Offices **OSHA**

Home

Workers

Regulations

Enforcement

Data & Statistics

Training

Publications

Newsroom

Small Business

Anti-Retaliation

Regulations (Standards - 29 CFR) - Table of Contents

- **Part Number:** 1926
- **Part Title:** Safety and Health Regulations for Construction
- **Standard Number:** 1926
- **Title:** Table of Contents

PART 1926 -- SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

Subpart A -- General

Sec.

1926.1 Purpose and scope.

1926.2 Variances from safety and health standards.

1926.3 Inspections - right of entry.

1926.4 Rules of practice for administrative adjudications for enforcement of safety and health standards.

1926.5 OMB control numbers under the Paperwork Reduction Act.

1926.6 Incorporation by reference.

Subpart B -- General Interpretations

1926.10 Scope of subpart.

1926.11 Coverage under section 103 of the act distinguished.

1926.12 Reorganization Plan No. 14 of 1950.

1926.13 Interpretation of statutory terms.

1926.14 Federal contracts for "mixed" types of performance.

1926.15 Relationship to the Service Contract Act; Walsh-Healey Public Contracts Act.

1926.16 Rules of construction.

Subpart C -- General Safety and Health Provisions

1926.20 General safety and health provisions.

1926.21 Safety training and education.

1926.22 Recording and reporting of injuries. [Reserved]

1926.23 First aid and medical attention.

1926.24 Fire protection and prevention.

1926.25 Housekeeping.

1926.26 Illumination.

1926.27 Sanitation.

1926.28 Personal protective equipment.

1926.29 Acceptable certifications.

1926.30 Shipbuilding and ship repairing.

1926.31 Incorporation by reference.

1926.32 Definitions.

1926.33 Access to employee exposure and medical records.

1926.34 Means of egress.

1926.35 Employee emergency action plans.

Subpart D -- Occupational Health and Environmental Controls

1926.50 Medical services and first aid.

1926.51 Sanitation.

1926.52 Occupational noise exposure.

1926.53 Ionizing radiation.

1926.54 Nonionizing radiation.

1926.55 Gases, vapors, fumes, dusts, and mists.

1926.56 Illumination.

1926.57 Ventilation.

1926.58 [Reserved]

1926.59 Hazard communication.

1926.60 Methyleneedianiline.

1926.61 Retention of DOT markings, placards and labels.

1926.62 Lead.

1926.64 Process safety management of highly hazardous chemicals.

1926.65 Hazardous waste operations and emergency response.

1926.66 Criteria for design and construction for spray booths.

Subpart E -- Personal Protective and Life Saving Equipment

1926.95 Criteria for personal protective equipment.

1926.96 Occupational foot protection.

1926.97 [Reserved]

1926.98 [Reserved]

1926.99 [Reserved]

1926.100 Head protection.

1926.101 Hearing protection.
1926.102 Eye and face protection.
1926.103 Respiratory protection.
1926.104 Safety belts, lifelines, and lanyards
1926.105 Safety nets
1926.106 Working over or near water.
1926.107 Definitions applicable to this subpart.

Subpart F -- Fire Protection and Prevention

1926.150 Fire protection.
1926.151 Fire prevention.
1926.152 Flammable and combustible liquids.
1926.153 Liquefied petroleum gas (LP-Gas).
1926.154 Temporary heating devices.
1926.155 Definitions applicable to this subpart.
1926.156 Fixed extinguishing systems, general.
1926.157 Fixed extinguishing systems, gaseous agent.
1926.158 Fire detection systems.
1926.159 Employee alarm systems.

Subpart G -- Signs, Signals, and Barricades

1926.200 Accident prevention signs and tags.
1926.201 Signaling.
1926.202 Barricades.
1926.203 Definitions applicable to this subpart.

Subpart H -- Materials Handling, Storage, Use, and Disposal

1926.250 General requirements for storage.
1926.251 Rigging equipment for material handling.
1926.252 Disposal of waste materials.

Subpart I -- Tools -- Hand and Power

1926.300 General requirements.
1926.301 Hand tools.
1926.302 Power operated hand tools.
1926.303 Abrasive wheels and tools.
1926.304 Woodworking tools.
1926.305 Jacks - lever and ratchet, screw and hydraulic.
1926.306 Air Receivers.
1926.307 Mechanical power-transmission apparatus.

Subpart J -- Welding and Cutting

1926.350 Gas welding and cutting.
1926.351 Arc welding and cutting.
1926.352 Fire prevention.
1926.353 Ventilation and protection in welding, cutting, and heating.
1926.354 Welding, cutting and heating in way of preservative coatings.

Subpart K -- Electrical

GENERAL

1926.400 Introduction.
1926.401 [Reserved]

INSTALLATION SAFETY REQUIREMENTS

1926.402 Applicability.
1926.403 General requirements.
1926.404 Wiring design and protection.
1926.405 Wiring methods, components, and equipment for general use.
1926.406 Specific purpose equipment and installations.
1926.407 Hazardous (classified) locations.
1926.408 Special systems.
1926.409-1926.415 [Reserved]

SAFETY-RELATED WORK PRACTICES

1926.416 General requirements.
1926.417 Lockout and tagging of circuits.
1926.418-1926.430 [Reserved]

SAFETY-RELATED MAINTENANCE AND ENVIRONMENTAL CONSIDERATIONS

1926.431 Maintenance of equipment.
1926.432 Environmental deterioration of equipment.
1926.433-1926.440 [Reserved]

SAFETY REQUIREMENTS FOR SPECIAL EQUIPMENT

1926.441 Battery locations and battery charging.
1926.442-1926.448 [Reserved]

DEFINITIONS

1926.449 Definitions applicable to this subpart.

Subpart L -- Scaffolds

1926.450 Scope, application and definitions applicable to this subpart.

1926.451 General requirements.

1926.452 Additional requirements applicable to specific types of scaffolds.

1926.453 Aerial lifts

1926.454 Training requirements.

APPENDIX A TO SUBPART L -- Scaffolds

APPENDIX B TO SUBPART L -- Scaffolds

APPENDIX C TO SUBPART L -- Scaffolds

APPENDIX D TO SUBPART L -- Scaffolds

APPENDIX E TO SUBPART L -- Scaffolds

Subpart M -- Fall Protection

1926.500 Scope, application, and definitions applicable to this subpart.

1926.501 Duty to have fall protection.

1926.502 Fall protection systems criteria and practices.

1926.503 Training requirements.

APPENDIX A TO SUBPART M -- DETERMINING ROOF WIDTHS

APPENDIX B TO SUBPART M -- GUARDRAIL SYSTEMS

APPENDIX C TO SUBPART M -- PERSONAL FALL ARREST SYSTEMS

APPENDIX D TO SUBPART M -- POSITIONING DEVICE SYSTEMS

APPENDIX E TO SUBPART M -- SAMPLE FALL PROTECTION PLANS

Subpart N -- Cranes, Derricks, Hoists, Elevators, and Conveyors

1926.550 [Reserved].

1926.551 Helicopters.

1926.552 Material hoists, personnel hoists and elevators.

1926.553 Base-mounted drum hoists.

1926.554 Overhead hoists.

1926.555 Conveyors.

1926.556 [Removed].

Subpart O -- Motor Vehicles, Mechanized Equipment, and Marine Operations

1926.600 Equipment.

1926.601 Motor vehicles.

1926.602 Material handling equipment.

1926.603 Pile driving equipment.

1926.604 Site clearing.

1926.605 Marine operations and equipment.

1926.606 Definitions applicable to this subpart.

Subpart P -- Excavations

1926.650 Scope, application, and definitions applicable to this subpart.

1926.651 Specific Excavation Requirements.

1926.652 Requirements for protective systems.

APPENDIX A TO SUBPART P -- SOIL CLASSIFICATION

APPENDIX B TO SUBPART P -- SLOPING AND BENCHING

APPENDIX C TO SUBPART P -- TIMBER SHORING FOR TRENCHES

APPENDIX D TO SUBPART P -- ALUMINUM HYDRAULIC SHORING FOR TRENCHES

APPENDIX E TO SUBPART P -- ALTERNATIVES TO TIMBER SHORING

APPENDIX F TO SUBPART P -- SELECTION OF PROTECTIVE SYSTEMS

Subpart Q -- Concrete and Masonry Construction

1926.700 Scope, application, and definitions, applicable to this subpart.

1926.701 General requirements.

1926.702 Requirements for equipment and tools.

1926.703 Requirements for cast-in-place concrete.

1926.704 Requirements for precast concrete.

1926.705 Requirements for lift-slab construction operations.

1926.706 Requirements of masonry construction.

APPENDIX TO SUBPART Q -- REFERENCES TO SUBPART Q OF PART 1926

Subpart R -- Steel Erection

1926.750 Scope.
 1926.751 Definitions.
 1926.752 Site layout, site-specific erection plan and construction sequence.
 1926.753 Hoisting and rigging.
 1926.754 Structural steel assembly.
 1926.755 Column anchorage.
 1926.756 Beams and columns.
 1926.757 Open web steel joists.
 1926.758 Systems-engineered metal buildings.
 1926.759 Falling object protection.
 1926.760 Fall protection.
 1926.761 Training.

APPENDIX A TO SUBPART R -- GUIDELINES FOR ESTABLISHING THE COMPONENTS OF A SITE-SPECIFIC ERECTION PLAN: NON-MANDATORY GUIDELINES FOR COMPLYING WITH § 1926.752(e)

APPENDIX B TO SUBPART R -- [RESERVED]

APPENDIX C TO SUBPART R -- ILLUSTRATIONS OF BRIDGING TERMINUS POINTS: NON-MANDATORY GUIDELINES FOR COMPLYING WITH § 1926.757(a)(10) and § 1926.757(c)(5)

APPENDIX D TO SUBPART R -- ILLUSTRATION OF THE USE OF CONTROL LINES TO DEMARCATATE CONTROLLED DECKING ZONES (CDZs): NON-MANDATORY GUIDELINES FOR COMPLYING WITH § 1926.760(c)(3)

APPENDIX E TO SUBPART R -- TRAINING: NON-MANDATORY GUIDELINES FOR COMPLYING WITH § 1926.761

APPENDIX F TO SUBPART R -- PERIMETER COLUMNS: NON-MANDATORY GUIDELINES FOR COMPLYING WITH § 1926.756(e) TO PROTECT THE UNPROTECTED SIDE OR EDGE OF A WALKING/WORKING SURFACE

APPENDIX G TO SUBPART R -- FALL PROTECTION SYSTEMS CRITERIA AND PRACTICES FROM § 1926.502: NON-MADATORY GUIDELINES FOR COMPLYING WITH § 1926.760(d)

APPENDIX H TO SUBPART R -- DOUBLE CONNECTIONS: ILLUSTRATION OF A CLIPPED END CONNECTION AND A STAGGERED CONNECTION: NON-MADATORY GUIDELINES FOR COMPLYING WITH § 1926.756(c)(1)

Subpart S -- Tunnels and Shafts, Caissons, Cofferdams, and Compressed Air

1926.800 Underground construction.
 1926.801 Caissons.
 1926.802 Cofferdams.
 1926.803 Compressed air.
 1926.804 Definitions applicable to this subpart.

APPENDIX A TO SUBPART S -- DECOMPRESSION TABLES

Subpart T -- Demolition

1926.850 Preparatory operations.
 1926.851 Stairs, passageways, and ladders.
 1926.852 Chutes.
 1926.853 Removal of materials through floor openings.
 1926.854 Removal of walls, masonry sections, and chimneys.
 1926.855 Manual removal of floors.
 1926.856 Removal of walls, floors, and material with equipment.
 1926.857 Storage.
 1926.858 Removal of steel construction.
 1926.859 Mechanical demolition.
 1926.860 Selective demolition by explosives.

Subpart U -- Blasting and Use of Explosives

1926.900 General provisions.
 1926.901 Blaster qualifications.
 1926.902 Surface transportation of explosives.
 1926.903 Underground transportation of explosives.
 1926.904 Storage of explosives and blasting agents.
 1926.905 Loading of explosives or blasting agents.
 1926.906 Initiation of explosive charges - electric blasting.
 1926.907 Use of safety fuse.
 1926.908 Use of detonating cord.
 1926.909 Firing the blast.
 1926.910 Inspection after blasting.
 1926.911 Misfires.
 1926.912 Underwater blasting.
 1926.913 Blasting in excavation work under compressed air.
 1926.914 Definitions applicable to this subpart.

Subpart V -- Power Transmission and Distribution

1926.950 General requirements.
 1926.951 Tools and protective equipment.
 1926.952 Mechanical equipment.
 1926.953 Material handling.
 1926.954 Grounding for protection of employees.
 1926.955 Overhead lines.

- 1926.956 Underground lines.
- 1926.957 Construction in energized substations.
- 1926.958 External load helicopters.
- 1926.959 Lineman's body belts, safety straps, and lanyards.
- 1926.960 Definitions applicable to this subpart.

Subpart W -- Rollover Protective Structures; Overhead Protection

- 1926.1000 Rollover protective structures (ROPS) for material handling equipment.
- 1926.1001 Minimum performance criteria for rollover protective structures for designated scrapers, loaders, dozers, graders, and crawler tractors.
- 1926.1002 Protective frames (roll-over protective structures, known as ROPS) for wheel-type agricultural and industrial tractors used in construction.
- 1926.1003 Overhead protection for operators of agricultural and industrial tractors.

APPENDIX A TO SUBPART W -- Figures W-14 through W-28

Subpart X -- Stairways and Ladders

- 1926.1050 Scope, application, and definitions applicable to this subpart.
- 1926.1051 General Requirements.
- 1926.1052 Stairways.
- 1926.1053 Ladders.
- 1926.1054-1926.1059 [Reserved]
- 1926.1060 Training Requirements

APPENDIX A TO SUBPART X -- Ladders

Subpart Y -- Commercial Diving Operations

GENERAL

- 1926.1071 Scope and application.
- 1926.1072 Definitions.

PERSONNEL REQUIREMENTS

- 1926.1076 Qualifications of dive team.

GENERAL OPERATIONS PROCEDURES

- 1926.1080 Safe practices manual.
- 1926.1081 Pre-dive procedures.
- 1926.1082 Procedures during dive.
- 1926.1083 Post-dive procedures.

SPECIFIC OPERATIONS PROCEDURES

- 1926.1084 SCUBA diving.
- 1926.1085 Surface-supplied air diving.
- 1926.1086 Mixed-gas diving.
- 1926.1087 Liveboating.

EQUIPMENT PROCEDURES AND REQUIREMENTS

- 1926.1090 Equipment

RECORDKEEPING

- 1926.1091 Recordkeeping requirements.
- 1926.1092 [Removed]

APPENDIX A TO SUBPART Y -- EXAMPLES OF CONDITIONS WHICH MAY RESTRICT OR LIMIT EXPOSURE TO HYPERBARIC CONDITIONS

APPENDIX B TO SUBPART Y -- GUIDELINES FOR SCIENTIFIC DIVING

Subpart Z -- Toxic and Hazardous Substances

- 1926.1100 [Reserved]
- 1926.1101 Asbestos
- 1926.1102 Coal tar pitch volatiles; interpretation of term.
- 1926.1103 13 Carcinogens (4-Nitrobiphenyl, etc.).
- 1926.1104 alpha-Naphthylamine.
- 1926.1105 [Reserved]
- 1926.1106 Methyl chloromethyl ether.
- 1926.1107 3,3'-Dichlorobenzidine (and its salts).
- 1926.1108 bis-Chloromethyl ether.
- 1926.1109 beta-Naphthylamine.
- 1926.1110 Benzidine.
- 1926.1111 4-Aminodiphenyl.
- 1926.1112 Ethyleneimine.
- 1926.1113 beta-Propiolactone.
- 1926.1114 2-Acetylaminofluorene.
- 1926.1115 4-Dimethylaminoazobenzene.
- 1926.1116 N-Nitrosodimethylamine.
- 1926.1117 Vinyl chloride.
- 1926.1118 Inorganic arsenic.
- 1926.1127 Cadmium.

1926.1128 Benzene.
 1926.1129 Coke oven emissions.
 1926.1144 1,2-dibromo-3-chloropropane.
 1926.1145 Acrylonitrile.
 1926.1147 Ethylene oxide.
 1926.1148 Formaldehyde.
 1926.1152 Methylene Chloride.

Subpart AA-BB -- [RESERVED]

Subpart CC -- Cranes and Derricks in Construction

1926.1400 Scope.
 1926.1401 Definitions.
 1926.1402 Ground conditions.
 1926.1403 Assembly/Disassembly--selection of manufacturer or employer procedures.
 1926.1404 Assembly/Disassembly--general requirements (applies to all assembly and disassembly operations).
 1926.1405 Disassembly--additional requirements for dismantling of booms and jibs (applies to both the use of manufacturer procedures and employer procedures).
 1926.1406 Assembly/Disassembly--employer procedures--general requirements.
 1926.1407 Power line safety (up to 350 kV)--assembly and disassembly.
 1926.1408 Power line safety (up to 350 kV)--equipment operations.
 1926.1409 Power line safety (over 350 kV).
 1926.1410 Power line safety (all voltages)--equipment operations closer than the Table A zone.
 1926.1411 Power line safety--while traveling.
 1926.1412 Inspections.
 1926.1413 Wire rope--inspection.
 1926.1414 Wire rope--selection and installation criteria.
 1926.1415 Safety devices.
 1926.1416 Operational aids.
 1926.1417 Operation.
 1926.1418 Authority to stop operation.
 1926.1419 Signals--general requirements.
 1926.1420 Signals--radio, telephone or other electronic transmission of signals.
 1926.1421 Signals--voice signals--additional requirements.
 1926.1422 Signals--hand signal chart.
 1926.1423 Fall protection.
 1926.1424 Work area control.
 1926.1425 Keeping clear of the load.
 1926.1426 Free fall and controlled load lowering.
 1926.1427 Operator qualification and certification.
 1926.1428 Signal person qualifications.
 1926.1429 Qualifications of maintenance & repair employees.
 1926.1430 Training.
 1926.1431 Hoisting personnel.
 1926.1432 Multiple-crane/derrick lifts--supplemental requirements.
 1926.1433 Design, construction and testing.
 1926.1434 Equipment modifications.
 1926.1435 Tower cranes.
 1926.1436 Derricks.
 1926.1437 Floating cranes/derricks and land cranes/derricks on barges.
 1926.1438 Overhead & gantry cranes.
 1926.1439 Dedicated pile drivers.
 1926.1440 Sideboom cranes.
 1926.1441 Equipment with a rated hoisting/lifting capacity of 2,000 pounds or less.
 1926.1442 Severability.

Appendix A to Subpart CC of part 1926--Standard Hand Signals

Appendix B to Subpart CC of part 1926--Assembly/Disassembly--Sample Procedures for Minimizing the Risk of Unintended Dangerous Boom Movement

Appendix C to Subpart CC of part 1926--Operator Certification--Written Examination--Technical Knowledge Criteria

APPENDIX A TO PART 1926 -- DESIGNATIONS FOR GENERAL INDUSTRY STANDARDS INCORPORATED INTO BODY OF CONSTRUCTION STANDARDS.

SOURCE: 44 FR 8577, Feb. 9, 1979; 44 FR 20940, Apr. 6, 1979, unless otherwise noted.

EDITORIAL NOTE: At 44 FR 8577, Feb. 9, 1979, and corrected at 44 FR 20940, Apr. 6, 1979, OSHA reprinted without change the entire text of 29 CFR Part 1926 together with certain General Industry Occupational Safety and Health Standards contained in 29 CFR Part 1910, which have been identified as also applicable to construction work. This republication developed a single set of OSHA regulations for both labor and management forces within the construction industry.

Editorial Note: The Federal Register of August 2, 1995, page 39254 issued a Final Rule; correcting amendment. OSHA will maintain the existing fall protection requirements for steel erection activities pending rulemaking that addresses the steel erection industry. This affected 1926.104, 1926.105, 1926.107, 1926.500, and 1926.753.

[55 FR 42328, Oct. 18, 1990; 55 FR 47687, Nov. 14, 1990; 58 FR 26627, May 4, 1993; 58 FR 35077, June 30, 1993; 59 FR 215, Jan. 3, 1994; 59 FR 36695, July 19, 1994; 59 FR 40729, Aug. 9, 1994; 59 FR 40964, Aug. 10, 1994; 60 FR 5131, Jan. 26, 1995; 60 FR 39254, Aug. 2, 1995; 61 FR 5507, Feb. 13, 1996; 61 FR 9227, March 7, 1996; 61 FR 31427, June 20, 1996; 61 FR 46025, Aug. 30, 1996; 62 FR 1493, Jan. 10, 1997; 63 FR 1152, Jan. 8, 1998; 63 FR 1919, Jan. 13, 1998; 63 FR 3813, Jan. 27, 1998; 63 FR 13338, March 19, 1998; 63 FR 17093, April 8, 1998; 63 FR 20098, April 23, 1998; 63 FR 33450, June 18, 1998; 63 FR 35137, June 29, 1998; 64 FR 18810, April 16, 1999; 66 FR 5265, Jan. 18, 2001; 70 FR 76985, Dec. 29, 2005; 71 FR 2885, Jan. 18, 2006; 71 FR 16675, April 3, 2006; 75 48130, Aug. 9, 2010]

Next Standard (1926 Subpart A)

DOCUMENT A00814

**MASSACHUSETTS BAY
TRANSPORTATION AUTHORITY**

PTC

**INFRASTRUCTURE CHANGE
REQUIREMENTS**

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**MBTA PTC
INFRASTRUCTURE CHANGE
REQUIREMENTS**

August 23, 2019

REVISION HISTORY

Date	Revision	Description	Author
August 23, 2019	0	Initial release	MBTA

1	INTRODUCTION.....	1
1.1	Purpose.....	1
1.2	Commuter Rail Modifications.....	1
1.3	Background.....	2
1.4	Process.....	3
2	PTC REQUIREMENTS RESULTING FROM TRACK CHANGES.....	5
3	PTC REQUIREMENTS RESULTING FROM SIGNAL CHANGES.....	7
4	PTC REQUIREMENTS RESULTING FROM STRUCTURE CHANGES ..	9
5	PTC REQUIREMENTS RESULTING FROM COMMUNICATIONS SYSTEM CHANGES	11
6	PTC REQUIREMENTS RESULTING FROM VEHICLE CHANGES.....	13
7	PTC REQUIREMENTS RESULTING FROM OPERATING RULES AND TIMETABLE CHANGES.....	14
APPENDIX A	MBTA PTC – INFRASTRUCTURE CHANGE DESCRIPTION FORM	16
APPENDIX B	PTC OPERATIONS AND MAINTENANCE TRAINING COURSES	19
APPENDIX C	RAILROAD SURVEY REQUIREMENTS	24
1	SURVEY REQUIREMENTS	24
1.1	GPS Survey and Mapping.....	24
1.2	Mile Post.....	25
1.3	Track Centerlines.....	26
1.4	Clearance Points.....	26
1.4.1	Clearance Point Options.....	26
1.4.2	Clearance Points, Track and Authorities.....	27
1.5	Horizontal Curves	28
1.5.1	Length.....	28
1.5.2	Degree of Curve	28
1.5.3	Superelevation.....	28
1.6	Railroad Crossings at Grade (Diamonds).....	28
1.7	Grade of Track	29
1.7.1	Elevation	29
1.8	Signals.....	29
1.8.1	High Stand Signals.....	29
1.8.2	Dwarf Signals	30
1.8.3	Cantilever Signals	31
1.8.4	Signal Bridges.....	32
1.9	Turnouts and Derails	33
1.9.1	Direction/Facing.....	33
1.9.2	Size	34
1.9.3	Type of Switch/Points	34
1.9.4	Point of Switch Examples.....	34

1.10	Timetable Speeds.....	36
1.11	Highway Grade Crossings.....	36
1.11.1	Begin/End Latitude/Longitude of Road Crossings at Grade	36
1.11.2	DOT Number.....	39
1.12	Horn Disable/Quiet Times.....	39
1.13	Bridges.....	39
1.13.1	Overhead Bridges	39
1.13.2	Under Grade Bridges.....	40
1.14	Tunnels.....	40
1.15	Station Platforms.....	41
1.16	Bungalows.....	41
1.16.1	WIUs	42
1.17	Limits of Permanent Speed Restriction	42
1.18	Sign Location	43
1.19	Method of Operation Change Sign.....	44
1.20	Other Wayside features as deemed necessary by MBTA.....	45
1.21	Wide Area Augmentation System (WAAS) Quality Survey	45
1.22	Light Detection and Ranging Survey (LiDAR)	45
1.23	Equipment Restrictions	46
1.23.1	Clearance and Curve Limitations	46
1.24	Reports and Data Output	46
APPENDIX D	PTC FIBER STANDARDS.....	48
1	INTRODUCTION.....	48
1.1	Requirements.....	48
1.2	Cable Delivery and Storage.....	52
1.3	Connectors and Patch Panels.....	53
1.4	Patch Cords and Pigtails	54
1.5	Splice Enclosures and splice trays	54
1.6	Splicing Requirements.....	55
1.7	Fiber Slacks.....	55
1.8	Labeling.....	56
1.9	Fiber Optic Testing Requirements	57
1.10	Required Documentation.....	57
1.11	Service Interruptions	58

1 Introduction

1.1 Purpose

The following document is meant to serve as a guide to the MBTA regarding necessary actions to address any changes that occur on the Commuter Railroad Network and Operation that have consequential impacts to the PTC System. This document is subdivided to address changes in the following areas:

- Track
 - Highway Grade Crossings
- Signals
- Structures (stations, platforms, bridges, etc.)
- Communications Systems
- Vehicles
- Operating Rules and Timetables

This document identifies actions that need to be included in the overall project plan for projects implemented on the Commuter Rail Network that involve changes to the aforementioned areas. The method(s) employed to address these actions will need to be addressed on a project by project basis between the MBTA and its stakeholders.

For all cases involving changes to the Commuter Railroad Network, the “Project Sponsor” is required to complete a MBTA PTC – Infrastructure Change Description Form (reference Appendix A). This form is a prerequisite for commencement of any work on the Commuter Rail Network.

1.2 Commuter Rail Modifications

The MBTA Commuter Rail Network is an ever-changing environment where the physical characteristics of the railroad are modified regularly to improve operations or address systemic issues. The Positive Train Control (PTC) System is designed and operated to the specific conditions and locations of rail network assets. This dependency is critical to the functionality of the PTC System.

If the MBTA has plans to alter rail network assets, the impact to the PTC System must be considered. During the planning stages of every MBTA Project, the MBTA must have the discipline to assess its impact on the PTC System and make sure that time and funds are set aside to address any modifications to the PTC System that are required.

As an example, if the MBTA plans to add a new track on a commuter rail line, the track and its interlockings will need to be integrated into the PTC System. The work to integrate this new asset into the PTC System will include:

- Survey of the track and interlockings (refer to Appendix C),
- Design of PTC System hardware, software and interfaces to the existing PTC System,

- Survey and design for installation of PTC equipment enclosures,
- Installation of PTC enclosures, hardware and software,
- Testing of wayside, back office, communications, and onboard PTC systems with respect to the new configuration,
- Federal Railroad Administration approval of the new PTC System elements (if testing on an Uncertified PTC System),
- Training of railroad operations and maintenance personnel as required (defined in Appendix B),
- Incorporation of new PTC elements into the long-term PTC maintenance program.

Coordination with the MBTA's PTC Program is essential to this process as each Project will have unique elements.

1.3 Background

The MBTA's PTC System is a vital train control system that provides four key functions:

- Prevention of train-to-train collision
- Prevention of over-speed derailment
- Prevention of movement through a misaligned switch
- Prevention of unauthorized train movements through a work zone

These four key functions rely on an integrated system to work that involve the following major subsystems:

- Onboard Subsystem – Consists of equipment mounted to the locomotive or cab car. Equipment includes onboard computer, CTV box, scanner antenna, 220 MHz data radio and antenna, GPS radio and antenna, cellular modem and antenna, mobile communications manager, aspect display unit, wheel tachometer, brake system interface and associated piping and wiring.
- Wayside Subsystem – Consists of passive transponders mounted to railroad ties to provide location-specific and directional-specific information to trains as they pass over the transponders. Includes Wayside Interface Unit (WIU) mounted inside signal bungalows or in separate enclosures which interfaces with the signal system to extract and communicate signal aspect and switch position information to approaching trains.
- Communications Subsystem – Consists of a radio frequency-based communications system deployed adjacent to interlockings and other signals as required by the PTC design to provide two-way train-to-wayside (WIU) communication of train movement authority specific to the routing of the train. The Communications Subsystem consists of a ground-based fiber optic communications network to link wayside PTC installations with the Back Office Subsystem. This subsystem includes cellular end of line links to provide redundant

communications paths and microwave links in locations where fiber optic link was not readily feasible.

- **Back Office Subsystem** – Consists of safety servers that interface with the dispatch system through dispatcher workstations to provide means for creating and transmitting temporary speed restrictions and work zone speed restrictions from the dispatcher desk to affected trains. The Back Office Subsystem relies on the Communications Subsystem for transmission of these restrictions to the Onboard Subsystem which provides enforcement of the restrictions.

The MBTA's Commuter Rail PTC System is implemented in compliance with the Code of Federal Regulations (49 CFR 236 Subpart I) that are administered by the Federal Railroad Administration (FRA) as required by Federal Law.

The FRA requires that the MBTA have its PTC System in operation at all times. The PTC System can only be cut out under special circumstances which will limit the speed of train movements. System operations requires that all four subsystems be operating properly at all times.

The FRA also requires the system be maintained to specific standards and requires that the configuration of the system be recorded and maintained in a configuration management system. This process is defined in the Configuration Management Plan. This is typically done initially in the planning stage of project, and continues through the design, construction, and test for service stages. This requirement will become particularly critical as projects require changes to the PTC System. The PTC Program has provided training covering the Operation and Maintenance of the PTC System. A list of Training Courses is provided in Appendix B.

This document references the "Project Sponsor" as the responsible party to provide the necessary information to properly coordinate between the relevant "Project" and the PTC Program. The "Project Sponsor" is defined as the lead department in charge of managing the relevant "Project".

Adherence to the requirements set forth in this document will create a path to minimize the potential disruption to the PTC System and maintain a productive environment for infrastructure projects to proceed in harmony with the PTC System.

1.4 Process

The process for engaging the PTC Program and establishing a plan for addressing the impacts to the PTC System involves the following steps that need to occur before the Project that is impacting PTC is approved for execution:

1. The Project Sponsor shall submit a PTC Program–Capital Project Coordination Form to the MBTA PTC Program. Forms may be emailed to the Program at MBTA_PTC_DOC_CTRL@gov-docs.e-builder.net.
2. The MBTA PTC Program will evaluate the submission and make recommendations. The Project Sponsor shall meet with the MBTA PTC Program Representative to discuss relevant scope, schedule, PTC impacts and budget considerations as required.

3. For projects with major PTC system impacts, a PTC Coordination Plan will be developed. This Plan shall include the scope for PTC work, designated responsibilities, schedule for activities from work initiation to completion and budget approved by designated Project Sponsor/Program Manager and the MBTA PTC Program Manager.
4. MBTA Railroad Operations and MBTA Capital Delivery approvals shall be obtained for the PTC Coordination Plan to accommodate PTC requirements associated with the Project.

After the MBTA accepts the PTC System from the System Integrator, this process will be managed by the PTC Operations and Maintenance Organization within MBTA Railroad Operations.

End of Section

2 PTC Requirements Resulting from Track Changes

The MBTA will embark on programs that involve movement of track and turnouts and the addition or removal of track and turnouts. These modifications to the Commuter Rail Network impact the PTC System.

The PTC System relies on precise measurements of track characteristics to dynamically calculate speed requirements for trains operating on the network. When the PTC system was designed for the MBTA, LiDAR measurements of track characteristics and the location of fixed points (landmarks) on the railroad were performed. These measurements generated a data-set that was used to calculate speed requirements in conjunction with train position.

If track changes are made after the original measurements were taken, and the PTC System is not modified to account for these changes, PTC System performance may be impacted. This could result in a failure of proper speed enforcement, violating Federal Railroad Administration requirements for PTC System Operation and Maintenance and potentially causing a catastrophic incident.

If an MBTA Project intends to alter track configuration either by movement of track(s) or turnouts, addition or removal of track(s) or turnouts, the following must occur:

1. Provide a complete description of the changes in track configuration. This description must be in the form of a track plan drawing with curvature, elevation, and planned timetable speed from the nearest milepost entering the affected zone to the nearest milepost exiting the affected zone. If the track changes involve changes to interlockings, complete interlocking plans must be provided that include, but are not limited to, turnout size, fouling points, and interlocking speed limits.
2. Project Sponsor must include in the scope of the Project, the following:
 - a. Transponder Management Plan
 - i. Requirements for transponder relocation during construction and the use of construction transponders.
 - ii. Programming and installation of new transponders to account for the changes made by the Project to the configuration of the rail network.
 - iii. As appropriate, construction zone transponders will be placed at the entry and exit boundaries of the work zone for the Project until such time that the MBTA PTC Program has determined all relevant testing has been successfully performed to confirm the modified subsystems of the PTC System are functioning properly.
 - b. LiDAR Measurements and Track Database Management
 - i. Prepare and conduct a LiDAR survey of the affected area from the nearest milepost before entering the affected zone to the nearest milepost after exiting the affected zone.
 - a. Other defined unchanged landmarks may be used instead of the nearest milepost. The Program or Railroad Operations would need to provide input to verify the landmarks on either side.
 - ii. Present LiDAR survey data in usable format so that it can be applied to the PTC Safety Server (Format requirements presented in Appendix C).

3. Railroad PTC System Modification Plan – The Project Sponsor must have a Railroad PTC System Modification Plan prepared, submitted and approved by the MBTA PTC Program Manager prior to the commencement of the work. This Plan shall at a minimum include:
 - a. Defined scope of PTC work that is consistent with the needs for PTC System modification driven by the changes to the railroad network resulting from completion of the subject Project.
 - b. Defined methods of executing the aforementioned work-scope that include scope, schedule and budget for all parties involved with said work.
4. Examples of work that impacts the configuration of the railroad and thus the PTC System include but are not limited to:
 - a. Track throw
 - b. Lowering or raising track to increase bridge clearance
 - c. New industry switch
 - d. New, Closed or Widened highway grade crossing
5. Examples of track work that does not change the configuration of the railroad (no LiDAR survey required) but may impact the PTC System due to transponders being affixed to railroad ties in the work area include but are not limited to:
 - a. Tie replacement
 - b. Rail replacement
 - c. Maintenance surfacing
 - d. Grade crossing replacement (as long as the physical limits of the crossing are not changed)

Transponders may need to be temporarily relocated or removed to maintain PTC System operation and prevent damage to transponders then reinstalled when work is completed.

The PTC System is an integral part of the railroad and needs to be accounted for in the execution of all track work.

End of Section

3 PTC Requirements Resulting from Signal Changes

The MBTA will embark on programs that will involve relocation, addition or removal of railroad signals and make changes to signal functions or indications. These modifications to the Commuter Rail Network impact the PTC System.

The PTC System relies on inputs from the Signal System to transmit Limits of Movement Authority (LOMA) messages to trains. At the time the PTC Program was designed, a complete signal survey was performed that accounted for the signal system configuration in place at that time. This information was used to design the interfaces between the Signal System and the PTC System.

If changes are made to the Signal System and the PTC System is not modified to account for these changes, PTC System performance may be impacted. This could result in a failure of proper signal enforcement, violating Federal Railroad Administration requirements for PTC System Operation and Maintenance and potentially causing a catastrophic incident.

If an MBTA Project intends to alter signal system configuration, the following must occur:

1. Provide a complete description of the changes to the signal system in the affected area. This description must be in the form of a signal plan drawing with control lines, interface changes and type.
2. Project Sponsor must include in the scope of the Project, the following:
 - a. Transponder Management Plan
 - i. Requirements for transponder relocation during construction and the use of construction transponders.
 - ii. Programming and installation of new transponders to account for changes made to the signal system.
 - iii. As appropriate, construction zone transponders will be placed at the entry and exit boundaries of the work zone for the Project until such time that the MBTA PTC Program has determined all relevant testing has been successfully performed to confirm the modified subsystems of the PTC System are functioning properly.
 - b. LiDAR Measurements and Track Database Management
 - i. If signal system changes result in physical changes to the railroad infrastructure, prepare and conduct a LiDAR survey of the affected area from the nearest milepost entering the affected zone to the nearest milepost exiting the affected zone.
 - a. Other defined unchanged landmarks may be used instead of the nearest milepost. The Program or Railroad Operations would need to provide input to verify the landmarks on either side.
 - ii. Present LiDAR survey data in usable format so that it can be applied to the PTC Safety Server (Format requirements presented in Appendix C).
3. Radio Frequency Plan – The addition of new signals may require new PTC radio installations to support train-to-wayside communications from the new signal location(s). This plan must include, at a minimum, the following:

- a. Determination that a new wayside radio installation is required as part of the initial design phase for all signal projects. This determination shall be presented to the MBTA PTC Program for concurrence before the signal project can progress.
 - b. If a new radio installation is required, the Project Sponsor has to request information from and confirm with the PTC Program the availability and limitation (if any) of the 217 MHz radio spectrum at a specific location. Please refer to Section 5 for more details about the Radio design changes.
4. Railroad PTC System Modification Plan – The Project Sponsor must have a Railroad PTC System Modification Plan prepared, submitted and approved by the MBTA PTC Program Manager prior to commencement of any such work. This Plan shall at a minimum include:
- a. Defined scope of PTC work that is consistent with the needs for PTC System modification driven by the changes to the railroad network resulting from completion of the subject Project.
 - b. Defined methods of executing the aforementioned work-scope that include scope, schedule and budget for all parties involved with said work.
5. Examples of signal work that impacts the PTC System includes but is not limited to:
- a. Adding new signals
 - b. Relocating existing signals
 - c. Removing signals
 - d. Modifications to signal logic

End of Section

4 PTC Requirements Resulting from Structure Changes

The MBTA will embark on programs that will involve relocation, addition or removal of railroad structures. For the purpose of this document, structures utilized by the railroad such as bridges, station platforms or other fixed structures that impact train operations or impact landmark data points that are used to define operating limits. These modifications to the Commuter Rail Network impact the PTC System.

The PTC System relies on precise location of railroad structures to ensure proper speeds are maintained at all times. At the time the PTC Program was in the Design Phase, a complete survey was performed that accounted for structures in place at that time. This information was used to design the PTC System.

If changes are made to the location and operating conditions with respect to railroad structures and the PTC System is not modified to account for these changes, PTC System performance may be impacted. This could result in a failure of proper speed enforcement, violating Federal Railroad Administration requirements for PTC System Operation and Maintenance and potentially causing a catastrophic incident.

If an MBTA Project intends to alter the configuration or railroad structures, the following must occur:

1. Provide a complete description of the changes in the affected area. This description must be in the form of a detailed drawing with description of the location of the structure(s) with respect to railroad mileposts, a description of the impact this project will have on railroad operations and a project plan describing what changes in operation are required to support construction activities related to this Project.
2. Project Sponsor must include in the scope of the Project, the following:
 - a. Transponder Management Plan
 - i. Requirements for transponder relocation during construction and the use of construction transponders.
 - ii. Programming and installation of new transponders to account for changes made to the rail network.
 - iii. As appropriate, construction zone transponders will be placed at the entry and exit boundaries of the work zone for the Project until such time that the MBTA PTC Program has determined all relevant testing has been successfully performed to confirm the modified subsystems of the PTC System are functioning properly.
 - b. LiDAR Measurements and Track Database Management
 - i. If the structure change results in physical changes to the railroad infrastructure or requires input to the landmark database, prepare and conduct a LiDAR survey of the affected area from the nearest milepost entering the affected zone to the nearest milepost exiting the affected zone.
 - a. Other defined unchanged landmarks may be used instead of the nearest milepost. The Program or Railroad Operations would need to provide input to verify the landmarks on either side.

- ii. Present LiDAR survey data in usable format so that it can be applied to the PTC Safety Server (Format requirements presented in Appendix C).
 - iii. Provide GIS Shapefiles to update the affected zone.
3. Railroad PTC System Modification Plan – The Project Sponsor must have a Railroad PTC System Modification Plan prepared, submitted and approved by the MBTA PTC Program Manager prior to commencement of such work. This Plan shall at a minimum include:
 - a. Defined scope of PTC work that is consistent with the needs for PTC System modification driven by the changes to the railroad network resulting from completion of the subject Project.
 - b. Defined methods of executing the aforementioned work-scope that include scope, schedule and budget for all parties involved with said work.
4. Examples of structure changes that impact the PTC System include but are not limited to:
 - a. Adding, relocating, removing, or changing the length of a station platform.
 - b. Adding a new station or removing an existing station.
 - c. Bridge replacements that involves changes to track centers, location, profile, or changes the bridge length.
5. Examples of structure changes that do not change the configuration of the railroad (i.e., no LiDAR survey required), but may impact the PTC System, due to potential impacts to the transponders affixed to the ties in the area of the work:
 - a. Culvert replacements.
 - b. Bridge deck replacements.

Transponders may need to be temporarily removed to prevent damage during the work and then reinstalled prior to placing the track back into service after completion of the structure work.

The PTC System is part of the railroad signal system and needs to be accounted for in the planning and execution of all structure work as with the other elements of the signal system.

End of Section

5 PTC Requirements Resulting from Communications System Changes

The MBTA will embark on programs that will involve relocation, addition or removal of railroad communications systems. For the purpose of this document, railroad communications systems are defined as fiber optic cable networks, microwave networks, telephone networks (land line and cellular) and radio frequency networks supporting the PTC and signal systems. Any modifications to the Commuter Rail communications networks have the potential to impact the PTC System.

The PTC System relies on these communications networks for critical operating functions. At the time the PTC Program was in the Design Phase, a complete survey was performed that accounted for communications networks already in place at that time. The PTC Program has also added new fiber optic, RF, microwave, and other networks to support the PTC and signal system operations.

If changes are made to the Communications System and the PTC System is not modified to account for these changes, PTC System performance will be impacted. This could result in a failure of proper speed or signal enforcement, violating Federal Railroad Administration requirements for PTC System Operation and Maintenance and potentially causing a catastrophic incident.

If an MBTA Project intends to alter the Communications System, the following must occur:

1. Provide a complete description of the changes in the affected area. This description must be in the form of a detailed drawing with description of the communications network change(s) with respect to railroad mileposts, a description of the impact this project will have on railroad operations, and a project plan describing what changes in operation are required to support construction activities related to this Project.
2. Railroad PTC System Modification Plan – The Project Sponsor must have a Railroad PTC System Modification Plan prepared, submitted and approved by the MBTA PTC Program Manager prior to commencement of any such work. This Plan shall at a minimum include:
 - a. Defined scope of PTC work that is consistent with the needs for PTC System modification driven by the changes to the railroad network resulting from completion of the subject Project.
 - b. Defined methods of executing the aforementioned work-scope that include scope, schedule and budget for all parties involved with said work.
3. Examples of work that could impact the communications systems are:
 - a. Temporary removal and reinstallation of fiber optic cable in conjunction with a bridge replacement. Note that the system includes a cellular backup system that allows the PTC communication system to continue to operate normally with one (but only one) break in the fiber on a commuter rail line.
 - b. Permanent relocation of the fiber optic cable pole line due to the construction of a new station platform. Note that there is some slack built into the PTC fiber optic cable pole line installation that may permit such relocation to take place without cutting or interrupting the use of the cable.
 - c. Changes to the communications network that may affect the PTC system, such as changes to network switches, routers or servers, change of IP addresses, etc.
 - d. MBTA PTC System has deployed a network of RF towers to support the PTC functionality. The network is based on the 217 MHz spectrum which is owned and

operated by the MBTA. In most cases a radio tower is located at an interlocking not as an isolated installation, but as a part of a systemwide network that must be coordinated to prevent intra/inter-system interference. Therefore, Project Sponsor must coordinate with the PTC Program the needs and requirements for the radio spectrum and compliance with the FCC regulations. The Project Sponsor staff shall become familiar with the existing PTC radio design and develop a change request for the RF channel plan changes for review and approval of the MBTA PTC Program.

- e. Project Sponsor shall note that changes to PTC radio system design can impact existing PTC radio configurations outside of the new project limits, including on adjacent MBTA lines and/or adjacent interoperable railroads.
- f. The PTC Program is currently considering an over-the-air cryptographic security functionality to be deployed in 2020. The security add-on will be deployed on onboard, wayside and the back office. The Project Sponsor is required to coordinate with the PTC Program the deployment of security keys to any new assets, such as BCPs, Onboard, and back office systems impacting the function and performance of the PTC system.
- g. Any new monitored PTC asset (such as BCP, Locomotive/Cab Car, WIU, GPS clock, or network switch) has to be added into the NMS (Network Management System) for monitoring. The current MBTA NMS system is based on SolarWinds and is operated by KCS. Project Sponsor shall coordinate with KCS and the PTC Project the addition (or removal) of PTC monitored assets to/from the NMS system.

The PTC System is part of the railroad signal system and needs to be accounted for in the planning and execution of all structure work as with the other elements of the signal system.

The MBTA PTC Program has standards for fiber optic cable installations, splicing and repair. Please refer to Appendix D – PTC Fiber Standards. As with all other communication system components, removal and installation of PTC communication system components must be entered into the MBTA's configuration management system.

End of Section

6 PTC Requirements Resulting from Vehicle Changes

The MBTA will embark on programs that will involve modifications to existing vehicles or addition of new vehicles to the Commuter Rail Fleet. These modifications to the Commuter Rail vehicle fleet impact the PTC System.

If changes are made to the existing fleet or new vehicles are planned for procurement, coordination with the PTC Program is critical.

The MBTA PTC Program has standard hardware, software and installation criteria for MBTA vehicles which are required for use in vehicle specifications that involve new PTC installations (on new or overhauled vehicles) or refurbished PTC Systems for existing fleets.

As with all other vehicle components, removal and installation of PTC onboard system components must be entered into the MBTA's configuration management system.

End of Section

7 PTC Requirements Resulting from Operating Rules and Timetable Changes

The MBTA will make changes from time to time in the Operating Rules and Timetables for the Commuter Rail System. Operating Rule changes related to movement authorities impact how the PTC System enforces speeds and may involve changes to the safety server or onboard computer. Timetable changes will require adjustments to the PTC System to appropriately enforce new civil speed limits.

If such changes are planned, coordination with the PTC Program is critical to determine if changes are required to the PTC System. The magnitude and impact of changes will need to be addressed on a case by case basis.

End of Section

APPENDIX A
MBTA PTC – INFRASTRUCTURE CHANGE
DESCRIPTION FORM

Appendix A MBTA PTC – Infrastructure Change Description Form



PTC Program – Capital Project Coordination Form

Date:

Project Name:

Project Manager:

Project Scope Description:

Project Schedule/Timeframe:

Design:

Construction:

Project Impacts to PTC System (*specify location/limits, permanent or temporary, dates*):

Relocation of PTC fiber optic cable:

Relocation of PTC antenna or signal house/case:

Changes to railroad infrastructure:

Track alignment changes:

Track structure changes that impact transponders:

Signal system changes:

Changes to railroad configuration:

Station platform location/limits changes:

Bridge location/limits changes:

Grade Crossing location/limits changes:

Track speed changes:

Interference with PTC radio frequencies or microwave signals:

Instructions: Please fill out this form for each project that will interface with the track, bridges, stations, or signal system of the MBTA Commuter Rail System and return to the PTC Project Coordinator. Coordination between the projects will be initiated upon receipt of the completed form.

Note: The PTC System is currently being implemented by Ansaldo-STIS, USA and the system and equipment is under warranty and management of Ansaldo. Work required to modify the PTC System to accommodate other projects will be performed by Ansaldo under a change order which will be charged to the submitting project's budget. This work includes relocation of fiber optic cable or other PTC wayside equipment, relocation or modification of transponders, installation and removal of construction transponders, testing of the modified PTC System, LiDAR resurveys of modified infrastructure, and modifications to dispatch software to incorporate changes to landmark data.

Rev 0, February 6, 2019

End of Section

APPENDIX B
PTC OPERATIONS AND MAINTENANCE TRAINING
COURSES

Appendix B PTC Operations and Maintenance Training Courses

The PTC System Training Program includes the following training courses:

- Passive Transponder Operations and Maintenance
- MicroLok II and Wayside Interface Unit (WIU) Hardware Operations and Maintenance
- MicroLok II and WIU Application Programming
- Safety Temporary Speed Restriction (TSR) Server Operations and Maintenance
- Radio System Software Operations and Maintenance
- Radio System Hardware Operations and Maintenance
- Mobile Communications Package (MCP) Operations and Maintenance
- Ground-Based Network (GBN) Operations and Maintenance
- ATC System Updates to CTC System - TBD
- PTC System Application and Forms on the CTC System
- CTC System Training for Pan Am Dispatchers
- CTC System Administration and Maintenance of PTC System Equipment
- ATC/PTC System Enclosure Operations and Maintenance
- Onboard PTC System Maintenance and Troubleshooting
- Onboard PTC System Operations
- Radio Network Management System (NMS) Operations and Maintenance
- PTC System Simulation Functions

All training courses contain the following basic information, as appropriate, about the course-specific equipment/system:

- Purpose and Functionality
- Equipment Identification and Location
- Operations and Maintenance
- Hands-On/On-the-Job Exercises with the PTC System Simulator

Table 1: Signal Department Training Matrix

	Signal Inspector	Signal Maintainer	Signal Electronic Technician	Signal Foreman	Signal Roadmaster	Senior Signal Engineer	Signal Electronic Specialist
System Overview Training	X	X	X	X	X	X	X
Passive Transponder	X	X	X	X	X		
MicroLok II and WIU Hardware	X	X	X	X	X		
MicroLok II and WIU Application Programming	X		X	X	X	X	
MicroLok II and WIU Application Programming – Interlocking						X	
Safety TSR Server							X
CTC System Administrator							X
CTC System: PTC System Application and Forms							X

Table 2: Communication Department Training Matrix

	Communications Radio Technician	Communications Electronic Technician	Communications Roadmasters	Communications Senior Engineer
System Overview Training	X	X	X	X
RF Wayside Subsystems	X		X	X
Radio System Software – MCM/BCM	X		X	X
Radio System Software – OCM/RFM	X		X	X
Mobile Communications Package (MCP)	X	X	X	X
Ground Based Network (GBN)		X	X	X

Table 3: Mechanical Department Training Matrix

	Mechanical Electrician - Outlying Point/S&I	Mechanical Electrician - Shop	Mechanical Foreman - Shop	Mechanical Help Desk	Mechanical Electrical Technician	Mechanical Foreman - Outlying Point/S&I
Departure Tests	X	X	X	X	X	X
Light Troubleshooting	X	X	X	X	X	X
Periodic Maintenance		X	X		X	
Heavy Troubleshooting		X	X		X	
Mobile Communications Package (MCP)		X	X		X	

Table 4: Transportation Training Matrix

	Locomotive Engineer - North	Locomotive Engineer - South	Conductor
System Overview	X	X	X
PTC Train Handling/Simulator	X	X	
PTC System Operator Training – ACSES II	X	X	X
PTC NORAC Rules and Special Instructions	X	X	X

Table 5: Train Dispatch Training Matrix

	Train Dispatcher - North	Train Dispatcher - South	Chief Train Dispatcher	Rules Examiner - Dispatch
System Overview Training	X	X	X	X
ARIS Application and Forms	X	X	X	X
Safety TSR Server			X	X
ARIS System Administrator			X	X

End of Section

APPENDIX C
RAILROAD SURVEY REQUIREMENTS

Appendix C Railroad Survey Requirements

1 Survey Requirements

1.1 GPS Survey and Mapping

The FRA Positive Train Control (PTC) regulations require that a complete GPS survey of the railroad territories is performed where PTC will be in operation. The survey must provide a horizontal accuracy of 0.3 meters and a vertical accuracy of 0.6 meters. The Project Team impacting the railroad will be responsible for the completion of the survey and the creation of GIS databases.

The Project Team must perform a complete track and signal survey identifying all critical tracks and signaling features of the MBTA system in the affected area.

The survey will identify the Latitude and Longitude of the following features.

- A. Main Line Tracks
 - 1. Milepost Equations
- B. Other Tracks leading into PTC Territory
 - 1. Yard Limits
- C. Milepost Markers
- D. Track Centerlines
 - 1. Clearance Points
 - 2. Horizontal Curves
 - i. Length of entry spiral
 - ii. Length of curve
 - iii. Length of exit spiral
 - iv. Degree of Curve
 - v. Superelevation
 - 3. Railroad Crossings at Grade (diamonds)
- E. Grade of Track
 - 1. Elevation
 - 2. Vertical Curves – Length and Degree
- F. Signals
 - 1. Wayside
 - 2. Interlocking
 - 3. Control Point
 - 4. Intermediate
- G. Turnouts
 - 1. Direction
 - 2. Facing
 - 3. Size
 - 4. Point of Switch (optional)
 - 5. Type of Switch
 - i. Normal
 - ii. Spring
- H. Timetable Speeds
- I. Highway Grade Crossings
 - 1. Begin/End Latitude/Longitude

2. DOT Number
3. Type of Crossing
 - i. Public
 - ii. Private
 - iii. Pedestrian
4. Horn Disable
5. Quiet Times
- J. Bridges (both undergrade and overhead)
 1. Begin/End Latitude/Longitude
 2. Type of Bridge (undergrade or overhead)
 3. Clearance Information
- K. Tunnels
 1. Begin/End Milepost
 2. Clearance Information
- L. Passenger Station Platform
 1. Clearance Information
- M. Bungalows, Cases, Antenna Towers
 1. WIU Locations
- N. Bumping Posts (end of track)
- O. Other Wayside features as deemed necessary by the MBTA, such as railroad stations.

This processed data must be capable of being loaded into:

- ESRI Shape files for submission to the FRA, and
- Most current Wabtec PTC data model using “Wabtec PTC Data Model Definition, version S” (see Appendix D) or the latest version from Wabtec.

Note: Appendix D (Wabtec PTC Data Model Definitions) of the MBTA PTC-SI Contact Negotiation document provides a thorough description of all database fields for each of the assets defined in the document, as relevant to a Wabtec I-ETMS PTC system.

- Most current ACSES PTC data model as required by Ansaldo STS, and
- Asset Management System to be determined by the MBTA.

All data and maps shall become the property of the MBTA. All features outside of the near running track will be shown in “Actual Location” and projected to the centerline of track and shown as the “Centerline Location”.

Speed data will come from the MBTA’s Timetable and Special Instructions and General Orders.

1.2 Mile Post

Full Mile Markers in PTC territory are required to be surveyed and validated. Where there are multiple tracks, Mile Markers for each track will be collected. All locations must show as “Actual Location” and “Track Center Location” per Figure 1.

The Mile Marker shall be collected at the Mile Marker mast. Mile Markers may appear on the mast as numbered plates as shown in Figure 1.

Figure 1 – Whole Milepost Marker

The red circle indicates the collection point on the Mile Marker mast. Survey locations shall be collected at both points indicated by the red arrow and circle shown in Figure 1 and Figure 2.

Figure 2 – Quarter Milepost Marker

1.3 Track Centerlines

Track centerlines shall be measured from centerline of track to centerline of each adjacent track.

1.4 Clearance Points

All switch clearance points on the normal and reverse legs on the trailing side of the switch are required to be surveyed and validated.

1.4.1 Clearance Point Options

The location of a clearance point may be identified in the field by the presence of different features. The following clearance point hierarchy indicates:

- A. All options that can be used to identify the location of a clearance point.
- B. Priority of options when multiple of them exist at a switch location.

Where one of these physical features exists, its location will also be utilized as the location of the clearance point (A) is the highest priority:

- A. Signal
- B. Sign or Post
- C. Other established mark on rail or tie

Where no physical feature marks the location of the clearance point on the main track or non-turnout trailing leg of such switches, nor may it be practical to establish one, the location of the clearance point will be calculated, based on geometry of the switch turnout, track center spacing, equipment plate clearance, and other engineering factors, and placed into the track database in lieu of survey.

Validation of such clearance points during field validation will be performed by verifying their presence in the track database and visual assessment of the adequacy of clearance rather than by measurement of proximity to a physical feature.

1.4.2 Clearance Points, Track and Authorities

Clearance points may be different on:

- A. The track on the trailing side of the switch;
- B. Crossover leg of the crossover switch or
- C. Different track authority

To consider all of the above factors, the following is where and what a clearance point shall be.

- A. Auxiliary track/Junction track/EOS – No CP or Interlocking signal in lieu of electric lock
 - 1. Auxiliary track/Junction track/Siding: clearance point options
 - 2. Main: clearance point options
 - 3. This clearance point options is listed in section 1.4.1.
- B. Auxiliary track/Junction track/EOS – CP or Manual Interlocking
 - 1. Auxiliary track/Junction track/Siding: Controlled Signal
 - 2. Main: Controlled Signal
- C. Crossover – CP or Manual Interlocking
 - 1. Crossover track: opposite point of switch
 - 2. Main: clearance point options
- D. Crossover– No CP or Interlocking
 - 1. Crossover track: clearance point options
 - 2. Main: clearance point options

1.5 Horizontal Curves

The alignment of the track.

1.5.1 Length

- A. Simple Curve – has one curve and two spirals
 - 1. Length of Entry Spiral
 - 2. Length of Curve
 - 3. Length of Exit Spiral
- B. Compound Curve – has two or more curves and multiple spirals
 - 1. Length of Entry Spiral
 - 2. Length of Curve
 - 3. Length of Intermediate Spiral
 - 4. Length of Curve
 - 5. Length of Exit Spiral

1.5.2 Degree of Curve

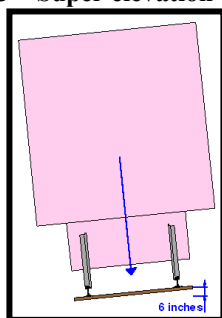
The Full Body of the Curve will be shown the in following formats:

- A. Decimal Degree
- B. Degrees, Minutes, Seconds

1.5.3 Superelevation

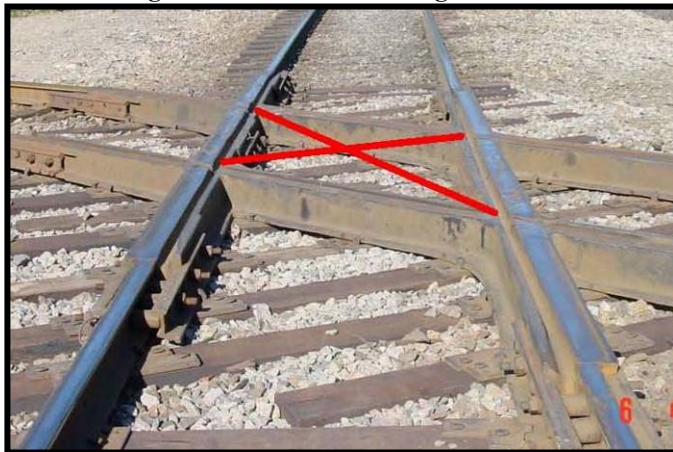
The superelevation will be shown in inches. Superelevation is determined by the height difference between the two rails (see Figure 3).

Figure 3 – Super elevation of Track



1.6 Railroad Crossings at Grade (Diamonds)

Diamond location will be shown where the centerline of both tracks meet (see red “X” in Figure 4).

Figure 4 –Railroad Crossing Diamond

1.7 Grade of Track

1.7.1 Elevation

Elevation will be shown in feet.

1.8 Signals

All signals in PTC territory are required to be surveyed and validated. All locations must be shown in the “Actual Location” and “Track Center Location”.

- A. If opposing signals are associated with a single set of insulated joints, the location of each signal shall be mapped at the same location. This location may or may not coincide with the location of the insulated joints. This rule applies at back-to-back (both trailing and facing directions) signal locations for all signal types.
- B. The signal is surveyed at the centerline location of the track perpendicular to the signal mast. If there is no mast, measure the location at the center of a base as a Dwarf Signal.

1.8.1 High Stand Signals

A High Stand Signal location is collected at the centerline of the track, perpendicular to the signal mast. This applies to facing and trailing directions as shown in Figure 5. A midpoint between facing and trailing signals will be collected as the location of a back-to-back High Stand Signals on the same mast, as shown in Figure 6.

Figure 5 – High Stand Signal (unidirectional)



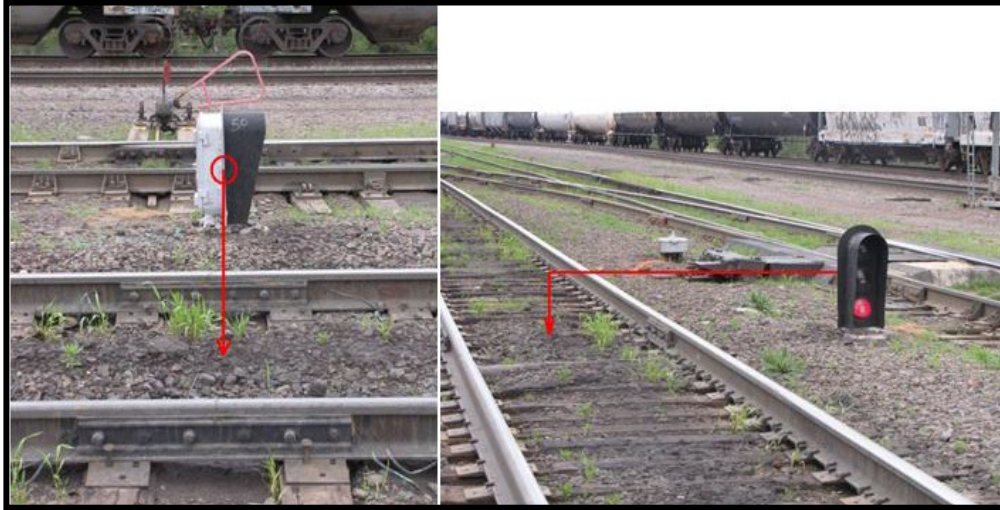
Figure 6 – High Stand Signal



1.8.2 Dwarf Signals

A Dwarf Signal location is collected at the centerline of the track, perpendicular to the midpoint of the mounted base of the dwarf signal. This applies to facing and trailing directions as shown in Figure 7. A midpoint between facing and trailing horizontally will be collected as the location of a back-to-back Dwarf Signal on the same base. Show both “Actual Location” and “Centerline Location”.

Figure 7 – Dwarf Signal

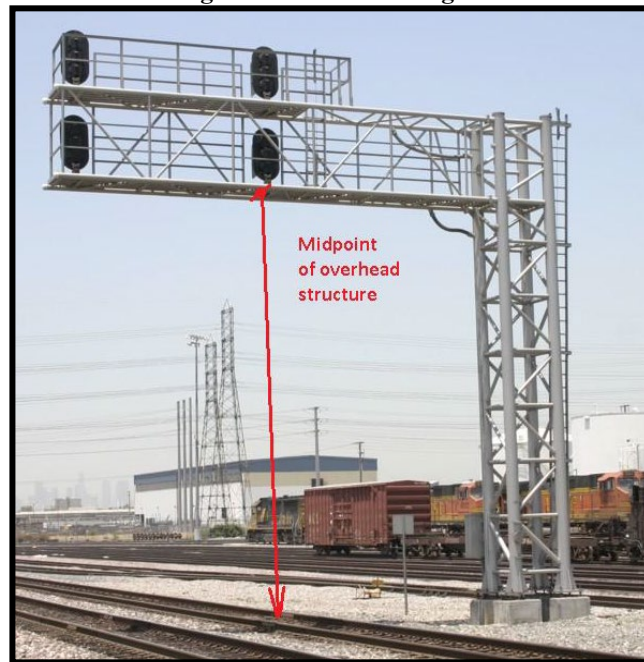


1.8.3 Cantilever Signals

A Cantilever Signal location is surveyed at the centerline of the track directly under the midpoint of the overhead structure. The red dot shown in Figure 8 represents the midpoint and the arrow points to the track centerline. This shall be applied to the following:

- Unidirectional Cantilever Signals
- Bidirectional Cantilever Signals

Figure 8– Cantilever Signal



For bidirectional Cantilever Signals, the signals on both sides shall be considered at the same location. The survey location is determined using the rule “if opposing signals are associated with

a single set of insulated joints, the location of each signal shall be mapped at the same location.” The location may or may not coincide with the location of the insulated joints.

1.8.4 Signal Bridges

A Signal Bridge location is surveyed at the centerline of the track directly under the midpoint of the overhead structure. The red dot in Figure 9, 10 and 11 represents the midpoint and the arrow points to the track centerline.

This shall be applied to the following:

- Unidirectional Signal Bridge
- Bidirectional Signal Bridge

Figure 9 – Signal Bridge Signal Location



Figure 10 – Overhead Structure



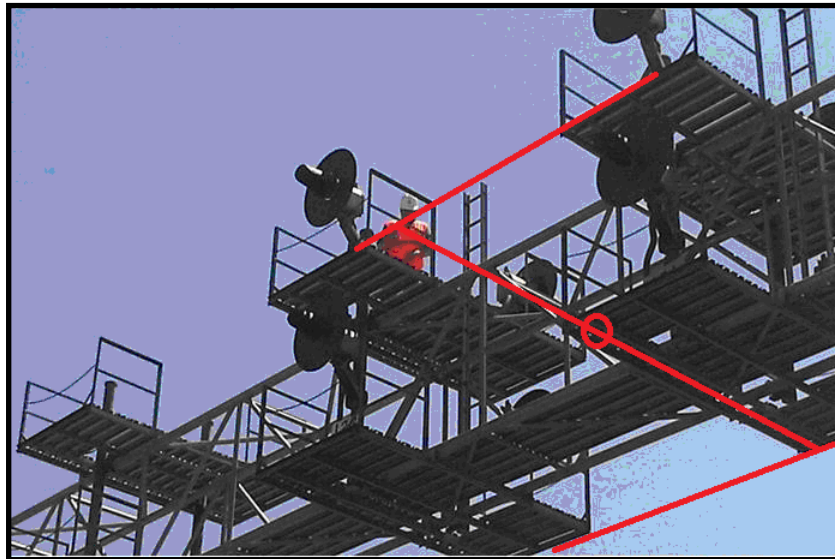
Figure 11 – Bidirectional Signal Bridge



For bidirectional Signal Bridges, the signals on both sides shall be considered at the same location. The survey location is determined using the rule “if opposing signals are associated with a single set of insulated joints”, the location of each signal shall be mapped at the same location.” The location may or may not coincide with the location of the insulated joints.

Survey locations for a Signal Bridge as shown in Figure 12 are marked at the red circle. The red circle is the midpoint between the outer edges of the signal bridge.

Figure 12 – Special Case of Signal Bridge

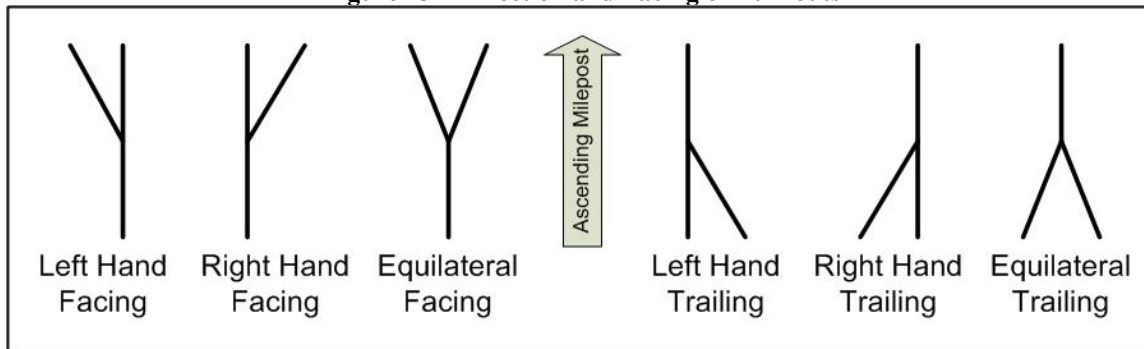


1.9 Turnouts and Derails

1.9.1 Direction/Facing

The illustration in Figure 13 shows examples turnout directions and facing.

Figure 13 – Direction and Facing of Turnouts



1.9.2 Size

The size of the turnout can be determined in most cases by the size of the frog. Standard frog sizes will be provided to automate this procedure.

1.9.3 Type of Switch/Points

All switches in PTC territory are required to be surveyed and validated.

The red arrows shown in the following figures indicate the point of switch location where GPS shall be surveyed and validated for each switch type.

There are two methods to identify the point of switch:

1. At the point of switch as indicated in the following images Figure 14 through Figure 17
2. At the switch rod. The choice of the methods is railroad specific.

1.9.4 Point of Switch Examples

Figure 14 – Point of Switch – Power Switch (left) & Hand Thrown Switch (right)



Figure 15 – Point of Switch – Spring Switch



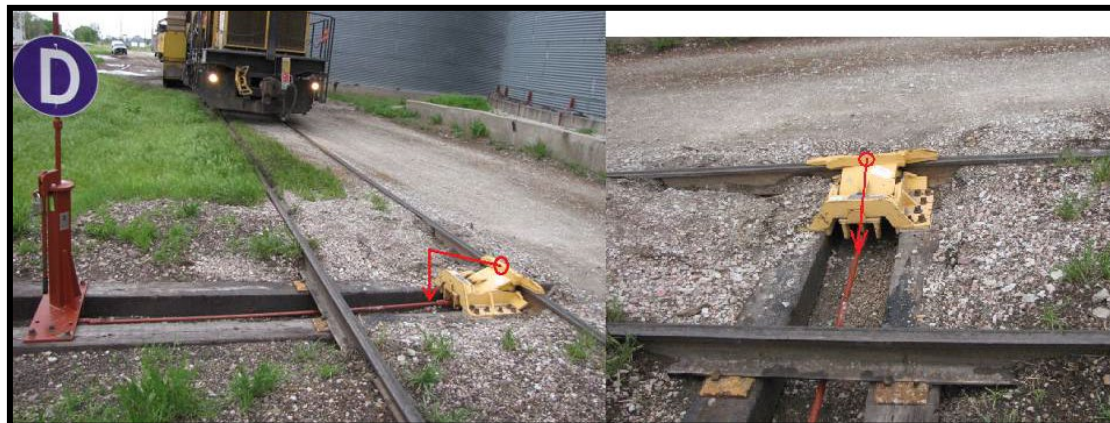
Figure 16 – Point of Switch – Crossover Switches



Figure 17 – Point of Switch – Slip Switch



Figure 18 – Location of Sliding Derail



1.10 Timetable Speeds

Speed data will be added to a database from the current MBTA Timetable. Since this data is identified by Line and Milepost, the GIS Dynamic Segmentation program will be used to determine the latitude and longitude.

1.11 Highway Grade Crossings

Highway grade crossing data will include the AAR number and street name written on a tag or bungalow at each crossing. All location data will be at the centerline of track. The MBTA will provide a list.

1.11.1 Begin/End Latitude/Longitude of Road Crossings at Grade

All road crossings at grade including Public, Private, and Pedestrian in PTC territory are required to be surveyed and validated at the beginning and the ending edge of the crossing. The survey location of road crossing shall be collected at the centerline of track on the outer apron.

The crossing limit, as utilized by the PTC bulletined crossing warning system which includes the malfunction handling function, shall be at a location such that if a locomotive or railcar stops immediately at that location, it does not foul the drivable surface of the roadway.

1.11.1.1 Public Road Crossings at Grade

The set of red arrows shown in Figures 19 and 20 indicate the edges of the crossing to be surveyed.

Figure 19 – Rubber Road Crossing



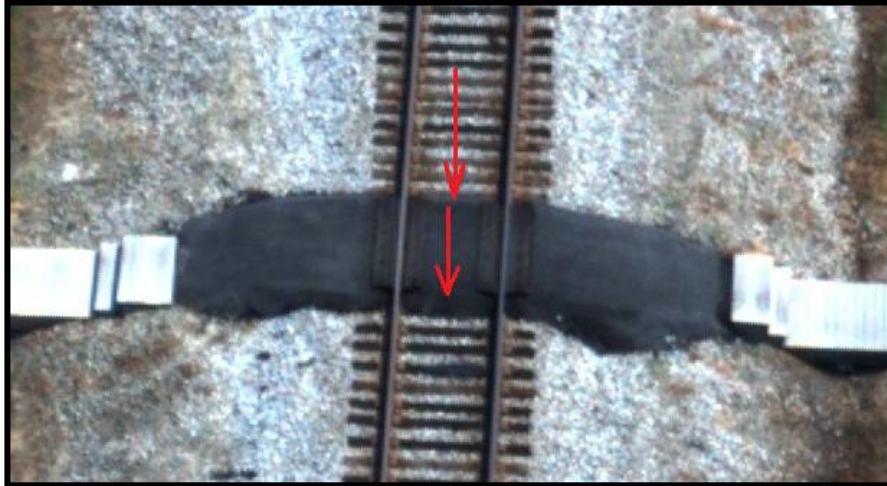
Figure 20 – Wood Road Crossing



1.11.1.2 Pedestrian Crossings at Grade

For Pedestrian Crossings at Grade, the beginning and ending edges of the pedestrian crossing will be surveyed. The red arrows shown in Figure 21 indicate the beginning and ending location collected for a pedestrian crossing.

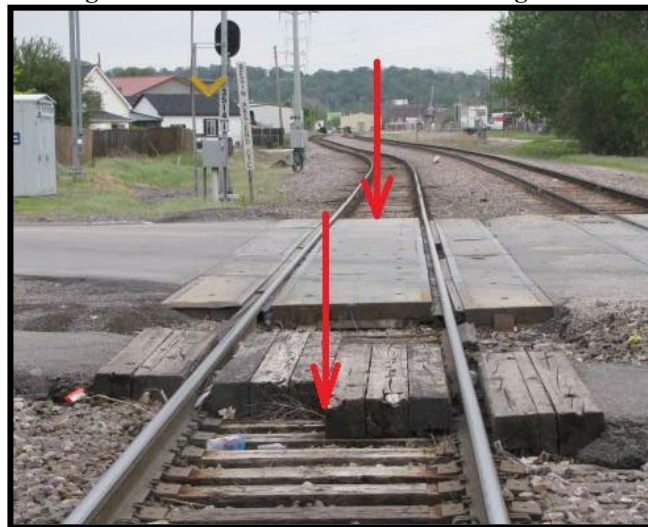
Figure 21 – Pedestrian Crossing



There are some cases where a pedestrian crossing is located adjacent to a road crossing. The two crossings can be:

- surveyed at the most outer edge of both crossings as shown in Figure 22

Figure 22 – Pedestrian and road crossing as one



1.11.1.3 Asphalt Crossing Survey Location

Figure 23 shows an example of a road crossing at grade. The edge of the asphalt road crossing should be surveyed at the top of the asphalt run off as indicated as Figure 24.

Figure 23 – Asphalt Crossing



Figure 24 – Side View of Asphalt Road Crossing



1.11.2 DOT Number

This is a number assigned to each road crossing. The number is a seven-character code issued by the FRA.

1.12 Horn Disable/Quiet Times

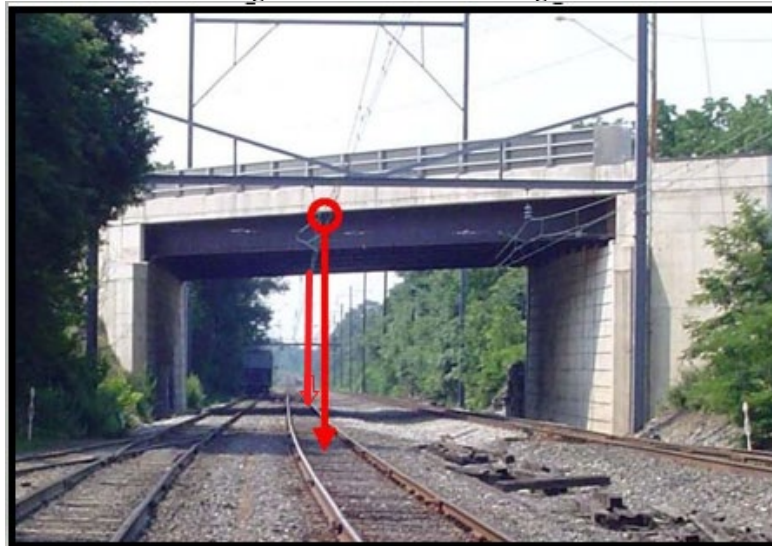
These areas must be identified and loaded into the database.

1.13 Bridges

Bridges will be located where each edge of the bridge crosses the centerline of each track.

1.13.1 Overhead Bridges

Overhead bridges cross above the railroad and are normally streets or highways. The street or highway name must be included in the data.

Figure 25 – Overhead Bridge

1.13.2 Under Grade Bridges

Under grade bridges carry the railroad over streets, streams, etc. The street, stream or other name must be included in the data.

Figure 26 – Under Grade Bridge

1.14 Tunnels

Each track will be marked at the centerline where it meets each portal. The tunnel name/number should be included. The tunnel name/number may also be available on the track charts.

Figure 27 – Tunnels



1.15 Station Platforms

The location of all station platforms are required to be surveyed and validated. The survey locations of each platform shall be collected at the track centerline, even with the beginning and end of the platform. A “PlatformEnd” field will be provided with the survey data which denotes whether each collected point is the beginning or end of a platform, in the direction of increasing milepost. A “PlatformSide” field will be provided to denote which side of the track the platform is on, with respect to travel in the direction of increasing milepost (left, right, or center if a platform is positioned between multiple tracks). A field will also be provided for the station name associated with each collected point.

Figure 28 – Station Platform



1.16 Bungalows

Bungalows will be shown as polygons in the GIS data. Include the bungalow name or MP in the data.

Figure 29 – Typical Bungalow

1.16.1 WIUs

All WIU locations.

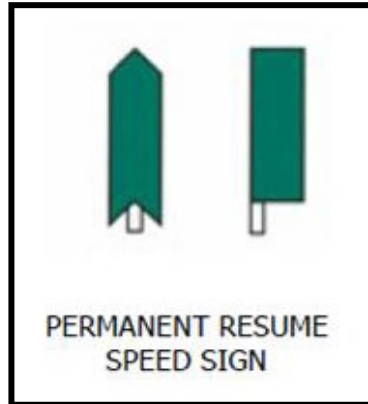
1.17 Limits of Permanent Speed Restriction

All permanent speed restrictions relating to train movements in PTC territory will be surveyed, included in the transponders via speed restriction packets, and validated. Permanent Speed Restrictions may, or may not, have signs identifying its location. In the case where there are no signs, except as noted below, the location of the Speed Restrictions will be calculated and placed into the track database. Validation of such points during field validation will be performed by verifying their presence in the track database, as well as visual assessment of the adequacy, rather than by measuring to a physical feature.

Fields will be provided in the track database for restriction speed (in m.p.h.), train type (e.g. Passenger, Freight, etc.), direction (bidirectional, increasing or decreasing with respect to milepost), restriction type (generic, axle count, etc), qualifier type (head end, none), for each collected point.

Permanent speed restrictions may also be referenced to a physical asset. For example, switch turnout speed restrictions lie between the clearance point and the points of the switch. Wye track speed restriction is between the points of the switch on both ends. In this case, the speed restriction shall be surveyed and validated at the clearance point and point of switch.

In the case where signs identify the geographic location of the speed restriction, the sign will include permanent speed restriction, speed resumes, and reduce signs. The sign may or may not have numbers or other characters. Figure 30 and Figure 31 show examples of speed signs; the centerline of the sign post shall be surveyed.

Figure 30 – Speed Resume Sign 1**Figure 31 – Speed Resume Sign 2**

1.18 Sign Location

Method of Operation Change signs and signs associated with dispatchable points (such as station signs) are required to be surveyed and validated. When a sign coincides with other critical features, such as signals, clearance points and switches, the device location will supersede the sign location. Refer to the red arrow shown in Figure 32 as an example. Figure 32 shows the front and side view of a case where the sign and signal are located identically to the centerline of the track. Because they are identical, either the sign or signal location can be used as the change location of the method of operation. In the case where signal and sign are not at identical locations, the signal location supersedes.

Figure 32 – A Combination of Sign and Feature



1.19 Method of Operation Change Sign

Figure 33 and Figure 34 show examples of where Method of Operation change signs will be surveyed. The actual location and the centerline point shall both be identified.

Figure 33 – Yard Limit Sign

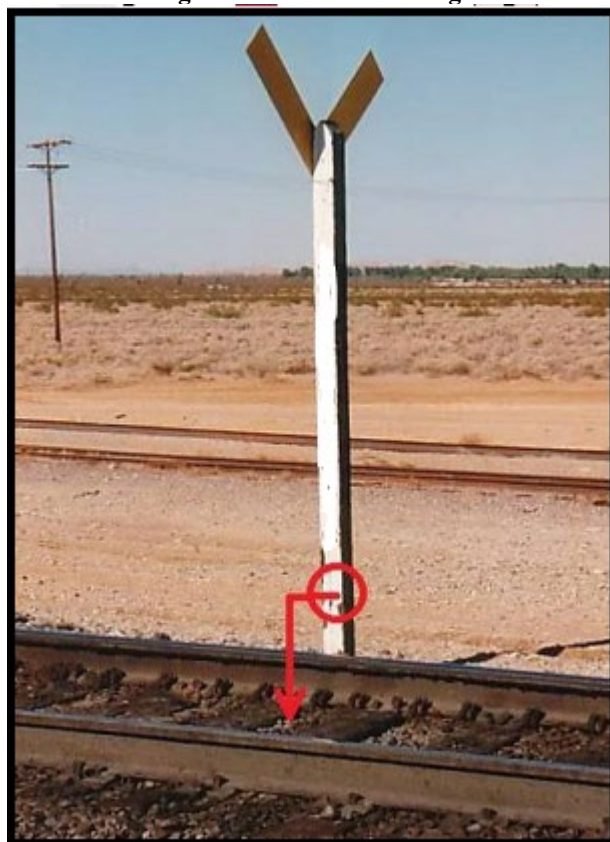
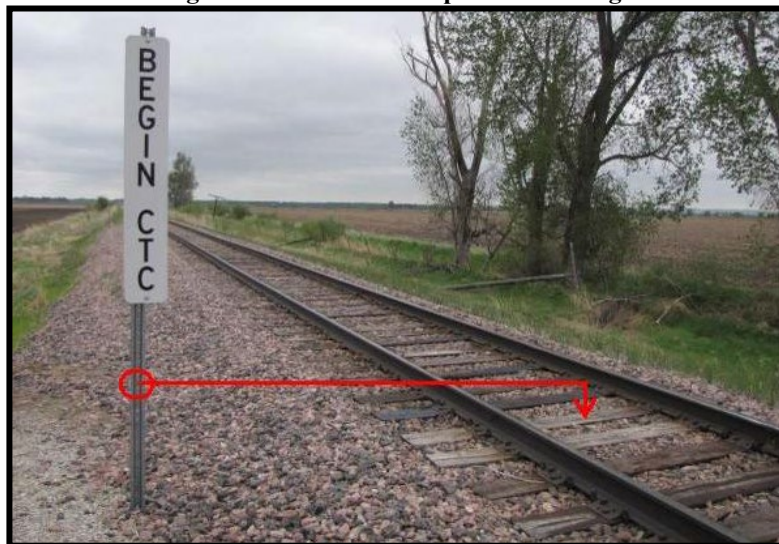


Figure 34 – Method of Operation Change

1.20 Other Wayside features as deemed necessary by MBTA

All features outside of the running track will be shown in “Actual Location” and projected to the centerline of running track and shown as the “Centerline Location”.

1.21 Wide Area Augmentation System (WAAS) Quality Survey

The Project Team shall perform a detailed survey of the MBTA ROW to document the presence, quality, reliability and redundancy of the WAAS coverage. A measurement of the signal strength and other relevant parameters shall be taken every three feet (3') or less along the MBTA ROW using a highway rail vehicle. The results shall be documented and presented in graphical and Excel® format and shall be submitted to the MBTA for evaluation. The report shall be a part of submittals to the MBTA PTC Program.

1.22 Light Detection and Ranging Survey (LiDAR)

The MBTA PTC System will require a LiDAR Survey. The LiDAR/Surveying requirements, should meet the following specifications to be able to collect all of the PTC features/assets:

- LiDAR – collecting minimum 25 points per square meter (within 0.6 m Vertical and 0.3 m horizontal per FRA Regulations.)
- Ortho imagery – 2 cm pixel resolution
- Forward and Aft oblique images with the following resolutions:
 - Base (toe) Resolution = 1.25 cm
 - Top (heel) Resolution = 3.5 cm

A GIS Viewer application for remote access to the data after collection and processing is available with the MBTA to provide to any Project Team that requires it.

Additional services include:

- Clearance data for tunnels and overhead bridges
- Infrared Camera shots for vegetation detection
- Video of the corridor

- Base map/planimetric/asset feature extractions for features not pertaining to PTC such as buildings
- Ground Survey Control within the corridor Area of Interest (AOI)

1.23 Equipment Restrictions

1.23.1 Clearance and Curve Limitations

Some parts of the line may have a limited clearance profile. All LiDAR equipment shall be able to operate in such restricted areas.

The Project Team is responsible for making sure that the surveying equipment selected is capable of operating over the line.

1.24 Reports and Data Output

All data shall be in a format that will allow the data to be used in the following:

- Database Management System
- ESRI GeoDatabase
- ESRI Shape Files (required by FRA)
- ITC/AAR Standard S9501A
- Track Charts

End of Section

APPENDIX D
PTC FIBER STANDARDS

Appendix D PTC Fiber Standards

1 Introduction

1. The MBTA ACSES II PTC Network is based on PTC-related message flow between the CROCC and interlockings and intermediate signal locations. The Fiber Optic Cable Network provides a dedicated path for communications between the CROCC and the SIH/BCPs.
2. The type of fiber installation, such as aerial, direct buried, or other, is to be determined during project planning stages and is subject to MBTA PTC Project direction and approval.
3. The following are the functional and performance requirements of the MBTA PTC Fiber Optic Network:
 - a. The MBTA PTC Fiber Optic Network shall include fiber optic communications infrastructure and interfaces to the existing communications hubs at Cobble Hill and South Station and all PTC wayside nodes and equipment.
 - b. The MBTA PTC Fiber Optic Network shall consist of 48 strand single mode fiber optic cables. The cables shall be installed as aerial or buried conduit with inner duct as prescribed in this document.
 - c. The MBTA PTC Fiber Optic Network shall provide a primary communications path with a minimum 1000 Mbps Ethernet grade IP-based redundant network with no single point of failure. Physical cut of cable/conduit is considered a single point of failure.

1.1 Requirements

This section covers the core requirements for fiber optic cables intended for conduit application. Materials, installation methods, testing and certification are required for the fully functional MBTA Fiber Optic Network as follows:

1. All fiber optic cables shall be from a currently ISO9001 certified manufacturer.
2. All furnished fiber optic cable that shall be 100% compatible with the existing PTC fiber optic cable plant.

All cables shall be designed for installation in underground conduit, wet or dry environments, and aerial application.
3. The cable shall be free of hazardous materials in compliance with RoHS 2002/95/EC. The cable shall be of all-dielectric (non-shielded, non-metal) construction. The cable shall be of loose tube construction.
4. Fiber cables shall be designed for installation in underground ducts, cable trays, open air, and other areas where uncontrolled temperature and humidity exist or where cable may be exposed to water and pest damage.
5. The cable shall be of entirely gel-free construction
6. The central strength member shall consist of a dielectric, glass reinforced plastic (GRP) rod
7. Fiber optic cable shall be designed for outside plant design for outdoor applications and plenum design for indoor applications

8. The life expectancy of the cable shall be 25 years for service in a railroad and transit environment. All fiber optic cable installation shall adhere to NECA/FOA 301 fiber optic installation standard and manufacturer recommendation guidelines.

9. For Aerial Application:
 - a. All cables shall conform to the requirements of the IEEE 1222-2011 “Standard for Testing and Performance for All-Dielectric Self-Supporting (ADSS) Fiber Optic Cable for Use on Electric Utility Power Lines”, ANSI / ICEA 640, IEC, RUS 7 CFR 1755 (RUS LISTED), Telecordia GR- 20 standards.
 - b. MBTA PTC fiber optic cable shall be a 48-strand single mode fiber optic ADSS double jacket cable.
 - c. The MBTA PTC fiber optic cable shall be rated for NESC Heavy Loading
 - d. The MBTA PTC fiber optic cable span shall not be more than 200 ft. per span or by manufacturer’s recommendation for maximum span length without exceeding the requirements set by NESC Section 252. The pole support and guying for correct ratio for spread/height and terminal, wind or angle stays shall be as per RUS Standard and NESC Table 253-1.
 - e. The MBTA PTC fiber cable shall be installed on the “communication space” and have clearance from other utilities and proper ground clearance per the NESC guidelines. Communications space is the lowest space on the pole and is located directly beneath the neutral space per the NESC Section 2 definition

Poles spacing shall depend on the maximum span rule provided by the cable manufacturer’s recommendations, but not exceeding the NESC Section 252 requirements.
 - f. All pole attachment hardware and slack hardware shall use aluminium material.
 - g. The poles shall be placed on either the existing or historical pole route or along the ROW property edge, but no less than 13.5 ft. from centreline of track per MBTA Railroad Operation Directorate V Section 3.02(E) and Plate IV. Prior to cable installation, all holes and hardware shall be drilled and installed to the pole according to the engineered height. Anchors and pole hardware must be rated above the expected environmental load of the cable, plus a safety factor.
 - h. All the pole attachment and slack/splice case hardware shall be from Fiberlign ADSS system or approved equivalent. Proper type of dead-end shall be based on applicable tension requirements.
 - i. The maximum angle of change shall not exceed 20 degrees.
 - j. Poles used for MBTA PTC fiber cable attachment shall be rated for heavy loading zone per the NESC Section 250 requirement. The “birthmark” or “pole tag” shall be at eye level, but no greater than 5 ft. above the level grade of the pole placement. Cable height, cable sag, and spacing shall be in accordance to cable manufacturer installation guidelines, NESC, and MBTA specifications. For at grade or track crossing, minimum clearance shall be followed per the MBTA Railroad Operation Directorate V Specifications and NESC Section 234, clearance of wires,

conductors, cables and equipment from buildings, bridges, rail cars, and other installations requirements. Only after completion of placing the entire run of cable, sagging and tensioning process shall be started. Sagging and tensioning shall be conducted according to the cable manufacturer's recommendations. The Project Sponsor/Contractor shall follow the installation of ADSS fiber optic cable manufacturer installation guidelines. The fiber optic cable has a maximum recommended pulling tension of 600 lbs. The maximum pulling tension is not to be exceeded. During the cable installation, pulling tension shall be constantly monitored.

- k. Existing pole - Existing pole should be inspected for structural integrity for attachment per RUS BULLETIN 1730B-121 Wood Pole Inspections and Maintenance Guidance.

10. For Conduit System:

- a. Any buried backbone conduit shall be a 4 in. Schedule 80 PVC/HDPE. It shall contain (2) 1 in. HDPE inner ducts. One inner duct for the backbone fiber and one vacant inner duct for future expansion. Pull ropes shall be installed in the empty inner duct and secured in all pull boxes / hand holes. Single cable fiber optic duct plugs shall be installed at each cable occupied inner duct end and an inner duct plug with pull rope attachment eyelet shall be installed in the ends of the empty spare inner duct in all boxes. Inner duct shall be of different color. The Project Sponsor/Contractor shall propose how to transition the fiber cable from the main duct bank to laterals for accessing the wayside locations. Lateral conduits shall be 4 in. minimum schedule 80 PVC/HDPE.
- b. Conduit shall be required at all street crossings. All backbone crossings shall have encasement pipe made of galvanized steel pipe with a minimum thickness of 0.375 in. and a minimum diameter of 6 in. utilizing non-metallic casing spacers. Lateral crossings shall have encasement pipe made of galvanized steel with minimum thickness of 0.375 in. and a minimum diameter of 4 in., utilizing non-metallic casing spacers. Fiber optic cable tension shall be monitored at all times with the use of an approved tension gauge and a recorder
- c. Pavement Cuts: At crossing areas where boring is not feasible, pavement cuts shall be employed and shall have encasement pipe made of galvanized steel pipe with a minimum thickness of 0.375 in. and a minimum diameter of 6 in. In other pavement areas such as parking lots, where boring is not feasible, pavement cuts shall be employed and shall have 4 in. galvanized steel pipe with a minimum thickness of 0.375 in.
- d. Attachments: PTC fiber optic cable shall be attached to bridge structures utilizing approved conduit hangers, clamps or approved installation on existing hangers. All attachments shall be constructed from galvanized steel. The Project Sponsor/Contractor's structural engineer shall verify the attachment prior to commencing installation work. Any bridge attachment required the Project Sponsor/Contractor to submit proper permits to the bridge stakeholder.
- e. Fiber Pull Boxes / Hand Holes: Pull boxes / hand holes shall be polymer concrete installed in non-deliberate heavy vehicle/traffic areas. If required to be installed in a traffic application, an AASHTO H-20 rated pull box shall be used.

- f. All fiber optic cable run in conduit shall be an accepted product of Rural Development Utilities Program (RDUP)/Rural Utilities Services (RUS) 7 CFR 1755.900 and meet the requirements of ICEA S-87-640.
 - g. Warning marker posts shall be placed every 500 ft. and at each side of every crossing.
 - h. When installing the fiber optic cable through conduit, lubrication such as Polywater F, or approved equivalent, shall be used to reduction of friction between the cable jacket and the conduit.
 - i. Warning tape shall be place at 12” from the surface along the conduit pathway.
11. All optic fibers shall conform to the general requirements as following:
- a. Ensure that single mode optical fiber used in cables meets EIA/TIA 492-BA000 Class 4A.
 - b. All cables shall be loose tube optical cable unless specified. The optical fibers contained in a tube buffer (loose tube), an inner jacket (unit core), a channel and containers. The protective container must be manufactured from a material having a coefficient of friction sufficiently low to allow the fibers free movement. The loose tube shall contain a suitable water blocking material.
 - c. Each fiber shall have a matched clad design.
 - d. The optical fiber must consist of a cylindrical core and cladding covered by either UV treated acrylate or other suitable coating.
 - e. The optical fiber shall conform to all the requirements below:

Table 6: Single Mode Optitcal Fiber Requirements

Single Mode Optical Fiber	
Typical Core Diameter	8.3 μm
Cladding Diameter	125 ± 1.0 μm
Core-to-Cladding Offset	≤ 0.6 μm
Core Non-circularity	≤ 1.0 %
Coating Diameter	245 ± 10 μm
Maximum Attenuation	≤ 0.4 dB/km @ 1310 nm ≤ 0.3 dB/km @ 1550 nm
Attenuation Uniformity	No point discontinuities greater than 0.1 dB @ 1310 nm and 1550 nm
Attenuation at the Water Peak	The attenuation @ 1383 shall not exceed 2.1 dB/km
Cutoff Wavelength	The cabled fiber cutoff wavelength shall be ≤ 1260 nm

Mode-Field Diameter	9.3± 0.5 μm @ 1310 nm 10.5± 1 μm @ 1510 nm
Zero Dispersion Wavelength	1301.5 nm ≤ λ _o ≤ 13.21.5 nm
Zero Dispersion Slope	≤ 0.092 ps/(nm ² -km)
Polarization Mode Dispersion	≤ 0.5 ps/sqrt km
Maximum Dispersion	≤ 3.2 ps/(nm.km) for 1285nm to 1310 nm ≤ 18 ps/(nm.km) for 1550 nm
Tensile Strength	100 kpsi

1.2 Cable Delivery and Storage

1. All cable should be delivered in a non-returnable wooden drum. Both ends of cables are securely attached to the drum and sealed. Every cable shall be delivered with the following information:
 - a. Part Number
 - b. Reel Number
 - c. Length (ft./m)
 - d. Marking (ft./m) (top and bottom)
 - e. Date Manufactured
 - f. UL/ETL/CSA Listing Information
 - g. Package ID
 - h. Customer ID
 - i. Factory Order Number
 - j. Manufacturer's Name and Address
 - k. Direction of Rotation
 - l. Reel Size
 - m. Note: "DO NOT LAY REEL ON SIDE"
 - n. Each reel shall be supplied with factory OTDR test results.

2. The following information shall be marked on the outer sheath of the fiber cables at an interval of 1 meter:
 - a. Cable Type
 - b. Fiber Count
 - c. Manufacturer Name
 - d. Part Number
 - e. Date - Month and Year Manufactured
 - f. Cable Length - Sequential Number of Lengths
3. The following information shall be marked on the cable reel marking:
 - a. Legible Manufacture Name
 - b. Cable Type
 - c. Cable Length
 - d. Type of Fiber and Number of Fibers
 - e. Weight

1.3 Connectors and Patch Panels

1. All connectors, patch panels or splice panel shall meet the following requirements at the minimum:
 - a. Shall meet Telcordia GR-63 NEBS physical testing.
 - b. The connector housings shall be a rack mountable combination connector and splice housing.
 - c. The unit provides for pigtail splicing to the connector panel within a single housing.
 - d. The 4U-sized unit shall be sized to accommodate the 48 strand fiber optic cables.
 - e. Housings shall be rack mountable in an existing EIA-310 compatible 19 in. rack, except where noted.
 - f. The unit shall be modular with a splicing compartment and a termination compartment in a single housing.
 - g. The unit shall not exceed a depth requirement of sixteen inches (16 in.).
 - h. The unit shall meet the design requirements of ANSI/TIA-568 and the plastics flammability requirements of UL 94 V-0.
 - i. The unit shall include a clamshell-type cable clamping mechanism to provide cable strain relief.

- j. Front and rear doors shall utilize a slide latch to provide ready access and secure closing. An opening shall be provided in the front and rear doors so that an optional key lock kit can be installed.
- k. The opening shall be filled with a removable plastic insert so that dust may not enter if the optional lock kit is not installed.
- l. The housings shall have a labeling scheme that complies with ANSI/TIA-606. K.

1.4 Patch Cords and Pigtails

1. All cable jackets shall be smooth and continuous, free from any splits, or imperfections and consistent with the best industry practice.
2. Patch cords and pigtails shall consist of flexible optical fiber cable with SC/LC compatible connectors. Patch cords shall be complete factory manufactured. Patch cords shall conform to the requirements of ANSI/TIA 568-3-D Optical Fiber Components.
3. Cable jacket color shall conform to ANSI/TIA-598D Optical Fiber Color Coding Standard.
4. Cable construction shall allow small bend radius for installation in constrained space areas.
5. The jacket of the cable shall contain a dielectric member and a protective outer jacket.
6. Patch cords and pigtails must utilize a two-fiber zip cord type jacketed cable.
7. The optical fiber shall meet the same characteristic requirements of distribution panel terminated cable where it mates.
8. Single mode pigtails with SC/LC type connector on one side and the other end bare fiber, at least 3m in length.

1.5 Splice Enclosures and splice trays

1. The splice enclosures manufacturer shall be ISO9001 certified
2. Tested in accordance to GR-771-CORE
3. Splice enclosures shall be “dome type” splice closures.
4. The splice enclosures shall be designed for all outdoor applications (aerial, underground, buried and vault and etc) and for all fiber types.
5. Splice enclosures shall be free of hazardous substances according to RoHS 2002/95/EC
6. Splice enclosures shall not contain gel, or any substance which requires cleaning or removal before splicing.
7. Splice enclosures shall be constructed of a black thermoplastic material.
8. The splice enclosures sealing shall maintain an air-tight and water-tight.

9. The splice enclosures shall be segmented end plate design provides independent access to every cable without disrupting the surrounding cables.
10. Splice enclosures shall be capable of through, branch and mid-span type splice applications.
11. Splice enclosures shall allow re-entry without requires any specialized tools. The interior of the dome shall support splice tray without casing any kinked on the cable.
12. Splice enclosures shall include a slack basket for managing loose tubes
13. Splice trays shall provide storage and protection for 12 splices per tray
14. Splice trays shall be specifically designed for use with the selected splice enclosure and shall fit accordingly into the splice closure. Splice closures shall use hinged splice trays.
15. Splice trays shall be re-enterable.

1.6 Splicing Requirements

1. All fibers in the fiber optic cables shall be spliced and /or terminated.
2. Develop and document a sequential fiber numbering plan as required in the TIA/EIA-598-A standard.
3. All splicing shall be performed according to the plan or approved by the Engineer.
4. The fusion technique shall be used for all splices and terminations.
5. Document each splice location and identify the source and destination of each fiber in each splice tray.
6. Individual splice loss shall not exceed 0 .05 dB loss in single direction.
7. Ensure all splicing equipment is in good working order, properly calibrated, and meets all industry standards and safety regulations
8. All splicing personnel shall be adequately trained for the fusion splicing, and shall possess a fiber optic splicing certification from an industry recognized authority such as IMSA or ETA
9. Upon the completion of splicing operation, properly disposed all the splicing waste materials

1.7 Fiber Slacks

1. Fiber optic cable slack shall be provided at minimum amount of following locations but not limited to:
 - a. Wayside Cabinet/Equipment Shelter
 - b. Pull Box (Junction Box/Handhold/Manhole)
 - c. Conduit Riser

- d. Existing Station or Future Expansion
 - e. Grade Crossings
 - f. Yards
 - g. Splice Points
2. Slacks in patch cord or pigtails shall be neatly coiled and stored so the minimum bend radius is not exceeding the cable requirement. No zip ties are allowed when tying down the patch cord. The use of a Velcro strap is required.
 3. Sufficient slack shall be left at each end of the cable to allow proper cable termination. This slack shall be in addition to the installation slack as hereinafter specified. At splice locations, additional cable shall be included to accommodate lowering to the ground with enough slack to allow splicing inside a splicing van or trailer. The minimum slack amounts shall be as follows but not limited to:
 - a. Wayside location (shelter, equipment) and splice enclosure – 60 ft.
 - b. Equipment shelter/case: 25 ft.
 - c. Grade crossing: minimum of 200 ft. slack on each crossing
 - d. Existing station or future expansion: minimum of 200 ft. slack
 - e. Handholes or Manholes: 100 ft.
 - f. Conduit riser: 50 ft.
 - g. Splice location: 125 ft.
 - h. Leaving slack cable lying free on the ground or floor of a building in not allowed, except during the actual pulling process.

1.8 Labeling

1. Labeling Requirements: All fiber optic cabling and equipment shall meet the following requirements:
 - a. Labeling of cables shall be in accordance with the requirements of TIA-606.
 - b. Fiber optic trunk and drop cables shall be permanently identified by printing (in a contrasting color) descriptive information on the outer surface of the jacket at intervals of 5 ft. or less.
 - c. Each cable shall be permanently labeled at each end with a unique cable number. In addition, labels shall be affixed to the cable at every vault, hand hole, riser closet, or fiber junction box.
 - d. The labeling material shall be rated for outdoor harsh environment without any degradation.
 - e. Each enclosure shall be labeled with a machine-made label with permanent black ink on a white background. Labels and labeling standards shall be in the format

acceptable to the MBTA. In addition, each Fiber Distribution Panel (FDP) shall be labeled on the faceplate with the identifiers of the cables it contains.

- f. Each fiber optic strand shall be labeled with a unique identifier at the connector six-pack. Connectors shall be labeled on the identifying sheets on the front of the FDP. Each fiber shall be labeled where it enters the back of the coupler panels. The identifier shall be in the format Cable #-tube #- fiber strand #. Fiber optic cable end caps shall be kept sealed at all times during installation, using approved end sealing caps.

1.9 Fiber Optic Testing Requirements

1. Provide factory test data sheets for each reel of fiber optic cable delivered as part of the testing requirement.
2. All new replacement fiber cables provided by the Project Sponsor/Contractor shall be tested as follows:
 - a. All test plans and procedures shall be submitted to the MBTA for review and acceptance at least 30 days in advance of any testing.
 - b. Link loss budget calculation shall be calculated and submitted to the MBTA as part of the test results.
 - c. All single mode fiber optic cable testing using TIA-526-7.
 - d. All fiber optic cable strands shall be tested end-to-end insertion loss using OLTS (Optical Loss Test Sets) power meter and source. These tests shall be done in both directions. Results are to be recorded and supplied to the MBTA PTC Program.
 - e. The Project Sponsor/Contractor shall test each fiber with an Optical Time Domain Reflectometer (OTDR) in the 1310 and 1550 nm wavelength for length, transmission anomalies, cable installation, and splice performance. These tests shall be done in both directions from patch panel to patch panel and average the measured values to reduce the directional effects of OTDR.
 - f. OTDR traces shall be submitted on paper and as a data file that can be displayed on a personal computer as part of a finished software package (for waveform analysis).
 - g. The maximum allowable attenuation for any splice is 0.05 dB, and any connector 0.75 dB.

1.10 Required Documentation

1. Documentation of the fiber optic cable plant shall follow TIA-606, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings or as specified by the MBTA.
2. The Project Sponsor/Contractor shall provide cut sheets for all equipment and material that is being provided to the MBTA.
3. The Project Sponsor/Contractor shall provide test procedures describing the methods used to test the cable at the factory and before and after installation to the MBTA PTC

Program.

4. The Project Sponsor/Contractor shall provide the test results for all testing that has been completed to the MBTA PTC Program, including the factory test data for fiber optic cable reel delivered
5. The Project Sponsor/ Contractor shall supply the MBTA PTC Program with a copy of as-built drawings with all directional bore depths, pull box, duct and cable locations.
6. The Project Sponsor /Contractor shall provide the MBTA PTC Program with the final routing and installation drawings as part of the as-built submittals.

1.11 Service Interruptions

1. The PTC System shall not be interrupted or placed out of service during any MBTA regular service operations, system testing, or revenue demonstration testing.

End of Section



**WORK
ZONE
SAFETY**

Temporary Traffic Control

*Typical Details and
Massachusetts Guidelines
for MassDOT, Municipalities,
Utilities, and Contractors*

SHEET INDEX (1 OF 3)

<u>GENERAL</u>	<u>PAGE</u>
NOTES AND GUIDELINES.....	1-9
FIG. 1: TYPICAL TRAFFIC CONTROL DEVICES.....	10
FIG. 2: PAVEMENT EDGE DROP-OFF GUIDANCE.....	11
FIG. 3: TYPICAL DEVICE SPACING; (AT 30 MPH).....	12-13
FLAGGING GUIDANCE.....	14-15
FIG. 4-5: TYPICAL PEDESTRIAN DEVICES.....	16-17
 <u>STATIONARY OPERATIONS</u>	
FIG. 6: TWO LANE UNDIVIDED ROADWAY; HALF OF ROADWAY CLOSED; WORK NEAR CURVE.....	18-19
FIG. 7: TWO LANE UNDIVIDED ROADWAY; HALF OF ROADWAY CLOSED.....	20-21
FIG. 8: TWO LANE UNDIVIDED ROADWAY; SHOULDER CLOSED.....	22-23
FIG. 9: TWO LANE UNDIVIDED ROADWAY WITH TRAVERSABLE SHOULDER; HALF OF ROADWAY CLOSED; MAINTAIN TWO-WAY TRAFFIC.....	24-25
FIG. 10: FOUR LANE UNDIVIDED ROADWAY; RIGHT LANE CLOSED.....	26-27
FIG. 11: FOUR LANE UNDIVIDED ROADWAY; LEFT LANE CLOSED.....	28-29
FIG. 12: FOUR LANE UNDIVIDED ROADWAY; HALF OF ROADWAY CLOSED.....	30-31
FIG. 13: MULTILANE DIVIDED ROADWAY; RIGHT LANE CLOSED.....	32-33
FIG. 14: MULTILANE DIVIDED ROADWAY; LEFT LANE CLOSED.....	34-35
FIG. 15: MULTILANE DIVIDED ROADWAY; CENTER LANE OR RIGHT/CENTER LANES CLOSED.....	36-37
FIG. 16: MULTILANE DIVIDED ROADWAY; CENTER LANE OR LEFT/CENTER LANES CLOSED.....	38-39

SHEET INDEX (2 OF 3)

<u>STATIONARY OPERATIONS (CONT.)</u>	<u>PAGE</u>
FIG. 17: MULTILANE DIVIDED ROADWAY; RIGHT SIDE OF OFF RAMP CLOSED.....	40-41
FIG. 18: MULTILANE DIVIDED ROADWAY; LEFT SIDE OF OFF RAMP CLOSED.....	42-43
FIG. 19: MULTILANE DIVIDED ROADWAY; ROADWORK BEYOND ON RAMP.....	44-45
FIG. 20: MULTILANE DIVIDED ROADWAY; ROADWORK BEYOND OFF RAMP.....	46-47
FIG. 21: MULTILANE DIVIDED ROADWAY; TYPICAL RAMP CLOSURE.....	48-49
FIG. 22: MULTILANE DIVIDED ROADWAY; TYPICAL CLOVERLEAF RAMP CLOSURE.....	50-51
FIG. 23: MULTILANE DIVIDED ROADWAY; TYPICAL RAMP CLOSURE; ADVANCE SIGNING.....	52-53
FIG. 24: FOR MULTILANE DIVIDED ROADWAY; PLACEMENT OF TEMPORARY PORTABLE RUMBLE STRIPS.....	54-55
 <u>MOBILE OPERATIONS</u>	
NOTES FOR MOBILE OPERATIONS.....	56
FIG. 25: ANY ROADWAY; BEYOND RIGHT SHOULDER.....	57
FIG. 26: ANY ROADWAY; SHOULDER.....	58
FIG. 27: DIVIDED ROADWAY; MEDIAN WORK.....	59
FIG. 28: UNDIVIDED TWO LANE ROADWAY; HALF OF ROADWAY CLOSED.....	60
FIG. 29: MULTILANE DIVIDED ROADWAY; LEFT LANE.....	61
FIG. 30: MULTILANE DIVIDED ROADWAY; RIGHT LANE.....	62
FIG. 31: MULTILANE DIVIDED ROADWAY; CENTER LANE.....	63
FIG. 32: POST-STORM CLEANUP OPERATION.....	64

SHEET INDEX (3 OF 3)

<u>EMERGENCY RESPONSE</u>	<u>PAGE</u>
NOTES FOR TRAFFIC EMERGENCY/INCIDENT OPERATIONS...	65
FIG. 33: ANY ROADWAY; SHOULDER ENCROACHMENT.....	66
FIG. 34: TWO LANE ROADWAY; NO SHOULDER; TRAVEL LANE ENCROACHMENT.....	67
FIG. 35: TWO LANE ROADWAY; TRAVERSABLE SHOULDER; SINGLE LANE ENCROACHMENT.....	68
FIG. 36: TWO LANE ROADWAY; TRAVERSABLE SHOULDER; CENTER OF ROADWAY.....	69
FIG. 37: MULTILANE DIVIDED ROADWAY; RIGHT LANE.....	70
FIG. 38: MULTILANE DIVIDED ROADWAY; LEFT LANE.....	71
FIG. 39: MULTILANE UNDIVIDED ROADWAY; LEFT LANE.....	72
FIG. 40: MULTILANE DIVIDED ROADWAY; MIDDLE LANE; APPROACH FROM LEFT.....	73
FIG. 41: MULTILANE DIVIDED ROADWAY; MIDDLE LANE; APPROACH FROM RIGHT.....	74
 <u>TRAFFIC SIGNAL REPAIR WORK AT INTERSECTION</u>	
FIG. 42: MULTILANE UNDIVIDED ROADWAY; LEFTMOST OR LEFT TURN LANE.....	75
FIG. 43: TWO LANE UNDIVIDED ROADWAY; ONE LEG OF INTERSECTION.....	76
FIG. 44: MULTILANE UNDIVIDED ROADWAY; CENTER OF INTERSECTION.....	77
 <u>PEDESTRIAN DETAILS</u>	
FIG. 45: PEDESTRIAN BYPASS.....	78
FIG. 46: TEMPORARY SIDEWALK CLOSURE.....	79
 <u>BIKE LANE DETAILS</u>	
FIG. 47: BIKE LANE CLOSURE.....	80-81

INTRODUCTION

This guide has been prepared to assist in the planning and installing of temporary traffic controls in maintenance, utility, or short-term construction work areas (work lasting 10 hours or less). This guide serves to assist with the many decisions that must be made for each work site. Special planning for traffic control is necessary on a case by case basis because conditions can vary widely among work locations. **Since this guide cannot cover every situation, representative illustrations covering typical short-term construction, maintenance, and utility operations are presented.**

All typical traffic control device setups illustrated should be considered as guides. The traffic control devices that are shown, the arrangement or position of the devices, and the distances prescribed in the tables are based on the Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) and the Massachusetts Amendments to the MUTCD (MA Amendments), but these illustrations only present minimum standards. The provision of safe work zones for all roadway users and roadway workers affected by these activities is paramount. Traffic controls may be expanded or improved upon whenever deemed necessary. Traffic movement through the work site all traffic control devices shall be periodically observed and inspected at all locations.

If necessary, Part 6 of the MUTCD and the MA Amendments, Chapter 17 (Work Zone Management) of MassDOT's Project Development & Design Guide, and the "Traffic Engineering and Safety Section" of the MassDOT web site: (<https://www.massdot.state.ma.us/highway/Departments/TrafficandSafetyEngineering.aspx>), as well as MassDOT District offices can provide additional guidance, information, and suggestions for work zone setups.

RESPONSIBILITIES FOR TRAFFIC CONTROL

Short-term construction, maintenance, and utility work on or near the roadway creates a potentially hazardous situation, typically requiring the use of temporary traffic controls. These controls are important to protect both work crews and the road users. It is the responsibility of each maintenance foreman to establish and maintain safe and effective controls.

Usually the supervisor, working with the crew, plans the traffic control procedures for proposed work sites. The foreman is responsible for re-requesting, storing, and maintaining all traffic control devices necessary for their crews.

The foreman is responsible for placing the devices according to these guidelines. They must inspect each installation and observe traffic flow through the area. The foreman is generally authorized to make adjustments to the original installations that, in their judgment, are necessary to improve the control of traffic and establish greater safety.

All necessary traffic control devices must be installed before work begins and properly maintained during the work period. They must also be removed as soon as they are no longer relevant to the roadway conditions.

PAGE 2

In situations such as night time road or lane closures, detours, or other unusual conditions on state highways, the District Traffic Maintenance Engineer (DTME) should be advised. If the DTME is absent, the section foreman shall follow the instructions of the District Maintenance Engineer.

TRAFFIC CONTROL DEVICES

Traffic control devices regulate the movement of road users, warn of unexpected or unusual roadway conditions, and inform them how to maneuver safely through or around the work area. All signs, channelizing devices, barricades, and other miscellaneous traffic control devices should work together to guide traffic safely and efficiently. Common temporary traffic control devices are outlined and described below.

Signs

Temporary traffic control zone (TTCZ) signs are the primary means of providing information and directions to roadway users. All signs must be retroreflective per MassDOT's latest standard.

Warning signs call attention to unexpected conditions and to situations that might not be readily apparent to road users on or adjacent to a roadway. Warning signs alert road users to conditions that might call for a reduction of speed or an action in the interest of safety and efficient traffic operations. Nearly all warning signs for construction and work areas have black legends and borders on a fluorescent orange background.

Regulatory signs shall be used to inform road users of selected traffic laws or regulations and indicate the applicability of the legal requirements. Regulatory signs typically have black legends and borders on a white background.

Channelizing Devices

When used properly, traffic cones, reflectorized plastic drums, and barricades guide traffic through the work area along an appropriate travel path. It takes roadway users a certain distance along the roadway to safely move away from the upcoming active work site. These transition distances are based on the following taper length (L) formulas:

$L = WS^2/60$ for speeds of 40 mph or less; or

$L = WS$ for speeds of 45 mph or more; where

- L = minimum length of taper in feet,
- S = posted speed limit or typical travel speed in miles per hour prior to the work, and
- W = width of lane closure in feet.

The spacing of channelizing devices (in feet) is approximately equal to the existing speed of traffic (in mph).

Warning Lights

Rotating beacons and other flashing lights mounted on work vehicles, signs, or channelizing devices help alert roadway users to the work area. They may also be used to warn roadway users of hazards within the work area. The first 10 drums in any taper shall be equipped with sequential flashing lights.

Arrow Boards

Arrow boards are a special type of sign that are highly visible work zone warning devices. They are particularly effective on highways, where both speed and volume are high. Arrow boards in the non-directional, CAUTION, mode (four corner flashing) may be used to indicate that a shoulder is closed. Arrow boards in the arrow mode shall only be used when a travel lane is dropped on a multi-lane road and one lane of traffic must merge with another. All arrow boards should be located at the beginning of each lane or shoulder closure taper without extending outside of it. Arrow boards shall flash at a rate of 25 to 40 flashes per minute. Arrow boards shall not be used to indicate a lane shift.

BASIC REQUIREMENTS

In every work situation, the temporary traffic control setup must: Give roadway users sufficient advance warning of the work area; advise roadway users of the proper actions to take and travel paths to follow; and provide protection to roadway users, workers, and the work area. These three general requirements can be met as outlined below.

Provide Advance Warning

Warning devices along the approaches to a work area alert roadway Users to changes to road and operating conditions. Roadway users are usually alerted to these dangers via a sign or series of signs installed in the same order as the roadway user generally would expect to see them on long-term construction projects.

The initial project limit sign is usually a general warning such as "ROAD WORK 1500 FT". Other operational warning signs then provide the roadway user with more specific information about the situation. A minimum of three advance warning signs (the initial project limit sign and two operational warning signs) is recommended when work is located on the traveled way. Warning lights and flags can be used to attract attention to the signs. A highly visible work area helps reinforce the advance warnings.

Advise and Direct Travelers

Operational warning signs provide information to the road-way user such as the type of work being performed, special conditions to watch for, or actions to take. These include signs such as, SHOULDER WORK, RIGHT LANE CLOSED, DETOUR 500 FT, ROAD CLOSED to THRU TRAFFIC, POLICE OFFICER AHEAD, etc. All of these signs must be located far enough in advance of the work area that the roadway user has sufficient time to react to them appropriately. For projects in Urban Areas, see detail: Typical Device Spacing for minimum sign spacing.

Protect Travelers, Workers, and the Work Area

The primary protection of any work area is its own visibility. Traffic cones, reflectorized plastic drums, portable breakaway barricades, etc. are used to make the work area visible and separate workers from traffic.

PAGE 4

Other devices, such as flashing lights, flags, delineators, temporary lighting, and portable changeable message signs (PCMS) can be used to provide additional emphasis and visibility.

Workers must protect themselves by being alert to their work situation, wearing safety vests and hard hats, and by facing traffic whenever possible.

Work vehicles can also add protection when they are equipped with truck mounted attenuators, rotating beacons, flashing lights, flashing arrow boards, etc. and are parked between workers and oncoming traffic. However, workers should not position themselves between two closely parked vehicles. No private personal vehicles are allowed within the work site.

PLANNING GUIDELINES

Decisions regarding selection of work area traffic control devices require a knowledge and understanding of the specifics of each work zone. As there may be vast differences between situations, three main variables need to be considered prior to determining the need for, or the selection of, traffic control devices: 1) location of work, 2) type of roadway, and 3) speed of traffic.

Compiling information about these variables will help with planning a safe work area control. Each of these variables is explained below.

Location of Work

The choice of traffic controls needed for a short-term construction, maintenance, or utility operation depends upon the work zone's location. As a general rule, the closer the active work site is to the roadway, the more control devices are needed. Work can take place:

- Away from the shoulder or edge of pavement. No special devices are needed if work is confined to an area 15 or more feet from the edge of the shoulder. A general warning sign, such as ROAD WORK AHEAD, should be used if workers and equipment must occasionally move closer to the roadway.
- On or near the shoulder/ edge of pavement. This area should be signed as if work were on the road itself, since it is part of the roadway users' recovery area. Advance warning and operational signs are needed, as well as channelization devices to direct traffic and keep the work area visible to roadway users.
- On the median of a divided highway. Work in this location may require traffic control in both directions of traffic. Advance warning and channelization devices should be used if the median is narrow.
- On the roadway. This condition requires detailed protection for workers and sufficient warning to roadway users. Advance warning must provide a general message that work is taking place as well as information about specific hazards and specific actions the roadway user must take.

TYPE OF ROADWAY

The characteristics of the roadway also have an important influence on the selection of work area traffic control. The roadway, itself, may present special hazards. You should plan for maximum protection, using the worst hazard present as your guide to signing the work area. Some general considerations are described below for road conditions.

One-way roads: A one-way road requires signage on both sides of the road if it carries two or more lanes in one direction, ensuring roadway users in all lanes are alerted and informed.

Two-way roads:

- **Undivided:** Two-way, undivided roads will usually require controls for both directions of traffic. When the active work site is well off the roadway, controls for the opposite lane may be eliminated.
- **Divided:** Work on divided multi-lane roadways can often be handled as work along a one-way road (i.e. signs are provided along both sides of the roadway along the direction affected). If the work is in the median, both directions of traffic must be controlled, and both approaches should be double signed (i.e. have all 3 advance warning signs on both sides of each direction).

EFFECTS OF SPEED ON WORK ZONES

Speed is an important consideration in the use of work area traffic control devices. As a general rule, the greater the speed of traffic approaching a work area, the greater the size, number, and spacing of control devices.

Size. The standard size for most warning signs is 36 x 36 inches on conventional roadways and 48 x 48 inches on freeways and expressways. Signs larger than the standard 36 x 36 inches may be desirable on high-speed conventional roads.

Position. Install signs far enough in advance of the work area so the roadway users have time to react to them (see charts associated with diagrams for spacing).

OTHER FACTORS

Sight Obstructions. To ensure safety, work areas must be visible. Assess the placement of the temporary traffic control devices by driving through the area, and determine if the devices can be easily seen and provide sufficient time for roadway users to react in a safe manner. Extra precaution should be enacted in areas where horizontal or vertical curves may obstruct a roadway user's clear view of road activities ahead.

Police/Flaggers. It should be noted that the MUTCD does not require police/flaggers for stationary setups. If police/flaggers are used, a police/flagger ahead sign should be used in advance of any point where the police/flagger is stationed to control road users.

PROCEDURES FOR WORK AREA TRAFFIC CONTROL

1. PLAN YOUR WORK

Inspect location of work area and its surroundings.

Analyze:

- Location of work in relation to the traveled way, intersecting road-ways, driveways, and sight distances;
- Type of roadway and traffic involved; and
- Volume and speed of traffic.

Meet and discuss the work and necessary traffic control with the crew.

Study representative illustrations in this guide to develop a temporary traffic control plan (TTCP).

Other Considerations:

- Base your traffic control plan on the premise that all roadway users are unfamiliar with the area.
- The closer the work area location is to traffic, the more controls are needed.
- Plan for maximum protection.
- Select and inspect the temporary control devices needed (including all warning signs), if they are not in good condition, REPLACE THEM!
- Then collect and transport them to the work site.
- Determine their proper placement.
- Install signs and other traffic control devices prior to allowing personnel or equipment onto the roadway.
- Make sure signs are reflective, accurate, clean, and meet specifications. Completely cover any existing permanent signs that will conflict with the messages of the new work area control signs.

2. INSTALLING/REMOVING TEMP. TRAFFIC CONTROL DEVICES

Care must be exercised when installing and removing temporary traffic control (TTC) devices. The traffic control needed to perform the operation safely is dictated by the location on the roadway the operation will occur: in a shoulder or a lane, in the left lane or right, etc. In all cases, installing TTC begins and ends as a mobile operation.

A shadow vehicle with a truck mounted attenuator (TMA) shall be used to protect workers installing and removing TTC devices on all roadways with a posted speed limit of 45 MPH or greater as directed by the engineer. TTC devices shall not be installed or removed from a shadow vehicle with a TMA. TTC devices shall be installed or removed from a work operation vehicle only and a shadow vehicle with a TMA shall be used to protect the workers installing or removing the devices.

PROCEDURES FOR WORK AREA TRAFFIC CONTROL (CONT.)

3. INSTALL TRAFFIC CONTROL DEVICES AT WORK SITE

FOR LOWER SPEED (≤ 40 MPH) ROADWAYS:

- 1) All devices shall be installed in order with the flow of traffic.
- 2) Where one direction of traffic is being affected, the first sign installed should be the sign farthest from the work site, and on the same side as the work.
- 3) Where two directions of traffic are affected, install signs for opposing traffic first, starting with the sign farthest from the work area. When signs for opposing traffic have been installed, install signs on the same side as the work area, again beginning with the sign farthest from the active work site.
- 4) Once signs are in place, other traffic control devices shall be installed in the same manner as the signs.

FOR HIGHER SPEED (≥ 45 MPH) ROADWAYS:

- 1) All devices shall be installed in order with the flow of traffic.
- 2) Install all advance warning signs, beginning with the ROAD WORK XXX (W20-1) sign and ending with the END ROAD WORK/DOUBLE FINES END (MA-R2-10E) sign.
- 3) Install all signs beginning with the opposite side which will be closed (for a right lane closure; first, install all signs on the left side (shoulder) and then install all signs on the right side (shoulder). No signs shall be erected on the roadway unless delineated by traffic control devices.
- 4) If required, install shoulder taper as the mobile operation advances.
- 5) Install arrow board on the shoulder prior to the merging taper or as close to the beginning of the merging taper as possible.
- 6) Install channelizing devices to form a merging taper. Use of a shadow vehicle with a TMA during installation is required on roads with speed limits of 45 MPH or greater or as directed by the Engineer.
- 7) Install traffic control devices along the buffer space at the appropriate spacing.
- 8) Continue placing devices along the work space at the appropriate spacing.
- 9) Install devices for the termination area as necessary.
- 10) Place the shadow vehicle with a TMA in advance of the first work crew or hazard approached by motorists. Multiple shadow vehicles may be required based on the number of lane and shoulder closures implemented.

4. INSPECT WORK AREA SIGNING AND CONTROL DEVICES

- 1) Assess the placement of the temporary traffic control devices by driving through the work area. All approaches to the work zone should be checked.
- 2) Ensure roadway users will have sufficient time to read signs and react in a safe manner.

PROCEDURES FOR WORK AREA TRAFFIC CONTROL (CONT.)

- 3) Check visibility of entire work area. If approaching roadway users can't see the work area well, or if they can't see ahead to traffic that may already be queued on the approach because of the work, additional traffic control devices should be deployed.
- 4) Check to ensure the proper temporary traffic control devices are positioned to protect workers from traffic (where possible).
- 5) Ensure all workers wear safety vests, hard hats, and all other necessary safety equipment. All worker safety gear should be in good condition. All reflective gear should be clean and highly visible in the dark.
- 6) Record in the log book the number and location of all signs and devices.

Considerations:

- Work area signs should never be blocked from view or obscured by vegetation, existing signs, or other obstructions.
- Flags, flashing lights, and edge line traffic cones can be used to improve visibility.

5. REMOVE TRAFFIC CONTROL DEVICES AT WORK SITE

All workers and equipment should be clear from work site BEFORE removing signs and other devices.

FOR LOWER SPEED (≤ 40 MPH) ROADWAYS:

- 1) Remove signs and other devices within the delineated area when work is complete.
- 2) Remove other traffic control devices in the reverse order in which they were installed
- 3) Remove signs in the reverse order in which they were installed (i.e. sign closest to the work area to be removed first).
- 4) When the operation is complete, uncover any existing permanent signs covered in Step 2.
- 5) Record in the log book the time at which the signs were removed.

FOR HIGHER SPEED (≥ 45 MPH) ROADWAYS:

All TTC devices for a stationary lane closure on a multi-lane roadway, except advance warning signs, should be removed against the flow of traffic in the following sequence:

- 1) Remove the channelizing devices starting from the end of the activity area working back to the widest part of the merging taper.
- 2) A shadow vehicle with TMA shall be positioned to protect workers removing devices and work backwards as the setup is removed from the roadway.

PROCEDURES FOR WORK AREA TRAFFIC CONTROL (CONT.)

- 3) Place the removal vehicle on the shoulder, and remove the channelizing devices from the merging taper by hand onto the work vehicle.
- 4) Remove the arrow board once traffic is clear and it is safe to do so.
- 5) Circle back and moving with the flow of traffic, remove the advance warning signs starting with the opposite side from previous lane closure first.
- 6) At no time shall workers run across the multilane roadway to remove signs on both sides of the road simultaneously.
- 7) Record in the log book the time at which the signs were removed

RAMP FACILITIES

At all times it is necessary to control the on and off-ramp traffic during the installation and breakdown of traffic control devices. Use of temporary traffic slow-downs or rolling roadblocks is recommended to allow for the safety of workers handing temporary traffic control devices on ramp facilities. A shadow vehicle with a TMA shall be used to protect the workers installing or removing the devices. At no time shall the work operation vehicle be used as the shadow vehicle with the TMA.

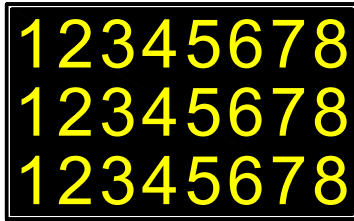
USE OF THIS GUIDE

Illustrations showing minimum standards for short-term construction, maintenance, and utility operations are arranged in this guide by type of operation. The users of this guide should compare all illustrated examples and examine their differences. After gathering information about the work zones using the general guidelines as outlined, proceed as follows:

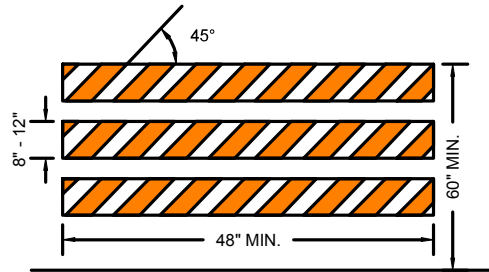
- 1) Turn to the Index. Consider the type of operations and the type of roadway upon which work will occur.
- 2) Select the figure that most closely matches the conditions where you plan to work. Remember that all diagrams represent minimum standards.
- 3) Read the title of the illustration to ensure that it is appropriate to your location. Study the layout of traffic control devices and read all notes.
- 4) Consult the appropriate tables, as directed on each illustration to determine taper length and proper spacing of signs. Notice that distances change when speeds change. Also note that these are guidelines, only, and they must be adapted to your specific work area.
- 5) Use the **“PROCEDURES FOR WORK AREA TRAFFIC CONTROL”** for assistance in completing all necessary steps to provide effective and safe work area traffic control.



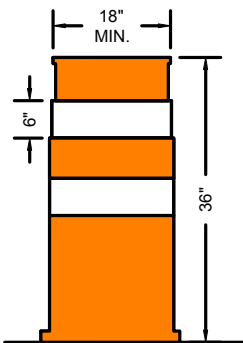
SIGN



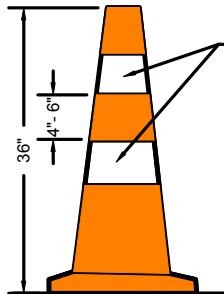
PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)



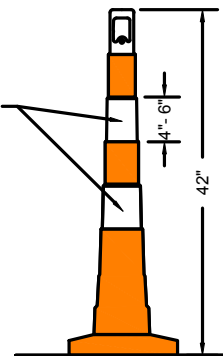
TYPE III BARRICADE



DRUM

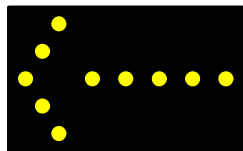


RETROFLECTIVE BANDS

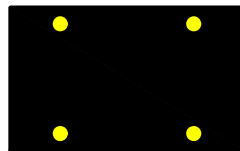


CONES

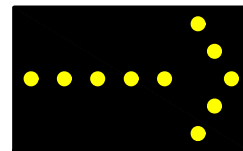
Cones may be used for all daytime operations. For night work, drums should be used to form the taper(s) and cones can be used along the tangent section of the work setup.



LEFT

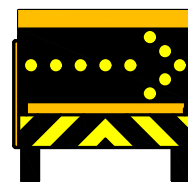


CAUTION



RIGHT

ARROW BOARD (WITH MODE)



TRUCK MOUNTED ATTENUATORS

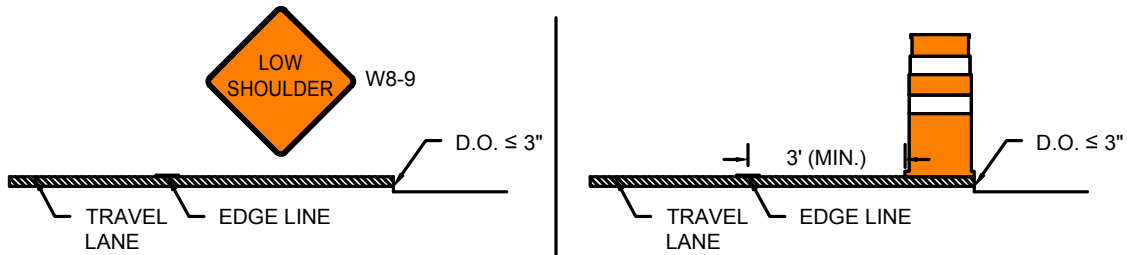
Truck Mounted Attenuators (TMA) shall be positioned between the start of the work area and the end of the designated buffer zone. The TMAs are to be positioned in each temporarily closed lane. This includes shoulders (≥ 8 feet) whether combined with a travel lane closure or being closed alone. These 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

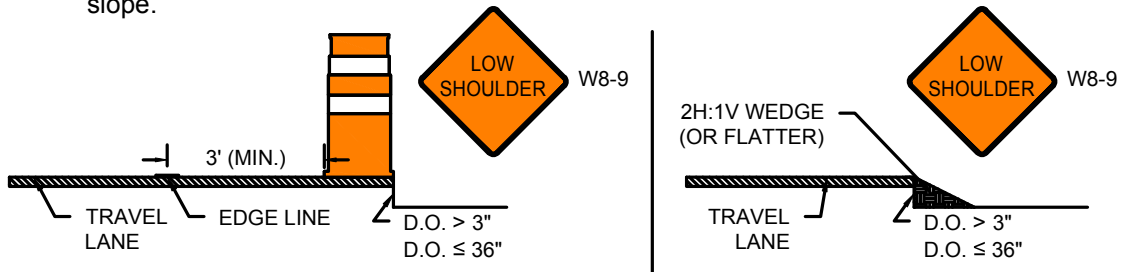
Note that this guidance is adopted from the Roadside Design Guide, 4th Edition.

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.

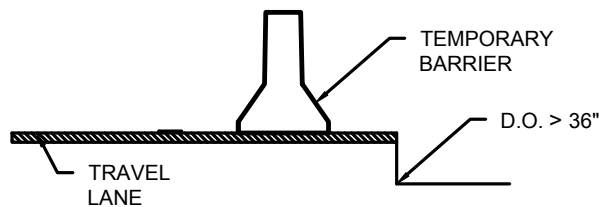
- Shoulder drop-offs 3" or less adjacent to a shoulder or active travel lane should be mitigated by:
 - ✓ A W8-9 (LOW SHOULDER) sign in advance of and at regular intervals throughout the treatment; or
 - ✓ The placement of drums on the traffic side of the drop-off.



- 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 of the drop-off, offset at least 3' from the travel lane; or
 - ✓ A W8-9 (LOW SHOULDER) sign in advance of and at regular intervals throughout the treatment and the placement of a temporary wedge of material along the face of the drop-off. The wedge should consist of stable material placed on a 2H:1V or flatter slope.



- Shoulder drop-offs greater than 36" must be protected by temporary barrier.





POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)	CHANNELIZATION DEVICES (DRUMS OR CONES)			
		TRAVEL LANE CLOSURE LENGTH (L) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	500 / 500 / 500	320	305	20	55
45-55	500 / 1000 / 1000	660	495	40	40
60-65	1000 / 1600 / 2600	780	645	40	50










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

MINIMUM SPACING OF ADVANCE WARNING SIGNS FOR URBAN ROADWAYS	
ROAD TYPE	DISTANCE BETWEEN SIGNS
URBAN (LOW SPEED)	100 FT
URBAN (HIGH SPEED)	350 FT

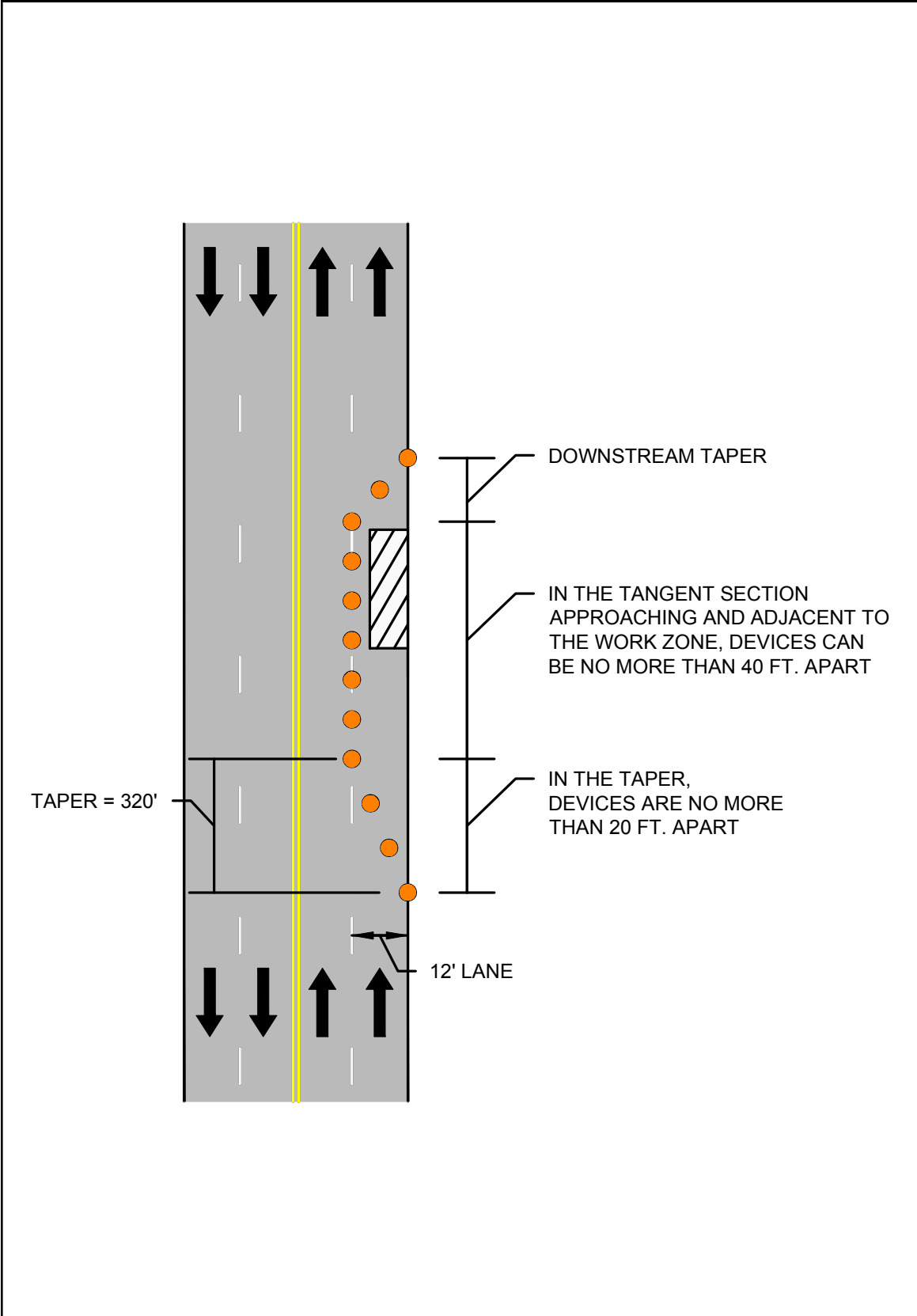
NOTES


1. 40 FT = 10 FT PAVEMENT MARKING + 30 FT SKIP

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 14</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FLAGGING GUIDANCE</p>
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Guidance for Flagging Operations

NOTE:

A flagger shall always be aware of their surroundings and have a good escape route. A flagger shall never be positioned directly beside or against construction equipment. When a flagger is required to direct traffic in an area where the escape route is partially blocked by a traversable obstruction such as a guardrail, the flagger shall be physically capable of traversing that obstruction. Prior to commencing a project, the supervisor in charge shall review the project, including guardrail areas, for safe flagging stations. The supervisor in charge shall clearly communicate with the flagger(s), indicating any locations where they cannot safely perform their duties.

Each flagger shall be equipped with the following high visibility clothing, signaling, and safety devices:

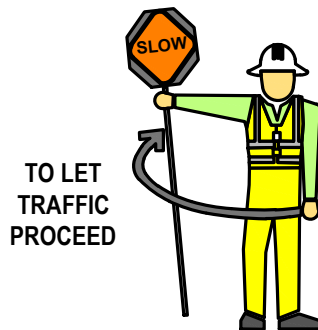
- 1) A white protective hard hat with a minimum level of reflectivity per the requirements of ANSI, Type I, Class E&G;
- 2) A clean, unfaded, untorn lime/yellow reflective safety vest and pants meeting the requirements of ANSI 107 Class 3 with the words "Traffic Control" on the front and rear panels in minimum two (2) inch (50 millimeter) high letters;
- 3) A 24 inch "STOP/SLOW" traffic paddle conforming to the requirements of Part 6E.03 of the Manual on Uniform Traffic Control Devices (MUTCD), a weighted, reflectorized red flag, flagger station advance warning signage, and two-way radios capable of providing clear communication within the work zone between flaggers, the Contractor, and the Engineer. The traffic paddle shall be mounted on a pole of sufficient length to be seven feet above the ground as measured from the bottom of the paddle;
- 4) A working flashlight with a minimum of 15,000 candlepower and a six inch red attachable wand, a whistle with a working lanyard, and a First Aid kit that complies with the requirements of ANSI Z308.1; and
- 5) An industrial/safety type portable air horn that complies with the requirements of the U.S. Coast Guard.

A "STOP/SLOW" paddle should be the primary hand-signaling device. It shall have an octagonal shape on a rigid handle. Flag use should be limited to emergency situations.



Properly Trained Flaggers

- Give clear messages to drivers.
- Allow distance for drivers to react.
- Coordinate with other flaggers.
- Use standard signaling methods.



Properly Equipped Flaggers

- Use approved stop/slow paddles.
- Use approved safety apparel.
- Use retroreflective equipment.
- Use hand held radios, as needed.
- All flaggers shall wear safety apparel that meets ANSI Class 3 requirements. The combination of vest and pants is required.



Proper Flagging Stations

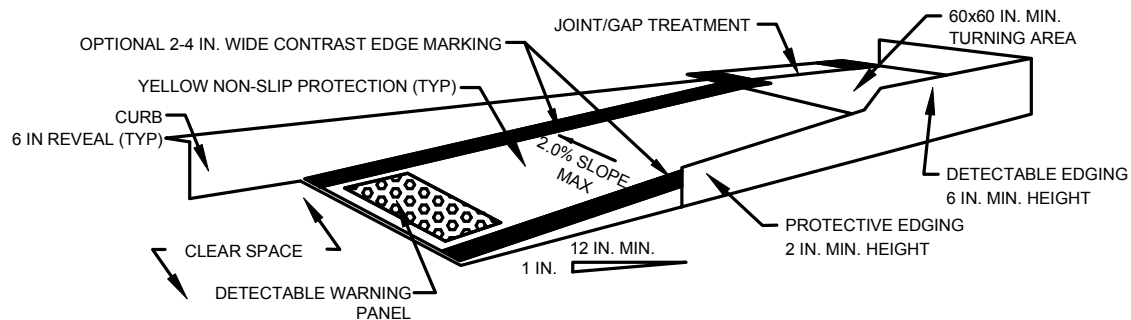
- Good approach sight distance.
- Highly visible to traffic.
- Stand alone away from other machinery and people.
- Stand on right edge of pavement or shoulder- proceed to centerline only when first vehicle has come to stop.
- Have a good escape route.

Proper Advance Warning Signs

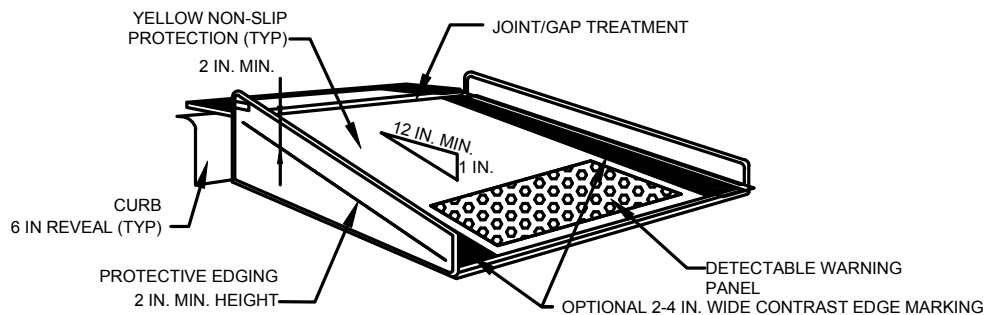
- Always use warning signs.
- Allow for reaction distance from signs.
- Remove signs if no longer necessary or not flagging.
- Use free hand in up-and-down motion to help slow traffic.



FIGURE 4
TYPICAL PEDESTRIAN DEVICES
(1 OF 2)
NOT TO SCALE



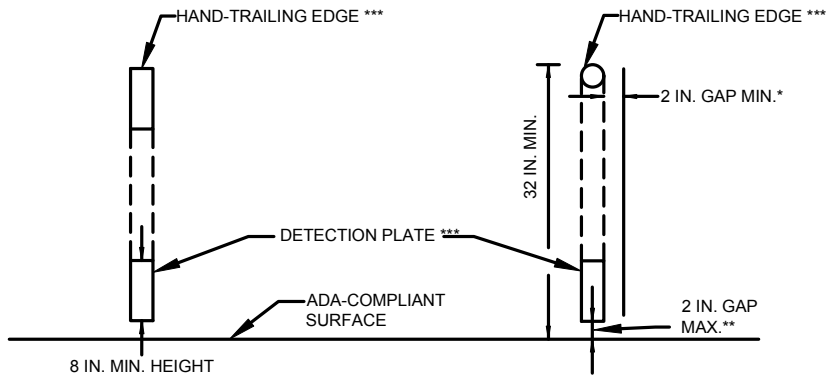
TEMPORARY CURB RAMP-PARALLEL TO CURB



TEMPORARY CURB RAMP-PERPENDICULAR TO CURB

NOTES:

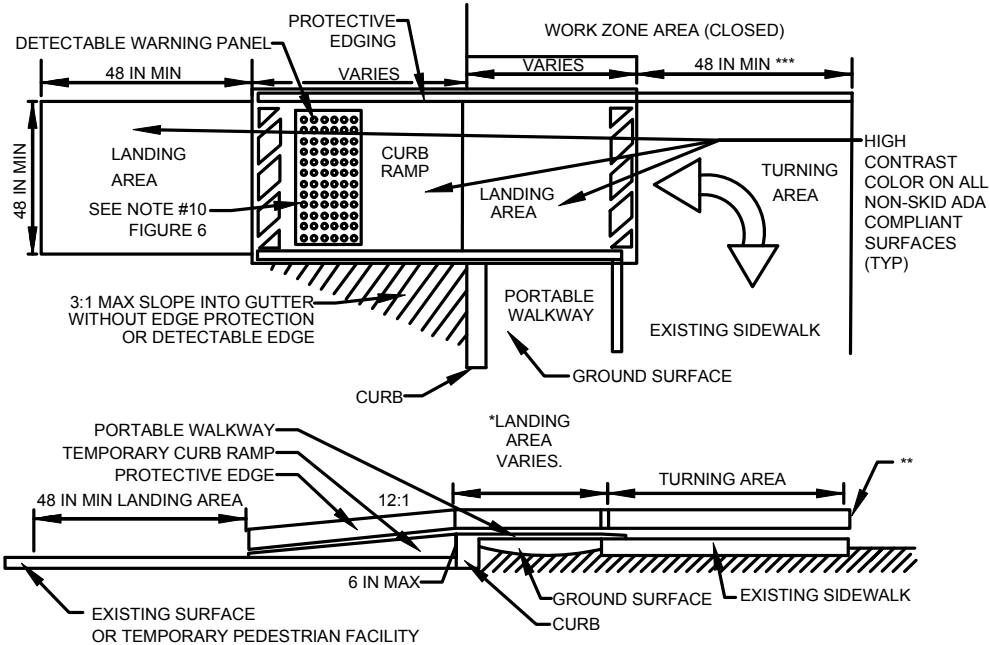
1. CURB RAMPS SHALL BE 60 IN. MINIMUM WIDTH WITH A FIRM, STABLE, AND NON-SLIP SURFACE.
2. PROTECTIVE EDGING WITH A 2 IN. MINIMUM HEIGHT SHALL BE INSTALLED WHEN THE CURB RAMP OR LANDING PLATFORM HAS A VERTICAL DROP OF 6 IN. OR GREATER OR HAS A SIDE APRON SLOPE STEEPER THAN 1:3 (33%). PROTECTIVE EDGING SHOULD BE CONSIDERED WHEN THE CURB RAMPS OR LANDING PLATFORMS HAVE A VERTICAL DROP OF 3 IN. OR MORE.
3. PROTECTABLE EDGING WITH 6 IN. MINIMUM HEIGHT AND CONTRASTING COLOR SHALL BE INSTALLED ON ALL CURB RAMP LANDINGS WHERE THE WALKWAY CHANGES DIRECTION (TURNS).
4. THE CURB RAMP WALKWAY AND LANDING AREA SURFACE SHALL BE OF A SOLID CONTINUOUS CONTRASTING COLOR ABUTTING UP TO THE EXISTING SIDEWALK.
5. CURB RAMPS AND LANDINGS SHOULD HAVE A 1:50 (2%) MAX CROSS-SLOPE.
6. CLEAR SPACE OF 48x48 IN. MINIMUM SHALL BE PROVIDED ABOVE AND BELOW THE CURB RAMP.
7. WATER FLOW IN THE GUTTER SYSTEM SHALL HAVE MINIMAL RESTRICTION.
8. LATERAL JOINTS OR GAPS BETWEEN SURFACES SHALL BE LESS THAN 0.5 IN. WIDTH.
9. CHANGES BETWEEN SURFACE HEIGHTS SHOULD NOT EXCEED 0.5 IN. LATERAL EDGES SHOULD BE VERTICAL UP TO 0.25 IN. HIGH, AND BEVELED AT 1:2 BETWEEN 0.25 IN. AND 0.5 IN. HEIGHT.
10. IF A TEMPORARY PEDESTRIAN RAMP LEADS TO A CROSSWALK, THEN A DETECTABLE WARNING PAD MUST BE ADHERED TO THE BASE OF THE RAMP. IF IT LEADS TO A PROTECTED PEDESTRIAN BYPASS THAT DOES NOT CONFLICT WITH VEHICULAR TRAFFIC, THEN A PAD SHALL NOT BE INSTALLED ON THE RAMP.



CROSS SECTION VIEW


PEDESTRIAN CHANNELIZING DEVICE

- * THERE SHALL BE A 2 INCH GAP BETWEEN THE HAND-TRAILING EDGE AND ITS SUPPORT.
- ** A MAXIMUM 2 INCH GAP BETWEEN THE BOTTOM OF THE BOTTOM RAIL AND THE SURFACE MAY BE USED TO PROVIDE DRAINAGE.
- *** THE HAND-TRAILING EDGE AND DETECTION PLATE SHALL BE CONTINUOUS THROUGHOUT THE LENGTH OF THE PATH SUCH THAT A PEDESTRIAN USER WITH A LONG CANE CAN FOLLOW IT.



TEMPORARY CURB RAMP

- * LANDING AREA USED TO OVERLAP NON-ADA COMPLIANT SURFACES.
- ** DETECTABLE EDGE REMOVED IF A CONTINUOUS SIDEWALK.
- *** 60 IN. IF AN OBSTRUCTION IS AT BACK OF SIDEWALK.

 Massachusetts Department of Transportation Highway Division	Work Zone Safety Standard Details and Drawings	FIGURE 5 TYPICAL PEDESTRIAN DEVICES (2 OF 2) NOT TO SCALE
PAGE 17		



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.

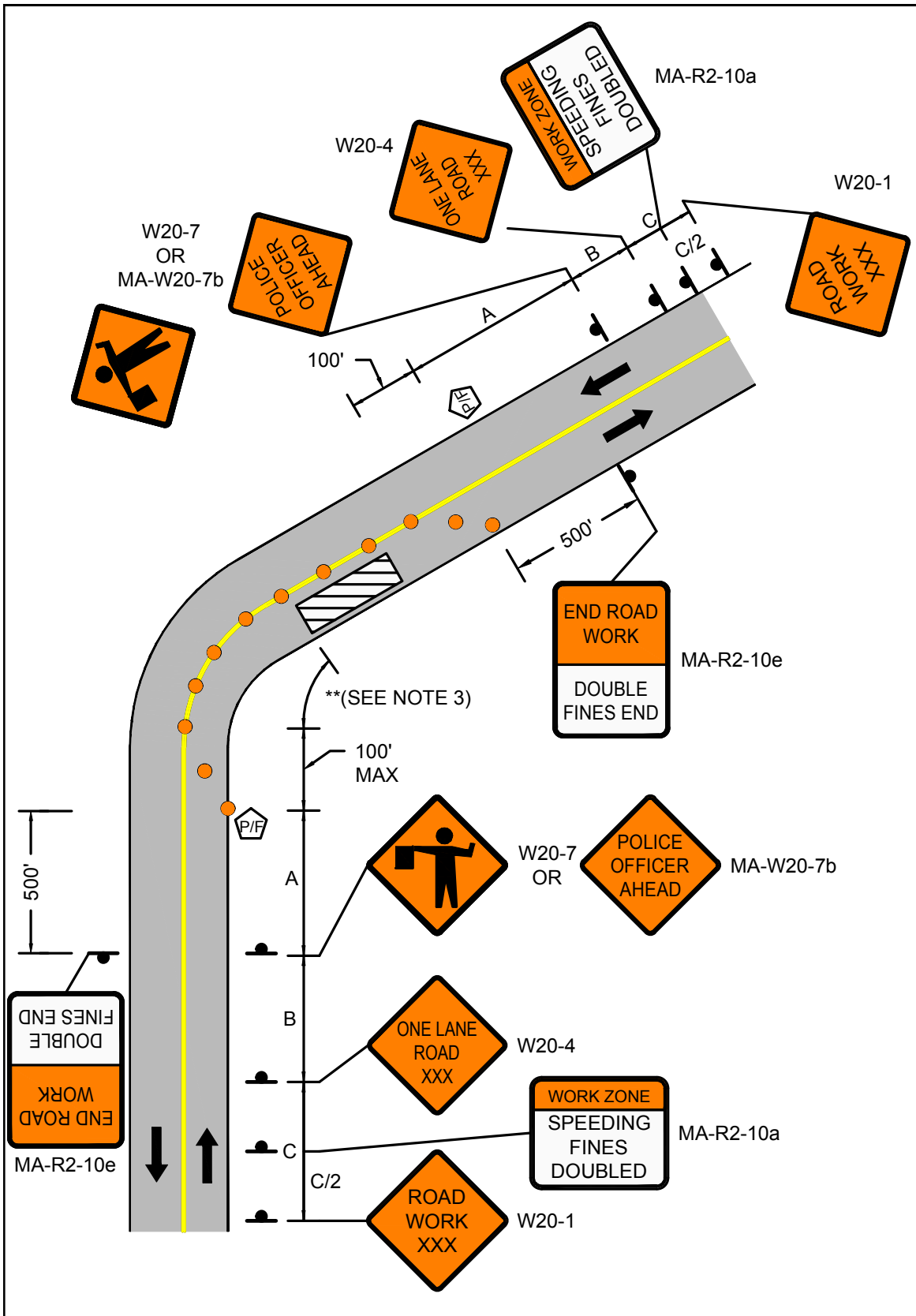
NOTES


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

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 19</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 6 STATIONARY OPERATIONS TWO LANE UNDIVIDED ROADWAY HALF OF ROADWAY CLOSED WORK NEAR CURVE</p>
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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

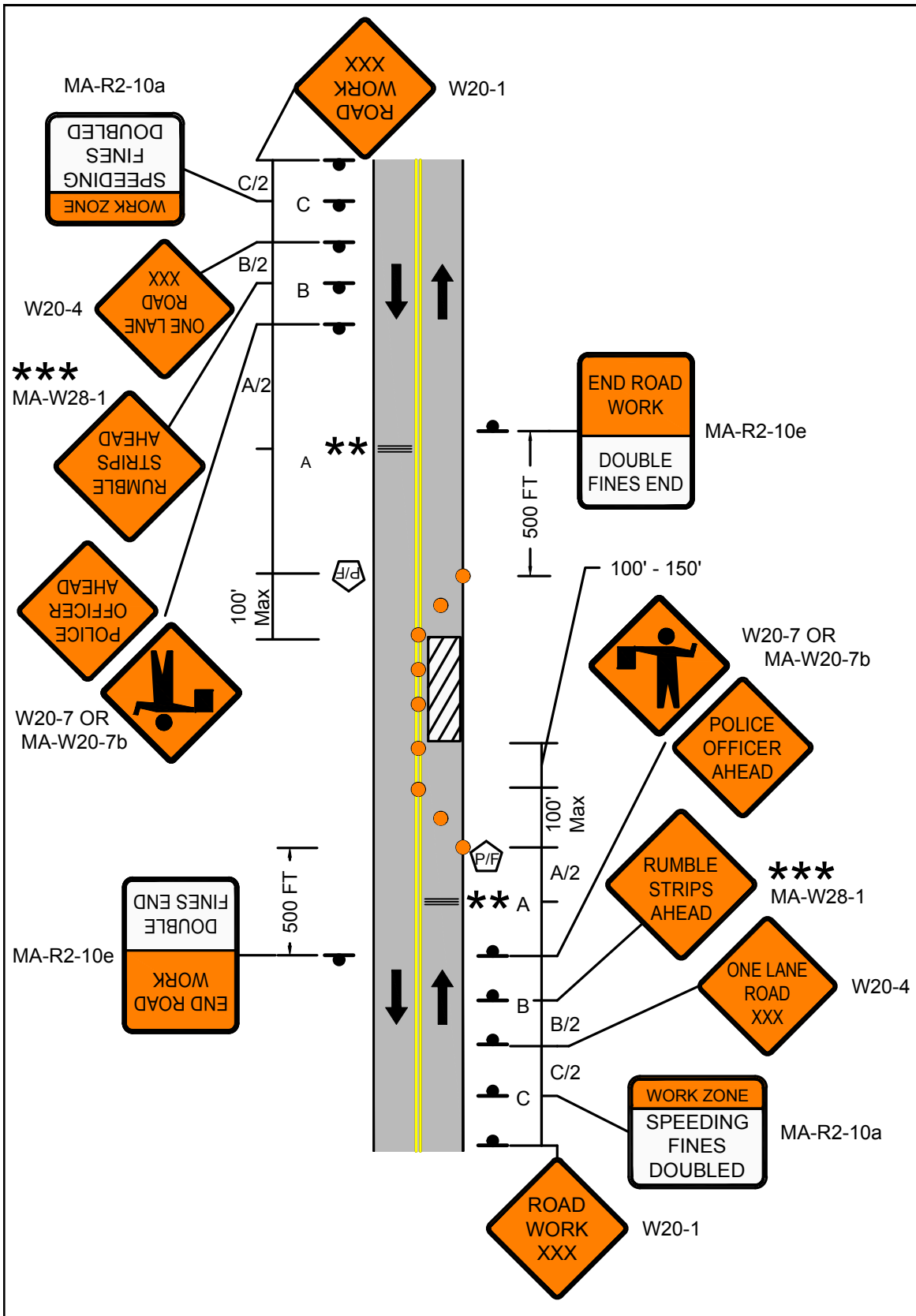
NOTES


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



 <p>PAGE 21</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 7 STATIONARY OPERATIONS TWO LANE UNDIVIDED ROADWAY HALF OF ROADWAY CLOSED</p>
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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.

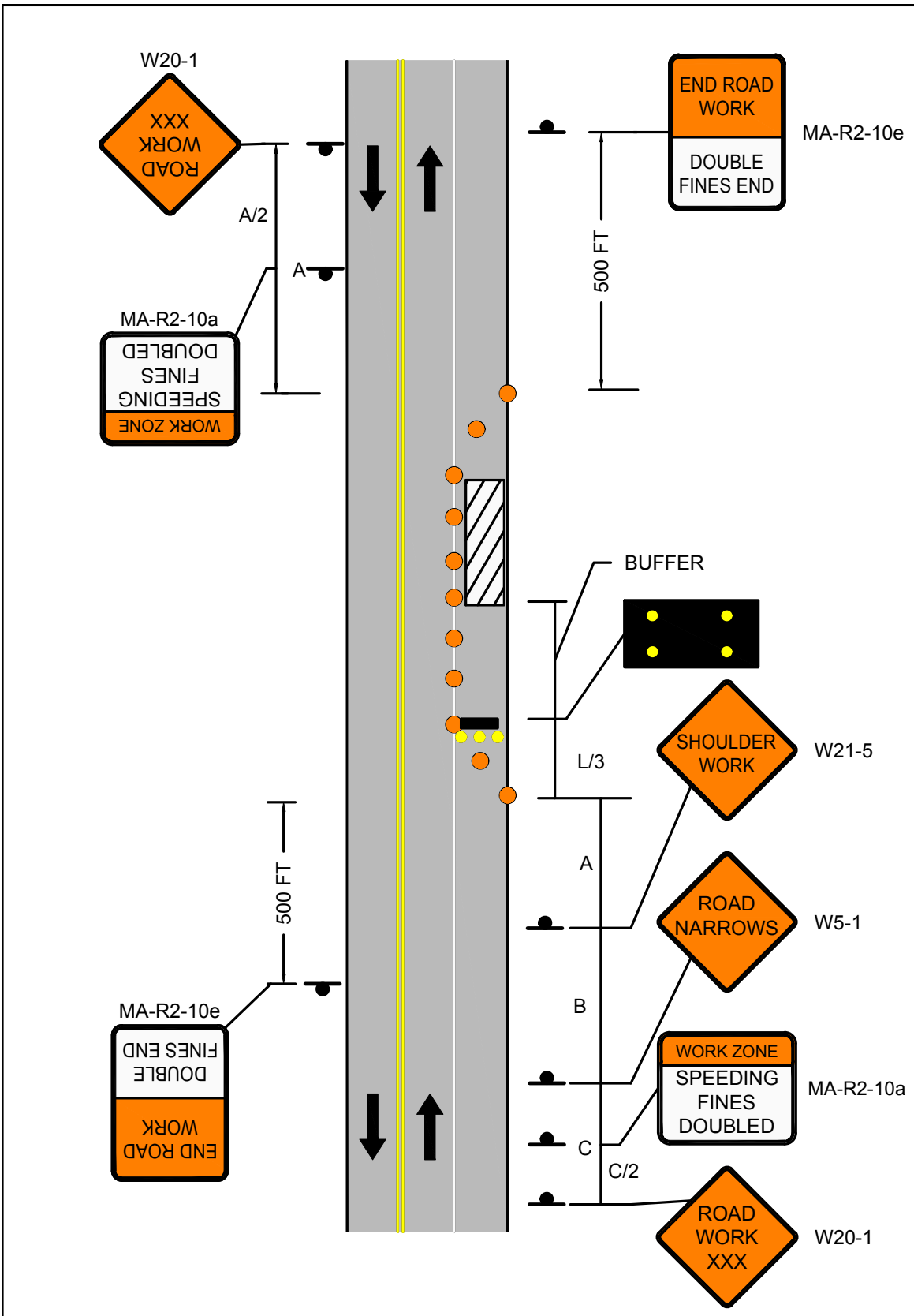
NOTES


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



 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 23</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 8 STATIONARY OPERATIONS TWO LANE UNDIVIDED ROADWAY SHOULDER CLOSED</p>
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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

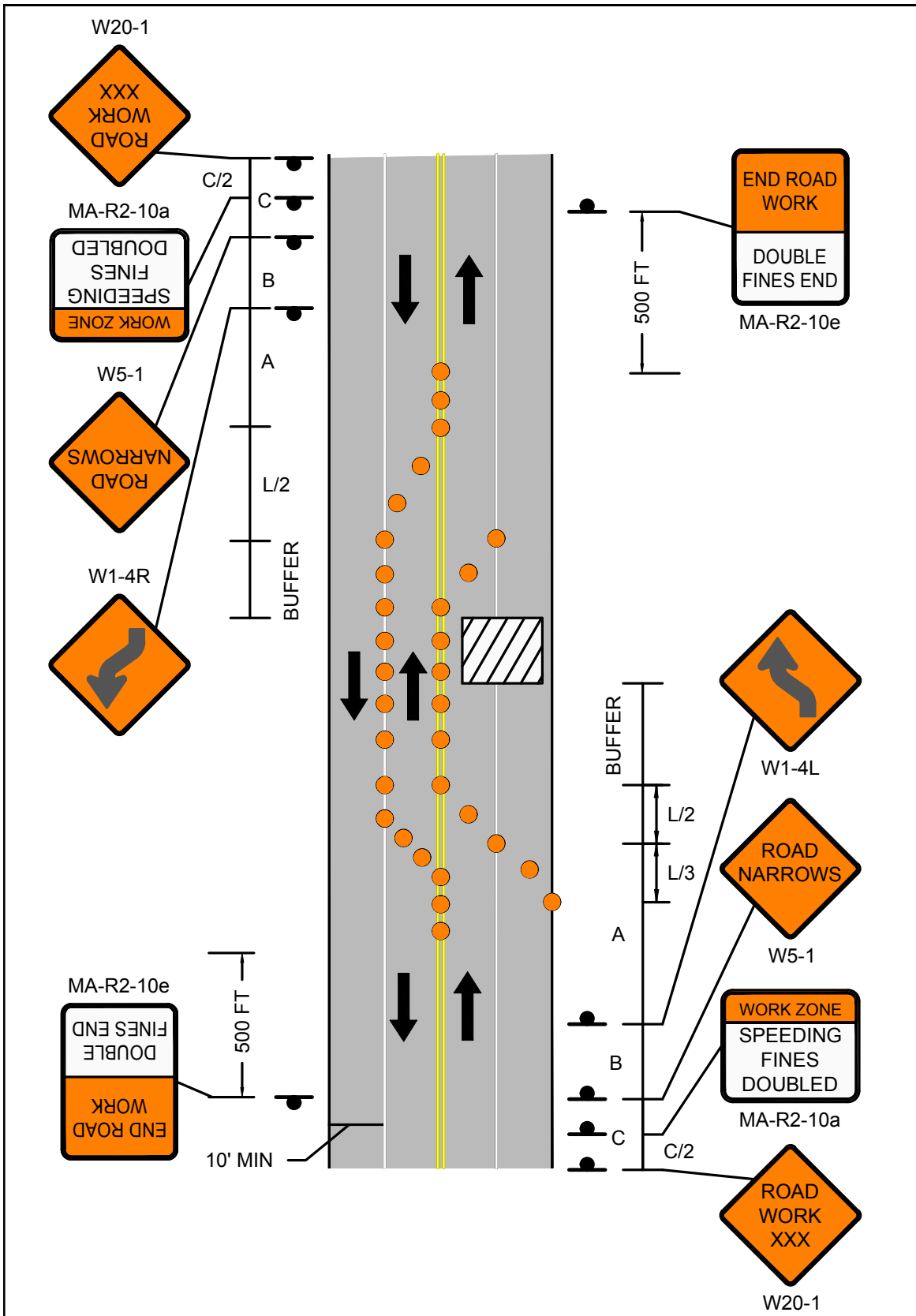


FIGURE 9
 STATIONARY OPERATIONS
 TWO LANE UNDIVIDED ROADWAY
 WITH TRAVERSABLE SHOULDER
 HALF OF ROADWAY CLOSED
 MAINTAIN TWO-WAY TRAFFIC





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

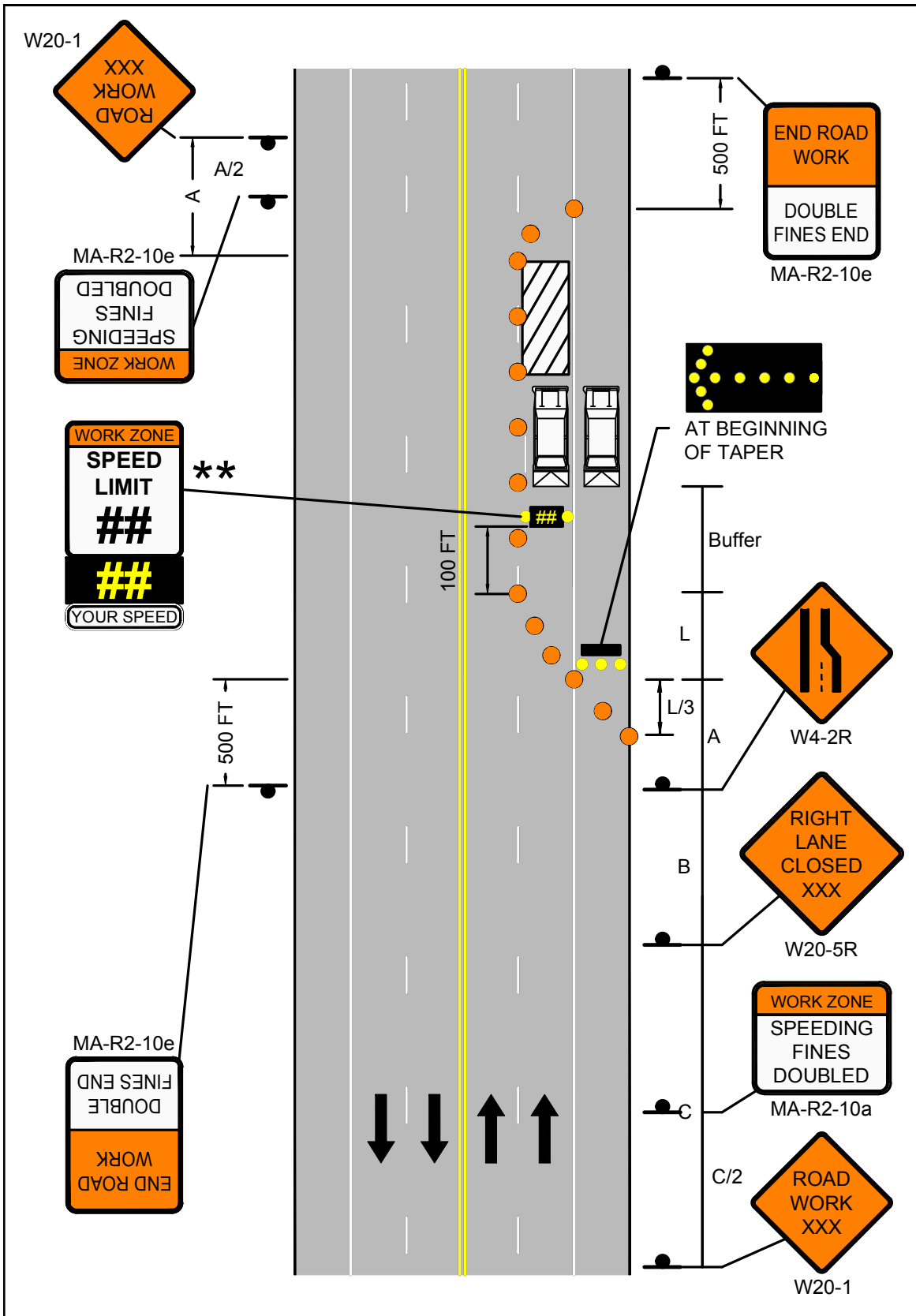
NOTES


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



 <p>PAGE 27</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 10 STATIONARY OPERATIONS FOUR LANE UNDIVIDED ROADWAY RIGHT LANE CLOSED</p>
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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

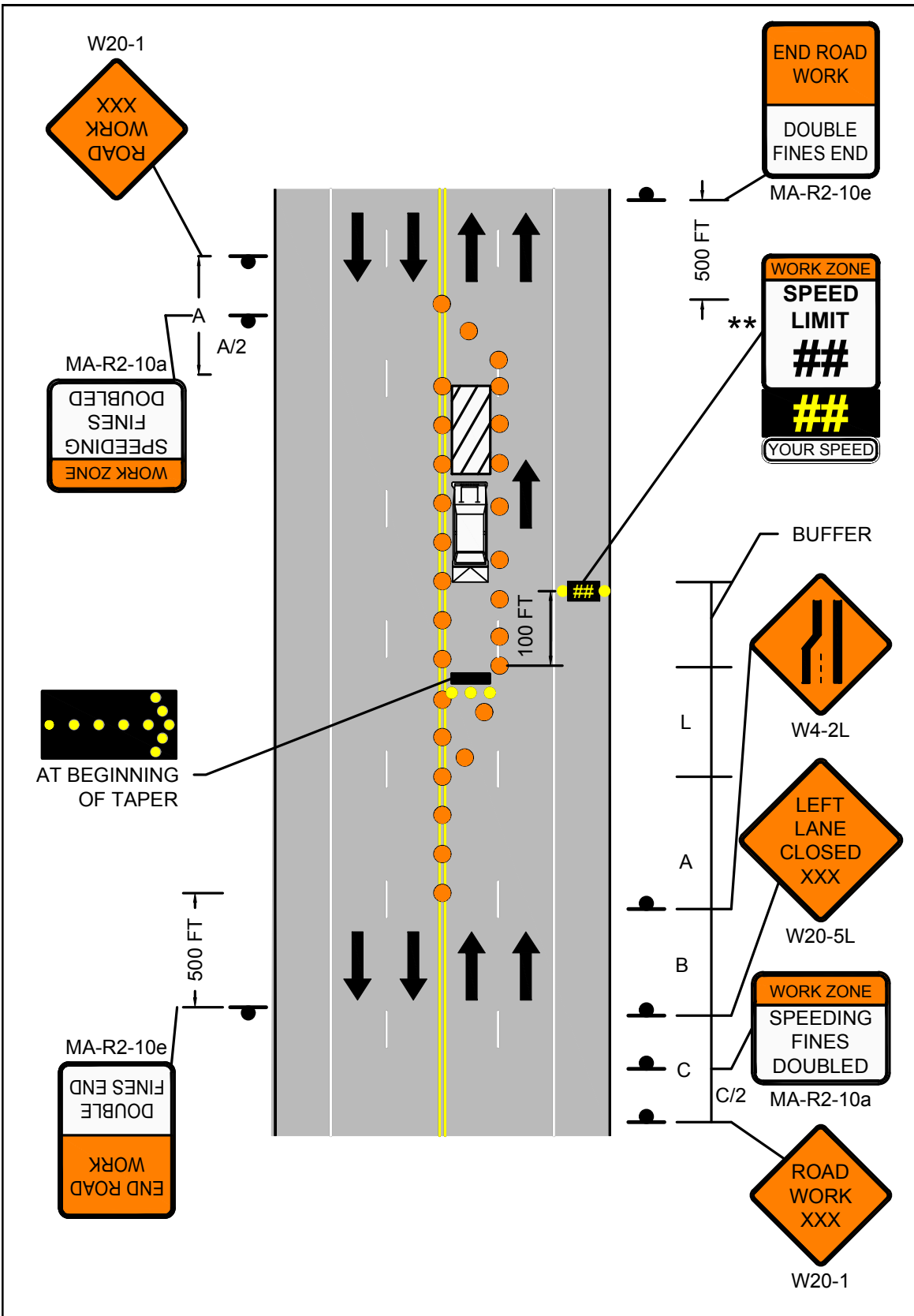



FIGURE 11
STATIONARY OPERATIONS
FOUR LANE UNDIVIDED ROADWAY
LEFT LANE CLOSED



 <p>PAGE 30</p>	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

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE

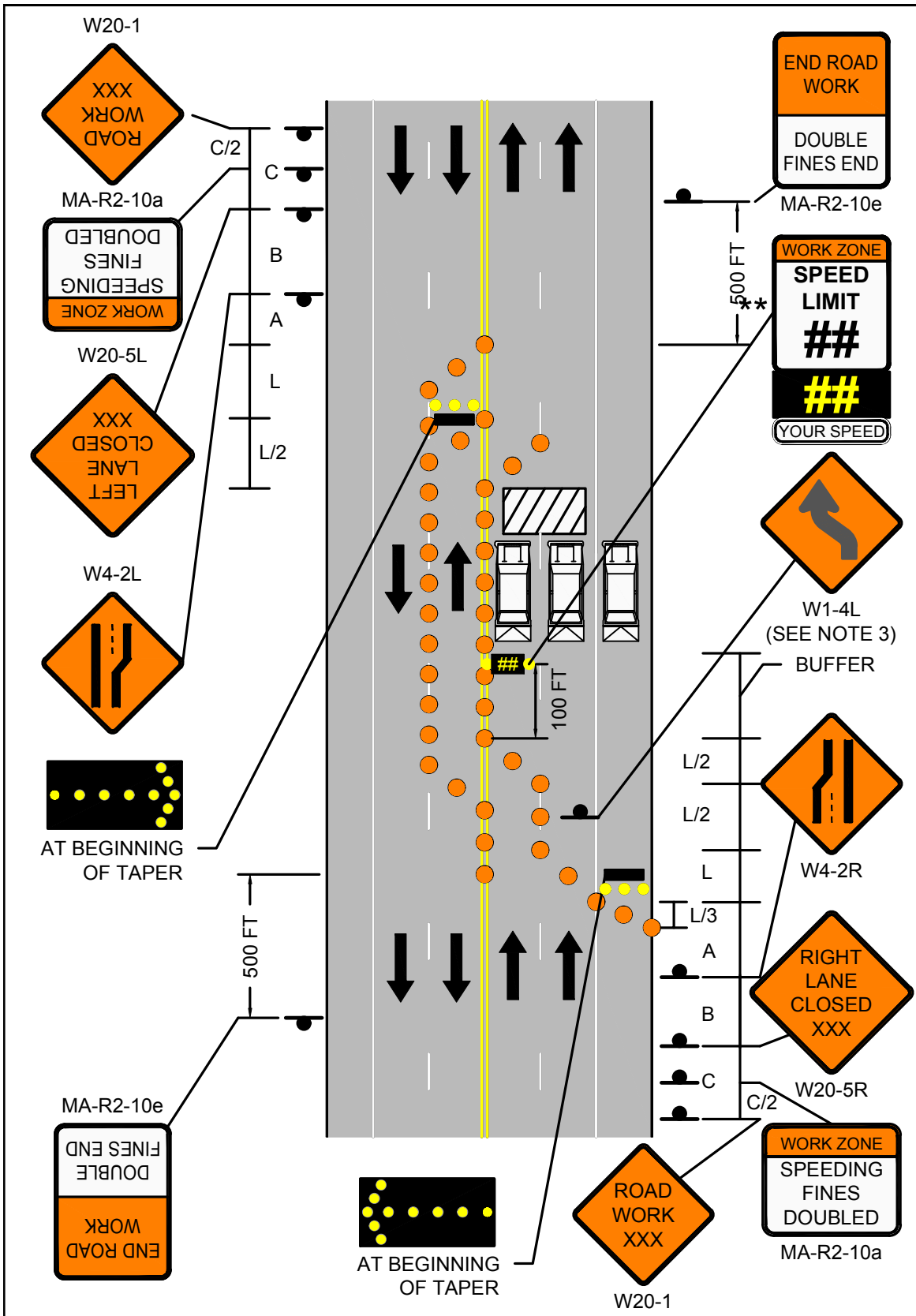


FIGURE 12
STATIONARY OPERATIONS
FOUR LANE UNDIVIDED ROADWAY
HALF OF ROADWAY CLOSED





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

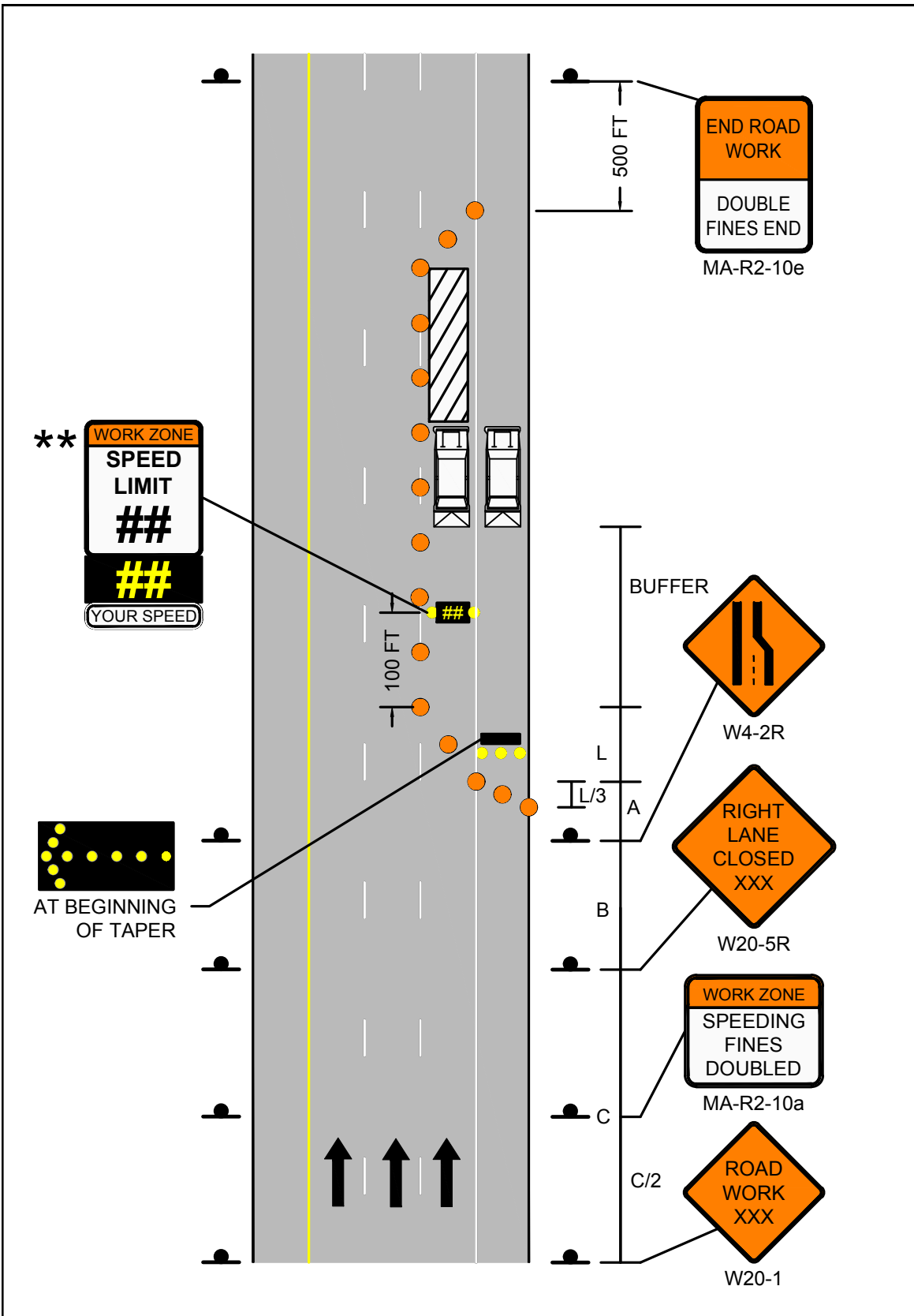
NOTES

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





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

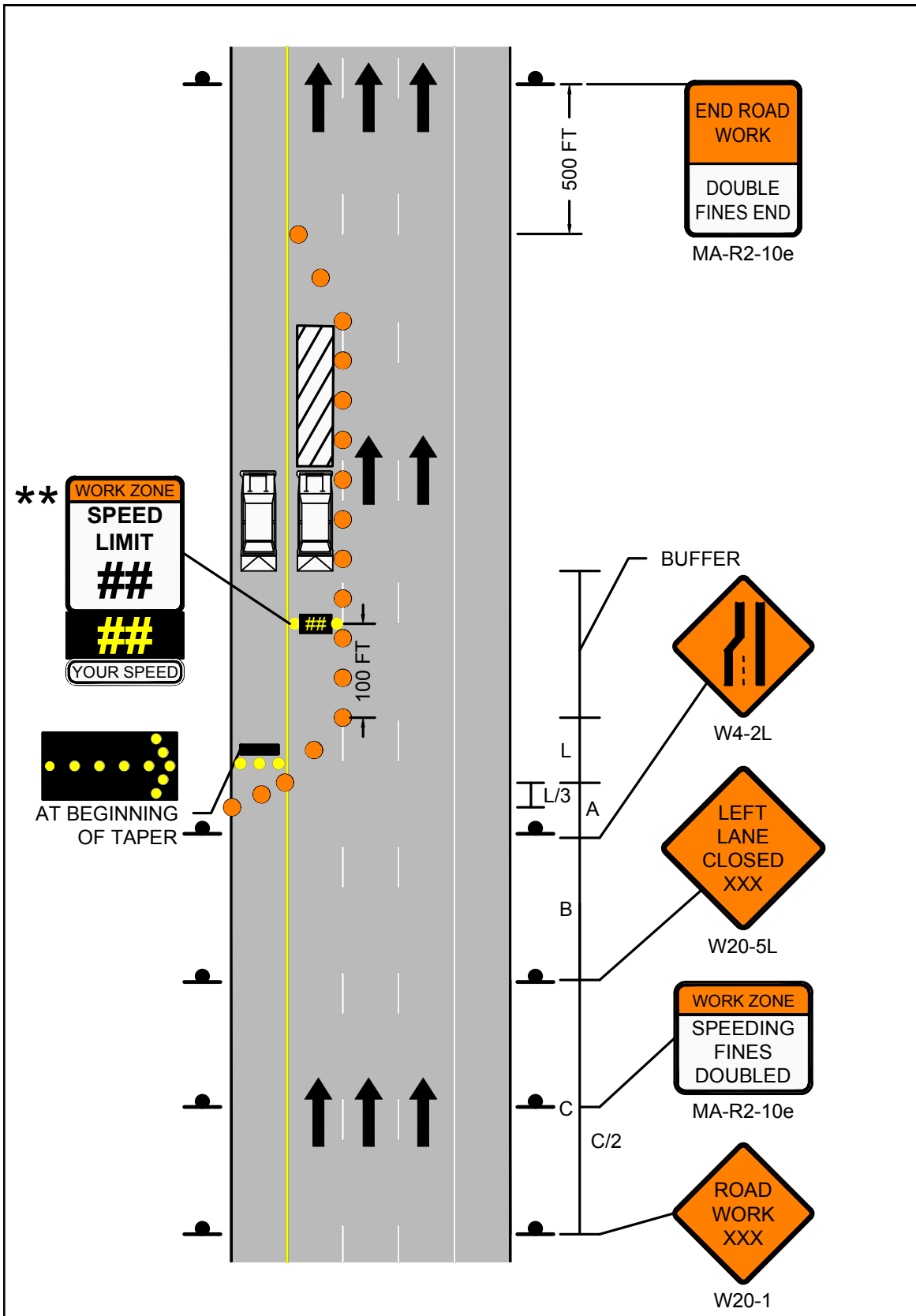
NOTES


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



 <p>PAGE 35</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 14 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY LEFT LANE CLOSED</p>
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 PAGE 36	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE OR RIGHT/CENTER LANES CLOSED
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POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)					
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	TANGENT LENGTH BETWEEN TAPERS T (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	640	305	20	110
45-55	220	660	1320	495	40	100
60-65	260	780	1560	645	40	115










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

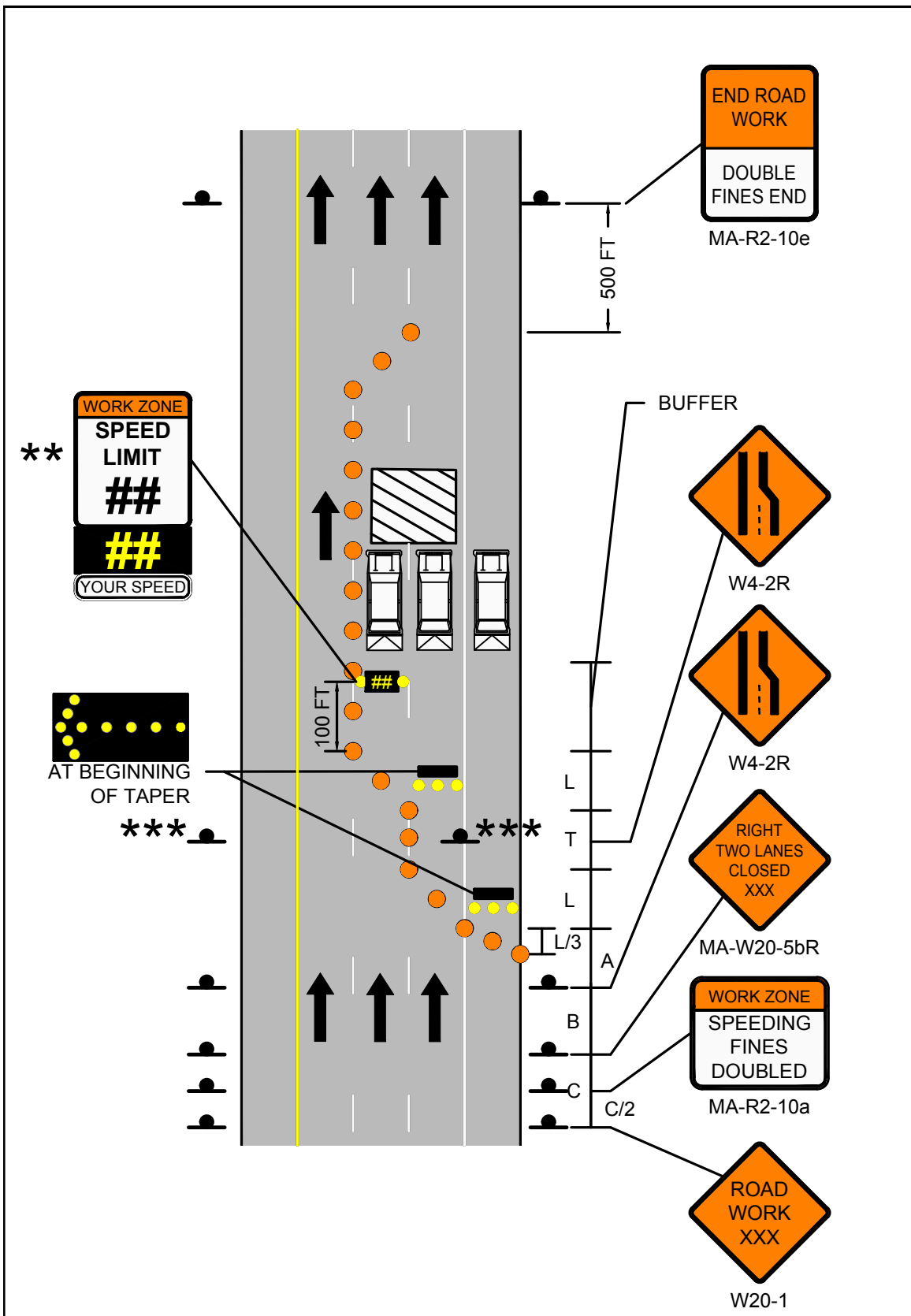
NOTES


1. MA-R2-10a LOCATED AT C/2.
2. ***OPTIONAL AT THE ENGINEER'S DISCRETION.
3. ***THIS SET OF SIGNS SHALL BE LOCATED AT T/2.


LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 37</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 15 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE OR RIGHT/CENTER LANES CLOSED</p>
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 <p>PAGE 38</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE OR LEFT/CENTER LANES CLOSED</p>
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POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)					
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	TANGENT LENGTH BETWEEN TAPERS T (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	640	305	20	110
45-55	220	660	1320	495	40	100
60-65	260	780	1560	645	40	115










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

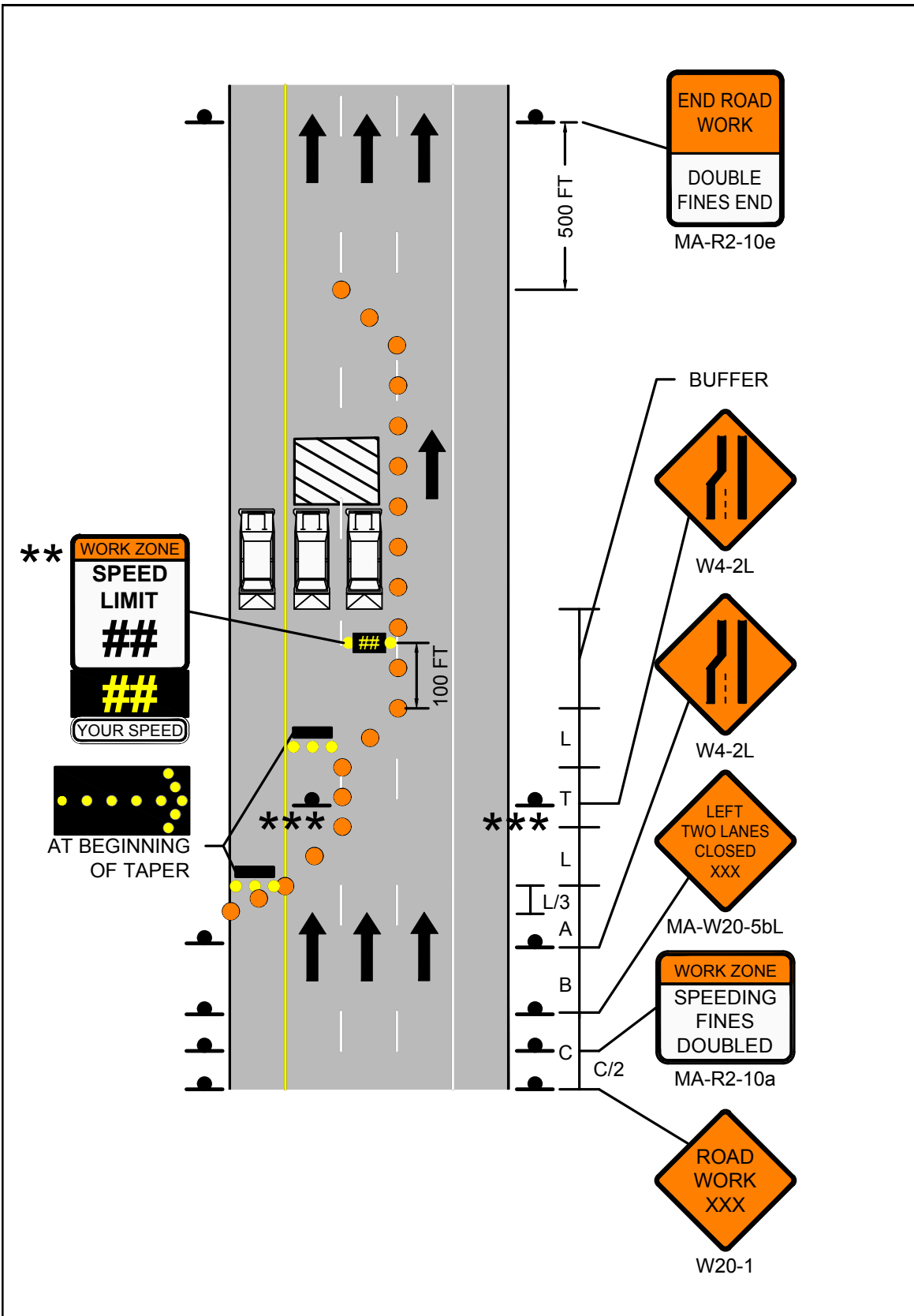
NOTES


1. MA-R2-10a LOCATED AT C/2.
2. ***OPTIONAL AT THE ENGINEER'S DISCRETION.
3. ***THIS SET OF SIGNS SHALL BE LOCATED AT T/2.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 39</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 16 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE OR LEFT/CENTER LANES CLOSED</p>
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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.

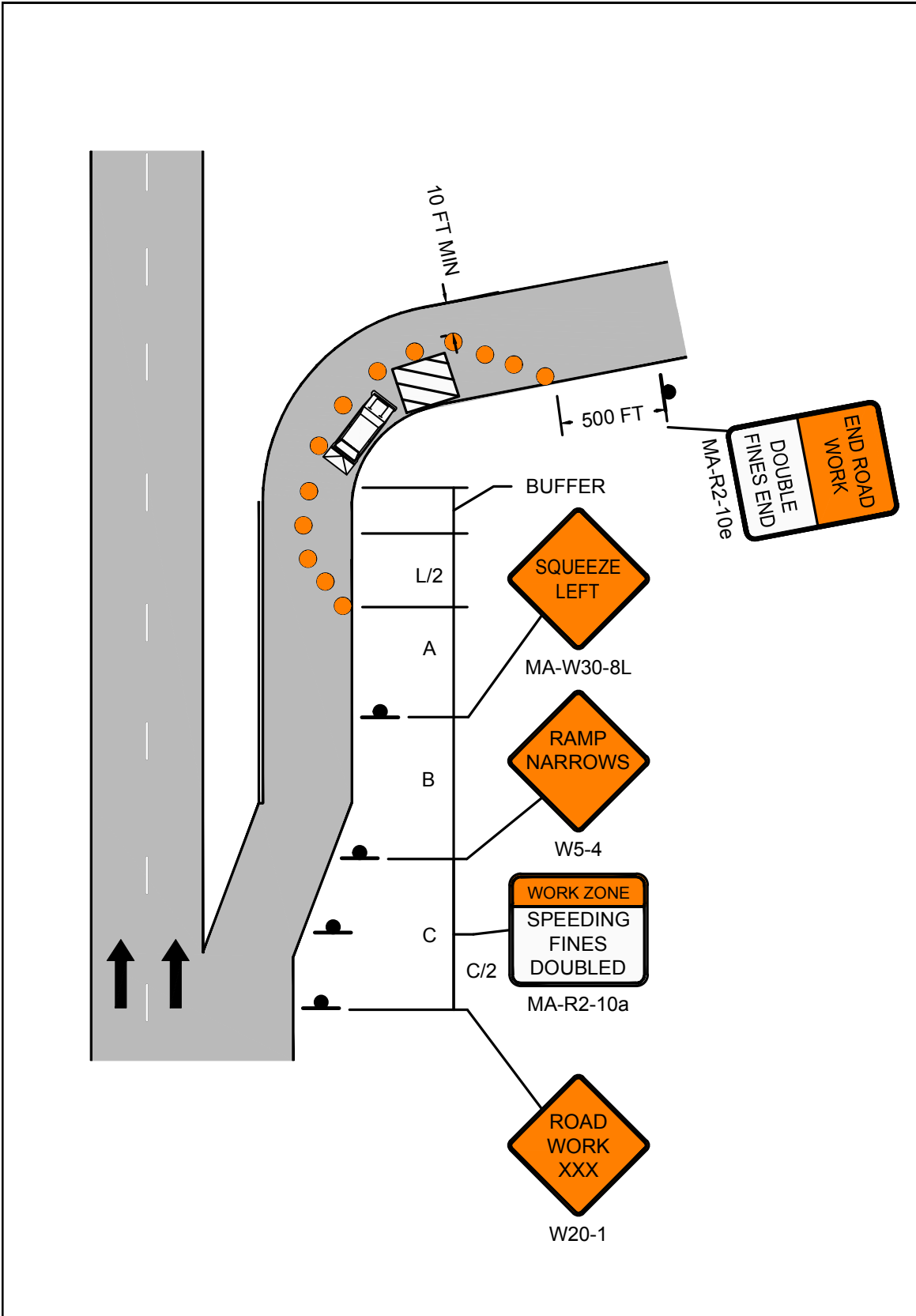
NOTES


1. MA-R2-10a LOCATED AT C/2.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>PAGE 41</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 17 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY RIGHT SIDE OF OFF RAMP CLOSED</p>
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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.

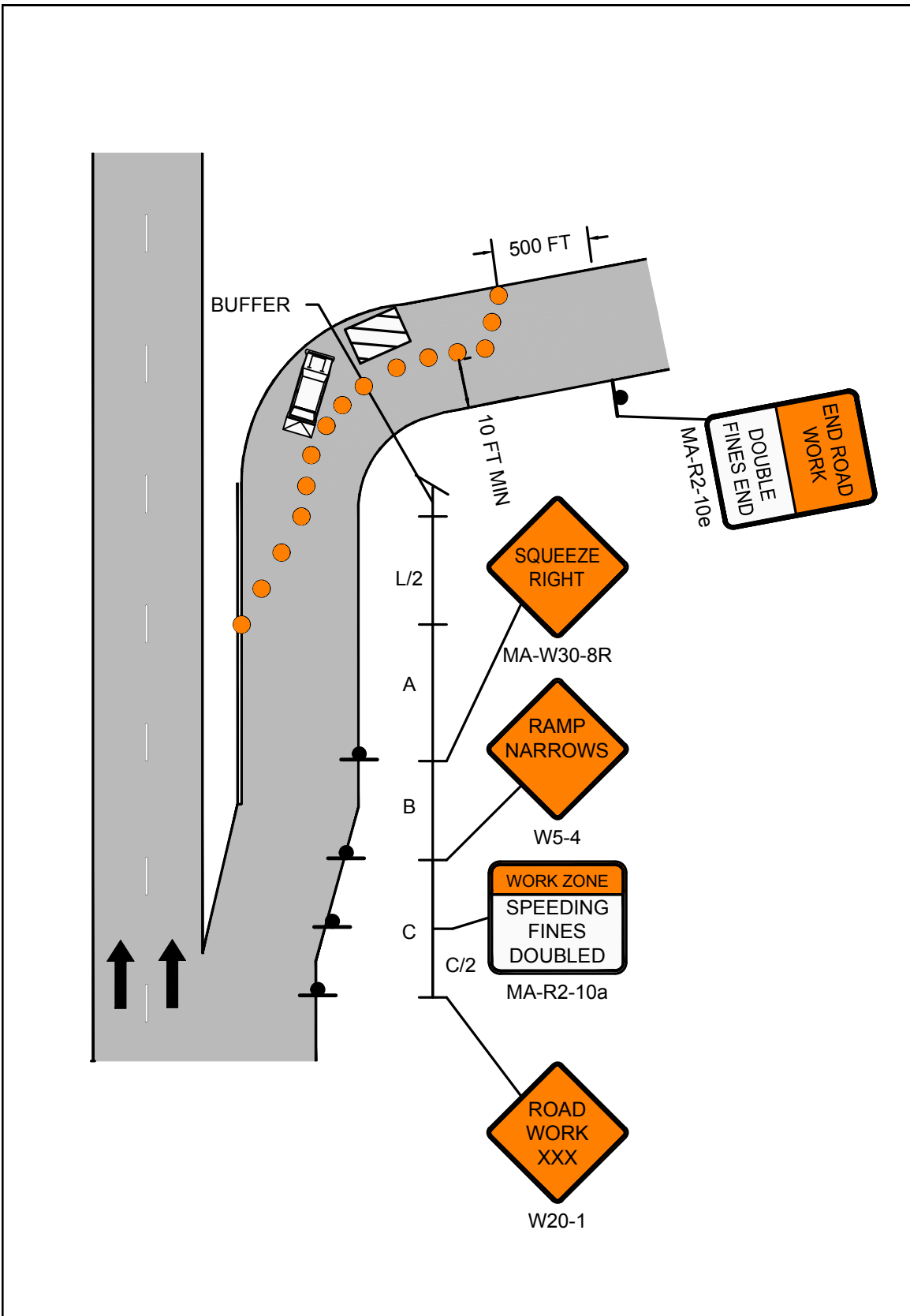
NOTES


1. MA-R2-10a LOCATED AT C/2.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 18 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY LEFT SIDE OF OFF RAMP CLOSED PAGE 43</p>
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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

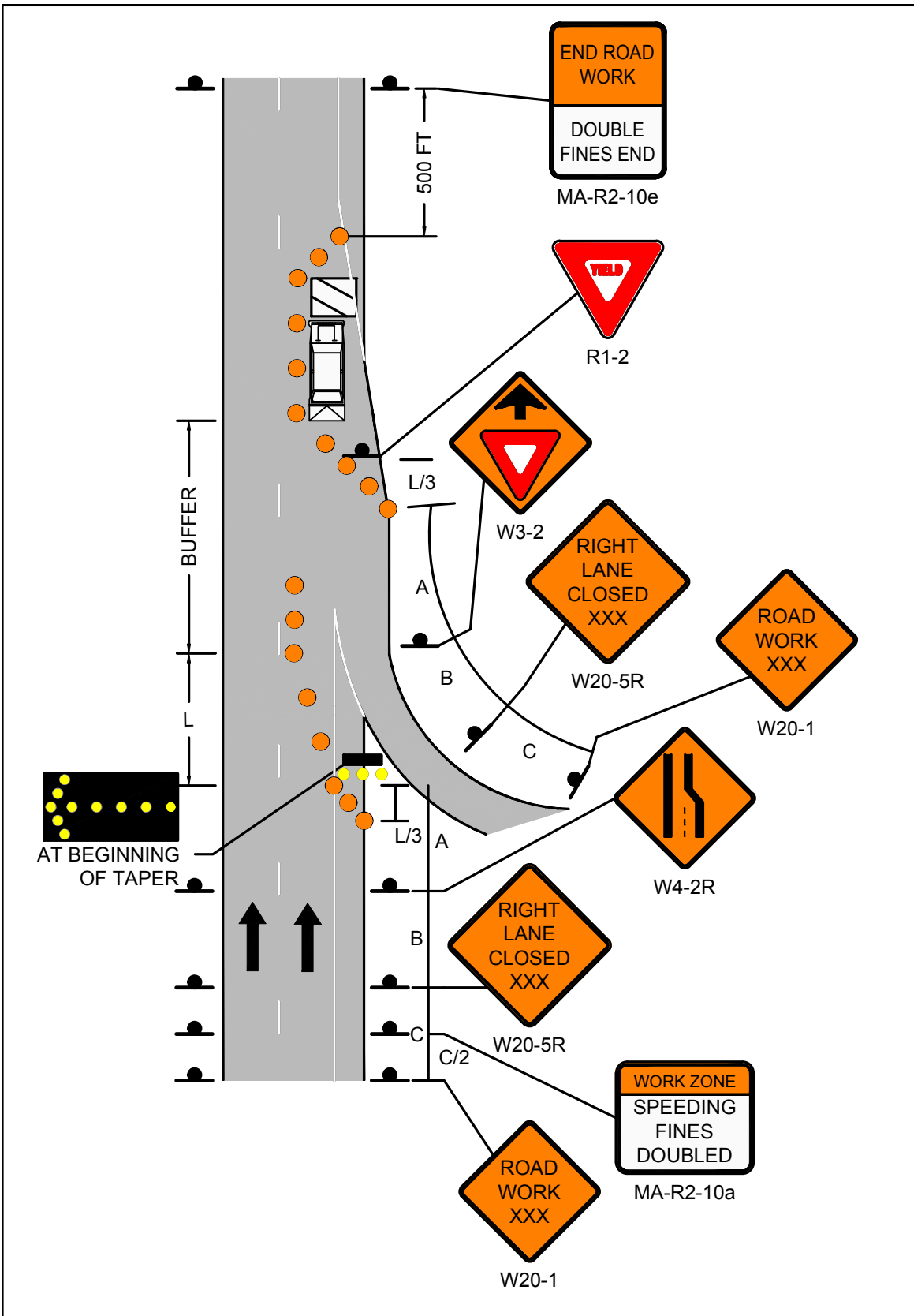
NOTES


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



 <p>PAGE 45</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 19 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY ROADWORK BEYOND ON RAMP</p>
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 MASSACHUSETTS DEPARTMENT OF TRANSPORTATION Highway Division PAGE 46	Work Zone Safety Standard Details and Drawings	STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY ROADWORK BEYOND OFF RAMP
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POSTED SPEED LIMIT (MPH)	CHANNELIZATION DEVICES (DRUMS OR CONES)					
	SHOULDER TAPER LENGTH (L/3) (FT)	TRAVEL LANE CLOSURE LENGTH (L) (FT)	TRAVEL LANE SHIFT LENGTH (L/2) (FT)	BUFFER ZONE LENGTH (FT)	DEVICE SPACING (FT)	MIN # OF DEVICES*
25-40	110	320	160	305	20	70
45-55	220	660	330	495	40	55
60-65	260	780	390	645	40	65










* NUMBER OF DEVICES BASED ON 400 FT WORK ZONE.

POSTED SPEED LIMIT (MPH)	SPACING FOR ADVANCE WARNING SIGNS (FT) (A,B,C)
25-40	500 / 500 / 500
45-55	500 / 1000 / 1000
60-65	1000 / 1600 / 2600

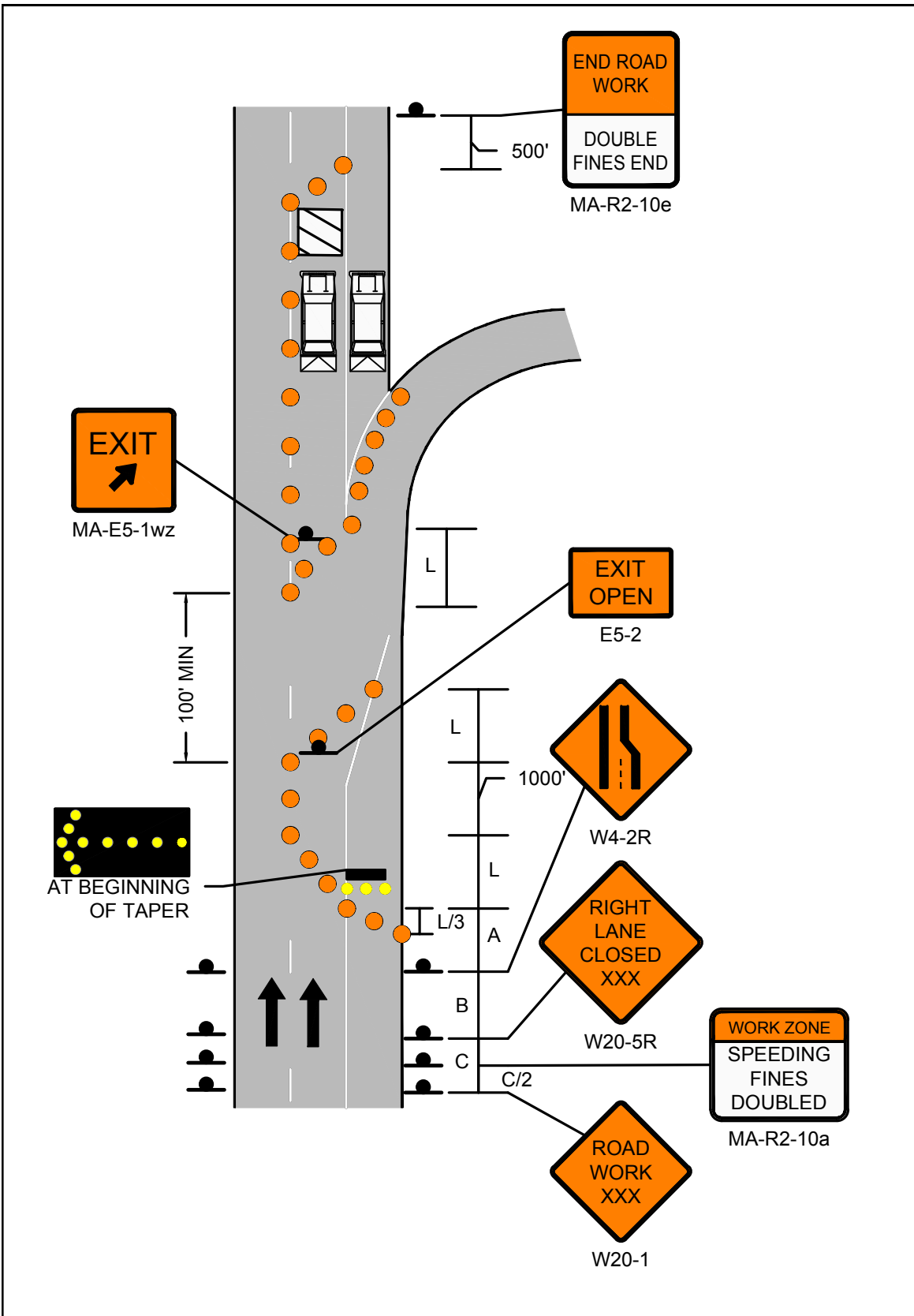
NOTES


1. MA-R2-10a LOCATED AT C/2.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 47</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 20 STATIONARY OPERATIONS MULTILANE DIVIDED ROADWAY ROADWORK BEYOND OFF RAMP</p>
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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

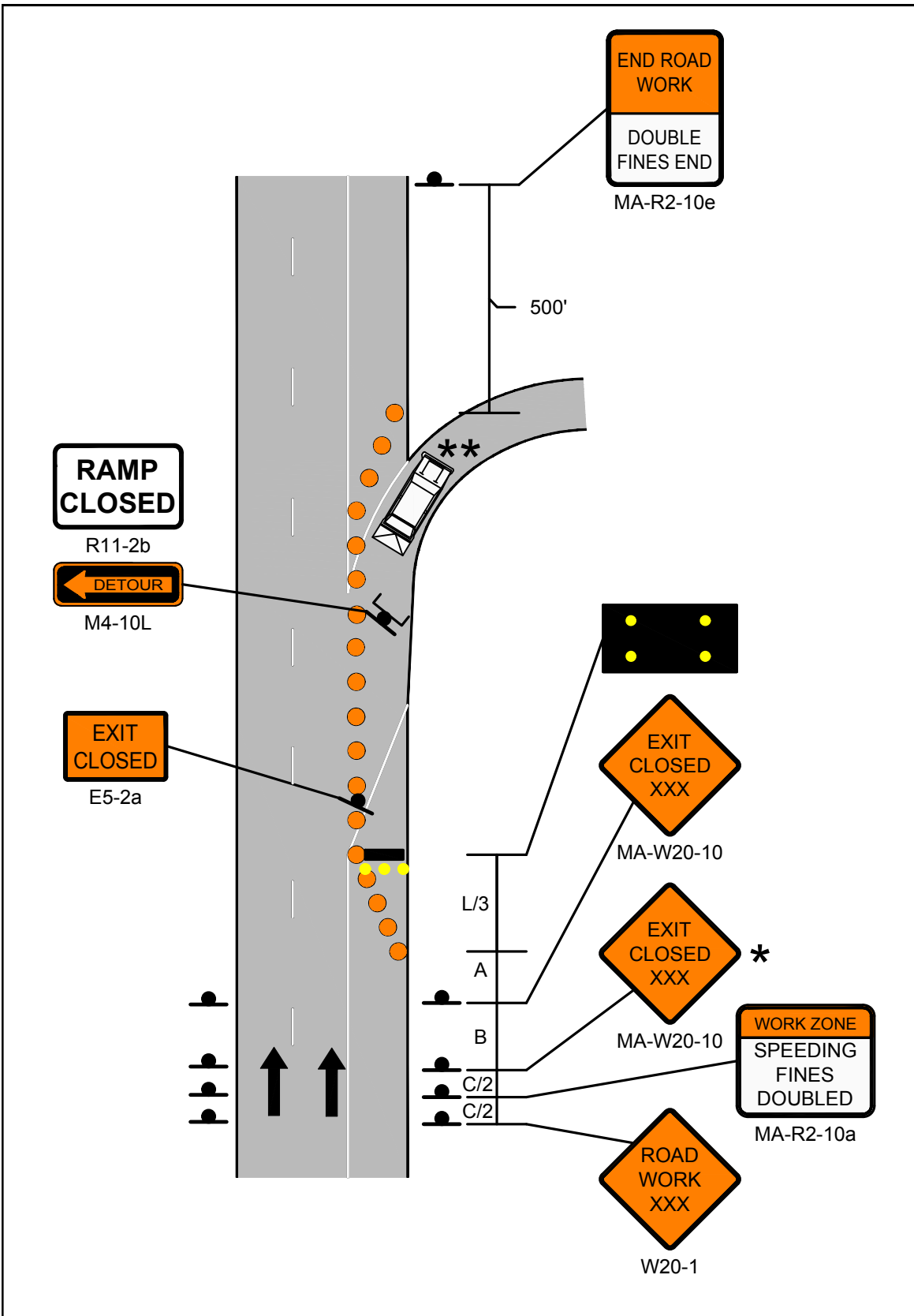
NOTES

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
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE





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

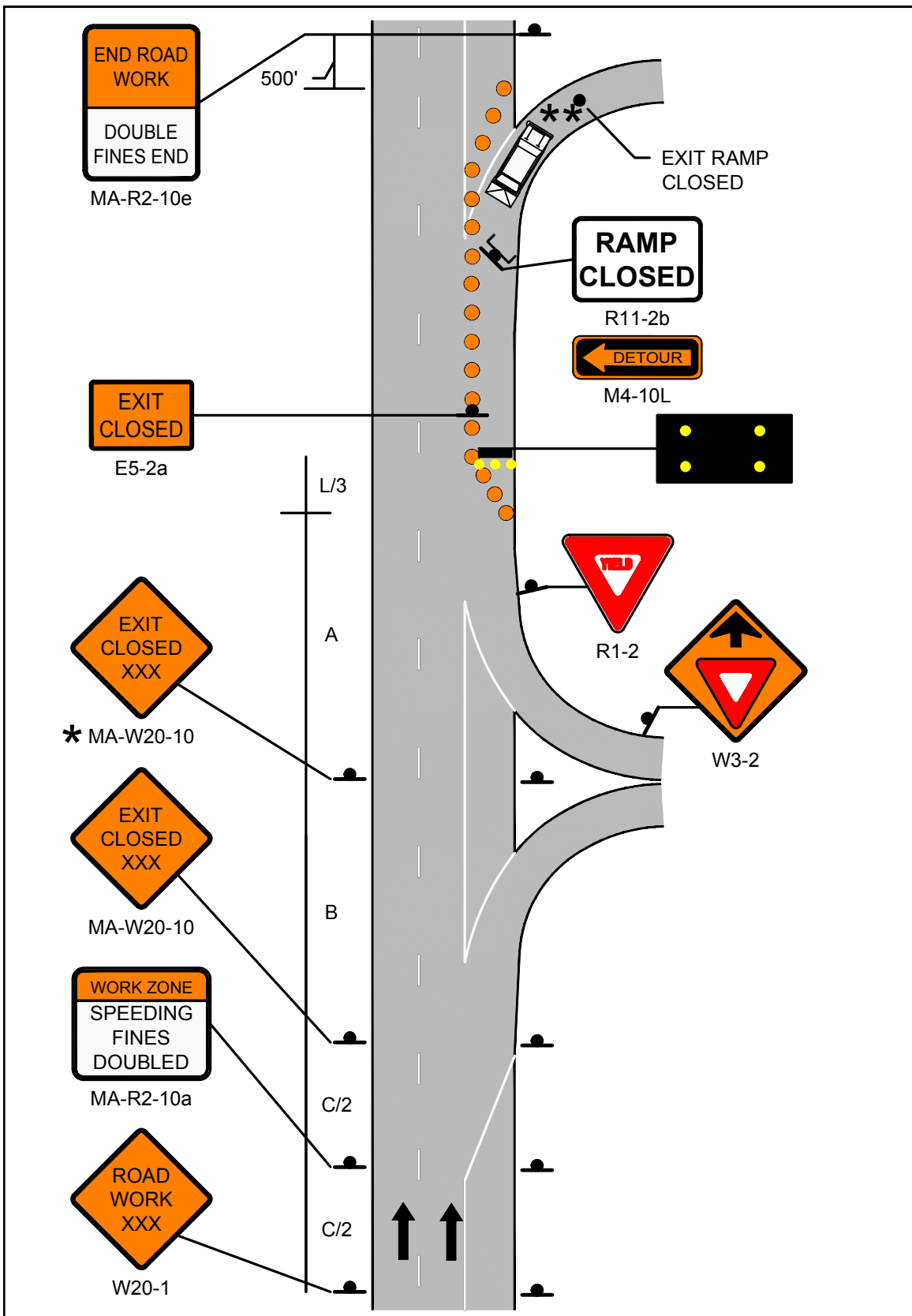
NOTES


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

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE












 <p>PAGE 51</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 22 MULTILANE DIVIDED ROADWAY TYPICAL CLOVERLEAF RAMP CLOSURE</p>
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 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 52</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>MULTILANE DIVIDED ROADWAY TYPICAL RAMP CLOSURE ADVANCE SIGNING</p>
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NOTES

1. IF THE CLOSED RAMP IS LOCATED DOWNSTREAM FROM THE PROPOSED DETOUR ROUTE/RAMP, A PCMS SHALL BE POSITIONED AT A SUFFICIENT DISTANCE IN ADVANCE OF THE DETOUR ROUTE/RAMP AND SHOULD STATE WHICH RAMP IS CLOSED AND WHICH SHALL BE USED FOR THE DETOUR.
2. IF THE CLOSED RAMP IS LOCATED UPSTREAM FROM THE PROPOSED DETOUR ROUTE/RAMP, A PCMS SHALL BE POSITIONED PRIOR TO THE CLOSED RAMP AND SHOULD STATE WHICH RAMP IS CLOSED AND WHICH SHALL BE USED FOR THE DETOUR.
3. A SUFFICIENT NUMBER OF DETOUR SIGNS (M4-9 SERIES) SHOULD BE DEPLOYED TO PROPERLY DIRECT DETOURED TRAFFIC. SIGN SPACING SHALL BE AT THE DIRECTION OF THE ENGINEER.

LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE

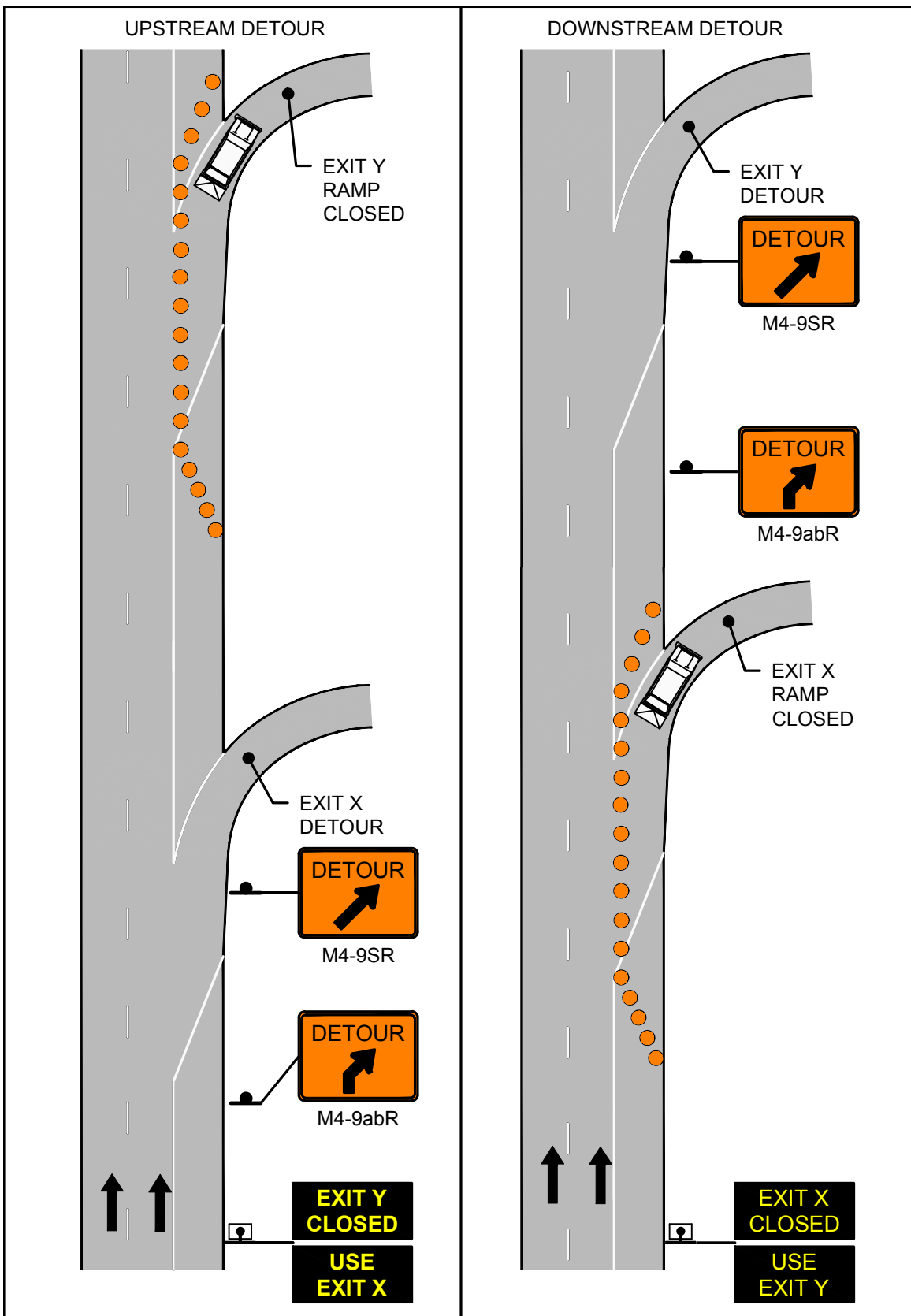


FIGURE 23
MULTILANE DIVIDED ROADWAY
TYPICAL RAMP CLOSURE
ADVANCE SIGNING



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

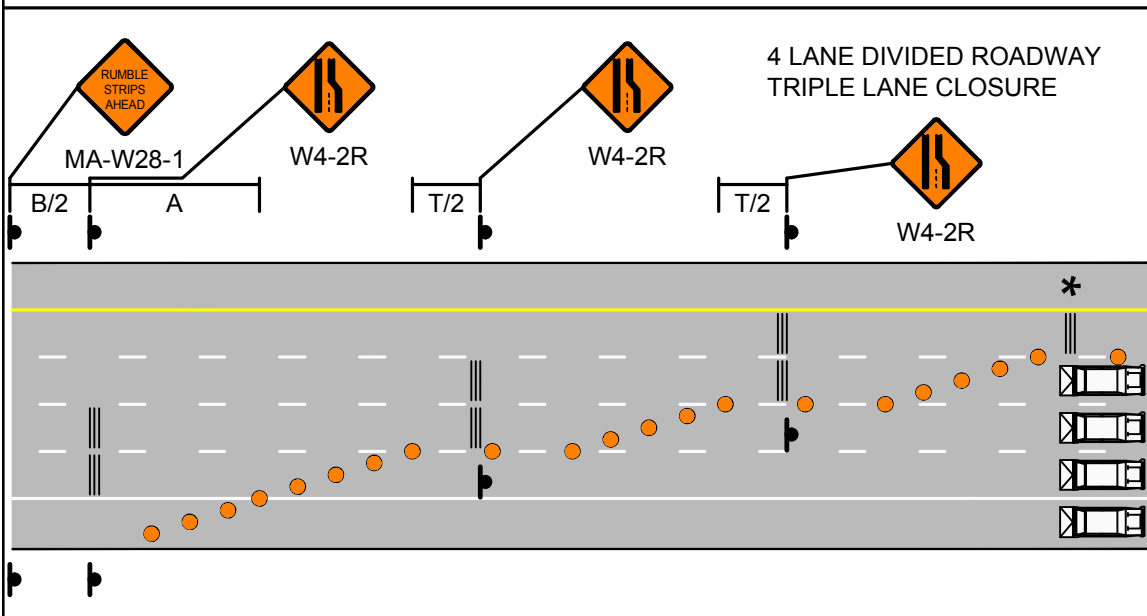
NOTES

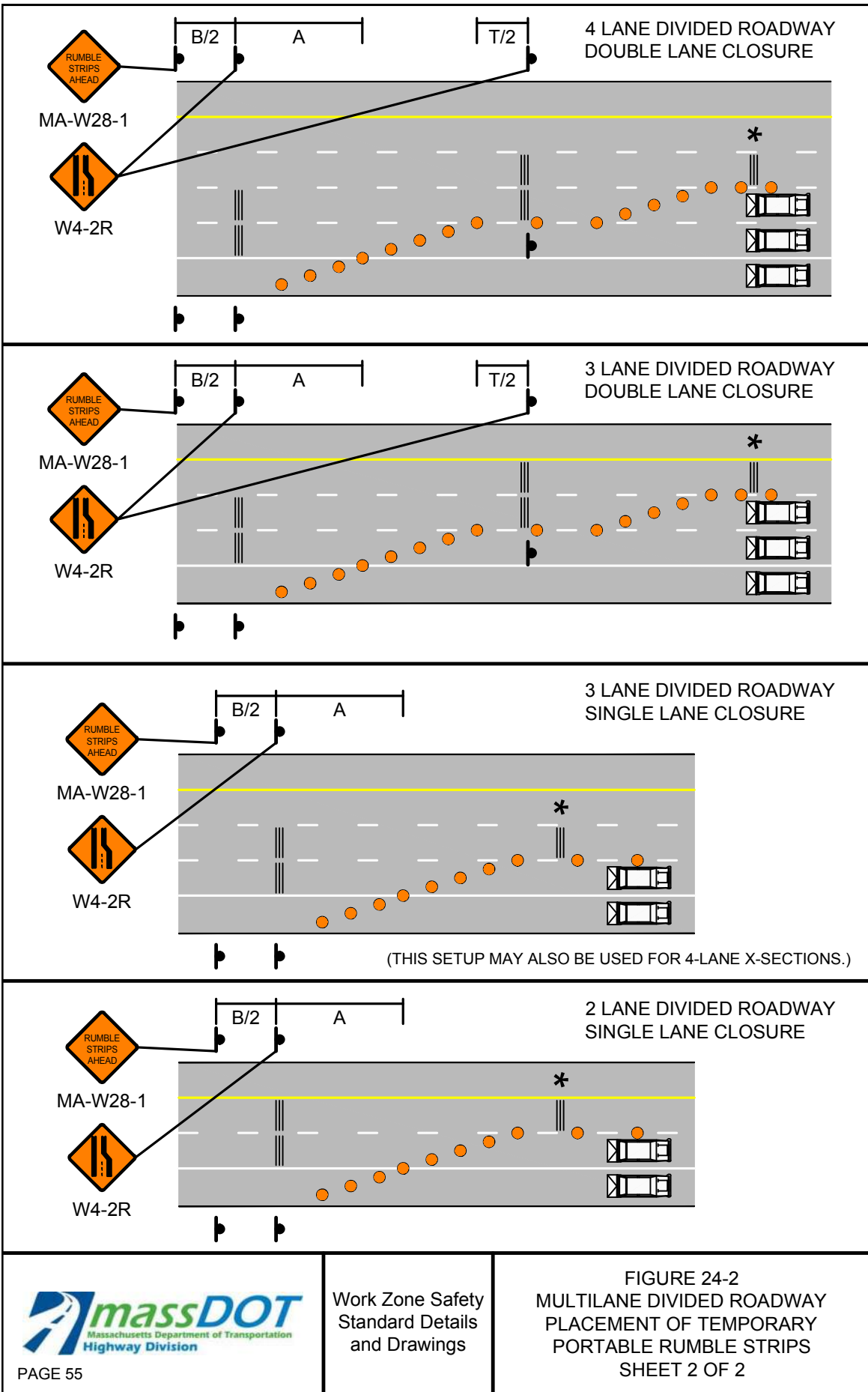
1. THE INTENTION OF THESE DETAILS IS ONLY TO DEPICT THE PLACEMENT OF TEMPORARY PORTABLE RUMBLE STRIPS (TPRS) IN RELATIONSHIP TO THE TAPER AND THE BUFFER OF A SINGLE- OR MULTI-LANE CLOSURE. THE DEPICTION OF THE NUMBER AND SPACING OF ALL OTHER TRAFFIC CONTROL DEVICES IS NOT TO SCALE. REFER TO OTHER DETAILS 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

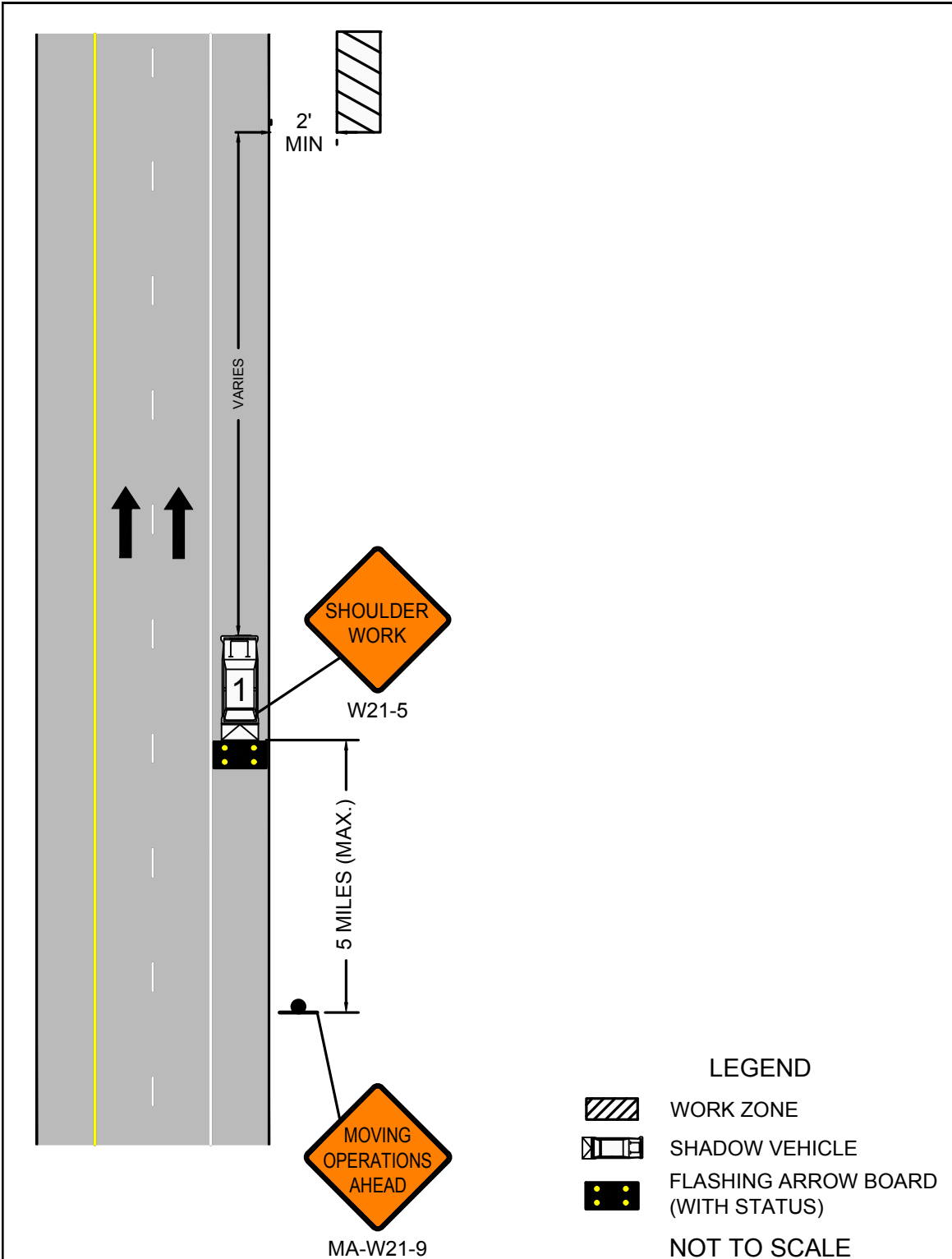




 <p>PAGE 56</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>NOTES FOR MOBILE OPERATIONS</p>
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Notes for Mobile Operations

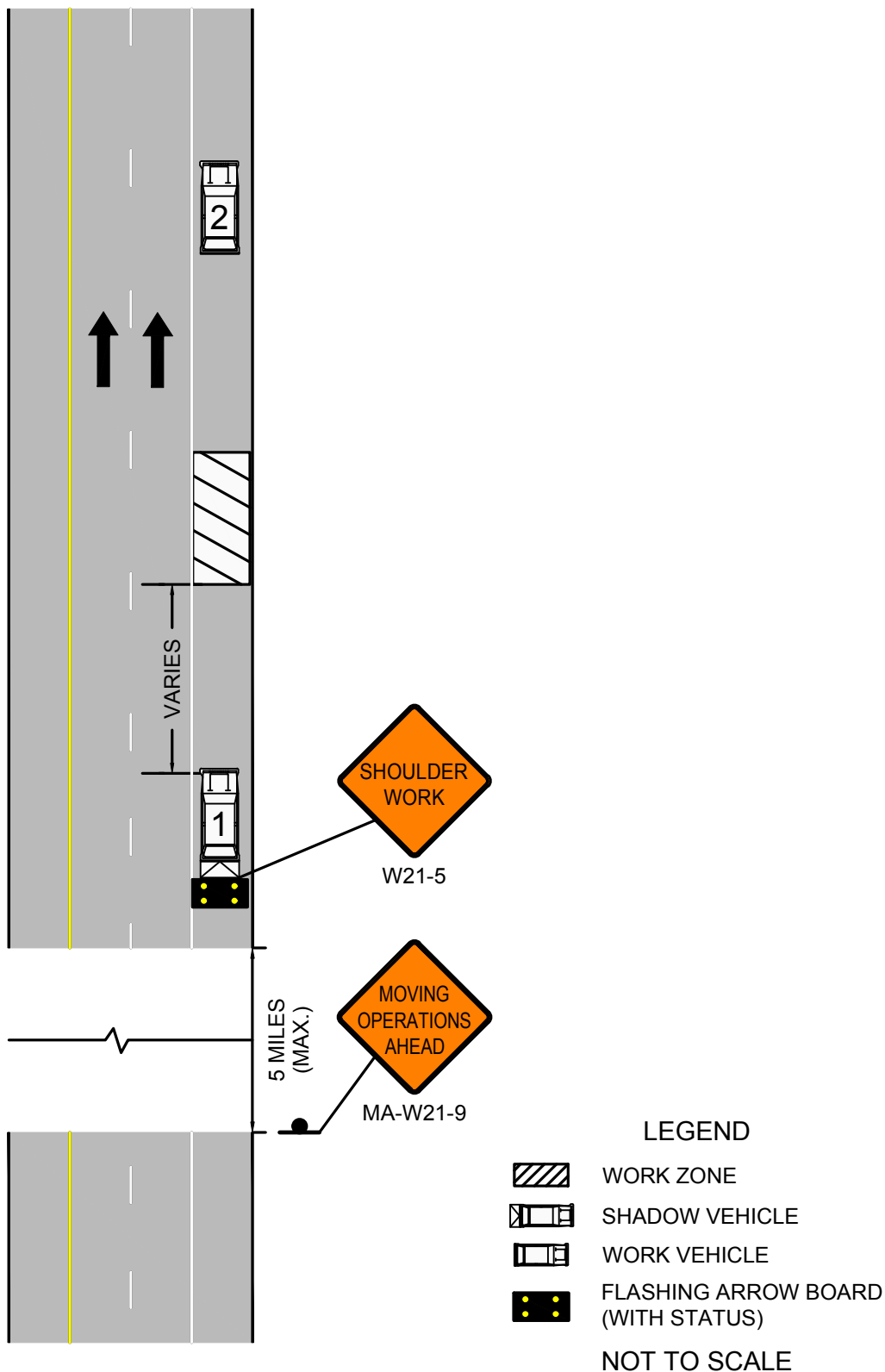
- Unless otherwise stated, these notes shall apply to all Mobile Operation setups.
 - Additional, setup-specific notes may be found on individual sheets.
1. The Supervisor shall travel the designated roadway prior to scheduling the work to ensure that sufficient and appropriate traffic control devices will be available. Special consideration shall be exercised to ensure that appropriate traffic controls be placed in areas that will have limited visibility of the work areas or any associated traffic queues.
 2. Vehicles used for these operations shall be made highly visible with appropriate equipment such as flashing lights, rotating beacons, flags, signs, flashing arrow boards, and/or portable changeable message signs. Any signs mounted to these vehicles shall not obscure the visibility of other devices.
 3. All vehicles shown may not be required based upon roadway conditions. However, when needed and practical, additional shadow vehicles and equipment to warn and protect motorists and workers should be used. Based upon roadway conditions, the addition of a police detail with cruiser may be used for additional protection or warning for the traveling public.
 4. The distance between the work and shadow vehicle(s) may vary according to the terrain and other factors. Shadow vehicles are used to warn traffic of the operations ahead. Whenever adequate sight distance exists, the shadow vehicle(s) should maintain the minimum appropriate distance and maintain the same speed to prevent non-work related vehicles from entering the work convoy. If this formation cannot be maintained then additional traffic control devices should be deployed in advance of any vertical or horizontal curves that may restrict the sight distance of an oncoming vehicle to either the work vehicle or associated traffic queue.
 5. All shadow vehicles shall be equipped with a truck or trailer mounted attenuator (TMA) and a flashing arrow board.
 6. Signs should be covered or turned from view when work is not in progress.
 7. Portable changeable message signs may be used in lieu of MA-W21-9 signs and any signs mounted directly to a shadow vehicle.



NOTES

1. IF THE WORK AREA IS SUFFICIENTLY AWAY FROM THE EDGE OF ROADWAY (20' MINIMUM) THEN SIGNS AND VEHICLES MAY NOT BE REQUIRED.





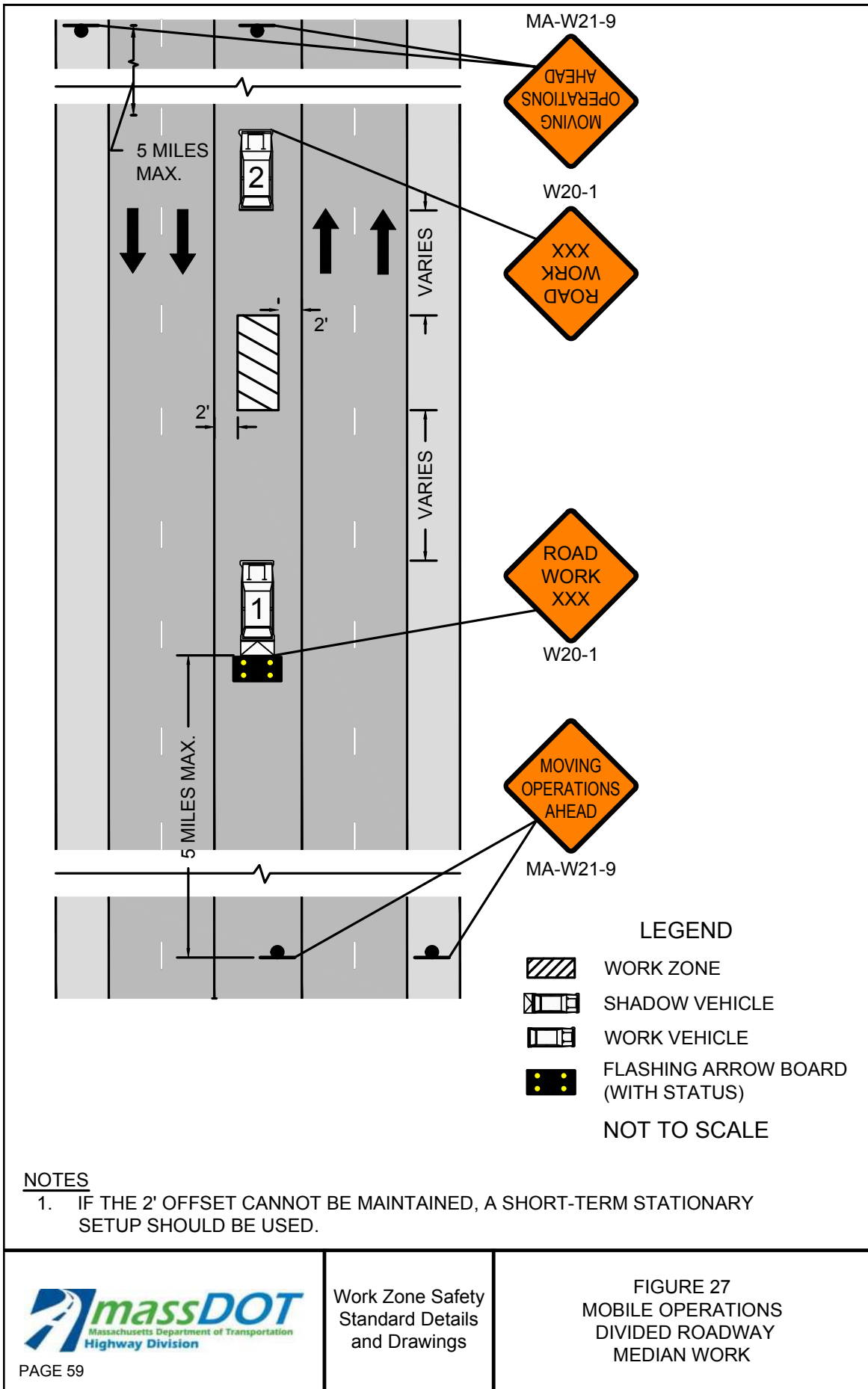
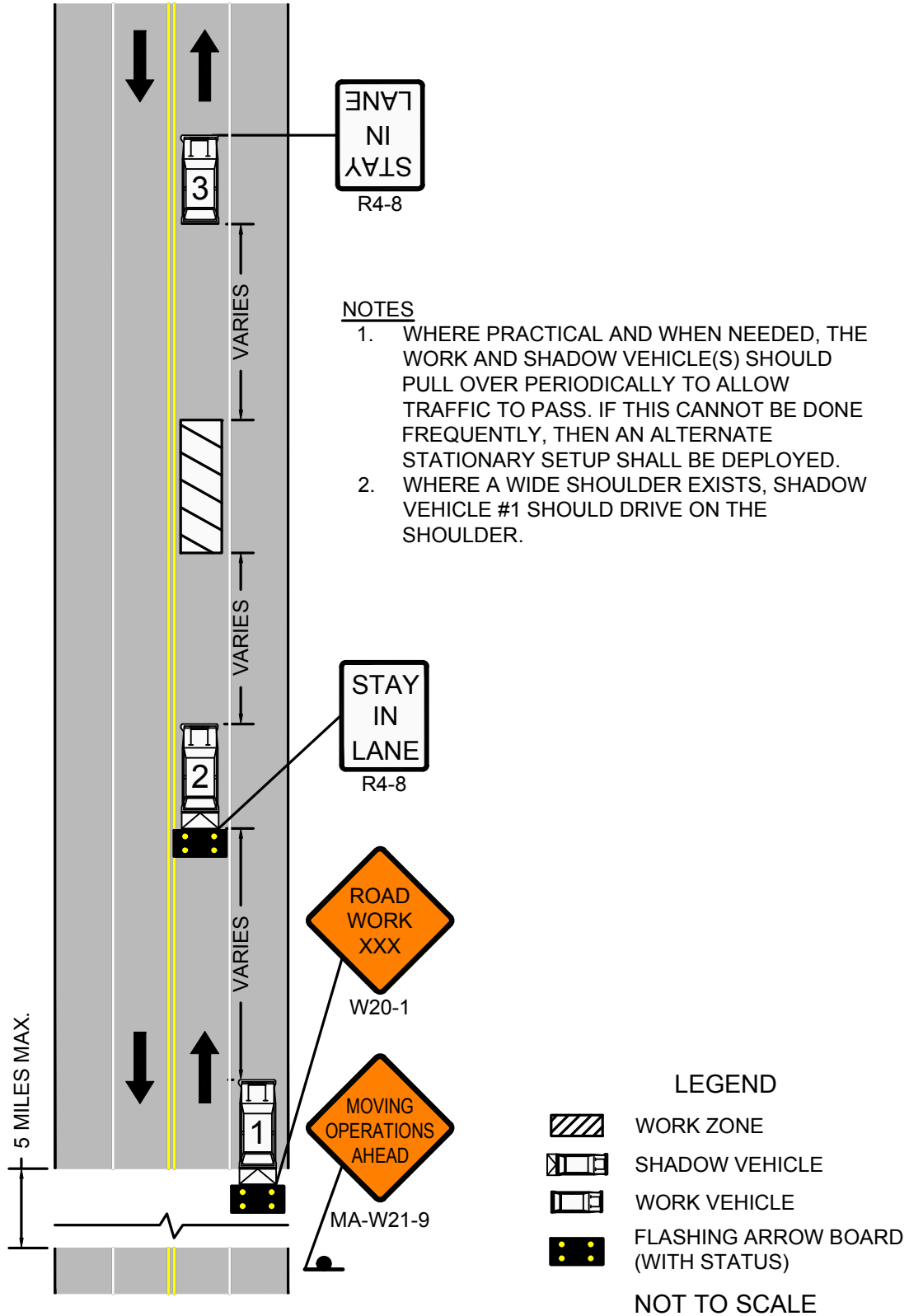




FIGURE 28
MOBILE OPERATIONS
UNDIVIDED TWO LANE ROADWAY
HALF OF ROADWAY CLOSED



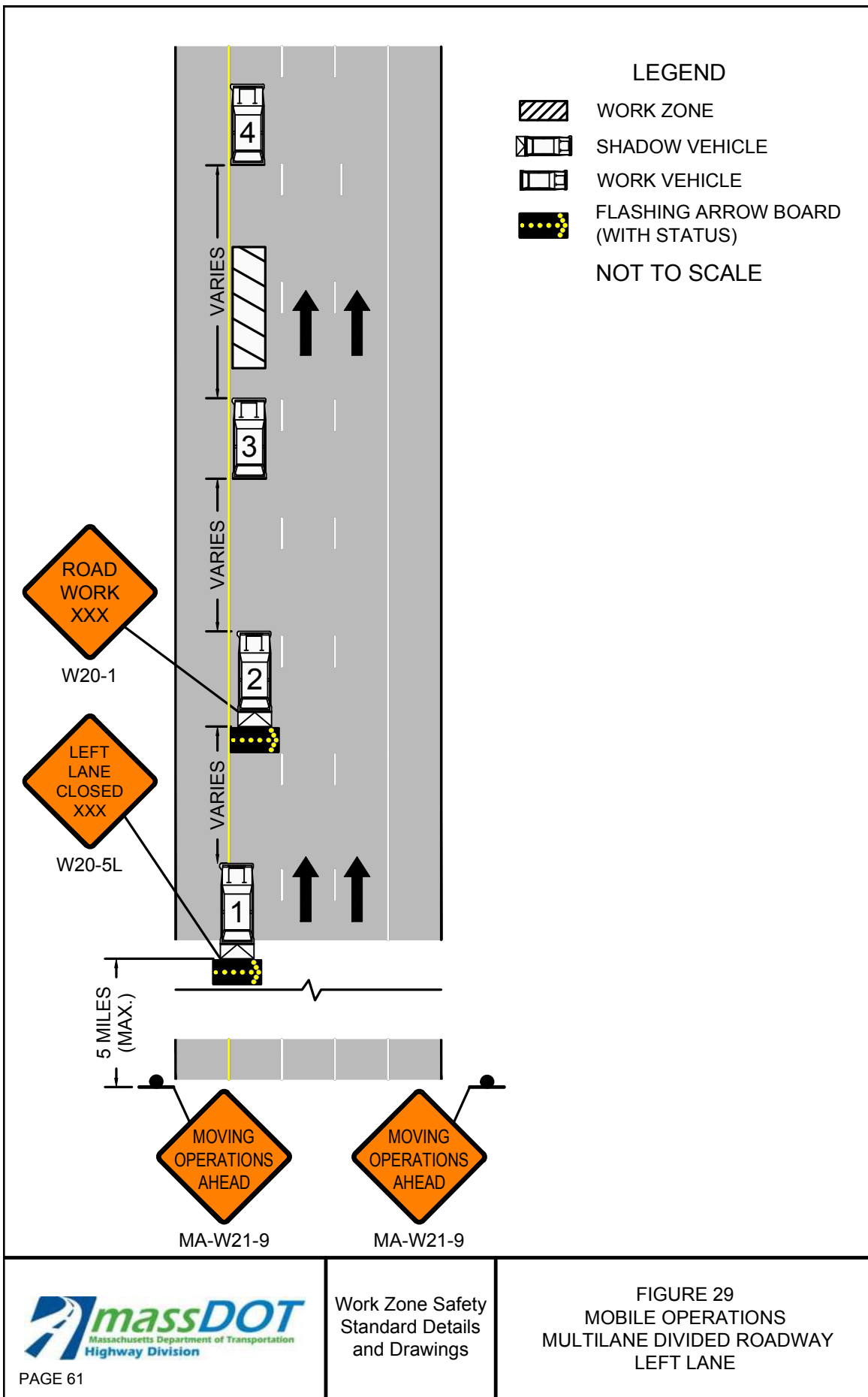
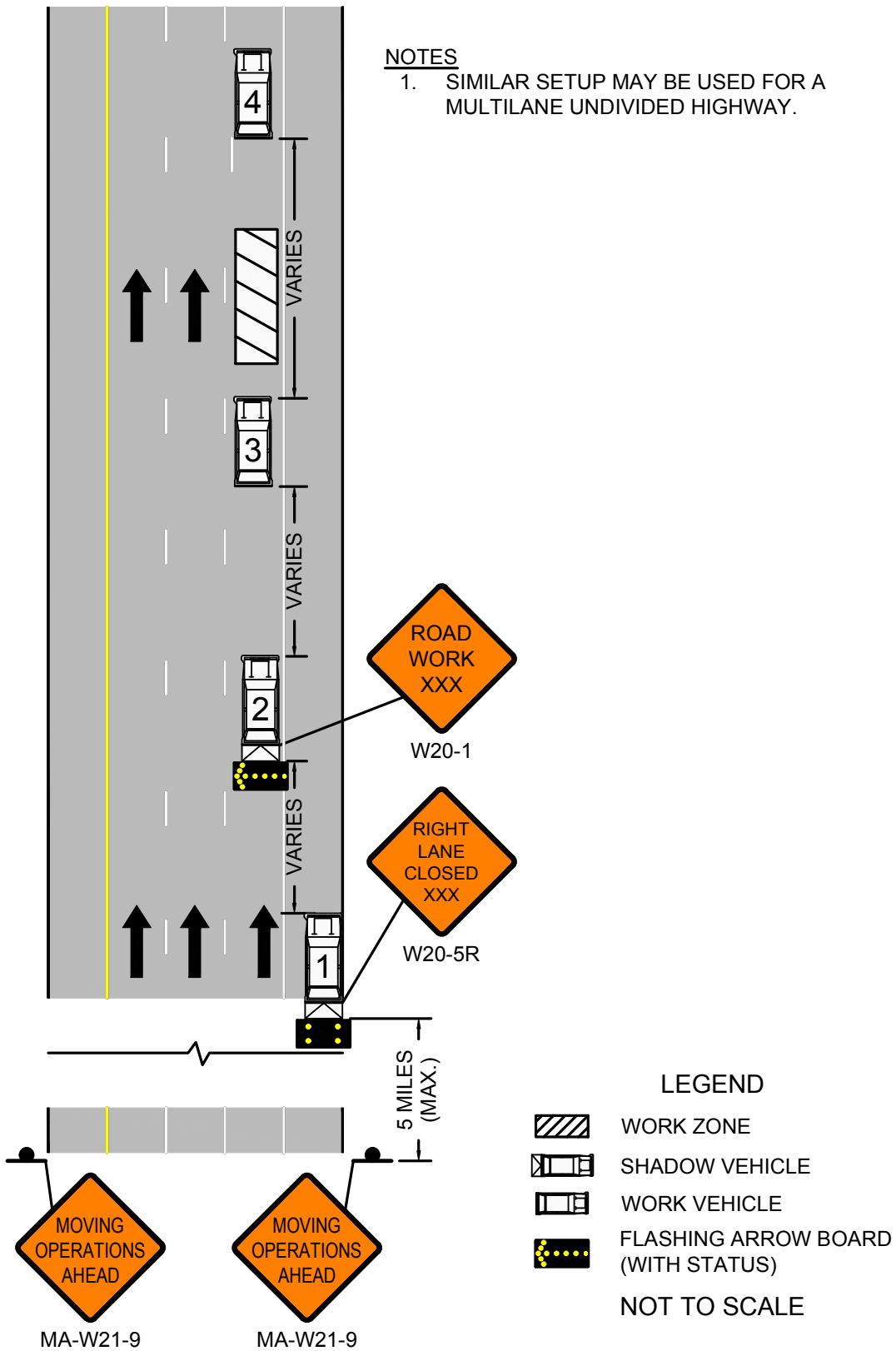
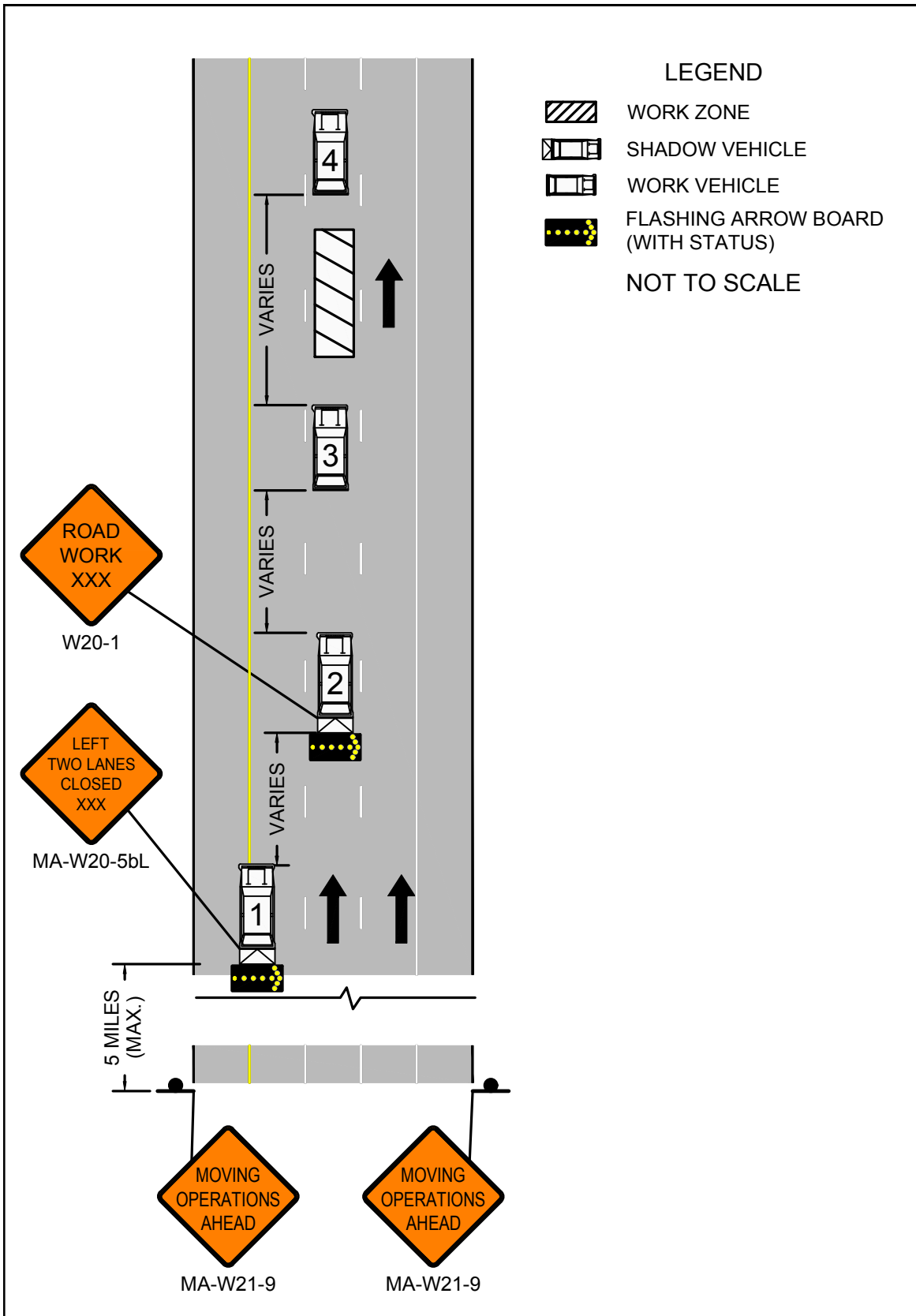



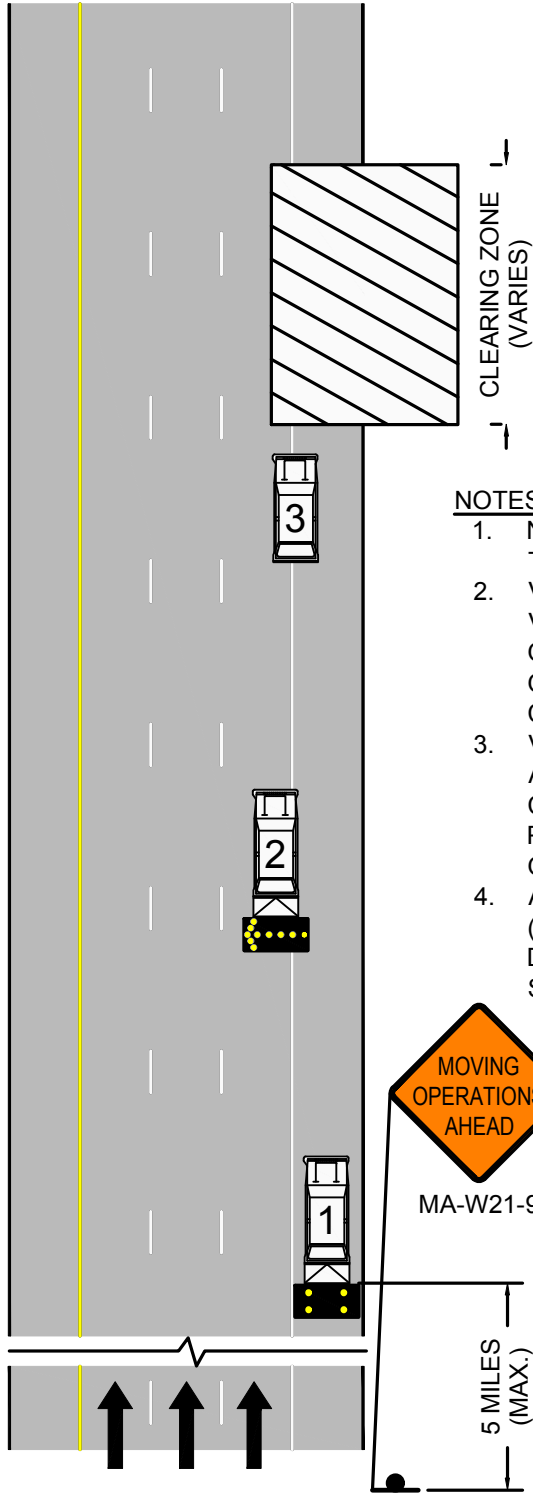


FIGURE 30
MOBILE OPERATIONS
MULTILANE DIVIDED ROADWAY
RIGHT LANE





 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 63</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 31 MOBILE OPERATIONS MULTILANE DIVIDED ROADWAY CENTER LANE</p>
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NOTES

1. NO OTHER NOTES ARE APPLICABLE TO THIS DETAIL.
2. VEHICLE #3 IS A SNOW/DEBRIS REMOVAL VEHICLE AND SHALL ALWAYS BE AWARE OF THE SURROUNDINGS. MORE THAN ONE VEHICLE MAY BE USED IN THE CLEARING ZONE.
3. VEHICLE #1 SHOULD BE EQUIPPED WITH A PCMS, A TMA, AND STAY IN VISUAL CONTACT WITH VEHICLE #3 WHILE PROVIDING AMPLE WARNING TO ONCOMING TRAFFIC.
4. A POLICE DETAIL WITH BLUE LIGHTS (OPTIONAL) SHALL REMAIN DOWNSTREAM OF VEHICLE #1 IN THE SHOULDER.

LEGEND

- WORK ZONE
- SHADOW VEHICLE
- WORK VEHICLE
- FLASHING ARROW BOARD (WITH STATUS)

NOT TO SCALE

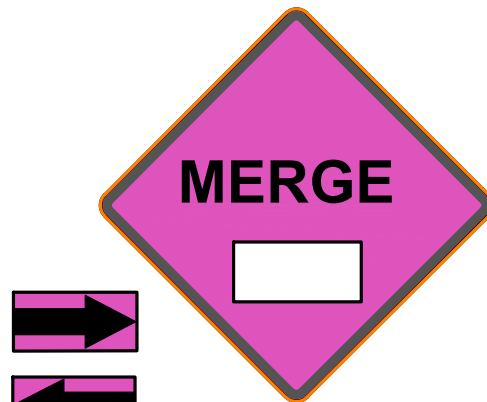
Notes for Traffic Emergency or Incident Operations

- The goal is to increase awareness of during traffic emergencies or incidents.
- These signs are to be used to differentiate from the traditional construction work zone and an emergency or incident.
- Upon arrival MassDOT First Responders shall assess the magnitude of the scene to determine if the incident is likely to last an hour or more in duration which would trigger the requirement to use these signs.
- Place the “Emergency Ahead” sign on the same side of the road as the incident, if possible, for up to an hour. Emergency response signs should be put up for all incidents and emergencies as soon as possible.
- Place the emergency sign 500 to 1000 feet before the first channelization devices.
- As an incident evolves this sign would be used as a secondary sign with all other emergency controls put in place.
- Only use “MERGE” signs where applicable (Not on 2 lane roads).
- Use MERGE signs on Multi-lane Roads to move traffic away from the incident and keep them in a safe lane.
- Place the MERGE sign about 500 feet before the closure.
- If additional signs are available, they should be placed accordingly as a sign informing people coming in the other direction or on the opposite side of the roadway.
- Use 12 emergency cones spaced 40 to 80 feet apart to form a taper and protect the scene.
- Sequential flashing lights/flares may be used in lieu of or to supplement cones.
- During a major incident that will last for a long duration, the EMERGENCY AHEAD sign should be moved back before an intersecting road or ramp to alert travelers and give them an option of using an alternate route. (Be sure all other devices are in place before moving this sign).

Standard Emergency Signs (36"x36" or 48"x48")



MA-W20-9






MA-W4-2aR/L



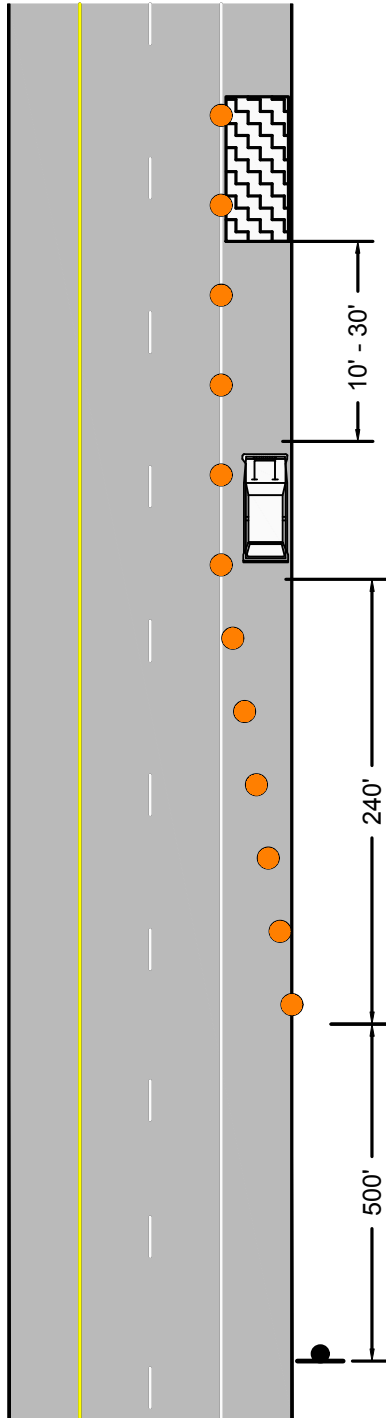


FIGURE 33
EMERGENCY RESPONSE
ANY ROADWAY
SHOULDER ENCROACHMENT

LEGEND

-  EMERGENCY AREA
-  CHANNELIZATION DEVICE
-  EMERGENCY RESPONSE VEHICLE

NOT TO SCALE



ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. PULL VEHICLE OVER TO THE RIGHT EDGE OF TRAVEL LANE BEFORE STOPPING.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 4 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. TEND TO EMERGENCY/INCIDENT.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.



MA-W20-9

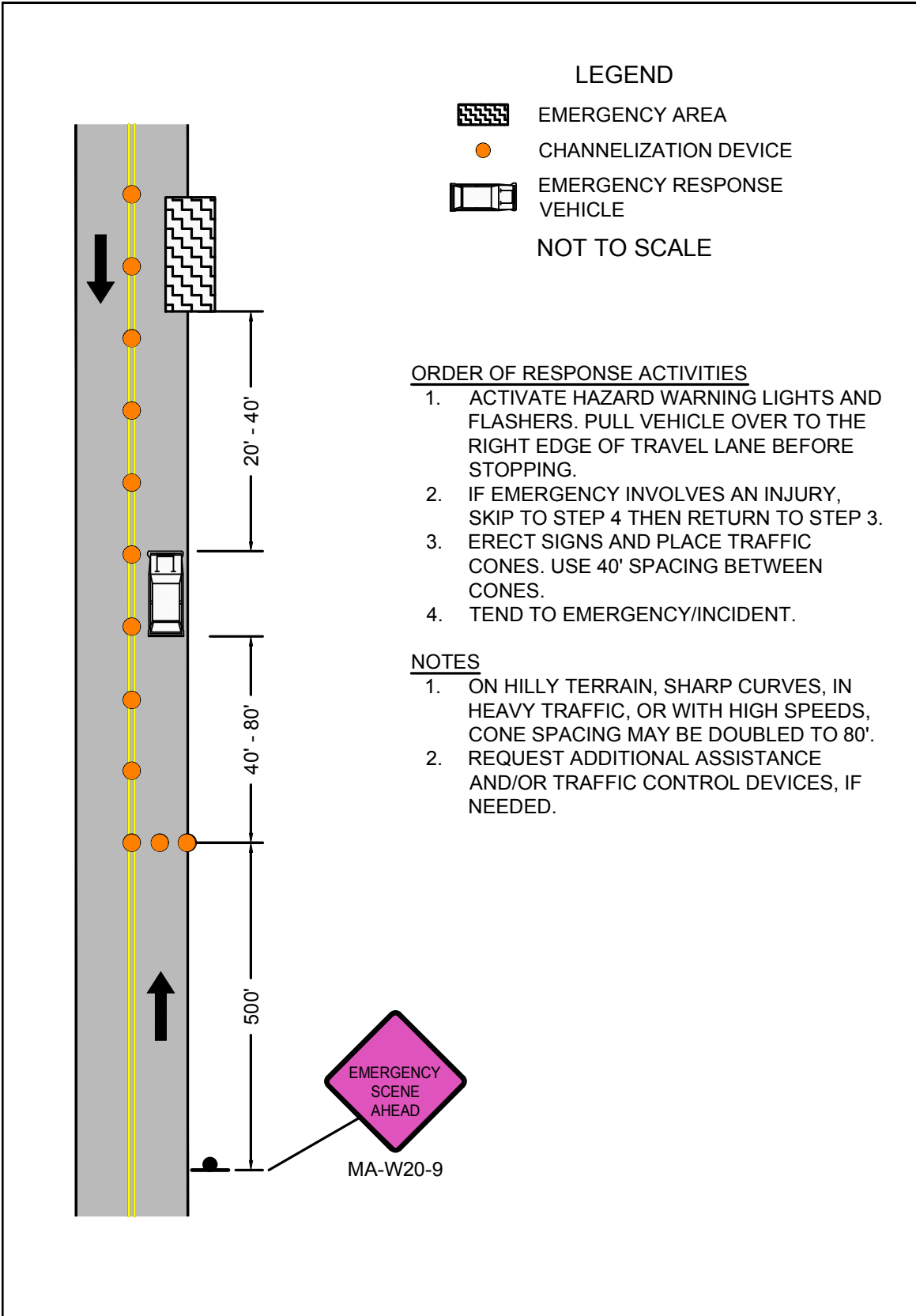





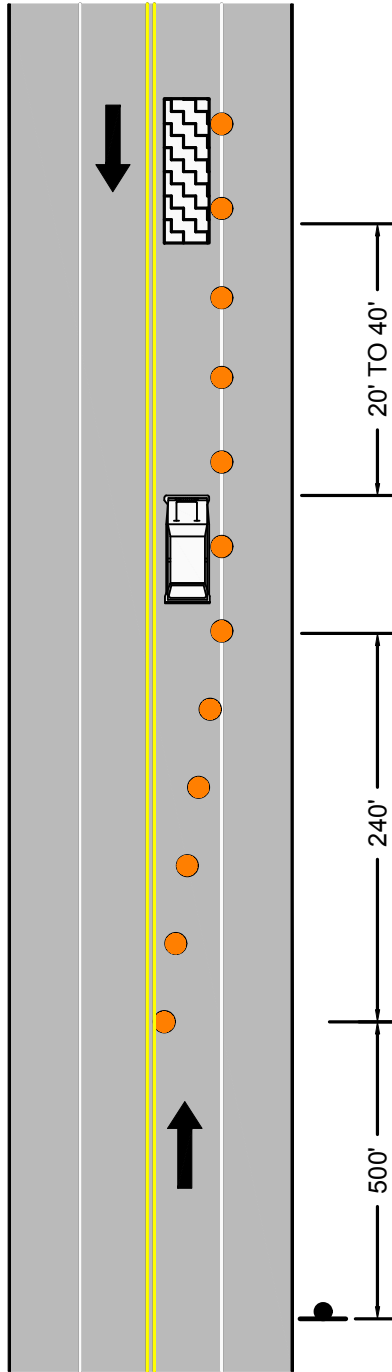


FIGURE 35
EMERGENCY RESPONSE
TWO LANE ROADWAY
TRAVERSABLE SHOULDER
SINGLE LANE ENCROACHMENT

LEGEND

-  EMERGENCY AREA
-  CHANNELIZATION DEVICE
-  EMERGENCY RESPONSE VEHICLE

NOT TO SCALE

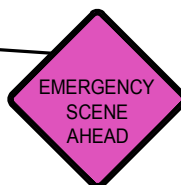


ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. PULL VEHICLE OVER TO THE LEFT EDGE OF TRAVEL LANE BEFORE STOPPING.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 4 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. TEND TO EMERGENCY/INCIDENT.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.



MA-W20-9

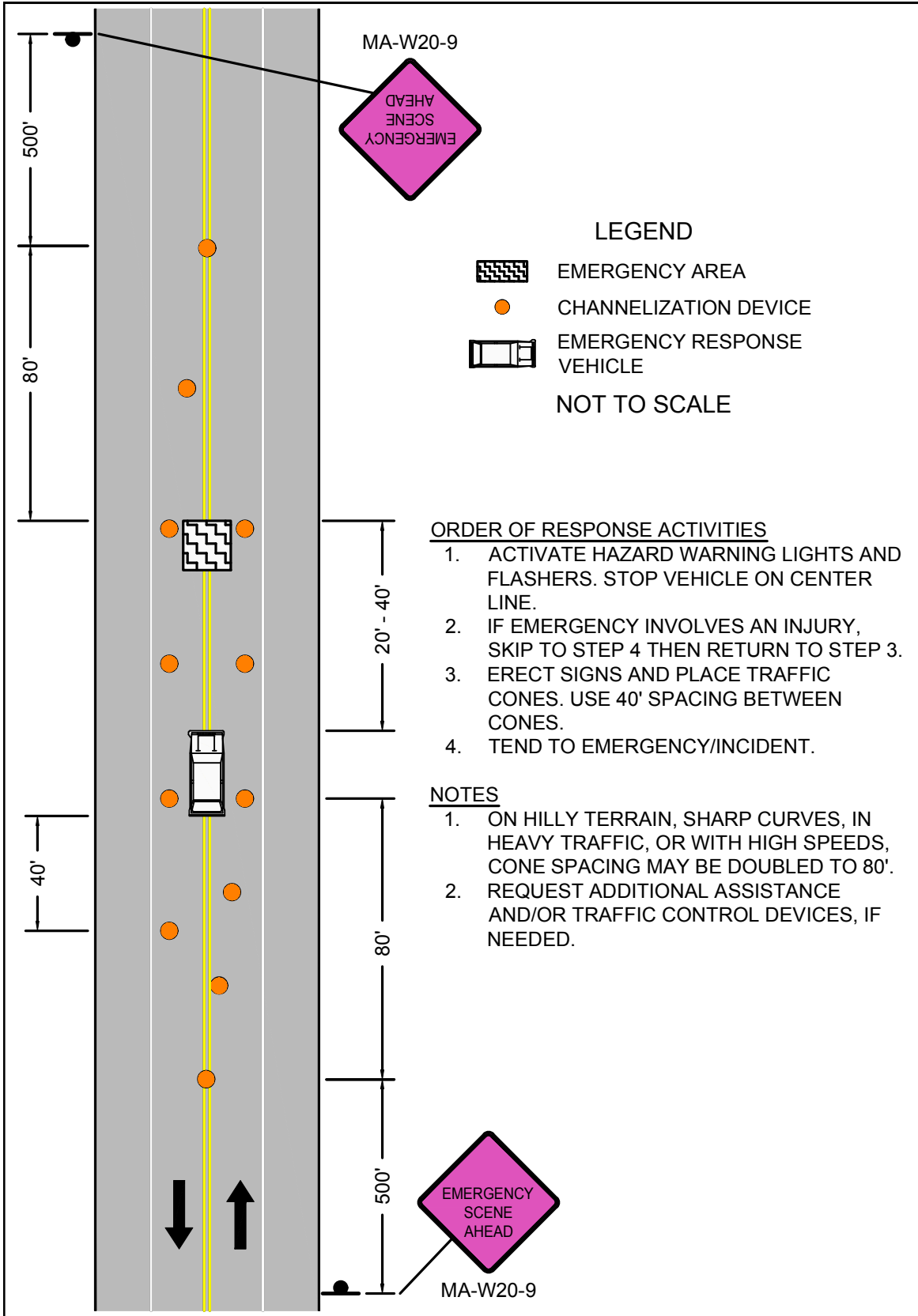
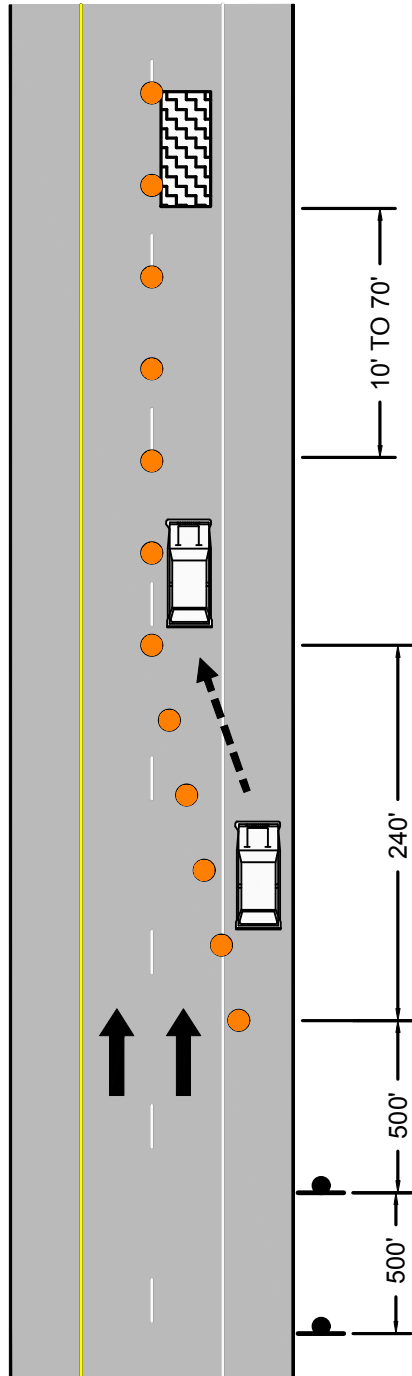








FIGURE 37
EMERGENCY RESPONSE
MULTILANE DIVIDED ROADWAY
RIGHT LANE



LEGEND

-  EMERGENCY AREA
-  CHANNELIZATION DEVICE
-  EMERGENCY RESPONSE VEHICLE
-  RESPONSE VEHICLE MOVEMENT

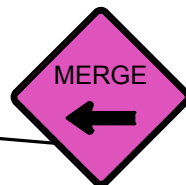
NOT TO SCALE

ORDER OF RESPONSE ACTIVITIES

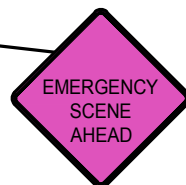
1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. STOP VEHICLE IN BREAKDOWN LANE.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 6 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. MOVE RESPONSE VEHICLE BEHIND EMERGENCY.
5. PLACE ADDITIONAL CONES.
6. TEND TO EMERGENCY.

NOTES

1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.



MA-W4-2aL



MA-W20-9

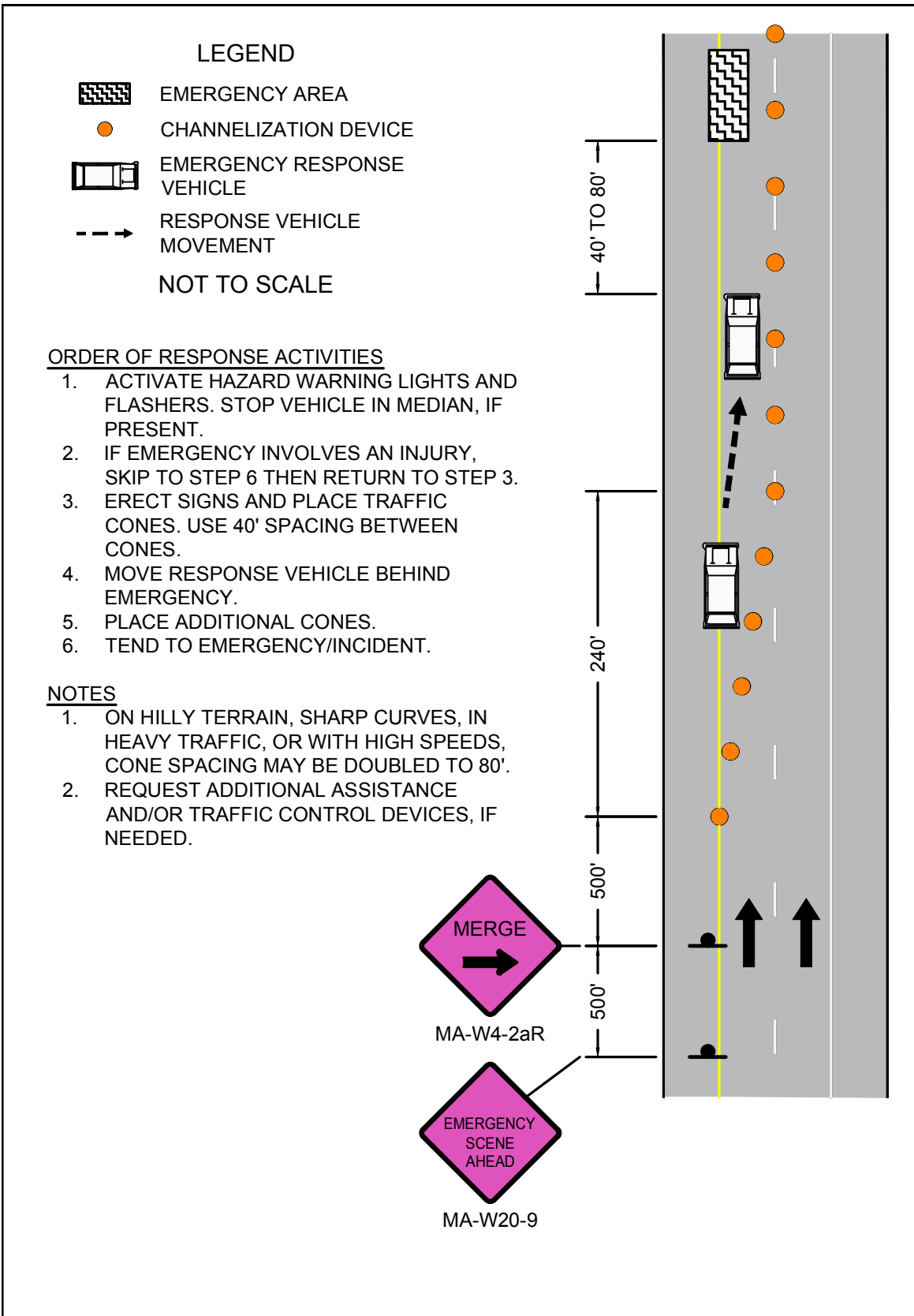
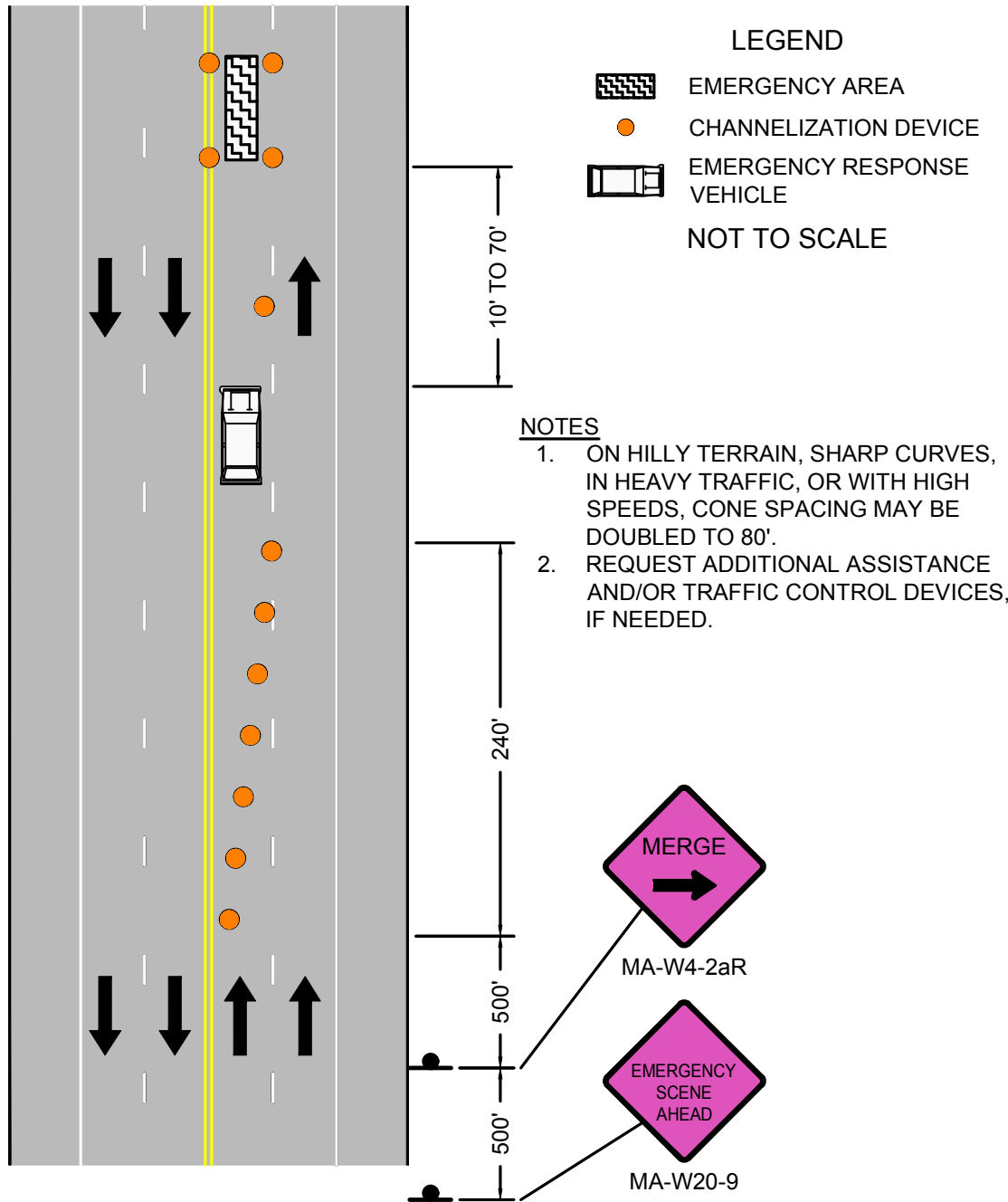


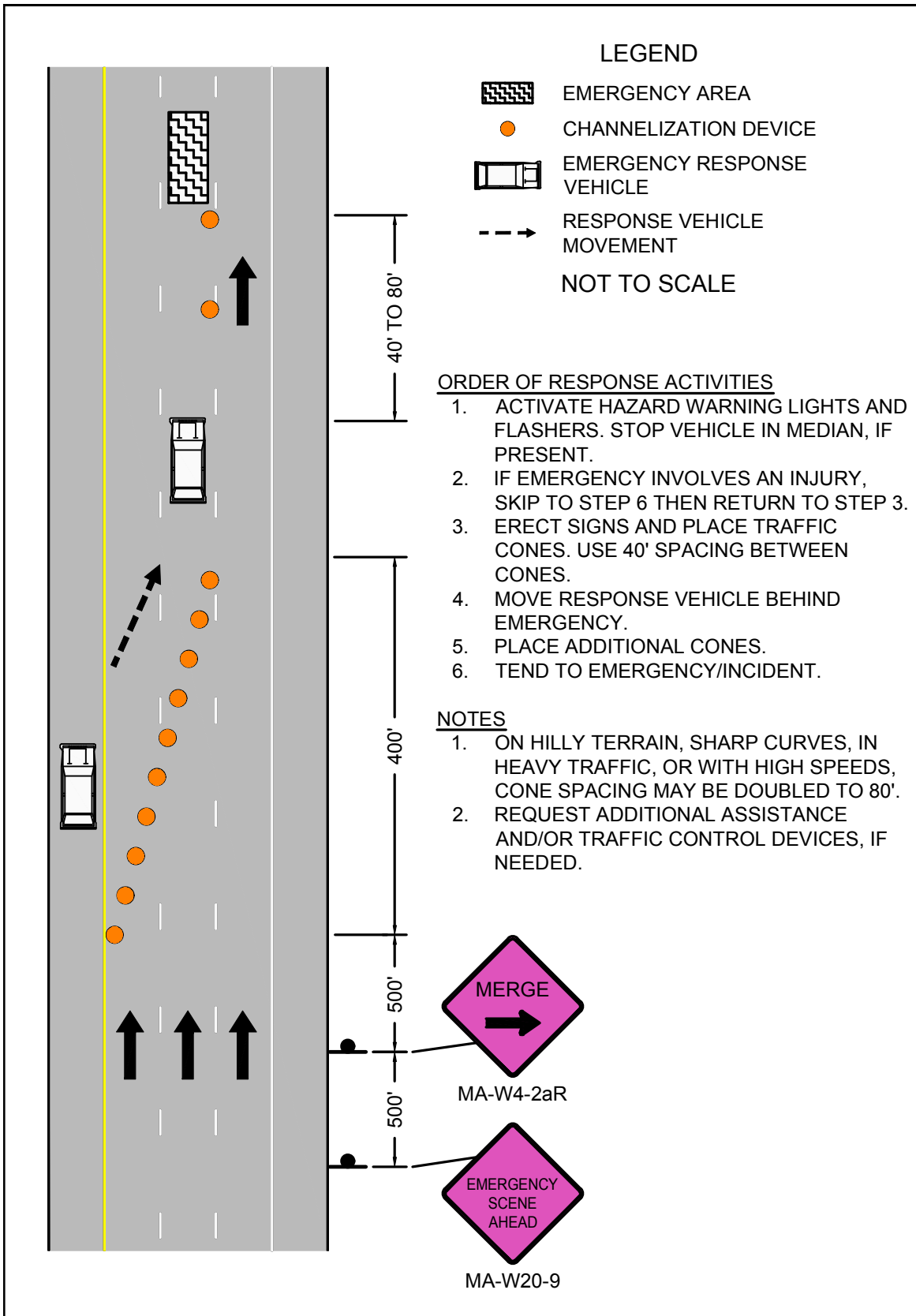


FIGURE 39
EMERGENCY RESPONSE
MULTILANE UNDIVIDED
ROADWAY
LEFT LANE



ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. PULL VEHICLE OVER TO THE RIGHT EDGE OF BREAKDOWN LANE OR SHOULDER OR, IF NOT PRESENT, RIGHT EDGE OF TRAVEL LANE BEFORE STOPPING.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 4 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. TEND TO EMERGENCY/INCIDENT.




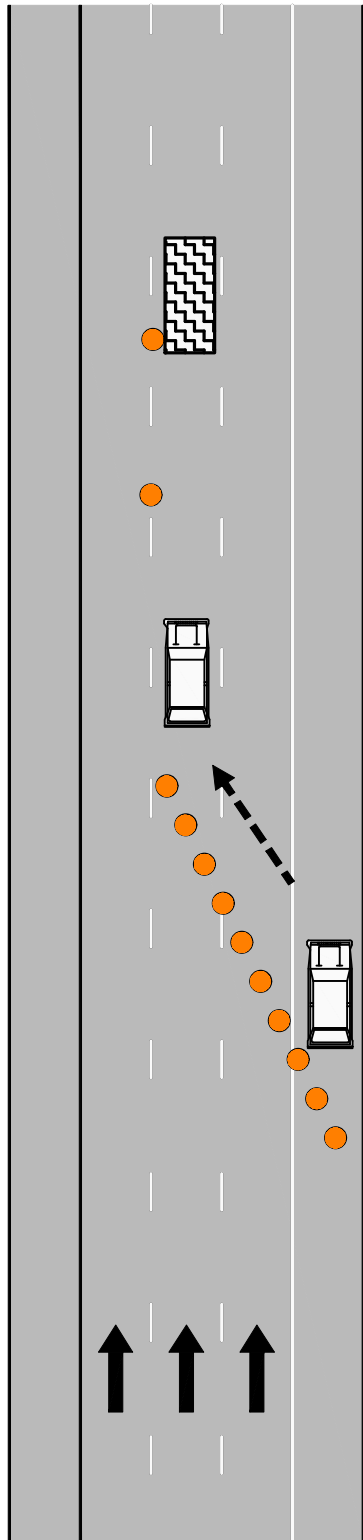




 <p>Massachusetts Department of Transportation Highway Division</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 40 EMERGENCY RESPONSE MULTILANE DIVIDED ROADWAY MIDDLE LANE APPROACH FROM LEFT</p>
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FIGURE 41
EMERGENCY RESPONSE
MULTILANE DIVIDED ROADWAY
MIDDLE LANE
APPROACH FROM RIGHT



LEGEND

-  EMERGENCY AREA
-  CHANNELIZATION DEVICE
-  EMERGENCY RESPONSE VEHICLE
-  RESPONSE VEHICLE MOVEMENT

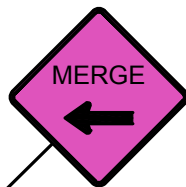
NOT TO SCALE

ORDER OF RESPONSE ACTIVITIES

1. ACTIVATE HAZARD WARNING LIGHTS AND FLASHERS. STOP VEHICLE IN BREAKDOWN LANE.
2. IF EMERGENCY INVOLVES AN INJURY, SKIP TO STEP 6 THEN RETURN TO STEP 3.
3. ERECT SIGNS AND PLACE TRAFFIC CONES. USE 40' SPACING BETWEEN CONES.
4. MOVE RESPONSE VEHICLE BEHIND EMERGENCY.
5. PLACE ADDITIONAL CONES.
6. TEND TO EMERGENCY.

NOTES

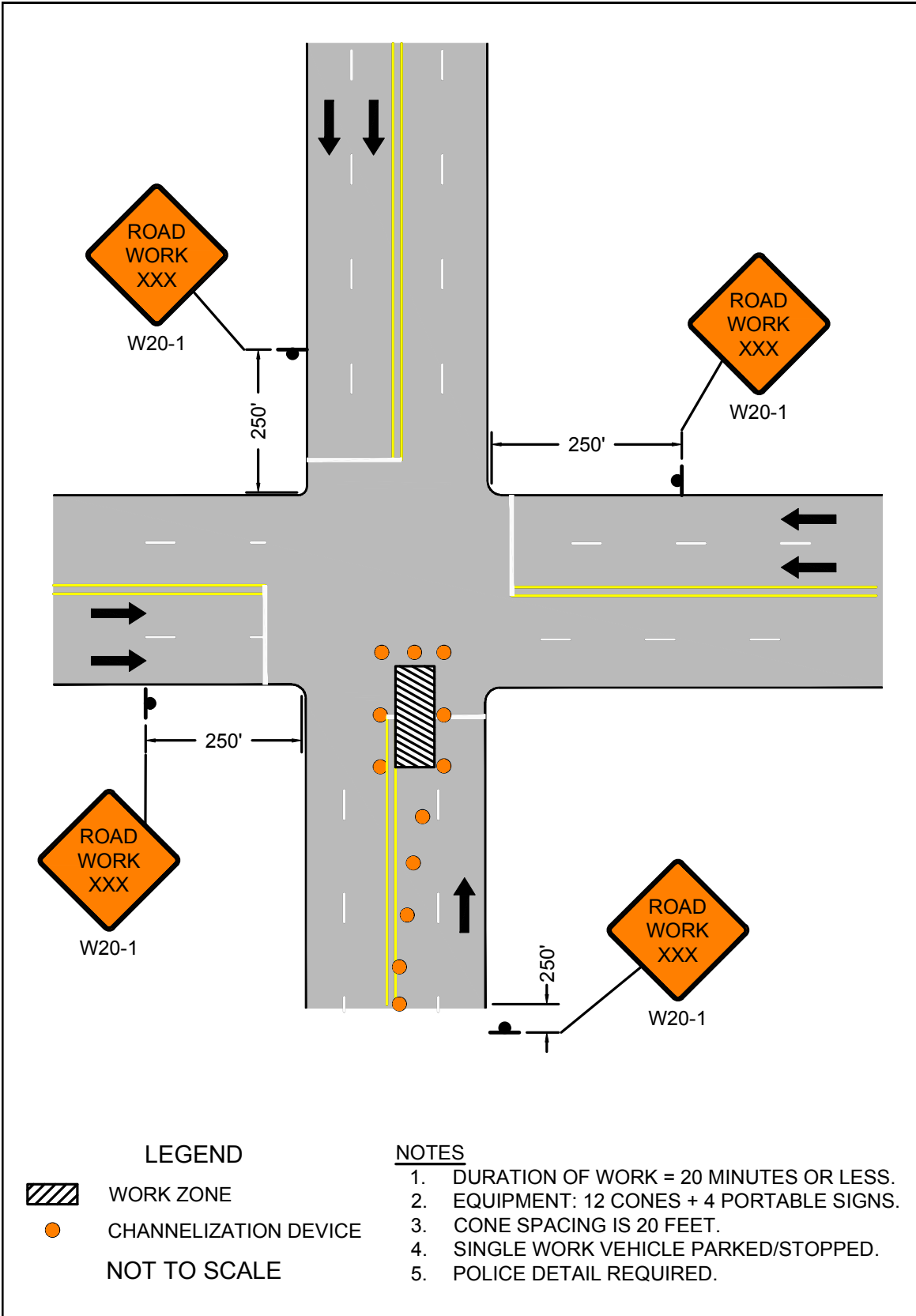
1. ON HILLY TERRAIN, SHARP CURVES, IN HEAVY TRAFFIC, OR WITH HIGH SPEEDS, CONE SPACING MAY BE DOUBLED TO 80'.
2. REQUEST ADDITIONAL ASSISTANCE AND/OR TRAFFIC CONTROL DEVICES, IF NEEDED.





MA-W4-2aL



MA-W20-9



LEGEND

-  WORK ZONE
-  CHANNELIZATION DEVICE

NOT TO SCALE

NOTES

1. DURATION OF WORK = 20 MINUTES OR LESS.
2. EQUIPMENT: 12 CONES + 4 PORTABLE SIGNS.
3. CONE SPACING IS 20 FEET.
4. SINGLE WORK VEHICLE PARKED/STOPPED.
5. POLICE DETAIL REQUIRED.

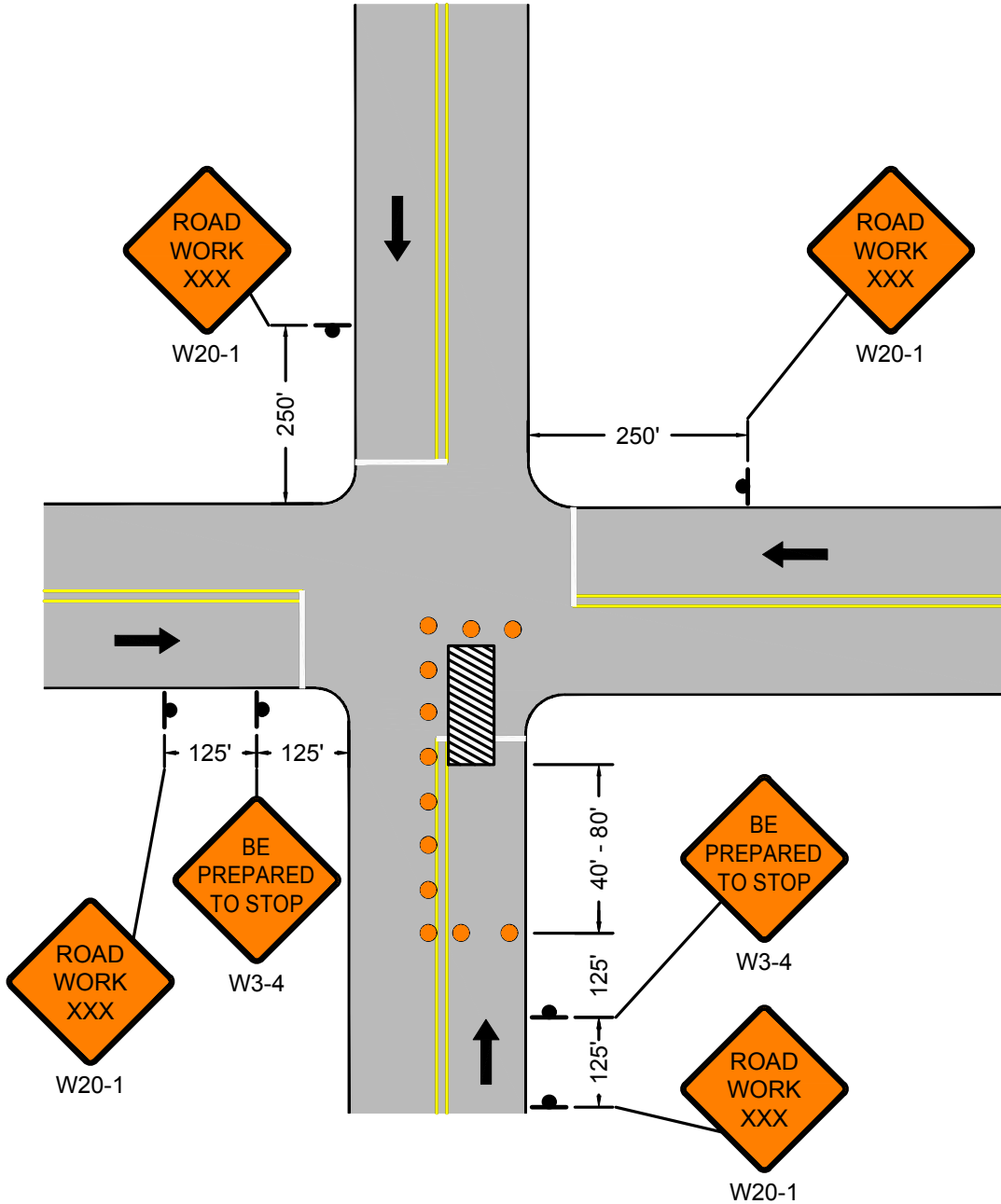






PAGE 76

Work Zone Safety
Standard Details
and Drawings

FIGURE 43
TRAFFIC SIGNAL REPAIR WORK
TWO LANE UNDIVIDED ROADWAY
ONE LEG OF INTERSECTION

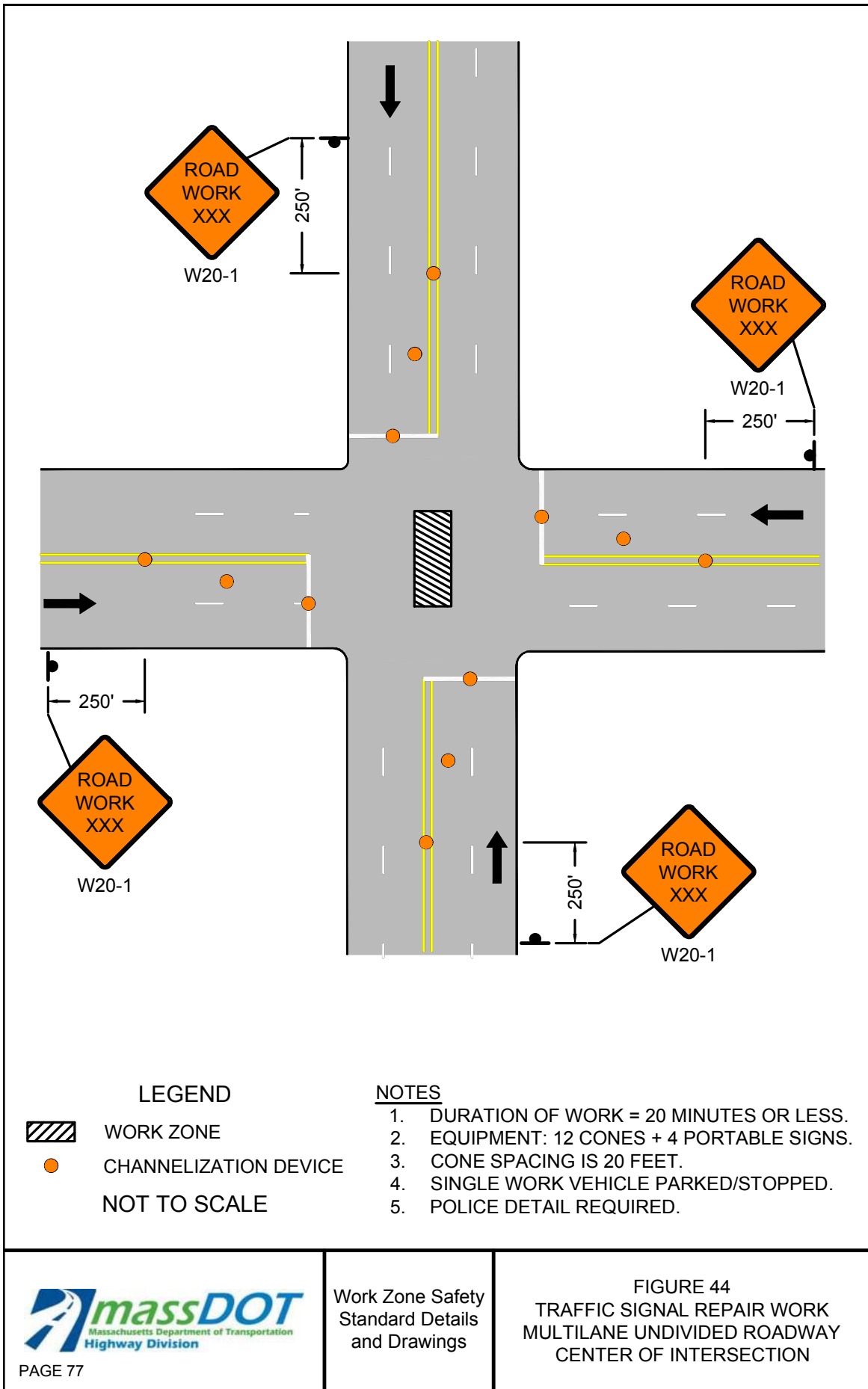


LEGEND

-  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.

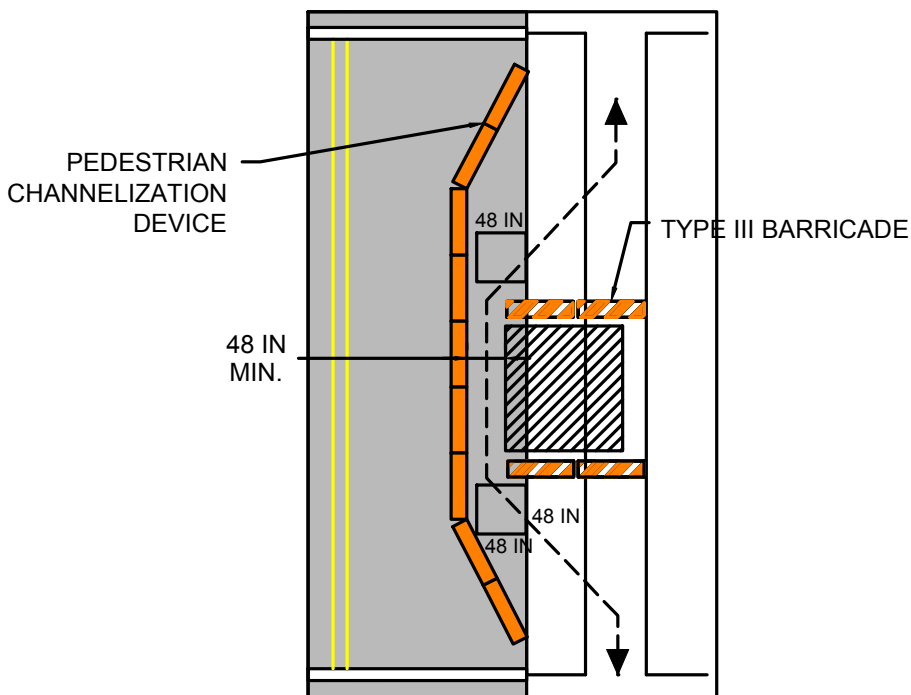




PAGE 78

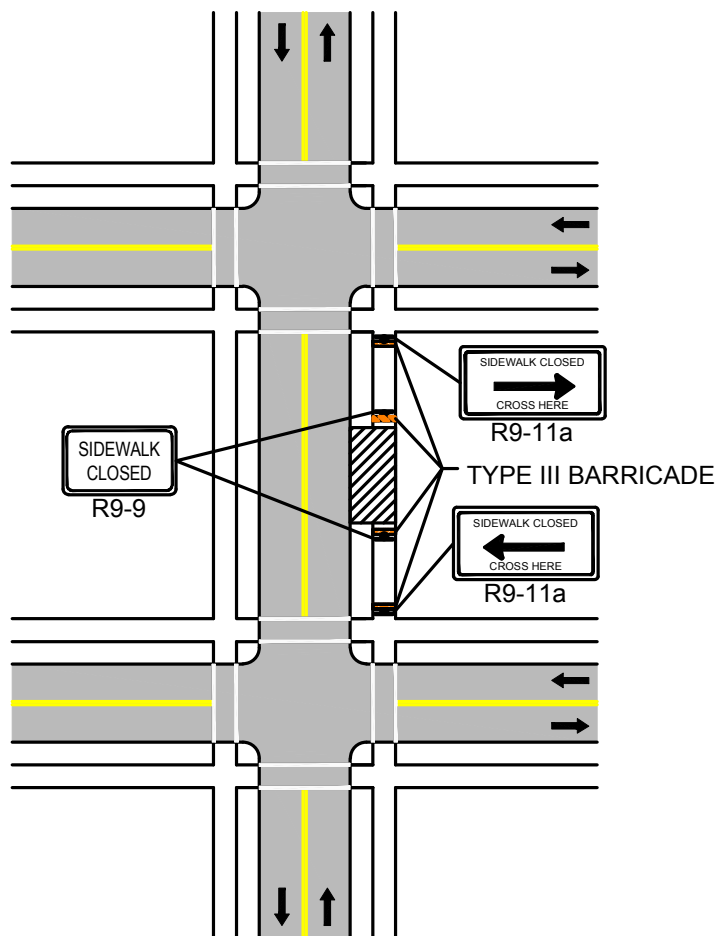
Work Zone Safety
Standard Details
and Drawings

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.





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.

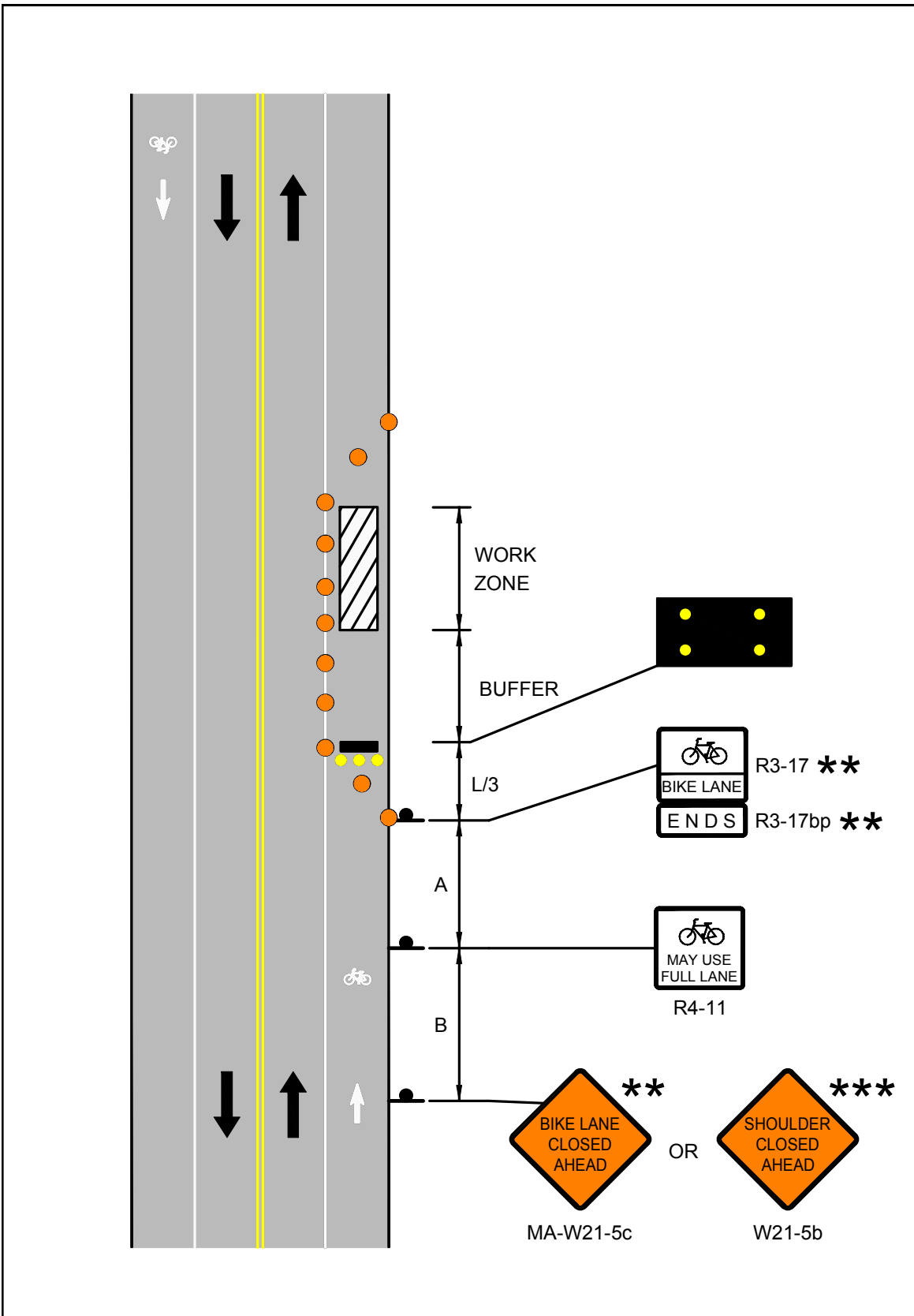
NOTES


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

-  WORK ZONE
-  CHANNELIZATION DEVICE
-  FLASHING ARROW BOARD
-  PORTABLE CHANGEABLE MESSAGE SIGN
-  TRUCK MOUNTED ATTENUATOR
-  RADAR SPEED FEEDBACK BOARD
-  POLICE DETAIL OR UNIFORMED FLAGGER
-  TEMPORARY PORTABLE RUMBLE STRIP
-  TYPE III BARRICADE

NOT TO SCALE



 <p>Massachusetts Department of Transportation Highway Division</p> <p>PAGE 81</p>	<p>Work Zone Safety Standard Details and Drawings</p>	<p>FIGURE 48 STATIONARY OPERATIONS BIKE LANE CLOSURE</p>
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Safety is everyone's business

Rev. June, 2017

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: NATICK Project File Number: 610869

Contract Number: 128933

Project Description: Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA

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 A00875

**POLICY DIRECTIVE P-22-001
AND
POLICY DIRECTIVE P-22-002**

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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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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

NATICK

For: **Pedestrian/Bike Bridge Superstructure Replacement, N-03-007,
Spring Street over the MBTA**

COMMONWEALTH OF MASSACHUSETTS

LOCATION

The work referred to herein is in the Town of Natick 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:

Spring Street

Beginning – Station 0+16.90

Ending –Station 3+64.47

Bridge N-03-007

Station 1+14.88 to Station 1+80.21

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 **950 CALENDAR DAYS** upon receipt of a Notice to Proceed, except that if the completion date falls between December 1 and March 15 then the same number of days beyond December 1st will be extended after March 15th.

The Work of this project is described by the following Items and quantities.

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Project # 610869		Contract # 128933		
Location : NATICK				
Description : Natick - Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
100.99	1	STRUCTURE AND GEOTECHNICAL MONITORING AT _____ LUMP SUM		
101.	0.2	CLEARING AND GRUBBING AT _____ PER ACRE		
102.1	200	TREE TRIMMING AT _____ PER FOOT		
102.3	20	HERBICIDE TREATMENT OF INVASIVE PLANTS AT _____ PER HOUR		
102.33	8	INVASIVE PLANT MANAGEMENT STRATEGY AT _____ PER HOUR		
102.511	5	TREE PROTECTION - ARMORING AND PRUNING AT _____ EACH		
102.521	50	TREE AND PLANT PROTECTION FENCE AT _____ PER FOOT		
103.	4	TREE REMOVED - DIAMETER UNDER 24 INCHES AT _____ EACH		
114.1	1	DEMOLITION OF SUPERSTRUCTURE OF BRIDGE NO. N-03-007 (29N) AT _____ LUMP SUM		

Project # 610869		Contract # 128933		
Location : NATICK				
Description : Natick - Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
120.	400	EARTH EXCAVATION AT _____ PER CUBIC YARD		
120.2	12	GRANITE BLOCK REMOVED AND STACKED AT _____ EACH		
121.	20	CLASS A ROCK EXCAVATION AT _____ PER CUBIC YARD		
127.	36	CONCRETE EXCAVATION AT _____ PER CUBIC YARD		
140.	330	BRIDGE EXCAVATION AT _____ PER CUBIC YARD		
141.1	10	TEST PIT FOR EXPLORATION AT _____ PER CUBIC YARD		
142.	30	CLASS B TRENCH EXCAVATION AT _____ PER CUBIC YARD		
144.	65	CLASS B ROCK EXCAVATION AT _____ PER CUBIC YARD		
150.	20	ORDINARY BORROW AT _____ PER CUBIC YARD		

Project # 610869		Contract # 128933		
Location : NATICK				
Description : Natick - Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
151.	350	GRAVEL BORROW AT _____ PER CUBIC YARD		
151.2	45	GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AT _____ PER CUBIC YARD		
153.2	310	LIGHTWEIGHT FILL AT _____ PER CUBIC YARD		
156.	15	CRUSHED STONE AT _____ PER TON		
156.5	10	CRUSHED STONE FOR FILTER BLANKET AT _____ PER CUBIC YARD		
170.	1,100	FINE GRADING AND COMPACTING - SUBGRADE AREA AT _____ PER SQUARE YARD		
180.01	1	ENVIRONMENTAL HEALTH AND SAFETY PROGRAM AT _____ LUMP SUM		
180.02	30	PERSONAL PROTECTION LEVEL C UPGRADE AT _____ PER HOUR		
180.03	10	LICENSED SITE PROFESSIONAL SERVICES AT _____ PER HOUR		

Project # 610869		Contract # 128933		
Location : NATICK				
Description : Natick - Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
181.11	1,390	DISPOSAL OF UNREGULATED SOIL AT _____ PER TON		
181.12	110	DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY AT _____ PER TON		
181.13	35	DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY AT _____ PER TON		
181.14	20	DISPOSAL OF HAZARDOUS WASTE AT _____ PER TON		
182.1	1	INSPECTION AND TESTING FOR ASBESTOS AT _____ LUMP SUM		
182.2	70	REMOVAL OF ASBESTOS AT _____ PER FOOT		
184.1	15	DISPOSAL OF TREATED WOOD PRODUCTS AT _____ PER TON		
201.	1	CATCH BASIN AT _____ EACH		
205.	1	LEACHING BASIN AT _____ EACH		

Project # 610869		Contract # 128933		
Location : NATICK				
Description : Natick - Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
222.	1	FRAME AND GRATE - MASSDOT BAR TYPE AT _____ EACH		
222.1	1	FRAME AND GRATE - MASSDOT CASCADE TYPE AT _____ EACH		
241.12	15	12 INCH REINFORCED CONCRETE PIPE CLASS III AT _____ PER FOOT		
258.	7	STONE FOR PIPE ENDS AT _____ PER SQUARE YARD		
358.	3	GATE BOX ADJUSTED AT _____ EACH		
402.	50	DENSE GRADED CRUSHED STONE FOR SUB-BASE AT _____ PER CUBIC YARD		
440.	1,600	CALCIUM CHLORIDE FOR ROADWAY DUST CONTROL AT _____ PER POUND		
443.	6	WATER FOR ROADWAY DUST CONTROL AT _____ PER 1000 GALLONS		
450.22	60	SUPERPAVE SURFACE COURSE - 9.5 (SSC - 9.5) AT _____ PER TON		

Project # 610869		Contract # 128933		
Location : NATICK				
Description : Natick - Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
450.31	80	SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC -12.5) AT _____ PER TON		
450.42	110	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5) AT _____ PER TON		
451.	5	HMA FOR PATCHING AT _____ PER TON		
452.	120	ASPHALT EMULSION FOR TACK COAT AT _____ PER GALLON		
453.	560	HMA JOINT ADHESIVE AT _____ PER FOOT		
472.	5	TEMPORARY ASPHALT PATCHING AT _____ PER TON		
482.4	30	SAWCUTTING PORTLAND CEMENT CONCRETE AT _____ PER FOOT		
506.	270	GRANITE CURB TYPE VB - STRAIGHT AT _____ PER FOOT		
509.	80	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - STRAIGHT AT _____ PER FOOT		

Project # 610869		Contract # 128933		
Location : NATICK				
Description : Natick - Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
509.1	15	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - CURVED AT _____ PER FOOT		
511.1	10	GRANITE EDGING TYPE SB - STRAIGHT AT _____ PER FOOT		
512.1	15	GRANITE EDGING TYPE SB (RADIUS 10 FEET OR LESS) AT _____ PER FOOT		
580.	25	CURB REMOVED AND RESET AT _____ PER FOOT		
594.	155	CURB REMOVED AND DISCARDED AT _____ PER FOOT		
630.2	20	HIGHWAY GUARD REMOVED AND DISCARDED AT _____ PER FOOT		
655.	270	CEDAR RAIL FENCE AT _____ PER FOOT		
657.	300	TEMPORARY FENCE AT _____ PER FOOT		
660.	180	METAL PIPE RAIL AT _____ PER FOOT		

Project # 610869		Contract # 128933		
Location : NATICK				
Description : Natick - Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
698.2	30	GEOTEXTILE FABRIC FOR SUBSURFACE DRAINAGE AT _____ PER SQUARE YARD		
698.3	293	GEOTEXTILE FABRIC FOR SEPARATION AT _____ PER SQUARE YARD		
701.	190	CEMENT CONCRETE SIDEWALK AT _____ PER SQUARE YARD		
701.2	180	CEMENT CONCRETE PEDESTRIAN CURB RAMP AT _____ PER SQUARE YARD		
701.21	25	DETECTABLE WARNING PANEL AT _____ PER SQUARE FOOT		
701.22	60	DIRECTIONAL TACTILE WARNING PANEL AT _____ PER SQUARE FOOT		
702.	5	HOT MIX ASPHALT SIDEWALK OR DRIVEWAY AT _____ PER TON		
707.4	1	PLANTER REMOVED AND STACKED AT _____ EACH		
707.8	2	STEEL BOLLARD AT _____ EACH		

Project # 610869		Contract # 128933		
Location : NATICK				
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ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
722.3	1	SCHEDULE OF OPERATIONS (TYPE C) - FIXED PRICE \$11,500 AT Eleven Thousand Five Hundred Dollars LUMP SUM	\$11,500.00	\$11,500.00
734.	1	SIGN REMOVED AND RESET AT _____ EACH		
734.1	7	SIGN REMOVED AND DISPOSED AT _____ EACH		
740.	31	ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) AT _____ PER MONTH		
748.	1	MOBILIZATION AT _____ LUMP SUM		
751.	50	LOAM FOR ROADSIDES AT _____ PER CUBIC YARD		
765.451	1	SEEDING - PART SHADE ROADSIDE MIX AT _____ PER POUND		
765.635	320	NATIVE SEEDING AND ESTABLISHMENT AT _____ PER SQUARE YARD		
767.121	400	SEDIMENT CONTROL BARRIER AT _____ PER FOOT		

Project # 610869		Contract # 128933		
Location : NATICK				
Description : Natick - Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
767.6	2	AGED PINE BARK MULCH AT _____ PER CUBIC YARD		
783.057	4	SHAD TREE - DOWNY CUMULUS 7-8 FEET CLUMP AT _____ EACH		
800.4	2	TEMPORARY CAISSON AT _____ EACH		
804.11	380	1 INCH ELECTRICAL CONDUIT - HDPE AT _____ PER FOOT		
804.4	190	4 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC -(UL) AT _____ PER FOOT		
811.31	2	PULL BOX 12 X 12 INCHES - SD2.031 AT _____ EACH		
821.01	1	HIGHWAY LIGHTING AT _____ LUMP SUM		
832.	50	WARNING-REGULATORY AND ROUTE MARKER - ALUMINUM PANEL (TYPE A) AT _____ PER SQUARE FOOT		
847.1	4	SIGN SUP (N/GUIDE)+RTE MKR W/1 BRKWAY POST ASSEMBLY - STEEL AT _____ EACH		

Project # 610869		Contract # 128933		
Location : NATICK				
Description : Natick - Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
848.1	8	SIGN SUP (N/GUIDE)+RTE MKR W/2 BRKWAY POST ASSEMBLIES-STEEL AT _____ EACH		
850.41	80	ROADWAY FLAGGER AT _____ PER HOUR		
852.	165	SAFETY SIGNING FOR TRAFFIC MANAGEMENT AT _____ PER SQUARE FOOT		
852.1	2	TEMPORARY PEDESTRIAN CURB RAMP AT _____ EACH		
852.2	100	TEMPORARY PEDESTRIAN BARRICADE AT _____ PER FOOT		
853.1	6	PORTABLE BREAKAWAY BARRICADE TYPE III AT _____ EACH		
853.2	60	TEMPORARY BARRIER (TL-2) AT _____ PER FOOT		
854.016	320	TEMPORARY PAVING MARKINGS - 6 INCH (PAINTED) AT _____ PER FOOT		
854.1	80	PAVEMENT MARKING REMOVAL AT _____ PER SQUARE FOOT		

Project # 610869		Contract # 128933		
Location : NATICK				
Description : Natick - Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
859.	2,350	REFLECTORIZED DRUM AT _____ PER DAY		
866.106	170	6 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) AT _____ PER FOOT		
866.112	550	12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) AT _____ PER FOOT		
867.106	170	6 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC) AT _____ PER FOOT		
874.1	1	STREET SIGN REMOVED AND RESET AT _____ EACH		
908.40	250	REPOINTING AT _____ PER SQUARE YARD		
912.4	140	DRILLED AND GROUTED #4 DOWELS AT _____ EACH		
964.3	719	ELASTOMERIC PROTECTIVE COATING AT _____ PER SQUARE FOOT		
993.31	1	TEMPORARY UTILITY BRIDGE AT _____ LUMP SUM		

Project # 610869		Contract # 128933		
Location : NATICK				
Description : Natick - Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA				
ITEM #	QUANTITY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE	AMOUNT
994.01	1	TEMPORARY PROTECTIVE SHIELDING BRIDGE NO. N-03-007 (29N) AT _____ LUMP SUM		
995.	1	BRIDGE SUPERSTRUCTURE, BRIDGE NO.N-03-007 (29N) AT _____ LUMP SUM		
996.003	840	WALL STRUCTURE - PRECAST CONCRETE MODULAR RETAINING WALL AT _____ PER SQUARE FOOT		
Total Qty:		16,966.2		

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DOCUMENT B00842

SCHEDULE OF PARTICIPATION
BY MINORITY OR WOMEN BUSINESS ENTERPRISES (M/WBE)

MASSDOT PROJECT NUMBER: 610869

PROJECT LOCATION: NATICK

DATE OF BID OPENING: _____

NAME OF PRIME BIDDER: _____

Name Address and Phone Number of M/WBE	Name of Activity	(a) M/WBE Contractor Activity Amount	(b) M/WBE Other Business Amount	(c) Total amount eligible for credit under rules in Section VIII of the Special Provisions
Total Bid Amount	TOTALS:	\$		\$
\$	M/WBE Percentage of Total bid:	%		%

Column (a) must be at least one-half of the M/WBE percentage goal.

SIGNATURE: _____ Date: _____ Tel No: _____

NAME AND TITLE (PRINT): _____

BIDDERS ARE CAUTIONED TO REVIEW DOCUMENT 00718 -- SPECIAL PROVISION FOR PARTICIPATION BY MINORITY OR WOMEN BUSINESS ENTERPRISES AND SERVICE DISABLED VETERAN OWNED BUSINESS ENTERPRISES.

*** END OF DOCUMENT ***

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DOCUMENT B00843

MINORITY OR WOMEN'S BUSINESS ENTERPRISE PARTICIPATION LETTER OF INTENT
PAGE 1 OF 2

MASSDOT PROJECT NUMBER: 610869

PROJECT LOCATION: NATICK

DATE OF BID OPENING:

FROM

(Minority or Women's Business Enterprise Company)

TO:

(Name of Prime Contractor)

1. My company is currently certified as an MBE or WBE by the Massachusetts Supplier Diversity Office, formerly known as the State Office of Minority and Women Business Assistance (SOMWBA). There have been no changes affecting the ownership, control or independence of my company since my last certification review.
2. If any such change occurs prior to my company's completion of this proposed work, I will give written notification to your firm and to the Massachusetts Department of Transportation (MassDOT).
3. (For contractor activity only.) My firm will provide to you, upon request, for the purpose of obtaining subcontractor approval from MassDOT; (1) a resume stating the qualifications and experience of the superintendent or foreperson who will supervise on site-work; (2) a list of equipment owned or leased by my firm for use on the project; (3) a list of all projects (public or private) which my firm is currently performing, is committed to perform, or intends to make a commitment to perform. I shall include, for each project, the names and telephone number of a contact person for the contracting organization, the dollar value of the work, a description of the work, and my firm's work schedule for the Project.
4. If you are awarded the Contract, my company intends to enter into an agreement with your firm to perform the items of work or other activity described on the following sheet for the prices indicated.
5. My firm has the ability to manage, supervise and perform the activity described on the following page.

M/WBE Authorized Signature

Date

MINORITY OR WOMEN'S BUSINESS ENTERPRISE PARTICIPATION LETTER OF INTENT
PAGE 2 OF 2

MASSDOT PROJECT NUMBER: 610869

PROJECT LOCATION: NATICK

DATE OF BID OPENING: _____

NAME OF PRIME BIDDER: _____

<u>Item number</u> if applicable	<u>Description of Activity</u> with notations such as Installation Only, Material Only, or Complete	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
TOTAL AMOUNT:				

M/WBE COMPANY NAME: _____

M/WBE AUTHORIZED SIGNATURE: _____

NAME AND TITLE (PRINT): _____

TELEPHONE NUMBER: _____ FAX NUMBER: _____

*** END OF DOCUMENT ***

Rev'd 9/20/19

DOCUMENT B00846

M/WBE OR SDVOBE JOINT CHECK ARRANGEMENT APPROVAL FORM
(to be submitted by Prime Contractor)

Contract No: 128933 Project No. 610869

Location: NATICK Bid Opening Date: _____

Project Description: Pedestrian/Bike Bridge Superstructure Replacement, N-03-007, Spring Street over the MBTA

We have received the attached request for the use of a joint check arrangement from _____, a M/WBE or SDVOBE on the above- referenced Contract and _____, a Material Supplier/Vendor for the subject Contract. The M/WBE or SDVOBE has complied with the requirements of Special Provision Document 00718. In particular, the M/WBE or SDVOBE 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 M/WBE or SDVOBE) for payment of sums due pursuant to invoices from the Supplier/Vendor and M/WBE or SDVOBE.

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 B00847

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 M/WBE or SDVOBE, 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 M/WBE or SDVOBE Venturer; (4) the commitment of management, supervisory and operative personnel employed by the M/WBE or SDVOBE 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, M/WBE or SDVOBE 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 ***