COMMONWEALTH OF MASSACHUSETTS

massDOT
Massachusetts Department of Transportation
Highway Division

CONTRACT DOCUMENTS
AND SPECIAL PROVISIONS

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<th>606091-93654</th>
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<td>$5,268,000.00</td>
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FOR

Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir

in the Town of

FRAMINGHAM

In accordance with the 1988 English Edition of the STANDARD SPECIFICATIONS For HIGHWAYS and BRIDGES and the Supplemental Specifications dated July 1, 2015

This Proposal to be opened and read: TUESDAY, MAY 17, 2016 @ 2:00 P.M.
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NOTICE TO CONTRACTORS

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

TUESDAY, MAY 17, 2016 at 2:00 P.M.**

FRAMINGHAM
Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir

**Date Subject to Change

PROJECT VALUE = $5,268,000.00

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 for Official Proposal Form (R109)”. The blank “Request for Official Proposal Form (R109)” can be obtained at:
http://www.massdot.state.ma.us/highway/Departments/PrequalificationofHorizontalConstructionFirms.aspx
Select the link “Request for Official Proposal Form (R-109 Form)”.

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

Upon approval, the Official Bidders will be entitled to receive an officially numbered Compact Disc (CD) containing the Plans and Specifications, free of charge. Other interested parties may receive an informational copy of the Compact Disc (CD) containing the Plans and Specifications, free of charge. Only officially numbered Compact Disc (CD) shall be used for bidding purposes.

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

All parties who wish to have the CDs mailed to them must provide a completed mailing label with an approved carrier account number for mail service (i.e. – Federal Express, UPS, etc) to the Bid Document Distribution Center.
NOTICE TO CONTRACTORS (Continued)

Bid Document Distribution Center
MassDOT Highway Division
10 Park Plaza - Suite 6261
Boston, MA 02116
Attn: Frank Kucharski, P. E., Construction Contracts Engineer

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.

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

PRICE ADJUSTMENTS
This Contract contains price adjustments for hot mix asphalt and Portland cement mixtures, diesel fuel, and gasoline. For this project the base prices are as follows: liquid asphalt $377.50 per ton, Portland cement $116.00 per ton, diesel fuel $1.632 per gallon, and gasoline $1.570 per gallon. MassDOT posts the Price Adjustments on their Highway Division’s website at http://www.massdot.state.ma.us/Highway/ under the following link sequences:

Doing Business With Us
Construction
Price Adjustments

STEEL PRICE ADJUSTMENTS
This Contract contains Price Adjustments for steel. See Document 00813 - PRICE ADJUSTMENT FOR STRUCTURAL STEEL AND REINFORCING STEEL of the Special Provisions for their application.

The Base Prices for these items on this project are as follows:

Rebar
ASTM A615/A615M Grade 60 (AASHTO M31 Grade 420) Reinforcing Steel = $0.32 per pound

Structural Steel
ASTM A709 (AASHTO M270) Grade 36 Structural Steel Plate = $0.52 per pound
ASTM A709 (AASHTO M270) Grade 36 Structural Steel Shapes = $0.37 per pound

ASTM A709 (AASHTO M270) Grade 50 Structural Steel Plate = $0.46 per pound
ASTM A709 (AASHTO M270) Grade 50 Structural Steel Shapes = $0.37 per pound
NOTICE TO CONTRACTORS (Continued)

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: Stephanie Pollack, Secretary and CEO, MassDOT
    Thomas J. Tinlin, Administrator, MassDOT Highway Division
SATURDAY, MARCH 12, 2016
REQUIREMENTS OF MASSACHUSETTS GENERAL LAWS CHAPTER 30, SECTION 39R

July 1, 1981, updated August 2012

§ 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 A 1/2 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 A 1/2 to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A through forty-four H, inclusive, of chapter one hundred and forty-nine, which is for amount or estimated amount greater than one hundred thousand dollars.

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

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

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

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

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

(8) Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.
(b) Subsection (a)(2) hereof notwithstanding, every agreement or contract awarded or executed pursuant to sections thirty-eight A 1/2 to thirty-eight O, inclusive, of chapter seven, or eleven C of chapter twenty-five A, and pursuant to section thirty-nine M of chapter thirty or to section forty-four A through H, inclusive, of chapter one hundred and forty-nine, shall provide that:

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

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

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

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

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

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

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

2. transactions are recorded as necessary
   i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and
   ii. to maintain accountability for assets;

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

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

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

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

2. whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.
(d) Every contractor awarded a contract by the commonwealth or by any political subdivision thereof shall annually file with the commissioner of capital asset management and maintenance during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the awarding authority upon request.

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

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

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LOCUS MAP

FRAMINGHAM
Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir
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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.

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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: Yes ☐ No ☐

Contractor’s Comments: __________________________________________________________________________

____________________________________________________________________________________________
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:

_____________________________________________________________________________________

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WORK NOT COMPLETED WITHIN SPECIFIED TIME:

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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.

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<th>Very Good 9</th>
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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: Yes ☐  No ☐

Subcontractor’s Comments: ______________________________________________________________________

____________________________________________________________________________________________

Contractor’s Comments: ______________________________________________________________________

____________________________________________________________________________________________

□ Final Report  □ Interim Report
INFO 10001 - 2

SUBCONTRACTOR PROJECT EVALUATION FORM (Continued)

Date: ___________________________ Contract Number: ___________________________

INFORMATION FOR DISTRICT HIGHWAY DIRECTORS RELATING TO PREQUALIFICATION

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

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

I recommend a deduction for Contractor’s unsatisfactory performance: ___________________________

I recommend a deduction for project completed late: ___________________________

Signed: ___________________________
District Highway Director

EXPLANATION OF RATINGS 1 – 8:

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WORK NOT COMPLETED WITHIN SPECIFIED TIME:

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*** END OF DOCUMENT ***
NOTICE OF AVAILABILITY

The STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, the July 1, 2015 SUPPLEMENTAL SPECIFICATIONS, the 1996 METRIC CONSTRUCTION AND TRAFFIC STANDARD DETAILS, the APRIL 2003 SUPPLEMENTAL DRAWINGS, the 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS; the 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING and the 2014 CONSTRUCTION STANDARD DETAILS are available online at http://www.massdot.state.ma.us/Highway/.

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

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.

*** END OF DOCUMENT ***
DATE: March 4, 2016

The 1988 Standard Specifications for Highways and Bridges, the 1995 Standard Specifications for Highways and Bridges (Metric) and the Supplemental Specifications dated July 1, 2015 (combined English and Metric) are amended by the following modifications, additions and deletions. These Interim Supplemental Specifications prevail over those published in the Standard Specifications and the Supplemental Specifications.

The MassDOT–Highway Specifications Committee has issued these Interim Supplemental Specifications for inclusion into each proposal until such time as they are approved as Standard Specifications.

Contractors are cautioned that these Interim Supplemental Specifications are periodically updated and may vary from project to project.

DIVISION I
GENERAL REQUIREMENTS AND COVENANTS

SECTION 5.00
CONTROL OF WORK

SUBSECTION 5.11  Final Acceptance (Also see Subsections 7.02 and 9.05)
(page 19 English, page 1.24 Metric) Replace second sentence of the first paragraph with the following:

If all construction provided for and contemplated by the Contract is found completed to the Engineer’s satisfaction, that inspection shall constitute the final inspection and the Engineer shall in writing make acceptance of the physical work, which acceptance shall relieve the Contractor from further responsibility only with respect to the physical work.
After the Contractor has finished installing the controller and all other associated traffic signal control equipment and after the Contractor has set the signal equipment to operate as specified in the contract documents, the fine tuning, adjusting and testing period shall begin. During this period, the Contractor, under the direction of the Engineer and with the cooperation of the local community representatives, if applicable, will make necessary adjustments and tests to ensure safe and efficient operation of the equipment. This period shall not last for more than 30 days, and the contract completion date has taken this testing period into consideration. No request for final acceptance will be considered until successful completion of the testing period.

The cost of electrical energy consumed by the operation of traffic signals, highway lighting or other electrical devices during the construction, fine tuning, adjustment and testing of the devices will be borne by the owner of the existing device. In the case of an installation requiring a new electrical service, the cost of electrical energy consumed will be borne by the Contractor until final acceptance.

SECTION 8.00
PROSECUTION AND PROGRESS

SUBSECTION 8.10 Determination and Extension of Contract Time for Completion (Time Extensions).
(page 40 English, page I.51 Metric, page SUPPLEMENT C2015-22) Replace this subsection with the following:

A. General

It is an essential part of all contracts that contractors shall perform the Work fully, entirely and in an acceptable manner within the contract duration.

The contract duration is based upon the requirements of public convenience and the assumption that the Contractor will prosecute the Work efficiently and with the least possible delay, in accordance with the maximum allowable working time, as specified in the Contract.

The contract duration has been carefully considered and has been established for reasons of importance to the Department. The contract duration will be enforced and it is understood that the Contractor accepted this concept at the time of the submission of the bid. The timing of the Notice to Proceed (NTP) has been taken into account in the determination of the contract duration and the timing of the issuance of the NTP shall not, by itself, be a reason for a time extension.

An extension of contract time will be granted only if entitlement to a time extension has been clearly demonstrated to the satisfaction of the Engineer by a documented time entitlement analysis (TEA), performed in accordance with the requirements of Subsection 8.02.

B. Requests for Additional Contract Time (Time Extensions)

In response to a request for a time extension, an extension of contract time may be granted for demonstrated delays resulting from only one, or, in the case of concurrent delays, a combination of the following causes:

1. Extra Work

Each extra work order (EWO) proposal shall include an evaluation of the impact of the EWO on contract time, expressed in calendar days. If there is no impact to the contract time as a result of the EWO, the EWO shall indicate this by stating that zero calendar days of additional time is being requested. The need for a time extension as a result of the EWO must be clearly demonstrated by a documented TEA performed by the Contractor in accordance with the requirements of Subsection 8.02. A documented preliminary TEA supporting the EWO proposal shall be submitted to the Engineer as part of the EWO proposal. Also see Subsection 4.03 – Extra Work and Subsection 4.05 – Validity of Extra Work.
SUBSECTION 8.10 (continued)

2. Department-Caused Delays

If any part of the Work is delayed or suspended by the Department, the Contractor will be granted a time extension to complete the Work or any portion of the Work only if entitlement to this time extension has been clearly demonstrated by a documented time entitlement analysis. Department-caused delays shall not include delays to or suspensions of the Work that result from the fault or negligence of the Contractor. Also see Subsection 8.05 – Claim for Delay or Suspension of the Work.

3. Increased Quantities

Increased quantities of work may be considered as the basis for a time extension only if the requirements of Subsection 4.06 - Increased or Decreased Contract Quantities are met. The time allowed for performance of the Work will be increased based on increased quantities only if entitlement to this time extension has been clearly demonstrated by a documented time entitlement analysis. A decrease in quantities shall also require a time entitlement analysis to determine if a deduction of contract time is warranted.

4. Delays Not Caused by Contractor Fault or Negligence

When delays occur due to reasonable causes beyond the control and without the fault or negligence of the Contractor, including, but not restricted to: “Acts of God”; war, whether or not declared, civil war, insurrection, rebellion or revolution, or to any act or condition incident to any of the foregoing; acts of the Government; acts of the State or any political subdivision thereof; acts of other contracting parties over whose acts the Contractor has no control; fires; floods; epidemics; abnormal tides (not including Spring tides); severe coastal storms accompanied by high winds or abnormal tides; freezing of streams and harbors; abnormal time of Winter freezing or Spring thawing; interference from recreational boat traffic; use of beaches and recreational facilities for recreational purposes during the Summer season; abnormal ship docking and berthing; unanticipated use of wharves and storage sheds; strikes, except those caused by improper acts or omissions of the Contractor; extraordinary delays in delivery of materials caused by strikes, lockouts, wrecks, and/or freight embargoes; a time extension will be granted only if entitlement to a time extension has been clearly demonstrated by a documented time entitlement analysis.

An “Act of God” as used in this subsection is construed to mean an earthquake, flood, cyclone, hurricane, tornado, or other cataclysmic phenomenon of nature beyond the power of the Contractor to foresee and/or make preparations against. Additional consideration may be given to severe, abnormal flooding in local rivers and streams that has been reported as such by the National Weather Service. Rain, wind, snow, and/or other natural phenomena of normal intensity, based on National Weather Service reports, for the particular locality and for the particular season of the year in which the Work is being prosecuted, shall not be construed as an “Act of God” and no time extension will be granted for the delays resulting therefrom.

Within the scope of acts of the Government, consideration will be given to properly documented evidence that the Contractor has been delayed in obtaining any material or class of labor because of any assignment of preference ratings by the Federal Government or its agencies to defense contracts of any type.

5. Delays Caused by Public Service Corporations, Municipal Departments or Other Third Parties

If any part of the Work is delayed by public service corporations, municipal departments or other third parties, a time extension will be granted only if entitlement to a time extension has been clearly demonstrated by a documented time entitlement analysis. Also see Subsections 5.05 - Cooperation by Contractor, 5.06 - Adjacent Contracts and 8.04 - Removal or Demolition of Buildings and Land Takings.

C. Time Extension Determination

1. When the Contractor submits a request for a time extension, placing the Department on notice of a delay due to any of the causes listed in Subsection 8.10.B., it shall be submitted in writing to the Engineer within 15 calendar days after the start of the delay. No time extension will be granted if a request for a time extension is not filed within 15 calendar days after the start of the delay.
SUBSECTION 8.10 (continued)

A documented preliminary TEA supporting the request for a time extension and meeting the requirements of Subsection 8.02 shall be submitted to the Engineer no later than 15 calendar days after the request for a time extension is submitted to the Engineer or 30 calendar days after the start of the delay. A documented final TEA shall be submitted to the Engineer no later than 15 calendar days after the end of the delay. During the time between the preliminary and final TEA, the delay shall be documented in contract progress schedules submitted in accordance with the requirements of Subsection 8.02.

2. No time extension will be granted for any delay or any suspension of the Work due to the fault of the Contractor.

3. No time extension will be granted if the request for a time extension is based on any claim that the originally established contract duration was inadequate.

4. Time extensions will only be granted for delays, including concurrent delays, to activities affecting contract milestones, the contract completion date and/or other critical path activities as demonstrated to the satisfaction of the Engineer by a detailed time entitlement analysis that clearly states the number of calendar days of extra time being requested.

5. The probable slowdown or curtailment of work during inclement weather and winter months has been taken into consideration in determining the contract duration and therefore no time extension will be granted, except as defined in Subsection 8.10.B.4.

6. Any work restriction related to weather, permit conditions, community accommodation, traffic or any other restriction specified in the Contract or reasonably expected for the particular locality and for the particular season of the year in which the Work is being prosecuted must be considered in the analysis of each individual time extension and shall not be considered, in itself, justification for an extension of time.

7. Any time entitlement analysis prepared for the purpose of requesting a time extension shall clearly indicate any proposed overtime hours or additional shifts that are incorporated in the schedule. The Engineer shall have final approval over the use of overtime hours and additional shifts and shall have the right to require that overtime hours and/or additional shifts be used to minimize the duration of time extensions if it is determined to be in best interest of the Department to do so.

D. Disputes

Any dispute regarding whether or not a time entitlement analysis demonstrates entitlement to a time extension, the number of days granted in a time extension or any other question of fact arising under this subsection shall be determined by the Engineer.

The Contractor may dispute a determination by the Engineer by filing a claim notice within 14 calendar 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 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.
DIVISION II
CONSTRUCTION DETAILS

SECTION 140
EXCAVATION OF STRUCTURES

SUBSECTION 140.63 Drainage Structures Abandoned or Removed.

Inlets and outlets of structures to be abandoned shall be plugged with masonry. The masonry plug shall conform to the requirements of Section 270. Upper portions of the masonry shall be removed to a depth of 3 feet below the finished grade at the location designated by the Engineer, and the structures shall be completely filled with selected excavated material placed in 6 inch layers and thoroughly compacted.

SUBSECTION 140.81 Basis of Payment.

Drainage Structures Abandoned and Drainage Structures Removed will be paid for at the contract unit price each. Masonry plugs shall be incidental to the work.

SECTION 270
PIPES REMOVED AND RELAID OR STACKED

SUBSECTION 270.62 Masonry Plug for Pipe Ends.

Masonry plugs shall consist of bricks and mortar to form a watertight seal at the end of the pipe being plugged. The thickness of the plug shall at least be equal to the inside diameter of the pipe being plugged.

SECTION 482
SAWCUTTING

SUBSECTION 482.81 Basis of Payment.

Sawing pavement will be paid for at the respective contract unit prices per foot, which prices shall include all labor, materials and equipment necessary to perform the work.

Sawcutting will be paid separately when made in areas of full depth box widening.

Sawcuts made in existing pavement in areas of trenching for new conduit, in areas of new or reset curb, or trench limits for drainage/water work, will be included in the unit price under the respective items and will not be paid for separately under this item.

Asphalt emulsion tack coat will be paid for under Item 464 Asphalt Emulsion for Tack Coat.
SUBSECTION 482.81 and 482.82 (continued)
482.82 Payment Items.

- 482.3 Sawcutting Asphalt Pavement Foot
- 482.4 Sawcutting Portland Cement Concrete Foot
- 482.5 Sawcutting Asphalt Pavement for Box Widening Foot
- 464. Asphalt Emulsion for Tack Coat Gallon

SECTION 660
METAL PIPE RAIL

SUBSECTION 660.40 General.
(page 170 English) Delete Basic Lead Silico Chromate, Intermediate Paint, M7.02.06.

SECTION 796
PAVEMENT MILLING MULCH UNDER GUARDRAIL

SUBSECTION 769.40 General.
(page SUPPLEMENT C2015-77) Replace this Subsection with the following:

Pavement milling mulch shall meet the requirements specified in Division III, M1.10.0. The geotextile fabric shall conform to M9.50.0 for Stabilization Fabric.

SECTION 815
TRAFFIC CONTROL SIGNALS

SUBSECTION 815.43 Mast Arms – Strain Poles and Span Wire Assemblies.
(page 232 English, page II.1923 Metric) Add the following paragraph immediately under A. General:

All metal support structures shall be in accordance with the requirements of Section 960. Structural Steel and Miscellaneous Metal Products.

SECTION 820
HIGHWAY LIGHTING

SUBSECTION 820.40 General.
(page 241 English, page II.203 Metric) Add the following paragraph to the end of this Subsection:

All metal support structures shall be in accordance with the requirements of Section 960. Structural Steel and Miscellaneous Metal Products.
SECTION 828  
TRAFFIC SIGNS

SUBSECTION 828.20  General.  
(page 248 English, page II.210, page SUPPLEMENT C-C2015-93) Replace the third paragraph to the end of this subsection with the following:

The signs, foundations and supports shall be fabricated and erected in conformity with the following:
A. MUTCD with Massachusetts amendments.
B. AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals
C. MassDOT Construction Standards.

SECTION 840  
SIGN SUPPORTS

SUBSECTION 840.30  General.  
(page 257 English, page II.219 Metric) Add the following paragraph to the end of this Subsection:

All overhead and cantilevered support structures shall be in accordance with the requirements of Section 960. Structural Steel and Miscellaneous Metal Products.

SECTION 850  
TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE OPERATIONS

SUBSECTION 850.45  Arrow Board.  
(page SUPPLEMENT C-2015-104) Delete the last sentence of this subsection:

SUBSECTION 850.47  Radar Detector Activator.  
(page SUPPLEMENT C-2015-104) Delete this entire subsection:
SUBSECTION 850.53  Portable Changeable Message Sign.
(page SUPPLEMENT C-2015-105) Replace the first paragraph with the following:

The Portable Changeable Message Sign shall be capable of performing all functions at ambient temperatures ranging from -31° to 165°F (–35 to 74°C). There shall be no degradation of operation due to fog, rain or snow.

SUBSECTION 850.81  Basis of Payment.
(page SUPPLEMENT C-2015-114) Replace the second paragraph of the page with the following:

Arrow Boards will be paid for at the contract unit price per day which shall include full compensation for furnishing, positioning, repositioning, and removing Arrow Boards as directed by the Engineer.

(page SUPPLEMENT C-2015-115) Replace the first paragraph of the page with the following:

Portable Changeable Message Signs will be paid for at the contract unit price per day which shall provide full compensation for furnishing, positioning, repositioning, and removing Portable Changeable Message Signs as specified or as directed by the Engineer.

SECTION 860
REFLECTORIZED PAVEMENT MARKINGS

SUBSECTION 860.60  Equipment.
(page 266 English, II.232 Metric) Replace this subsection with the following:

860.60  Equipment.

All equipment used for the application of pavement markings shall be approved by the Engineer and shall be of standard commercial manufacture. All equipment and devices necessary for the protection of the pavement marking and the traveling public shall be approved by the Engineer. The pavement marking equipment shall be operated in accordance with the manufacturer’s recommendations.

Truck mounted equipment shall be used for the application of pavement markings except in such cases where in the Engineer’s judgment travel will be unreasonably delayed and/or the quality of the work performed by the machine is unsatisfactory.

The Contractor shall supply the following equipment for each pavement marking operation;
1) infrared pistol thermometer meeting the requirements of Section 460.60
2) digital thickness gauge for measuring the thickness of thermoplastic lines
3) wet film thickness gauges for painted lines.
4) a retoreflectometer with certification of calibration within the last 6 months.

The above equipment shall remain the property of the Contractor upon completion of the project.
**SUBSECTION 860.82 Payment Items.**

*(page 268 English, page II.234 Metric, page SUPPLEMENT C2015-117)* Replace this subsection with the following:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>860.106</td>
<td>6 Inch Reflectorized White Line (Painted)</td>
<td>Foot</td>
</tr>
<tr>
<td>860.112</td>
<td>12 Inch Reflectorized White Line (Painted)</td>
<td>Foot</td>
</tr>
<tr>
<td>861.106</td>
<td>6 Inch Reflectorized Yellow Line (Painted)</td>
<td>Foot</td>
</tr>
<tr>
<td>861.112</td>
<td>12 Inch Reflectorized Yellow Line (Painted)</td>
<td>Foot</td>
</tr>
<tr>
<td>864.</td>
<td>Pavement Arrow Reflectorized White (Painted)</td>
<td>Square Foot</td>
</tr>
<tr>
<td>864.01</td>
<td>Pavement Arrow and Legends Reflectorized White – Inlay Tape</td>
<td>Square Foot</td>
</tr>
<tr>
<td>864.02</td>
<td>Pavement Arrow and Legends - Tape</td>
<td>Square Foot</td>
</tr>
<tr>
<td>864.04</td>
<td>Pavement Arrows and Legends Reflectorized White (Thermoplastic)</td>
<td>Square Foot</td>
</tr>
<tr>
<td>866.106</td>
<td>6 Inch Reflectorized White Line (Thermoplastic)</td>
<td>Foot</td>
</tr>
<tr>
<td>866.112</td>
<td>12 Inch Reflectorized White Line (Thermoplastic)</td>
<td>Foot</td>
</tr>
<tr>
<td>867.106</td>
<td>6 Inch Reflectorized Yellow Line (Thermoplastic)</td>
<td>Foot</td>
</tr>
<tr>
<td>867.112</td>
<td>12 Inch Reflectorized Yellow Line (Thermoplastic)</td>
<td>Foot</td>
</tr>
</tbody>
</table>
DIVISION III
MATERIALS SPECIFICATIONS

SECTION M1
SOILS AND BORROW MATERIALS

SUBSECTION M1.10.0 Pavement Milling Mulch.
(pages 330 English, III.7 Metric) Add this Subsection:

Pavement milling mulch shall consist of recently milled asphalt concrete pavement. The milled material shall meet the following gradation requirements as determined by AASHTO T11 and T27:

<table>
<thead>
<tr>
<th>Square Opening Sieve</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ½ inch (37.5 mm)</td>
<td>100</td>
</tr>
<tr>
<td>1 inch (25.0 mm)</td>
<td>85 - 100</td>
</tr>
<tr>
<td>½ inch (12.5 mm)</td>
<td>10 - 98</td>
</tr>
<tr>
<td>No. 4 (4.75 mm)</td>
<td>0 - 70</td>
</tr>
<tr>
<td>No. 200 (75 µm)</td>
<td>0 - 12</td>
</tr>
</tbody>
</table>

SECTION M7
PAINTS AND PROTECTIVE COATINGS

SUBSECTION M7.02 Structural Paint
(pages 379 English, page III.67 Metric) Delete this subsection.

**<<<<<<<<<<<<<<<<<<<<<<>**
END OF INTERIM SUPPLEMENTAL SPECIFICATIONS
SUPERPAVE REQUIREMENTS
Section 450 - Hot Mix Asphalt Pavement entirely replaces the following Sections and Subsections of the Standard Specifications for Highways and Bridges:

- Section 420 - Class I Bituminous Concrete Base Course Type I-1
- Section 460 - Class I Bituminous Concrete Pavement Type I-1
- Subsection M3.01.0 - Asphalt Cement
- Subsection M3.11.06 - Bituminous Materials
- Subsection M3.11.08 - Inspection
- Subsection M3.11.09 - Composition and Compaction Acceptance Tests

The Contractor shall adhere to all of the requirements herein of Section 450, Hot Mix Asphalt Pavement. All QC Inspection Report Forms and Test Report Forms must be submitted to the Department by the Contractor at the completion of each Lot. Material produced and placed must conform to the Quality Limits specified in Subsection 450.77. Contractor QC data and Department Acceptance data for each Lot falling under HMA Lot Category A (Large Lot) or Category B (Small Lot) will be evaluated using Quality Level Analysis and must meet the minimum Percent Within Limits specified in Subsection 450.77.

NOTE: The Pay Adjustment provisions included in Subsection 450.92 will be applied to items under this contract.
SECTION 450
HOT MIX ASPHALT PAVEMENT

DESCRIPTION

450.20 General.

This work shall consist of producing and placing Hot Mix Asphalt (HMA) pavement. HMA mixtures shall be composed of the following: Mineral aggregate, mineral filler (if required), Performance Graded Asphalt Binder (PGAB), and as permitted, reclaimed materials (limited to Reclaimed Asphalt Pavement (RAP), Manufactured Asphalt Shingles (MAS), and Processed Glass Aggregate (PGA)). The HMA pavement shall be constructed as shown on the plans and as directed on the prepared or existing base in accordance with these specifications and in close conformity with the lines, grades, compacted thickness and typical cross section as shown on the plans. Unless specified otherwise, each HMA pavement course placed shall be comprised of one of the mixture types listed in Table 450.1.

Table 450.1 - HMA Pavement Courses & Mixture Types

<table>
<thead>
<tr>
<th>Pavement Course</th>
<th>Mixture Type</th>
<th>Mixture Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friction Course</td>
<td>• Open-Graded Friction Course - Polymer Modified</td>
<td>OGFC-P</td>
</tr>
<tr>
<td>Surface Course</td>
<td>• SUPERPAVE Surface Course - 4.75</td>
<td>SSC - 4.75</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Surface Course - 9.5</td>
<td>SSC - 9.5</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Surface Course - 12.5</td>
<td>SSC - 12.5</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Surface Course - 19.0</td>
<td>SSC - 19.0</td>
</tr>
<tr>
<td>Intermediate Course</td>
<td>• SUPERPAVE Intermediate Course - 12.5</td>
<td>SIC - 12.5</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Intermediate Course - 19.0</td>
<td>SIC - 19.0</td>
</tr>
<tr>
<td>Base Course</td>
<td>• SUPERPAVE Base Course - 25.0</td>
<td>SBC - 25.0</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Base Course - 37.5</td>
<td>SBC - 37.5</td>
</tr>
<tr>
<td>Leveling Course</td>
<td>• SUPERPAVE Leveling Course - 4.75</td>
<td>SLC - 4.75</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Leveling Course - 9.5</td>
<td>SLC - 9.5</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Leveling Course - 12.5</td>
<td>SLC - 12.5</td>
</tr>
<tr>
<td>Bridge Surface Course</td>
<td>• SUPERPAVE Bridge Surface Course - 9.5</td>
<td>SSC-B - 9.5</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Bridge Surface Course - 12.5</td>
<td>SSC-B - 12.5</td>
</tr>
<tr>
<td>Bridge Protective Course</td>
<td>• SUPERPAVE Bridge Protective Course - 9.5</td>
<td>SPC-B - 9.5</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Bridge Protective Course - 12.5</td>
<td>SPC-B - 12.5</td>
</tr>
</tbody>
</table>
450.30 Quality Assurance.

A. Quality Assurance Responsibilities.

This is a Quality Assurance Specification wherein the Contractor is responsible for controlling the quality of materials and workmanship and the Department is responsible for accepting the completed work based on the measured quality. Quality Assurance is simply defined as “making sure the Quality of a product is what it should be”.

The core elements of Quality Assurance include: Contractor Quality Control (QC), Department Acceptance, Department Independent Assurance (IA), Dispute Resolution, Qualified Laboratories, and Qualified Personnel. Although Quality Assurance utilizes test results to control production and determine acceptance of the HMA, inspection remains as an important element in controlling the process and accepting the product.

The Contractor is responsible for providing an appropriate Quality Control system to ensure that all materials and workmanship meet the required quality levels for each specified Quality Characteristic. The Contractor will perform all required Quality Control inspection, sampling, and testing in accordance with these specifications and the Contractor’s Quality Control Plan.

The Department will monitor the adequacy of the Contractor’s QC activities and will perform Acceptance inspection, sampling, and testing. The Department’s Acceptance information will be utilized in the acceptance determination for each Lot of material produced and placed.

Independent Assurance is the responsibility of the Department’s Central Materials Laboratory. The function of IA testing is to periodically provide an unbiased and independent evaluation of the sampling and testing procedures used in the acceptance decision. Contractor QC and Department Acceptance testing procedures and equipment will be evaluated by IA personnel using one or more of the following: observation, calibration checks, split sample comparison, or proficiency samples (homogeneous samples distributed and tested by two or more laboratories). QC and Acceptance testing personnel are evaluated by observation and split samples or proficiency samples.

B. Hot Mix Asphalt Lots & Sublots.

The quality of each HMA pavement course of the same mixture type produced and placed will be inspected, tested, and evaluated on the basis of Lots and Sublots. A Lot is defined as “an isolated quantity of material from a single source which is assumed to be produced or placed by the same controlled process”.

The Lot size and corresponding unit of measure is a function of the individual Quality Characteristic evaluated. Lot sizes for Quality Characteristics subject to Department Acceptance are as shown in Table 450.2.

Changes in the target values, material sources, or JMF for an HMA mixture type will constitute a change in Lot, requiring the establishment of a new Lot. All Lots will be properly identified for accurate evaluation and reporting of HMA quality.
Table 450.2 - HMA Lot Sizes

<table>
<thead>
<tr>
<th>Quality Characteristic</th>
<th>Lot Size &amp; Unit of Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG Asphalt Binder Grading</td>
<td>Total Tons of HMA from all JMFs using the same PGAB Grade (from same PGAB Supplier), produced by a single plant and placed within same construction season.</td>
</tr>
<tr>
<td>PG Asphalt Binder Content</td>
<td>Total quantity of an HMA mixture type with same JMF for same individual pavement course, produced by a single plant using the same source of materials and placed at a uniform plan thickness within the same construction season, not to exceed 18,000 tons. (See Table 450.3).</td>
</tr>
<tr>
<td>Volumetrics - Air Voids</td>
<td></td>
</tr>
<tr>
<td>In-place Density</td>
<td></td>
</tr>
<tr>
<td>Thickness</td>
<td></td>
</tr>
<tr>
<td>Ride Quality (IRI)</td>
<td>Total length (miles) of individual wheel paths (in all travel lanes and ramps) of in-place HMA with same JMF for same individual pavement course, produced by a single plant and placed within same construction season, and which is located within the same posted speed limit range as defined in Table 450.19</td>
</tr>
<tr>
<td>Wheel Path Deviations</td>
<td></td>
</tr>
</tbody>
</table>

C. HMA Quality Assurance Requirements.

These Specifications establish three categories under which Hot Mix Asphalt Lots will be produced, placed, evaluated and accepted. Table 450.3 below defines each of the Lot categories and outlines the required Quality Assurance activities of the Contractor and the Department. The division of the Lot categories is based on the total estimated contract quantity of each individual HMA mixture type per each project location. For contracts containing multiple Hot Mix Asphalt items, it is possible to have work performed under more than one HMA Lot category.

(1) Determination of Lot Size and Lot Category

When the total contract quantity of an HMA mixture type is < 2,100 tons (1,925 Mg), it shall be classified as a Minor Lot (Category C Lot).

When the total contract quantity of an HMA mixture type is ≥ 2,100 tons (1,925 Mg), but < 7,500 tons (6,875 Mg), it shall be classified as a Small Lot (Category B Lot).

When the total contract quantity of an HMA mixture type is ≥ 7,500 tons (6,875 Mg), but ≤ 15,000 tons (13,750 Mg), it shall be classified as a Large Lot (Category A Lot).

When the total contract quantity of an HMA mixture type is > 15,000 tons (13,750 Mg), each 15,000 tons (13,750 Mg) will represent a Category A Lot. If the quantity remaining after all 15,000 ton (13,750 Mg) Category A Lots is ≤ 3,000 tons (2,750 Mg), it shall be added to the final Lot providing a final Lot quantity not to exceed 18,000 tons (16,500 Mg). If the quantity remaining after all 15,000 ton (13,750 Mg) Category A Lots is > 3,000 tons (2,750 Mg), it shall constitute a separate Category A Lot.

(2) Determination of Sublot Size

Each HMA Lot will be divided into Sublots of uniform size. The size of each HMA Sublot shall be as listed in Table 450.10 and Table 450.17. If the HMA quantity at the end of a Lot is equal to or greater than one half of a full Sublot, then such quantity shall be identified and evaluated as a separate Sublot. If the HMA quantity at the end of a Lot is less than one half of a full Sublot, then such quantity shall be combined with the previous full Sublot quantity and shall be identified and evaluated as the final Sublot.
Table 450.3 - HMA Lot Categories & Quality Assurance Requirements

<table>
<thead>
<tr>
<th>Quality Assurance Requirements</th>
<th>Category A (Large Lot)</th>
<th>Category B (Small Lot)</th>
<th>Category C (Minor Lot)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Quantity for individual Lot of HMA:</td>
<td>≥ 7,500 tons (6,875 Mg), but ≤ 15,000 tons (13,750 Mg)</td>
<td>≥ 2,100 tons (1,925 Mg), but &lt; 7,500 tons (6,875 Mg)</td>
<td>&lt; 2100 tons (1,925 Mg)</td>
</tr>
<tr>
<td>QC Plan Required:</td>
<td>YES</td>
<td>YES</td>
<td>(See Note 2)</td>
</tr>
<tr>
<td>Contractor QC Inspection Required:</td>
<td>YES (Subsection 450.64)</td>
<td>YES (Subsection 450.64)</td>
<td>YES (Subsection 450.64)</td>
</tr>
<tr>
<td>Contractor QC Testing Required:</td>
<td>YES (Subsection 450.65)</td>
<td>YES (Subsection 450.65)</td>
<td>YES (Subsection 450.65)</td>
</tr>
<tr>
<td>Control Strip Required:</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Control Charts Required:</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Quality Level Analysis Required:</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>MassDOT Acceptance Inspection &amp; Testing Performed:</td>
<td>Minimum 25% of Sublots (Subsection 450.74)</td>
<td>Minimum 50% of Sublots, But Minimum 3 Sublots (Subsection 450.74)</td>
<td>100% of Sublots (Subsection 450.74)</td>
</tr>
<tr>
<td>QC Test Results included in MassDOT Acceptance Determination:</td>
<td>YES (If Validated)</td>
<td>YES (If Validated)</td>
<td>NO</td>
</tr>
<tr>
<td>Pay Adjustment Applied:</td>
<td>YES (Subsection 450.92)</td>
<td>YES (Subsection 450.92)</td>
<td>NO</td>
</tr>
</tbody>
</table>

Note 1: Category A Lots shall not exceed 18,000 tons (16,500 Mg) as specified in Subsection 450.30C(1)
Note 2: If all HMA Lots fall under Category C then a QC Plan is not required. However, if any Lots on the project fall under Category A or Category B, then any Category C Lots must be addressed in the QC Plan.
MATERIALS

450.40 General.

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

- Asphalt Emulsion M3.03.0
- Hot Poured Joint Sealer M3.05.0
- Asphalt Anti-Stripping Additive M3.10.0
- Job-Mix Formula M3.11.03
- Mineral Aggregate M3.11.04
- Mineral Filler M3.11.05
- Plant Requirements M3.11.07

450.42 Hot Mix Asphalt Mix Design.

The Contractor shall be responsible for development of all HMA Laboratory Trial Mix Formulas (LTMF). The aggregate gradation structure and target PG Asphalt Binder content of each LTMF for HMA base courses, HMA intermediate courses, and HMA surface courses shall conform to the Control Points in Section 455. The aggregate gradation structure and target PG Asphalt Binder content for Open-Graded Friction Course (OGFC-P) shall conform to the master ranges in M3.11.03 – Table B.

All LTMFs for HMA pavement courses shall be supported by volumetric mix designs. Volumetric mix designs are not required for OGFC-P.

All HMA LTMF’s will be submitted to the Engineer with adequate samples of individual ingredients for verification of each proposed mixture. Upon the Engineer’s laboratory verification of the LTMF for Category A Lots, a Control Strip will be necessary. Once each LTMF for Category B Lots or Category C Lots is laboratory verified and accepted by the Engineer, the LTMF will become the approved job mix formula (JMF).

Two or more job-mix formulas per HMA mixture type may be approved for a particular plant, however, only HMA conforming to one job-mix formula is permitted to be produced and placed on any given day.

450.44 Reclaimed Asphalt Pavement (RAP).

Reclaimed Asphalt Pavement (RAP) shall consist of the material obtained from the highways or streets by crushing or milling existing HMA pavements. This material shall be transported to the HMA production facility yard and processed through an appropriate crusher so that the resulting material will contain no particles larger than the maximum aggregate size of the HMA mixture in which it will be used. The material shall be stockpiled on a free draining base, covered and kept separate from the virgin aggregates. The material contained in the RAP stockpiles shall have a reasonably uniform gradation from fine to coarse and shall be protected from accumulation of excessive moisture and shall not be contaminated by foreign materials.
The use of RAP will be permitted at the option of the Contractor provided that the end product is in conformance with the approved job-mix formula. The proportion of RAP to virgin aggregate for base course mixtures and intermediate course mixtures shall be limited to a maximum of 40% for drum mix plants and 20% for modified batch plants. The maximum amount of RAP for all surface course mixtures listed in Table 450.1 shall be 15%. No RAP will be allowed in OGFC-P mixtures.

450.46 Manufactured Asphalt Shingles (MAS)

Manufactured Asphalt Shingles (MAS), as defined in M3.11.04, may be used in HMA leveling courses, HMA base courses, and HMA intermediate courses at a maximum rate of 5% by weight only when RAP is not included in the job mix formula. When MAS is used in HMA mixtures containing RAP or other reclaimed materials, the MAS will be considered as part of the overall allowable mass of reclaimed materials in the mixture, as defined in M3.11.06. HMA mixtures containing MAS shall be designed, produced, and placed in accordance with the requirements contained in Section M3.

450.48 Performance Graded Asphalt Binder.

A. Standard Asphalt Binder Grade.

The Asphalt Binder shall be a Performance Graded Asphalt Binder (PGAB) which meets the specification requirements of AASHTO Standard M320. PGAB shall be provided by an Approved Supplier (AS) in accordance with the Approved Supplier Certification (ASC) system outlined in AASHTO R26, “Standard Practice for Certifying Suppliers of Performance Graded Asphalt Binders”.

The standard PGAB grade for Massachusetts has been determined based upon the expected minimum and maximum pavement in-service temperature using the LTPPBind software with a High Reliability (96-98%). Unless indicated otherwise on the Plans or in the Special Provisions, the standard PGAB Grade of PG64-28 shall be used.

B. Asphalt Binder Modifiers for Reclaimed Materials.

For any HMA containing reclaimed materials, an asphalt binder modifier shall be added to the mixture to restore the asphalt binder properties of the reclaimed materials to a level that is consistent with the specified virgin PGAB. If greater than 25% RAP is used in an HMA mixture, the PGAB modifier grade used shall be in accordance with Table 450.4. The type and amount of asphalt binder modifier to be used shall be included as part of the LTMF. Only Performance Graded Asphalt Binders will be used as modifiers and shall meet the requirements of AASHTO M 320. However, the resulting final PGAB grade shall be in accordance with Table 450.4 (or the specified PGAB grade per the contract).

For HMA Category A Lots and Category B Lots incorporating greater than 25% RAP in the LTMF, the Contractor shall perform, as part of the mix design, full binder testing per AASHTO M 320 on samples of asphalt binder recovered from the RAP (by Abson recovery) blended in the appropriate proportion with samples of the virgin PGAB.

For HMA Category A Lots containing greater than 25% RAP, the Contractor shall also perform full binder testing (on asphalt binder recovered from the RAP blended with the virgin PGAB) for the Control Strip and for Quality Control during HMA production and placement as specified in Subsection 450.65.
## Table 450.4 - PGAB Grades for HMA Mixtures Containing RAP

<table>
<thead>
<tr>
<th>Amount of RAP in Mixture</th>
<th>PGAB Modifier Grade</th>
<th>Resulting PGAB Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 25% RAP by Weight of Mixture</td>
<td>None</td>
<td>64-28</td>
</tr>
<tr>
<td>&gt; 25% to 40% RAP by Weight of Mixture</td>
<td>52-34</td>
<td>64-28 ± 2°C</td>
</tr>
</tbody>
</table>
CONSTRUCTION PROCEDURES

450.50  General.

Prior to the start of any work activity addressed in Subsections 450.53 thru 450.59 below, a Construction Quality Meeting shall be held to review the Contractor’s Quality Control system. The Contractor shall present and discuss with the Engineer in sufficient detail the specific Quality Control information and activities contained in each section of their QC Plan as outlined in Subsection 450.61 below. The meeting is intended to ensure that the Contractor has an adequate Quality Control system in place and that the Contractor’s personnel are fully knowledgeable of the roles and activities for which they are responsible to achieve the specified level of quality. Contractor personnel required to attend the Construction Quality Meeting include: the Project QC Manager, all other QC personnel (production facility and field operations), all Superintendents, and the Foremen for field operations. The Contractor shall provide a copy of the approved QC Plan for each Contractor and Department attendee of the meeting.

450.51  Control of Grade and Cross-Section.

The Contractor will provide a longitudinal and transverse reference system, with a maximum spacing of 100 ft (30 meters), for the purpose of locating and documenting sampling and testing locations and related uses. It is the Contractor’s responsibility to clearly mark this reference system in the field. Work related to this reference system is incidental and will be included as part of the Contractor’s Quality Control system. The Department shall provide information tying in the Contractor’s reference system to the State Mile Marker System.

The Contractor shall furnish, set and maintain all line and grade stakes necessary to guide the automated grade control equipment. Where required these control stakes shall be maintained by the Contractor and used throughout the operations, from the grading of the subbase material up to and including the final course of the pavement.

Under normal conditions, where more than one course of HMA is to be constructed, the use of the string line for grade control may be eliminated or discontinued after the construction of the initial course of HMA. For resurfacing projects, where only one course of HMA is to be constructed, the use of the string line for grade control may be eliminated. The use of approved automation may then be substituted for the string line where lines and grades are found to be satisfactory by the Engineer.

450.52  Weather Limitations.

HMA shall only be placed on dry, unfrozen surfaces and only when the temperature requirements contained in Table 450.5 below are met.

The Contractor may continue HMA placement when overtaken by sudden rain, but only with material which is in transit from the HMA production facility at the time, and then only when the temperature of the HMA mixture is within the temperature limits specified and when the existing surface on the roadway is free of standing moisture.

The construction of HMA pavement shall terminate November 15 and shall not be resumed prior to April 1 except as determined and directed in writing by the Engineer depending upon the necessity and emergency of attendant conditions, weather conditions, and location of the project. Only in extreme cases will the placement of surface courses be permitted between November 15 and April 1. Regardless of any temperature requirements, OGFC-P mixtures shall not be placed after October 31 or before May 1 without the written permission of the Engineer.
### Table 450.5 - Temperature Limitations for HMA Placement

<table>
<thead>
<tr>
<th>HMA Pavement Course</th>
<th>Lift Thickness Inches (mm)</th>
<th>Minimum Air Temperature °F (°C)</th>
<th>Minimum Surface Temperature °F (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friction Course</td>
<td>1 (25)</td>
<td>50 (10)</td>
<td>55 (13)</td>
</tr>
<tr>
<td>Surface Course</td>
<td>&lt; 1¼ (45)</td>
<td>45 (7)</td>
<td>50 (10)</td>
</tr>
<tr>
<td></td>
<td>≥ 1¼ (45)</td>
<td>40 (4)*</td>
<td>45 (7)</td>
</tr>
<tr>
<td>Intermediate Course</td>
<td>All</td>
<td>40 (4)*</td>
<td>45 (7)</td>
</tr>
<tr>
<td>Base Course</td>
<td>All</td>
<td>40 (4)*</td>
<td>45 (7)</td>
</tr>
<tr>
<td>Leveling Course</td>
<td>As Specified</td>
<td>45 (7)</td>
<td>50 (10)</td>
</tr>
</tbody>
</table>

*When the air temperature falls below 50°F (10°C), extra precautions shall be taken in drying the aggregates, controlling the temperatures of the materials, and in placing and compacting the mixtures.

The Contractor shall supply the Engineer with an approved dial type thermometer with a temperature range of -50°F to 500°F (-18°C to 260°C) and an infrared pistol thermometer for each paving machine in operation on the project. The infrared pistol thermometer shall be Fahrenheit or Celsius selectable and conform to the following requirements:

- Portable and battery operated
- LCD Display to nearest 1°F (1°C)
- Temperature operating range of 0°F to 750°F (-18°C to 400°C)
- Accuracy of ±2%
- Repeatability of +/- 5°F (±3°C)
- Emissivity preset at 0.95

The thermometers will remain the property of the Contractor upon completion of the project.

### 450.53 Preparation of Underlying Surface.

HMA mixtures shall be placed only upon properly prepared surfaces that are clean from foreign materials. The underlying surface shall be prepared in accordance with the requirements below, prior to the placement of HMA pavement courses.

#### A. Subbase or Reclaimed Base.

Prior to the placement of HMA base course mixtures, the Contractor shall inspect the prepared subbase or reclaimed base material to ensure that it is in conformance with the required grade, cross-section, and in-place density. Subbase or reclaimed base material that is not in accordance with the plans or specifications shall be reworked or replaced to meet the applicable requirements of Sections 401, 402, or 403 before the start of HMA placement. The subbase or reclaimed base shall not be frozen or have standing water when placing HMA.
B. Milling Existing HMA Pavement.

When specified on the plans, existing HMA pavement courses shall be milled and removed from the project by the Contractor. Milling shall be performed in conformity with the limits, line, grade, and typical cross-section shown on the plans and in accordance with Section 130, Milling Existing HMA Pavement. All Quality Control activities for milling shall be addressed in the Contractor’s HMA QC Plan.

C. Patching Existing Pavement Courses.

Areas of existing HMA pavement courses that are significantly distressed or unsound shall be removed and replaced with patches using new Hot Mix Asphalt. The location and limits of patching will be as identified in the plans or as directed by the Engineer.

Each existing pavement course determined to be unsound shall be removed to the full depth of the pavement course within a rectangular area. For each patch location equal to or greater than 50 square feet (4.6 square meters) in area (and having a minimum dimension of 4 feet (1.2 meters)) where the existing pavement courses are removed down to subbase, the subbase shall be compacted by mechanical means to not less than 95% of the maximum dry density of the subbase material as determined by AASHTO T 99 method C at optimum moisture content. Each edge of the patch area shall be sawcut or otherwise neatly cut by mechanical means to provide a clean and sound vertical face. The vertical face of each edge shall be thoroughly coated with a hot poured rubberized asphalt sealant meeting the requirements of ASTM D3405 immediately prior to placing the HMA patching mixture.

Delaminated areas of existing pavement courses resulting from pavement milling shall be cut back neatly by mechanical means to the limits of any unsound material. After removing all unsound material, the underlying pavement surface within the patch limits shall receive a thorough tack coat at a rate of application of 1/10 gal/s.y. (0.40 liters/square meter) immediately prior to placing the HMA patching mixture.

HMA patching mixture shall be the same mixture type as the existing pavement course being patched or as specified on the plans or as directed by the Engineer. The lift thickness of the patching mixture shall not exceed four times the nominal maximum aggregate size of the mixture. The patching mixture will be placed by hand or by mechanical means and shall match the thickness, grade, and cross-slope of the surrounding pavement. The HMA patching mixture shall be compacted using a steel wheel roller. For patch areas not large enough to permit use of a roller, compaction shall be accomplished using a mechanical tamper capable of achieving the required in-place density. The Contractor shall test the in-place density of each patched area using a calibrated density gauge and record the test data for each patched area on NETTCP Test Report Forms. The in-place density of the HMA patching mixture shall be not less than 92% of the maximum theoretical density of the mixture as determined by AASHTO T 209.

D. Leveling Courses.

HMA Leveling Courses shall only be used when specified in the Plans or Special Provisions. The HMA mixture used for a Leveling Course shall be as specified in the Plans or Special Provisions and shall conform to the relevant Materials requirements of Section 450.

E. Preparation of Curbs, Edging, and Utilities.

All curbs or edging shall be installed or reset to the line and grade established on the plans. The surface elevation of all catch basin frames and grates, manholes, utility valve boxes, or other utility structures located in the pavement shall uniformly match the grade and cross-slope of the final pavement riding surface. Adjustment of all curbs, edging, and utilities shall be completed prior to the placement of the HMA surface course. When OGFC-P is specified to be placed over the HMA surface course, all curbs, edging, and utilities shall be adjusted prior to
placement of the surface course mixture. Hand placement of HMA along curbs and edging or around utilities after placement and compaction of the surface course shall not be permitted.

F. Sweeping Underlying Surface.

The Contractor shall provide a mechanical sweeper equipped with a water tank, spray assembly to control dust, a pick-up broom, a dual gutter broom, and a dirt hopper. The sweeper shall be capable of removing millings and loose debris from the underlying surface.

All milled pavement surfaces shall be thoroughly swept in accordance with Section 130, prior to opening a milled area to traffic, to remove all remaining millings and dust. All other existing pavement surfaces shall be swept immediately prior to application of the tack coat. Any new HMA pavement course that has been open to traffic, or that was placed 30 days prior to placement of the subsequent pavement course, shall also be swept immediately prior to application of the tack coat.

G. Tack Coat.

A tack coat of asphalt emulsion, grade RS-1 shall be uniformly applied to existing or new pavement surfaces prior to placing pavement courses as specified below. The existing surface shall be swept clean of all foreign matter and loose material using a mechanical sweeper and shall be dry before the tack coat is applied.

(1) Tack Distributor System.

A pressure distributor shall be used to apply the tack coat. The tack distributor system shall be equipped with the following to control and monitor the application:

(a) System for heating the asphalt emulsion uniformly to specified temperature.
(b) Thermometer for measuring the asphalt emulsion temperature.
(c) Adjustable full circulation spray bar.
(d) Positive controls including tachometer, pressure gauge, and volume measuring device.

(2) Tack Application Requirements.

The tack coat material shall be applied by a pressure distributor. All nozzles on the distributor shall be open and functioning. All nozzles shall be turned at the same angle to the spray bar. Proper nozzle angle shall be as determined by the manufacturer of the distributor spray bar. The spray bar shall be adjusted so that it is at the proper height above the pavement surface to provide a double overlap spray for a uniform coverage of the pavement surface. A double lap application requires that the nozzle spray patterns overlap one another such that every portion of the pavement receives spray from exactly two nozzles.

When an HMA pavement course is placed on an existing tight smooth pavement surface, a tack coat shall be applied at the rate of 1/20 gal/s.y. (0.20 liters/square meter). All existing surfaces subjected to milling shall receive a tack coat at the rate of 1/15 gal/s.y. (0.28 liters/square meter). Tack coat shall be applied to cover approximately 90% of the pavement surface.

Any new HMA pavement course that has been open to traffic, or that was placed 30 days prior to placement of the subsequent pavement course, shall receive a tack coat at an application rate of 1/20 gal/s.y. (0.20 liters/square meter).

When the surface of a new HMA pavement course is in a condition which in the Engineer's judgment is unsatisfactory for the direct placement of the subsequent pavement course, a tack coat shall be applied at the applicable rate specified above for the particular pavement surface condition.

In addition to the requirements above, all vertical surfaces of curbs, edging, utilities, and drainage structures shall receive a thorough tack coat application immediately prior to placing each HMA pavement course.
(3) Tack Inspection.

The asphalt emulsion temperature and application rate shall be periodically measured and properly recorded by the Contractor on NETTCP Inspection Report Forms. If the temperature or application rate is determined to not be in conformance with the specification requirements above, the Contractor shall make appropriate adjustments to the tack application operations.

450.54 Hot Mix Asphalt Transportation and Delivery.

A. Haul Unit Equipment.

The trucks used to transport HMA to the field placement site shall have tight, clean, smooth metal beds. When necessary to maintain the required HMA temperature, trucks shall be equipped with insulated beds. The truck beds shall be evenly and lightly coated with an approved release agent to prevent HMA mixture adherence. Release agents may consist of soapy water or commercial oil emulsions (also known as soluble oils) in the proportions recommended by the manufacturer. Truck beds shall be kept free of kerosene, gasoline, fuel oil, solvents, or other materials that could adversely affect the HMA mixture. Excess lubricant shall not be allowed to accumulate in low spots in the body. The Contractor shall employ sufficient procedures and QC inspection to ensure that all truck beds are free of contaminants, residual HMA, or excess release agent.

B. HMA Protection During Transport.

The HMA shall be transported from the plant to the field placement site in trucks previously cleaned of all foreign materials. During transportation of the HMA from the plant to the placement equipment at the site, each load shall be fully covered at all times, without exception, with canvas or other suitable material of sufficient size and thickness, which is tightly secured to furnish complete protection. The HMA shall not be transported such a distance that segregation of the mixture takes place or that a crust is formed on the surface, bottom or sides of the HMA.

C. Coordination and Inspection of HMA Delivery.

The dispatching of trucks from the plant shall be continuously coordinated to ensure that all HMA mixture planned to be delivered to the field placement site may be placed and compacted before the end of the scheduled work day. During paving operations, the Contractor shall provide for ongoing two-way radio or cellular phone communication between the field placement site and the HMA plant.

The target temperature and allowable range of the HMA when delivered at the field placement site will be established in the Contractor’s Quality Control Plan. The Contractor shall measure the temperature of the HMA, either from the trucks prior to discharge or from the paver hopper, using a metal stemmed dial type thermometer at the minimum frequency indicated in the approved QC Plan. All QC temperature measurement results of the delivered HMA mixture shall be recorded on NETTCP Inspection Report Forms. The Contractor shall also visually inspect the delivered HMA for crusting or material (physical) segregation. The Contractor shall reject any loads of HMA with material which is crusted, segregated, or which is not within the delivery temperature range established in the Contractor’s Quality Control Plan.

450.55 Hot Mix Asphalt Placement.

A. Material Transfer Vehicles

For projects on all controlled access highways with HMA Category A Lots, a Material Transfer Vehicle (MTV) will be required. The MTV shall be used to place each pavement
course, with the exception of leveling courses, on the mainline of the traveled way including all travel lanes, auxiliary lanes, and collector/distributor (C/D) lanes.

1) MTV Equipment Requirements.
   The MTV shall be self-propelled and capable of remixing and transferring the HMA mixture to the paver so that the HMA mat behind the paver has a uniform homogeneous temperature and appearance. The MTV shall be equipped with the following:
   (a) A truck unloading system, capable of 600 tons per hour (550 Mg per hour), which shall receive HMA from the trucks and independently deliver the mixture from the trucks to the paver.
   (b) A paver hopper insert with a minimum capacity of 14 tons (12.7 Mg) shall be installed in the hopper of conventional paving equipment. The paver hopper insert shall be marked to identify the point at which the insert is 50% full.
   (c) An internal storage bin with a minimum capacity of 25 tons (22.7 Mg) of mixture and a remixing system in the bottom of the storage bin to continuously blend the mixture as it discharges to a conveyor system; or a dual pugmill system located in the paver hopper insert with two full length longitudinally mounted counter-rotating screw augers to continuously blend and feed the mixture through the paver to the screed.

2) MTV Operations.
   The Contractor shall ensure that the MTV is loaded continuously to keep the paver moving. The volume of HMA in the paver hopper insert shall remain above the 25% capacity mark during all paving operations. In the event the MTV malfunctions during HMA placement operations, the Contractor shall continue placement of material until such time there is sufficient HMA placed to maintain traffic in a safe manner. The Contractor may continue placement of HMA until any additional mixture in transit has been placed. Paving Operations may resume only after the MTV has been repaired and is fully operational.

3) Bridge Loading Restrictions.
   The MTV shall be subject to all bridge load restrictions. The Contractor shall verify the sufficiency of the current bridge ratings with the Engineer. In the event that the MTV exceeds the maximum allowable bridge load, the MTV shall be empty when crossing the bridge and shall be moved across without any other Contractor vehicles or equipment being on the bridge. The MTV shall be moved across the bridge in a travel lane and shall not be moved across the bridge on the shoulder. The MTV shall be moved at a speed no greater than five miles per hour (8 kph) without any acceleration or deceleration.

B. Pavers.
   Each HMA pavement course shall be placed with one or more pavers at the specified grade, cross-slope, and lift thicknesses.

1) Paver Equipment Requirements.
   Each paver shall be a self-contained, power propelled unit and shall produce a finished surface of smooth and uniform texture without segregating, tearing, shoving or gouging the HMA. The pavers shall be equipped with the following:
   (a) A receiving hopper having sufficient capacity to ensure a uniform and continuous placement operation.
   (b) Automatic feed controls, which are properly adjusted to maintain a uniform depth of material ahead of the screed.
   (c) Automatic screed controls with sensors capable of sensing the transverse slope of the screed, and providing the automatic signals that operate the screed to maintain grade and transverse slope.
An adjustable vibratory screed with full-width screw augers and heated for the full width of the screed.

Capable of spreading and finishing HMA pavement courses in widths at least 12 inches (300mm) more than the width of one travel lane.

Capable of being operated at forward speeds to satisfactorily place the HMA.

(2) Paver Operations.

The Contractor shall ensure that the paver is loaded continuously to keep the placement operation moving. The volume of HMA in the paver receiving hopper shall remain above the paver tunnel during all paving operations. Proper practices shall be utilized to ensure that HMA is not dumped or spilled onto the prepared underlying surface in front of the paver by trucks unloading into the receiving hopper.

C. HMA Placement Inspection.

The HMA shall be free of identifiable material (physical) segregation or temperature related segregation. The HMA placed shall be a homogeneous mixture that is of uniform temperature. The Contractor shall inspect the HMA in the paver receiving hopper for material (physical) segregation. The Contractor will also inspect the uncompacted HMA mat behind the paver for longitudinal streaks, end-of-load segregation or other irregularities.

The Contractor shall also measure the temperature differential in the uncompacted mat behind the paver. Each HMA pavement course behind the paver shall be divided into longitudinal Sublots of 500 feet (150 meters). The mat temperature differential of the uncompacted HMA shall be measured at a minimum of one location in each Sublot along a straight transverse line behind the paver at a minimum frequency of once per Sublot. The transverse line for mat temperature measurement shall be established at a distance within 10 feet (3 meters) behind the paver screed. Temperature measurements shall be obtained by the Contractor using an infrared pistol thermometer at two (2) foot intervals along the transverse line across the width of the mat and recorded on NETTCP Inspection Report Forms. The difference between the highest and lowest temperature measurement shall not exceed 20°F (10°C).

If the maximum mat temperature differential is exceeded, or if material segregation or irregularities in the HMA mat behind the paver are noted, the Contractor shall review the production, transportation, and placement operations and take corrective action. The Contractor shall make every effort to prevent or correct any irregularities in the HMA, such as changing pavers or using different and additional equipment. The Contractor’s Quality Control Plan shall fully outline procedures for inspecting the HMA mat during placement, identifying and troubleshooting material segregation or temperature related segregation, and implementing corrective action.

450.56 Hot Mix Asphalt Compaction.

A. Compaction Equipment Requirements.

The Contractor shall employ compaction equipment as outlined in the approved Quality Control Plan. Equipment used for compaction of HMA Base Courses, Intermediate Courses and Surface Courses may include steel wheeled rollers, vibratory rollers, oscillation rollers, or pneumatic-tired (rubber tired) rollers as determined appropriate by the Contractor for the particular mixture type being placed. The number and type of rollers used for breakdown, intermediate, and finish rolling shall be sufficient to achieve the target in-place density and specified course thickness.
B. Compaction Operations.

The rollers shall not crush the aggregate in the HMA mixture and shall be capable of reversing without shoving or tearing the mixture. The Contractor shall outline in the Quality Control Plan the proposed rolling sequence for each HMA pavement course to be placed. For HMA Category A Lots, the initial rolling pattern for each pavement course will be confirmed or adjusted during placement of the Control Strip in accordance with the requirements of Subsection 450.66B. As Lot placement progresses during the construction season, the rolling pattern shall be adjusted as necessary to achieve the specified HMA in-place density.

C. Compaction of Open-Graded Friction Course.

Vibratory rollers, oscillation rollers, or rubber tire rollers will not be permitted on Open Graded Friction Course (OGFC-P) mixtures. Initial rolling of OGFC-P should be accomplished with the breakdown roller within a short distance of the paver. Any subsequent rolling shall be accomplished without over-rolling the mixture. Breakdown and intermediate rolling of OGFC-P shall be completed before the material has cooled to 195°F (90°C).

D. Inspection & Testing of Compacted HMA.

The compacted HMA pavement course shall be free of material (physical) segregation and shall meet the requirements for in-place density, thickness, and ride quality specified in Subsection 450.65F. The Contractor shall inspect each Sublot of HMA throughout the compaction operation and shall further inspect the in-place HMA after Sublot completion and identify any areas of visible material (physical) segregation. The Contractor shall reject any in-place Sublot of HMA which is determined to be segregated through procedures established in the Quality Control Plan. The Contractor will also test each Sublot for in-place density, thickness, and ride quality as specified in Subsection 450.65F.

450.57 Hot Mix Asphalt Joints.

The Contractor shall plan the sequence of HMA placement to minimize transverse and longitudinal joints in each pavement course. Paving operations should employ long pulls or tandem pavers, whenever practicable, to reduce the number and length of joints.

A. Transverse Joints.

Where the start or end of a new HMA pavement course meets existing HMA pavement, the existing pavement shall be sawcut to form a transverse butt joint for the full depth of all new pavement courses. The sawcut shall follow a straight line and provide a clean and sound vertical face. Material at any intermediate transverse joint resulting from suspension of placement of a new HMA pavement course shall also be sawcut and removed to provide a clean vertical face before continuing placement of the pavement course.

When traffic is to be carried over any transverse joint before completion of an HMA pavement course, the Contractor shall provide a temporary tapered joint with a maximum 12:1 slope. The HMA mixture forming the taper shall be placed on heavy wrapping paper or other suitable material to serve as a bond breaker. The temporary tapered joint shall be sawcut to reveal the full depth of the pavement course and form a transverse butt joint with a clean vertical face. The temporary tapered joint material shall be completely removed before resuming placement of the HMA pavement course.

Prior to the start of HMA placement at each transverse joint, the vertical joint face shall be thoroughly coated with a hot poured rubberized asphalt sealant meeting the requirements of ASTM D3405, with a minimum of 15% ground reclaimed tire rubber. The asphalt sealant temperature and application rate for each pavement course shall be established in the
Contractor’s Quality Control Plan. No reheating of the joint face shall be permitted. Equipment used to apply the hot poured rubberized asphalt sealant shall be capable of maintaining the sealant at the established temperature and application rate sufficient to uniformly coat the vertical joint face without runoff or accumulation of the asphalt sealant.

B. Longitudinal Joints.

All longitudinal joints in HMA surface courses shall be located on the roadway centerline or on a lane line or edge line of the traveled way. The longitudinal joints in each pavement course below the surface course shall be successively offset from the joint in the surface course by no more than 12 inches (300 mm) and no less than six inches (150 mm).

(1) Vertical Joints.

When an HMA pavement course is placed using single paver pulls, the Contractor shall employ suitable equipment to confine the longitudinal edge of the HMA mixture to establish an edge that is near vertical. For all HMA surface course mixtures placed, when the Contractor’s placement operations do not provide a confined and near vertical edge, the longitudinal edge of the surface course shall be sawcut full depth and removed to provide a clean vertical face before placement of the adjacent course of HMA.

All longitudinal joint edges of HMA surface courses, regardless of whether the joint edge is required to be sawcut, shall be treated prior to placing the adjacent pull of HMA. The vertical joint shall be coated with a hot poured rubberized asphalt sealant meeting the requirements of ASTM D3405, with a minimum of 15% ground reclaimed tire rubber. The asphalt sealant shall be applied at a sufficient temperature and application rate sufficient to uniformly coat the vertical joint face without runoff or accumulation of the sealant. The asphalt sealant temperature and application rate shall be established in the Contractor’s Quality Control Plan. No reheating of the joint shall be permitted.

When placing an HMA surface course with pavers in tandem, the use of the hot poured rubberized asphalt sealant will be omitted, provided the temperature of the mixture at the longitudinal joint does not fall below 200°F (95°C) prior to the placement of the adjacent mat.

When the longitudinal edge of any HMA pavement course is placed against an adjoining edge such as existing pavement, curb, gutter, drainage or utility structure, or any metal surface, a tack coat shall be uniformly applied to the entire vertical joint surface in accordance with Subsection 450.53 prior to placement of the HMA.

(2) Wedge Joints.

The Contractor may use a longitudinal wedge joint when placing HMA pavement courses at a thickness of 1.75 inches (45 mm) or greater.

When a wedge joint is proposed for use, the joint detail shall be included in the Contractor’s QC Plan. The wedge joint shall include a notched vertical edge with a minimum depth of 0.5 inches (12.5 mm). The sloped surface of the wedge joint shall not exceed a 6:1 slope. The Contractor shall use a commercially manufactured wedge joint attachment to the paver, or other attachment approved by the Engineer, to form the wedge joint.

Hot poured rubberized asphalt sealant shall not be applied to wedge joints. A tack coat shall be applied to the entire surface of the wedge joint in accordance with Subsection 450.53 prior to placement of the adjacent pull of HMA.

C. Inspection & Testing of HMA Joints.

The hot poured rubberized asphalt sealant temperature and application rate shall be measured and properly recorded by the Contractor on NETTCP Inspection Report Forms a minimum of once per transverse joint and once per 1,000 feet (300 meters) of longitudinal joint. If the temperature or application rate is determined to not be in conformance with the
requirements established in the Contractor’s Quality Control Plan, the Contractor shall make appropriate adjustments to the asphalt sealant application operations.

The placement and compaction of HMA at each transverse joint or longitudinal joint shall provide a tight bond between the existing pavement and the new pavement course. The Contractor shall visually inspect each transverse joint and longitudinal joint throughout the placement and compaction operations and shall further inspect the joints after Sublot completion and identify any bumps, depressions, openings, or other visible defects. The Contractor shall reject any in-place Sublot of HMA which is determined to have defective joints through procedures established in the Quality Control Plan.

Finished joint surfaces shall be smooth and true to the required grade and cross-slope without deviations exceeding 0.25 inches (6 mm), both transversely and parallel to the joint, when measured with a 10 foot (3 meter) standard straightedge. The in-place density of the completed HMA pavement course, within 1 foot (300 mm) of either side of the finished joint, shall be not less than 90% of the maximum theoretical density of the mixture as determined by AASHTO T 209. The Contractor will measure the surface smoothness and test the in-place density of each transverse joint and longitudinal joint of each Sublot of HMA as specified in Subsection 450.65F. All joint inspection and testing data shall be recorded on NETTCP Inspection Report Forms and Test Report Forms.

### 450.58 HMA Pavement on Bridges.

#### A. Bridge Course Mixture Requirements.

HMA pavement courses for bridge decks shall consist of a bridge protective course, placed first, followed by a bridge surface course. Unless specified otherwise on the plans, the bridge protective course mixture shall consist of Dense Binder treated with an approved anti-stripping compound as specified under M3.10.0.

The bridge protective course and bridge surface course shall be placed only after all curbing and edging, when included in the work, are in place. The bridge protective course shall be placed within 24 hours after the membrane waterproofing has been placed, unless an exception is granted by the Engineer. No vehicular traffic shall be permitted over any bare membrane waterproofing except as provided for under Subsection 965.62. Equipment used for placement and compaction of the bridge protective course and bridge surface course shall be sufficient to place the HMA mixture at the required grade, cross-slope, thickness, and in-place density without damaging the underlying membrane waterproofing.

#### B. Inspection & Testing of Bridge Course Mixtures.

The Contractor shall inspect and test each Sublot of bridge protective course HMA mixture and bridge surface course HMA mixture in accordance with the requirements for mixture temperature, mat temperature, segregation, and joint quality as specified in Subsections 450.54 through 450.57. QC sampling and testing of each Sublot shall be performed for all HMA loose mix Quality Characteristics specified in Subsection 450.65F. The in-place density of the bridge protective course and bridge surface course shall be randomly tested using a calibrated density gauge and the test data recorded on NETTCP Test Report Forms. The in-place density of the bridge protective course and bridge surface course shall be not less than 90% of the maximum theoretical density of the mixture as determined by AASHTO T 209 and tested per AASHTO TP-68 or ASTM D2950. Cores shall only be allowed for Dispute Resolution. When the HMA bridge surface course is placed in conjunction with mainline pavement, QC testing for ride quality shall be performed as specified in Subsection 450.65F(11).
450.59 Opening to Traffic.

No vehicular traffic or loads shall be permitted on the newly completed HMA pavement until adequate stability has been attained and the material has cooled sufficiently to a temperature of 140°F (60°C) or less as indicated by a surface type thermometer. The Contractor shall clearly outline, in the Quality Control Plan, the specific criteria related to opening new pavement to traffic. HMA cores shall be obtained by the Contractor for all Sublots placed each day in accordance with the approved Quality Control Plan prior to opening to traffic. At the discretion of the Engineer, based on climactic or other conditions, obtaining of cores may be delayed for a period up to, but not to exceed, 48 hours. In the event of force majeure resulting from direction by Traffic Police or the Engineer, the Contractor shall document the event and may submit a claim in accordance with current Department procedures. In such event, the affected Sublots will be isolated from the relevant HMA Lot and the HMA quality will be evaluated as a separate Lot.
CONTRACTOR QUALITY CONTROL

450.60 General.

The Contractor shall provide a Quality Control (QC) system, as outlined in their Quality Control Plan, adequate to ensure that all materials and workmanship meet the required quality levels for each specified Quality Characteristic. The Contractor shall provide qualified QC personnel and QC laboratory facilities and perform Quality Control inspection, sampling, testing, data analysis, corrective action (when necessary), and documentation as outlined further below.

450.61 Contractor Quality Control Plan.

For projects with HMA Category A Lots (Large Lot) or Category B Lots (Small Lot), the Contractor shall provide and maintain a detailed Quality Control Plan, hereinafter referred to as the “QC Plan”. If all HMA Lots fall under Lot Category C (Minor Lot) then a QC Plan is not required. However, if any Lots on the project fall under Lot Category A or Category B, then any Category C Lots must be addressed in the 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 Section 450. The QC Plan is not intended to be a generic document, but rather must be project specific.

A. QC Plan Submittal Requirements.

At the pre-construction conference, the Contractor shall be prepared to discuss the Quality Control Plan. Information to be discussed shall include the proposed QC Plan submittal date, QC organization, and sources of materials. The Contractor shall submit one (1) hard copy and one (1) electronic copy of the QC Plan to the Engineer for approval not less than forty-five (45) days prior to the start of any work activities related to HMA pavement construction (including preparation of underlying surface) addressed in Subsections 450.53 thru 450.59. The Contractor shall not start work on the subject work items without an approved QC Plan.

B. QC Plan Format and Contents.

The QC Plan shall be structured to follow the format and section headings outlined below, and as outlined in further detail in the New England Transportation Technician Certification Program (NETTCP) “Model QC Plan” for HMA. In the event of discrepancies between the section headings below and the NETTCP Model QC Plan, the current version of the Model QC Plan shall take precedence. The pages of the QC Plan shall be sequentially numbered. The QC Plan shall address, in sufficient detail, the specific information requested under each section and subsection contained in the NETTCP Model QC Plan.

C. QC Plan Approval and Modifications.

Approval of the QC Plan will be based on the inclusion of the required information. Revisions to the QC Plan may be required prior to approval for any part of the QC Plan that is determined by the Department to be insufficient. Approval of the QC Plan does not imply any warranty by the Engineer that the QC Plan will result in completed work that complies with the specifications. It remains the responsibility of the Contractor to demonstrate such compliance. The Contractor may modify the QC Plan as work progresses when circumstances necessitate changes in Quality Control personnel, laboratories, or procedures. In such case, the Contractor shall submit an amended QC Plan to the Department for approval a minimum of three calendar days prior to the proposed changes being implemented.
Quality Control Plan Outline

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Quality Control Personnel Requirements.

The Contractor’s Quality Control organization shall, at a minimum, consist of the personnel outlined below that meet the described minimum qualifications. Every effort should be made to maintain consistency in the Quality Control organization, however substitution of qualified personnel shall be allowed. When circumstances necessitate substitution of QC personnel not originally listed in the approved QC Plan, the Contractor shall submit an amended QC Plan for approval in accordance with Subsection 450.61C.

A. Quality Control Manager.

The Contractor’s Quality Control system and QC Plan shall be administered by a qualified project assigned Quality Control Manager (QC Manager). The QC Manager must be a full-time employee of the Contractor or a Quality Control consultant engaged by the Contractor. The QC Manager shall have full authority to institute any and all actions necessary for the successful implementation of the QC Plan. The QC Manager (or their assistant in the QC Manager’s absence) shall be available to communicate with the Engineer at all times.

Principal responsibilities of the QC Manager shall include preparation and submittal of the Contractor’s QC Plan, managing the activities of all QC personnel, communicating on quality issues within the Contractor’s organization, and ensuring that all requirements outlined in the approved QC Plan are met.

For all projects with HMA Category A Lots (Large Lot), the QC Manager shall be certified by the NETTCP as a Quality Assurance Technologist. For projects having only HMA Category B Lots or Category C Lots, the Contractor may submit alternate qualifications for the QC Manager acceptable to the Department.

B. Production Facility Quality Control Technician(s).

All Contractor Quality control sampling, testing, and inspection conducted at the HMA production facility shall be performed by qualified Production Facility Quality Control Technicians (Plant QCTs). The Contractor shall provide a sufficient number of Plant QCTs to adequately implement the minimum Quality Control requirements contained in Section 450 and as outlined in the approved QC Plan. A minimum of one (1) qualified Plant QCT shall be present at each production facility location. HMA will not be accepted by the Department unless the Plant QCT is physically present at the plant during production and correctly performs the required Quality Control inspection, testing and documentation.

All Plant QCTs shall be certified as a HMA Plant Technician by the NETTCP.

C. Laboratory Quality Control Technician(s).

Any QC testing that is performed at off site laboratories (i.e. other than at the production facility or field site) shall be performed by qualified Laboratory Quality Control Technicians (Laboratory QCTs). The Contractor shall provide a sufficient number of Laboratory QCTs to adequately implement the minimum Quality Control requirements contained in Section 450 and as outlined in the approved QC Plan. A minimum of one (1) qualified Laboratory QCT shall be present at each laboratory location.

All Laboratory QCTs shall be certified as a HMA Plant Technician by the NETTCP.

D. Field Quality Control Technician(s).

All Contractor Quality Control sampling, testing, and inspection conducted at the HMA field placement site shall be performed by qualified Field Quality Control Technicians (Field QCTs). The Contractor shall provide a sufficient number of Field QCTs to adequately implement the minimum Quality Control requirements contained in Section 450 and as outlined in the approved QC Plan. A minimum of one (1) qualified Field QCT will be present at each field placement site. HMA will not be accepted by the Department unless the Field QCTs is physically present.
present at the site during pre-placement and placement operations and correctly performs the required Quality Control inspection, testing and documentation.

All Field QCTs shall be certified as a HMA Paving Inspector as certified by the NETTCP.

450.63 Quality Control Laboratory Facility Requirements.

All Contractor Quality Control testing shall be performed in laboratories qualified through the NETTCP Laboratory Certification Program (LCP) or accredited through the AASHTO Accreditation Program (AAP). Laboratory facilities shall be kept clean and all equipment shall be maintained in proper working condition. The QC Manager shall have overall responsibility for ensuring that all laboratories utilized for Quality Control are in compliance with the requirements of the NETTCP LCP. This includes providing required AASHTO, ASTM, and NETTCP reference documents and ensuring that all required equipment and tools are properly functioning and calibrated.

The Engineer shall be permitted unrestricted access to inspect and review the Contractor’s laboratory facility. The Engineer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. Deficiencies shall be grounds for the Engineer to order an immediate stop to incorporating materials into the work until deficiencies are corrected. The Engineer shall be provided with laboratory space and the availability of laboratory testing equipment to conduct Acceptance testing at the HMA plant.

450.64 Quality Control Inspection.

The Contractor shall perform Quality Control inspection of all work items addressed under Section 450. Inspection activities during HMA production and placement may be performed by qualified Production personnel (e.g. Skilled Laborers, Foremen, and Superintendents). However, the Contractor’s QC personnel shall have overall responsibility for QC inspection. The Contractor shall not rely on the results of Department Acceptance inspection for Quality Control purposes. The Engineer shall be provided the opportunity to monitor and witness all QC inspection.

Quality Control inspection activities must address the following four primary components:

- Equipment
- Materials
- Environmental Conditions
- Workmanship

The minimum frequency of Quality Control inspection activity shall be in accordance with the requirements below and as outlined in the approved QC Plan. The results and findings of QC inspection shall be documented on NETTCP Inspection Report Forms (IRFs).
A. QC Inspection for Preparation of Underlying Surface.

The Contractor’s personnel will perform Quality Control inspection during preparation of the underlying surface in accordance with the requirements of Subsection 450.53. The minimum items to be inspected shall be as outlined in Table 450.6 and Table 450.7. The Contractor shall identify in the QC Plan the specific inspection activities necessary to ensure the quality of the work, including any additional inspection activities not specifically listed in Table 450.6 and Table 450.7.

### Table 450.6 - Minimum QC Inspection of HMA Patching Operations

<table>
<thead>
<tr>
<th>Inspection Component</th>
<th>Items Inspected</th>
<th>Minimum Inspection Frequency</th>
<th>Point of Inspection</th>
<th>Inspection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td>As specified in QC Plan</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
</tr>
<tr>
<td>Materials</td>
<td>Aggregates &amp; PG Binder (Correct Type)</td>
<td>Per QC Plan</td>
<td>HMA Production Facility</td>
<td>Visual Check + Manufacturer COC</td>
</tr>
<tr>
<td></td>
<td>Rubberized Asphalt Sealant (Correct Type)</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
<td>Check Manufacturer COC</td>
</tr>
<tr>
<td></td>
<td>Temperature of HMA Mix</td>
<td>4 per Day$^{(1)}$</td>
<td>From Haul Vehicle at Patching Site</td>
<td>Check Measurement</td>
</tr>
<tr>
<td>Environmental</td>
<td>Underlying Surface Soundness &amp; Moisture</td>
<td>Per QC Plan</td>
<td>Underlying Surface</td>
<td>Visual Check</td>
</tr>
<tr>
<td>Conditions</td>
<td>Temperature of Air &amp; Underlying Surface</td>
<td>1 per Day$^{(2)}$</td>
<td>At Patching Site</td>
<td>Check Measurement</td>
</tr>
<tr>
<td>Workmanship</td>
<td>Sawcut Limit Vertical Face</td>
<td>Per QC Plan</td>
<td>Sawcut Limits</td>
<td>Visual Check</td>
</tr>
<tr>
<td></td>
<td>Rubberized Asphalt Sealant Application Rate</td>
<td>Per QC Plan</td>
<td>Sawcut Limits</td>
<td>Check Measurement</td>
</tr>
<tr>
<td></td>
<td>HMA Lift Thickness</td>
<td>Per QC Plan</td>
<td>HMA Lift</td>
<td>Check Measurement</td>
</tr>
<tr>
<td></td>
<td>Cross-Slope &amp; Profile</td>
<td>Per QC Plan</td>
<td>Compacted HMA</td>
<td>Check Measurement</td>
</tr>
</tbody>
</table>

$^{(1)}$ The initial temperature measurements will be taken from haul vehicles on the first or second load.

$^{(2)}$ As a minimum, the temperature measurements of the air and underlying surface shall be obtained prior to starting the HMA patching placement.
Table 450.7 - Minimum QC Inspection of Tack Coat Operations

<table>
<thead>
<tr>
<th>Inspection Component</th>
<th>Items Inspected</th>
<th>Minimum Inspection Frequency</th>
<th>Point of Inspection</th>
<th>Inspection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td>As specified in QC Plan</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
</tr>
<tr>
<td>Materials</td>
<td>Asphalt Emulsion (Correct Type)</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
<td>Check Manufacturer COC</td>
</tr>
<tr>
<td></td>
<td>Asphalt Emulsion Temperature</td>
<td>(See Note 1)</td>
<td>From Tack Distributor System</td>
<td>Check Measurement</td>
</tr>
<tr>
<td>Environmental</td>
<td>Underlying Surface Cleanliness &amp; Moisture</td>
<td>Per QC Plan</td>
<td>Underlying Surface</td>
<td>Visual Check</td>
</tr>
<tr>
<td>Conditions</td>
<td>Temperature of Air &amp; Underlying Surface</td>
<td>1 per Day(2)</td>
<td>At Paving Site</td>
<td>Check Measurement</td>
</tr>
<tr>
<td>Workmanship</td>
<td>Asphalt Emulsion Application Rate</td>
<td>(See Note 1)</td>
<td>From Tack Distributor System</td>
<td>Check Measurement</td>
</tr>
</tbody>
</table>

(1) The Asphalt Emulsion Temperature and Application Rate shall be checked as follows:
- After application of the first 1,000 lane-feet (300 lane-meters) per HMA pavement course.
- After application of the next 1,500 lane-feet (450 lane-meters) per HMA pavement course.
- After application of the next 2,500 lane-feet (750 lane-meters) per HMA pavement course.
- Thereafter, a minimum of once per 5,000 lane-feet (1500 lane-meters) each day.

(2) As a minimum, the temperature measurements of the air and underlying surface shall be obtained prior to starting the tack coat placement.

B. QC Inspection for Production & Placement of HMA Lots.

The Contractor’s QC personnel will perform Quality Control inspection at both the HMA production facility and at the site of HMA field placement to ensure that the production and placement processes are providing work conforming to the contract requirements. The minimum items to be inspected for each HMA Lot shall be in accordance with the requirements of Subsection 450.54 thru Subsection 450.59 and as outlined in Table 450.8a and Table 450.8b. The Contractor shall identify in the QC Plan the specific inspection activities necessary to ensure the quality of the work, including any additional inspection activities not specifically listed in Table 450.8a and Table 450.8b.

(1) Wheel Path Deviations.

A wheel path is defined as 3 feet (1 meter) from and parallel to each longitudinal edge of a travel lane. Each wheel path for all HMA pavement course Lots shall be inspected for Wheel Path Deviations (high points or low points). Inspection shall be performed using a 10-foot (3 meter) standard straightedge in the longitudinal direction on each wheel path. The Sublot size and minimum frequency of QC inspection for Wheel Path Deviations shall be as specified in Table 450.8b, and in the approved Contractor Quality Control Plan. Each random inspection location shall be established by determining a randomly selected distance along the wheel path in accordance with ASTM D3665. Additional selective QC inspection for Wheel Path Deviations within each Sublot of compacted HMA pavement courses shall be as determined necessary by the Field QCT and as specified in the Contractor’s approved QC Plan.

The variation from the edge of the 10-foot (3 meter) straightedge to the top of the wheel path surface between any two contact points in the wheel path shall not exceed 0.25 inches (6 mm). The Contractor shall correct any location in a pavement course wheel path not meeting
this requirement. The corrective method(s) proposed by the Contractor shall be subject to the approval of the Department and shall be performed at the Contractor's expense. The Contractor shall re-inspect any Sublots where corrections are made and provide the Department with a copy of the inspection data for the corrected Sublots.

Table 450.8a - Minimum QC Inspection at HMA Production Facility

<table>
<thead>
<tr>
<th>Inspection Component</th>
<th>Items Inspected</th>
<th>Minimum Inspection Frequency</th>
<th>Point of Inspection</th>
<th>Inspection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td>As specified in QC Plan</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
</tr>
<tr>
<td>PG Binder (Correct Type)</td>
<td>Per QC Plan</td>
<td>HMA Production Facility</td>
<td>Visual Check + Manufacturer COC</td>
<td></td>
</tr>
<tr>
<td>Aggregates (Correct Type)</td>
<td>Per QC Plan</td>
<td>HMA Production Facility</td>
<td>Visual Check</td>
<td></td>
</tr>
<tr>
<td>RAP</td>
<td>Per QC Plan</td>
<td>HMA Production Facility</td>
<td>Visual Check</td>
<td></td>
</tr>
<tr>
<td>MAS</td>
<td>Per QC Plan</td>
<td>HMA Production Facility</td>
<td>Visual Check + Manufacturer COC</td>
<td></td>
</tr>
<tr>
<td>Release Agent</td>
<td>Per QC Plan</td>
<td>Haul Vehicle Bed at Plant</td>
<td>Check QPL + Visual Check + Manufacturer COC</td>
<td></td>
</tr>
<tr>
<td>Temperature of HMA Mix at Plant</td>
<td>4 per Day$^{(1)}$</td>
<td>From Haul Vehicle at Plant</td>
<td>Check Measurement</td>
<td></td>
</tr>
<tr>
<td>Environmental Conditions</td>
<td>Stockpile Moisture</td>
<td>Per QC Plan</td>
<td>HMA Production Facility</td>
<td>Visual Check</td>
</tr>
<tr>
<td>Air Temperature &amp; Precipitation Forecast</td>
<td>1 per Day$^{(2)}$</td>
<td>HMA Production Facility</td>
<td>Check Measurement</td>
<td></td>
</tr>
<tr>
<td>Workmanship</td>
<td>Uncoated Mixture</td>
<td>Per QC Plan</td>
<td>HMA Production Facility</td>
<td>Visual Check</td>
</tr>
<tr>
<td>Excess Blue Smoke or Moisture</td>
<td>Per QC Plan</td>
<td>HMA Production Facility</td>
<td>Visual Check</td>
<td></td>
</tr>
<tr>
<td>Burnt Mix</td>
<td>Per QC Plan</td>
<td>HMA Production Facility</td>
<td>Visual Check</td>
<td></td>
</tr>
<tr>
<td>Physical Segregation</td>
<td>Per QC Plan</td>
<td>HMA Production Facility</td>
<td>Visual Check</td>
<td></td>
</tr>
</tbody>
</table>

$^{(1)}$ The initial temperature measurements shall be taken from the first or second load.

$^{(2)}$ As a minimum, the air temperature measurements and precipitation forecast shall obtained prior to starting the HMA Plant operation.
**Table 450.8b - Minimum QC Inspection at HMA Placement Location**

<table>
<thead>
<tr>
<th>Inspection Component</th>
<th>Items Inspected</th>
<th>Minimum Inspection Frequency</th>
<th>Point of Inspection</th>
<th>Inspection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equipment</strong></td>
<td>As specified in QC Plan</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
</tr>
<tr>
<td><strong>Materials</strong></td>
<td>Rubberized Asphalt Sealant (Correct Type)</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
<td>Check Manufacturer COC</td>
</tr>
<tr>
<td></td>
<td>Temperature of Delivered HMA Mix</td>
<td>4 per Day(^{1})</td>
<td>From Haul Vehicle or Paver Hopper</td>
<td>Check Measurement</td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td>Underlying Surface Soundness &amp; Moisture</td>
<td>Per QC Plan</td>
<td>Underlying Surface</td>
<td>Visual Check</td>
</tr>
<tr>
<td></td>
<td>Temperature of Air &amp; Underlying Surface</td>
<td>1 per Day(^{2})</td>
<td>At Paving Site</td>
<td>Check Measurement</td>
</tr>
<tr>
<td><strong>Workmanship</strong></td>
<td>Joint Location &amp; Alignment</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
<td>Visual Check</td>
</tr>
<tr>
<td></td>
<td>Sawcut Joint Vertical Face</td>
<td>Per QC Plan</td>
<td>Joint Vertical Face</td>
<td>Visual Check</td>
</tr>
<tr>
<td></td>
<td>Rubberized Asphalt Sealant Application Rate</td>
<td>Once per 1,000 ft (300 meters) per joint</td>
<td>Joint Vertical Face</td>
<td>Check Measurement</td>
</tr>
<tr>
<td></td>
<td>Temperature Differential in HMA Mat</td>
<td>Once per 500 feet (150 meters) per pavement course</td>
<td>HMA Mat Behind Paver &amp; Compacted HMA</td>
<td>Per Subsection 450.55C</td>
</tr>
<tr>
<td></td>
<td>Physical Segregation</td>
<td>Per QC Plan</td>
<td>HMA Mat Behind Paver &amp; Compacted HMA</td>
<td>Visual Check</td>
</tr>
<tr>
<td></td>
<td>HMA Lift Thickness</td>
<td>Per QC Plan</td>
<td>HMA Lift</td>
<td>Check Measurement</td>
</tr>
<tr>
<td></td>
<td>Cross-Slope</td>
<td>Per QC Plan</td>
<td>Compacted HMA</td>
<td>Check Measurement</td>
</tr>
<tr>
<td></td>
<td>Joint Tightness</td>
<td>Per QC Plan</td>
<td>Compacted HMA</td>
<td>Visual Check</td>
</tr>
<tr>
<td></td>
<td>Joint Surface Deviations</td>
<td>Once per 500 feet (150 meters) per joint</td>
<td>At Finished Joint</td>
<td>10 foot (3 meter) standard straightedge</td>
</tr>
<tr>
<td></td>
<td>Wheel Path Deviations</td>
<td>Once per 2,000 ft (600 meters) per Wheel Path</td>
<td>Wheel Path</td>
<td>10 foot (3 meter) standard straightedge</td>
</tr>
</tbody>
</table>

\(^{1}\) The initial temperature measurements will be taken from the first or second load.

\(^{2}\) As a minimum, the temperature measurements of the air and underlying surface shall be obtained prior to starting the HMA placement.
450.65 **Quality Control Sampling and Testing Requirements.**

The Contractor’s QC personnel will perform Quality Control sampling and testing at both the HMA production facility and at the site of HMA field placement to ensure that the production and placement processes are providing work conforming to the contract requirements. The Engineer will not sample or test for Quality Control or assist in controlling the Contractor’s operations. All QC sampling and testing shall be in accordance with the AASHTO, ASTM, NETTCP, or Department procedures specified in Table 450.9 and Table 450.10. The Contractor shall furnish approved containers for all material samples. The Engineer shall be provided the opportunity to monitor and witness all QC sampling and testing.

A. Random Sampling.

The Contractor’s Quality Control system shall utilize stratified random sampling of each Lot produced and placed to assure that all material within the Lot has an equal probability of being selected for testing. The Contractor’s qualified QC personnel shall obtain random QC samples at the minimum frequencies specified in Table 450.9 and Table 450.10. In all cases, application of the specified QC sampling frequencies shall result in a minimum one random sample per Sublot.

Random sample locations shall be determined using the random number tables and procedures contained in ASTM D 3665 or an electronic random number generator, as presented by the NETTCP. The determination of all random sample locations shall be documented on NETTCP Standard Test Report Form D3665. The Contractor will provide the Engineer with the random QC sampling locations selected and documented for each Sublot prior to production and placement of the relevant Sublots.

B. Selective Sampling.

The Contractor’s Quality Control system will also utilize selective sampling (i.e. non-random samples) as needed to provide supplemental information to assist in maintaining all production and placement processes in control. The Contractor’s qualified QC personnel shall obtain selective QC samples from any Sublot as determined necessary and in accordance with the guidelines established in the approved QC Plan.

C. QC Sample Identification System.

The Contractor shall establish a reliable system for the identification of all QC samples obtained. All PG Asphalt Binder samples, HMA loose mixture samples, and core samples shall be correctly labeled with the following minimum information:

(a) Contract No.
(b) Date of Sample.
(c) Mixture Type.
(d) Lot & Sublot No.
(e) Sample No.
(f) Sample Type (i.e. Random or Selective).
(g) Sample Location (e.g. Station & Offset).

All QC sampling data for Ride Quality and Wheel Path Deviations will be identified by the Contractor as directed by the Engineer. The Contractor’s system and procedures for identification of QC samples shall be outlined in the approved QC Plan.
D. Retention of Split Samples.

The Contractor’s qualified QC personnel shall obtain all material samples (PGAB samples, HMA loose mix samples, and cores) for QC testing. The Contractor will retain split samples from each PGAB sample and HMA loose mix sample and provide a split sample to the Engineer if requested. The Contractor shall retain the original core samples after testing to serve as “split samples” and protect them from damage. All split samples shall be properly labeled and stored for a period of (30) days, or until tested. These split samples (PGAB samples, HMA loose mix samples, and cores) will be utilized if necessary, in the Dispute Resolution process. If mutually agreed upon by the Contractor and the Department, the retained split samples may be discarded prior to the required thirty (30) days.

E. Quality Control Testing of Prepared Underlying Surface.

The Contractor’s QC personnel will perform Quality Control testing during preparation of the underlying surface. All QC testing shall be in accordance with the AASHTO, ASTM, NETTCP, or Department procedures specified in Table 450.9. The Engineer shall be provided the opportunity to monitor and witness all QC testing.

Table 450.9 - Minimum QC Sampling & Testing of Prepared Underlying Surface

<table>
<thead>
<tr>
<th>Quality Characteristic</th>
<th>Test Method(s)</th>
<th>Sublot Size</th>
<th>Minimum Test Frequency</th>
<th>Point of Sampling</th>
<th>Sampling Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMA Patching Mixture: PG Asphalt Binder Content</td>
<td>AASHTO T164 or T308</td>
<td>150 tons (140 Mg)</td>
<td>1 per Sublot</td>
<td>From Haul Vehicle at Plant</td>
<td>Random AASHTO T168</td>
</tr>
<tr>
<td>HMA Patching Mixture: Combined Agg. Gradation</td>
<td>AASHTO T30</td>
<td>150 tons (140 Mg)</td>
<td>1 per Sublot</td>
<td>From Haul Vehicle at Plant</td>
<td>Random AASHTO T168</td>
</tr>
<tr>
<td>HMA Patching Mixture: Maximum Theo. Specific Gravity</td>
<td>AASHTO T209</td>
<td>150 tons (140 Mg)</td>
<td>1 per Sublot</td>
<td>From Haul Vehicle at Plant</td>
<td>Random AASHTO T168</td>
</tr>
<tr>
<td>HMA Patching Mixture: In-place Density</td>
<td>ASTM D2950 or TP68</td>
<td>100 sq. feet. (10 sq. meter) per each Patch Area</td>
<td>1 per Sublot</td>
<td>From Compacted HMA Patch</td>
<td>Random ASTM D2950, AASHTO TP68</td>
</tr>
</tbody>
</table>

F. Quality Control Testing of HMA Lots.

The Contractor’s QC personnel will perform Quality Control testing at both the HMA production facility and at the site of HMA field placement to ensure that the production and placement processes are providing work conforming to the contract requirements. The Engineer shall be provided the opportunity to monitor and witness all QC testing of HMA. All QC testing of HMA Lots shall be in accordance with the AASHTO, ASTM, NETTCP, or Department test methods specified in Table 450.10 and the procedures outlined below.
Table 450.10 - Minimum Quality Control Sampling & Testing of HMA Lots

<table>
<thead>
<tr>
<th>Quality Characteristic</th>
<th>Test Method(s)</th>
<th>Sublot Size</th>
<th>Minimum Test Frequency</th>
<th>Point of Sampling</th>
<th>Sampling Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG Asphalt Binder Grading</td>
<td>AASHTO M320</td>
<td>Per Supplier QC Plan or 24,000 tons (22,000 Mg) of HMA per Subsection 450.65F(1)</td>
<td>See Subsection 450.65F(1)</td>
<td>See Subsection 450.65F(1)</td>
<td>Random AASHTO T40</td>
</tr>
<tr>
<td>Aggregate Gradation</td>
<td>AASHTO T27</td>
<td>Per QC Plan</td>
<td>Per QC Plan</td>
<td>At HMA Plant Per QC Plan</td>
<td>Random AASHTO T2</td>
</tr>
<tr>
<td>PG Asphalt Binder Content</td>
<td>AASHTO T164 or AASHTO T308</td>
<td>600 tons (550 Mg)</td>
<td>1 per Sublot(1)</td>
<td>From Haul Vehicle at Plant</td>
<td>Random AASHTO T168</td>
</tr>
<tr>
<td>Combined Aggregate Gradation</td>
<td>AASHTO T30</td>
<td>600 tons (550 Mg)</td>
<td>1 per Sublot(1)</td>
<td>From Haul Vehicle at Plant</td>
<td>Random AASHTO T168</td>
</tr>
<tr>
<td>Maximum Theo. Specific Gravity</td>
<td>AASHTO T209</td>
<td>600 tons (550 Mg)</td>
<td>1 per Sublot(1)</td>
<td>From Haul Vehicle at Plant</td>
<td>Random AASHTO T168</td>
</tr>
<tr>
<td>Bulk Specific Gravity</td>
<td>AASHTO T166 (SSD Method)</td>
<td>600 tons (550 Mg)</td>
<td>1 per Sublot(1)</td>
<td>From Haul Vehicle at Plant</td>
<td>Random AASHTO T168</td>
</tr>
<tr>
<td>Volumetrics: Air Voids, VMA, VFA</td>
<td>AASHTO T245</td>
<td>600 tons (550 Mg)</td>
<td>1 per Sublot(1)</td>
<td>From Haul Vehicle at Plant</td>
<td>Random AASHTO T168</td>
</tr>
<tr>
<td>In-place HMA Mat Density (Density Gauge)</td>
<td>ASTM D2950 or AASHTO TP68</td>
<td>150 tons (140 Mg)</td>
<td>1 per Sublot(1)</td>
<td>From Compacted HMA Course</td>
<td>Selective &amp; Random ASTM D2950, AASHTO TP68</td>
</tr>
<tr>
<td>In-place HMA Mat Density (Cores)</td>
<td>AASHTO T230 AASHTO T166 AASHTO T269</td>
<td>600 tons (550 Mg)</td>
<td>1 per Sublot(1)</td>
<td>From Compacted HMA Course</td>
<td>Random AASHTO T269</td>
</tr>
<tr>
<td>Thickness</td>
<td>AASHTO T269</td>
<td>600 tons (550 Mg)</td>
<td>1 per Sublot(1)</td>
<td>From Compacted HMA</td>
<td>Random AASHTO T269</td>
</tr>
<tr>
<td>Transverse Joint Density</td>
<td>ASTM D2950 or AASHTO TP68</td>
<td>Each Joint</td>
<td>1 per Sublot(1)</td>
<td>At Finished Joint</td>
<td>Random ASTM D2950, AASHTO TP68</td>
</tr>
<tr>
<td>Longitudinal Joint Density</td>
<td>ASTM D2950 or AASHTO TP68</td>
<td>500 feet (150 meters) per Joint</td>
<td>1 per Sublot(1)</td>
<td>At Finished Joint</td>
<td>Random ASTM D2950, AASHTO TP68</td>
</tr>
<tr>
<td>Ride Quality (IRI)</td>
<td>AASHTO PP52 Per Subsection 450.65F(11)</td>
<td>0.1 miles (160 meters) per each Wheel Path</td>
<td>3 Runs per Sublot</td>
<td>Each Pavement Course Per Subsection 450.65F(11)</td>
<td>Random Per Subsection 450.65F(11)</td>
</tr>
<tr>
<td>Wheel Path Deviations</td>
<td>10 foot (3 meter) standard straightedge</td>
<td>500 feet (150 meters) per each Wheel Path</td>
<td>1 per Sublot(1)</td>
<td>Each Pavement Course Per Subsection 450.65F(12)</td>
<td>Random Per QC Plan</td>
</tr>
</tbody>
</table>

(1) In the event that the total daily HMA production is less than one Sublot, a minimum of one random QC sample shall be obtained for the day’s production.
(1) PG Asphalt Binder Grading.

QC testing of PG Asphalt Binder shall be performed by the PGAB Supplier in accordance with AASHTO R26 and the Supplier’s approved PGAB Quality Control Plan. The Contractor shall submit to the Engineer a Supplier’s Certificate of Compliance (COC) along with copies of the certified AASHTO M320 test results for each Supplier Lot of PGAB from which the HMA Producer’s PGAB was obtained.

If the Contractor modifies the PGAB at the HMA production facility through blending or introduction of an asphalt binder modifier, the Contractor (i.e. HMA Producer) shall assume responsibility as the PGAB Supplier per AASHTO R26. In such case, the Contractor shall obtain and test a minimum of one random sample of the modified PGAB for each 24,000 ton (22,000 Mg) HMA Sublot, as defined in Table 450.10, to determine conformance with AASHTO M320. A minimum of two 1-quart (1 Liter) containers of PGAB shall be obtained for each PGAB sample in accordance with AASHTO T40. All QC samples shall be split prior to testing and the un-tested portion of the sample shall be retained for a minimum of 30 days.

For HMA Category A Lots incorporating greater than 25% RAP or greater in the job-mix formula, the Contractor shall perform full asphalt binder grade testing on a minimum of one random sample from the Control Strip and from each Sublot as specified in Table 450.10 during HMA Lot production. The QC testing shall be performed on samples of asphalt binder recovered from the RAP (by Abson recovery) blended in the appropriate proportion with samples of the virgin PGAB to determine conformance with AASHTO M320. The PG Asphalt Binder Grade testing results shall be within ±2ºC of the specified PGAB grade for the HMA pavement course mixture.

(2) Aggregate Gradation.

The virgin aggregates utilized in each HMA Lot shall be tested for Gradation in accordance with AASHTO T27. The Sublot size and minimum frequency of QC testing for Aggregate Gradation shall be as specified in the Contractor’s approved QC Plan. Aggregate samples shall be obtained at the HMA plant from aggregate bins or stockpiles in accordance with AASHTO T2.

(3) PG Asphalt Binder Content.

Each HMA Lot produced and placed shall be tested for PG Asphalt Binder Content in accordance with either AASHTO T164 or T308. When AASHTO T164 is used, the test results shall be reported prior to ash correction. The Sublot size and minimum frequency of QC testing for PG Asphalt Binder Content shall be as specified in Table 450.10. Each material sample for PG Asphalt Binder Content shall be obtained at the HMA plant from a randomly selected quadrant from the haul vehicle in accordance with ASTM D3665 and AASHTO T168.

(4) Combined Aggregate Gradation.

Each HMA Lot produced and placed shall be tested for Combined Aggregate Gradation in accordance with AASHTO T30. The Sublot size and minimum frequency of QC testing for Combined Aggregate Gradation shall be as specified in Table 450.10. Each material sample for Combined Aggregate Gradation shall be obtained at the HMA plant from a randomly selected quadrant from the haul vehicle in accordance with ASTM D3665 and AASHTO T168.

The QC test results of Combined Aggregate Gradation must be plotted on Control Charts with Action Limits. Recommended Action Limits are provided in Table 450.11, however, the Action Limits to be used for each HMA Lot shall be as specified in the Contractor’s approved QC Plan. If the QC test results for an individual Sublot fall outside of the established Action Limits, the Contractor shall evaluate the HMA production process and determine any adjustments necessary to bring the Combined Aggregate Gradation back within the Action Limits. If the subsequent Sublot test result falls outside of the Action Limits, the Contractor shall suspend Lot production until it can be demonstrated that the HMA mixture can be produced within the Action Limits. The Contractor’s QC personnel shall document all action(s) taken to bring the HMA production process into control.
Table 450.11 - Recommended Action limits for Combined Aggregate Gradation

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Action Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passing No. 4 Sieve (4.75mm) and larger sieve sizes</td>
<td>JMF Target +/-6 percent</td>
</tr>
<tr>
<td>Passing No. 8 sieves (2.36mm)</td>
<td>JMF Target +/-5 percent</td>
</tr>
<tr>
<td>Passing No. 16 (1.18mm) to No. 50 (300µm) sieves (inclusive)</td>
<td>JMF Target +/-3 percent</td>
</tr>
<tr>
<td>Passing No. 100(150µm) sieve</td>
<td>JMF Target +/-2 percent</td>
</tr>
<tr>
<td>Passing No. 200(75µm) sieve</td>
<td>JMF Target +/-1 percent</td>
</tr>
</tbody>
</table>

(5) **Maximum Theoretical Specific Gravity.**

Each HMA Lot produced and placed shall be tested for Maximum Theoretical Specific Gravity in accordance with AASHTO T209. The Sublot size and minimum frequency of QC testing for Maximum Theoretical Specific Gravity shall be as specified in Table 450.10. Each material sample for Maximum Theoretical Specific Gravity shall be obtained at the HMA plant from a randomly selected quadrant from the haul vehicle in accordance with ASTM D3665 and AASHTO T168.

(6) **Bulk Specific Gravity.**

Each HMA Lot produced and placed shall be tested for Bulk Specific Gravity in accordance with AASHTO T166 (SSD Method). The Sublot size and minimum frequency of QC testing for Bulk Specific Gravity shall be as specified in Table 450.10. Each material sample for Bulk Specific Gravity shall be obtained at the HMA plant from a randomly selected quadrant from the haul vehicle in accordance with ASTM D3665 and AASHTO T168.

(7) **Volumetrics (Air Voids, VMA, VFA).**

Each HMA Lot produced and placed shall be tested for Volumetrics (Air Voids, VMA, VFA) in accordance with AASHTO T245. The requirement for Volumetric testing of laboratory compacted specimens applies to HMA mixtures for all pavement courses, with the exception of Open Graded Friction Courses and Base Courses. The Sublot size and minimum frequency of QC testing for Volumetrics shall be as specified in Table 450.10. Each material sample for Volumetrics shall be obtained at the HMA plant from a randomly selected quadrant from the haul vehicle in accordance with ASTM D3665 and AASHTO T168.

(8) **In-place HMA Mat Density.**

Each HMA Lot produced and placed shall be tested for In-place Density using a density gauge or cores as specified below. The requirement for In-Place Density testing applies to all pavement courses, with the exception of Open Graded Friction Courses and Leveling Courses. The Sublot size and minimum frequency of random QC testing for In-place Density by either density gauge or core shall be as specified in Table 450.10.

(a) **Testing In-Place Density by Density Gauge.** Initial QC testing of In-Place Density during compaction of HMA pavement courses shall be performed selectively (or randomly when determined appropriate by QC personnel) using a density gauge in accordance with ASTM D2950 or AASHTO TP 68. QC testing of In-Place Density for all HMA bridge protective courses and bridge surface courses shall be performed randomly using a density gauge. Each random sampling and testing location for HMA bridge courses shall be established by determining a randomly selected tonnage and corresponding approximate longitudinal distance within the Sublot, along with a randomly selected offset distance in accordance with ASTM D3665. Additional selective QC sampling and testing within each Sublot of compacted HMA bridge...
protective courses or bridge surface courses shall be as determined necessary by the Contractor’s QC personnel and as specified in the Contractor’s approved QC Plan.

(b) Testing In-Place Density by Cores. Final QC testing of In-Place Density of all applicable HMA pavement courses shall be performed using 6-inch (150 mm) diameter cores in accordance with AASHTO T230, T166, and T269. Cores shall not be obtained from bridge protective surface courses. In-Place Density shall be determined from each core by comparing the Bulk Specific Gravity of the core to the average Maximum Theoretical Specific Gravity for all HMA mixture Sublots produced for the pavement course on the same day’s production. Each core location shall be established by determining a randomly selected tonnage and corresponding approximate longitudinal distance within the Sublot, along with a randomly selected offset distance in accordance with ASTM D3665. If the randomly determined sampling location coincides with one of the following conditions, the sampling location shall be relocated immediately beyond the boundary distance as indicated below for the specific condition:

1. Within 1 foot (300mm) from an edge of pavement course to be left unconfined upon project completion
2. Within 1 foot (300mm) of any longitudinal joint or transverse joint.
3. Within 3 feet (1 meter) of any drainage structure.

Core samples shall be obtained in accordance with AASHTO T230 prior to opening the pavement course to traffic. At the discretion of the Engineer, based on climactic or other conditions, obtaining of cores may be delayed for a period up to, but not to exceed, 48 hours. All cores shall be protected against damage and tested within 24 hours after they have been obtained. The Contractor shall fill all core holes, whether from QC sampling or Department Acceptance sampling, with fresh HMA mixture from the same Lot. The filled core holes shall be thoroughly compacted as outlined in the Contractor’s approved QC Plan.

(9) Thickness.
Each HMA pavement course specified to be placed at a compacted thickness of 1 inch (25mm) or greater shall be tested for Thickness using cores, with the exception of the following courses:

1. Open Graded Friction Course.
2. Bridge Surface Course.
3. Bridge Protective Course.
4. Leveling Course.
5. In the absence of a Leveling Course, the first pavement course placed over existing pavement.

The aforementioned pavement courses are exempt only from determination of Thickness using cores and the corresponding statistical evaluation of Lot quality. The Contractor is still responsible for ensuring the minimum required thickness of these pavement courses using an appropriate sampling and testing protocol as outlined in the Contractor’s approved QC Plan.

All sampling and testing for Thickness of the applicable pavement courses using cores shall be in accordance with AASHTO T269. The Sublot size and minimum frequency of random QC testing for Thickness shall be as specified in Table 450.10.

(10) Joint Density.
Each transverse joint and longitudinal joint formed during placement of a pavement course shall be tested for Joint Density using a density gauge in accordance with ASTM D2950. The requirement for Joint Density testing applies to all pavement courses, with the exception of Open Graded Friction Courses and Leveling Courses. The Sublot size and minimum frequency of random QC testing for Joint Density shall be as specified in Table 450.10.
Each random sampling and testing location shall be established by determining a randomly selected distance along the joint, along with a randomly selected offset distance within 1 foot (300 mm) of either side of the finished joint, in accordance with ASTM D3665. Additional selective QC sampling and testing of Joint Density within each Sublot of compacted HMA pavement courses or bridge protective surface courses shall be as determined necessary by the Field QCT and as specified in the Contractor’s approved QC Plan.

(11) Ride Quality.

The finished surface of the pavement shall be uniform in appearance, free from irregularities in contour and texture and shall present a smooth riding surface. Ride Quality testing shall be performed for Quality Control on a periodic basis during construction of the HMA pavement courses specified below. QC testing shall be performed for HMA Category A Lots, at a minimum, within 24 hours after each 8 lane-miles (13 lane-kilometers) of an individual pavement course have been placed. QC testing of HMA Category B Lots shall be performed, at a minimum, every other paving day. In addition, the Contractor shall perform QC testing of the entire final pavement course placed upon completion.

(a) Pavement Courses Subject to Ride Quality Testing. For projects having a posted speed equal to or greater than 40 mph with HMA Lots falling under Lot Category A (Large Lots) or Category B (Small Lots), QC testing shall be performed with an inertial profiler to determine the Ride Quality of the following pavement courses:

- Friction Course (OGFC-P)
- Surface Course
- Intermediate Course (lift immediately beneath Surface Course only)
- Leveling Course (when placed immediately beneath Surface Course)
- Bridge Surface Course (when asphaltic bridge joints are used and when placed on the same contract with the mainline Surface Course)

At a minimum, the finished surface of these pavement courses will be tested for all mainline travel lanes, auxiliary lanes, ramps, and side road travel lanes. The Contractor may also elect to perform Ride Quality testing of the pavement courses beneath the courses indicated above in order to provide adequate Quality Control.

(b) Pavement Courses Excluded from Ride Quality Testing

The following pavement courses and surfaces are specifically excluded from Ride Quality testing:

1. All exposed concrete bridge decks and any Bridge Surface Course without asphaltic bridge joints (including 15 feet (5 meters) before the approach joint and 15 feet (5 meters) after the departure joint).
2. Mainline pavement courses less than one half mile (800 meters) in total length (excluding bridge lengths).
3. Side road pavement courses less than one Sublot (0.1 mile (160 meters)) in total length.
4. Single resurfacing pavement courses placed in one lift at a total plan (compacted) thickness less than 1.50 inches (40 millimeters).
5. Pavement courses on horizontal curves having a centerline radius of curvature of 500 feet (150 meters) or less, including the length of pavement within the super-elevation transition of such curves.
6. Pavement courses for shoulders.
7. Pavement segments with manholes or catch basins in the travel lane (the Ride Quality testing data for such pavement segments shall be excluded, including 15 feet (5 meters) before and after these manholes or catch basins).
(c) **Inertial Profiler Equipment Requirements.** All inertial profilers used for Contractor QC testing shall conform to the equipment specifications contained in AASHTO PP50 and ASTM E950. The inertial profiler shall be equipped with a system of transducers (height sensor, accelerometer, distance sensor) to measure the longitudinal pavement profile. An automated triggering system shall be provided that detects a reference mark to start, stop, and event mark the data collection process. The profiler equipment shall include an onboard computer system capable of storing all profile measurement data, calculating the real time International Roughness Index (IRI) per ASTM E1926 (independent of speed), and displaying profile plots.

(d) **Certification and Correlation of Inertial Profilers.** All inertial profilers used for Contractor QC testing must be certified for precision and accuracy in accordance with the requirements of AASHTO PP51. In addition, all Contractor QC profilers must be correlated against the Department’s reference profiling device in accordance with the Department’s correlation procedures. The certification and correlation of all profilers shall be conducted at the Profiler Correlation Center in New Bedford, MA established by the University of Massachusetts at Dartmouth. The certification and initial correlation of the Contractor’s inertial profiler shall be completed prior to the start of Ride Quality testing on the project. After the initial correlation is successfully completed, the same inertial profiler can be used on any Department project without re-correlation for the remainder of the construction season. Equipment that does not pass the Department’s correlation procedure shall not be used. The Contractor’s use of inertial profiler equipment that has not been successfully correlated is sufficient grounds for withholding payment for QC testing of Ride Quality. The Contractor’s inertial profiler equipment may be required to undergo re-correlation at any time during the construction season if significant variations are found within the Contractor’s QC test data or between the QC test data and the Department’s Acceptance test data.

(e) **Ride Quality Testing Procedures.** Ride Quality testing shall be performed in accordance with the procedures outlined in AASHTO PP52, as clarified or amended herein.

The Ride Quality will be measured for each wheel path [a wheel path is defined as 3 feet (1 meter) from and parallel to each longitudinal edge of the lane to be measured]. Each wheel path will be divided into 0.1 mile (160 meters) Sublots starting at the project limits in the direction of traffic. Partial Sublots may result at either end of the project or as a result of interruptions of the continuous pavement surface (i.e. bridge approaches, railroad crossing, cessation of daily paving operations, etc.).

Just prior to testing, the Contractor shall sweep the pavement and remove all foreign objects or materials on the pavement course surface. Testing will begin 15 feet (5 meters) after the transverse approach joint and end 15 feet (5 meters) before the transverse departure joint. A minimum of three and up to a maximum of five test runs will be performed on each wheel path. The final test result for each Sublot will be the average of the three best test runs.

(f) **Data Format and Reporting Requirements.** All Ride Quality QC testing data shall be collected and saved in electronic format in an ASCII data file. A copy of the raw data file shall be provided to the Engineer on site immediately following testing of completed Sublots. A longitudinal profile shall be determined for all Sublots tested and an average IRI value shall be determined and reported for each Sublot (i.e. each 0.1 mile (160 meters) segment of each wheel path). The Contractor shall summarize the results for all Sublots, by corresponding Ride Quality Lot, in an electronic spreadsheet file (MS Excel) consistent with the format of the Department’s QA Spreadsheets. The summary spreadsheet of QC testing data shall be submitted to the Department, electronically and in hardcopy, within two days after the testing is completed.
(g) **Ride Quality Monitoring & Corrective Action.** The Contractor shall evaluate and monitor the test data for each pavement course requiring Ride Quality testing for conformance with the applicable Quality Limits specified in Table 450.19. If the running Quality Level for all Sublots placed and tested falls below the Suspension Quality Level (70 PWL), the Contractor shall suspend further placement of the corresponding pavement course and evaluate the Sublots placed for appropriate corrective action. If the running Mean IRI of all Sublots placed and tested for the pavement course immediately below the final course is greater than the Action Limits specified in Table 450.12, corrective action will be required prior to placement of the final pavement course.

When Ride Quality correction is required, the Contractor shall use one or more of the following corrective methods:

1. Removal and replacement of the entire pavement course.
2. Partial depth removal of the pavement course by milling and placement of new pavement course(s) of the same mixture type.
3. Overlaying (not patching) with the specified pavement course.
4. Diamond grinding or use of other surface profiling devices.

The corrective method(s) chosen by the Contractor shall be subject to the approval of the Department and shall be performed at the Contractor's expense. The Contractor shall retest any Sublots where corrections are made and provide the Department with a copy of the raw data file, the profile plot, and the IRI summary spreadsheet data for the corrected Sublots.

**Table 450.12 - Action Limits for Pavement Course Below Final Pavement Course**

<table>
<thead>
<tr>
<th>Posted Speed Limit(^{(1)})</th>
<th>Target IRI</th>
<th>Maximum Mean IRI of All Sublots Tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than or equal to 55 mph (90 km/hr)</td>
<td>60 in/mile (0.95 m/km)</td>
<td>≤ 85 in/mile (1.34 m/km)</td>
</tr>
<tr>
<td>40 mph (65 km/hr) to 55 mph (90 km/hr)</td>
<td>80 in/mile (1.26 m/km)</td>
<td>≤ 105 in/mile (1.66 m/km)</td>
</tr>
<tr>
<td>Less than 40 mph (65km/hr)</td>
<td>Not subject to Ride Quality testing</td>
<td>N/A</td>
</tr>
</tbody>
</table>

\(^{(1)}\) Note that projects with posted speed limits that fall into more than one of the Posted Speed Limit ranges above will be divided into multiple Lots and evaluated separately.

**450.66 HMA Mix Design Verification and Control Strip Requirements.**

For all pavement courses with HMA Lots falling under Lot Category A (Large Lots), the HMA mix design Verification and Control Strip procedures outlined below shall apply.

**A. Laboratory Verification of HMA Mix Design.**

The Contractor shall develop and submit a Laboratory Trial Mix Formula (LTMF) for each HMA mixture type, which is to be proposed as a Job Mix Formula, a minimum of forty-five (45) days prior to the start of HMA production. The Contractor shall not proceed to HMA production for the Control Strip as outlined below until the LTMF is verified by the Department.
B. HMA Control Strip.

The Contractor shall produce and place a Control Strip Lot for all HMA pavement courses, with the exception of Leveling Courses, on the first day of HMA production. The Control Strip will be used to verify that the HMA can be produced per the LTMF, to establish compaction patterns, and to verify that the equipment and processes for lay-down and compaction are capable of providing the HMA pavement course in conformance with these specifications. The Control Strip Lot shall consist of a minimum of 600 tons (550 Mg) of HMA, but not more than 1,800 tons (1,650 Mg). Each Control Strip will be divided into three (3) equal Sublots. The Contractor and the Department will both perform inspection, sampling, and testing on the Control Strip and evaluate the corresponding data as outlined below.

(1) Control Strip Inspection.

The Contractor’s QC personnel shall perform inspection of each Control Strip Sublot at both the HMA production facility and at the site of HMA field placement. The specific items to be inspected for the Control Strip shall include the four primary inspection components (Equipment, Materials, Environmental Conditions, Workmanship) in accordance with the requirements of Table 450.8a, Table 450.8b and as specified in the Contractor’s approved QC Plan. The Department will also inspect each Control Strip Sublot for the inspection components of Materials and Workmanship.

(2) Control Strip Sampling and Testing.

The Contractor and the Department shall independently sample and test the Control Strip Lot for the Quality Characteristics identified in Table 450.13. The Contractor and the Department shall each sample and test each Sublot produced and placed. Each Contractor QC sample and each Agency Acceptance sample shall be randomly obtained from each Sublot in accordance with ASTM D3665 and the prescribed sampling protocols for each Quality Characteristic as outlined in Subsection 450.65F. Split samples shall be retained for each Sublot by both the Contractor and the Department in accordance with Subsection 450.65D.

(3) Evaluation of Control Strip Inspection Data.

The Contractor and the Department shall each evaluate their respective Control Strip inspection data against the requirements for Materials and Workmanship specified in Subsection 450.53 thru Subsection 450.58.

(4) Evaluation of Control Strip Sampling and Testing Data.

The Contractor and the Department shall each evaluate their respective individual Sublot test results against the Control Strip Quality Limits in Table 450.13. The Contractor and the Department shall also evaluate the Control Strip Lot Quality Level (PWL) using the Specification Limits in Table 450.13 for those Quality Characteristics subject to Quality Level Analysis. The Contractor’s QC test data shall be combined with the Agency’s Acceptance test data to determine the Lot Quality Level, provided that the QC data is Validated against the Acceptance data in accordance with Subsection 450.77. The Control Strip Lot Quality Level must be 70 PWL or greater.
<table>
<thead>
<tr>
<th>Quality Characteristic</th>
<th>Target</th>
<th>Specification Limits</th>
<th>Engineering Limits</th>
<th>Acceptance Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LSL</td>
<td>USL</td>
<td>LEL</td>
</tr>
<tr>
<td>PG Asphalt Binder Grading</td>
<td>Per Binder Grade specified</td>
<td>N/A</td>
<td>N/A</td>
<td>Per AASHTO M320</td>
</tr>
<tr>
<td>PG Asphalt Binder Content</td>
<td>Per LTMF</td>
<td>Target - 0.3 %</td>
<td>Target + 0.3 %</td>
<td>Target - 0.4 %</td>
</tr>
<tr>
<td>Volumetrics: Air Voids</td>
<td>4 %</td>
<td>2.7 %</td>
<td>5.3 %</td>
<td>2 %</td>
</tr>
<tr>
<td>Combined Gradation: Passing #4 (4.75mm) and Larger Sieves</td>
<td>Per LTMF</td>
<td>N/A</td>
<td>N/A</td>
<td>Target - 7%</td>
</tr>
<tr>
<td>Combined Gradation: Passing #8 (2.36mm) Sieve</td>
<td>Per LTMF</td>
<td>N/A</td>
<td>N/A</td>
<td>Target - 5%</td>
</tr>
<tr>
<td>Combined Gradation: Passing #16 (1.18mm) to #50 (300um) Sieve</td>
<td>Per LTMF</td>
<td>N/A</td>
<td>N/A</td>
<td>Target - 4%</td>
</tr>
<tr>
<td>Combined Gradation: Passing #100 (150um) Sieve</td>
<td>Per LTMF</td>
<td>N/A</td>
<td>N/A</td>
<td>Target - 3%</td>
</tr>
<tr>
<td>Combined Gradation: Passing #200 (75um) Sieve</td>
<td>Per LTMF</td>
<td>N/A</td>
<td>N/A</td>
<td>Target - 1.5%</td>
</tr>
<tr>
<td>In-Place HMA Mat Density (Cores)</td>
<td>95 % of $G_{mm}$</td>
<td>92.5 % of $G_{mm}$</td>
<td>97.5 % of $G_{mm}$</td>
<td>92 % of $G_{mm}$</td>
</tr>
<tr>
<td>Thickness*: (All Courses 1 inch (25mm) or greater)</td>
<td>Per Plans</td>
<td>- 20 % of Target Thickness</td>
<td>+ 20 % of Target Thickness</td>
<td>- 30 % of Target Thickness</td>
</tr>
<tr>
<td>Ride Quality*: Greater than or equal to 55 mph (90 km/hr)</td>
<td>50 in/mile (0.79 m/km)</td>
<td>N/A</td>
<td>70 in/mile (1.10 m/km)</td>
<td>N/A</td>
</tr>
<tr>
<td>Ride Quality*: 40mph (65 km/hr) to 55 mph (90 km/hr)</td>
<td>70 in/mile (1.10 m/km)</td>
<td>N/A</td>
<td>100 in/mile (1.58 m/km)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*To be evaluated for applicable pavement courses subject to testing per Subsection 450.65F. The Quality Limits for Ride in Table 450.13 shall only apply to Control Strips for the final pavement course (HMA Surface Course or Friction Course). For pavement courses below the final pavement course that are subject to Ride Quality testing, the Mean IRI for the Control Strip Sublots shall be less than or equal to the Maximum Mean IRI values in Table 450.12.
(5) Verification of Control Strip Lot and LTMF.

In order for a Control Strip Lot and corresponding LTMF to be Verified, the following criteria must be met:

a) All Attributes inspected for each Sublot must meet the specification requirements in Table 450.16.

b) All individual Sublot test results for the Quality Characteristics tested on the Control Strip must be within the Engineering Limits in Table 450.13.

c) If the evaluation of all inspection data and testing data for the Control Strip indicates that the individual Sublots are in conformance with the requirements outlined in Subsection 450.66B paragraphs (3) and (4) above and the Lot Quality for each applicable Quality Characteristic in Table 450.13 is ≥ 70 PWL, the Control Strip Lot and LTMF shall be declared “Verified”. In such event, the LTMF shall become the Job Mix Formula (JMF) for the Lot and the Contractor may proceed with production and placement of the first HMA Lot.

d) If the Control Strip is not Verified, the Contractor shall reassess the LTMF, the production process, and the placement process to determine the apparent cause(s) of nonconformance. The Contractor must submit proposed adjustment(s) to the LTMF and/or the production process and/or placement process. If adjustments to the LTMF are “major” (as defined in Table 1 of AASHTO R 42), the Contractor will be required to submit a new LTMF for laboratory verification by the Engineer per the requirements of Section 450.66A. If proposed adjustment(s) are accepted by the Engineer, the Contractor may proceed with a subsequent Control Strip.

e) If a 2nd or any subsequent Control Strip does not pass all of the inspection and testing requirements, the Contractor must submit proposed adjustment(s) to the LTMF and/or the production process and/or placement process,

f) If the computed PWL for any Quality Characteristic, with the exception of thickness, is < 60 PWL, the Control Strip Lot will be determined rejected and shall be removed. If the mean thickness of the Lot is determined to be greater than the target, it may remain in place, but payment will be based upon the HMA tonnage calculated at the target thickness.

g) For any Control Strip that is not Verified, the Contractor shall prepare a Corrective Action Plan for the nonconforming Control Strip Lot. The corrective method(s) proposed by the Contractor shall be subject to the approval of the Department and shall be performed at the Contractor's expense.

(6) Acceptance and Payment of Control Strips

(a) 1st and 2nd Control Strip

For each Control Strip Lot that has been Verified, payment shall be determined for each individual Quality Characteristic in accordance with the pay adjustment provisions of Subsection 450.92. If the Lot Quality Level for an individual Quality Characteristic is 90 PWL, payment for the Quality Characteristic shall be 100% of the Contractor’s bid price for the pay item quantity placed on the Control Strip. If the Lot Quality Level for an individual Quality Characteristic is > 90 PWL, payment for the Quality Characteristic shall be an incentive amount determined in accordance with Subsection 450.92. If the Lot Quality Level for an individual Quality Characteristic is ≥ 60 PWL, but < 90 PWL, payment for the Quality Characteristic shall be a disincentive amount determined in accordance with Subsection 450.92. If the computed Quality Level for an individual Quality Characteristic is < 60 PWL, the Control Strip Lot will be determined rejected and removed in accordance with Subsection 450.66B(5) and shall receive no payment.
(b) **3rd Control Strip**

If a 3rd Control Strip Lot is placed and is Verified, payment shall be limited to a maximum of 85% of the Contractor’s bid price for the entire pay item quantity placed on the Control Strip, regardless of the actual calculated Quality Level for the Lot. If a 3rd Control Strip Lot is placed and is not Verified, payment shall be limited to a maximum of 80% of the Contractor’s bid price for the entire pay item quantity placed on the Control Strip, regardless of the actual calculated Quality Level for the Lot. If the computed Quality Level for an individual Quality Characteristic is < 60 PWL, the Control Strip Lot will be determined rejected and removed in accordance with Subsection 450.66B(5) and shall receive no payment.

(c) **4th or Subsequent Control Strip**

If a 4th or subsequent Control Strip Lot is placed and is Verified, payment shall be limited to a maximum of 75% of the Contractor’s bid price for the entire pay item quantity placed on the Control Strip, regardless of the actual calculated Quality Level for the Lot. If a 4th or subsequent Control Strip Lot is placed and is not Verified, payment shall be limited to a maximum of 70% of the Contractor’s bid price for the entire pay item quantity placed on the Control Strip, regardless of the actual calculated Quality Level for the Lot. If the computed Quality Level for an individual Quality Characteristic is < 60 PWL, the Control Strip Lot will be determined rejected and removed in accordance with Subsection 450.66B(5) and shall receive no payment.

### 450.67 Quality Control Documentation and Data Evaluation.

**A. QC Inspection Documentation & Evaluation.**

The Contractor shall document all QC inspection activity for each HMA Lot Category (Category A, B, or C) produced and placed. All inspection results shall be recorded within 24 hours of inspection on current NETTCP standard Inspection Report Forms (IRFs). The QC Manager shall evaluate inspection results in a timely manner to confirm that production and placement processes are in control. The Contractor shall submit hard copies of all IRFs to the Engineer at the completion of each Lot.

**B. QC Sampling and Testing Documentation & Data Analysis.**

The Contractor shall document all QC sampling and testing data for each HMA Lot Category (Category A, B, or C) produced and placed. All sampling and testing data shall be recorded within 24 hours of sampling and testing on current NETTCP standard Test Report Forms (TRFs). The QC Manager shall evaluate sampling and testing results in a timely manner, as further outlined below, to confirm that production and placement processes are in control. All QC testing data shall be entered into the Department’s MS-Excel QA Data Spreadsheets via the internet (mhdqa.com) within two (2) days after completion of testing. The Contractor shall submit hard copies of all TRFs to the Engineer at the completion of each Lot.

1. **Control Charts.**

   For each HMA Category A Lot produced and placed, the Contractor shall use Control Charts as part of the QC system to assist in identifying assignable causes affecting the HMA production and placement processes. Control Charts shall be prepared for the Quality Characteristics subject to QC sampling and testing listed in Table 450.10. As a minimum, the Contractor shall plot all QC test results of each Lot on Control Charts for individual Sublot measurements or test values (Run Charts). It is also recommended practice for the Contractor to use Control Charts that plot Subgroups of data (e.g. X-Bar Charts, R Charts). The Contractor shall submit examples of the Control Charts to be used in the QC Plan. As a minimum, the Control Charts shall identify the Contract number, the Payment Item number, the Lot number, the Quality Characteristic, the Control Chart Target, the Upper and Lower Control Chart Limits, and Sublot or Subgroup numbers.
All Control Charts should be updated within 24 hours after the corresponding testing is completed and documented. Quality Control personnel should use the Control Chart data to monitor and adjust the production and placement processes or suspend operations as determined necessary. Control Charts for Quality Characteristics related to HMA production should be maintained at the HMA production facility. Control Charts for Quality Characteristics related to HMA field placement should be maintained at the project field site. Current Control Charts shall be posted in an accessible location. The Engineer shall be provided access to all Control Charts as part of the Department’s monitoring of Contractor QC activity.

(2) Evaluation of Individual Sublot QC Test Results.

The Contractor shall evaluate the individual QC test results for each HMA Lot Category (Category A, B, or C) produced and placed. Each random QC test result shall be evaluated against the applicable Quality Limits within 24 hours of testing. For HMA Category A Lots and Category B Lots, each Sublot test value shall be within the Engineering Limits specified in Table 450.19. For HMA Category C Lots, each Sublot test value shall be within the Specifications Limits indicated in Table 450.19.

If the evaluation of the QC testing data indicates that an individual Sublot is not in conformance with the applicable Quality Limits for the particular HMA Lot Category, the Contractor shall isolate the Sublot and perform selective sampling followed by additional random sampling of the Sublot to quantify the actual quality of the Sublot.

(3) Evaluation of Lot Quality Level.

For HMA Category A Lots and Category B Lots, the Contractor shall use all random QC test results to continuously evaluate the running quality level and determine the percent within limits (PWL) for each Lot during production and placement. The PWL shall be determined through Quality Level Analysis (QLA) for each of the applicable Quality Characteristics listed in Table 450.19 using the corresponding Specification Limits therein. The Contractor shall perform a running QLA using random QC data only at a minimum after each 5 Sublots have been tested and shall plot the cumulative PWL after each 5 Sublot interval. The Engineer shall be provided access to all records documenting the running QLA for each Lot as part of the Department’s monitoring of Contractor QC activity.

If the running QLA shows the PWL falling below the Acceptable Quality Level (AQL) of 90 PWL, the Contractor shall initiate appropriate adjustments to the production or placement process or initiate corrective action in accordance with procedures outlined in the approved QC Plan. If the PWL falls below the Suspension Quality Level (SQL) of 70 PWL, the Contractor shall suspend production and placement of the Lot. The Contractor shall prepare a plan of corrective action for any nonconforming Lot, as further outlined below. If significant adjustment to the JMF or the production or placement process is required, a new Lot will be established. After resuming production and placement, the PWL for the Lot must be back at or above the AQL of 90 PWL.

450.68 Corrective Action.

As part of the Contractor’s Quality Control system, the Contractor shall implement corrective action for any part of a Lot that is determined by inspection or testing to not be in conformance with the quality requirements specified in Section 450. If the results of QC inspection identify nonconforming material or workmanship within one or more Sublots, or if the evaluation of the QC testing data indicates that any Sublot is not in conformance with the applicable Quality Limits for the particular HMA Lot Category, the Contractor shall isolate the Sublot(s) and perform additional inspection or testing to further assess the quality of the Sublot. Selective inspection or testing should be used to determine the limits of nonconformance, followed by random inspection or testing to quantify the actual quality of the nonconforming area.
Based on the results of additional inspection or testing, the Contractor shall prepare a plan of corrective action for the nonconforming Sublot(s). The Corrective action plan shall be submitted to and approved by the Engineer prior to initiating corrective action. All corrective action shall be performed at the Contractor’s expense.

450.69 Quality Control Records System.

A. Quality Control Daily Diary.

The QC Manager should maintain a Quality Control Daily Diary (QC Daily Diary) to document all major activities or actions related to the Contractor’s QC system. The QC Daily Diary serves as a summary record of key actions taken by QC personnel each day. Recommended Information which should be recorded in the QC Daily Diary includes:

- The day’s weather or environmental conditions.
- A summary of production or placement activities completed.
- Any non-conforming material or workmanship identified.
- Any corrective actions recommended or taken by QC personnel.
- Discussions held with other Contractor personnel or Department personnel.
- Visitors to the production facility or field placement operation.

B. Quality Control Record Books.

The Contractor shall maintain one or more ringed binders referred to as “Quality Control Record Books” (QC Record Books) to store all required QC documents. Separate QC Record Books shall be kept at each HMA production facility and at the project field site. Either a separate QC Record Book shall be established for each HMA pavement course or the data for each pavement course may be included in a single QC Record Book provided the data is separated according to pavement course. QC data for each pavement course shall be organized into separate sections by Quality Characteristic and by Lot number. QC documents to be stored in the QC Record Book(s) include:

- A signed copy of the current approved QC Plan.
- The original signed copies of all completed Inspection Report Forms.
- The original signed copies of all completed Random Sampling location forms.
- The original signed copies of all completed Test Report Forms.
- A current copy or printout of all Control Charts.
- A current copy or printout of all running QLA performed.
- Current summaries of all individual QC test results to date (by Lot & Sublot).
- Summary sheets of material quantities produced or placed (by Lot & Sublot).

Each required record shall be inserted into the corresponding QC Record Book within 24 hours after the document has been completed. All QC Record Books shall be maintained in a suitable location. The Engineer shall be provided access to all QC Record Books as part of the Department’s monitoring of Contractor QC activity.

C. Quality Control Records Retention.

All Contractor QC records identified above shall be retained for a minimum of seven (7) years. The records shall be protected from damage or alteration. When requested by any State or Federal Agency for audit or similar purposes, the Contractor shall provide complete access to all QC records.
DEPARTMENT ACCEPTANCE

450.70 General.
The Department is responsible for performing all Acceptance activities and making the final acceptance determination for each HMA Lot produced and placed. The Department’s Acceptance system will include monitoring the Contractor’s QC activity, performing Acceptance inspection, sampling & testing, and determining the Quality and corresponding payment for each Lot. These activities will be performed for each HMA Lot Category (Lot Category A, B, and C) as outlined further below.

450.71 Acceptance System Approach.

A. Acceptance of Category A Lots.
The Engineer’s acceptance determination for each HMA Category A Lot will be based on an evaluation of the Department’s Acceptance inspection information and Acceptance testing data. The Engineer will perform Acceptance sampling and testing on a minimum of 25% of the Sublots produced and placed. Contractor QC test data will be included in the Department’s acceptance determination for each Category A Lot provided the following requirements are met:
- Split Sample Correlation testing requirements are satisfied.
- The Contractor provides adequate Quality Control per the approved QC Plan.
- All QC test results included are from random samples.
- The QC test results are Validated against the Department’s Acceptance test results.

B. Acceptance of Category B Lots.
The Engineer’s acceptance determination for each HMA Category B Lot will also be based on an evaluation of the Department’s Acceptance inspection information and Acceptance testing data. The Engineer will perform Acceptance sampling and testing on a minimum of 50% of the Sublots produced and placed, but not less than three (3) Sublots. Contractor QC test data will be included in the Department’s acceptance determination for each Category B Lot provided the requirements outlined in paragraph A above are satisfied.

C. Acceptance of Category C Lots.
For all HMA Category C Lots, the Engineer’s acceptance determination will be based only on the Department’s Acceptance inspection information and Acceptance testing data. The Engineer will perform Acceptance sampling and testing on 100% of the Sublots produced and placed. Contractor QC test data will not be included in the Department’s acceptance determination for Category C Lots.

450.72 Department Monitoring of Contractor Quality Control.
For projects with HMA Category A Lots or Category B Lots, the Department will monitor the Contractor’s Quality Control system to confirm that QC activities are being performed for each Lot in reasonable compliance with the approved QC Plan. Department monitoring of the Contractor’s QC system is not intended to evaluate the Quality of the Work. The Engineer will not perform the QC responsibilities of the Contractor or provide constant direction to the Contractor on how to perform Quality Control. The Engineer’s monitoring of QC activity will include the following:
- Periodic visual observation of QC inspection, sampling, and testing.
- Reviewing QC documentation and records.
- Providing feedback based on monitoring findings.
The Engineer will document all findings (positive or negative) from any monitoring of the Contractor’s QC system on standard Monitoring Report Forms (MRFs). Copies of all MRFs will be provided to the Contractor on a timely basis. When deficiencies in the Contractor’s QC system are identified and documented by the Engineer, the Contractor shall take immediate action to address the deficiencies. If the Contractor fails to take appropriate action, the Contractor shall suspend production and placement of the corresponding Lot(s). The Department will withhold payment for the Contractor Quality Control Payment Item (Item No. 450.70) until the Contractor implements satisfactory corrective measures.

450.73 Acceptance Inspection.

The Engineer will perform Acceptance inspection of all work items addressed under Section 450 to ensure that all materials and completed work are in conformance with the contract requirements. Acceptance inspection is intended to visually assess the quality of each HMA 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 activity by the Department will be performed independent of the Contractor’s QC inspection at both the HMA production facility and at the site of HMA field placement. The Engineer will document the results and findings of Acceptance inspection on NETTCP Inspection Report Forms (IRFs). The Engineer will furnish a copy of all Department Acceptance inspection results to the Contractor within five (5) days following the inspection.

A. Acceptance Inspection of Prepared Underlying Surface.

The Department will perform Acceptance inspection of the prepared underlying surface prior to placement of HMA. The items to be inspected and minimum frequency of inspection will be in accordance with the requirements outlined in Table 450.14 and Table 450.15.

### Table 450.14 - Department Acceptance Inspection of HMA Patching

<table>
<thead>
<tr>
<th>Inspection Component</th>
<th>Items Inspected</th>
<th>Minimum Inspection Frequency</th>
<th>Point of Inspection</th>
<th>Inspection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials</strong></td>
<td>Mixture Type + PG Binder Grade (Correct Type)</td>
<td>1 per Day</td>
<td>HMA Production Facility</td>
<td>Visual Check + Manufacturer COC</td>
</tr>
<tr>
<td></td>
<td>Rubberized Asphalt Sealant (Correct Type)</td>
<td>1 per Day</td>
<td>At Paving Site</td>
<td>Check Manufacturer COC</td>
</tr>
<tr>
<td><strong>Workmanship</strong></td>
<td>Sawcut Limit Vertical Face</td>
<td>25% of Patched Areas</td>
<td>Sawcut Limits</td>
<td>Visual Check</td>
</tr>
<tr>
<td></td>
<td>Rubberized Asphalt Sealant Application Rate</td>
<td>25% of Patched Areas</td>
<td>Sawcut Limits</td>
<td>Visual Check + Check Measurement</td>
</tr>
<tr>
<td></td>
<td>Cross-Slope &amp; Profile</td>
<td>25% of Patched Areas</td>
<td>Compacted HMA</td>
<td>Check Measurement</td>
</tr>
</tbody>
</table>
### Table 450.15 - Department Acceptance Inspection of Tack Coat

<table>
<thead>
<tr>
<th>Inspection Component</th>
<th>Items Inspected</th>
<th>Minimum Inspection Frequency</th>
<th>Point of Inspection</th>
<th>Inspection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Asphalt Emulsion (Correct Type)</td>
<td>1 per Day</td>
<td>At Paving Site</td>
<td>Check Manufacturer COC</td>
</tr>
<tr>
<td>Workmanship</td>
<td>Asphalt Emulsion Application Rate</td>
<td>Once per 5,000 lane-ft (1,500 lane-m)</td>
<td>Tacked Surface + Tack Distributor System</td>
<td>Visual Check + Check Measurement</td>
</tr>
</tbody>
</table>

#### B. Acceptance Inspection of HMA Lots.

The Department will perform Acceptance inspection at both the HMA production facility and at the site of HMA field placement. For purposes of Acceptance inspection, the total quantity of each HMA pavement course produced and placed during the same construction season will constitute a Lot. Each in-place HMA Lot will be divided into 500 lane-feet (150 lane-meters) Sublots. The items to be inspected and minimum frequency of inspection will be in accordance with the requirements outlined in Table 450.16.

1. **Wheel Path Deviations.**

Each HMA Lot produced and placed will be inspected by the Engineer for Wheel Path Deviations (high points or low points) using a 10 foot (3 meter) standard straightedge in accordance with the procedures outlined in Subsection 450.64B. Acceptance inspection for Wheel Path Deviations applies to all pavement courses (including bridge protective courses and bridge surface courses). The finished surface of each required pavement course will be inspected for all mainline travel lanes, auxiliary lanes, ramps, and side road travel lanes. The Sublot size and minimum frequency of Acceptance inspection for Wheel Path Deviations will be as specified in Table 450.16.
### Table 450.16 - Department Acceptance Inspection of HMA Lots

<table>
<thead>
<tr>
<th>Inspection Component</th>
<th>Items Inspected</th>
<th>Minimum Inspection Frequency</th>
<th>Point of Inspection</th>
<th>Inspection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials</strong></td>
<td>HMA Mixture Type, Aggregates &amp; PG Binder (Correct Type)</td>
<td>1 per Day</td>
<td>HMA Production Facility</td>
<td>Visual Check + Manufacturer COC</td>
</tr>
<tr>
<td></td>
<td>Rubberized Asphalt Sealant (Correct Type)</td>
<td>1 per Day</td>
<td>At Paving Site</td>
<td>Check Manufacturer COC</td>
</tr>
<tr>
<td><strong>Workmanship</strong></td>
<td>Joint Location &amp; Alignment</td>
<td>50% of Sublots, Once per Joint</td>
<td>At Finished Joint</td>
<td>Visual Check</td>
</tr>
<tr>
<td></td>
<td>Sawcut Joint Vertical Face</td>
<td>50% of Sublots, Once per Joint</td>
<td>Joint Vertical Face</td>
<td>Visual Check</td>
</tr>
<tr>
<td></td>
<td>Rubberized Asphalt Sealant Application Rate</td>
<td>50% of Sublots, Once per Joint</td>
<td>Joint Vertical Face</td>
<td>Visual Check + Check Measurement</td>
</tr>
<tr>
<td></td>
<td>Physical Segregation</td>
<td>50% of Sublots, Once per Lane</td>
<td>Compacted HMA</td>
<td>Visual Check</td>
</tr>
<tr>
<td></td>
<td>Cross-Slope</td>
<td>50% of Sublots, Once per Lane</td>
<td>Compacted HMA</td>
<td>Check Measurement</td>
</tr>
<tr>
<td></td>
<td>Joint Tightness</td>
<td>50% of Sublots, Once per Joint</td>
<td>Compacted HMA</td>
<td>Visual Check</td>
</tr>
<tr>
<td></td>
<td>Joint Surface Deviations</td>
<td>50% of Sublots, Once per Joint</td>
<td>At Finished Joint</td>
<td>10 foot (3 meter) standard straightedge</td>
</tr>
<tr>
<td></td>
<td>Wheel Path Deviations</td>
<td>50% of Sublots, per Wheel Path</td>
<td>Wheel Path</td>
<td>10 foot (3 meter) standard straightedge</td>
</tr>
</tbody>
</table>
450.74 Acceptance Sampling & Testing.

A. Random Sampling.

The Department will utilize stratified random sampling to determine the overall quality of each HMA Lot produced and placed. Random Acceptance sample locations will be determined by the Engineer in accordance with ASTM D 3665 or by electronic random number generator, as presented by the NETTCP. All random Acceptance sample locations will be documented on NETTCP Standard Test Report Form D3665.

The Contractor shall furnish the Engineer with approved containers for all Acceptance samples. The Engineer will obtain all random Acceptance samples independent of the Contractor’s QC samples at the frequencies outlined below.

(1) Sampling HMA Category A Lots.

The Engineer will obtain Acceptance samples from a minimum of 25% of all Sublots in each HMA Category A Lot for all Quality Characteristics specified in Table 450.17, other than PG Asphalt Binder Grading and Ride Quality. Acceptance samples For PG Asphalt Binder Grading and Ride Quality will be obtained from each Sublot as defined in Table 450.17.

(2) Sampling HMA Category B Lots.

The Engineer will obtain Acceptance samples from a minimum of 50% of all Sublots, but not less than three (3) Sublots, in each HMA Category B Lot for all Quality Characteristics specified in Table 450.17, other than PG Asphalt Binder Grading and Ride Quality. Acceptance samples For PG Asphalt Binder Grading and Ride Quality will be obtained from each Sublot as defined in Table 450.17.

(3) Sampling HMA Category C Lots.

The Engineer will obtain Acceptance samples from 100% of all Sublots in each HMA Category C Lot for all Quality Characteristics specified in Table 450.17, other than Ride Quality. Acceptance sampling and testing for Ride Quality will not be performed on Category C Lots.

B. Selective Sampling.

The Department will utilize selective sampling (i.e. non-random samples) as needed to provide supplemental information to assist in quantifying the quality of apparent nonconforming material. When the results of acceptance inspection or random sampling and testing identify material which is not in conformance with the applicable Quality Limits for the particular HMA Lot Category, the Engineer will isolate the corresponding Sublot(s) and perform selective sampling to further assess the quality of the Sublot. Selective inspection or testing will be used to determine the limits of nonconformance, followed by random inspection or testing to quantify the actual quality of the nonconforming area. The test results of selective Acceptance samples will not be combined with random Acceptance sample data in the determination of Lot acceptance using Quality Level Analysis as outlined in Subsection 450.78.

C. Contractor Assistance in Obtaining Acceptance Samples.

The Engineer will obtain all material samples for Acceptance testing by the Department. When requested by the Department, the Contractor shall assist the Engineer in obtaining Acceptance samples in accordance with the following requirements:

- The Acceptance sample location and time will be randomly selected by the Engineer and provided to the Contractor immediately prior to sampling.
- The Contractor’s qualified QC personnel will only provide the physical labor to assist the Engineer in obtaining the Acceptance sample.
- The Engineer will be present to direct and monitor the taking of the sample.
- The Engineer will take immediate possession of the Acceptance sample.
Contractor assistance may be requested in obtaining Acceptance samples for PG Asphalt Binder Grading and for In-Place Density and Thickness (HMA cores). The Contractor shall provide adequate traffic control for the Department to obtain cores, regardless of whether the Contractor assists the Engineer in obtaining the Acceptance core samples.

D. Acceptance Sample Identification System.

The Department will use a standard system for the identification of all Acceptance samples. All PG Asphalt Binder samples, HMA loose mixture samples, and core samples will be labeled by the Engineer with the minimum information indicated under Subsection 450.65C. Acceptance sampling data for Ride Quality and Wheel Path Deviations will be identified by the Engineer in accordance with the Department’s Standard Operating Procedures (SOPs).

E. Retention of Split Samples.

Qualified Department personnel will obtain all material samples (PGAB samples, HMA loose mix samples, and cores) for Acceptance testing. The Department will retain split samples from each PGAB sample and HMA loose mix sample and provide a split sample to the Contractor if requested. The Department will retain the original core samples after testing to serve as “split samples” and protect them from damage. All split samples will be stored for a period of (30) days, or until tested. These split samples will be utilized if necessary, in the Dispute Resolution process. If mutually agreed upon by the Department and the Contractor, the retained split samples may be discarded prior to the required thirty (30) days.

F. Acceptance Testing of HMA Lots.

The Department will perform Acceptance testing using the random samples obtained in accordance with Subsection 450.74A from the HMA production facility and at the site of HMA field placement. The specific Quality Characteristics subject to Department Acceptance testing are identified in Table 450.17. All Acceptance testing of HMA Lots will be performed by the Engineer in accordance with the AASHTO, ASTM, NETTCP, or Department test methods specified in Table 450.17 and the procedures outlined below. The Engineer will furnish a copy of all Department Acceptance test results/data to the Contractor within five (5) days following completion of testing.

1) PG Asphalt Binder Grading.

The Department will review the Supplier’s Certificate of Compliance (COC) and corresponding certified AASHTO M320 test results submitted by the Contractor for each Supplier Lot of PGAB from which the HMA Producer’s PGAB was obtained. The Engineer will also obtain and test a minimum of one random Acceptance sample of PGAB for each 12,000 ton (11,000 Mg) HMA Sublot, as defined in Table 450.17, to determine conformance with AASHTO M320. A minimum of two 1-quart (1-Liter) containers of PGAB will be obtained for each Acceptance sample from the HMA Producer’s tanks in accordance with AASHTO T40. All PGAB Acceptance samples will be split prior to testing and the untested portion of the sample will be retained for a minimum of 30 days.

2) PG Asphalt Binder Content.

The Engineer will test each HMA Lot produced and placed for PG Asphalt Binder Content in accordance with either AASHTO T164 or T308. When AASHTO T164 is used, the test results will be reported prior to ash correction. The Sublot size and minimum frequency of Acceptance testing for PG Asphalt Binder Content will be as specified in Table 450.17. Each material sample for PG Asphalt Binder Content will be obtained at the HMA plant from a randomly selected quadrant from the haul vehicle in accordance with ASTM D3665 and AASHTO T168.
### Table 450.17 - Department Acceptance Sampling and Testing of HMA Lots

<table>
<thead>
<tr>
<th>Quality Characteristic</th>
<th>Test Method(s)</th>
<th>Sublot Size</th>
<th>Minimum Test Frequency</th>
<th>Point of Sampling</th>
<th>Sampling Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG Asphalt Binder Grading</td>
<td>AASHTO M320</td>
<td>12,000 tons (11,000 Mg) of HMA using same PG Grade</td>
<td>1 per Sublot</td>
<td>From Tank Valve at HMA Plant</td>
<td>Random AASHTO T40</td>
</tr>
<tr>
<td>PG Asphalt Binder Content</td>
<td>AASHTO T164 or AASHTO T308</td>
<td>600 tons (550 Mg)</td>
<td>1 per Sublot sampled per Subsection 450.74A(1)</td>
<td>From Haul Vehicle at HMA Plant</td>
<td>Random AASHTO T168</td>
</tr>
<tr>
<td>Volumetrics: Air Voids</td>
<td>AASHTO T245</td>
<td>600 tons (550 Mg)</td>
<td>1 per Sublot sampled per Subsection 450.74A(1)</td>
<td>From Haul Vehicle at HMA Plant</td>
<td>Random AASHTO T168</td>
</tr>
<tr>
<td>In-place HMA Mat Density (Cores)</td>
<td>AASHTO T269 AASHTO T230 AASHTO T209 AASHTO T166</td>
<td>600 tons (550 Mg)</td>
<td>1 per Sublot sampled per Subsection 450.74A(1)</td>
<td>From Compacted HMA Course</td>
<td>Random AASHTO T269</td>
</tr>
<tr>
<td>In-place HMA Mat Density (Bridge Courses)</td>
<td>ASTM D2950 or AASHTO TP68</td>
<td>150 tons (140 Mg)</td>
<td>1 per Sublot sampled per Subsection 450.74A</td>
<td>From Compacted HMA Course</td>
<td>Random ASTM D2950 or AASHTO TP68</td>
</tr>
<tr>
<td>Thickness</td>
<td>AASHTO T269</td>
<td>600 tons (550 Mg)</td>
<td>1 per Sublot sampled per Subsection 450.74A(1)</td>
<td>From Compacted HMA Course</td>
<td>Random AASHTO T269</td>
</tr>
<tr>
<td>Ride Quality (IRI)</td>
<td>AASHTO PP52 per Subsection 450.65F(11)</td>
<td>0.1 miles (160 meters) per each Wheel Path</td>
<td>1 Per Sublot</td>
<td>Each Pavement Course per Subsection 450.65F(11)</td>
<td>Random per Subsection 450.65F(11)</td>
</tr>
</tbody>
</table>

(1) In the event that the total daily HMA production is less than one Sublot but greater than 150 tons (140 Mg), a minimum of one random Acceptance sample shall be obtained for the day’s production.
(3) Volumetrics (Air Voids).

The Engineer will test each HMA Lot produced and placed for Volumetrics (Air Voids) in accordance with AASHTO T245. The requirement for Volumetric testing of laboratory compacted specimens applies to HMA mixtures for all pavement courses, with the exception of Open Graded Friction Courses and Base Courses. The Sublot size and minimum frequency of Acceptance testing for Volumetrics will be as specified in Table 450.17. Each material sample for Volumetrics will be obtained at the HMA plant from a randomly selected quadrant from the haul vehicle in accordance with ASTM D3665 and AASHTO T168.

(4) In-Place HMA Mat Density.

The Engineer will test each HMA Lot produced and placed for In-place HMA Mat Density. The requirement for In-Place Density testing applies to all pavement courses, with the exception of Open Graded Friction Courses and Leveling Courses, as outlined below.

(a) Testing In-Place Density by Cores. Acceptance testing of HMA pavement courses (other than bridge courses) for In-place Density will be performed using cores in accordance with the procedures outlined in Subsection 450.65F(8)(b). The Sublot size and minimum frequency of Acceptance testing for In-place Density of HMA pavement courses by core will be as specified in Table 450.17.

(b) Testing In-Place Density by Density Gauge. Acceptance testing of all HMA Bridge Protective Courses and Bridge Surface Courses for In-place Density will be performed using a density gauge in accordance with the procedures outlined in Subsection 450.65F(8)(a). The Sublot size and minimum frequency of Acceptance testing for In-place Density of HMA bridge courses by density gauge will be as specified in Table 450.17.

(5) Thickness.

Each HMA pavement course specified to be placed at a compacted thickness of 1 inch (25mm) or greater, with the exception of the HMA pavement courses identified in Subsection 450.65F(9), will be tested by the Engineer for Thickness using cores. Acceptance sampling and testing for Thickness of the applicable pavement courses shall be in accordance with AASHTO T269. The Sublot size and minimum frequency of Acceptance testing for Thickness will be as specified in Table 450.17.

(6) Ride Quality.

Department Acceptance testing for Ride Quality will be required for all projects having a posted speed equal to or greater than 40 mph (65 km/hr) with HMA Lots falling under Lot Category A or Category B. The Engineer will perform Ride Quality testing on the final HMA pavement course placed (either Surface Course or OGFC-P, when specified) for all mainline travel lanes, auxiliary lanes, ramps, and side road travel lanes using an inertial profiler in accordance with the procedures outlined in Subsection 450.65F(11). Pavement courses and surfaces that are specifically excluded from Acceptance testing for Ride Quality are as specified in Subsection 450.65F(11)(b). The Sublot size and minimum frequency of Acceptance testing for Ride Quality will be as specified in Table 450.17.

The inertial profiler equipment used to perform Acceptance testing will be certified and correlated by the Department in accordance with the requirements and procedures outlined in Subsection 450.65F(11). The Department Acceptance data and Contractor QC data will be correlated and normalized using statistical procedures. The normalization of data will be based on the measurement difference/bias from the Department Reference Profiling Device determined during the device correlation conducted at the Profiling Center by UMass Dartmouth. The Department will provide software and procedures to perform the data normalization. The normalized Acceptance Ride Quality data and QC Ride Quality data will be used to determine the quality level (PWL) and corresponding pay for each Lot.
450.75  Split Sample Correlation.

Split Sample Correlation is an important part of the Department acceptance system for HMA Category A Lots and Category B Lots. Split Sample Correlation shall be performed when Validated Contractor QC test data is to be included in the acceptance determination. The purpose of Split Sample Correlation testing is to identify and eliminate any discrepancies in testing procedures or equipment that could result in significant differences between the Contractor’s QC testing results and the Engineer's Acceptance testing results.

Either prior to or on the first day of production and placement of any HMA Category A Lot or Category B Lot, the Contractor and the Department will conduct Split Sample Correlation. The Engineer or the Contractor may also request that Split Sample Correlation be performed at any time during HMA Lot production and placement. Department IA personnel may also test a split of the Correlation samples.

Split Sample Correlation will be performed on split material samples for those Quality Characteristics identified in Table 450.18. Correlation samples for HMA mixture testing shall be either laboratory prepared specimens or plant produced HMA specimens. Samples for HMA Category A Lots may be obtained from the Control Strip Lot. Correlation testing of the Contractor’s QC ride quality testing equipment and the Department’s Acceptance ride quality testing equipment will be performed in accordance with Subsection 450.65F(11)(c).

<table>
<thead>
<tr>
<th>Quality Characteristic</th>
<th>Allowable Difference Between Contractor and Department Split Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Theoretical Specific Gravity (Gmm)</td>
<td>+/- 0.020</td>
</tr>
<tr>
<td>Bulk Specific Gravity (Gmb)</td>
<td>+/- 0.030</td>
</tr>
<tr>
<td>PG Asphalt Binder Content</td>
<td>+/- 0.4%</td>
</tr>
<tr>
<td>Volumetrics - Air Voids</td>
<td>+/- 1.4%</td>
</tr>
<tr>
<td>In-Place HMA Mat Density</td>
<td>+/- 1.4%</td>
</tr>
<tr>
<td>Thickness</td>
<td>+/- 10 %</td>
</tr>
<tr>
<td>Ride Quality (IRI)</td>
<td>Per Subsection 450.65F(11)(c)</td>
</tr>
</tbody>
</table>

If the Contractor’s Split Sample Correlation results differ from the Department’s results by more than the allowable differences specified in Table 450.18, then the Contractor and the Department shall determine and resolve the reasons for the differences prior to the start or continuation of HMA Lot production and placement.
450.76 Lot Acceptance Determination Based on Inspection Results.

The Department’s Acceptance Inspection results will be used in the final acceptance determination for all HMA Lots (Lot Category A, B, and C). Prior to final acceptance of each HMA Lot produced and placed, the Department will periodically evaluate all Acceptance inspection information for the prepared underlying surface and 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 450.53 thru 450.58.

When the Acceptance information identifies deficiencies in either material quality or product workmanship for any underlying surface location or HMA Sublot(s), the location or Sublot(s) will be isolated and further evaluated by the Engineer through additional Acceptance inspection (or sampling and testing, if relevant or possible). 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.

After each HMA Lot (and corresponding prepared underlying surface) is complete, including any corrective action, the Engineer will evaluate all Acceptance inspection information for the Work. The Department will accept the subject Work if the Engineer’s evaluation of all inspection information for the completed Lot (and underlying surface) indicates that the corresponding materials and product workmanship meet the specified requirements (provided the evaluation of all Acceptance testing data for the subject Work per Subsection 450.77 also finds the Work to be acceptable).

450.77 Lot Acceptance Determination Based on Testing Data.


Prior to final acceptance of each HMA Category A Lot produced and placed, the Engineer will periodically evaluate all available Department Acceptance testing data for the Lot.

The Contractor’s random QC testing data for each Lot will be included with the Department’s random Acceptance testing data in the acceptance determination, provided that the QC data has been Validated in accordance with paragraph (1) below. The Department’s Acceptance data and all Validated Contractor QC data will be evaluated using the Quality Limits specified in Table 450.19 and as further outlined below.

(1) Validation of Contractor QC Test Results.

Validation is defined as the mathematical comparison of two independently obtained sets of data to determine whether it can be assumed they came from the same Population. The Validation of each HMA Lot will be performed through a statistical comparison of the Engineer’s random Acceptance testing data and the Contractor’s random QC testing data for the Lot.

The statistical comparison of testing data will be made using the test result Variances (F-test) and the test result Means (t-test) at a significance level of 0.01 and in accordance with the procedures contained in Appendix F of the AASHTO Implementation Manual For Quality Assurance (February 1996). The Validation worksheet in the Department’s MS-Excel QA Data Spreadsheets will be used to perform the Validation of each Lot.

If the Validation results indicate that the Contractor’s QC test results and the Department’s Acceptance test results can be assumed to be from the same Population, then the Contractor’s QC test results will be included with the Department’s Acceptance test results in the final acceptance determination for each Lot.
If the Validation results indicate that the Contractor’s QC test results and the Department’s Acceptance test results cannot be assumed to be from the same Population, then the Department will endeavor to determine the reason for the difference between the two data sets. If a reason for the difference cannot be determined, then only the Department’s Acceptance test results will be used in the final acceptance determination for each Lot.

**2 Conformance with Engineering Limits.**

The Engineer will evaluate all Department Acceptance testing data and Validated Contractor QC testing data for each Category A Lot to determine conformance with the Engineering Limits in Table 450.19. Each Sublot test value for the Acceptance Quality Characteristics identified in Table 450.19 shall be within the Engineering Limits.

If a Sublot test result is outside of the Engineering Limits, the Engineer will further assess the Sublot quality to determine whether the material in the Sublot can remain in place. The Engineer will isolate the Sublot and perform selective sampling followed by additional random sampling (if possible) within the Sublot to quantify the actual quality of the Sublot. The Engineer will determine the disposition of the Sublot in accordance with Division I, Subsection 5.03, Conformity with Plans and Specifications. If the Engineer’s assessment determines that the material quality is sufficient to permit the Sublot to remain in place without corrective action, all random testing data for the Sublot (including the original out of Engineering Limit test result) will be included in the Quality Level Analysis for the Lot in accordance with paragraph (3) below.

When a nonconforming Sublot is corrected or replaced, the Engineer will perform Acceptance testing of the Sublot and evaluate the test results for conformance with the Engineering Limits. The Acceptance test data for the corrected Sublot will replace the original Acceptance test result and will be included in the Quality Level Analysis for the Lot in accordance with paragraph (3) below. Once the above requirements have been met, the Department will accept all completed Sublots, provided that the overall Lot quality is above the Acceptance Limit as further outlined below.

**3 Analysis of Lot Quality Level.**

For each HMA Category A Lot, the Engineer will determine the Lot Quality Level, for the applicable Quality Characteristics in Table 450.19, using the Quality Level Analysis (QLA) procedures outlined in Subsection 450.78. The QLA procedure will evaluate all Department Acceptance testing data and Validated Contractor QC testing data using the Specification Limits in Table 450.19. The Department’s MS-Excel QA Data Spreadsheets will be used to perform the QLA for each Lot.

All random test results that are within the Engineering Limits will be included in the Quality Level Analysis. Individual Sublot test results that are beyond the Engineering Limits, but for which the corresponding Sublot is permitted to remain in place per paragraph (2) above, will also be included in the Quality Level Analysis.

The QLA procedure will determine the Percent Within Limits (PWL) for each Lot. The Acceptance Limit (Rejectable Quality Level) for each completed Lot is 60 PWL. Each Lot must achieve a final Quality Level of at least 60 PWL in order to be accepted by the Department.

If the final computed Lot Quality Level is at 90 PWL, the Contractor will receive full payment at the unit bid price for the Lot. If the Lot Quality Level is greater than 90 PWL, the Contractor will receive an incentive pay adjustment for the Lot in accordance with Subsection 450.92. If the Lot Quality Level is less than 90 PWL but greater than or equal to 60 PWL, the Contractor will receive a disincentive pay adjustment for the Lot. If the final computed Lot Quality Level is below 60 PWL, the Lot will not be accepted. Payment for the Lot will be withheld and the Contractor shall submit a corrective action plan within 14 days following determination of the Lot PWL. The Engineer will review the corrective action plan and render a decision within 14 days of receipt of the corrective action plan. If the Engineer determines that the Lot or some of the Sublots cannot remain in place, the Contractor shall remove and replace...
the affected Lot or Sublots. If the Engineer allows the Lot to remain in place, payment will be limited to a maximum of 75% of the bid price for the item.

(4) Final Lot Acceptance Determination.
After each HMA Category A Lot is complete, including any corrective action, the Engineer will perform a final evaluation of all Department Acceptance data and Validated Contractor QC data for the Lot. The Department will accept the subject Lot if the Engineer’s evaluation of all testing data for the Lot is in conformance with the applicable Quality Limits as outlined in paragraph (2) and paragraph (3) above.

### Table 450.19 - Quality Limits for Acceptance of HMA Lots

<table>
<thead>
<tr>
<th>Quality Characteristic</th>
<th>Target</th>
<th>Specification Limits</th>
<th>Engineering Limits</th>
<th>Acceptance Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LSL</td>
<td>USL</td>
<td>LEL</td>
</tr>
<tr>
<td>PG Asphalt Binder Grading</td>
<td>Per Binder Grade specified</td>
<td>N/A</td>
<td>N/A</td>
<td>Per AASHTO M320</td>
</tr>
<tr>
<td>PG Asphalt Binder Content</td>
<td>Per JMF</td>
<td>2.7%</td>
<td>5.3%</td>
<td>2%</td>
</tr>
<tr>
<td>Volumetrics: Air Voids</td>
<td>4%</td>
<td>4%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>In-Place HMA Mat Density (Cores)</td>
<td>95% of (G_{mm})</td>
<td>92.5% of (G_{mm})</td>
<td>97.5% of (G_{mm})</td>
<td>92% of (G_{mm})</td>
</tr>
<tr>
<td>In-Place HMA Mat Density (Bridge Courses)</td>
<td>95% of (G_{mm})</td>
<td>N/A</td>
<td>N/A</td>
<td>90% of (G_{mm})</td>
</tr>
<tr>
<td>Thickness: (All Courses 1 inch (25mm) or greater)</td>
<td>Per Plans</td>
<td>-20% of Target Thickness</td>
<td>+20% of Target Thickness</td>
<td>-30% of Target Thickness</td>
</tr>
<tr>
<td>Ride Quality: Greater than or equal to 55 mph (90 km/hr)</td>
<td>50 in/mile (0.79 m/km)</td>
<td>N/A</td>
<td>70 in/mile (1.10 m/km)</td>
<td>N/A</td>
</tr>
<tr>
<td>Ride Quality: 40mph (65 km/hr) to 55 mph (90 km/hr)</td>
<td>70 in/mile (1.10 m/km)</td>
<td>N/A</td>
<td>100 in/mile (1.58 m/km)</td>
<td>N/A</td>
</tr>
<tr>
<td>Ride Quality: Less than 40 mph (65 km/hr)</td>
<td>Not subject to ride testing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Section 450 – HMA Pavement (Pay Adjustment) 00717 - 55 November 1, 2010

Prior to final acceptance of each HMA Category B Lot produced and placed, the Engineer will periodically evaluate all available Department Acceptance testing data for the Lot.

The Contractor’s random QC testing data for each Lot will be included with the Department’s random Acceptance testing data in the acceptance determination, provided that the QC data has been Validated. The Department’s Acceptance data and all Validated Contractor QC data will be evaluated for conformance with Engineering Limits and for Lot Quality Level in accordance with the requirements of Subsection 450.77A above using the applicable Quality Limits specified in Table 450.19.

After each HMA Category B Lot is complete, including any corrective action, the Engineer will perform a final evaluation of all Department Acceptance data and Validated Contractor QC data for the Lot. The Department will accept the subject Lot if the Engineer’s evaluation of all testing data for the Lot is in conformance with the applicable Quality Limits.

C. Evaluation of Lot Category C Testing Data.

For each HMA Category C Lot produced and placed, the Engineer will evaluate all Department Acceptance testing data for the Lot entered into the Department’s MS-Excel QA Data Spreadsheets after all HMA Sublots are complete in-place. The Contractor’s random QC testing data for each Lot will not be included with the Department’s random Acceptance testing data in the acceptance determination. The individual Sublot test results for each HMA Category C Lot will be evaluated against the Specification Limits contained in Table 450.19 (Note: the Engineering Limits are not applied since the inherent variability for Minor Lot quantities is expected to be within the Specification Limits). Work under HMA Lot Category C will not be subject to an evaluation of Lot Quality Level using QLA procedures.

If a Sublot test result is outside of the Specification Limits, the Engineer will further assess the Sublot quality in accordance with the requirements of Subsection 450.77A(2). The Engineer will determine the disposition of the Sublot in accordance with Division I, Subsection 5.03, Conformity with Plans and Specifications.

After each HMA Category C Lot is complete, including any corrective action, the Engineer will perform a final evaluation of all Department Acceptance data. The Department will accept the subject Lot if the Engineer's evaluation of the testing data for each Sublot is in conformance with the Specification Limits.
450.78 Quality Level Analysis Procedures.

For each Quality Characteristic subject to analysis of Lot Quality Level, the Quality Level Analysis (QLA) - Standard Deviation Method will be used to determine the percentage of the Lot that is within the Specification Limits. The number of significant figures retained in each step of the QLA calculations and the rounding of all reported values will be as established in the Department’s MS Excel QA Data Spreadsheets. The estimated percentage of Work that is within the Specification Limits for a given Lot will be determined as follows:

A. Step 1 – Determine Lot Mean.

The Mean (X) will be determined for each Lot using all random Department Acceptance sample test values and all random Contractor QC sample test values (provided they have been Validated). The Mean is calculated using the following equation:

\[ X = \frac{\Sigma x}{n} \]

Where: \( \Sigma = \) summation of
\( x = \) individual test value of each material sample
\( n = \) total number of material samples tested

B. Step 2 – Determine Lot Standard Deviation.

The Standard Deviation (s) will be determined for each Lot using all random Department Acceptance sample test values and all random Contractor QC sample test values (provided they have been Validated). The Standard Deviation is calculated using the following equation:

\[ s = \sqrt{\frac{n\Sigma(x^2) - (\Sigma x)^2}{n(n-1)}} \]

Where: \( \Sigma(x^2) = \) summation of the squares of individual test values
\( (\Sigma x)^2 = \) summation of the individual test values squared

C. Step 3 – Determine Upper Quality Index for Lot.

The Upper Quality Index (Q_u) will be determined for each Lot using the Lot Mean and Lot Standard Deviation calculated in Step 1 and Step 2 above. The Upper Quality Index is calculated using the following equation:

\[ Q_u = \frac{USL - X}{s} \]

Where: \( USL = \) Upper Specification Limit from Table 450.19
\( X = \) The Lot Mean
\( s = \) The Lot Standard Deviation
D. Step 4 – Determine Lower Quality Index for Lot.

The Lower Quality Index ($Q_L$) will be determined for each Lot using the Lot Mean and Lot Standard Deviation calculated in Step 1 and Step 2 above. The Upper Quality Index is calculated using the following equation:

$$Q_L = \frac{X - LSL}{s}$$

Where: $LSL = $ Lower Specification Limit from Table 450.19
$X = $ The Lot Mean
$s = $ The Lot Standard Deviation


The estimated percentage of the Lot falling below the Upper Specification Limit ($P_U$) will be determined using Table 450.20. The $P_U$ value is determined from the table by entering the column for the number of material samples (n) representing the Lot and locating the row that corresponds to the $Q_a$ value determined in Step 3 above. If no USL is specified in Table 450.20, the $P_U$ value is equal to 100.


The estimated percentage of the Lot falling above the Lower Specification Limit ($P_L$) will be determined using Table 450.20. The $P_L$ value is determined from the table by entering the column for the number of material samples (n) representing the Lot and locating the row that corresponds to the $Q_L$ value determined in Step 4 above. If no LSL is specified in Table 450.20, the $P_L$ value is equal to 100.

G. Step 7 – Determine Estimated Percent Within Limits for Lot.

The Lot Quality Level will be determined by estimating the Percent Within Limits (PWL). The PWL is determined using the $P_U$ value from Step 5 and the $P_L$ value from Step 6 above. The Percent Within Limits is calculated using the following equation:

$$PWL = (P_U + P_L) - 100$$
<table>
<thead>
<tr>
<th>( P_{0r} ) or ( P_{L} ) (%)</th>
<th>( n = 3 )</th>
<th>( n = 4 )</th>
<th>( n = 5 )</th>
<th>( n = 6 )</th>
<th>( n = 7 )</th>
<th>( n = 8 )</th>
<th>( n = 9 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1.16</td>
<td>1.50</td>
<td>1.72</td>
<td>2.03</td>
<td>2.23</td>
<td>2.39</td>
<td>2.53</td>
</tr>
<tr>
<td>99</td>
<td>1.47</td>
<td>1.67</td>
<td>1.80</td>
<td>1.89</td>
<td>1.95</td>
<td>2.00</td>
<td>2.04</td>
</tr>
<tr>
<td>98</td>
<td>1.54</td>
<td>1.61</td>
<td>1.76</td>
<td>1.81</td>
<td>1.84</td>
<td>1.86</td>
<td>1.88</td>
</tr>
<tr>
<td>97</td>
<td>1.58</td>
<td>1.65</td>
<td>1.74</td>
<td>1.75</td>
<td>1.76</td>
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<td>96</td>
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<td>1.52</td>
<td>1.54</td>
<td>1.55</td>
<td>1.55</td>
<td>1.55</td>
</tr>
<tr>
<td>94</td>
<td>1.13</td>
<td>1.32</td>
<td>1.43</td>
<td>1.46</td>
<td>1.47</td>
<td>1.47</td>
<td>1.47</td>
</tr>
<tr>
<td>93</td>
<td>1.25</td>
<td>1.35</td>
<td>1.38</td>
<td>1.40</td>
<td>1.41</td>
<td>1.42</td>
<td>1.42</td>
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<tr>
<td>92</td>
<td>1.26</td>
<td>1.31</td>
<td>1.33</td>
<td>1.35</td>
<td>1.36</td>
<td>1.36</td>
<td>1.36</td>
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<tr>
<td>91</td>
<td>1.27</td>
<td>1.27</td>
<td>1.29</td>
<td>1.30</td>
<td>1.31</td>
<td>1.31</td>
<td>1.31</td>
</tr>
</tbody>
</table>

Note: If the calculated value of \( Q_U \) or \( Q_L \) does not correspond exactly to a value in the table, use the next lower value.

If \( Q_U \) or \( Q_L \) are negative values, \( P_{0r} \) or \( P_L \) is equal to 100 minus the table value for \( Q_U \) or \( Q_L \).

* \( P_{0r} \) or \( P_L \) = Percent Within limits for positive values of \( Q_U \) or \( Q_L \).
DISPUTE RESOLUTION

450.80 Disputable items

The Contractor or the Department may dispute any of the test values that are utilized in the acceptance determination for a given Lot. The specific Quality Characteristics which may be disputed are as listed in Table 450.21 below. All disputes shall be initiated within the 30 day split sample retention time limit as specified in Subsection 450.82 below.

450.81 Basis for Dispute

Differences from one individual Contractor QC test value to another (or from one individual Department Acceptance test value to another) within a Lot are expected due to inherent variability. Differences are also expected between the QC test values and the Acceptance values for a given Lot as a result of inherent variability. An individual QC test value cannot be directly compared to an individual Acceptance test value since the samples are randomly obtained independent of one another. However, if one or more of the Contractor’s random QC test values for a Lot significantly differs from the Department’s Acceptance test values for the same Lot, either party may dispute the validity of an individual test value.

450.82 Dispute Resolution Samples

Samples used for Dispute Resolution testing shall be the split samples required to be retained for thirty (30) days by the Contractor and the Department in accordance with Subsection 450.65D and Subsection 450.74E. Original cores are to be retained and shall be protected from damage. If In-place density or thickness is disputed, then the original core, unless damaged, will be used in the Dispute Resolution process. If the original disputed core is damaged, then a new core shall be obtained from within a 2-foot (600mm) radius of the location of the original core by the party whose data is being disputed in the presence of the other party. If ride quality smoothness test data is disputed, then the disputed Sublot(s) shall be re-sampled/retested by the party whose data is being disputed in the presence of the other party.

450.83 Dispute Resolution Steps

The Contractor may dispute the Department’s Acceptance results and the Department may dispute the Contractor’s Quality Control results by requesting that the dispute resolution split sample be tested. Such a request, either from the Contractor or the Department, must be made in writing within five days after the original sample was obtained. The following shall be provided in the written request:

- Sample reference number, including Lot and Sublot
- The specific Quality Characteristic and test result(s) being disputed
- The complete NETTCP test report form containing the disputed results

A. Step 1 – Split Sample Correlation.

Immediately prior to conducting testing for Dispute Resolution, the Contractor’s QC testing personnel, the Department’s Acceptance testing personnel (from the District), and a Department Independent Assurance (IA) technician will conduct Split Sample Correlation testing as detailed in Subsection 450.75. Split Sample Correlation testing will be conducted on a separate material sample obtained independent from the original sample and the Dispute Resolution sample.
The purpose of the Split Sample Correlation testing is to determine if testing procedures or equipment utilized by the Contractor or the Department might be the cause of the disputed result(s).

B. Step 2 – Dispute Resolution Sample Testing.

If a Department Acceptance test value is being disputed, the Department’s Acceptance testing personnel (from the District) will test the Dispute Resolution split sample. If a Contractor QC test value is being disputed, the Contractor’s QC testing personnel will test the Dispute Resolution split sample. In either case, testing of the Dispute Resolution split sample shall be performed by the same Contractor QC testing personnel and Department Acceptance testing personnel that performed the split sample correlation in step 1 above. Testing of the Dispute Resolution split sample shall be performed in the presence of both the Contractor and the Department.

C. Step 3 – Additional Dispute Resolution Testing.

If either the Contractor or the Department believes that the results of the Dispute Resolution split sample testing in Step 2 above do not conclusively resolve the dispute, additional sampling and testing within the disputed Sublot may be requested. In such case, an independent AASHTO accredited laboratory will be utilized to obtain and test three (3) random samples from the disputed Sublot. The Mean of the three test results will be used as the Dispute Resolution test value.

450.84 Final Disposition.

If the difference between the original test value and the Dispute Resolution test value (as determined under either Step 2 or Step 3 above) is within the maximum test difference values listed in Table 450.21, then the original test value will be used in the acceptance determination for the Lot. If the difference between the original test value and the Dispute Resolution test value exceeds the maximum difference values in Table 450.21, then the Dispute Resolution test value will be used in the acceptance determination. In such case, the record of the original test value will be retained (with notation of the outcome of Dispute Resolution); however, it will not be used in calculating the Lot quality level.

Table 450.21 – Dispute Resolution Maximum Test Difference Values

<table>
<thead>
<tr>
<th>Quality Characteristic</th>
<th>Maximum Test Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Specific Gravity (G\text{mm})</td>
<td>+/- 0.020</td>
</tr>
<tr>
<td>Bulk Specific Gravity (G\text{mm})</td>
<td>+/- 0.030</td>
</tr>
<tr>
<td>PG Asphalt Binder Content</td>
<td>+/- 0.4</td>
</tr>
<tr>
<td>Volumetrics - Air Voids</td>
<td>+/- 1.4</td>
</tr>
<tr>
<td>In-place HMA Mat Density</td>
<td>+/- 1.4</td>
</tr>
<tr>
<td>Thickness</td>
<td>+/- 10% of original value</td>
</tr>
<tr>
<td>Ride Quality (IRI)</td>
<td>+/- 10% of original value</td>
</tr>
</tbody>
</table>
450.90 Method of Measurement.

A. Patching.

HMA for Patching will be measured for payment by the ton (Megagram) and shall be the actual quantity complete, in place and accepted by the Engineer.

B. Tack Coat.

Asphalt Emulsion for Tack Coat, as required by the plans or these specifications, will be measured by the gallon (liter).

C. Joint Sealer.

HMA Joint Sealant used for sealing all longitudinal joints and transverse joints in HMA pavement courses will be measured by the linear foot (linear meter).

D. Hot Mix Asphalt.

Hot Mix Asphalt pavement course mixtures will be measured by the ton (Megagram) and shall be the actual pavement course quantity complete, in place and accepted by the Engineer. The quantity shall be determined only by weight slips that have been properly countersigned by the Engineer at the time of delivery.

E. Contractor Quality Control.

The Contractor's Quality Control system as specified in Subsection 450.60 through Subsection 450.69 will be measured by the ton (Megagram) and shall be represented by the actual quantity of HMA for Patching and all HMA pavement courses complete, in place and accepted by the Engineer.

450.91 Basis of Payment.

A. Patching.

HMA for Patching will be paid for at the contract unit price per ton (Megagram) of the HMA mixture type specified under Pay Item 451. Payment shall include all sawcutting, removal of existing distressed or unsound pavement, applying hot poured rubberized asphalt sealant to vertical faces, and transportation, delivery, placement, and compaction of HMA for Patching in accordance with Subsection 450.53C.

B. Tack Coat.

Asphalt Emulsion for Tack Coat will be paid for at the contract unit price per gallon (liter) of applied tack coat under Pay Item 452. Payment shall include sweeping existing surfaces and applying the tack coat to all required surfaces at the specified rate in accordance with Subsection 450.53F.

C. Joint Sealer.

HMA Joint Sealant will be paid for at the contract unit price per linear foot (linear meter) of joint sealed under Pay Item 453. Payment shall include application of the joint sealer to all longitudinal joints and transverse joints in HMA pavement courses as required and in accordance with Subsection 450.57.
D. Hot Mix Asphalt.

Each Hot Mix Asphalt pavement course will be paid for at the contract unit price per ton (Megagram) of in-place mixture under the HMA Pay Items specified (Pay Items 450.10 through 450.70). Payment shall include sweeping the underlying surface, transportation, delivery, placement (including providing a MTV when required), and compaction of each HMA pavement course in accordance with Subsection 450.54 through Subsection 450.58. All sawcutting required for transverse joints or longitudinal joints in accordance with Subsection 450.57 shall also be included in the contract unit price for each HMA pavement course.

E. Contractor Quality Control.

The Contractor's Quality Control system will be paid for at the contract unit price per ton (Megagram) under Pay Item 450.90. Payment will be full compensation for all QC activities required under Subsection 450.50 through Subsection 450.69 including; the Construction Quality Meeting, preparing and maintaining the approved Quality Control Plan, preparing all HMA mixture designs, performing QC sampling, testing and inspection (including the Control Strip when required), evaluating all QC data, and maintaining proper QC records. No separate payment will be made for any assistance provided by the Contractor to the Engineer in obtaining Department Acceptance samples. Failure of the Contractor to perform adequate Quality Control in accordance with the specifications and the Contractor’s approved QC Plan will be justification for withholding payment.

450.92 Pay Adjustment (PA).

Payment for each HMA Category A Lot and Category B Lot will be determined based on the final Lot Quality Level (PWL) computed in accordance with the QLA procedures contained in Subsection 450.78. Pay adjustments will be determined for each of the Acceptance Quality Characteristics identified in Table 450.22. The relative pay adjustment weight assigned to each of the HMA Quality Characteristics is indicated in Table 450.22.

Table 450.22 - Pay Adjustment Weight Assigned to HMA Quality Characteristics

<table>
<thead>
<tr>
<th>HMA Quality Characteristics</th>
<th>Pay Adjustment Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG Asphalt Binder Content</td>
<td>10 percent</td>
</tr>
<tr>
<td>Volumetrics - Air Voids</td>
<td>25 percent</td>
</tr>
<tr>
<td>In-Place HMA Mat Density</td>
<td>25 percent</td>
</tr>
<tr>
<td>Thickness</td>
<td>10 percent</td>
</tr>
<tr>
<td>Ride Quality (IRI)</td>
<td>30 percent</td>
</tr>
</tbody>
</table>

A. Lot Pay Factor.

A Pay Factor (PF) will be determined for each HMA Lot using the Quality Level (PWL) computed for the Lot and the equation below:

\[
PayFactor(PF) = \frac{55 + 0.5(QualityLevel)}{100}
\]

The Lot Pay Factor will be used to determine the pay adjustment for each Quality Characteristic as further outlined below.
B. Pay Adjustment for PG Asphalt Binder Content.

Pay adjustment for PG Asphalt Binder Content shall be applied to Pay Item 999.490 at the completion of the HMA Lot. The total Lot pay adjustment for PG Asphalt Binder Content will be determined as follows:

\[ PA_{PGAB} = \sum (PF_i - 1) (Q_i) (P_i) (0.10) \]

Where:
- \( PA_{PGAB} \) = Pay adjustment in dollars for PG Asphalt Binder Content.
- \( PF_i \) = Pay factor based on Quality Level (PWL) of PG Asphalt Binder Content for individual Lot (i).
- \( Q_i \) = Quantity represented by individual Lot (i) in tons (Mg).
- \( P_i \) = Contract unit price per ton (Mg) for individual Lot (i).
- 0.10 = Weight given to PG Asphalt Binder Content pay adjustment

C. Pay Adjustment for Volumetrics (Air Voids).

Pay adjustment for Volumetrics (Air Voids) shall be applied to Pay Item 999.491 at the completion of the HMA Lot. The total Lot pay adjustment for Volumetrics (Air Voids) will be determined as follows:

\[ PA_{Air\ Voids} = \sum (PF_i - 1) (Q_i) (P_i) (0.25) \]

Where:
- \( PA_{Air\ Voids} \) = Pay adjustment in dollars for Volumetrics (Air Voids).
- \( PF_i \) = Pay factor based on Quality Level (PWL) of Volumetrics (Air Voids) for individual Lot (i).
- \( Q_i \) = Quantity represented by individual Lot (i) in tons (Mg).
- \( P_i \) = Contract unit price per ton (Mg) for individual Lot (i).
- 0.25 = Weight given to Volumetrics (Air Voids) pay adjustment

D. Pay Adjustment for In-Place HMA Mat Density.

Pay adjustment for In-Place HMA Mat Density shall be applied to Pay Item 999.492 at the completion of the HMA Lot. The total Lot pay adjustment for In-Place HMA Mat Density will be determined as follows:

\[ PA_{In-Place\ Density} = \sum (PF_i - 1) (Q_i) (P_i) (0.25) \]

Where:
- \( PA_{In-Place\ Density} \) = Pay adjustment in dollars for In-Place HMA Mat Density.
- \( PF_i \) = Pay factor based on Quality Level (PWL) of In-Place HMA Mat Density for individual Lot (i).
- \( Q_i \) = Quantity represented by individual Lot (i) in tons (Mg).
- \( P_i \) = Contract unit price per ton (Mg) for individual Lot (i).
- 0.25 = Weight given to In-Place HMA Mat Density pay adjustment
E. Pay Adjustment for Thickness.

Pay adjustment for Thickness shall be applied to Pay Item 999.493 at the completion of the HMA Lot. The total Lot pay adjustment for Thickness will be determined as follows:

\[ PA_{\text{Thickness}} = \sum (PF_i - 1) (Q_i) (P_i) (0.10) \]

Where:
- \( PA_{\text{Thickness}} \) = Pay adjustment in dollars for Thickness.
- \( PF_i \) = Pay factor based on Quality Level (PWL) of Thickness for individual Lot (i).
- \( Q_i \) = Quantity represented by individual Lot (i) in tons (Mg).
- \( P_i \) = Contract unit price per ton (Mg) for individual Lot (i).
- 0.10 = Weight given to Thickness pay adjustment.

B. Pay Adjustment for Ride Quality.

Pay adjustment for Ride Quality shall be applied to Pay Item 999.494 at the completion of all HMA Lots. Although Ride Quality Acceptance testing will be performed only on the final pavement course, the pay adjustment will be applied to the total quantity of all HMA pavement courses placed. Since each wheel path of the final pavement course represents a Lot for Ride Quality, the quantity for each Lot shall be computed by dividing the total quantity of all pavement courses placed by the number of wheel paths for all lanes tested in the final pavement course. The total Lot pay adjustment for Ride Quality will be determined as follows:

\[ PA_{\text{Ride Quality}} = \sum (PF_i - 1) \left( \sum (Q_{pc})(P_{pc})/N_{wp} \right) (0.30) \]

Where:
- \( PA_{\text{Ride Quality}} \) = Pay adjustment in dollars for Ride Quality.
- \( PF_i \) = Pay factor based on Quality Level (PWL) of Ride Quality for individual Lot (i).
- \( Q_{pc} \) = Quantity represented by individual pavement course (pc) in tons (Mg).
- \( P_{pc} \) = Contract unit price per ton (Mg) for individual pavement course (pc).
- \( N_{wp} \) = Total number of wheel paths for all lanes tested.
- 0.30 = Weight given to Ride Quality pay adjustment.
## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

### 450.93 Payment Items

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Payment Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>450.10</td>
<td>Open Graded Friction Course - Polymer Modified (OGFC-P)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.21</td>
<td>SUPERPAVE Surface Course - 4.75 (SSC - 4.75)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.22</td>
<td>SUPERPAVE Surface Course - 9.5 (SSC - 9.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.23</td>
<td>SUPERPAVE Surface Course - 12.5 (SSC - 12.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.24</td>
<td>SUPERPAVE Surface Course - 19.0 (SSC - 19.0)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.31</td>
<td>SUPERPAVE Intermediate Course - 12.5 (SIC - 12.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.32</td>
<td>SUPERPAVE Intermediate Course - 19.0 (SIC - 19.0)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.41</td>
<td>SUPERPAVE Base Course - 25.0 (SBC - 25.0)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.42</td>
<td>SUPERPAVE Base Course - 37.5 (SBC - 37.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.51</td>
<td>SUPERPAVE Leveling Course - 4.75 (SLC - 4.75)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.52</td>
<td>SUPERPAVE Leveling Course - 9.5 (SLC - 9.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.53</td>
<td>SUPERPAVE Leveling Course - 12.5 (SLC - 12.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.60</td>
<td>SUPERPAVE Bridge Surface Course - 9.5 (SSC-B - 9.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.61</td>
<td>SUPERPAVE Bridge Surface Course - 12.5 (SSC-B - 12.5)</td>
<td>Ton (Megagram)</td>
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<tr>
<td>455.70</td>
<td>SUPERPAVE Bridge Protective Course - 9.5 (SPC-B - 9.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.71</td>
<td>SUPERPAVE Bridge Protective Course - 12.5 (SPC-B - 12.5)</td>
<td>Ton (Megagram)</td>
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<tr>
<td>450.90</td>
<td>Contractor Quality Control</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>451</td>
<td>HMA for Patching</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>452</td>
<td>Asphalt Emulsion for Tack Coat</td>
<td>Gallon (Liter)</td>
</tr>
<tr>
<td>453</td>
<td>HMA Joint Sealant</td>
<td>Linear Foot (Meter)</td>
</tr>
</tbody>
</table>

### 999.490 HMA Pay Adjustment – PG Asphalt Binder Content ¹

### 999.491 HMA Pay Adjustment – Volumetrics (Air Voids) ¹

### 999.492 HMA Pay Adjustment – In-place Mat Density ¹

### 999.493 HMA Pay Adjustment – Thickness ¹

### 999.494 HMA Pay Adjustment – Ride Quality ¹

¹ Not a bid item
SECTION 455
SUPERPAVE HOT MIX ASPHALT PAVEMENT

Section 455 - SUPERPAVE Hot Mix Asphalt Pavement amends Section 450 - Hot Mix Asphalt Pavement. The provisions herein replace the Subsections of Section 450 as indicated.

NOTE: The Pay Adjustment provisions included in Subsection 450.92 will be applied to items under this contract.

DESCRIPTION

Delete Subsection 450.20 - General and replace with the following:

455.20 General.

This work shall consist of producing and placing Hot Mix Asphalt (HMA) pavement. All HMA mixtures shall meet the requirements of the SUPERPAVE volumetric design system. The HMA pavement shall be constructed in courses on the prepared or existing base in accordance with these specifications and in conformance with the lines, grades, compacted thickness and typical cross section as shown on the plans. Each SUPERPAVE HMA pavement course placed shall be comprised of one of the mixture types listed in Table 455.1.

Table 455.1 - SUPERPAVE HMA Pavement Courses & Mixture Types

<table>
<thead>
<tr>
<th>Pavement Course</th>
<th>Mixture Type</th>
<th>Mixture Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friction Course</td>
<td>• Open-Graded Friction Course - Polymer Modified</td>
<td>OGFC – P</td>
</tr>
<tr>
<td>Surface Course</td>
<td>• SUPERPAVE Surface Course - 4.75</td>
<td>SSC - 4.75</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Surface Course - 9.5</td>
<td>SSC - 9.5</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Surface Course - 12.5</td>
<td>SSC - 12.5</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Surface Course - 19.0</td>
<td>SSC - 19.0</td>
</tr>
<tr>
<td>Intermediate Course</td>
<td>• SUPERPAVE Intermediate Course - 12.5</td>
<td>SIC - 12.5</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Intermediate Course - 19.0</td>
<td>SIC - 19.0</td>
</tr>
<tr>
<td>Base Course</td>
<td>• SUPERPAVE Base Course - 25.0</td>
<td>SBC - 25.0</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Base Course - 37.5</td>
<td>SBC - 37.5</td>
</tr>
<tr>
<td>Leveling Course</td>
<td>• SUPERPAVE Leveling Course - 4.75</td>
<td>SLC - 4.75</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Leveling Course - 9.5</td>
<td>SLC - 9.5</td>
</tr>
<tr>
<td>Bridge Surface Course</td>
<td>• SUPERPAVE Bridge Surface Course - 9.5</td>
<td>SSC-B - 9.5</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Bridge Surface Course - 12.5</td>
<td>SSC-B - 12.5</td>
</tr>
<tr>
<td>Bridge Protective Course</td>
<td>• SUPERPAVE Bridge Protective Course - 9.5</td>
<td>SPC-B - 9.5</td>
</tr>
<tr>
<td></td>
<td>• SUPERPAVE Bridge Protective Course - 12.5</td>
<td>SPC-B - 12.5</td>
</tr>
</tbody>
</table>

When a SUPERPAVE Surface Course - 19.0 (SSC - 19.0) is specified in the contract, the Laboratory Trial Mix Formula (LTMF) aggregate gradation shall provide a fine-graded HMA mixture as defined in Subsection 455.42F.
MATERIALS

Delete Subsection 450.40 - General and replace with the following:

455.40 General.

SUPERPAVE HMA mixtures shall be composed of the following: Mineral aggregate, mineral filler (if required), Performance Graded Asphalt Binder (PGAB), and as permitted, reclaimed materials (limited to Reclaimed Asphalt Pavement (RAP), Reclaimed Asphalt Shingles (RAS), and Processed Glass Aggregate (PGA)). Materials shall meet the requirements in the following Subsections of Division III, Materials and as otherwise specified herein:

- Asphalt Emulsion M3.03.0
- Hot Poured Joint Sealer M3.05.0
- Asphalt Anti-Stripping Additive M3.10.0
- Mineral Aggregate M3.11.04
- Mineral Filler M3.11.05
- Plant Requirements M3.11.07

Delete Subsection 450.42 - Hot Mix Asphalt Mix Design and replace with the following:

455.42 SUPERPAVE Hot Mix Asphalt Mixture Design.

The Contractor shall be responsible for development of all SUPERPAVE HMA mixture designs. All HMA surface courses, intermediate courses, base courses, leveling courses, bridge surface courses, and bridge protective courses shall be supported by volumetric mixture designs using the SUPERPAVE mixture design system. All SUPERPAVE HMA mixture designs shall be developed in accordance with the following AASHTO standards, as modified herein:

- AASHTO M 323
- AASHTO R 35
- AASHTO T 312

Volumetric mixture designs are not required for OGFC. The aggregate gradation structure and target PG Asphalt Binder content for Open-Graded Friction Course - Polymer Modified (OGFC-P) shall conform to the master ranges in M3.11.03 – Table B.

A. Development of Laboratory Trial Mix Formula (LTMF).

The Contractor shall develop and submit for Department approval, a minimum of forty-five (45) days prior to the start of SUPERPAVE HMA pavement construction, a Laboratory Trial Mix Formula (LTMF) as the proposed Job Mix Formula (JMF) for each SUPERPAVE mixture type to be used on the project. Two or more JMFs per HMA mixture type may be approved for a particular plant, however, only HMA conforming to one JMF is permitted to be produced and placed on any given day.
The following is a general outline of the steps for developing an LTMF and an approved JMF:

1. Estimate Percentage of RAP to be utilized and select PG Asphalt Binder as required by the specifications (Subsection 455.42C.);
2. Evaluate aggregates (and reclaimed materials) for conformance with Consensus Properties (Subsection 455.42D.) and Source Properties (Subsection 455.42E.);
3. Develop trial aggregate blends and estimate PG Asphalt Binder content in accordance with AASHTO R 35. Compact each of the blends. Based on volumetric analysis, select the best trial blend that meets the requirements of M 323 (Subsections 455.42F and 455.42G.);
4. Determine volumetric properties of LTMF and select PG Asphalt Binder content (Subsection 455.42H.);
5. Evaluate Moisture Sensitivity of the mixture (Subsection 455.42I.);
6. LTMF to be verified in the laboratory by the Department (Subsection 455.43);
7. Through production of a Control Strip Lot, verify that LTMF can be produced through the plant. (Subsection 450.66B.). Verification of the LTMF results in an approved JMF;
8. Repeat process for all mixtures to be utilized.

B. Estimated Design Traffic.

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

C. Performance Graded Asphalt Binder.

The Asphalt Binder used for all HMA mixtures under this contract shall comply with the requirements of Subsection 450.48. The PGAB Grade selected for this Contract is PG XX-XX

D. Aggregate Consensus Properties.

Aggregates utilized in SUPERPAVE HMA mixtures, including RAP if used in the mixture, shall be tested for conformance with the following Consensus Property requirements:

- Determining the Percentage of Fractured Particles in Coarse Aggregate (ASTM D 5821)
- Uncompacted Void Content of Fine Aggregate (AASHTO T 304 - Method A)
- Flat or Elongated Particles (ASTM D 4791)
- Clay Content/Sand Equivalent Test (AASHTO T 176)

The Consensus Property test results shall be submitted with the LTMF for each SUPERPAVE HMA mixture. The Contractor shall provide aggregate samples a minimum of forty-five (45) days prior to production for each LTMF to the Department for LTMF verification prior to SUPERPAVE HMA production. The required minimum or maximum criteria for each of the Consensus Property tests for the total aggregate blend are specified below in Table 455.2 below.
Table 455.2 - Aggregate Consensus Property Requirements

<table>
<thead>
<tr>
<th>Traffic Level</th>
<th>Design ESALs 18-kip (80-kn) (million)</th>
<th>Coarse Aggregate Angularity (1) (2) ASTM D5821 (Percent Minimum)</th>
<th>Fine Aggregate Angularity (1) AASHTO T 304 - Method A (Percent Minimum)</th>
<th>Flat or Elongated Particles (2) ASTM D4791 (Percent Minimum)</th>
<th>Sand Equivalent AASHTO T 176 (Percent Minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt; 0.3</td>
<td>55/--</td>
<td>--</td>
<td>--</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>0.3 to &lt; 3.0</td>
<td>75/--</td>
<td>40</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>3 to &lt; 10</td>
<td>85/80</td>
<td>45</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>4</td>
<td>10 to &lt; 30.0</td>
<td>95/90</td>
<td>45</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>5</td>
<td>≥ 30.0</td>
<td>100/100</td>
<td>45</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

Design ESALs are the anticipated project traffic level expected on the design lane, projected over a 20 year period, regardless of the actual expected design life of the roadway.

Criteria presented as minimum values. 95/90 denotes that a minimum of 95% of the coarse aggregate, by mass, shall have one fractured face and that a minimum of 90% shall have two fractured faces.

Criteria presented as minimum percent air voids in loosely compacted fine aggregate passing the #8 (2.36 mm) sieve.

Criteria presented as maximum percent by mass of flat or elongated particles of materials retained on the #4 (4.75 mm) sieve, determined at 5:1 ratio.

Criteria presented as minimum values for fine aggregate passing the #4 (4.75 mm) sieve.

Notes:
1. If less than 25% of a given layer is within 4 inches (100 mm) of the anticipated top surface, the layer may be considered to be below 4 inches (100 mm) for mixture design purposes.
2. This criterion does not apply to #4 (4.75 mm) nominal maximum size mixtures.
E. Aggregate Source Properties.

The coarse mineral aggregate utilized in SUPERPAVE HMA mixtures shall be clean, crushed rock consisting of the angular fragments obtained by breaking and crushing shattered natural rock. It shall be free from dirt or other objectionable materials. The coarse aggregate, including RAP if used in the mixture, shall be tested for conformance with the following Source Property requirements:

- Toughness as Determined by: Los Angeles Abrasion (AASHTO T 96)
- Soundness as Determined by: Soundness (AASHTO T 104)
- Deleterious Materials as Determined by: Clay Lumps & Friable Particles (AASHTO T 112)
- Specific Gravity (AASHTO T 8)

Testing for each of the Source Properties shall be performed for each SUPERPAVE HMA mixture design developed for the project. The Source Property test results shall be submitted with the LTMF for each SUPERPAVE HMA mixture. The Contractor shall provide samples of each aggregate material from each stock pile, a minimum of forty-five (45) days prior to production for each LTMF to the Department for LTMF verification prior to SUPERPAVE HMA production. The requirements for each of the Source Properties are as indicated in Table 455.3 below.

<table>
<thead>
<tr>
<th>Source Property Test</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toughness (AASHTO T 96)</td>
<td>Maximum Loss &lt; 30 %</td>
</tr>
<tr>
<td>Soundness (AASHTO T 104)</td>
<td>Maximum Loss &lt; 10 %</td>
</tr>
<tr>
<td>Deleterious Materials (AASHTO T 112)</td>
<td>Maximum Permissible &lt; 0.5 %</td>
</tr>
</tbody>
</table>

F. SUPERPAVE Aggregate Gradation and Specific Gravity Requirements.

The combined aggregate blend for each SUPERPAVE HMA mixture shall conform to the Gradation Control Point requirements specified in Table 455.6 below. The results of the selected optimum Design Aggregate Structure shall be plotted on a 0.45 Power Chart and included with the LTMF.

The combined aggregate gradation shall be classified as coarse-graded when it passes below the Primary Control Sieve (PCS) control point as defined in Table 455.4. All other gradations shall be classified as fine graded.

The specific gravity of each coarse and fine aggregate component shall be determined in accordance with AASHTO T 85 and T 84 respectively, and the specific gravity of the mineral filler shall be determined in accordance with AASHTO T 100. The individual aggregate specific gravities shall be included with the LTMF. The Contractor shall provide samples of each aggregate material a minimum of forty-five (45) days prior to production for each LTMF to the Department for verification of the selected optimum Design Aggregate Structure and specific gravity of each stock pile.
Table 455.4 - Gradation Classification

<table>
<thead>
<tr>
<th>Nominal Maximum Aggregate Size % Passing</th>
<th>1-1/2&quot; (37.5 mm)</th>
<th>1&quot; (25.0 mm)</th>
<th>3/4&quot; (19.0 mm)</th>
<th>1/2&quot; (12.5 mm)</th>
<th>3/8&quot; (9.5 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Control Sieve mm</td>
<td>3/8&quot; (9.5 mm)</td>
<td>#4 (4.75 mm)</td>
<td>#4 (4.75 mm)</td>
<td>#8 (2.36 mm)</td>
<td>#8 (2.36 mm)</td>
</tr>
<tr>
<td>PCS Control point (% Passing)</td>
<td>47</td>
<td>40</td>
<td>47</td>
<td>39</td>
<td>47</td>
</tr>
</tbody>
</table>

G. Gyratory Compaction Criteria.
Each SUPERPAVE HMA mixture shall be designed and controlled during production using an approved Gyratory Compactor which meets the requirements of AASHTO T 312. Compaction shall be in accordance with the requirements of AASHTO T 312. The density of each SUPERPAVE HMA mixture shall be evaluated at the initial number of gyrations \( N_{\text{init}} \), the design number of gyrations \( N_{\text{design}} \), and the maximum number of gyrations \( N_{\text{max}} \). The gyratory-compacted specimens for each LTMF shall meet the density requirements specified in Table 455.5 below.

H. Volumetric Design Requirements.
Each SUPERPAVE HMA mixture shall be designed in accordance with the volumetric mixture design specifications contained in AASHTO M 323 and procedures contained in AASHTO R 35, as modified herein. Each HMA mixture LTMF shall be tested for conformance with the following volumetric properties:

- Air Voids at \( N_{\text{design}} \) \( (V_a) \)
- Voids in the Mineral Aggregate at \( N_{\text{design}} \) \( (VMA) \)
- Voids Filled with Asphalt at \( N_{\text{design}} \) \( (VFA) \)
- Fines to Effective Asphalt Ratio \( (P_{0.075} / P_{be}) \)

The volumetric property test results shall be submitted with the LTMF for each SUPERPAVE HMA mixture. The required minimum or maximum criteria for each of the volumetric property tests are specified in Table 455.6 below.
## Table 455.5 - SUPERPAVE HMA Design Requirements

<table>
<thead>
<tr>
<th>Traffic Level</th>
<th>Design ESALs</th>
<th>Number of Gyrations by Superpave Gyratory Compactor</th>
<th>Percent Density of Gmm from HMA Specimen</th>
<th>Voids Filled with Asphalt (VFA)* Based on Nominal Maximum Aggregate Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(million)</td>
<td>Nini</td>
<td>Ndes</td>
<td>Nmax</td>
</tr>
<tr>
<td>1</td>
<td>&lt; 0.3</td>
<td>6</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>2</td>
<td>0.3 to &lt; 3.0</td>
<td>7</td>
<td>75</td>
<td>115</td>
</tr>
<tr>
<td>3</td>
<td>3.0 to &lt; 10</td>
<td>8</td>
<td>100</td>
<td>160</td>
</tr>
<tr>
<td>4</td>
<td>10 to &lt; 30.0</td>
<td>8</td>
<td>100</td>
<td>160</td>
</tr>
<tr>
<td>5</td>
<td>≥ 30.0</td>
<td>9</td>
<td>125</td>
<td>205</td>
</tr>
</tbody>
</table>

*The VFA values contained in Table 455.5 have been modified from AASHTO M 323 to ensure adequate PG Asphalt Binder content in each SUPERPAVE HMA mixture.
## Table 455.6 - Gradation and Volumetric Requirements

<table>
<thead>
<tr>
<th>Sieve</th>
<th>SUPERPAVE HMA Mixture Nominal Maximum Aggregate Size</th>
<th>LTFM Verification Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CONTROL POINTS</td>
<td>3/8&quot; (9.5 mm)</td>
</tr>
<tr>
<td>Inches</td>
<td>Min (%)</td>
<td>Max (%)</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>½</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>3/8</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>#4</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>#8</td>
<td>75</td>
<td>85</td>
</tr>
<tr>
<td>#16</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>#30</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>#50</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>#100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>#200</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>PB</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**VMA (3)**

<table>
<thead>
<tr>
<th>Value</th>
<th>17.0</th>
<th>19.0</th>
<th>15.0</th>
<th>14.0</th>
<th>13.0</th>
<th>12.0</th>
<th>1.0</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>VFA</th>
<th>Per Table 455.5 ± 5 off LTFM</th>
<th>Per Table 455.5 ± 5 off LTFM</th>
<th>Per Table 455.5 ± 5 off LTFM</th>
<th>Per Table 455.5 ± 5 off LTFM</th>
<th>Per Table 455.5 ± 5 off LTFM</th>
<th>Per Table 455.5 ± 5 off LTFM</th>
<th>Per Table 455.5 ± 5 off LTFM</th>
<th>Per Table 455.5 ± 5 off LTFM</th>
<th>1.0</th>
</tr>
</thead>
</table>

| Gge   | LTFM value | LTFM value | LTFM value | LTFM value | LTFM value | LTFM value | LTFM value | LTFM value | 0.02 |
| Gmm   | LTFM value | LTFM value | LTFM value | LTFM value | LTFM value | LTFM value | LTFM value | LTFM value | 0.02 |
| Dust/Ph(2) | 0.9 - 2.0 | 0.6 - 1.2 | 0.6 - 1.2 | 0.6 - 1.2 | 0.6 - 1.2 | 0.6 - 1.2 | 0.6 - 1.2 | 0.6 - 1.2 | 4.0 |
| Mixture Temp | 265 - 325°F(1) | 265 - 325°F(1) | 265 - 325°F(1) | 265 - 325°F(1) | 265 - 325°F(1) | 265 - 325°F(1) | 265 - 325°F(1) | 265 - 325°F(1) | - |

<table>
<thead>
<tr>
<th>PCS (4)</th>
<th>Sieve #8</th>
<th>47</th>
<th>Sieve #8</th>
<th>39</th>
<th>Sieve #4</th>
<th>47</th>
<th>Sieve #4</th>
<th>40</th>
<th>Sieve 3/8&quot;</th>
<th>47</th>
</tr>
</thead>
</table>

1. Based on the final design PG Asphalt Binder certification. 2. Dust is considered to be the percent of material passing the #200 (75 µm) sieve. The calculated effective asphalt content (Pbe) shall be used for this calculation. 3. Voids in Mineral Aggregates shall be computed as specified by AASHTO R 35. 4. If the aggregate gradation passes beneath the PCS Control Point specified in Table 455.4, the dust-to-binder ratio range may be increased from 0.6-1.2 to 0.8-1.6 at the Engineer’s discretion. 5. When used as a Surface Course under OGFC the Min % for the #8 (2.36 mm) Sieve should be 40.

Each SUPERPAVE HMA mixture shall be tested by the Contractor for Moisture Sensitivity in accordance with the requirements of AASHTO T 283. The compacted specimens for each LTMF shall exhibit a minimum tensile strength ratio of 80% as determined by AASHTO T 283. A minimum tensile strength ratio of 80% is required. The use of approved anti-stripping agents (either liquid or mineral) can be used to meet this requirement. If an anti-strip agent is required, it shall be included in the Contractor’s cost.

The Moisture Sensitivity test results shall be submitted with the LTMF for each SUPERPAVE HMA mixture. The Department will perform testing of the Moisture Sensitivity prior to SUPERPAVE HMA production as part of the verification of each LTMF.

Delete Subsection 450.66A. - Laboratory Verification of HMA Mix Design and replace with the following:

**455.43 Verification of Laboratory Trial Mix Formula (LTMF)**

The Contractor shall submit a LTMF with supporting documentation, a minimum of forty-five (45) days prior to production, to the Engineer with samples of blended aggregate material and PG Asphalt Binder. An adequate amount of the blended aggregate material and PG Asphalt Binder shall be supplied in order to verify the LTMF selected for production (proposed JMF).

If the Engineer is unable to verify the Contractor’s LTMF in accordance with the LTMF Verification Limits in Table 455.7, then the Engineer will work with the Contractor to resolve the verification issue(s). The Contractor shall not proceed with production and placement of the Control Strip (Section 450.66B.) until the LTMF is verified by the Engineer.

**Table 455.7 - SUPERPAVE HMA LTMF Verification Limits**

<table>
<thead>
<tr>
<th>Properties</th>
<th>LTMF Verification Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt Binder Content ($P_b$)</td>
<td>Target ± 0.3 percent</td>
</tr>
<tr>
<td>Gradation Passing #4 (4.75 mm) and Larger Sieves</td>
<td>Target ± 6.0 percent</td>
</tr>
<tr>
<td>Gradation Passing #8 (2.36 mm) Sieve</td>
<td>Target ± 5.0 percent</td>
</tr>
<tr>
<td>Gradation Passing #16 (1.18 mm) to #50 (0.30 mm) Sieve</td>
<td>Target ± 3.0 percent</td>
</tr>
<tr>
<td>Gradation Passing #100 (0.15 mm) Sieve</td>
<td>Target ± 2.0 percent</td>
</tr>
<tr>
<td>Gradation Passing #200 (75 µm) Sieve</td>
<td>Target ± 1.0 percent</td>
</tr>
<tr>
<td>Max. Theo. Specific Gravity ($G_{mm}$)</td>
<td>Target ± 0.02</td>
</tr>
<tr>
<td>Air Voids ($V_a$)</td>
<td>Target ± 1.0 percent</td>
</tr>
<tr>
<td>Voids in Mineral Aggregate (VMA)</td>
<td>Target ± 1.0 percent</td>
</tr>
<tr>
<td>Voids Filled With Asphalt (VFA)</td>
<td>Target ± 5.0 percent</td>
</tr>
<tr>
<td>Bulk Specific Gravity ($G_{mb}$)</td>
<td>Target ± 0.022</td>
</tr>
</tbody>
</table>
CONSTRUCTION PROCEDURES

Delete Subsection 450.53F. - Tack Coat and replace with the following:

**G. Tack Coat.**
A tack coat of asphalt emulsion, grade RS-1 shall be uniformly applied to existing or new pavement surfaces prior to placing pavement courses as specified below. The existing surface shall be swept clean of all foreign matter and loose material using a mechanical sweeper and shall be dry before the tack coat is applied.

(1) **Tack Distributor System.**
A pressure distributor shall be used to apply the tack coat. The tack distributor system shall be equipped with the following to control and monitor the application:

- (e) System for heating the asphalt emulsion uniformly to specified temperature.
- (f) Thermometer for measuring the asphalt emulsion temperature.
- (g) Adjustable full circulation spray bar.
- (h) Positive controls including tachometer, pressure gauge, and volume measuring device.

(2) **Tack Application Requirements.**
The tack coat material shall be applied by a pressure distributor. All nozzles on the distributor shall be open and functioning. All nozzles shall be turned at the same angle to the spray bar. Proper nozzle angle shall be as determined by the manufacturer of the distributor spray bar. The spray bar shall be adjusted so that it is at the proper height above the pavement surface to provide a double overlap spray for a uniform coverage of the pavement surface. A double lap application requires that the nozzle spray patterns overlap one another such that every portion of the pavement receives spray from exactly two nozzles.

When an HMA pavement course is placed on an existing tight smooth pavement surface, a tack coat shall be applied at the rate of 1/20 gal/s.y. (0.20 liters/square meter). All existing surfaces subjected to milling shall receive a tack coat at the rate of 1/15 gal/s.y. (0.28 liters/square meter). Tack coat shall be applied to cover approximately 90% of the pavement surface.

Any new HMA pavement course that has been open to traffic, or that was placed 30 days prior to placement of the subsequent pavement course, shall receive a tack coat at an application rate of 1/20 gal/s.y. (0.20 liters/square meter).

When the surface of a new HMA pavement course is in a condition which in the Engineer's judgment is unsatisfactory for the direct placement of the subsequent pavement course, a tack coat shall be applied at the applicable rate specified above for the particular pavement surface condition.

In addition to the requirements above, all vertical surfaces of curbs, edging, utilities, and drainage structures shall receive a thorough tack coat application immediately prior to placing each HMA pavement course.

(3) **Tack Inspection.**
The asphalt emulsion temperature and application rate shall be periodically measured and properly recorded by the Contractor on NETTCP Inspection Report Forms. If the temperature or application rate is determined to not be in conformance with the specification requirements above, the Contractor shall make appropriate adjustments to the tack application operations.
COMPENSATION

The Pay Adjustment provisions included in Subsection 450.92 - Pay Adjustment shall be applied to items under this contract.

Delete Subsection 450.91D. - Hot Mix Asphalt and replace with the following:

D. Hot Mix Asphalt.

Each Hot Mix Asphalt pavement course will be paid for at the contract unit price per ton (Megagram) of in-place mixture under the HMA Pay Items specified in Subsection 455.93. Payment shall include sweeping the underlying surface, transportation, delivery, placement including providing a Material Transfer Vehicle (MTV), and compaction of each HMA pavement course in accordance with Subsection 450.54 through Subsection 450.58.

All sawcutting required for transverse joints or longitudinal joints in accordance with Subsection 450.57 shall also be included in the contract unit price for each HMA pavement course.

Delete Subsection 450.93 - Payment Items and replace with the following:

<table>
<thead>
<tr>
<th>Payment Items</th>
<th>Payment Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>450.10 Open Graded Friction Course - Polymer Modified (OGFC - P)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.21 SUPERPAVE Surface Course - 4.75 (SSC - 4.75)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.22 SUPERPAVE Surface Course - 9.5 (SSC - 9.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.23 SUPERPAVE Surface Course - 12.5 (SSC - 12.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.24 SUPERPAVE Surface Course - 19.0 (SSC - 19.0)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.31 SUPERPAVE Intermediate Course - 12.5 (SIC - 12.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.32 SUPERPAVE Intermediate Course - 19.0 (SIC - 19.0)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.41 SUPERPAVE Base Course - 25.0 (SBC - 25.0)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.42 SUPERPAVE Base Course - 37.5 (SBC - 37.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.51 SUPERPAVE Leveling Course - 4.75 (SLC - 4.75)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.52 SUPERPAVE Leveling Course - 9.5 (SLC - 9.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.60 SUPERPAVE Bridge Surface Course - 9.5 (SSC-B - 9.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.61 SUPERPAVE Bridge Surface Course - 12.5 (SSC-B - 12.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.70 SUPERPAVE Bridge Protective Course - 9.5 (SPC-B - 9.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>455.71 SUPERPAVE Bridge Protective Course - 12.5 (SPC-B - 12.5)</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>450.90 Contractor Quality Control</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>451 HMA for Patching</td>
<td>Ton (Megagram)</td>
</tr>
<tr>
<td>452 Asphalt Emulsion for Tack Coat</td>
<td>Gallon (Liter)</td>
</tr>
<tr>
<td>453 HMA Joint Sealant</td>
<td>Linear Foot (Meter)</td>
</tr>
</tbody>
</table>
999.490     HMA Pay Adjustment – PG Asphalt Binder Content ¹     Dollar
999.491     HMA Pay Adjustment – Volumetrics (Air Voids) ¹     Dollar
999.492     HMA Pay Adjustment – In-place Mat Density ¹     Dollar
999.493     HMA Pay Adjustment – Thickness ¹     Dollar
999.494     HMA Pay Adjustment – Ride Quality ¹     Dollar

¹ Not a bid item
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 ___% *(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 an MBE or as a Portuguese owned firm 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, Portuguese owned businesses or WBEs may be used on this contract for 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.somwba.state.ma.us/. This site lists those firms which have been certified as minority or Portuguese 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 B008047, 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.


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, SDVOBEs 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 contact 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)

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

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.


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 (DCAM) 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.


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: 02/18/2009

This provision applies to all projects using greater than 100 tons (91 megagrams) of hot mix asphalt (HMA) mixtures containing liquid asphalt cement as stipulated in the Notice to Contractors section of the bid documents.

The Price Adjustment will be based on the variance in price for the liquid asphalt component only from the Base Price to the Period Price. It shall not include transportation or other charges. This Price Adjustment 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 at the time of bid by the Department by using the same method as for the determination of the Period Price detailed below.

Period Price
Please note that, starting December 15, 2008, two sets of period prices will be posted each month on the MassDOT website at http://www.MassDOT.state.ma.us/. They will be labeled “New Asphalt Period Price Method” and “Old Asphalt Period Price Method”.

New Asphalt Period Price Method
The “New Asphalt Period Price Method” is for contracts bid after December 15, 2008 and will show the Period Price of liquid asphalt for each monthly period as determined by MassDOT 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. MassDOT will post this Period Price on this website within two (2) business days following their receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted MassDOT the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor.

Old Asphalt Period Price Method
The “Old Asphalt Period Price Method” Period Price will be for contracts bid on or before December 15, 2008 and will contain liquid asphalt prices as determined by the old or previous method. These prices will continue to be posted on MassDOT’s website until all contracts using the “Old Asphalt Period Price Method” Period Price have been closed.

New and Old Asphalt Period Price Methods
The paragraphs below apply to both the New and the Old Asphalt Period Price Methods.

The Contract Price of the hot mix asphalt mixture 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 virgin liquid asphalt content in the mixture placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M3.11.03.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of tons of hot mix asphalt mixtures placed during each monthly period times the liquid asphalt content percentage times the variance in price between Base Price and Period Price of liquid asphalt. 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.

*** END OF DOCUMENT ***
DOCUMENT 00812

SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE – ENGLISH UNITS

Revised: 01/26/2009

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 (www.MassDOT.state.ma.us) 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:

<table>
<thead>
<tr>
<th>ITEMS COVERED</th>
<th>FUEL FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diesel</td>
</tr>
<tr>
<td>Excavation: and Borrow Work:</td>
<td>0.29 Gallons / CY.</td>
</tr>
<tr>
<td>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</td>
<td>(Both Factors used)</td>
</tr>
<tr>
<td>Surfacing Work:</td>
<td>2.90 Gallons / Ton</td>
</tr>
<tr>
<td>All Items containing Hot Mix Asphalt</td>
<td></td>
</tr>
</tbody>
</table>

*** END OF DOCUMENT ***
This provision applies to projects containing a price adjustment for structural steel and reinforcing steel as stipulated in the Notice to Contractors section of the Bid Documents. It applies to all structural steel as defined below and all reinforcing steel 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 structural steel material, consisting of rolled shapes, plate steel, sheet piling, pipe piles, steel castings and steel forgings, and unfabricated reinforcing steel bars.

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 subject to a price adjustment by the index factor calculated as shown below under Example of a Period Price Calculation.

Price adjustments will not include 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 Notice to Contractors section of the Bid Documents.

The Base Price Date is the month and year in which MassDOT opened bids for the project. This date is used to select the Base Price Index.

**Period Prices** of unfabricated structural steel and unfabricated reinforcing steel on a project are variable prices calculated based on the purchase date of the steel (Period Price Date) using 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. Bureau of Labor Statistics (BLS) 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)”.

May 11, 2011

00813 - 1
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://www.bls.gov/PPI/

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.

*** END OF DOCUMENT ***
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.

*** END OF DOCUMENT ***
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 151B).

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.
Massachusetts Department Of Transportation

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

*** END OF DOCUMENT ***
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 (866) 528-4381.

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: http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ContractorVendorInformation/EBOReportingSystem/ObtainingaLoginPassword.aspx

Contractors must also agree to comply with the EBO system user agreement located on the MassDOT website.

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

Interim Reporting Requirements

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

*** END OF DOCUMENT ***
DOCUMENT 00859

CONTRACTOR/ SUBCONTRACTOR CERTIFICATION FORM 

(Contractor) Date:

This form shall be prepared and submitted to MassDOT for each and every subcontractor; the Prime Contractor shall ensure that the indicated documents have been given, as applicable, to its SubContractors.

(Subcontractor) □ District Approved Subcontractor

Contract No: 93654 Project No. 606091 Federal Aid No.:

Location: FRAMINGHAM

Project Description: Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir

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
☐ 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/WBE†

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 – Schedule of Participation By SDVOBE
B00855 – Letter of Intent – SDVOBE
B00856 – M/WBE or SDVOBE Joint Check Arrangement Approval Form
B00857 – Joint Venture Affidavit

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Document #

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☐ 00875 – Federal Trainee Special Provisions
☐ B00853 – Schedule of Participation by Disadvantaged Business Enterprise†
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 : http://www.massdot.state.ma.us/Debarred.aspx.

6. This company is properly registered and in good standing with the Office of the Secretary of the Commonwealth.

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

Firm: ________________________________________
Address: _____________________________________
Telephone Number: _________________________
Federal I.D. Number: _________________________
Estimated Start Date: _________________________
Estimated Completion Date: _________________________
Estimated Dollar Amount: _________________________

(Print Name and Title) (Authorized Signature) (Date)
The Contractor's attention is directed to Massachusetts General Laws, Chapter 149, Sections 25 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's 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 eight hours in any calendar day or 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 eight hours in any calendar day or 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 Law.

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.

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 Division of Occupational Safety (DOS). 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 DOS.

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 (most recently amended August, 2008).

*** END OF DOCUMENT ***
STATE WAGE RATES
Awarding Authority: MassDOT Highway  
Contract Number: 606091-93654  
City/Town: FRAMINGHAM  
Description of Work: FRAMINGHAM: Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir  
Job Location: Interstate 90 over the Foss Reservoir  

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

• 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 from the Department of Labor Standards (“DLS”) 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 any sub-contractor.

• All apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentice must keep his/her apprentice identification card on his/her person 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. If an apprentice rate is not listed on the prevailing wage schedule for the trade in which an apprentice is registered with the DAS, the apprentice must be paid the journeyworker's rate for the trade.

• 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. Awarding authorities are required to request these updates 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, 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. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F “rental of equipment” contracts.

• Every contractor or subcontractor which performs construction work on the project is required to 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. A sample of a payroll reporting form may be obtained at 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.

• Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

• 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.
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### Apprentice - BOILERMAKER - Local 29

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### Notes:

Apprentice to Journeyworker Ratio: 1:5

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**Proposal No. 606091-93654**

**Issue Date:** 03/14/2016  
**Wage Request Number:** 20160311-073  
**Page 3 of 36**
### Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Lowell

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**Notes:**
- Apprentice to Journeyworker Ratio: 1:5

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

### BULLDOZER/GRADER/SCRAPER OPERATING ENGINEERS LOCAL 4

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For apprentice rates see "Apprentice- LABORER"

### CAISSON & UNDERPINNING BOTTOM MAN LABORERS - FOUNDATION AND MARINE

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For apprentice rates see "Apprentice- LABORER"

### CAISSON & UNDERPINNING LABORER LABORERS - FOUNDATION AND MARINE

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For apprentice rates see "Apprentice- LABORER"

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For apprentice rates see "Apprentice- LABORER"

### CARBIDE CORE DRILL OPERATOR LABORERS - ZONE 2

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For apprentice rates see "Apprentice- LABORER"
### CARPENTER - CARPENTERS -ZONE 2 (Eastern Massachusetts)

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### Apprentice - CARPENTER - Zone 2 Eastern MA

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### Notes:
- Apprentice to Journeyworker Ratio: 1:5

### CEMENT MASONRY/PLASTERING

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### CEMENT MASONRY/PLASTERING - Lowell

**Apprentice -**

**Effective Date -** 01/01/2016

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**Notes:**

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

**Apprentice to Journeyworker Ratio: 1:3**

### CHAIN SAW OPERATOR

**LABORERS - ZONE 2**

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For apprentice rates see "Apprentice- LABORER"

### CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES

**OPERATING ENGINEERS LOCAL 4**

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

### COMPRESSOR OPERATOR

**OPERATING ENGINEERS LOCAL 4**

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

### DELEADER (BRIDGE)

**PAINTERS LOCAL 35 - ZONE 2**

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**Notes:**
- Steps are 750 hrs.
- Apprentice to Journeyworker Ratio: 1:1

**DEMO: ADZEMAN**
LABORERS - ZONE 2
12/01/2015  $35.50 $7.45 $13.55 $0.00 $56.50
For apprentice rates see "Apprentice- LABORER"

**DEMO: BACKHOE/LOADER/HAMMER OPERATOR**
LABORERS - ZONE 2
12/01/2015  $36.50 $7.45 $13.55 $0.00 $57.50
For apprentice rates see "Apprentice- LABORER"

**DEMO: BURNERS**
LABORERS - ZONE 2
12/01/2015  $36.25 $7.45 $13.55 $0.00 $57.25
For apprentice rates see "Apprentice- LABORER"

**DEMO: CONCRETE CUTTER/SAWYER**
LABORERS - ZONE 2
12/01/2015  $36.50 $7.45 $13.55 $0.00 $57.50
For apprentice rates see "Apprentice- LABORER"

**DEMO: JACKHAMMER OPERATOR**
LABORERS - ZONE 2
12/01/2015  $36.25 $7.45 $13.55 $0.00 $57.25
For apprentice rates see "Apprentice- LABORER"

**DEMO: WRECKING LABORER**
LABORERS - ZONE 2
12/01/2015  $35.50 $7.45 $13.55 $0.00 $56.50
For apprentice rates see "Apprentice- LABORER"
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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

| DIVER                                               | 08/01/2015     | $58.86    | $9.80  | $19.23  | $0.00         | $87.89     |

For apprentice rates see "Apprentice- PILE DRIVER"

| DIVER TENDER                                        | 08/01/2015     | $42.04    | $9.80  | $19.23  | $0.00         | $71.07     |

For apprentice rates see "Apprentice- PILE DRIVER"

| DIVER TENDER (EFFLUENT)                             | 08/01/2015     | $63.06    | $9.80  | $19.23  | $0.00         | $92.09     |

For apprentice rates see "Apprentice- PILE DRIVER"

| DIVER/SLURRY (EFFLUENT)                             | 08/01/2015     | $88.23    | $9.80  | $19.23  | $0.00         | $117.26    |

For apprentice rates see "Apprentice- PILE DRIVER"

| DRAWBRIDGE OPERATOR (Construction)                  | 03/01/2016     | $46.17    | $13.00 | $16.39  | $0.00         | $75.56     |

For apprentice rates see "Apprentice- ELECTRICIAN"

| ELECTRICIAN                                         | 03/01/2016     | $46.17    | $13.00 | $16.39  | $0.00         | $75.56     |

### Apprentice - ELECTRICIAN - Local 103

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Notes:

- App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80
- Apprentice to Journeyworker Ratio: 2:3***
### Apprentice - ELEVATOR CONSTRUCTOR - Local 4

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**Notes:**
- Steps 1-2 are 6 mos.; Steps 3-5 are 1 year
- Apprentice to Journeyworker Ratio: 1:1

### Field Eng. Inst. Person - Bldg., Site, HvY/HwY

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**For apprentice rates see "Apprentice - OPERATING ENGINEERS"**

### Field Eng. Party Chief - Bldg., Site, HvY/HwY

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**For apprentice rates see "Apprentice - OPERATING ENGINEERS"**
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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

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For apprentice rates see "Apprentice- ELECTRICIAN"

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For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"

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For apprentice rates see "Apprentice- LABORER"

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Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio: 1:1

Issue Date: 03/14/2016  Wage Request Number: 20160311-073  Page 10 of 36
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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

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Notes:
- Steps are 750 hrs.
- Apprentice to Journeyworker Ratio: 1:1

Issue Date: 03/14/2016  Wage Request Number: 20160311-073  Page 11 of 36
### HOISTING ENGINEER/CRANES/GRADALLS

**OPERATING ENGINEERS LOCAL 4**

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### Apprentice - OPERATING ENGINEERS - Local 4

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**Notes:**

Apprentice to Journeyworker Ratio: 1:6

### HVAC (DUCTWORK)

**SHEETMETAL WORKERS LOCAL 17 - A**

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For apprentice rates see "Apprentice- SHEET METAL WORKER"

### HVAC (ELECTRICAL CONTROLS)

**ELECTRICIANS LOCAL 103**

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For apprentice rates see "Apprentice- ELECTRICIAN"
### HVAC (TESTING AND BALANCING - AIR)
**SHEETMETAL WORKERS LOCAL 17 - A**

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For apprentice rates see "Apprentice- SHEET METAL WORKER"

### HVAC (TESTING AND BALANCING - WATER)
**PIPEFITTERS LOCAL 537**

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

### HVAC MECHANIC
**PIPEFITTERS LOCAL 537**

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

### HYDRAULIC DRILLS
**LABORERS - ZONE 2**

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For apprentice rates see "Apprentice- LABORER"

### INSULATOR (PIPES & TANKS)
**HEAT & FROST INSULATORS LOCAL 6 (BOSTON)**

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**Notes:**
- Steps are 1 year
- Apprentice to Journeyworker Ratio:1:4
### IRONWORKER/WELDER

**IRONWORKERS LOCAL 7 (BOSTON AREA)**

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### Apprentice - *IRONWORKER - Local 7 Boston*

**Effective Date:** 09/16/2015

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**Notes:**

**Structural 1:6; Ornamental 1:4**

**Apprentice to Journeyworker Ratio:**

### JACKHAMMER & PAVING BREAKER OPERATOR

**LABORERS - ZONE 2**

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For apprentice rates see "Apprentice - LABORER"

### LABORER

**LABORERS - ZONE 2**

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### Notes:

Apprentice to Journeyworker Ratio: 1:5

**LABORER: CARPENTER TENDER**
- LABORERS - ZONE 2
- For apprentice rates see "Apprentice - LABORER"
- Effective Date: 12/01/2015
- Base Wage: $31.15
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $51.25
- Effective Date: 06/01/2016
- Base Wage: $31.65
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $51.75
- Effective Date: 12/01/2016
- Base Wage: $32.40
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $52.50

**LABORER: CEMENT FINISHER TENDER**
- LABORERS - ZONE 2
- For apprentice rates see "Apprentice - LABORER"
- Effective Date: 12/01/2015
- Base Wage: $31.15
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $51.25
- Effective Date: 06/01/2016
- Base Wage: $31.65
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $51.75
- Effective Date: 12/01/2016
- Base Wage: $32.40
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $52.50

**LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER**
- LABORERS - ZONE 2
- For apprentice rates see "Apprentice - LABORER"
- Effective Date: 12/01/2015
- Base Wage: $31.35
- Health: $7.45
- Pension: $12.60
- Supplemental Unemployment: $0.00
- Total Rate: $51.40
- Effective Date: 06/01/2016
- Base Wage: $31.65
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $51.75
- Effective Date: 12/01/2016
- Base Wage: $32.40
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $52.50

**LABORER: MASON TENDER**
- LABORERS - ZONE 2
- For apprentice rates see "Apprentice - LABORER"
- Effective Date: 12/01/2015
- Base Wage: $31.40
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $51.50
- Effective Date: 06/01/2016
- Base Wage: $31.90
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $52.00
- Effective Date: 12/01/2016
- Base Wage: $32.65
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $52.75

**LABORER: MULTI-TRADE TENDER**
- LABORERS - ZONE 2
- For apprentice rates see "Apprentice - LABORER"
- Effective Date: 12/01/2015
- Base Wage: $31.15
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $51.25
- Effective Date: 06/01/2016
- Base Wage: $31.65
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $51.75
- Effective Date: 12/01/2016
- Base Wage: $32.40
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $52.50

**LABORER: TREE REMOVER**
- LABORERS - ZONE 2
- For apprentice rates see "Apprentice - LABORER"
- Effective Date: 12/01/2015
- Base Wage: $31.15
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $51.25
- Effective Date: 06/01/2016
- Base Wage: $31.65
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $51.75
- Effective Date: 12/01/2016
- Base Wage: $32.40
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $52.50

**Laser Beam Operator**
- LABORERS - ZONE 2
- For apprentice rates see "Apprentice - LABORER"
- Effective Date: 12/01/2015
- Base Wage: $31.40
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $51.50
- Effective Date: 06/01/2016
- Base Wage: $31.90
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $52.00
- Effective Date: 12/01/2016
- Base Wage: $32.65
- Health: $7.45
- Pension: $12.65
- Supplemental Unemployment: $0.00
- Total Rate: $52.75
### MARBLE & TILE FINISHERS
*BRICKLAYERS LOCAL 3 - MARBLE & TILE*

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**Effective Date:** 02/01/2016

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**Effective Date:** 08/01/2016

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**Notes:**

- Apprentice to Journeyworker Ratio: 1:3

### MARBLE MASONS, TILERLAYERS & TERRAZZO MECH
*BRICKLAYERS LOCAL 3 - MARBLE & TILE*

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**Effective Date -** 02/01/2016

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**Notes:**
- Apprentice to Journeyworker Ratio: 1:5
- For apprentice rates see "Apprentice - OPERATING ENGINEERS"

---

### MECH. SWEEPER OPERATOR (ON CONST. SITES)

**OPERATING ENGINEERS LOCAL 4**

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For apprentice rates see "Apprentice - OPERATING ENGINEERS"

### MECHANICS MAINTENANCE

**OPERATING ENGINEERS LOCAL 4**

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For apprentice rates see "Apprentice - OPERATING ENGINEERS"

### MILLWRIGHT (Zone 2)

**MILLWRIGHTS LOCAL 1121 - Zone 2**

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**Issue Date:** 03/14/2016  **Wage Request Number:** 20160311-073  **Page 17 of 36**
## Apprentice - MILLWRIGHT - Local 1121 Zone 2

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### Notes:
- Steps are 2,000 hours

### Apprentice to Journeyworker Ratio: 1:5

**MORTAR MIXER**
LABORERS - ZONE 2

- 12/01/2015: $31.40, Health: $7.45, Pension: $12.65, Total: $51.50
- 06/01/2016: $31.90, Health: $7.45, Pension: $12.65, Total: $52.00
- 12/01/2016: $32.65, Health: $7.45, Pension: $12.65, Total: $52.75

For apprentice rates see "Apprentice - LABORER"  

**OILER (OTHER THAN TRUCK CRANES, GRADALLS)**
OPERATING ENGINEERS LOCAL 4

- 12/01/2015: $22.27, Health: $10.00, Pension: $14.90, Total: $47.17
- 06/01/2016: $22.66, Health: $10.00, Pension: $14.90, Total: $47.56
- 12/01/2016: $23.31, Health: $10.00, Pension: $14.90, Total: $48.21
- 06/01/2017: $23.82, Health: $10.00, Pension: $14.90, Total: $48.72
- 12/01/2017: $24.34, Health: $10.00, Pension: $14.90, Total: $49.24

For apprentice rates see "Apprentice - OPERATING ENGINEERS"  

**OILER (TRUCK CRANES, GRADALLS)**
OPERATING ENGINEERS LOCAL 4

- 12/01/2015: $26.08, Health: $10.00, Pension: $14.90, Total: $50.98
- 06/01/2016: $26.54, Health: $10.00, Pension: $14.90, Total: $51.44
- 12/01/2016: $27.29, Health: $10.00, Pension: $14.90, Total: $52.19
- 06/01/2017: $27.89, Health: $10.00, Pension: $14.90, Total: $52.79
- 12/01/2017: $28.50, Health: $10.00, Pension: $14.90, Total: $53.40

For apprentice rates see "Apprentice - OPERATING ENGINEERS"  

**OTHER POWER DRIVEN EQUIPMENT - CLASS II**
OPERATING ENGINEERS LOCAL 4

- 12/01/2015: $43.31, Health: $10.00, Pension: $14.90, Total: $68.21
- 06/01/2016: $44.06, Health: $10.00, Pension: $14.90, Total: $68.96
- 12/01/2016: $45.29, Health: $10.00, Pension: $14.90, Total: $70.19
- 06/01/2017: $46.28, Health: $10.00, Pension: $14.90, Total: $71.18
- 12/01/2017: $47.27, Health: $10.00, Pension: $14.90, Total: $72.17

For apprentice rates see "Apprentice - OPERATING ENGINEERS"  

**PAINTER (BRIDGES/TANKS)**
PAINTERS LOCAL 35 - ZONE 2

- 01/01/2016: $49.51, Health: $7.85, Pension: $16.10, Total: $73.46
- 07/01/2016: $50.46, Health: $7.85, Pension: $16.10, Total: $74.41
- 01/01/2017: $51.41, Health: $7.85, Pension: $16.10, Total: $75.36
## Apprentice - PAINTER Local 35 - BRIDGES/TANKS

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### Notes:
- Steps are 750 hrs.
- Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *

* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.

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

**Effective Date -** 01/01/2016

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**Notes:**
- Steps are 750 hrs.
- Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)  
PAINTERS LOCAL 35 - ZONE 2

**Proposal No. 606091-93654**

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**Notes:**

Steps are 750 hrs.

Apprentice to Journeyworker Ratio: 1:1

**PAINTER (TRAFFIC MARKINGS)**

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**PAINTER / TAPER (BRUSH, NEW) * **

* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.

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**Notes:**
- Steps are 750 hrs.
- Apprentice to Journeyworker Ratio: 1:1

---

### PAINTER / TAPER (BRUSH, REPAIN)

**PAYNERS LOCAL 35 - ZONE 2**

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**Issue Date:** 03/14/2016  **Wage Request Number:** 20160311-073  **Page 22 of 36**
### Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT

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**Notes:**
- Steps are 750 hrs.
- Apprentice to Journeyworker Ratio: 1:1

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**Panel & Pickup Trucks Driver**

TEAMSTERS JOINT COUNCIL NO. 10 ZONE B

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**Pier and Dock Constructor (Underpinning and Deck)**

PILE DRIVER LOCAL 56 (ZONE 1)

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**For apprentice rates see "Apprentice- PILE DRIVER"**

**Pile Driver**

PILE DRIVER LOCAL 56 (ZONE 1)

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**Notes:**

Apprentice to Journeyworker Ratio: 1:3

### Apprentice - PIPEFITTER & STEAMFITTER

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**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:**

### Apprentice - PIPELAYER

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**Notes:**

For apprentice rates see "Apprentice- LABORER"
### PLUMBERS & GASFITTERS

**PLUMBERS & GASFITTERS LOCAL 12**

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### Apprentice - PLUMBER/GASFITTER - Local 12

#### Effective Date - 03/01/2016

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**Notes:**

**1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr Step4 with lic $57.78 Step5 with lic $64.37**

### PNEUMATIC CONTROLS (TEMP.)

**PIPEFITTERS LOCAL 537**

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

### PNEUMATIC DRILL/ TOOL OPERATOR

**LABORERS - ZONE 2**

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For apprentice rates see "Apprentice- LABORER"

### POWDERMAN & BLASTER

**LABORERS - ZONE 2**

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For apprentice rates see "Apprentice- LABORER"

### POWER SHOVEL/DERRICK/ TRENCHING MACHINE

**OPERATING ENGINEERS LOCAL 4**

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

As of 9/1/09 Carpentry work on wood-frame residential WEATHERIZATION projects shall be paid the RESIDENTIAL WOOD FRAME CARPENTER rate.

** The Residential Wood Frame Carpenter classification applies only to the construction of new, wood frame residences that do not exceed four stories including the basement. CARPENTERS -ZONE 2 (Residential Wood)
### Carpenter (Residential Wood Frame) - Zone 2

**Effective Date:** 05/01/2011

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**Notes:**
- Apprentice to Journeyworker Ratio: 1:5

### Ride-On Motorized Buggy Operator - Laborers - Zone 2

**Effective Date:**
- 12/01/2015
- 06/01/2016
- 12/01/2016

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For apprentice rates see "Apprentice- LABORER"

### Roler/Spreader/Mulching Machine - Operating Engineers Local 4

**Effective Date:**
- 12/01/2015
- 06/01/2016
- 12/01/2016
- 06/01/2017
- 12/01/2017

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

### Roofer (Inc.Roofer Waterproofing & Roofer Damproofing)

**Effective Date:** 02/01/2016

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**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.

### Roofer Slate / Tile / Precast Concrete

**Effective Date:** 02/01/2016

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For apprentice rates see "Apprentice- ROOFER"
### Proposal No. 606091-93654

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**Notes:**
- Steps are 6 mos.
- Apprentice to Journeyworker Ratio: 1:4

---

**SIGN ERECTOR**

| PAYERS LOCAL 35 - ZONE 2 | 06/01/2013 | $25.81 | $7.07 | $7.05 | $0.00 | $39.93 |

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## Classification

**Apprentice - SIGN ERECTOR - Local 35 Zone 2**

**Effective Date** - 06/01/2013

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**Notes:**
- Steps are 4 mos.

*Apprentice to Journeyworker Ratio: 1:1*

**SPECIALIZED EARTH MOVING EQUIP < 35 TONS**

TEAMSTERS JOINT COUNCIL NO. 10 ZONE B

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**SPRINKLER FITTER**

SPRINKLER FITTERS LOCAL 350 - (Section A) Zone 1

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#### Notes

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

#### Apprentice to Journeyworker Ratio: 1:3

#### STEAM BOILER OPERATOR

**Operating Engineers Local 4**

- 12/01/2015: $43.31, $10.00, $14.90, $0.00, $68.21
- 06/01/2016: $44.06, $10.00, $14.90, $0.00, $68.96
- 12/01/2016: $45.29, $10.00, $14.90, $0.00, $70.19
- 06/01/2017: $46.28, $10.00, $14.90, $0.00, $71.18
- 12/01/2017: $47.27, $10.00, $14.90, $0.00, $72.17

#### TAMPER, SELF-PROPELLED OR TRACTOR DRAWN

**Operating Engineers Local 4**

- 12/01/2015: $43.31, $10.00, $14.90, $0.00, $68.21
- 06/01/2016: $44.06, $10.00, $14.90, $0.00, $68.96
- 12/01/2016: $45.29, $10.00, $14.90, $0.00, $70.19
- 06/01/2017: $46.28, $10.00, $14.90, $0.00, $71.18
- 12/01/2017: $47.27, $10.00, $14.90, $0.00, $72.17

#### TELECOMMUNICATION TECHNICIAN

**Electricians Local 103**

- 03/01/2016: $34.63, $13.00, $14.55, $0.00, $62.18

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**Issue Date:** 03/14/2016  **Wage Request Number:** 20160311-073  **Page 30 of 36**
### Apprentice -  **TELECOMMUNICATION TECHNICIAN - Local 103**

**Effective Date -** 03/01/2016

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**Notes:**
- Apprentice to Journeyworker Ratio: 1:1

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### Apprentice to Journeyworker Ratio: 1:1

**TERRAZZO FINISHERS**

**BRICKLAYERS LOCAL 3 - MARBLE & TILE**

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### Apprentice to Journeyworker Ratio: 1:2

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**Notes:**

**Apprentice to Journeyworker Ratio: 1:2**

- **TELEDATA CABLE SPlicer**
  - **OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104**
  - **01/01/2016**
  - **$28.98**
  - **$4.25**
  - **$3.12**
  - **$0.00**
  - **$36.35**

- **TELEDATA LINEMAN/EQUIPMENT OPERATOR**
  - **OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104**
  - **01/01/2016**
  - **$27.31**
  - **$4.25**
  - **$3.07**
  - **$0.00**
  - **$34.63**

- **TELEDATA WIREMAN/INSTALLER/TECHNICIAN**
  - **OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104**
  - **01/01/2016**
  - **$27.31**
  - **$4.25**
  - **$3.07**
  - **$0.00**
  - **$34.63**

- **TREE TRIMMER**
  - **OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104**
  - **01/31/2016**
  - **$18.51**
  - **$3.55**
  - **$0.00**
  - **$0.00**
  - **$22.06**

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company’s equipment, and (c) by a person who is using hand or mechanical cutting methods and is not on the ground.

This classification does not apply to wholesale tree removal.

- **TREE TRIMMER GROUNDMAN**
  - **OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104**
  - **01/31/2016**
  - **$16.32**
  - **$3.55**
  - **$0.00**
  - **$0.00**
  - **$19.87**

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company’s equipment, and (c) by a person who is using hand or mechanical cutting methods and is on the ground. This classification does not apply to wholesale tree removal.
Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.

*** APP to JM; 1:1, 2:2, 3:3, 3:4, 4:4, 4:5, 4:6, 5:5, 6:6, 6:7, 7:7, 7:8, 8:8, 8:9, 8:10, 9:9, 9:10, 9:11, 9:12, 9:13, 9:14, 9:15, 9:16, etc.


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Proposal No. 606091-93654

Issue Date: 03/14/2016  Wage Request Number: 20160311-073  Page 36 of 36
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### Project # 606091
### Contract # 93654

**Location:** FRAMINGHAM

**Description:** Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir.

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### Description:
Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir.

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# Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir.

<table>
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### Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir.

<table>
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<td><strong>Total Qty:</strong> 273,637</td>
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SPECIAL PROVISIONS

FRAMINGHAM
Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel)
Interstate 90 over the Foss Reservoir

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

Work under this Contract shall be to rehabilitate Bridge No. F-07-045 (4PH & 4PJ) that carries Interstate Route 90 (Massachusetts Turnpike) over MDC Reservoir No. 3 (Foss Reservoir) and to reconstruct the approach roadways. The Contract comprises all work, generally outlined in the Proposal Document, Contract Plans, Contract Specifications, including additional work that may be deemed necessary by the Contractor for performance of work, as approved and directed by the Engineer.

All work under this contract shall be done in conformance with the Standard Specifications for Highways and Bridges dated 1988, the Supplemental Specifications dated July 1, 2015, and the Interim Supplemental Specifications contained in this contract; the 2014 Construction Standard Details, the 1990 Standard Drawings for Signs and Supports; the 1996 Construction and Traffic Standard Details (as relates to the Pavement Markings details only); the 2009 Manual on Uniform Traffic Control Devices (MUTCD) with Massachusetts Amendments and the Standard Municipal Traffic Code; the 1968 Standard Drawings for Traffic Signals and Highway Lighting; the latest edition of American Standard for Nursery Stock; the Plans and these Special Provisions.
CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

Prospective bidders are required to submit all questions to the Construction Contracts Engineer by 1:00 P.M. on the Thursday 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 massdot-specifications@dot.state.ma.us. Please put the MassDOT project file number and municipality in the subject line.

MASSHIGHWAY TO MASSDOT NAME CHANGE

The following definitions in Section 100 of the Standard Specifications for Highways and Bridges are revised as follows:

(Amend definition of Department)

1.17 – Department Effective November 1, 2009, St. 2009, c. 25 abolishes the Massachusetts Department of Highways and all assets, liabilities, and obligations become those of the Massachusetts Department of Transportation (MassDOT). Anywhere in this contract the terms Commission, Commonwealth, Department of Public Works, Department, Massachusetts Highway Department, MassHighway, Party of the First Part, or any other term intending to mean the former Massachusetts Department of Highways is used, it shall be interpreted to mean MassDOT or applicable employee of MassDOT unless the context clearly requires otherwise. Furthermore, MassDOT by operation of law inherited all rights and obligations pursuant to any contract, and therefore parties to this contract hereby acknowledge and agree that its terms shall be liberally construed and interpreted to maintain the rights and obligations of MassDOT. Furthermore, the parties hereby acknowledge and agree that the transfer of all rights and obligations from the Massachusetts Department of Highways to MassDOT shall not have the effect of altering or eliminating any provision of this contract in a manner that inures to the detriment of MassDOT.

(Add a definition for MassDOT)

1.46 – MassDOT The Massachusetts Department of Transportation, a body politic and corporate, under St. 2009, c. 25 “An Act Modernizing the Transportation Systems of the Commonwealth”, as amended.
ENGINEERING DIRECTIVES

Contractors can access MassDOT, Highway Division Engineering Directives at:
http://www.mass.gov/massdot/highway
Select Doing business with us
Select Design/Engineering
Select Engineering & Policy Directives
Select Engineering Directives

CONTRACTOR/SUBCONTRACTOR CERTIFICATION – CONTRACT COMPLIANCE
(Revision 03-23-10)

Pursuant to 23 C.F.R. § 633.101 et seq., the Federal Highway Administration requires each contractor to “insert in each subcontract, except as excluded by law or regulation, the required contract provisions contained in Form FHWA–1273 and further requires their inclusion in any lower tier subcontract that may in turn be made. The required contract provisions of Form FHWA–1273 shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the requirements contained in the provisions of Form FHWA–1273.” The prime contractor shall therefore comply with the reporting and certification requirements provided in MassDOT’s CONTRACTOR/SUBCONTRACTOR CERTIFICATION Form (DOT-DIST-192) certifying compliance with 23 C.F.R. § 633.101 for each subcontract agreement entered into by the contractor. The contractor shall provide a fully executed original copy of said CONTRACTOR/SUBCONTRACTOR CERTIFICATION Form to MassDOT upon execution of any subcontract agreement. Failure to comply with the reporting and certification requirement of the CONTRACTOR/SUBCONTRACTOR CERTIFICATION Form may result in action against the prequalification status of the prime contractor with MassDOT.

SUBSECTION 4.04 CHANGED CONDITIONS.

This Subsection is revised by deleting the two sequential paragraphs near the end that begin “The Contractor shall be estopped…” and “Any unit item price determined …” (1/6/2006).

MATERIAL REMOVED AND STACKED

The Contractor shall carefully remove and stack materials as designated within the Project plans and specifications, and as directed by the Engineer to be removed and stacked within the project area, away from the traveled way, and at a location accessible for removal by the owners.
PROTECTION OF UNDERGROUND FACILITIES

The Contractor's attention is directed to the necessity of making his own investigation in order to assure that no damage to existing structures, drainage lines, traffic signal conduits, etcetera, will occur.

The Contractor shall notify Massachusetts DIG SAFE and procure a Dig Safe Number for each location prior to disturbing existing ground in any way. The telephone number of the Dig Safe Call Center is 811 or 1-888-344-7233.

DESIGNER/PROJECT MANAGER

DESIGNER/Highway and Bridge
HNTB Corporation
Michael Beintum, P.E.
617-532-6900

BRIDGE PROJECT MANAGER
MassDOT
Matt Hopkinson, Project Manager
857-368-9307

PROCEDURE FOR RELEASING AUTOCAD FILES TO THE GENERAL CONTRACTOR

After the bid opening the low bidder may submit the Request for Release of MassDOT AutoCAD Files Form to the Highway Design Engineer. When the Highway Design Section has received both the AutoCAD files from the designer and the Request for Release of MassDOT AutoCAD Files Form from the Contractor, Highway Design will email the contractor a link through Dropbox.com with a reminder disclaimer of use (copy to Project Manager and District Construction Engineer).

SUPPLEMENTAL REQUIREMENTS FOR NON-BID ITEMS (Supplementing Subsection 3.04)

The Contractor will be paid for additional artisans, equipment rental, materials, engineering services and specialty services required to perform the work plus (10%) percent, plus actual increased bond premium.

The Contractor shall be required to furnish certified paid receipts for additional artisans, equipment rental, materials, engineering services and specialty services that are required to perform the work prior to payment by the Department. Increased bond premium for additional artisans, equipment rental, materials, engineering services and specialty services will be paid after a certified paid receipt is submitted showing payment of the increased bond.
**SHEETING AND BRACING**

Unless otherwise noted, the Contractor shall furnish, place, and remove all sheeting and bracing required to support the sides of all trenches or other excavations for this Project.

The Contractor shall be solely responsible for the safety of the workmen and the adjacent facilities from danger of caving and sliding. All work to be done shall be in strict accordance with the Department of Labor, Occupational Safety and Health Administration regulations and suggested practices for construction excavations and/or other applicable codes and regulations. Special precautions shall be taken to guard against any damage to or settlement of pavements, buildings, walls, pipes, ducts or other structures and facilities which are adjacent to the work.

The cost of providing and removing sheeting, shoring and bracing shall be included in the cost of the various items of work under this Contract and no additional compensation will be allowed therefore. Providing and removing sheeting, shoring and bracing for temporary support of excavation for construction of proposed backwall modifications, guardrail transition bases, and approach slab construction for Bridge No. F-07-045 shall be paid under item 950.1. Sheetin shall be completely removed and shall not be cut off below grade and left in place, except as noted on the plans.

**EROSION AND SEDIMENTATION CONTROL**

Temporary erosion and sediment control provisions shall be coordinated with the permanent erosion control features to the extent practical to assure economical, effective and continuous erosion control throughout the construction and post-construction period.

For all phases of construction, Best Management Practices for erosion and sedimentation control shall be utilized to minimize potential impacts to natural resources and wildlife. All disturbed or exposed soil must be temporarily stabilized within 30 days of disturbance or exposure.

Prior to the start of construction, the Contractor shall submit for acceptance its written methods and schedules for accomplishment of temporary and permanent grading, paving and excavation. The Contractor shall also submit its proposed method of dealing with erosion and sediment control and its plan for disposal of waste material in written form. No work shall be started until the control methods and schedules of operation have been accepted by the Engineer.

Vehicles leaving the site must be washed to avoid tracking materials onto the public way. Trucks entering and leaving the site shall be covered in compliance with M.G.L. Ch. 85 Section 36. Refer to Division II, Section 109. Dust Control of the Project Supplemental Specifications for additional information.
EROSION AND SEDIMENTATION CONTROL (Continued)

The Engineer has the authority to limit the surface areas of erodible earth material exposed by excavation, borrow and fill, or any such operations, and to direct the Contractor to provide immediate, permanent or temporary control measures to prevent contamination of surface waters. Such measures will involve the construction of compost filter tubes, sedimentation basins, silt fences or other control devices or methods as necessary to control erosion and sedimentation. Erosion and sedimentation controls shall be installed prior to the start of work and shall be inspected daily. Sediment shall be removed from behind all erosion and sediment control measures as directed by the Engineer.

The erosion and sediment control features installed by the Contractor shall conform to the requirements of the Massachusetts Department of Environmental Protection Water Quality Certification and other permits and shall be satisfactorily maintained by the Contractor.

In the event of conflict between these Specifications and Laws, Rules or Regulations of local agencies, the more restrictive requirements shall apply.

Dewatering of excavated areas for the installation of storm drainage piping, structures and/or other facilities may be required for the installations to be completed “in-the-dry.” Temporary sedimentation basin(s) or other appropriate treatment practices necessary to comply with the NPDES permit program shall be installed to control discharges from the dewatering operations from directly entering surface waters, and as may be required under Item 756. NPDES Storm Water Pollution Prevention Plan.

The Contractor shall maintain flow capacity of all watercourses to prevent unnatural flooding due to the Contractor’s operations.

The Contractor shall maintain a log of daily entries that includes performance of maintenance activities, as required by the Orders of Conditions.

If temporary erosion and sediment control measures are required due to the Contractor’s negligence or carelessness, the control measures shall be performed by the Contractor at its own expense. Construction of temporary erosion and sediment control measures, which are not attributed to the Contractor’s negligence, carelessness or failure to install permanent controls, will be performed as shown on the Plans and/or as ordered by the Engineer.
EROSION AND SEDIMENTATION CONTROL (Continued)

Repeated failures by the Contractor to control erosion, pollution and/or siltation, shall be cause for the Engineer to employ outside assistance or to use its own forces to provide the necessary corrective measures. The cost of such assistance plus project engineering costs will be charged to the Contractor and appropriate deductions made from the Contractor’s monthly progress estimate.

Compost filter tubes for erosion control shall meet the requirements of Item 767.12. Payment for other temporary soil erosion and control work, including preparation of a Construction Dewatering Plan and a NPDES Storm Water Pollution Prevention Plan, will be included under the various items in the Contract.

PROTECTION AND RESTORATION OF PROPERTY
(Supplementing Subsection 7.13)

It shall be the Contractor's responsibility to maintain the temporary drainage system within the project limits as defined by the Engineer. The Contractor will maintain positive drainage within the project limits (and the immediate vicinity) at all times throughout the construction phase.

It shall be the responsibility of the Contractor to make certain that all drainage systems, either new or existing, that carry drainage run-off from the limits of this project operate efficiently to their point of discharge. If drainage system is found to be inactive it shall be removed or abandoned. Payment for the work will be by Item 146. Drainage Structure Removed or Item 145. Drainage Structure Abandoned.

Pipes and structures requiring cleaning as a result of accumulations from the construction operations shall be cleaned without additional compensation.

The Contractor, in crossing under or in running parallel to or near drains, sewers, gas pipes, water mains, poles, sidewalks and other structures, shall at Contractor’s expense sustain them securely in place, cooperating with the officers and agents of the various companies and municipal departments which control them, so that the services of these structures may be maintained.
PROTECTION AND RESTORATION OF PROPERTY (Continued)

The Contractor shall be responsible for all above or below ground utilities and shall repair at his/her own expense any damage to such structures caused by his/her act or neglect, and shall leave them in as good condition as they were previous to the commencement of the work. In cases of damage to utilities caused by the Contractor resulting in an emergency, the Contractor shall promptly warn the owner and shall, if requested, furnish laborers to work temporarily under the owner's direction in getting access to the utility. Pipes or other structures damaged by the operation of the Contractor may be repaired by the company that suffers the loss. The cost of such repairs shall be at the expense of the Contractor.

If live service connections are to be interrupted by excavations of any kind, the Contractor shall not break the service until new services are provided. Abandoned services shall be plugged or otherwise made secure.

Before the Contractor begins any work that may possibly damage or impair the use of any subsurface structure, he shall carefully locate the structure by hand tool excavation and shall conduct his operations so as to avoid damage or impairment. Guardrail posts shall not be driven in close proximity to existing underground utilities unless underground utilities are exposed and locations are clearly known.

If, as the work progresses, it is found that any of the utility structures are so placed as to render it impracticable, in the judgment of the Engineer, to do the work called for under this Contract, the Contractor shall protect and maintain the services in such utilities and structures and the Engineer will, as soon thereafter as reasonable, cause the position of the utilities to be changed or take such other actions deemed suitable and proper.

The Contractor shall perform a pre-existing video site survey of all private and public property adjacent to the construction area, prior to commencement of construction activities.
NOTICE TO OWNERS OF UTILITIES
(Supplementing Subsection 7.13)

The following are contact names for utilities in the project area. Not all listed utilities are affected by the project. The Department does not guarantee the completeness or accuracy of this list:

<table>
<thead>
<tr>
<th>Service</th>
<th>ATTN:</th>
<th>Address</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Eric Johnson</td>
<td>Framingham Dept. of Public Works</td>
<td>508-532-6092</td>
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<tr>
<td></td>
<td></td>
<td>110 Western Ave</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Framingham, MA 01702</td>
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</tr>
<tr>
<td>Other</td>
<td>Stephen Parretti</td>
<td>MCI</td>
<td>508-248-1305</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P.O. Box 600</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charlton, MA 01507</td>
<td></td>
</tr>
<tr>
<td>Cable</td>
<td>Wendy Brown</td>
<td>Comcast</td>
<td>978-848-5183</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO Box 6505</td>
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<tr>
<td></td>
<td></td>
<td>Chelmsford, MA 01824</td>
<td></td>
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<tr>
<td>Other</td>
<td>Tony Wade</td>
<td>MassDOT Fiber/ Telcom</td>
<td>617-946-3185</td>
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<tr>
<td></td>
<td></td>
<td>10 Park Plaza, Rm. 4470</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Boston, MA 02116</td>
<td></td>
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<tr>
<td>Cable</td>
<td>Margot Jones</td>
<td>RCN</td>
<td>781-652-8951</td>
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<td></td>
<td></td>
<td>173 Bedford Street</td>
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<td></td>
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<td>Lexington, MA 02420</td>
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<tr>
<td>Other</td>
<td>Mike Wiemer</td>
<td>Level (3) Communications</td>
<td>617-480-4861</td>
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<td></td>
<td></td>
<td>300 Bent Street</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Cambridge, MA 02141</td>
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<tr>
<td>Cable</td>
<td>David Edgar</td>
<td>AT&amp;T/ TCG</td>
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<td></td>
<td>c/o Siena Engineering</td>
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<td></td>
<td></td>
<td>50 Mall Road, Suite 203</td>
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<td></td>
<td></td>
<td>Burlington, MA 01803</td>
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<td></td>
<td></td>
<td>781-221-8400 x7005</td>
<td></td>
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<tr>
<td>Sewer</td>
<td>Eric Johnson</td>
<td>Framingham Dept. of Public Works</td>
<td>508-532-6092</td>
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<tr>
<td>DPW</td>
<td>Eric Johnson</td>
<td>Framingham Dept. of Public Works</td>
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NOTICE TO OWNERS OF UTILITIES (Continued)

The following website lists the names and addresses of the utilities presumed to be affected, but the completeness of the list is not guaranteed: [http://www.massdot.state.ma.us/](http://www.massdot.state.ma.us/)

Select Quick Links
Select Doing Business with the Highway Division
Select Design/engineering
Select Utility Contacts
Select District, then locate the utility.

MAINTENANCE AND CLEANING OF ROADS

Existing roadways intended to be used for hauling earth and rock excavated materials shall be cleaned and maintained by the Contractor during the length of the Project. The Contractor shall be responsible for providing street sweepers and operators for sweeping of haul road paved surfaces. Sweeping services shall be provided on an hourly basis at the discretion of Engineer. Street sweepers shall be self-propelled, diesel powered units with brushes and a water spray, less than three years old. The Contractor shall remove debris from the work area and deposit sweepings at locations as directed by the Engineer. The Contractor shall also be responsible for repairing roadways and bridges damaged by construction vehicles. Compensation for maintenance and cleaning of roads will not be paid for separately but shall be considered incidental to the work.

PRESERVATION OF ROADSIDE GROWTH
(Section 8.08 shall be amended as follows)

The Contractor shall take all necessary care when excavating or working in the vicinity of existing trees so that the root systems, trunks, and branches are not damaged. All precautions shall be taken to ensure that heavy equipment does not damage any roots, including those that lie below the limits of excavation.

Do not store equipment or stockpile materials within drip line of trees or in areas enclosed by tree protection fencing.

Avoid any direct soil contamination in root zone area by petroleum, petroleum products or solvents, salts or any other pollutant during construction.

All cutting or trimming of trees to be preserved shall be executed by a Massachusetts Certified Arborist. The Contractor shall provide the Engineer with a copy of the certification prior to any work on trees.

Trees that, in the judgment of the Engineer, have been irreparably damaged by the Contractor shall be replaced in kind and in size, or, with a quantity of two (2) inch caliper replacement trees (the quantity of which shall be determined by the Engineer) such that the cumulative caliper of the replacement trees will be up to the equivalent of diameter of the lost tree at breast height. Cost for removal of destroyed trees, including roots and stump and cost for replacement trees including, materials, equipment and labor, shall be paid by the Contractor.
HOLIDAY WORK RESTRICTIONS FOR CALENDAR YEAR 2016
(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.

Below are the holiday work restrictions for the calendar year 2016.

New Year’s Day (Federal Holiday)
Friday, January 1, 2016:

No work on major arterial roadways from noon on Thursday, December 31, 2015 until the normal start of business on Monday, January 4, 2016. 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)
Monday, January 18, 2016:

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)
Monday, February 15, 2016:

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

Evacuation Day (Suffolk County State Holiday)
Thursday, March 17, 2016:

No work restrictions due to traffic concerns.

Patriot's Day (State Holiday)
Monday, April 18, 2016:

Work restrictions will be in place for Districts 3, 4 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
Sunday, May 8, 2016:

No work on Western Turnpike and Metropolitan Highway System from noon on Friday, May 6, 2016 until the normal start of business on Monday, May 9, 2016.
HOLIDAY WORK RESTRICTIONS FOR CALENDAR YEAR 2016  (Continued)

Memorial Day (Federal Holiday)
Monday, May 30, 2016:

No work on major arterial roadways from noon on Friday, May 27, 2016 until the normal start of business on Tuesday, May 31, 2016.

Bunker Hill Day (Suffolk County State Holiday)
Friday, June 17, 2016:

No work restrictions due to traffic concerns.

Independence Day (Federal Holiday)
Monday, July 4, 2016:

No work on major arterial roadways from noon on Friday, July 1, 2016 until the normal start of business on Tuesday, July 5, 2016.

Labor Day (Federal Holiday)
Monday, September 5, 2016:

No work on major arterial roadways from noon on Friday, September 2, 2016 until the normal start of business on Tuesday, September 6, 2016.

Columbus Day (Federal Holiday)
Monday, October 10, 2016:

No work on major arterials from noon time on Friday, October 7, 2016 until the normal start of business on Tuesday, October 11, 2016. DHD may allow work in those areas on a case by case basis and where work is behind barrier and will not impact traffic.

Veterans' Day (Federal Holiday)
Friday, November 11, 2016:

No work restrictions due to traffic concerns.

Thanksgiving Day (Federal Holiday)
Thursday, November 24, 2016:

No work on major arterials from noon on Wednesday, November 23, 2016 until the normal start of business on the Monday, November 28, 2016.
HOLIDAY WORK RESTRICTIONS FOR CALENDAR YEAR 2016 (Continued)

Christmas Day (Federal Holiday)
Sunday, December 25, 2016:

No work on major arterial roadways from noon on Friday, December 23, 2016 until the normal start of business on Tuesday, December 27, 2016.

NORTHERN LONG-EARED BAT PROTECTION

The U.S. Fish and Wildlife Service has listed the northern long-eared bat as threatened under the Endangered Species Act (ESA) and the following requirements exist to protect the bat and its habitat. This project has been reviewed by MassDOT Highway Division’s Environmental Services Section, and has been determined to have “No Effect” to the northern long-eared bat. No time of year restrictions are required for the project at this time. 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 time of year restrictions may apply to such tree cutting.

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.

PROMPT PAYMENT

Contractors are required to promptly pay Subcontractors under this Prime Contract within ten (10) business days from the receipt of each payment the Prime Contractor receives from MassDOT. Failure to comply with this requirement may result in the withholding of payment to the Prime Contractor until such time as all payments due under this provision have been received by the Subcontractor(s) and/or referral to the Prequalification Committee for action which may affect the Contractor’s prequalification status.
SUBSECTION 8.14 UTILITY COORDINATION, DOCUMENTATION, AND MONITORING RESPONSIBILITIES

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

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

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

C. INITIATION OF UTILITY WORK
The Engineer will issue all initial notice-to-proceed dates to each Utility company based on either the:

1) Contractor’s accepted Baseline Schedule
2) An approved Early Utility Request in the form of an Early Utility sub-net schedule (in accordance with the requirements of this Subsection)
3) An approved Proposal Schedule
SUBSECTION 8.14 (Continued)

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

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

C.3 – PROPOSAL SCHEDULE - CHANGES TO THE PUC FORM
If the Contractor intends to submit a schedule (in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02) that contains durations or sequencing that vary from those provided in the Project Utility Coordination (PUC) Form, the Contactor must submit this as an intended change, in the form of a Proposal Schedule and in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02. These proposed changes are subject to the approval of the Engineer and the impacted utilities, in the form of this Proposal Schedule and a proposed revision to the PUC form. The Contractor shall not proceed with any changes of this type without written authorization from the Engineer, that references the approved Proposal Schedule and PUC form changes. The submission of the Baseline Schedule should not include any of these types of proposed utility changes and should not delay the submission of the Baseline Schedule. As a prerequisite to the Proposal Schedule submission, and in advance of the utility notification(s) period, the Contractor shall coordinate the proposed utility changes with the Engineer and the utility companies, to develop a mutually agreed upon schedule, prior to the start of construction.
SUBSECTION 8.14 (Continued)

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.

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.
SUBSECTION 8.14 (Continued)

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.

A. SUPPORT OF EXISTING UTILITIES
The Contractor shall temporarily support existing utility conduits as needed. Temporary support of utility conduits may be required at the abutments and wingwalls during wingwall modifications and new end post construction as indicated on plans. Temporary support of utility conduits may be required during stringer jacking for bearing replacements. Temporary support of utility conduits may be required for contractor installation of shielding, cleaning and painting of stringers, and applying elastomeric protective coating at piers. Contractor shall contact the utility company and coordinate temporary support of conduits with them in advance of proceeding with any work that impacts the conduits.

B. REQUIREMENTS FOR AT&T UTILITY IN BACKWALL
The AT&T utility is located between the fascia stringer and the first interior stringer on the south side of the eastbound bridge. The utility penetrates the existing backwall at both the east and west abutments within the limits of the backwall removal and replacement. The contractor shall coordinate with AT&T before removal of the surrounding backwall concrete and shall provide access as described in Limitations of Operations dedicated to AT&T inspection and repairs to the utility. Requirements specific to this utility are:
SUBSECTION 8.14 (Continued)

Contacts:
Mark P. Burkhart
Senior Technical Project Manager Engineering and Construction
AT&T Corp. AT&T Network Operations (NY, CT, ME, VT, RI, NH, MA)
National Construction - Engineering Team
139 Bacon Pond Road
Woodbury, CT 06798
Office  203 266 4372 or 203 266 4375
mb2439@att.com

Jerry Lamoureux
AT&T Cable Technician
gl1975@att.com
cell 617-899-8160

- The AT&T representatives shown above shall be notified a minimum of 72 hours in advance of any work near the AT&T facilities.
- The MassDOT Contractor awarded the project, shall not be permitted to remove more than one hanger at a time to conduct their bridge repairs, unless otherwise approved by AT&T after the repairs have begun. The hanger shall be replaced, in kind, prior to the next hanger being removed. Any damaged hardware shall be replaced in kind.
- It is understood that the MassDOT Contractor awarded the project shall be responsible for “shielding” the AT&T conduit prior to work near the facilities taking place. The MassDOT Contractor shall provide AT&T with a description of the proposed shielding measures prior to work taking place.
- The MassDOT Contractor awarded the project shall saw cut the concrete around the AT&T conduit on either end of the bridge. The saw cutting shall be no closer that 6-inches to the AT&T conduit. No jackhammering will be permitted in close proximity to the AT&T conduit.
Guidelines for Working Near AT&T Plant

1. The following are minimum requirements for working near AT&T plant. They can only be superseded by the project specific "Method of Procedure" (MOP) or the AT&T On-Site Work Force (OSWF) Representative.

   Warning: Under no circumstances will there be any digging activity on or near AT&T's facilities/right-of-way without the presence of the OSWF Representative. Work will not begin until the cable has been physically located and exposed by hand excavating test pits (potholes).

2. OSWF Representative: The OSWF Representative has the primary responsibility of protecting all AT&T plant. He has full authority to stop work under the following conditions:

   a) Service has been affected by the work operations.
   b) Approved MOP not being followed.
   c) Cable plant or working service in danger.
   d) Special service precautions (conditions blue, yellow, red, or protection facility utilization).

   The work operation will be permitted to resume as soon as conditions permit.

3. Method of Procedure (MOP): A MOP will be required for construction activities near AT&T plant which may endanger service.

   The MOP will be developed by the OSWF Representative and supporting departments. It requires a thorough understanding by all parties associated with the work. Before construction starts, an on-site meeting will be held to discuss in detail the plans for performing the work under the MOP after review and signatures (by those representing the Contractor and AT&T). The approved MOP shall be followed without deviation. A project specific MOP will be a part of and included in the Contract Documents.
SUBSECTION 8.14 (Continued)

The MOP will detail the following as required:

a) Locating the cable route.

b) Establishing protective area boundaries.

c) Exposing buried cable or conduit.

d) Pipe pushing or boring.

e) Power equipment.

f) Backhoe or trenching machines.

g) Cable plow.

h) Drag lines or crane with bucket.

i) Other related items or procedures to be used.

The procedures listed in the approved MOP shall not be changed or altered in any way without the joint approval of all concerned groups.

4. Excavation: Excavation within or around AT&T cable right-of-way will not be permitted unless the cables are located and protected during all activity. Vigilance shall be used in these operations. It is a requirement to know the exact depth and how much cover is over and around the cable at all times while work is in progress. Protective area boundaries that safeguard the cables from a backhoe, trencher, or other power equipment will be determined on an individual case basis. Factors that may be considered include soils (rocks, roots, and debris) and the work environment (equipment size, operator competency, and willingness to cooperate, weather, cable configuration, and time to react to danger).

5. Exposing the Cable: Sight location is the most accurate method of locating the cable. When the cable's location is in doubt and the digging operation is crossing or nearing AT&T plant, a test pit (pothole) shall be dug by hand, and the cable exposed by hand. In doing so, the following shall be considered:
SUBSECTION 8.14 (Continued)

a) The cable does not always lie in a straight line.

b) Splices are often offset from the main cable path.

c) Conduit runs may vary in depth and construction material.

d) Underground ducts with concrete caps all look alike. When in doubt, break the concrete and verify the cable.

e) Never assume that record drawings are correct.

f) In multiconduit runs or cable locations, verify that the correct cable has been identified. Never assume it is in the conduit or casing you happen to see first.

g) Never assume the exposed cable is AT&T plant. Verify by the markings and by the OSWF Representative.
6. Hand-Dig-Only Zone:
   
a) Marking: A hand-dig-only zone will be marked by AT&T with lines, flags, or orange paint on each side of the cable. The zone will be measured from the actual cable location determined visually whenever possible. (See Figure 102-1 below)
SUBSECTION 8.14 (Continued)

LEVELS:

a Test pit dug by hand and cable visually identified. Orange streamer tied to the cable and brought out of the test pit.

b, c, and d Backhoe digging parallel to the cable.

e and f Hand dig only with shovel. Throw soil in backhoe trench.

g and h Very careful hand digging to expose the cable.

Sandbag for protection of exposed cable as excavation continues.

b) State Law: In some states, the laws governing the One-Call system specify the width of the hand-dig-only zone. The zone indicated above shall be the minimum acceptable for work near AT&T cables.

c) Test Pits: Test pits (potholes) shall be dug at intervals determined by the nature of the work operation as directed by the OSWF Representative.

*Warning:* Even with short intervals between test pits, cable or conduit can deviate by as much as 12 inches. Exercise extreme care.

d) Site of the Zone: The following conditions affect the width (2 feet minimum) of the hand-dig-only zone:

1) Local legislation.

2) Cable changes direction.

3) Cable has buried slack loops.

4) Cable has branching stubs and offsets.

5) Other utilities crossing or parallel to the cable.

e) Length of the Zone: The zone shall be extended a minimum of 20 feet on each side of the activity area.
SUBSECTION 8.02 SCHEDULE OF OPERATIONS
Replace this subsection with the following:

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

DESCRIPTION

722.20 General

The Contractor's approach to prosecution of the Work shall be disclosed to the Department by submission of a Critical Path Method (CPM) schedule and a cost/resource loaded Construction Schedule when required in this Subsection. These requirements are in addition to, and not in limitation of, requirements imposed in other sections.

The requirements for scheduling submissions are established based on the Project Value at the time of the bid and are designated as Type A, B, C or D. The definitions of these Schedule Requirement Types are summarized below. Complete descriptions of all detailed requirements are established elsewhere in this specification.

**Type A** – for all Site-Specific Contracts with a Project Value over $20 Million
- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Resource-Loading
- Resources Graphic Reporting
- Cash Flow Projections from the CPM
- Cash Flow Charts
- Cost-loaded CPM
- Contractor-furnished CPM software, computer and training

**Type B** – for all Site-Specific Contracts with a Project Value between $10 Million and $20 Million
- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Cost-loaded CPM
- Resource-Loading
- Monthly Projected Spending Report (PSR)
- Contractor-furnished CPM software, computer and training
SECTION 722 (Continued)

Type C – for all Site-Specific Contracts with a Project Value between $3 Million and $10 Million
- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Monthly Projected Spending Report (PSR)
- Contractor-furnished CPM software, computer and training

Type D - for all contracts with a Project Value less than $3 Million; various locations contracts of any dollar amount; contracts with durations less than one-hundred and eighty (180) Calendar Days; and other contracts as determined by the Engineer.
- Bar chart schedule updated monthly or at the request of the Engineer (See Section 722.62.B - Bar Charts.)
- Monthly Projected Spending Report (PSR) (See Section 722.62.F - Projected Spending Reports.)

MATERIALS, EQUIPMENT, PERSONNEL

722.40 General

A. Software Requirements (Types A, B and C)
The Contractor shall use Primavera P6 computer scheduling software.

In addition to the requirements of 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 within twenty-eight (28) Calendar Days after Notice to Proceed. The computer and software shall be maintained and serviced as recommended by the computer manufacturer and/or as required by the Engineer during the duration of the Contract at no additional cost to the Department. The Contractor shall provide professional training in the basic use of the software for up to eight (8) Department employees. The trainer shall be approved by the Engineer. This training shall be provided within twenty-eight (28) Calendar Days after Notice to Proceed.

B. Scheduler Requirements
For all schedule types, if the Contractor plans to use outside scheduling services, the scheduler shall be approved as a subcontractor by the Engineer.
SECTION 722 (Continued)

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

CONSTRUCTION METHODS

722.60 General

A. Schedule Planning Session
   (Types A, B and C)

The Contractor shall conduct a schedule planning session within seven (7) Calendar Days after the Contractor receives the NTP and prior to submission of the Baseline Schedule. This session will be attended by the Department and its consultants. During this session, the Contractor shall present its planned approach to the project including, but not limited to:

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

This will be an interactive session and the Contractor shall answer all questions that the Department and its consultants may have. The Contractor shall provide a minimum of five (5) copies of a written summary of the information presented and discussed during the session to the Engineer. The Contractor’s Baseline Schedule and accompanying Schedule Narrative shall incorporate the information discussed at this Schedule Planning Session.
SECTION 722 (Continued)

B. Schedule Reviews by the Department (All Types)

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

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

   Failure to submit schedules as and when required could result in the withholding of full or partial pay estimate payments by the Engineer.

722.61 Schedule Content and Preparation Requirements
(Types A, B and C unless otherwise noted)

Each Contract Progress Schedule shall fully conform to these requirements.

A. LOGIC
   The schedules shall divide the Work into activities with appropriate logic ties to show:
   1. conformance with the requirements of this Section and Division I, Subsection 8.02 - Schedule of Operations
   2. the Contractor’s overall approach to the planning, scheduling and execution of the Work
   3. conformance with any additional sequences of Work required by the Contract Documents, including, but not limited to, Subsection 8.03 - Prosecution of Work and Subsection 8.06 – Limitations of Operations.
SECTION 722 (Continued)

B. ACTIVITIES
The schedules shall clearly define the progression of the Work from NTP to Contractor Field Completion (CFC) by using separate activities for each of the following items:

1. NTP
2. Each component of the Work defined by specific activities
3. Detailed activities to satisfy permit requirements
4. Procurement of fabricated materials and equipment with long lead times, including time for review and approval of submittals required before purchasing
5. The preparation and submission of shop drawings, procedures and other required submittals, with a planned duration that is to be demonstrated to the Engineer as reasonable
6. The review and return of shop drawings, procedures and other required submittals, approved or with comments, the duration of which shall be thirty (30) Calendar Days, unless otherwise specified or as approved by the Engineer
7. Interfaces with adjacent work, utility companies, other public agencies, sensitive abutters, and/or any other third party work affecting the Contract
8. The Critical Path, clearly defined and organized
9. Float shall be clearly identified
10. Access Restraints – restrictions on access to areas of the Work that are defined by the Department in the bid package, in Subsection 8.06 – Limitations of Operations or elsewhere in the Contract
11. Milestones listed in Subsection 8.03 - Prosecution of Work or elsewhere in the Contract Documents
12. Subcontractor approvals at fifteen (15) Calendar Days from submittal to response
13. Full Beneficial Use (FBU) Contract Milestone per the requirements of Subsection 8.03 - Prosecution of Work
14. Contractor’s request for validation of FBU (ready to open to traffic)
15. The Department’s confirmation of completed work to allow for FBU
16. Substantial Completion Contract Milestone per the requirements of Subsections 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes and 8.03 - Prosecution of Work
17. Contractor’s request for validation of Substantial Completion
18. Punchlist Completion Period of at least thirty (30) Calendar Days per the requirements of Subsections 5.11 - Final Acceptance, 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes and 8.03 - Prosecution of Work
19. Contractor confirmation that all punchlist work and documentation has been completed
20. Physical Completion of the Work Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
SECTION 722 (Continued)

21. Documentation Completion per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work

22. Contractor Field Completion Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work

23. Utility work to be performed in accordance with the Project Utility Coordination (PUC) Form as provided in Section 8.14 - Utilities Coordination, Documentation and Monitoring Responsibilities

24. Traffic work zone set-up and removal, night work and phasing

25. Early Utility Relocation (by others) that has been identified in the Contract

26. Right-of-Way (ROW) takings that have been identified in the Contract

27. Material Certifications

28. Work Breakdown Structure in accordance with the MassDOT-Highway Division Contractor Construction Schedule Toolkit located on the MassDOT-Highway Division website at:


29. For Type A and B Contracts only: All items to be paid, including all Unit Price and Lump Sum pay items, shall be identified by activity. This shall include all non-construction activities such as engineering work; purchase of permanent materials and equipment, purchase of structural steel stock, equipment procurement, equipment delivery to the site or storage location and the representative amount of overhead/indirect costs that was included in the Contractor’s Bid Prices.

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.
SECTION 722 (Continued)

D. DURATIONS

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

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

E. MATERIALS ON HAND (for Types A and B only)

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

F. ACTIVITY DESCRIPTIONS

The Contractor shall use activity descriptions in all schedules that clearly describe the work to be performed using a combination of words, structure numbers, station numbers, bid item numbers, work breakdown structure (WBS) and/or elevations in a concise and compact label as specified in the MassDOT-Highway Division Contractor Construction Schedule Toolkit located on the MassDOT-Highway Division website at:


G. ACTIVITY IDENTIFICATION NUMBERS

The Contractor shall use the activity identification numbering system specified in the MassDOT-Highway Division Contractor Construction Schedule Toolkit located online at the address above.

H. ACTIVITY CODES

The Contractor shall use the activity codes specified in the MassDOT-Highway Division Contractor Construction Schedule Toolkit located online at the address above.
SECTION 722 (Continued)

A. CALENDARS

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

Examples of special calendars include, but are not limited to:

- Winter Shutdown Period, specific work is required by separate special provision to be performed during the winter. See Special Provision 8.03 (if applicable)
- Peak traffic hours on heavily traveled roadways. This shall be from 6:30 am to 9:30 am and from 3:30 pm to 7:00 pm, unless specified differently elsewhere in the Contract.
- Special requirements by sensitive abutters, railroads, utilities and/or other state agencies as defined in the Contract.
- Cape Cod and the Islands Summer Roadway Work Restrictions: A general restriction against highway and bridge construction is enforced between Memorial Day and Labor Day, unless otherwise directed by the Engineer. Refer to the Project Special Provisions for specific restrictions.
- Cape Ann Summer Roadway Work Restrictions: While there are no general restrictions for Cape Ann as there are for Cape Cod and the Islands, project-specific restrictions may be enforced. Refer to the Project Special Provisions for specific restrictions.
- Turtle and/or Fish Migration Periods and/or other in-water work restrictions: Refer to the Project Special Provisions for specific restrictions.
- Working over Waterways Restricted Periods: Refer to the Project Special Provisions for specific restrictions.
- Night-time paving and striping operations, traffic and temperature restrictions: Refer to the Project Special Provisions for specific restrictions.
- Utility Restrictions shall be as specified within the Contract.

B. 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.
SECTION 722 (Continued)

C. 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.

8. For Type A Schedules, each month, the Contractor will be paid using the Cost-loaded CPM activities for Lump Sum payment items. This requirement supersedes any requirements elsewhere in this Contract regarding partial payments of schedule-of-values for all Lump Sum items.

D. 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
SECTION 722 (Continued)

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.

Except as stated elsewhere in this subsection, schedule submittals shall include each of the documents listed below, prepared in two formats, for distribution as follows:

a. four (4) compact discs (CD); one (1) each for the Office of Project Controls and Performance Oversight (O-PC&PO), the Boston Construction Section Office, the District Construction Office and the Resident Engineer’s Office. Additional copies shall be required if the work is performed in more than one district.

b. two (2) hard copies plotted in color on 24” X 36” paper; one (1) copy each for the District Construction Office and the Resident Engineer’s Office. No copies for the O-PC&PO and the Boston Construction Section Office. Additional copies shall be required if the work is performed in more than one district.

A. Narratives

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

1. itemize and describe the flow of work for all activities on the Critical Path in a format that includes any changes made to the schedule since the previous Contract Progress Schedule / Monthly Update or the Baseline Schedule, whichever is most recent;

2. provide a description of any specification requirements that are not being followed. Identify those that are improvements and those that are not considered to be meeting the requirements;

3. provide all references to any Notice of Delay that has been issued, within the time period of the Contract Progress Schedule Update, by letter to the Engineer. Note that any Notice of Delay that is not issued by letter will not be recognized by the Engineer. See Subsection 722.64.A - Notice of Delay;

4. provide a description of each third-party utility’s planned vs. actual progress and note any that are trending late or are late per the durations and commitments as provided in the PUC Form; provide a description of the five (5) most important responses needed from the Department and the need date for the responses in order to maintain the current Schedule of Record;

5. provide a description of all critical issues that are not within the control of the Contractor or the Department (third party) and any impact they had or may have on the Critical Path;
SECTION 722 (Continued)

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.
SECTION 722 (Continued)

B. Bar Charts (Types A, B, C and D)

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

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

Bar Charts shall be printed in color and submitted on 11” X 17” paper or, if approved by the Engineer, as a .pdf file.

C. Detailed Activity Schedule Comparisons

A Detailed Activity Schedule Comparison (DASC) is a simple reporting tool in the format of a graphical report that will provide Resident Engineers with immediate, timely and up-to-date information. The DASC consists of an updated bar chart that overlays the current time period’s bar chart onto the previous time period’s bar chart for an easily-read comparison of progress during the present and previous reporting periods. The DASC shall be prepared and submitted in accordance with the instructions contained in the Construction Schedule Toolkit located on the MassDOT-Highway Division website at:


The reports described in Subsections D, E and F below shall be submitted with all of the schedules listed in Subsection 722.20 - General:

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

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

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

1. activity ID and description,
2. forecast start and finish dates for each activity and,
3. when submitted as a revised schedule, actual start and finish dates for each completed activity.

For Unit Price pay items, in addition to the above, estimates to complete and any variance to the estimated Contract quantity shall be shown.
E. Resource Graphs (Type A only)

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

F. Projected Spending Reports (Types B, C and D)

A Projected Spending Report (PSR) shall be prepared and submitted in accordance with the instructions listed at the end of this section. The PSR shall indicate the monthly spending (cash flow) projection for each month from NTP to Contractor Field Completion (CFC). Each month’s actual spending shall be calculated using all CQEs paid during that month. If the difference between the Contractor’s monthly projections vs. the actual spending is greater than 10%, the Contractor’s monthly spending projection shall be revised and resubmitted within fifteen (15) Calendar Days.

The Projected Spending Report (PSR) shall be depicted in a tabular format and printed in color on 11 x 17-sized paper or larger as approved by the Engineer. For additional instructions and a template for preparing the Projected Spending Report (PSR), refer to the Contractor’s Construction Schedule Toolkit located on the MassDOT-Highway Division website at:


722.63. Progress Schedule Requirements

A. Baseline Schedule

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

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

The Engineer’s review comments on the Baseline Schedule and the Contractor’s responses to them will be maintained for the duration of the Contract and will be used by the Engineer to monitor the Contractor’s work progress by comparing it to the Contract Progress Schedule / Monthly Update.
SECTION 722 (Continued)

B. Interim Progress-Only Schedule Submissions

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

C. Contract Progress Schedules / Monthly Updates (Types A, B, C and D)

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

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

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

Any proposed logic changes for in-progress or future activities shall be submitted to the Engineer for approval before being incorporated into a Contract Progress Schedule. The logic changes must be submitted using a Proposal Schedule or a schedule fragnet submission. Once approved by the Engineer, the Contractor may incorporate the logic in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.
SECTION 722 (Continued)

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

Except as otherwise designated by a Contract Modification, no Contract Progress Schedule that extends performance beyond the Contract Time and/or beyond any Contract Milestone shall be approved by the Engineer. The Contractor shall submit a Recovery Schedule if any Contract Progress Schedule/Monthly Update indicates a failure to meet the Contract Dates.

D. Short-Term Construction Schedule

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

The Short-Term Construction Schedule shall be submitted every two weeks. It shall display all work for a thirty-five (35) Calendar Day period consisting of completed work for the two (2) week period prior and all planned work for the following three (3) week period. The initial submission shall be provided no later than thirty (30) Calendar Days after NTP or as required by the Engineer.

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

Failure to submit Short-Term Construction Schedules every two (2) weeks may result in withholding of full or partial payments by the Engineer.
SECTION 722 (Continued)

722.64 Impacted Schedule Requirements

A. Notice of Delay

The Contractor shall notify the Engineer in writing, with copies to the District and State Construction Engineers, within three (3) Calendar Days of the start of any delays to the Critical Path that are caused by actions or inactions that were not within the control of the Contractor. Delay notifications that are not provided in a letter to the Engineer, such as a delay notification in the schedule narrative, will not be recognized as contractual notice in the determination of any Time Extension related to the impacts to the work associated with this specific alleged delay. Should such delay continue for more than one (1) week, the Contractor shall note it in the Schedule Narrative until the delay is no longer impacting the Critical Path for the completion of the Contract Milestones. The Engineer will evaluate the alleged delay and its impact and will respond to the Contractor within ten (10) Calendar Days after receipt of a notice of delay.

B. Time Entitlement Analysis

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

TEAs shall be prepared and submitted in accordance with the requirements of 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 fourteen (14) Calendar Days after a request for a TEA by the Engineer for any other reason.

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

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

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

When accepted, the changes included in a TEA shall be incorporated into the next Contract Progress Schedule per the requirements of Subsection 722.63.C - Contract Progress Schedules / Monthly Updates.

During the review of any TEA, all Contract Progress Schedules shall continue to be submitted as required.

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

C. Recovery Schedules

The Contractor shall promptly report to the Engineer all schedule delays during the prosecution of the Work. Except as otherwise designated by a Contract Modification, no Contract Progress Schedule that extends performance beyond the Contract Time and/or beyond any Contract Milestone shall be approved by the Engineer. The Contractor shall submit a Recovery Schedule within fourteen (14) Calendar Days of a Contract Progress Schedule submission that shows failure to meet the Contract Dates. This requirement is critical to the Department’s ability to make informed decisions regarding Contract Time and costs.
SECTION 722 (Continued)

During the prosecution of the Work, should the Contractor’s progress on a critical operation clearly not meet anticipated production, without cause by fault of the Department, or should a critical activity or series of activities not be staffed in accordance with the Contractor’s approved Baseline Schedule resource planning, the Contractor shall be obligated to recover such delay. Recovery Schedules shall be prepared and submitted in accordance with Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements within fourteen (14) Calendar Days of any of the cases listed above.

Recovery Schedules shall clearly indicate any proposed overtime hours, additional shifts, and the resources that are proposed to be incorporated in to the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts and shall have the right to require that overtime hours and/or additional shifts be used to minimize the duration of Time Extensions, without additional compensation for any Contractor delays, if it is determined to be in the best interest of the Department to do so.

During the review of any Recovery Schedule, all Contract Progress Schedules shall continue to be required every month.

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

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

D. Proposal Schedules

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

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

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

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

Proposal Schedules shall clearly indicate any proposed overtime hours, additional shifts, and the resources that are proposed to be incorporated in the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts.

Changes represented in accepted Proposal Schedules shall be incorporated into the next Contract Progress Schedule. During the review of any Proposal Schedule, all Contract Progress Schedules shall continue to be required every month.
SECTION 722 (Continued)

E. Disputes (Types A, B, C and D)
All schedules shall be submitted, reviewed, dispositioned and accepted in the timely manner specified herein so as to provide the greatest possible benefit to the execution of this Contract.

Any dispute concerning the acceptance of a schedule or any other question of fact arising under this subsection shall be determined by the Engineer. Pending resolution of any dispute, the last schedule accepted by the Engineer will remain the Contract Schedule of Record.

COMPENSATION

722.80 Method of Measurement and Basis of Payment (Types A, B, C and D)

The Special Provisions will specify the fixed-price amount to be paid to the Contractor for the Project Schedule requirements contained herein. Each bidder shall include this lump-sum, fixed-price bid item amount in his/her bid. Failure to do so may be grounds for the rejection of the bid.

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

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

Twenty percent (20%) of this pay item will be paid upon the Engineer’s acceptance of the Contractor’s Baseline Schedule, prepared and submitted in accordance with Subsection 8.02.C.

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

\[
\text{Monthly Payment} = \frac{\text{Remaining Fixed Price amount (80\% of Item 100.)}}{\text{Contract Duration in whole months} - 2 \text{ months}}
\]

The timely and accurate submission of the Baseline Schedule is critical to the Contract and the Department’s ability to make informed decisions. Only payments under Item 740 - Engineer’s Field Office and Item 748 – Mobilization will be made until the Baseline Schedule is accepted by the Engineer.
SECTION 722 (Continued)

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

All Contract Progress Schedule Updates submitted later than ten (10) Calendar Days after the CQE (Contract Quantity Estimate) completion date, or greater than forty (40) Calendar Days from the Data Date of the previous submission, will be deemed to be no longer useful and will not qualify for payment. Late submittal of missed Contract Progress Monthly Updates will not result in recovery of the previously forfeited portion of the Schedule of Operations Fixed Price Payment Item.

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

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

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

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

Should there be a Time Extension granted to the Contractor, the Engineer may provide an Equitable Adjustment for additional Contract Progress Schedule Updates at intervals directed by the Engineer. Item 100. will be the basis for this Equitable Adjustment.

722.82 Payment Items

100. SCHEDULE OF OPERATIONS - FIXED PRICE $_______ LUMP SUM
ARCHITECTURAL ACCESS BOARD TOLERANCES

The Contractor is hereby notified that they are ultimately responsible for constructing all project elements in strict compliance with the current AAB/ADA rules, regulations and standards.

All construction elements in this project associated with sidewalks, walkways, wheelchair ramps and curb cuts are controlled by 521CMR - Rules and Regulations of the Architectural Access Board (AAB).

The AAB Rules and Regulations specify maximum slopes and minimum dimensions required for construction acceptance. There is no tolerance allowed for slopes greater than the maximum slope or for dimensions less than the minimum dimensions.

Contractors shall establish grade elevations at all wheelchair ramp locations, and shall set transition lengths according to the appropriate table in the Construction Standards (or to the details shown on the plans).

All wheelchair ramp joints and transition sections which define grade changes shall be formed, staked and checked prior to placing cement concrete. All grade changes are to be made at joints.

ASPHALT BINDER

In order to allow an efficient transition from viscosity graded Asphalt Cement (AC) specifications to performance graded Superpave Binder (PG) specifications (non-modified binder), the Massachusetts Department of Transportation is replacing AC graded products with PG binder as follows:

Projects requiring AC-20 will be constructed using PG 64-28
Projects requiring AC-5 will be constructed using PG 52-34

The Contractor shall follow existing mix design requirements and produce the hot-mix using the required grade of PG binder.

The binder supplier shall provide the Department with PG test results and a certification of the PG binder grade when PG binder is substituted for AC grade asphalt. This testing and certification shall be based on the existing lot numbering system.

Performance-Graded asphalt shall not have a higher temperature grade than specified without prior approval.
PAINTING - STRUCTURAL CERTIFICATION

All Contractors or Subcontractors performing lead based paint removal, containment and collection, surface preparation, or coating of structural steel must be pre-qualified by MassDOT in the Painting - Structural category.

All painting contractors and painting subcontractors to be used for lead-based paint removal, containment and collection, surface preparation, or coating of structural steel must be certified by the Society for Protective Coatings (SSPC) Painting Contractor Certification Program (PCCP), QP-2. Information pertaining to certification may be obtained by contacting, the Society for Protective Coatings.

This certification must be full and not interim. The painting contractor and painting subcontractor must remain so certified for the duration of the contract. If a contractor or subcontractor’s certification expires or is nullified, the painting firm shall not be allowed to perform any work until the certification is reissued. Requests for extensions of time for any delay to the completion of the contract due to an inactive certification shall not be considered and liquidated damages shall apply.

GENERAL REQUIREMENTS FOR DEMOLITION AND WORK INVOLVING PAINTED STEEL

Demolition and work involving painted steel shall conform to the requirements of Section 961 of the Supplemental Specifications dated July 1, 2015.

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

Environmental

All applicable portions of Sections 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 Section 961.68 “Handling of Hazardous Waste and Reporting Release Programs”.

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

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

Mechanical Disassembly Of Steel

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

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

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

NEW INTRODUCTIONS OF INVASIVE PLANTS INTO OR AROUND THE SITE
(Supplementing Subsections 7.01(D) Plant Pest Control and 7.13 Protection and Restoration of Property)

The Contractor shall ensure that no invasive plant species, as defined and listed by the Massachusetts Invasive Plant Advisory Group, are introduced or moved around the site by construction activities either by improperly cleaned construction equipment or importation of infected materials such as borrow, compost, nursery stock, seed, or hay bales. Corrective measures, if necessary, shall be made by the Contractor as directed by the Engineer. The Contractor shall be solely responsible for all costs associated with ensuring that invasive species are not introduced or moved around the site by construction activities and for all corrective measures required for as long as necessary to eliminate the introduced invasive plant species and prevent re-establishment of same.
ITEM 106.87 JACKING SUPERSTRUCTURE LUMP SUM

Description

The work under this item shall consist of jacking and shoring the existing bridge superstructure at the abutments to allow for the replacement of the existing bearings with new bearings and construction of proposed concrete pedestals. This item also consists of temporary shoring of the existing deck at the median at the abutments as noted on the Contract Plans.

The work under this item shall also include designing, furnishing, fabricating, and erecting the jacking and shoring systems, including all required components. The temporary jacking and shoring systems shall be removed upon the completion of the bearing replacement.

Any rivets that are removed from the existing structure to facilitate the jacking system shall be filled with the appropriate diameter high strength bolts upon the jacking material removal.

The existing member sizes and dimensions shown on the plans are based on the available original design drawings, and are not guaranteed. The available original design drawings are available for review at the Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116. The Contractor shall be responsible for verifying all sizes and dimensions in the field prior to fabrication of any new bearing or component. No additional payment will be made as a result of discrepancies between the design drawings and the existing as-built conditions.

All jacking and shoring systems shall be designed by a professional structural engineer licensed in the Commonwealth of Massachusetts. The design of the jacking and shoring system shall be in accordance with the Allowable Stress Method of the AASHTO Standard Specifications for Highway Bridges, including the latest interims. The jacking and shoring system shall be designed for all full dead and live loads along with all other applicable loads as specified in AASHTO Standard Specifications. The contractor shall provide an analysis of the stresses in the existing structural members as well as the jacking system and supporting members during all phases of the jacking operation. Under no circumstance will any overstress of more than 10% above the AASHTO allowable stresses be permitted in the design. The contractor shall design the support of the jacking towers including geotechnical design. The design shall include the effects on the existing abutment footings.

The jacking schemes shown on the contract plans are schematic only and are provided to indicate general design intent only. The Contractor shall be fully responsible for the design of all jacking systems. The schemes shown are based on the assumption that the bearing replacement and jacking will occur during Stages 2 to 4 of construction. The Contractor shall be fully responsible for the stability of the structure during the jacking procedure.
ITEM 106.87 (Continued)

The shoring system must provide for thermal expansion and contraction of the superstructure. The jacking system shall be monitored for lateral movements to ensure that the jacking system remains plumb during jacking. Vertical deflections shall be monitored to detect any movement such that if movement is detected jacking can be halted and corrective measures taken.

Materials

**Jacks and Temporary Materials** used by the Contractor in shoring and temporary supports shall be in sound condition and shall meet the requirements of these specifications and the approval of the Engineer. All jacks shall be equipped with pressure gauges or other load measuring devices so that the jacking forces can be monitored at all times. Each jack shall have the rated capacity and stroke clearly shown on the manufacture's name plate attached to each jack. The minimum stroke requirement shall be 2 inches for each jack. The Engineer may require that any lifting equipment which he deems to be inadequate or faulty be removed from the project site.

Materials and equipment used to perform the jacking and shoring shall be capable of supporting the actual loads on the structure at the time of jacking, including the dead loads, live loads, and all other applicable loads. For any proposed methods, the Contractor shall determine the appropriate jacking loads and required jack capacities, including a minimum safety factor equal to 1.5 of the bearing reactions.

All jacks to be equipped with locking rings. The jacking system shall be capable of synchronized jacking of multiple jacks.

**Timber** for cribbing may be used for the jacking operation. The timber cribbing, if selected by the Contractor, shall be southern yellow pine or Douglas fir and designed for wet service condition. Timber for cribbing shall be free of decay, excessive knots and shakes and need not be new.

**Other Materials** not listed shall be on the MassDOT’s Approved List of Materials.
ITEM 106.87 (Continued)

CONSTRUCTION METHODS:

Submittals

Designs and shop drawings shall be submitted to the Engineer in accordance with the Subsection 5.02 “Plans and Detail Drawings”, and shall be stamped by a structural engineer registered in the Commonwealth of Massachusetts. The submission shall contain a description, design calculations and plans of the proposed methods and materials in sufficient detail to permit evaluation of the system for structural adequacy. Typical jacking and steel modification related items to be submitted with the shop drawings shall include, but not limited to, the following:

1) A hydraulic schematic.
2) General jacking procedure, including jacking sequence, duration, and lowering of the structure, type and material designations for all materials used.
3) Design calculations and details for all jack supports, shoring towers, deck support, jacking beams and any other structural components and temporary or permanent modifications to existing members such as additional bearing stiffeners or web blocking at lifting points.
4) Analysis calculations to check the stresses and stability of all existing members being lifted, for all phases of the jacking. This must include the effects of the longitudinal forces due to thermal movements.
5) A Proof Test Certificate for the jacks, gauges, and fittings and all accessories.
6) A certificate verifying 2% accuracy of all gages.
7) Catalog cut sheets and assembly drawings of each size of jack.
8) A theoretical conversion chart for converting pressures to loads.
9) Method of monitoring the jacking forces, movements and deflections.

The Contractor shall also submit his proposed welding procedures and welder's certifications to the Engineer for approval prior, if necessary, to commencement of work.

Jacking and Shoring

Jacking of bearings shall be done on each set of bearings, as shown on the Stage Construction Details in the contract plans, with all bearings in a set jacked at the same time. The Contractor shall maintain the stability of the bridge by fixing the bridge at one (and only one) location at all times.

The Contractor shall ensure that the existing bearings are unrestrained in the vertical direction prior to jacking, such that the bearings and existing hold-down devices provide no resistance to the jacking. This can be performed by removing the existing bearing anchor bolts after the jacks have been brought up tight against the jacking beams and/or jacking brackets.
ITEM 106.87 (Continued)

The Contractor shall temporarily support existing conduits supported by beams being jacked in that stage as needed to prevent damage to existing conduits. Temporary support of conduits will be coordinated with Engineer and with the utility owner.

At no time shall any jacking be performed unless the Engineer is present. The Contractor shall provide a minimum of two-day advance notice to the Engineer prior to any jacking operation.

The Contractor shall use jacks with mechanical locking capability, or with "horseshoe" type shims/blocking, which provide the required load capacity. The jacks shall be centered under the jacking beams and/or jacking brackets. All jacks shall have locking devices engaged or blocking shall be provided once the load has been transferred to the jacks but prior to removal of existing bearings.

The Contractor shall minimize the duration that the structure is supported by jacks and/or shoring, and shall inspect the shoring system at least daily while it is carrying the bridge loads.

Jacking system shall accommodate the thermal movements of the structure as required.

The Contractor shall carefully lower the structure by using the hydraulic system of the jacks.

1. The Contractor shall jack the structure to a height sufficient to allow for removal and replacement of the bearings, but not to exceed 1/8 inch as measured at the center lines of the bearings. There shall be no live load on the lanes directly above the beams while the jacks are lifting (hydraulic mode).

2. The jacks shall be mechanically locked prior to allowing traffic above the beam being lifted, or the structure shimmed/blocking after each 1/8 inch of lift at each jack, and at the completion of the lift. The hydraulic system of the jacks shall not be relied upon to sustain the jacking loads once the lifting has been completed.

3. During jacking, jack pressures shall be monitored continuously and the jacking procedure shall be suspended if deviations from expected jacking forces of more than 20% are experienced until the cause of the discrepancy is determined and resolved to the satisfaction of the Engineer.

4. The bottom of beam elevations shall be the same before and after the completion of work.
ITEM 106.87 (Continued)

5. In the case of a failure of the hydraulic system of a jack, all jacks shall be carefully and immediately lowered to the relative shim or lock-off height corresponding to the failed jack, and the beam supported by the failed jack shall be supported such that the jack can be replaced. All repairs as required by the Engineer (including associated design) shall be performed by the Contractor prior to further jacking, at no additional cost to the Commonwealth of Massachusetts. The Contractor shall provide emergency back up jacks, equal in number to 25% of the amount of jacks for each rated capacity (but no less than one jack for each rated capacity and type), on site in case of a failure of a jack(s).

Jacking Beam and Jacking Brackets Installation

All materials shall be lifted into position with care so as not to damage the existing structure. Any damaged caused by the contractor to the existing structure will be repaired as required and to the approval of the Engineer at the expense of the Contractor.

At no time shall the Contractor's material or equipment be directly placed in the waterway. Once the bearings have been successfully installed, all jacking materials shall be removed.

PAYMENT

Method of Measurement

Jacking Superstructure, being paid for on a lump sum basis, will not be measured for payment.

Basis of Payment

Payment for this item of work shall constitute full compensation for all design, labor, tools, materials, equipment, and other incidentals necessary to properly jack and shore and complete the work as specified on the Contract Drawings and in these Special Provisions. Payment shall also include modifications to the existing beams, removal and reinstallaion of minor obstructions to jacking erection, shoring systems, jacking material removal, existing conduit support, removal and replacement of riprap, and any alterations to the structure proposed by the Contractor, any repair work to the existing structure required as a result of the Contractor's operation, all plates, shims, excavation and/or filling when required, and restoration of grades to the original conditions after completion of work.
ITEM 109.31  WIND SCREEN FOR DUST CONTROL SQUARE YARD

ITEM 109.33  WIND SCREEN REMOVE AND RESET FOOT

ITEM 109.4  POWER SWEEPER HOUR

ITEM 440.  CALCIUM CHLORIDE FOR ROADWAY DUST CONTROL POUND

ITEM 443.  WATER FOR ROADWAY DUST CONTROL MGALLON

GENERAL

This work shall consist of controlling dust generated during the contract and supplements the Construction Dust Control requirements of Division I Subsection 7.02.

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

Work shall be conducted in a manner that will not result in nuisance dust conditions (i.e., visible airborne dust cloud).

SUBMITTALS

Prior to starting any work the Contractor shall develop and submit for approval a dust control plan that outlines in detail the measures to be implemented. The plan shall include details as to how dust emissions will be controlled and/or minimized for demolition activities, earthwork activities including excavation, stockpiling of material, and transportation on public roadways.

MATERIALS

The material for this work shall be of the kind described below, shown on the plans and shall meet the requirements of the following Subsections of Division III, Materials:

- Water M4.02.04
- Calcium chloride M9.01.0

Wind screens shall be a durable fabric mesh of 50 percent porosity, attached to a fence.

Wind barriers shall be solid wood panels, solid durable fabric attached to a fence, or other solid barriers intended to block the passage of wind.

Covers for stockpiles shall be UV resistant plastic tarps with a minimum 4 mil thickness.
ITEMS 109.1 through 109.4, ITEM 440 and ITEM 443. (Continued)

CONSTRUCTION METHODS

Construction Site Dust Control.

Water or calcium chloride shall be used to provide dust control.

The Contractor shall apply water as necessary, or as directed by the Engineer to control dust. Several applications per day may be necessary to control dust depending on weather conditions and the work activity being performed.

Water application equipment shall consist of sprinkler pipelines, tanks, tank trucks, or other devices that are capable of providing regulated flow, uniform spray, and positive shut-off. Calcium chloride shall be applied at a rate of 1.5 pounds per square yard, or as directed by the Engineer to control dust.

Water shall not be applied to any roadway surface when freezing conditions occur.

The Contractor shall ensure that vegetation and the soil to be used for vegetation are not treated. The use of petroleum products for dust suppression is prohibited.

Wind screens shall be provided in locations where they would be effective in minimizing the spread of dust. The location of wind screen placement shall be submitted as part of the Contractor’s dust control plan. Wind screens can be moved as necessary as the active work area shifts within a work zone. The Contractor shall keep wind screens in good repair for the life of the contract.

Compressed air for cleaning debris from any surface or structure will be permitted only when in compliance with the approved dust control plan.

Only wet cutting of concrete block, concrete and/or asphalt surfaces is allowed. See item 115.01 for cutting concrete on bridge No. F-07-045 (4PH & 4PJ).

Public Roadway Dust Control

Vehicles leaving the construction site shall have no mud or dirt on the vehicle body or wheels.

Haul truck cargo areas shall be securely covered during material transport on public roadways.

Material with high water content shall not be allowed to leak from truck cargo areas during transport over public roadways.
ITEMS 109.1 through 109.4, ITEM 440 and ITEM 443. (Continued)

Vehicle mud and dirt carryout, material spills and soil wash-out onto public roadways and walkways and other paved areas shall be immediately cleaned up by the Contractor.

At work zone egress points, the Contractor shall use power sweeping which consists of vacuuming, wet power sweeping, regenerative air sweeping, or wet power broom sweeping on paved roadways. Dry sweeping is prohibited.

Control Of Earthwork Dust
During batch drop operations (i.e., earthwork with front-end loader, clamshell bucket, or backhoe) the free drop height of excavated or aggregate material shall be minimized to prevent the generation of dust.

To prevent spills during transport, freeboard space shall be maintained between the material load and the top of the truck cargo bed rail.

Control Of Stockpile Dust
The Contractor shall employ one or more of the following methods to prevent the release of dust from stockpiles. The method to be used shall be submitted for review and approval as part of the dust control plan specified under Submittals.

a. Water shall be used during active stockpile load-in, load-out and maintenance activities;

b. UV resistant plastic tarps on stockpiles, secured with sandbags or an equivalent method to prevent the covers from being dislodged by the wind. The Contractor shall repair or replace covers whenever damaged or dislodged, without additional compensation.

Demolition Dust Control Measures
Water shall be used during demolition. During transport of demolition debris, the truck cargo area shall be securely covered.

METHOD OF MEASUREMENT
Item 109.31 will be measured for payment by the square yard complete in place excluding overlap.

Item 109.33 will be measured for payment by the foot as measured along the barrier.

Item 109.4 will be measured for payment by the hour, by the time spent sweeping.

Item 440. will be measured for payment by the pound.

Item 443 will be measured for payment by the number of M gallons (1000 gallons). The water will be measured in tanks or tank trucks of predetermined capacity, or by means of satisfactorily installed meters. Any and all measuring devices shall be furnished by the Contractor.
ITEMS 109.1 through 109.4, ITEM 440 and ITEM 443. (Continued)

BASIS OF PAYMENT

Item 109.31 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 109.33 will be paid for at the Contract unit price per foot, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

Item 109.4 will be paid for at the Contract unit price per hour, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

Item 440. will be paid for at the Contract unit price per pound, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

Item 443. will be paid for at the Contract unit price per MGallon (1,000 gallons), which price shall include all water, labor, tools and equipment required to furnish and measure the water applied to surfaces designated by the Engineer, and all incidental costs required to complete the work.
ITEM 115.01 PARTIAL DEMOLITION OF BRIDGE NO. F-07-045 LUMP SUM

Description

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

The Contractor is advised to conduct a field investigation prior to bidding. The Contractor shall verify all conditions and materials in the field and shall base his bid on his 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 work to be done under this item includes furnishing all labor and materials necessary to perform demolition of the entire bridge deck and portions of all wingwalls as indicated on the Contract Plans. The demolition includes, but is not limited to, removal and disposal of the existing reinforced concrete deck, existing concrete barriers, existing approach slabs, existing end posts, existing portions of concrete wingwalls, existing steel end diaphragms, existing steel bearings and anchor bolts, existing metal deck joints, temporary asphaltic bridge joint system, and other components as indicated on the plans. The work under this item also includes all sawcuts in concrete where indicated on the Plans.

The Massachusetts Department of Transportation does not guarantee or represent that the bridge materials will actually coincide with any descriptions contained herein or represented on drawings. Plans of the existing bridge are available at the Office of the Director of Bridges and Structures, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA.

The Contractor shall take necessary precautions to protect existing utilities in place from damage during his/her operations.

Temporary Shielding

The work under this item includes providing temporary shielding to prevent any debris, tools or incidental equipment of any kind resulting from demolition, excavation or construction from falling into the reservoir. Any material that accidentally falls into the reservoir shall be immediately removed at the Contractor’s expense. The work under this item shall include designing, furnishing, installing, maintaining, relocating, removal and disposal of the protective shielding. Temporary shielding that serves as a work platform shall be included under this item.
ITEM 115.01  (Continued)

Shielding shall be in place prior to the start of the demolition and shall extend the full length of the span(s) where demolition is being performed and a sufficient distance beyond the bridge fascias. The shielding shall be installed or removed only upon the approval of the Engineer.

The Contractor’s demolition plan as described herein, shall include the shielding design, calculations and sketches for review. The demolition plan and calculations shall indicate if the shielding is being used as a work platform. The shielding design shall be stamped by a Professional Structural Engineer registered in Massachusetts.

Shop drawings shall be submitted for approval and all shields shall be approved by the Engineer and installed prior to the start of demolition of the superstructure. The protective shields shall remain in position during removal of all superstructure components. The shields shall be installed, relocated or removed only upon approval of the Engineer.

The installation of the protective shield including connections, fasteners, erection procedures and maintenance shall be undertaken in accordance with the following criteria:

1. The protective shielding system shall be designed to support all loads that it will be subjected to. The design of the shielding components shall be in conformance with the AASHTO LRFD Bridge Design Specifications. The loads imposed by the shielding, both globally and locally shall not cause overstress of any portion of the existing structure and calculations shall be submitted to demonstrate this requirement has been met. The shielding shall be designed to carry a construction live load of not less than 100 pounds per square foot.

2. The protective shield shall extend horizontally a minimum of three feet beyond the bridge parapet and shall extend vertically to a point one foot above the top of the bridge parapet wall.

3. The protective shield shall be placed to protect the entire area of demolition, including the areas over land.

4. The protective shield shall be sufficiently tight to prevent leakage of slurry from cutting tools, dust, chips or other small debris to the surface below.

5. The protective shield shall be tongue and groove or ship lap, lined with 6 mil polyethylene unless otherwise specified or approved by the Engineer.
ITEM 115.01 (Continued)

Alternate methods for protective shielding will be considered and reviewed by the Engineer. Their use will be subject to the approval of the Engineer. If the Contractor proposes an alternate method, the Contractor shall submit shop drawings showing complete details of this method. These drawings and details shall be designed and stamped by a Professional Structural Engineer registered in conformance with the laws of the Commonwealth of Massachusetts.

The Contractor may utilize existing bottom flanges of the existing steel beams as supports for the Protective Shielding. The Contractor will not be able to span temporary shielding directly between beam flanges in the first interior south bay due to the existing conduit and must use other means for shielding this area and protecting the conduit. The Contractor will not be permitted to weld onto any existing steel except as shown on the contract plans. Contractor will not be permitted to drill into or cut in the tensile zone areas of any existing structural beams without prior approval of the Engineer. Holes drilled for temporary support shall be filled with fully tightened high strength bolts after temporary support removal. If the Contractor's operations damage any existing portions of the bridge that have been designated to be retained in the proposed construction, such damage shall be repaired at the Contractor's expense.

All materials removed under Item 115.01 shall become the property of the Contractor and shall be removed from the job site, unless such materials are designated to be reused in the proposed construction.

Submittals
The Contractor shall prepare and submit a demolition plan indicating his/her proposed demolition procedures and methods to be used including equipment, tools, devices, crane capacity and location, schedule of operations, methods of utility protection, methods of preventing any debris resulting from demolition, excavation or construction from falling into the river and adjacent property to the Engineer for approval. The requirements for equipment and all procedures utilized shall be in conformance with the intent of Subsection 960.61D, Steel Erection of the Standard Specifications for Highways and Bridges. The demolition procedures and any necessary calculations and drawings shall be stamped by a Professional Structural Engineer registered in Massachusetts certifying that all existing structural members are suitably braced and supported throughout the demolition process. Work under this item may not commence until the Engineer has given written approval.

CONSTRUCTION METHODS
The Contractor shall be solely responsible for maintaining the stability of the existing bridge at all times during the demolition and construction operations. The Contractor shall prepare and submit a detailed plan indicating his proposed demolition sequence, procedures, and methods to be used including, but not limited to, equipment, tools, devices, crane capacity and locations, temporary shoring and supports, schedule of operations, methods of utility protection, protective shielding design to the Engineer for approval.
ITEM 115.01 (Continued)

The requirements for equipment and all procedures utilized shall be in conformance with the intent of Subsection 960.61. Temporary shoring and supports required for the removal of structural steel shall also be designed to allow the installation of new structural steel and connections.

The demolition procedures and any necessary calculations and drawings shall be stamped by a Professional Structural Engineer registered in the Commonwealth Massachusetts, certifying that all existing structural members are suitably braced and supported throughout the demolition process. The Contractor’s demolition method shall take into consideration any utilities on or near the bridges. Work under these items may not commence until the Engineer has given written approval.

The Contractor is cautioned to use extreme care so as not to damage portions of the existing structure to remain. During the prosecution of this work, the Engineer may reject use of any method or equipment which causes undue vibration or possible damage to portions of the remaining structure. The use of heavy equipment, such as hoe-rams, for removal of the existing deck and other concrete components will not be allowed. Any damage done to portions to remain in the bridge shall be replaced or repaired to the satisfaction of the Engineer, by the Contractor at no cost to the Commonwealth.

The Contractor shall take care not to damage exposed reinforcing steel or any remaining concrete or any other part of the structure that is to remain. Any of the above items damaged, or otherwise made unsatisfactory for continued use by the Contractor's operations, shall be replaced by the Contractor at his own expense, as directed by the Engineer.

After the concrete has been removed, all exposed reinforcing steel to remain shall be cleaned by mechanical cleaning and then high pressure-washing with water that does not contain detergents or any bond inhibiting chemicals. Where active corrosion has occurred that would inhibit bonding, sandblast steel to white metal finish prior to placement of concrete. All costs in connection with such work shall be considered as included in the bid price for this item and no additional compensation will be allowed.

De-leading

Work under this item includes selective deleading of the structural components which are to be disassembled, burned or cut to allow subsequent removal. The entire bridge will not be deleded under this item. Lead removal will be confined only to the immediate area where the removal of welds, removal of mechanical connections, cutting or burning are to be performed.
ITEM 115.01 (Continued)

The Contractor is required to evaluate and include in costs for the proper handling, disposal and/or recycling of materials suspected to contain lead that are generated during partial demolition of the bridge superstructure, and must conform with all Federal, State and local regulations.

The handling, removing, disposing and/or recycling of all lead-based painted materials shall conform Division I, General Requirements For Demolition And Work Involving Painted Steel

PAYMENT

Method of Measurement

Demolition of Deck for Bridge F-07-045, being paid for on a lump sum basis, will not be measured for payment.

Basis of Payment

The work under this Item shall be paid for by three equal amounts totaling the contract lump sum price, paid at the completion of stages 2, 3, and 4 as shown on the plans, which price constitutes full payment for all labor, transportation, equipment, tools, disposal fees necessary or incidentals to complete the work as specified above including field survey, deleading, installation and removal of temporary shielding system including supports and as shown on the Plans and/or as required. Miscellaneous removals and disposals that are not specifically listed for payment under another item shall be deemed included under this Item.
ITEM 120.1 UNCLASSIFIED EXCAVATION CUBIC YARD

GENERAL
The work under this item shall conform to the relevant provisions of Section 120 and the following:

The work to be done under this item consists of removing and disposing in accordance with the relevant provisions of Section 120, all materials required for execution of the required work as shown on the Plans and as directed, except material for which payment is made under the items of Partial Demolition Of Bridge No. F-07-045; Alteration To Bridge Structure No. F-07-045; Bridge Excavation; Class A Trench Excavation, Class B Rock Excavation, Class B Rock Excavation and Concrete Repairs of this Contract and except those materials for which payment is made under other items of this Contract. All materials removed under this item shall become property of the Contractor and shall be disposed of by him/her in accordance with all local, state and federal regulations.

Also included shall be the removal and disposal of hot mix asphalt and concrete pavements and curbing, removal and disposal of existing hot mix asphalt berm, excavation and removal of existing roadway base course material, headwalls, retaining walls designated for removal, steel tubular rail fencing, existing median barrier, clearing and grubbing, and all other materials not designated to be reused on the project or to be removed and stacked. The Engineer shall determine the disposition of all materials with respect to removal and disposal.

Edges of excavations made in existing pavements shall be squared by saw cutting with power driven tools to provide a neat, clean edge for joining new pavement as shown on the Plans. Ragged, uneven edges shall not be accepted. Pavement areas, which have been broken or undermined, shall be edged neatly with a minimum disturbance to the remaining pavement. New conduit, in areas of new or reset curb, or trench limits for drainage/water work, will be included in the unit price under the respective items and will not be paid for separately under this item. Sawcutting will be paid separately when made in areas of full depth box widening.

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

The method of stripping vegetation shall be such as to minimize erosion. Fills shall be placed and compacted in such a manner that soil sliding and erosion is minimized. Grading shall be done in such a manner as not to divert water on to the property adjoining the projects right-of-way or construction site without expressed written permission of the land owner. If the Contractor fails to employ adequate and acceptable erosion control techniques during construction, the Engineer may order a suspension of the work until implementation of satisfactory techniques are agreed upon and demonstrated, and the Contractor shall have no claim for damages or time extension resulting from such delays.
ITEM 120.1  (Continued)

PAYMENT

Method Of Measurement

Item 120.1, Unclassified Excavation, will be measured based on the original position of the material excavated using the cross section method, except where such measurement is impractical. In such cases, the volume shall be measured by such other methods as the Engineer may determine. In any case, payments will be made only for excavation to lines and grades as indicated on the plans or as directed.

Basis Of Payment

Item 120.1 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 127.1   REINFORCED CONCRETE EXCAVATION   CUBIC YARD

General

The work shall conform to the relevant provisions of Section 100 and the following:

The work under this Item 127.1 consists of furnishing all labor, materials and equipment necessary for the removal and disposal of all deteriorated and spalled concrete located at the existing surfaces of the various structural elements (existing deck and existing abutments), which will be repaired as directed by the Engineer and replacement of existing backwalls as shown on the plans.

The Contractor is advised to conduct a field investigation prior to bidding. Contractor shall verify all conditions, dimensions and materials in the field and shall base his/her bid on his/her own findings without any additional compensation for variances from the Plans or these Special Provisions regarding actual conditions for the materials to be removed.

During the prosecution of the work, the Engineer may reject the use of any method or equipment, which causes undue vibration or possible damage to the structure or any part thereof. In no event shall any pneumatic hammers heavier than the nominal 25 lbs be used, unless approved by the Engineer. Also, no use of pneumatic or power driven chipping hammers over the nominal 15 lbs will be permitted to remove any concrete from below any reinforcing bar.
ITEM 127.1 (Continued)

If removal of deteriorated concrete results in full or partial exposure of reinforcing steel, but less than 1” of clearance exists between the sound concrete and the inside surface of the exposed reinforcing steel, enough sound concrete as is necessary to achieve this 1” minimum shall be removed. The edges of the patch shall be cut to neat lines by saw cutting or by methods approved by the Engineer, and the patch areas shall be made rectangular in shape, if possible, with horizontal and vertical edges and square corners.

The Contractor shall take all precautions necessary so as not to damage those portions of the structure, including reinforcing steel that are to remain. This includes determining the concrete cover to the steel bars at the edge of each patch prior to excavating concrete. The Contractor’s attention is also directed to the ‘Repair Details’ included elsewhere in this Contract.

All reinforcing steel encountered in the excavation shall be thoroughly cleaned, using sand or water/sand blasting methods. The Contractor at his own expense shall replace any steel damaged or made unsatisfactory by his negligence.

The Contractor shall furnish and install additional ties for the exposed reinforcing steel that is to remain in place.

Concrete removed under this Heading shall be replaced with 4000 PSI-3/8 IN-660 Cement Concrete as specified in Item 905 for backwall replacement, existing deck repairs, and Type A and B abutment repairs as shown on the plans and with cementitious mortar for patching as specified in Item 909.20 for Type C abutment repairs, or as directed by the Engineer.

Submittals

The Contractor shall prepare and submit a Reinforced Concrete Excavation Plan and schedule to the Engineer for review describing the proposed sequence, method of concrete excavation and equipment for the excavation and disposal of all materials. The Contractor shall not proceed with demolition until the Engineer has given written acceptance of the plan.

The Massachusetts Department of Transportation does not guarantee or represent that the bridge materials will actually coincide with any descriptions contained herein or represented on Drawings. The Contractor must visit the bridge site prior to submitting bids to get familiar with the scope of work and bridge condition. No additional compensation, other than the contract unit price bid for this Item, shall be made if the materials or work provided is different than that inferred or described herein or shown on the drawings. Drawings of the existing bridge are available on request from the office of the Director of Bridges and Structures, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116.
ITEM 127.1 (Continued)

CONSTRUCTION METHODS

The Contractor shall use suitable means to prevent demolition material and debris from falling into the Foss Reservoir. The Contractor shall be responsible for removing any debris falling into the reservoir. The Contractor shall take necessary precautions to protect existing utilities in place from damage during his/her operations.

The use of explosives is not permitted.

METHOD OF MEASUREMENT

Reinforced Concrete Excavation shall be measured by the cubic yard for all concrete excavated and removed as directed by the Engineer, complete and accepted. Previously spalled concrete will not be measured for payment.

BASIS OF PAYMENT

Item 127.1 Reinforced Concrete Excavation shall be paid for at the Contract unit price per cubic yard, which price shall include all labor, materials, tools, equipment, disposal, and incidentals necessary to complete the work to the satisfaction of the Engineer, including the pick-up and disposal of previously spalled concrete within the same footprint of an assigned work location.

ITEM 153.01 CONTROLLED DENSITY FILL CUBIC YARD

VERY FLOWABLE AND EXCAVATABLE

General
The Contractor shall furnish Controlled Density Fill to be used as fill material for all locations shown on the plans, specified herein or ordered by the Engineer. The Contractor shall not encapsulate gas pipes, including gas services, with controlled density fill. Controlled Density Fill (CDF) shall be excavatable after setting and be designated as CDF-VFE (very flowable, excavatable). CDF shall be furnished by an approved concrete producer listed on the MassDOT QCML. Trial batching shall be required and approved by the Engineer prior to use.

CDF-VFE are fill materials, which are delivered by ready mixed concrete mixers (R/M). CDF-VFE are a flowable, excavatable, self-compacting and self-leveling material, which after solidifying will have the structural characteristics of a well-compacted load bearing soil. CDF-VFE's are used for those purposes plus the areas where long flowable horizontal movements are required such as filling pipes, hard to access areas requiring long lateral movements.
ITEM 153.01  (Continued)

The mixes for CDF-VFE shall have the following ingredients and appropriate quantities:

1. Portland Cement- ASTM C150- the range of cement content will be between 40 lbs. to 100 lbs. per cubic yard. Trial batches by the R/M operator should be done as soon as possible, if the R/M intends to be a bona fide supplier of CDF-VFE.

2. Flyash - Type F - Fly Ash shall be used in CDF-VFE mixes. The flyash content may vary, subject to a minimum content of 250 lbs. per cubic yard, which can be increased for more flowability and/or pumpability. Type C flyash or high lime Flyash is not to be used, since it tends to increase the long term strength and may render the mix unexcavatable in the future.

3. Water - shall be potable and shall be used as needed to achieve the proper flowability (slump).

4. Air-Entraining Admixture - the air content shall be in the 12-18% range.

5. No admixtures that tend to increase strength with time may be used without the written consent of the Engineer and an appropriate change of the mix where required.

6. Aggregate-ASTM 33 for the excavatable mixes - well-graded concrete sand shall make up the remaining volume of the mix to achieve the full one cubic yard.

ACCEPTANCE OF MIX AND SUPPLIER

The acceptance of the mix and the supplier will be based on the range and length of experience of the supplier and the mix backup data. The primary properties are the maximum and minimum strengths, air content, setting times, flowability and yield. The supplier shall submit to the Contractor and then to the Engineer, documentation of his experience with his mixes and his personnel's ability to deliver them. If these are sufficient to start the placement, the Engineer can waive pre-job testing and the testing can be done on the initial placements.

The Engineer requires a testing program that should begin as soon as possible after the contract award. The Contractor shall submit the materials to be used to the designated approved AASHTO accredited laboratory along with the suppliers proposed mix.

The lab will perform all the tests required by the specification at the suppliers cost, to include setting times, 3,7,28 and 90-day strength tests, air contents, and the ASTM tests on the Cement and Aggregate. In lieu of trial mixes, the materials Engineer may allow the use of the following mix until there is sufficient test feedback.
ITEM 153.01 (Continued)

NOTE: The mix is a guideline only and shall be adjusted for proper yield, SP.GR and other properties specified.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>CDF-VFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROD</td>
<td>WGT</td>
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<td>12%</td>
</tr>
<tr>
<td>water</td>
<td>347</td>
</tr>
</tbody>
</table>

LAB MIX TARGETS

SLUMP 11"
AIR 14%
STRENGTH 25 PSI @ 7 DAYS MIN
80 PSI @ 28 DAYS MAX
100 PSI @ 90 DAYS MAX

NOTE: The use of slump, on the job, lower than the design slump can push the strength beyond its excavatable property. It shall not be allowed. If a lower slump is desired, the mix shall be designed for that lower slump. Test cylinders shall not be rodded but simply overfilled and struck off. Use waxed cardboard cylinders that can be torn apart with little damage to the cylinder to be tested. Low early strengths (3 day) may require a soil bearing plate test in lieu of cylinders.

SPECIFICATIONS

The following is the specification format:

CEMENT- Range of cement content 40-100 LBS/C.Y.
FLYASH - 250 lbs. MIN when used
SLUMP - 8"-11" or, an alternative method is to achieve an 8"-15" diameter spread from a 6" long 3" diameter tube filled vertically and lifted off vertically
ITEM 153.01 (Continued)

<table>
<thead>
<tr>
<th>Unconfined @ 3 days</th>
<th>Compressive @ 7 days</th>
<th>Strength @ 28 days</th>
<th>Targets @ 90 days</th>
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</thead>
<tbody>
<tr>
<td>MIN 10 PSI</td>
<td>25 PSI</td>
<td>30 PSI</td>
<td></td>
</tr>
<tr>
<td>MAX</td>
<td>80 PSI</td>
<td></td>
<td>100 PSI</td>
</tr>
</tbody>
</table>

NOTE: If strength targets are not reached, the Engineer may direct the Contractor to increase the testing pace until he is satisfied with the results.

PAYMENT

Method Of Measurement

Item 153.01 will be measured by the cubic yards of material delivered to the site and used for backfill of excavation. Quantity will be measured in place by the Engineer.

Basis Of Payment

Item 153.01 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 222.1 FRAME AND GRATE – MASSDOT CASCADE TYPE

Work under this Item shall conform to the relevant provisions of Section 220 and the following:

All frames and grates on State owned Roads shall have hook lock frames and grates conforming to the Standard Construction Drawings. Castings manufacturers must be listed on the QCML and castings shall be listed on the QCML by casting date.

The Contractor shall determine the number of left and right frames and grates according to the direction of flow and shall provide a list to the Engineer for approval before ordering the castings.

BASIS OF PAYMENT

The work will be paid at the Contract Unit Price per Each. No distinction will be made between frames and grates with flow from the left or right.
ITEM 222.4 LARGE HOOK LOCK BAR GRATE FURNISHED AND INSTALLED

Work under this Item shall conform to the relevant provisions of Section 200 and the following:

The work consists of furnishing and installing large hook lock bar grates on existing frames. The grate shall have a parallel bar configuration matching the style of the existing grates with two rows of parallel bars separated by a single bar running perpendicular to the long side of the grate.

The hook lock grates shall fit on frames originally installed as Massachusetts Turnpike Standard Inlet Grate and Frame - Type G1 and G2. See the accompanying drawing, "Large Frame and Hook Lock Bar Grate Details." Sample frames are available for viewing, inspection and test fits at I-90 Maintenance facilities in Auburn (Mile 91.8) upon request. Each grate will have two lock hooks evenly spaced on the short side of the grate that shall hook under the existing frame. The opposite side from the lock hooks shall have one lock tumbler assembly and a lock stop lug centered along the edge of the grate. The lock hooks and lock tumbler assembly shall be as shown on MassDOT Construction Standard Details Drawings E 201.10.0 and E 201.10.1.

The lock tumbler assembly shall consist of a 5/8" x 7" stainless steel hex bolt, a 5/8" stainless steel flat washer, a cast iron tumbler with a 5/8" tapped hole and a stainless steel capture nut. All stainless steel shall be grade 304. The threads of the lock tumbler assembly shall be coated with a no-seize grease prior to installation. The grease shall be lead and copper free.

The grates shall be cast ductile iron conforming to ASTM A536 Grade 80-55-06, 55 + KSI yield strength. The grates shall meet AASHTO M306 requirements, including HS20 loading requirements, test bar testing and weigh at least 460 pounds. Proof-load testing will be performed by an independent nationally recognized testing laboratory approved by the Engineer. Seat surfaces of the grate shall be machined and the grate shall not rock in the existing frame when installed.
ITEM 222.4 (Continued)

The Contractor shall provide shop drawings to the Engineer for approval. Prior to final shop drawing approval the Contractor shall perform a test installation in the presence of the engineer at a location to be determined. The Contractor shall also provide the manufacture's Certificate of Compliance which meets the requirements of Section 6.00. Existing grates removed shall become the property of the Contractor for proper disposal.

Installation

Removal of existing masonry in the throat of the drop inlets to accommodate the lock hooks and lock stop lugs will be included under this item. Pockets shall be created by sawcutting the sides and bottom with an approved masonry saw. Separate pockets shall be created for each of the two lock hooks and the tumbler assembly. The bottom of the pocket shall be sloped slightly so that water will not accumulate in the pocket. The remaining masonry shall be removed using a small pneumatic hammer to produce a neat, smooth surface. The pocket shall have 1 inch of clear space around and below the hooks and tumbler assembly. Excess masonry shall not be removed.

ITEM 222.5 FRAME - TURNPIKE (2 FT X 4 FT) EACH

Work under this Item shall conform to the relevant provisions of Section 200 of the Standard Specifications, Supplemental Specifications, Standard Special Provisions and the following:

Work under this item consists of replacing 2' X 4’ existing drop inlet frames that are found to be damaged and/or unusable.

Method of Measurement

Measurement for this item shall be measured by the unit each furnished and installed. The cost to remove and discard existing grates shall be included under this item.

Basis of Payment

Payment under this item will be at the contract unit price each, complete in place, which will be full compensation for all work, materials, and equipment to complete the work.
ITEM 223.2 FRAME AND GRATE (OR COVER) EACH
REMOVED AND DISCARDED

Work under this Item shall conform to the relevant provisions of Section 220 and the following:

All other frames and grates or covers shall be removed and discarded as shown on the construction plans. Existing castings shall be discarded at the locations shown on the plans.

ITEM 231.12 SLOTTED DRAIN FOOT

Work under this Item shall conform to the relevant provisions of Section 230 of the Standard Specifications and the following:

DESCRIPTION

Pipe shall be corrugated metal aluminized steel, conforming with AASHTO M36 and AASHTO M274. Pipe gauge shall be 14 gauge or 16 gauge as recommended by manufacturer. Pipe ends shall be rerolled annular ends. Adjacent pipes shall be fastened together using hugger type bands as fabricated by the pipe’s manufacturer. If pipeline bends, junction fittings, or connections to structures must be accommodated along proposed runs of slotted inlet drain pipe, utilize standard 12-inch corrugated aluminized steel pipe bends, fittings and piping for these purposes.

Slotted inlet drain pipe grates shall be fabricated from steel conforming either with ASTM A1011 Grade 36 or ASTM A36, 3/16” thickness for spacers and side plates, +/- 0.008 inches. Plate extenders shall be steel conforming with ASTM A761, or ASTM A1011, or ASTM A36, as recommended by the slotted inlet drain pipe manufacturer. Slotted inlet drain pipe installation shall accommodate an H-20 loading condition. Contractor to submit shop drawings stamped and signed.

CONSTRUCTION METHODS

Contractor shall install the slotted inlet drain pipe where shown on the Plans and to depths as shown therein. Trench shall be excavated to conform with pipe manufacturer’s recommended installation practices and pipe shall be set, supported in place, and anchored so as to prevent flotation, all as recommended by pipe manufacturer.
ITEM 231.12  (Continued)

Pipe sections shall be fastened together so that the gap between adjacent slotted drain sections shall not exceed 3 inches. Trench shall then be backfilled with flowable fill, minimum 750 psi compressive strength, to depth of bury as recommended by manufacturer. Slotted inlet opening shall be covered during final backfilling and pavement surface preparation, in accordance with manufacturer’s instructions, to prevent entry of foreign material into drain. Opening cover shall be removed upon completion of final paving.

The slotted drain pipe shall be connected to drain structures at the locations as shown on plans. Connections to drain structure shall follow the detail shown on plans. The Contractor shall connect the slotted drain with CMP Item 230.112. The connection shall be within 10 feet of slotted drain using CMP and 45 degree elbows to ensure positive flow. The Contractor shall core drill the structure no closer than 3” to any structure joint and secure with non-shrink grout.

MAINTENANCE

Contractor shall inspect the slotted inlet drain pipe regularly and after major storm events. The Contractor shall clean any sediment that has accumulated within the slotted inlet drain pipe at no additional cost.

METHOD OF MEASUREMENT

Item 231.12 will be measured by the foot, as measured along the top centerline complete in place. Pricing shall include all labor, materials, tools and equipment to complete this work.

BASIS OF PAYMENT

Item 231.12 will be paid for at the Contract unit price per foot, which price shall include furnishing and setting trench drain pipe sections, elbows, bends, fasteners, bands, grates, paint, end caps, or polymer concrete structures; furnishing and setting trench drain grates; excavation, disposal of soil, outlet pipe connection, and all labor, materials, equipment, and all incidental costs required to complete the work. Slotted drain to drainage structure connection is incidental to this item. Removal of drain and pipe connections are incidental to this item. Any damage to existing drainage structures shall be promptly repaired or replaced in kind at the Contractor’s expense. Restoration of pavement shall be paid for under Section 450. Shop drawing and calculations submittal costs are incidental to the Item.
ITEM 415. PAVEMENT MICROMILLING SQUARE YARD

All references to Section 130 Pavement Milling within Section 450 Hot Mix Asphalt Pavement shall be replaced by Item 415 Pavement Micromilling.

Description

415.20 General.

This work shall consist of micromilling and removal of existing Hot Mix Asphalt (HMA) pavement courses from the project by the Contractor. Micromilling shall be performed in conformity with the approved QC Plan. The Contractor shall present and discuss in sufficient detail the Quality Control information and activities related to milling at the Construction Quality Meeting required under Section 450. Unless otherwise specified, the milled material shall become the property of the Contractor.

Construction Procedures

415.60 General.

All construction procedures under Pavement Micromilling shall also conform to any of the following relevant provisions of Pavement Milling:

Milling Equipment Requirements.

The milling equipment shall be self-propelled with sufficient power, traction, and stability to remove the existing HMA pavement to the specified depth and cross-slope. The milling machine shall be capable of operating at a minimum speed of 10 feet (3 meters) per minute, designed so that the operator can at all times observe the milling operation without leaving the control area of the machine, and equipped with the following:

(a) A built in automatic grade control system that can control the longitudinal profile and the transverse cross-slope to produce the specified results.

(b) Longitudinal controls capable of operating from any longitudinal grade reference, including string line, 30 foot (10 meter) ski minimum, 30 foot (10 meter) mobile string line minimum, or a matching shoe.
ITEM 415. (Continued)

(c) The transverse controls shall have an automatic system for controlling cross-slope at a given rate.

(d) Cutting heads able to provide a minimum 6 foot (2 meter) cutting width and a 0 to 4 inch (0 to 100 mm) deep cut in one pass. The teeth on the revolving cutting drum must be continually maintained and shall be replaced as warranted to provide a uniform pavement texture.

(e) An integral pickup and conveying device to immediately remove milled material from the roadway and discharge the millings into a truck, all in one operation.

(f) All necessary safety devices such as reflectors, headlights, taillights, flashing lights and back up signals so as to operate safely in both day and night.

(g) A means of effectively limiting the amount of dust escaping from the milling and removal operation in accordance with local, State, and Federal air pollution control laws and regulations.

When milling smaller areas or areas where it is impractical to use the above described equipment, the use of a smaller or lesser-equipped milling machine may be permitted when approved by the Engineer.

Sweeper Equipment Requirements.

The Contractor shall provide a sufficient number of mechanical sweepers to ensure that the milled surface is free of millings and debris at the end of each day’s milling operations. Each sweeper shall be equipped with a water tank, spray assembly to control dust, a pick-up broom, a dual gutter broom, and a dirt hopper. The sweepers shall be capable of removing millings and loose debris from the textured pavement.

Milling Operations.

The milling operations shall be scheduled to minimize the duration and placement of traffic on the milled surface. The milling operations shall not proceed more than 3 miles ahead of the paving operations. Under no circumstances shall the milled surface be left exposed to traffic for a period exceeding seven days. The Engineer may allow the Contractor to adjust the above limitations on milling production when necessary.
ITEM 415. (Continued)

The Contractor shall coordinate milling and paving operations to minimize the exposure of milled surfaces to traffic. The Contractor shall ensure that milled surfaces are overlaid in a timely manner to avoid damage to the pavement structure. Any damage to the pavement structure resulting from extended exposure of the milled surface to traffic shall be repaired as directed by the Engineer at the Contractor’s expense.

The existing pavement shall be removed to the average depth shown on the plans, in a manner that will restore the pavement surface to a uniform cross-section and longitudinal profile. The longitudinal profile of the milled surface shall be established using a 30 foot (10 meter) mobile ski, mobile string line, or stationary string line. The cross-slope of the milled surface shall be established by a second sensing device or by an automatic cross-slope control mechanism. The Contractor will be responsible for providing all grades necessary to remove the material to the proper line, grade, cross section, superelevation, and transitions shown on the plans or as directed by the Engineer. The requirement for automatic grade or slope controls may be waived by the Engineer in locations warranted by the situation, including intersections and closely confined areas.

The Engineer may adjust the average milling depth specified on the plans by ± 3/4” (± 20mm) during each milling pass at no additional payment to minimize delamination of the underlying pavement course or to otherwise provide a more stable surface. If delamination or exposure of concrete occurs when milling a HMA pavement course from an underlying Portland Cement Concrete (PCC) pavement, the Contractor shall cease milling operations and consult the Engineer to determine whether to reduce the milling depth or make other adjustments to the operation.

Protection of Inlets and Utilities.

Throughout the milling operation, protection shall be provided around existing catch basin inlets, manholes, utility valve boxes, and any similar structures. Any damage to such structures as a result of the milling operation is the Contractor’s responsibility and shall be repaired at the Contractor’s expense. To prevent the infiltration of milled material into the storm sewer system the Contractor shall take special care to prevent the milled material from falling into the inlet openings or inlet grates. Any milled material that falls into inlet openings or inlet grates shall be removed at the Contractor’s expense.
ITEM 415. (Continued)

Vertical Faces.

All permanent limits of the milled area shall be sawcut or otherwise neatly cut by mechanical means to provide a clean and sound vertical face. No vertical faces, transverse or longitudinal, shall be left exposed to traffic. If any vertical face is formed in an area exposed to traffic a temporary paved transition with a maximum 12:1 slope shall be established. If the milling machine is used to temporarily transition the milled pavement surface to the existing pavement surface, the temporary transition shall be constructed at a maximum 12:1 slope.

Opening to Traffic.

Prior to opening a milled area to traffic, the milled surface shall be thoroughly swept with a mechanical sweeper to remove all remaining millings and dust. This operation shall be conducted in a manner so as to minimize the potential for creation of a traffic hazard and to comply with local, State, and Federal air pollution control laws and regulations. Any damage to vehicular traffic as a result of milled material becoming airborne is the responsibility of the Contractor and shall be repaired at the Contractor’s expense. Temporary pavement markings shall be placed in accordance with the provisions of Subsection 850.64.

Milled Surface Inspection.

The milled surface shall provide a satisfactory riding surface with a uniform textured appearance. The milled surface shall be free from gouges, excessive longitudinal grooves and ridges, oil film, and other imperfections that are a result of defective equipment, non-uniform milling teeth, improper use of equipment, or otherwise poor workmanship. Any unsatisfactory surfaces produced shall be corrected by remilling at the Contractor’s expense and to the satisfaction of the Engineer.

The Contractor shall perform Quality Control inspection of all work items addressed as specified in the table below. Inspection activities during milling of HMA pavement may be performed by qualified Production personnel (e.g. Skilled Laborers, Foremen, Superintendents). However, the Contractor’s QC personnel shall have overall responsibility for QC inspection. The Contractor shall not rely on the results of Department Acceptance inspection for Quality Control purposes. The Engineer shall be provided the opportunity to monitor and witness all QC inspection.

The milled surface of each travel lane shall be divided into longitudinal Sublots of 500 feet (150 meters). The Contractor shall perform a minimum of one random QC measurement within each Sublot with a 10 foot (3 meter) straightedge in the transverse direction across the milled surface.
ITEM 415. (Continued)

Additional selective QC measurements within each Sublot will be performed as deemed necessary by the QC personnel. All QC inspection results shall be recorded on NETTCP Inspection Report Forms. The Engineer will also randomly inspect a minimum of 25% of the Sublots. The Contractor shall perform surface texture measurements with a 10 foot (3 meter) straightedge in the transverse direction across the milled surface. The milled surface shall have a texture such that the variation from the edge of the straightedge to the top of ridges between any two ridge contact points shall not exceed 1/8 inch (3 mm). The difference in height from the top of any ridge to the bottom of the groove adjacent to that ridge shall not exceed 1/16” (1.6 mm). Any point in the surface not meeting these requirements shall be corrected as directed by the Engineer at the Contractor’s expense.

In isolated areas where surface delamination between existing HMA layers or a surface delamination of HMA on Portland Cement Concrete causes a non-uniform texture to occur, the straightedge surface measurement requirements stated in the preceding paragraph may be waived, subject to the approval of the Engineer.

Minimum QC Inspection of Milling Operations

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<tr>
<th>Inspection Component</th>
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<td>Per QC Plan</td>
<td>Per QC Plan</td>
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<tr>
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<td>Cross-Slope &amp; Profile</td>
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<td>Check Measurement</td>
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<tr>
<td></td>
<td>Milled Surface Texture</td>
<td>Per QC Plan</td>
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<td></td>
<td>Milled Surface Roughness</td>
<td>Once per 500 feet(150 meters) per milled lane</td>
<td>Milled Surface per Subsection 410.67</td>
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<td>Per QC Plan</td>
<td>Sawcut Limits</td>
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ITEM 415. (Continued)

415.61  Micromilling Equipment Requirements.

The micromilling machine shall be equipped with a drum specifically designed to provide the surface specified below.

415.62  Control Strip.

The Contractor shall micromill a control strip. The control strip shall be 500 feet minimum in length with a uniformly textured surface and cross slope, as approved by the Engineer.

The micromilled surface of the control strip shall provide a satisfactory riding surface with a uniform textured appearance. The micromilled surface shall be free from gouges, excessive longitudinal grooves and ridges, oil film, and other imperfections that are a result of defective equipment, non-uniform milling teeth, improper use of equipment, or otherwise poor workmanship. Any unsatisfactory surfaces produced in the control strip shall be corrected by additional micromilling at the Contractor’s expense and to the satisfaction of the Engineer.

The micromilled pavement surface shall have a transverse pattern of 0.2 – 0.3 inch center to center of each strike area. The Contractor shall perform surface texture measurements with a 10 foot (3 meter) straightedge in the transverse direction across the milled surface. The milled surface shall have a texture such that the variation from the edge of the straightedge to the top of ridges between any two ridge contact points shall not exceed 1/8 inch (3 mm). The difference in height from the top of any ridge to the bottom of the groove adjacent to that ridge shall not exceed 1/16” (1.6 mm). Any point in the surface not meeting these requirements shall be corrected as directed by the Engineer at the Contractor’s expense.

415.67  Micromilled Surface Inspection.

The Contractor shall perform Quality Control inspection of all work items addressed under Section 415. The Contractor shall not rely on the results of Department Acceptance inspection for Quality Control purposes.

The micromilled surface shall meet the requirements of 415.62.

Compensation
ITEM 415. (Continued)

415.80 Method of Measurement.

Micromilling - Micromilling will be measured for payment by the number of square yards (square meters) of area from which the milling of existing HMA pavement has been completed and the work accepted. No area deductions will be made for minor unmilled areas such as catch basin inlets, manholes, utility boxes and any similar utility structures.

415.81 Basis of Payment.

Micromilling - Micromilling, removal and disposal of existing HMA pavement will be paid for at the contract unit price per square yard (square meter). This price shall include all equipment, tools, labor, and materials incidental thereto. No additional payments will be made for multiple passes with the milling machine to remove the existing HMA surface to the grade specified.

No separate payments will be made for: performing handwork removal of existing pavement and providing protection around catch basin inlets, manholes, utility valve boxes and any similar structures; repairing surface defects as a result of the Contractor’s negligence; providing protection to underground utilities from the vibration of the milling operation; sawcutting micromilled limits; installing and removing any temporary transition; removing and disposing of millings; furnishing a sweeper and sweeping after milling. The costs for these items shall be included in the contract unit price for Pay Item 415., Pavement Micromilling.

415.82: Payment Items:

ITEM 415. PAVEMENT MICROMILLING SQUARE YARD
ITEM 431.1  HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE

The work under this item shall conform to the relevant provisions of Section 430 and the following:

The work shall include the furnishing and placing of cement concrete pavement as base material for proposed HMA full depth pavement less than 4 feet wide and greater than 6-inches wide as shown on the plans and as directed by the Engineer.

Method Of Measurement and Basis Of Payment

Item 431.1 will be measured by cubic yard, complete in place within the limits shown on the plans, or as required by the Engineer, and will be paid at Contract Bid Price per cubic yard, which price shall be the full payment for all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 450.90  CONTRACTOR QUALITY CONTROL  TON
ITEM 451.  HMA FOR PATCHING  TON
ITEM 452.  ASPHALT EMULSION FOR TACK COAT  GALLON
ITEM 453.  HMA JOINT SEALANT  FOOT
ITEM 455.23  SUPERPAVE SURFACE COURSE – 12.5 (SSC-12.5)  TON
ITEM 455.32  SUPERPAVE INTERMEDIATE COURSE – 19.0 (SIC-19.0)  TON
ITEM 455.42  SUPERPAVE BASE COURSE – 37.5 (SBC-37.5)  TON
ITEM 455.60  SUPERPAVE BRIDGE SURFACE COURSE – 9.5 (SSC-B - 9.5)  TON
ITEM 455.71  SUPERPAVE BRIDGE PROTECTIVE COURSE – 12.5 (SPC-B – 12.5)  TON

Work under these Items shall conform to the relevant provisions of Document 00717 SUPERPAVE REQUIREMENTS contained herein and the following:

The Equivalent Single Axle Loads (ESALs) for the design travel lane over a 20-year period, is for traffic level 4, 21 Million 18-kip (80-kn) ESALs. The PGAB Grade selected for this Contract is PG 64E-28.

An emulsion under this specification shall be Grade RS-1H. The emulsion shall meet the requirements of AASHTO M 140 for grade RS-1, except the 16 penetration of residue shall be at least 50 and no more than 100.
ITEM 456.  WARM-MIX ASPHALT (WMA) PAVEMENT  TON

All SUPERPAVE Hot Mix Asphalt Mixture shall be modified using a WMA additive capable of lowering plant production temperatures to below 260°F. Warm Mix Asphalt additives reduce compaction effort and permit lower production temperatures than conventional hot mix asphalt. The WMA additive shall be a product listed on the Northeast Asphalt User Producer Group (NEAUPG) website (http://www.neaupg.uconn.edu/?attachment_id=345), except that no WMA foaming technology which requires the mechanical injection of steam or water into the liquid asphalt will be permitted.

The WMA additive must be compatible with polyphosphoric acid modified binders, polymer modified binders, and the HMA producer’s HMA anti-stripping agents. The WMA additive shall be introduced in accordance with the Manufacturer’s dosing rates and approved blending methods. The WMA additive Manufacturer shall have an on-site representative at the beginning of paving operations. The Manufacturer’s representative shall be available for additional consultation during the remaining Warm Mix production.

All work done under this Item shall conform to the provisions of Sections 450 and 455. The WMA mixture design shall incorporate the requirements of AASHTO R35 Appendix X2: Special Mixture Design Considerations and Practices for Warm Mix Asphalt (WMA).

When the asphalt binder is modified with the WMA additive at the HMA plant, all WMA additive equipment shall be fully automated and integrated into the plant controls and shall record actual dosage rates on the plant printouts.

The HMA QC Plan shall provide mixture production and placement alterations due to the WMA additive and shall incorporate the modification of asphalt binders when the WMA additive is blended with the asphalt binder at the plant. This plan shall specifically address WMA metering requirements, tolerances and other QC measures.

All costs associated with these provisions will be considered incidental to Item 456. No additional compensation will be provided for the Manufacturer’s representative, production of samples, the Warm Mix additive or other incidental costs.

Method Of Measurement and Basis Of Payment

Item 456 Warm-Mix Asphalt (WMA) Pavement shall be measured by the ton of hot mix asphalt modified with warm-mix additive. Item 456 Warm Mix Asphalt Pavement will be paid per ton of HMA modified with a WMA additive, which price shall include all costs of the WMA Additive, equipment, labor, manufacturer’s representative, and incidental costs required to modify the HMA. Costs for the Superpave HMA production, placement and QC are paid under the respective Superpave pay items.
ITEM 482.31  SAWING & SEALING JOINTS IN ASPHALT PAVEMENTS AT BRIDGES

FOOT

Work under this Item consists of saw cutting the existing pavement at the bridge to the depth, width and shape shown on the Plans. Prior to the start of the asphalt pavement operation, the Contractor shall place a mark on each curb or barrier on either side of the paved roadway. These marks shall be aligned with the actual end of the bridge deck and shall be placed so that they will not be covered or otherwise obscured by the asphalt pavement. After the completion of the paving operation, the Contractor shall snap a straight chalk line on the pavement between these two marks. The Contractor shall then saw cut the pavement along this line to the depth, width and shape shown on the Plans. The equipment shall be approved by the Engineer prior to commencing work. After completing the saw cutting, the Contractor shall clean the saw groove of any dust and debris with an oil free air blast. If the groove was wet sawn, the groove shall be cleaned with a water blast to remove any remaining slurry and debris, vacuumed with a Wet-or-Dry vacuum to remove any standing water, and then dried with an air blast from a Hot-Air-Lance. Once the groove is clean and dry, the Contractor shall fill it completely with a hot-applied bituminous crack sealer meeting the requirements of M3.05.4 in accordance with the manufacturer’s application instructions and restrictions regarding ambient and material temperatures. The crack sealer shall be thoroughly cured prior to opening the road to traffic. To reduce tackiness, only boiler slag aggregate (black beauty) shall be scattered over the sealer when deemed necessary by the Engineer. Conventional sand shall not be used for this purpose.

Method Of Measurement
This work will be measured for payment by the actual number of feet of joints properly sawed and sealed in the asphalt surface in place and accepted.

Basis Of Payment
Payment will be made at the Contract Bid Price per foot for Item 482.31 complete in place, which price shall be the full payment for all labor, materials, equipment, tools and all incidentals necessary to complete the work as specified.
ITEM 629.2  PRECAST CONCRETE MEDIAN BARRIER  
DOUBLE FACED  

Work under this Item shall conform to the relevant provisions of Section 629 of the Standard Specifications for Highways and Bridges and the following:

Delineators shall be installed per Section 629.66 on top of the barrier.

The contractor shall use a MassDOT approved producer.

All proposed barrier shall be 42” in height from finished grade. Barrier shall be constructed in accordance with MassDOT Standard Details E 402.10.0 and E 402.11.0. Connections for the existing median barrier and bridge median barrier shall be formed and installed as shown in the plans. Contractor to sawcut existing median barrier at nearest chamfer or construction joint. Height of barrier to transition over a slope of no greater than 12:1 to meet the existing height of the barrier. Reinforcing shall be constructed in accordance with MassDOT Standard Detail E 402.11.0. Contractor to maintain minimum of 1-1/2” cover over reinforcing. Connection between existing barrier and proposed barrier filled with bonded closed cell foam joint system. Connection of transition piece to precast barrier shall be constructed in accordance with MassDOT Standard Detail E 402.13.0. Connection of proposed concrete barrier to existing concrete barrier work is considered incidental to this Item. Connection for the proposed Precast Concrete Median Barrier-Double Faced and bridge median barrier shall be formed and installed as shown on the Bridge Plans. 25 ft. lengths of Median Barrier transition at Approach Slabs is paid under Item 992.1 – 5000 PSI, ¾ In.,685 HP Cement Concrete.

The contractor shall be allowed to use cast-in-place barrier if needed, and where approved by the Engineer. The field layout of the proposed concrete median barrier is the responsibility of the Contractor.
ITEM 635.1 HIGHWAY GUARD REMOVED AND DISCARDED

Work under this Item shall conform to the relevant provisions of Section 630 of the Standard Specifications and includes the removal of existing guardrail, posts and associated hardware from the bridge approaches as designated by the construction plans and/or by the Engineer.

Guardrail to be removed and discarded as shown on the plans shall become the property of the Contractor, and shall be legally disposed of.

The work shall include the removal and disposal of all rail, posts, fittings, anchors, buried ends, and appurtenances. Old post holes shall be backfilled with suitable material and satisfactorily compacted. This work (and materials) shall be considered as incidental to the Item.

The highway guard shall only be removed once other appropriate traffic safety measures are in place. Any highway guard that is to remain and is damaged during the removal operations of adjacent highway guard shall be removed and replaced at the Contractor’s expense.

PAYMENT

Method Of Measurement.

The quantity of guardrail removed and discarded shall be the number of feet removed, based on actual measurements.

Basis Of Payment.

Item 635.1 will be paid for at the Contract unit price per foot, which price shall include the removal of panels, posts, spacer blocks and other hardware associated with guardrail, all related excavation, borrow, grading, all labor, materials, equipment and incidental costs required to complete the work.
ITEM 657. TEMPORARY FENCE FOOT

ITEM 657.5 TEMPORARY FENCE REMOVED AND RESET FOOT

The work under these items shall conform to the relevant provisions of Section 644 of the Standard Specifications and the following:

Item includes: Erection, maintenance, removal and relocation, dismantling and removal from the project site of temporary six foot fencing and gates around construction site and materials storage areas. Also included under this item is temporary six foot fencing for protection of existing trees during construction.

Refer to Drawings for temporary fence layout and location of gates.

PRODUCTS

Temporary Chain Link Fencing

Unless otherwise indicated, type of temporary chain link fencing shall be Contractor's option. Following types are acceptable:

1. New materials or previously used salvaged chain link fencing in good condition – subject to inspection/approval by the Engineer.
2. Posts: Galvanized steel pipe of diameter to provide rigidity. Post shall be suitable for setting in concrete footings, driving into ground, anchoring with base plates, or inserting in precast concrete blocks.
3. Fabric: Woven galvanized steel wire. Provide in continuous lengths to be wire tied to fence posts or prefabricated into modular pipe-framed fence panels.

Gates

Provide personnel and vehicle gates of the quantity and size indicated on the Drawings or required for functional access to site.

1. Fabricate of same material as used for fencing
2. Vehicle gates:
   a. Minimum width: 20 feet to allow access for emergency vehicles.
   b. Capable of manual operation by one person.
ITEMS 657. and 657.5 (Continued)

EXECUTION

Layout

A. Installation of temporary fencing shall not deter or hinder access to existing and new hose connections and fire hydrants.
   1. Maintain three (3) feet diameter clear space around fire hydrants.
   2. Where fire hydrant or hose connection is blocked by fencing, provide access gate.
B. Access: Provide gates for personnel, delivery of materials, and access by emergency vehicles.
C. Field verify location with the Engineer.

Installation

Chain link posts:
   1. Space as 10’ maximum.
   2. Drive posts, set in holes and backfill, or anchor in precast concrete blocks.
   3. For soft and unstable ground conditions, cast concrete plug around post incidental to Item 657. and 657.5.
   4. Posts over pavement: Use steel post plates or precast concrete blocks.
   5. Gate posts: Use bracing or concrete footings to provide rigidity for accommodating size of gate.
   6. Care shall be taken to avoid tree roots while installing posts.

Gates: Install with required hardware.

Remove And Reset

Chain Link Fence shall be removed and reset as necessary prior to beginning the succeeding construction phase.

Maintenance And Removal

Maintain fencing in good condition. If damaged, immediately repair.

Remove temporary fencing upon completion of Work or when no longer required for security or control as directed by the Engineer. Backfill holes and compact. Holes in pavement shall be surfaced to match existing paving. Repair damage caused by installation of temporary fencing.
ITEMS 657. and 657.5 (Continued)

Method Of Measurement

Item 657. will be measured, approximately parallel to the ground, by foot of completed fence, including gates installed for the convenience of the Contractor.
Item 657.5 will be measured, approximately parallel to the ground, by foot of removed and reset fence, including gates installed for the convenience of the Contractor.

Basis Of Payment

Item 657. And Item 657.5 will be paid for at the contract unit price per foot complete in place, and shall include all materials, equipment and labor required to install, maintain and remove the fencing, as well as resetting the fence as necessary during phased construction. All materials shall remain the property of the Contractor and shall be removed from the site upon completion of construction.

ITEM 697.1 SILTSAKC EACH

Work under this item shall conform to the relevant provisions of Sections 227 and 670 of the Standard Specifications and the following:

The work under this item includes the furnishing, installation, maintenance and removal of a reusable fabric sack to be installed in drainage structures for the protection of wetlands and other resource areas and the prevention of silt and sediment from the construction site from entering the storm water collection system. Devices shall be ACF Environmental (800)-448-3636; Reed & Graham, Inc. Geosynthetics (888)-381-0800; The BMP Store (800)-644-9223; or approved equal.

CONSTRUCTION

Silt sacks shall be installed in retained catch basins and drop inlets within the project limits and as required by the Resident Engineer.

The silt sack shall be as manufactured to fit the opening of the drainage structure under regular flow conditions, and shall be mounted under the grate. The insert shall be secured from the surface such that the grate can be removed without the insert discharging into the structure. The filter material shall be installed and maintained in accordance with the manufacturer’s written literature and as directed by the Engineer.
ITEM 697.1 (Continued)

Silt sacks shall remain in place until the placement of the pavement overlay or top course and the graded areas have become permanently stabilized by vegetative growth. All materials used for the filter fabric will become the property of the Contractor and shall be removed from the site.

The Contractor shall inspect the condition of silt sacks after each rainstorm and during major rain events. Silt sacks shall be cleaned periodically to remove and disposed of accumulated debris as required. Silt sacks, which become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Department.

When emptying the silt sack, the contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed at the Contractors expense. The silt and sediment from the silt sack shall be legally disposed of offsite. Under no condition shall silt and sediment from the insert be deposited on site and used in construction.

All curb openings shall be blocked to prevent stormwater from bypassing the device.

All debris accumulated in silt sacks shall be handled and disposed of as specified in Section 227

PAYMENT

Silt sacks will be measured and paid at the Contract Bid Price per each, complete in place, which price shall be the full payment for all labor, materials, equipment and incidental costs required to complete the work. No separate payment will be made for removal and disposal of the sediment from the insert, but all costs in connection therewith shall be included in the Contract unit price bid.
ITEM 740. ENGINEERS FIELD OFFICE AND EQUIPMENT (TYPE A)

MONTH

Work under this Item shall conform to the relevant provisions of Section 740 and the following:

Two 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
System Memory (RAM): 8GB
Hard Drive: 500GB
Optical Drive: DVD-RW/DVD+RW/CD-RW/CD+RW
Graphics Card: 4GB
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
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.
ITEM 740 (Continued)

The Multifunction Printer System shall meet the following minimum criteria or better:

Color laser printer, fax, scanner, email and copier all in one with the following minimum capabilities:
- Estimated volume 8,000 pages per month
- LCD touch panel display
- 50 page reversing automatic document feeder (RADF)
- Reduction/enlargement capability
- Ability to copy and print 11” x 17” paper size
- email and network pc connectivity
- Microsoft and Apple compatibility
- ability to overwrite latent images on hard drive
- 600 x 600 dpi capability
- 30 pages per minute print speed (color),
- 4 Paper Trays Standard (not including the bypass tray)
- Automatic duplexing
- Finisher with staple functions
- Standard Ethernet. Print Controller
- Scan documents to PDF, PC and USB
- ability to print with authenticated access protection

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
Internal Memory Included: Yes
Memory: 8 GB SD Card
Screen: 3 inch Clear Photo LCD
Min Operating Temperature: 14°F
Max Depth of Water Resistant: 30 feet
Height of Shock Resistant: 5 feet
Battery Power: 2 rechargeable batteries and a battery charger
Carrying Case: Rain-proof with shoulder strap

The Engineer's Field Office and the equipment included herein including the computer system, printer and camera shall remain the property of the Contractor at the completion of the project. Disks, flash drives, and card readers with cards shall become the property of the Department.

Compensation for this work will be made at the contract unit price per month which price includes full compensation for all services and equipment, and incidentals necessary to provide equipment, maintenance, insurance as specified and as directed by the Engineer.
ITEM 756.  

NPDES STORMWATER 
POLLUTION PREVENTION PLAN 

This Item addresses the preparation and implementation of a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit (CGP) issued by the U.S. Environmental Protection Agency (EPA).

Pursuant to the Federal Clean Water Act, construction activities which disturb one acre or more are required to apply to the EPA for coverage under the NPDES General Permit for Storm Water Discharges from Construction Activities. On February 16, 2012 (77 FR 12286), EPA issued the final NPDES Construction General Permit (CGP) for construction activity. The Contractor shall be fully responsible for compliance with the CGP. Should a fine or penalty be assessed against it, or MassDOT, as a result of a local, state, or federal enforcement action due to non-compliance with the CGP, the Contractor shall take full responsibility.

The NPDES CGP requires the submission of a Notice of Intent (NOI) to the EPA prior to the start of construction (defined as any activity which disturbs land, including clearing and grubbing). There is a 14 day review period commencing from the date on which EPA enters the Notice into their database. The Contractor is advised that, based on the review of the NOI, EPA may require additional information, including but not limited to, the submission of the Storm Water Pollution Prevention Plan (SWPPP) for review. Work may not commence on the project until final authorization has been granted by EPA. Any additional time required by EPA for review of submittals will not constitute a basis for claim of delay.

In addition, if the project discharges to an Outstanding Resource Water, vernal pool, or is within a coastal ACEC as identified by the Massachusetts Department of Environmental Protection (DEP), a separate notification to DEP is required. DEP may also require submission of the Storm Water Pollution Prevention Plan for review and approval. Filing fees associated with the notification to DEP and, if required, the SWPPP filing to DEP shall be paid by the Contractor.

The CGP also requires the preparation and implementation of a SWPPP in accordance with the afore-mentioned statutes and regulations. The Plan will include the CGP conditions and detailed descriptions of controls of erosion and sedimentation to be implemented during construction. It is the responsibility of the Contractor to prepare the SWPPP to meet the requirements of the most recently issued CGP. The Contractor shall submit the Plan to the Engineer for approval at least 4 weeks prior to any site activities. It is the responsibility of the Contractor to comply with the CGP conditions and the conditions of any state Wetlands Protection Act Order, Water Quality Certification, Corps of Engineers Section 404 Permit and other environmental permits applicable to the project and to include in the SWPPP the methods and means necessary to comply with applicable conditions of said permits (reference to Part 9.1.1 of the 2012 CGP).
ITEM 756. (Continued)

It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA CGP, provide all information required, and obtain any and all certifications as required by the CGP. Any amendments to the SWPPP required by site conditions, schedule changes, revised work, construction methodologies, and the like are the responsibility of the Contractor. Amendments will require the approval of the Engineer prior to implementation.

Included in the CGP conditions is the requirement for inspection of all erosion controls and site conditions on a weekly basis as well as after each incidence of rainfall exceeding 0.25 inches in twenty-four hours. For multi-day storms, EPA requires that an inspection must be performed during or after the first day of the event and after the end of the event. The CGP requires that inspections be performed by a qualified individual. MassDOT requires proof of completion of a 4 hour minimum sedimentation and erosion control training class current to the latest CGP. This individual can be, but not limited to, someone that is either a certified inspector, certified professional, or certified storm water inspector. The documentation shall be included as an appendix in the SWPPP. The Engineer must approve the contractor’s inspector. This individual shall be on-site during construction to perform these inspections. In addition, if the Engineer determines at any time that the inspector’s performance is inadequate, the Contractor shall provide an alternate inspector. Written weekly inspection forms, storm event inspection forms, and Monthly Summary Reports must be completed and provided to the Engineer. Monthly Summary Reports must include a summary of construction activities undertaken during the reporting period, general site conditions, erosion control maintenance and corrective actions taken, the anticipated schedule of construction activities for the next reporting period, any SWPPP amendments, and representative photographs.

The Contractor is responsible for preparation of the Plan, all SWPPP certifications, inspections, reports and any and all corrective actions necessary to comply with the provisions of the CGP. Work associated with performance of inspections is not included under this Item. The Standard Specifications require adequate erosion control for the duration of the Contract.

All Control measures must be properly selected, installed, and maintained in accordance with manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or is no longer adequate, it is the responsibility of the Contractor to replace or modify the control for site conditions at no additional cost to the Department. The Contractor must maintain all control measures and other protective measures in effective operating condition and shall consider replacement of erosion controls for each construction season.
ITEM 756. (Continued)

This Item addresses acceptable completion of the SWPPP, any revisions/amendments required during construction, and preparation of monthly reports. In addition, any erosion controls beyond those specified in bid items elsewhere in this contract which are selected by the Contractor to facilitate and/or address the Contractor’s schedule, methods and prosecution of the work shall be considered incidental to this item.

The Contractor is advised that the CGP provides specific requirements for temporary and final stabilization. This shall be incorporated into the project schedule. The permit defines specific deadline requirements for Initial Stabilization (“immediately”, i.e., no later than the end of the next work day following the day when earth-disturbing activities have temporarily or permanently ceased) and for Complete Stabilization Activities (no later than 14 calendar days after the initiation of stabilization). Stabilization criteria for vegetative and non-vegetative measures are provided in the CGP.

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved, as well as removal and proper disposal of all construction materials, waste and waste handling devices, removal of all equipment and construction vehicles, removal of all temporary stormwater controls, etcetera. Approval of final stabilization by the Engineer and confirmation of submission of the NOT will be required prior to submission of the Resident Engineer’s Final Estimate. The permittee is required to use EPA’s electronic NOI system or “eNOI system” to prepare and submit NOT. The electronic NOT form can be found at www.epa.gov/npdes/stormwater/cgpenoi. If you are given approval by the EPA Regional Office to use a paper NOT, you must complete the form in Appendix K of the 2012 CGP.

Payment

Payment for all work under this Item shall be made at the contract unit price, lump sum, which shall include all work detailed above, including plan preparation, required revisions, revisions/addenda during construction, monthly reports and filing fees.

Payment of 50% of the contract price shall be made upon acceptance of the Storm Water Pollution Prevention plan. Payment of 40% of the contract price shall be made in equal installments for implementation of the Stormwater Pollution Prevention plan. Payment of the final 10% of the contract price shall be paid upon satisfactory submissions of a Notice of Termination (NOT) when final stabilization has been achieved.
ITEM 767.12  COMPOST FILTER TUBES  FOOT

(Revised December 2015)

The purpose of this item is to provide a linear, compost-filled tube for filtering suspended sediments and improve water quality from storm water flow. This item shall conform to the requirements of Section 751 and 767 of the Standard Specifications and the following.

MATERIALS

Material for the filter tubes shall be compost meeting M1.06.0, except that no manure or biosolids shall be used. In addition, no kiln-dried wood or construction debris shall be allowed. Particle size analysis: 98% shall pass through a 3 inch (75mm) sieve; 30-50% shall pass 3/8 inches (10mm) sieve.

Tubes for compost filters shall be a minimum of 12 inches (300 mm), a maximum of 18” (450mm) in diameter. Tube material shall be a knitted mesh with 1/8” - 3/8” (3-10 mm) openings, and made of biodegradable (cotton or jute) materials. Additional tubes shall be used at the direction of the Engineer.

Stakes for anchors, if required, shall be nominal 2 x 2 stakes.

CONSTRUCTION METHODS

Tubes of compost may be filled on site or shipped. Tubes shall be placed, filled and staked in place as required to ensure stability against water flows. All tubes shall be tamped to ensure good contact with soil. Stakes shall not puncture compost tubes.

The Contractor shall ensure that the filter tubes function as intended at all times. Tubes shall be inspected after each rainfall and at least daily during prolonged rainfall. The Contractor shall immediately correct all deficiencies, including, but not limited, to washout, overtopping, clogging due to sediment, and erosion. The contractor shall review location of tubes in areas where construction activity causes drainage runoff to ensure that the tubes are properly located for effectiveness. Where deficiencies exist, such as overtopping or wash-out, additional staking or compost material shall be installed as directed by the Engineer. Contractor shall remove sediment deposits as necessary to maintain the filters in working condition. The functional integrity of filter tubes shall be maintained in sound condition at all times. Filter tubes that are decomposing, cut, or otherwise compromised shall be repaired or replaced as directed by the Engineer and be incidental to this item.
ITEM 767.12 (Continued)

Filter tube fabric and stakes shall be removed by the Contractor when site conditions are sufficiently stable to prevent surface erosion, and after receiving permission to do so from the Engineer. All biodegradable tube fabric shall be cut and laid flat in place to decompose on-site at the direction of the Engineer. Tube fabric that is not decomposing satisfactorily shall be removed and disposed off-site by the Contractor. At the direction of the Engineer, the Contractor may rake out and seed compost so that it is no greater than 2 inches (50 mm) in depth on soil substrate.

PAYMENT

This item shall be measured by FOOT of Compost Filter Tube installed, approved, and maintained in place, and will be paid at Contract Bid Price per FOOT which price shall be the full payment for all labor, equipment and materials necessary to complete the work specified above, including, but not limited to, stakes and tube fabric, compost mulch wedge along top of tubes, removal and disposal of fabric and stakes, raking and seeding of compost.
ITEM 853.211  TEMPORARY BARRIER REMOVED AND RESET

DESCRIPTION
Work under this item shall consist of removing, transporting and resetting temporary barrier systems and limited deflection temporary barrier systems from alignments established along the roadway to new alignments in accordance with the details shown on the plans, as required by the construction and staged construction operations and as required by the Engineer for the channelization of traffic and/or work zone protection.

The work shall also include furnishing and installing all hardware and associated materials per the details and/or manufacturer’s specifications for anchored or restrained temporary barrier systems.

The work shall also include necessary patches and repairs caused by the temporary barrier system to damaged pavement surfaces or any adjacent longitudinal barrier once the system has been removed.

CONSTRUCTION METHODS
Temporary barrier systems and limited deflection temporary barrier systems shall be removed from existing locations and reset in accordance to the Construction Methods stated in Item 853.23. Damage to the pavement surface or adjacent permanent barriers caused by removing or resetting temporary barrier shall be repaired as directed by the Engineer at the Contractor’s expense.

PAYMENT
Method of Measurement and Basis Of Payment
Item 853.211 shall be measured by the foot, in place, and will be paid at the Contract Bid Price per Foot, which price shall be the full compensation for removing, relocating, resetting, realigning, and transporting maintaining the temporary barrier system. The Contractor will be paid for this item each time the barrier is relocated either to a new work zone, to off-season storage, or back to the project from storage. The Contractor will not be separately compensated for any work necessary to maintain or re-align units or replace damaged units. No payment will be made for removing and resetting barriers for the purpose of gaining access to the construction work zone. No payment will be made for removing, relocating and resetting any barriers moved for the convenience of the Contractor. For temporary barrier systems that require anchorage systems, the cost of furnishing, installing and removing the anchorage and hardware and the restoration of pavement surfaces or adjacent permanent barrier systems to facilitate anchorage shall be considered incidental to the cost of the item.
ITEM 853.23 TEMPORARY BARRIER (TL-3) FOOT

DESCRIPTION
Work under this item shall consist of furnishing, installing, maintaining and final removal of TL-3 temporary barrier systems for channelization of traffic and/or work zone protection.

MATERIALS
The following temporary barrier systems are acceptable for use:

1. BarrierGuard 800; Highway Care International.  
   http://www.highwaycareint.com/product_info/44/barrierguard800
4. Texas DOT X-Bolt F-Shaped Concrete Safety Barrier

The Contractor may submit alternate materials to the Engineer for approval if the temporary barrier system meets the following criteria:

1. The system has been tested by an independent laboratory that is accredited by FHWA to crash test roadside hardware;
2. The system meets the minimum requirements of the AASHTO Manual on Assessing Safety Hardware (MASH) at Test Level (TL) 3 or higher; and
3. The system has a federal-aid eligibility letter from FHWA.

Copies of the testing results and the federal-aid eligibility letter shall be submitted and approved by the Engineer prior to procurement of an alternate temporary barrier system.

The Contractor shall supply shop drawings to confirm the available clear area behind the barrier equals or exceeds the maximum dynamic deflection of MASH Test 3-11 during testing procedures taken at an independent laboratory that is accredited by FHWA to crash test roadside hardware.

Delineators shall be installed on all temporary barrier systems in conformance with the relevant provisions of Section 850.69 and shall be incidental to the temporary barrier systems.

Temporary impact attenuators that are listed on the Qualified Traffic Control Equipment List shall be used whenever a blunt end of the temporary barrier system is facing traffic within the clear zone unless it is protected by a second barrier system or secured to a separate barrier system or bridge railing by a method approved by the manufacturer.
ITEM 853.23 (Continued)

CONSTRUCTION METHODS

Temporary barrier systems shall be placed in line with the drawings. Installation shall be per the manufacturer’s specifications, details, and the approved shop drawings.

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

Within the LON section, temporary barrier systems shall only be placed on paved surfaces unless otherwise tested and certified under MASH TL-3 for those conditions. Damage to the pavement surface caused by the temporary barrier during installation, while in service, and/or during removal shall be repaired as directed by the Engineer at the Contractor’s expense.

Temporary barrier systems that require anchorage systems shall conform with the relevant provisions of Section 850.70.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Items 853.23 shall be measured by the foot, in place, and will be paid at the Contract Bid Price per Foot, which price shall be the full payment for furnishing, installing, maintaining and final removal of all temporary barrier installed in place, including all incidental items.

For temporary barrier systems that require anchorage, the cost of furnishing and installing the anchorage and hardware and the restoration of pavement surfaces or adjacent permanent barrier systems to facilitate anchorage shall be considered incidental to the cost of the item.

Payment for temporary barrier removed and reset will be made under Item 853.211.
ITEM 853.24  TEMPORARY RESTRAINED BARRIER  FOOT
ON ROAD

ITEM 853.241 TEMPORARY RESTRAINED BARRIER  FOOT
ON ROAD
REMOVED AND RESET

DESCRIPTION
Work under these items shall conform to the relevant provisions of Section. 850 of the Standard Specifications, the Supplemental Specifications and the following:

Temporary Restrained Barrier on Road shall be installed at the locations shown on the drawings. It is specified for use on roadways to establish temporary work areas for construction of the proposed bridge and roadways or to separate opposing traffic flows in work zones. It shall be designed and installed to meet or exceed Test Level 3 (TL-3) in accordance with the “National Cooperative Highway Research Program, Report 350” (NCHRP 350) or the AASHTO Manual for Assessing Safety Hardware (MASH) and be approved by the Federal Highway Administration (FHWA). This item shall be designed to not deflect more than three inches (3”) when struck by an errant vehicle in accordance with the criteria set forth for Test Level 3 of NCHRP 350 or MASH.

Complying materials include the California K-Rail and the TXDOT New Jersey Shape barrier (pinned with stakes).

Anchoring of the barrier into the roadway will be allowed and the Contractor shall strictly follow the manufacturer’s anchorage requirements per the crash test results. All barriers shall be continuously attached to each other by an approved method to form a continuous string including the transition to a different barrier system as specified on the Plans or directed by the Engineer.

The Contractor shall supply the FHWA approval letter, manufacturer-approved shop drawings and connection and anchorage details and catalog cuts for each barrier type to the Engineer for approval. The manufacturer’s shop drawings shall specify the maximum deflection distance the product is approved for, all anchorage details and any additional information necessary. The Contractor’s shop drawing submittal shall specify the available distance between the back of barrier to the closest fixed object or activity area. The submittal should also provide anchorage/installation information relative to the location of installation such as pavement section and/or cement concrete deck thicknesses and material specifications. When the existing conditions differ over the length of the proposed installation, the Contractor shall supply anchorage/installation information for each condition.
ITEM 853.24 and 853.241 (Continued)

Temporary Restrained Barrier on Road shall consist of installing, maintaining and removing the barrier as shown on the plans, as required to complete the work or as required by the Engineer.

Temporary Restrained Barrier on Road Removed and Reset shall consist of the removal and resetting of existing Temporary Restrained Barrier as needed to complete the work.

METHOD OF MEASUREMENT

Temporary Restrained Barrier on Road will be measured for payment by the foot, as measured along the barrier centerline.

Temporary Restrained Barrier on Road Removed and Reset will be measured for payment by the foot, as measured along the barrier centerline.

BASIS OF PAYMENT

Temporary Restrained Barrier on Road 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.

Temporary Restrained Barrier on Road Removed and Reset 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 additional compensation shall be made for design or work related to the continuity connection between the Temporary Restrained Barrier and any other temporary or permanent barrier system utilized on this project.

No additional compensation shall be made for removing and resetting of any barrier for the contractors convenience, storage, between phases, or to allow for daily access to work areas.
ITEM 853.32  TEMPORARY RESTRAINED BARRIER  FOOT
ON BRIDGE

ITEM 853.33  TEMPORARY RESTRAINED BARRIER  FOOT
ON BRIDGE
REMOVED AND RESET

DESCRIPTION
Work under these items shall conform to the relevant provisions of Section. 850 of the Standard Specifications and the following:

Temporary Restrained Barrier on bridge (hereafter referred to as TRB-OB) shall be installed at the locations shown on the drawings. TRB-OB is specified for use on the existing bridge deck to establish temporary work areas for construction of the proposed superstructure shall be designed and installed to meet or exceed Test Level 3 (TL-3) in accordance with of “National Cooperative Highway Research Program, Report 350” (NCHRP 350) or the AASHTO Manual for Assessing Safety Hardware (MASH) and be approved by the Federal Highway Administration (FHWA). This TRB-OB shall be designed to not deflect when struck by an errant vehicle in accordance with the criteria set forth for Test Level 3 of NCHRP 350 or MASH. Anchoring of the barrier into the existing bridge deck will be allowed and the Contractor shall strictly follow the manufacturer's anchorage requirements per the crash test results. All barriers shall be continuously attached to each other by an approved method to form a continuous string including the transition to a different barrier system off of the bridge deck.

The Contractor shall supply the FHWA approval letter, manufacturer approved shop drawings and connection and anchorage details and catalog cuts for each barrier type to the Engineer for approval. The manufacturers shop drawings shall specify the maximum deflection distance the product is approved for, all anchorage details and any additional information necessary. The Contractor's shop drawing submittal shall specify the available distance between the back or non-roadway side of the barrier to the closest fixed object, location on deck with relation to nearest bridge beams, or edge of open excavation being protected. The submittal should also provide anchorage/installation information relative to the location of installation such as pavement section and/or cement concrete deck thicknesses and material specifications. When the existing conditions differ over the length of the proposed installation, the Contractor shall supply anchorage/installation information for each condition.

An example of potential TRB-OB options include:
ITEM 853.32 and 853.33 (Continued)

Clampcrete Construction Systems
9 Commercial Street
Hudson, NH 03051
Tel: (603) 889-4163
Fax: (603)889-0039

TRB-OB shall consist of installing, maintaining and removing the barrier as shown on the plans, as required to complete the work or as required by the Engineer.

TRB-OB removed and reset shall consist of the removal and resetting of existing TRB as needed to complete the work.

METHOD OF MEASUREMENT

Temporary restrained barrier on bridge will be measured for payment by the foot, complete in place.

Temporary restrained barrier on bridge removed and reset will be measured for payment by the foot, complete in place.

BASIS OF PAYMENT

Temporary restrained barrier on bridge 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.

Temporary restrained barrier on bridge removed and reset 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 additional compensation shall be made for design or work related to the continuity connection between the Temporary Restrained Barrier on Bridge and the barrier system off the bridge.

No additional compensation shall be made for removing and resetting of any barrier for the contractors convenience or to allow for daily access to work areas.
ITEM 853.501  TEMPORARY IMPACT ATTENUATOR  EACH
REMOVED AND RESET

ITEM 853.63  TEMPORARY IMPACT ATTENUATOR  EACH
REDIRECTIVE (TL-3)

DESCRIPTION

Work under Item 853.501 shall conform to the relevant provisions of Section 850 and shall consist of maintaining, removing and reinstalling temporary impact attenuators where indicated on the plans or as directed by the Engineer.

Work under Item 853.63 shall conform to the relevant provisions of Section 850 and shall consist of furnishing, installing, maintaining and final removal of temporary impact attenuator systems for protection of the ends of temporary barrier and other roadside hazards in work zones. All work shall be in conformance with the specifications of the manufacturer and in close conformance with the locations, lines, and grades shown on the plans.

MATERIALS

The Contractor shall supply a temporary impact attenuator that meets the same or higher crash Test Level (TL) as the adjacent temporary barrier, unless otherwise shown on the plans. The temporary attenuator shall be listed on the Department’s Qualified Traffic Control Equipment List.

The temporary impact attenuator shall be designed to fit within reasonably close tolerance of the dimensions given on the plans.

The Contractor shall supply shop drawings for the temporary attenuator and for any anchorage system and for any transitions or connections between the temporary attenuator and the adjacent barrier or other roadside hazard.

The side of the temporary attenuator that faces traffic shall include a Type 3 Object Marker that conforms to the language found in Sections 2C.64 and 2C.65 of the Manual on Uniform Traffic Control Devices.

Unless a separate barrier system protects it from opposing traffic, only temporary impact attenuators that are certified for bi-directional use shall be used in medians.
ITEM 853.501 and 853.63 (Continued)

CONSTRUCTION METHODS

Installation means and methods shall be per the manufacturer’s specifications and/or drawings.

Temporary Impact Attenuators Removed and Reset consists of removing temporary impact attenuators, relocating and reinstalling at a new location per the specifications and recommendations of the manufacturer and as shown on the plans or as directed by the Engineer.

Excavation for temporary attenuator foundations and anchorage shall be made to the required depth and to a width that will permit the installation and bracing of forms where necessary. All soft and unsuitable material shall be replaced with compacted gravel borrow.

The Contractor shall supply the Engineer instructions for installation and the manufacturer’s recommended routine inspection and maintenance program. The cost of inspection and maintenance of temporary attenuators shall be considered incidental in nature.

Damaged temporary impact attenuators shall be replaced by the Contractor within 24 hours or as directed by the Engineer, at the Contractor’s expense. A truck mounted attenuator that meets the same or higher TL, or other means of protecting the damaged temporary impact attenuator, shall be deployed until the repairs or replacement has been completed, at the Contractor’s expense.

METHOD OF MEASUREMENT

Item 853.501 shall be measured as a single unit each.

Item 853.63 shall be measured as a single unit each furnished and installed in place.

BASIS OF PAYMENT

Payment for work under these items shall be made at the Contract Bid Price Each, which price shall be the full payment for all labor and materials for furnishing, foundations and anchorages, installation, maintenance and final removal, and all incidental work necessary to complete the work as specified.
ITEM 864.31 SLOTTED PAVEMENT MARKER EACH

DESCRIPTION
Work under this Item shall conform to the relevant provisions of Section 860 of the Standard Specifications and the following:

The work to be done under this Item shall consist of furnishing and installing slotted pavement markers in accordance with the contract drawings, the relevant provisions of the latest MUTCD, MassDOT Standard Specifications and the following:

- Install one-way white markers halfway between successive broken white lane lines at 80 foot intervals on the mainline.

Materials
Reflectorized pavement markers shall be 3M Series 290, Avery Dennison Lifelite Model 948 BW, Ray-O-Lite Model 200 or an approved equal.

Construction Methods
Only motorized vehicles with specialized grinding equipment intended for these purposes shall be used to grind out the slots for the recessed pavement markers. No manually-propelled or walk behind carts will be allowed. Equipment that does not produce slots that remain in true alignment with the striping centerline shall be replaced with satisfactory equipment as directed by the Engineer.

The work shall include cutting the tapered pavement slot to the dimensions shown on the typical details for the one-way markers, application of the manufacturer’s recommended epoxy adhesive, and placing the reflectorized pavement marker in the proper position within the slot so that the reflective face is visible and perpendicular to oncoming traffic and so that the top of the marker is set 1/8± inch below the top of the adjacent pavement.

Surface preparation and installation shall be in strict accordance with the manufacturer’s instructions.

Method of Measurement and Basis Of Payment
Work to be done under this Item shall be measured per Each and will be paid for at the Contract Bid Price per Each, which price shall include all labor, equipment and materials necessary to complete the work specified above, and all incidentals necessary to complete the work.
ITEM 866.206  6 INCH REFLECTORIZED WHITE LINE (POLYUREA) (RECESSED) FOOT

ITEM 867.206  6 INCH REFLECTORIZED YELLOW LINE (POLYUREA) (RECESSED) FOOT

DESCRIPTION

Work under these items shall conform to the relevant provisions of Section 860 of the Standard Specifications and the following:

Work shall consist of grooving a slot in the pavement surface and the furnishing and installation of a liquid two-part polyurea wet reflective pavement markings. As work incidental to these items, the Contractor or pavement marking Material Supplier(s) shall measure the performance of the pavement markings upon installation, six months following installation, and one year following installation using a new 30 meter retroreflectometer. Upon completion of the installation of the pavement markings, the retroreflectometer shall become the property of MassDOT and shall be incidental to these items.

Materials

The polyurea reflectorized pavement markings shall be:

VERY FAST CURING POLYUREA TRAFFIC PAINT (no-track times < 10 minutes).
- Innovative Performance Systems HPS-5, Ph. 800.448.3482
- Epoplex LS-90, Ph. 800.822.6920
- 3M Liquid Pavement Series 5000 and LPM, Ph. 800.553.1380

SUBMITTALS

Certification: The Contractor shall furnish a notarized Certificate of Compliance that all materials conform to the requirements of this specification.
ITEMS 866.206 and 867.206 (Continued)

Construction Methods

All work shall be done in accordance with the Material Suppliers specifications and the following:

1. The polyurea binder shall be applied at rates to achieve a minimum uniform wet thickness of 25±2 mils.

2. Glass Beads shall be applied as a reflective medium at a rate in accordance with the polyurea material supplier’s specifications.

Items 866.206 & 867.206 for edge lines and skip lines (mainline only) shall be applied into a 6-3/4 inch ± 1/4 inch wide x 45 mils ± 5 mils deep recessed groove. The recessed groove shall be constructed in accordance with the polyurea manufacturer’s recommended procedures. Particular attention shall be paid to the surface texture. The acceptability of the surface texture will be decided by the Engineer and/or Manufacturer’s Technical Representative. A two (2) inch offset from the edge of the recessed groove to the longitudinal surface course pavement joint is desirable.

The white and yellow edge lines on the ramps and 12 inch white lines at the gore areas shall be surface applied with no recessed groove.

3. Marking Performance: The typical average initial retroreflectance of the markings shall be 600 [(mcd(ft-2)(fc-1] for white and 400 [(mcd(ft-2)(fc-1] for yellow. The initial performance of the pavement markings shall be measured within seven (7) days after application.

4. A Technical Representative from the Material Supplier(s) shall be present for the first grooving operation shift to provide quality assurance/quality control. All measuring equipment shall be properly calibrated prior to the implementation of any temporary traffic controls that are required.

Retroreflectance readings shall be taken at the following three times:

1. Initial (between 7 and 30 days from date of application);
2. 6 Month (182 days, ± 14 days from initial application); and
3. 1 Year (365 days, ± 14 days from initial application).
ITEMS 866.206 and 867.206 (Continued)

The cost of temporary traffic control setups for the Initial readings shall be considered incidental to the cost of item. The Department will provide temporary traffic control setups for the 6 Month and 1 Year readings at no cost to the Contractor or Material Supplier.

Readings taken at the 6 Month and 1 Year intervals are for MassDOT Highway Division informational purposes only. Average readings that fall below the specified minimum values will not require additional testing or pavement marking removal and reinstallation.

The average initial retroreflectance shall be determined according to the measurement and sampling procedures outlined in ASTM D 6359, using a 30 meter retroreflectometer. The retroreflectometer shall measure the coefficient of retroreflected luminance, RL, at an observation angle of 1.05 degrees and an entrance angle of 88.76 degrees. RL shall be expressed in units of millicandela per square foot per foot-candle [(mcd(ft-2)(fc-1]. The metric equivalent shall be expressed in units of millicandela per square meter per lux [mcd(m-2)(lux-1].

Results for all readings shall be provided within 10 business days of testing to the Engineer, with a second copy sent to:

State Traffic Engineer  
Attention: Pavement Marking Retroreflectivity Testing  
10 Park Plaza, Room 7210  
Boston, MA 02116

PAYMENT

Method Of Measurement

The measurement for these items is per Foot which shall include all labor, materials, tools and equipment to complete this work.

Basis Of Payment

Items 866.206 and 867.206 will be paid for at the Contract unit price per foot, which price shall include all labor, equipment and materials necessary to complete the work specified above, and all incidentals necessary to complete the work.
ITEM 874.2  

TRAFFIC SIGN REMOVED AND RESET

DESCRIPTION

The work to be completed under this item shall consist of removing existing miscellaneous sign panels and supports, discarding the existing supports, and resetting the existing sign panels to new locations on new supports of a type that shall match the existing supports, as indicated on the plans.

Method Of Measurement

Item 874.2 will be measured per each sign removed and reset as shown on the plans, complete in place.

Basis Of Payment

Item 874.2 will be paid for at the contract unit price bid per each sign removed and reset, which price shall include removal, loading, transporting and resetting all signs and all other incidental work, complete in place.

ITEM 905.  

4000 PSI, 3/8 IN, 660 CEMENT CONCRETE CUBIC YARD

DESCRIPTION

All work shall conform to the relevant Provisions of Section 901 of the Standard Specifications and shall also consists of furnishing and placing 4000 PSI, 3/8 inch, 660 Cement Concrete Masonry.

This item shall be used for existing deck and abutment patching and existing abutment backwall replacement, after all deteriorated and/or unsound concrete is removed under Item 127.1. The Contractor’s attention is also directed towards the Repair Procedure Notes and Details contained elsewhere in this Proposal.

The Engineer shall determine whether to use this Item or to direct the use of a Hi-Early mix.

All cost(s) associated with the addition of any approved admixture to the cement concrete shall be considered incidental to this Item unless otherwise provided below.
ITEM 905. (Continued)

Approval by the Engineer of all formwork shall be required prior to placement of any concrete. No traffic, placement of waterproofing membrane, hot mix asphalt or removal of formwork will be allowed until the 4000 PSI, 3/8 inch, 660 Cement Concrete at a partial depth repair has cured a minimum of three (3) days and fourteen (14) days for a full depth repair. Shorter periods of time may be allowed with the use of Hi-Early Cement Concrete.

All formwork placed under this item must be removed no later than 45 days after the repair has been completed. Failure to remove said formwork within said 45 days could result in its removal by others with the associated costs being assessed to the Contractor.

PREPARATION OF CONCRETE SURFACES:

All concrete surfaces to be patched shall be roughened, cleaned of all laitance, dirt, grease, oil, other contaminants and all standing water. All reinforcing steel encountered in the excavation shall be thoroughly cleaned by abrasive blasting, and painted with a zinc-rich primer conforming to MHD Spec. No. M7.02.61 before being covered with new concrete.

The excavated areas shall then be coated with and Epoxy Bonding Compound (see item 964.1). At the discretion of the Engineer, epoxy bonding compound may be omitted in favor of a thorough application of water for a minimum of 10 minutes, any remaining water should be blown out to produce a saturated surface dry (SSD) condition, using oil free compressed air.

BASIS OF PAYMENT

The work described in this Item shall be measured by the cubic yard of concrete actually installed complete in place. The Contract Unit Price per cubic yard shall include full compensation for materials, tools, equipment, labor, oversight services and all incidentals necessary to complete this Item as specified herein to the satisfaction of the Engineer, including the installation and subsequent removal of any formwork, and coating of the steel reinforcing. When Hi-Early concrete is directed to be used by the Engineer, the contractor will be compensated at the unit bid price plus 5%. The additional 5% will not apply when Hi-Early concrete is used for the contractor’s convenience. Anti-wash concrete additive may be required for some concrete placement. The Contractor will be compensated under the non-bid Materials Item a differential of $70 per cubic yard when the Engineer specifies anti-wash admixture to be added to the concrete mix.

Where formwork is placed for a full depth deck repair payment for the associated concrete quantity will be made at 70% of the measured volume; the remaining 30% will be paid only after the forms have been removed by the Contractor.
ITEM 909.20  CEMENTITIOUS MORTAR  SQUARE FOOT  FOR PATCHING

Work under this item consists of furnishing and placing a polymer-modified, cementitious, fast setting, trowel grade patching mortar to patch vertical surfaces on the existing structures at areas of spalled, delaminated, or cracked concrete as directed by the Engineer.

This item shall not be applied to repair any vertical patch that exceeds 2” in depth, which shall be repaired by using Item 905.

MATERIAL

The polymer modified cementitious patching mortar shall conform to the following requirements:

The mortar system shall not contain chlorides, nitrates, added lime, or high silica cements. The system shall be non-combustible, either before or after cure.

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing Time</td>
<td>20-60 minutes after combining components</td>
</tr>
<tr>
<td>Color</td>
<td>Concrete Gray</td>
</tr>
</tbody>
</table>

TYPICAL PROPERTIES OF CURED MATERIALS

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion Resistance</td>
<td>6 times that of controlled concrete</td>
</tr>
<tr>
<td>Bond Strength</td>
<td>100% concrete substrate failure (Pull off method)</td>
</tr>
<tr>
<td>Modulus of Elasticity</td>
<td>4.5 x 10^6 PSI</td>
</tr>
<tr>
<td>Surface Scaling</td>
<td>No Deterioration after 120 cycles (deicing salt solution freeze/thaw)</td>
</tr>
<tr>
<td>Compressive Strength (2 hours 50% RH)</td>
<td>150 PSI minimum</td>
</tr>
<tr>
<td>Compressive Strength (28 days 50% RH)</td>
<td>5,500 PSI minimum</td>
</tr>
<tr>
<td>Flexural Strength (28 days 50% RH)</td>
<td>1,300 PSI minimum</td>
</tr>
</tbody>
</table>

The system shall conform to the ECA/USPHS Standards for surface contact with potable water. The system shall not produce a vapor barrier. The system shall be thermally compatible with concrete.
ITEM 909.20 (Continued)

CERTIFICATION

The Contractor shall furnish notarized certification that all materials conform to the above requirements. In addition, samples of all materials proposed for use shall be submitted to the Department’s Research and Materials Section. To allow sufficient time for testing, these samples must be submitted at least six weeks prior to scheduled use.

SURFACE PREPARATION

The contractor shall remove all deteriorated and spalled areas as designated by the Engineer. All costs to remove the deteriorated and spalled concrete shall be compensated for under Item 127.1.

The Contractor shall have the approval of the Engineer certifying that all spalled and deteriorated concrete has been removed prior to patching deteriorated areas. If the deterioration of the vertical surfaces is deeper than 1”, then the repair will be made in maximum lifts of 1” deep. The preceding lift shall be allowed to reach final set before applying fresh material. The fresh mortar must be scrubbed into the preceding lift.

APPLICATION METHODS

Areas to be patched must be clean and sound. All loose and disintegrated concrete shall be removed by means of sandblasting, or an equivalent method, to a depth where sound concrete is exposed. Minimum patch depths at edges of patch shall be ½”. Sandblast existing concrete to remove all contaminants prior to applying mortar. Chipping methods are to be approved in advance by the Engineer.

At the time of application, surfaces should be damp (saturated surface dry) with no glistening water. Mortar must be worked into the substrate filling all pores and voids. Force the material against the edge of the repair, working towards the center. After filling, consolidate, then screed.

The maximum thickness of application in one pass shall be 1”. If the depth of patch exceeds 1”, the mortar shall be placed in two passes of approximate equal thickness. Before the first pass has achieved an initial set, the surface shall be prepared for the second pass by scratching with a trowel to form a grid of deformation on the surface.

CURING

Use a fine mist spray of water, wet burlap, or a non-solvent approved curing compound if ambient conditions might cause premature surface drying (high temperature, low humidity, strong winds, etc.). If necessary, protect the newly applied mortar from rain. To prevent freezing, cover with insulating material.
ITEM 909.20 (Continued)

MANUFACTURER’S FIELD REPRESENTATIVE

The Contractor shall arrange with the material’s manufacturer or distributor to have the services of a competent field representative at the work site prior to any mixing of components to instruct the work crews in the proper mixing and application procedures.

The manufacturer’s field representative must be fully qualified to instruct artisans or perform the work and shall be subject to the approval of the Engineer.

The Contractor shall be completely responsible for the expense and services of the required field representative and the bid contract price shall be full compensation for all cost in connection therewith.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 909.20 shall be measured per square foot of patch area, complete in place and accepted by the Engineer, and will be paid at the Contract Bid Price per Square Foot, which price shall be the full payment for all labor, materials and equipment necessary to perform the work described above to the satisfaction of the Engineer.

ITEM 910.1  STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED

Work under this item shall conform to the relevant Provisions of Section 901 and the following:

This item shall be used for repair and replacement of existing deck, abutment and backwall, after removal of all deteriorated and/or unsound concrete under Item 127.1.

The Contractor may be required to submit for approval, detail plans and schedule of bar reinforcement. The Contractor will replace reinforcing bars as directed by the Engineer. Any reinforcing steel damaged by the Contractor’s operations will be replaced by the Contractor at no additional payment.

Should the Engineer direct the placement of MassDOT supplied anodes for cathodic protection at locations where such protection is warranted, the Contractor will be required to supply replacement reinforcing (black bar) that is not epoxy coated, at no additional payment for any such required substitution, nor for tying in the anodes.

Basis of Payment

The work described under this Item shall be measured for payment by the actual number of pounds of steel reinforcement bar placed as directed by the Engineer. The Contract Unit Price per pound shall include full compensation for all labor, materials, tools and equipment necessary to complete the work to the satisfaction of the Engineer.
ITEM 950.1  TEMPORARY SHORING  LUMP SUM

The work under this item shall conform to the relevant provisions of Sections 140 and 950 of the Standard Specifications and the following:

The work shall consist of designing, furnishing, placing and removing a temporary support of excavation system to maintain existing and proposed roadways during construction of the proposed backwall modifications, guardrail transition bases, and approach slab construction. This work shall also consist of any temporary shoring required to support and/or maintain the existing underground conduits. The approximate limits of the Support of Excavation shall be as shown on the Plans, and as required by the Contractor. Temporary shoring shall not be placed in any WPA jurisdictional areas.

For the purpose of this specification, the temporary support of excavation system shall be any type of adequately designed earth support system that satisfies the design criteria outlined within this section and meets the requirements shown on the plans.

The Contractor is advised to investigate the site to determine the most appropriate earth support system for each location and develop his/her bid accordingly. All materials used for this support of excavation, whether new or used, shall be sound and free from strength impairing defects. New steel sheeting (if used) shall conform to the applicable provisions of Section 950 and the requirements of AASHTO M202. The Contractor shall submit drawings and calculations for the proposed temporary support of excavation system, to the Engineer for approval, stamped by a Professional Structural engineer registered in the Commonwealth of Massachusetts. The temporary support of excavation system shall be designed according to AASHTO and MassDOT Standards and the following criteria:

1. The support of excavation system shall be designed to resist surcharge live load of at least HS20 truck loading, as well as a provision for additional surcharge due to temporary concrete barriers.

2. Any temporary shoring located along the roadway approaches and adjacent to concrete barrier shall be designed for a vehicular impact load equivalent to the Test Level, NCHRP-TL3 assuming the concrete barrier to impact the shoring.

3. The Contractor shall make his own evaluation of existing conditions and facilities, and of the effects of the proposed support of excavation system and construction methods, and shall provide in his design for all loads and methods necessary to permit construction of the proposed utilities while maintaining public safety and protecting completed work (and all third party property) from damage caused by his operations.
ITEM 950.1 (Continued)

4. Timber lagging (if used) shall be southern yellow pine, mixed hardwoods or equivalent of Grade 2 or better, having Fb = 1,030 Kpa minimum. Install lagging tightly against the soil to minimize loss of ground. If necessary, install the lagging one board at a time as required to minimize loss of ground in any local areas having unstable (raveling) soil conditions. Immediately backpack the lagging tightly with gravel backfill as required to fill any voids that develop behind the lagging.

5. No element of the support system shall be spliced unless approved by the Engineer. The Contractor shall accurately locate all existing utility lines and structures to ensure that the proposed support of excavation system will not interfere with them. The Engineer’s approval of the Support of Excavation System will be general in character and shall not relieve the Contractor from the responsibility for the adequacy of the design, materials and workmanship to safely support the excavation.

Temporary shoring shall be installed without causing damage or misalignment of existing adjacent pavements. Any damage to existing adjacent facilities as a result of temporary shoring operations shall be promptly repaired or replaced in kind at the Contractor’s expense.

The Contractor, in order to ensure the integrity and stability of the temporary shoring, shall be solely responsible for monitoring the shoring to identify and correct bulges, breakage or other evidence of movement.

All temporary shoring shall be installed in strict accordance with the design and recommendations of the design engineer employed by the Contractor, and in accordance with any review requirements of the Engineer.

Temporary shoring shall be removed as indicated on the Contract Drawings, and discarded from the site. Temporary shoring will be removed in its entirety. The Contractor shall avoid damaging any adjacent infrastructure.

The Contractor is alerted to the fact that the work zones for the construction operations are extremely tight due to the proximity of the workzone to temporary travel lanes. Special consideration shall be given to these conditions such that the Contractor is aware that use of specialized equipment may be necessary.
ITEM 950.1 (Continued)

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Payment for the work to be done under this item shall be at the Contract Lump Sum Price for Item 950.1, which price shall include full compensation for all labor, materials, tools, equipment and all associated work that may be necessary to accomplish the specified work. Thirty percent (30%) of the Lump Sum Price Bid for this Item will be paid after the completion and satisfactory acceptance of the Stage 2 installation. Thirty percent (30%) of the Lump Sum Price Bid for this Item will be paid after the completion and satisfactory acceptance of the Stage 3 installation. Thirty percent (30%) of the Lump Sum Price Bid for this Item will be paid after the completion and satisfactory acceptance of the Stage 4 installation. The final ten percent (10%) of the Lump Sum Price Bid for this Item will be paid upon the proper removal of the temporary earth support system from the project site at the completion of the stage 4 work.

ITEM 960.1 STRUCTURAL STEEL - COATED STEEL POUND

Description

The work under this item shall include replacing and/or repairing existing structural steel as indicated on the plans, in accordance with these specifications, and as directed by the Engineer.

This work shall conform to the applicable provisions of the Standard Specifications Sections 960 and 112 as amended by the latest Supplemental Specifications, and the specific requirements stipulated below.

The work shall include furnishing, fabricating, transporting and erecting structural steel for replacing or reinforcing deteriorated or otherwise damaged components of structural steel. The work also includes all miscellaneous temporary shoring and bracing, post-tensioning, and jacking necessary to complete the work that is not covered under Item 106.87 Jacking Superstructure. Work also includes the removal and disposal of existing deteriorated structural steel components and bolting new structural steel into place, including all equipment, labor, and materials and incidentals necessary to complete the work. Removing existing rivets and replacing them with high strength bolts shall be included in item 960.2. Field drilling holes in new or existing steel for high strength bolts, shall be included in this item. High strength bolts in new holes shall be included in this item. Cutting and grinding edges of corrosion damaged areas of steel to remain necessary to replace existing steel is also included in this item.
ITEM 960.1 (Continued)

The Contractor shall submit details of sequence of assembly, installation of temporary shoring, erection, etc. including detailed plans and design calculations for all temporary shoring and bracing. All original design calculations and plans prepared by the Contractor for temporary braces and shoring shall bear the seal of a Professional Structural Engineer registered in Massachusetts, in accordance with Section 5.02.

This work shall also include surface preparation and shop-applied paint of the new steel for the repairs and member replacements. Surface preparation and painting of the existing steel and replaced/repaired steel performed in the field shall be provided under Item 963.201 Clean (Full Removal) and Paint Steel Bridge No. F-07-045.

The work also includes installation of any additional miscellaneous steel plates or rolled shapes, including shim plates, fill plates, clip angles, etc., not specifically called out on the plans, but which may be required during construction to complete the repair as directed by the Engineer.

The work includes all field survey, including detailed measurements of existing features and details, required to ensure proper alignment and fit. Following the initial cleaning of areas to be repaired, the Engineer will direct the Contractor as to any adjustments to the approximate repair quantities and dimensions.

However, the Contractor is fully responsible for the accuracy and fit of the work and must develop the final detailed geometry based on field measurements.

Any components of the existing bridge that are damaged by the Contractor’s operation shall be repaired in conformance with these specifications. The costs of such repairs shall be borne by the Contractor.

Materials

All structural steel shall meet the requirement of AASHTO M270 (A709), either Grade 50 or Grade 36, as indicated on the plans, and shall be painted. Paints for steel shall be selected from the MassDOT qualified construction materials list. Fabrication and painting shall be in accordance with Section 960 and 961. All stringers shall be considered main members. Charpy v-notch impact testing shall be completed in accordance with AASHTO and temperature zone 2.

All bolted connections shall be slip-critical AASHTO M164 (ASTM A325) high strength bolts. All bolts, nuts and washers shall conform to Section M8.04.3 of the MassDOT Standard Specifications. Verification testing as specified by the AASHTO Standard Specifications, shall be performed by the Contractor. All bolts, nuts and washers shall be galvanized in accordance with AASHTO M232.
ITEM 960.1 (Continued)

Contact surfaces of bolted parts shall meet or exceed the Class B requirements for slip-critical joints specified in the AASHTO Standard Specifications for Highway Bridges.

Unless noted otherwise, the paint system used for structural steel shall be in accordance with Item 963.201 Clean (Full Removal) and Paint Steel Bridge No. F-07-045.

Shop Drawings

Before fabricating any materials, the Contractor shall submit shop drawings to the Engineer for approval. For all submittals that include Contractor-designed elements or procedures, shall be sealed and signed by a Professional Structural Engineer registered in the Commonwealth of Massachusetts. The seal and signature shall be original and affixed directly to the plans and calculations. These drawings shall be in accordance with Section 960.60 and are to include, but not be limited to, the following information:

a. All pertinent specifications.

b. Complete details, all detail dimensions, and weights of all structural steel. Dimensions that are based on field measurements shall be clearly differentiated from other dimensions.

c. Details and quantities of all permanent bolting and welding.

d. Details of sequence of assembly, installation of temporary supports, erection, etc. including detailed plans and design calculations for all temporary shoring and bracing.

e. Supplier's name, address and telephone numbers.

In addition, for each repair type, the Contractor shall submit to the Engineer, in writing, his proposed construction sequence and a detailed description of the procedure he will use to complete the work for approval prior to beginning work.

Construction Methods

All work shall be done as directed by and to the satisfaction of the Engineer in accordance with the details shown on the plans. The proposed repair procedure and sequence of the construction operations required to accomplish this work shall be prepared by the Contractor and submitted to the Engineer for approval prior to performing any repairs.
ITEM 960.1 (Continued)

All holes for field bolted connections to existing steel shall be sub drilled and reamed to size at assembly or drilled from the solid using the steel plate being removed as a template.

All high strength bolts shall be installed in accordance with the applicable requirements of Section 960 and M 8.04.3 of the Supplemental Specifications. High strength bolts once tightened shall not be loosened and reused.

Extreme care shall be taken not to damage any existing components that are scheduled to remain. Any damage to the structure caused by the Contractor shall be repaired to the satisfaction of the Engineer and at no expense to the Commonwealth of Massachusetts.

No field welding, other than shown in the repair details, is permitted on existing structural steel.

The existing steel structure and appurtenances are believed to be coated with lead paint, which must be removed from areas that are to be cut or burned as required for the demolition operations in accordance with Item 115.01.

The Contractor shall be fully responsible for determining the required bracing, shoring and sequence for safely cutting and/or mechanical disassembly of structural members to facilitate the repairs/replacement.

Dimensions of plates and replacement elements are given for the purpose of estimating. The Contractor is fully responsible for the accuracy and fit of the work and, thus, shall determine what measurements are required and shall allow adequate time and resources for obtaining field measurements in developing his sequence of fabrication and construction. The Contractor shall develop shop drawings utilizing the field measurements and shall not begin fabrication prior to approval of shop drawings.

Method of Measurement and Basis of Payment

Item 960.1 Structural Steel – Coated Steel shall be measured by the actual net weight of new structural steel in Pounds, (including bolts for steel repairs but not including those replacing rivets) installed in the structure, completed and accepted, and will be paid at the Contract Bid price per Pound, which price shall be the full payment of all materials, equipment, tools and labor incidental thereto, completed to the satisfaction of the Engineer.
ITEM 960.2  RIVET REPLACEMENT  EACH

**Description**

The work under this item shall consist of replacement of existing rivets with high strength bolts in accordance with these specifications, and as directed by the Engineer, which are not specifically included for payment under any other items.

The work shall include furnishing and installing high strength bolts, nuts and washers to replace loose, missing, deteriorated (including missing rivet heads) or otherwise damaged rivets, and shall conform to the applicable provisions of the Standard Specifications Section 960, 961 and 112 including the latest Supplemental Specifications, and the specific requirements stipulated below.

The removal of existing rivets and replacement with high strength bolts in order to make steel repairs shall conform to the technical requirements of this item and shall be paid for with this item. The replacement of existing rivets with high strength bolts for temporary jacking and shoring of superstructure shall also conform to the technical provisions of this item and shall be incidental to item 106.87.

Any components of the existing bridge that are damaged by the Contractor’s operation shall be repaired in conformance with these specifications. The costs of such repairs shall be borne by the Contractor.

**Materials**

All bolted connections shall be slip-critical AASHTO M164 (ASTM A325) high strength bolts. All bolts, nuts and washers shall conform to Section M8.04.3 of the MassDOT Standard Specifications. Verification testing as specified by the AASHTO Standard Specifications, shall be performed by the Contractor. All bolts, nuts and washers shall be galvanized in accordance with AASHTO M232.

Contact surfaces of bolted parts shall meet or exceed the Class B requirements for slip-critical joints specified in the AASHTO Standard Specifications for Highway Bridges.

A detailed description of the procedure the contractor will use to complete the rivet replacement work shall be submitted for approval prior to beginning work with the submittal for steel repairs under item 960.1. Requirements given in 960.1 for the submittal shall apply.
ITEM 960.2 (Continued)

Construction Methods

All work shall be done as directed by and to the satisfaction of the Engineer in accordance with the details shown on the plans. The proposed repair procedure and sequence of the construction operations required to accomplish this work shall be prepared by the Contractor and submitted to the Engineer for approval prior to performing any repairs.

All holes for field bolted connections to existing steel shall be sub drilled and reamed to size at assembly or drilled from the solid using the steel plate being removed as a template.

All existing rivets or bolts which have been removed for the purpose of performing the work shall be replaced with high strength bolts of the same diameter as the removed item, unless otherwise noted. Where the existing rivet hole is to be re-used, the rivet shall be removed without damaging the existing base metal. Existing holes are to be cleaned and reamed if required to install new bolts. Holes not used shall be filled with bolts as directed by the Engineer.

All high strength bolts shall be installed in accordance with the applicable requirements of Section 960 and M 8.04.3 of the Supplemental Specifications. The Contractor should note that existing rivets may vary in diameter. Replacement high strength bolts shall be generally the same size as the rivet replaced, unless otherwise directed by the Engineer. Open rivet holes to receive new high strength bolts shall be standard size holes, 1/16 inch larger in diameter than the bolt diameter. In the event that upon removal of the existing rivets, the hole is found to be out of round or the connected elements have corroded to the extent that required fit cannot be made by cleaning, the hole shall be drilled and reamed as required to provide a full section of metal in the connection elements and a larger diameter bolt shall be installed. High strength bolts shall be installed after the nicks, burrs and foreign substances that might interfere with seating of the bolt head and nut washers are removed. Light grinding may be ordered by the Engineer. Existing rivets may be removed by chipping, chiseling, or other mechanical methods that will not damage members to remain and as approved by the Engineer. Flame cutting of existing rivets shall not be permitted. Existing rivets are to be removed by sheering the head using a pneumatic rivet breaker (helldog) and driving out the shank with pneumatic punch. If, in the opinion of the Engineer, punching will damage the base metal, the shank shall be removed by drilling.

Unless otherwise noted on the plans or herein, not more than 15% of the rivets in a particular connection may be removed before temporary replacement high strength bolts are installed. High strength bolts once tightened shall not be loosened and reused.
ITEM 960.2 (Continued)

Extreme care shall be taken not to damage any existing components that are scheduled to remain. Any damage to the structure caused by the Contractor shall be repaired to the satisfaction of the Engineer and at no expense to the Commonwealth of Massachusetts.

The existing steel structure and appurtenances are believed to be coated with lead paint, which must be removed from areas that are to be cut or burned as required for the demolition operations in accordance with Item 115.01.

Contractor shall submit procedure for rivet removal and provide a field demonstration of method for the Engineer’s approval. Use of Magnetic drill is allowed.

Method of Measurement

Replacement of existing rivets with high strength bolts for steel repairs shall be measured by the actual number of new bolts (including nuts and washers) installed in the structure, completed and accepted. No payment for temporary bolts or rivets replaced for jacking and shoring shall be made. Rivet replacement for steel repairs, included in Item 960.1, shall be measured for payment under this item.

Basis of Payment

Replacement of existing rivets with high strength bolts for steel repairs will be paid for at the contract unit price per each for “Rivet Replacement”, completed to the satisfaction of the Engineer, and shall include all materials, equipment, tools and labor incidental thereto.
ITEM 963.201 CLEAN (FULL REMOVAL) & PAINT STEELBRIDGE NO. F-07-045

Work under this item shall conform to the relevant provisions of Section 960 of the Standard Specifications, Section 961 of the Supplemental Specifications dated July 1, 2015 and shall consist of full removal of the existing paint system and painting of the steel of Bridge No. F-047-045 (4PH & 4PJ) to the following limits:

- All existing structural steel to remain in place including but not limited to: beams, bracing, diaphragms, bearings and connections.
- All proposed replacement steel as shown on the plans including but not limited to: new diaphragms.
- All repaired members and connections.
- All structural steel surfaces that are to come in contact with concrete shall be shall be painted with the prime coat only.
- This item also includes environmental protection, containment of work areas and waste disposal.

LIMITS OF WORK
Bridge No. No. F-07-045 (4PH & 4PJ) Interstate 90 over MDC Reservoir #3 (Foss Reservoir)
Area: Superstructure – Structural Steel
Surface Preparation: Full Removal
Paint 3- Coat System – (Full prime, intermediate, & finish coat)

Paints for steel shall be selected from the MassDOT qualified construction materials list.

Item 992.1 Alteration to Bridge Structure No. F-07-045 includes surface preparation and shop-applied paint of the new steel for the repairs and member replacements.

Method of Measurement and Basis of Payment

This work will be measured and paid for at the contract bid price per lump sum for "Clean (Full Removal) and Paint Steel Bridge No. F-07-045 complete in place and payment shall be full compensation, including all equipment, materials, tools, labor and incidentals necessary to complete the work."
ITEM 964.1  EPOXY BONDING COMPOUND  SQUARE FOOT

This specification describes a 2-component, 100% solids, moisture insensitive, epoxy resin system which shall be used as a bonding adhesive to bond newly placed Cement Concrete to surfaces of sound, hardened concrete.

MATERIAL

Epoxy Bonding Compound Materials shall meet requirements of Materials Specification Subsection M4.05.5 of the Standard Specifications for Highways and Bridges.

The Contractor shall furnish notarized certification that the epoxy bonding compound conforms to the above requirements. In addition, a sample of the epoxy bonding compound proposed for use shall be submitted to the Department's Research and Materials Section for approval. This sample must be submitted at least six weeks prior to scheduled use.

CONSTRUCTION METHODS

A. Preparation of Concrete Surfaces:

   All surfaces to be patched with cement concrete must be clean and sound. Surfaces shall be free of standing water. The entire surface to be bonded shall be blast cleaned to remove any laitance, dirt, grease, oil, or other contaminants.

B. Mixing Epoxy Compound

   Components "A" and "B" of the epoxy-resin system shall be mixed in exact accordance with the manufacturer's instructions.

   The area to be overlaid shall be covered with one coat of the epoxy compound, applied with long-nap paint rollers, brooms, brushes, or by spray.

   The rate of application shall be 80 sq. ft/gallon maximum on smooth concrete (20 mils). As the concrete increases in roughness, the rate of coverage decreases proportionately.

   While the epoxy compound is still tacky (4-5 1/2 hrs. at 73 degrees F.), place the concrete. If the bonding compound should harden before the concrete is placed, apply a fresh coat over the hardened coat and proceed.
ITEM 964.1 (Continued)

C. Weather Limitations

The epoxy bonding compound shall be applied according to manufacturer’s recommendations and as directed.

D. Epoxy Manufacturer's Field Representative

The Contractor shall arrange with the epoxy manufacturer to have the services of competent field representative present at the work site. The field representative shall be present at work site prior to any mixing of components to instruct the work crews, explain the inspection procedure and to inspect the condition of the prepared surfaces. He shall remain at the job site after work commences and continue to instruct until the Contractor has mastered the technique of installing the epoxy system successfully. The representative shall make periodic visits to the project as the work progresses and shall confer on each visit with the Inspector and/or Engineer. The manufacturer's field representative must be fully qualified to perform the work and shall be subject to the approval of the Engineer. At the discretion of the Engineer, the services of the manufacturer’s representative may not be required when in the opinion of the Engineer, the Contractor has demonstrated a thorough understanding and successful execution of the work procedures. The Contractor shall be completely responsible for the expense of the services of the required field representative and the contract bid price shall be full compensation for all costs in connection therewith.

BASIS OF PAYMENT

Payment for the work done under this item shall be made at the Contract Unit Price per Square Foot of epoxy bonding compound applied to the satisfaction of the Engineer.
ITEM 964.21  ELASTOMERIC PROTECTIVE COATING  SQUARE FOOT

The work to be done under this item shall consist of applying a minimum of two (2) coats of an elastomeric acrylic protective coating to the above grade surfaces of concrete bridge abutments (including backwalls and seats), piers (to the limits shown on the contract plans), wingwalls, and other locations as directed by the Engineer. A total dry film thickness (DFT) of sixteen (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:

- SikaGard 550W Elastocolor by Sika Corp.
- Flexxide Elastomer by Carboline
- 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 “GRAY” for bridge abutments, piers & wing walls. This color is from the SikaGard Color Chart and has been approved by the District Bridge Engineer. This color must be exactly reproduced as certified by the manufacturer in order to be allowed to use the Flexxide or Colorastic coatings (at this time Flexxide has matching color samples that have been pre-approved).

PREPARATION & PROTECTION OF SURFACES

All vegetation growing adjacent to or within the limits of the concrete surfaces to be coated shall be removed and properly discarded. All debris adjacent to or within the limits of the concrete surfaces to be coated shall be removed and properly discarded (this includes all bridge abutment & pier seats). All means & methods for vegetation and debris removal are subject to the approval of the Engineer.

Existing steel superstructure surfaces (including bearings), utilities, drain lines, etc. at the abutments and piers shall be protected to ensure that no elastomeric coating contaminates the surfaces. All means & methods for protection of the existing surfaces are subject to the approval of the Engineer. Any contamination of existing surfaces will be cleaned up at the contractor’s expense.
ITEM 964.21 (Continued)

All surfaces to be coated 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 deteriorated 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 is dry and the surface preparation has been approved by the Engineer.

APPLICATION

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 (2) coats shall be applied to achieve a total DFT of sixteen (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 AND BASIS OF PAYMENT

Elastomeric Protective Coating shall be measured in place by the following:

Square Foot for all concrete surfaces to which the coating is applied, complete in place, and accepted.

The Unit Contract Prices shall include all labor, materials, tools, equipment, mobilization and incidentals necessary to complete the work, including all preparation & protection of surfaces.

The Contractor will also supply a wet/dry film thickness gauge for the use of the Engineer, the cost of this device will be considered incidental to this Item. The Contractor will retain ownership of the gauge.

Concrete repairs will be paid for under the applicable contract Items.
ITEM 971.2 TEMPORARY ASPHALTIC BRIDGE JOINT SYSTEM

Description
The work shall include the furnishing and installation of a polymeric binder and aggregate system composed of hot mix asphalt, placed into a prepared joint blockout after removal of the existing median barrier as shown on the plans. The system shall provide a flexible waterproof bridge joint capable of accommodating a total movement of up to 2 inches (50 mm) from maximum expansion to maximum contraction, and maintain a continuous load bearing surface. Contractor shall maintain the integrity of the joint throughout construction as part of this item.

Materials
Temporary wearing surface shall meet the requirements of section 472, Hot Mix Asphalt for Miscellaneous Work. Materials shown on the plans for the temporary joints shall meet the requirements specified in the following Subsections of Division III, Materials:

- Polyurethane Joint Sealer, Non-Sag M9.14.4
- Backer Rod M9.17.2
- Bridge Plate for Asphaltic Bridge Joint System M9.17.3

Construction Methods
General.
A qualified employee of the manufacturer or an installer certified by the manufacturer and approved by the Department shall be at the job site prior to the beginning of the joint construction process to instruct the work crews in proper joint construction procedures and shall remain on the job site for the duration of the joint installation.

The minimum ambient air temperature during installation shall be 40°F and rising.

The Contractor shall produce uniform and parallel surfaces in the forming and placement of the blockout area within the reinforced concrete deck slabs as detailed on the plans. The formed blockout area shall be protected by the Contractor to prevent any edge damage by any site equipment throughout the on-going construction process.

The Contractor shall produce the required gap width within the full depth of the joint as dimensioned on the plans.

Immediately prior to placing any binder, the blocked out section and the joint gap shall be inspected full depth and any debris shall be removed. Immediately thereafter the blockout and road surface 6 inches either side of the blockout shall be thoroughly cleaned and dried using a hot compressed air (H.C.A.) lance capable of producing flame-retarded air stream at a temperature of at least 2,000°F. The lance’s blast orifice shall be capable of producing 150 psi of pressure (1MPa).

The binder shall be melted and heated to the application temperature in a double jacketed, hot oil, heat transfer kettle, or as recommended by the manufacturer. The kettle shall be equipped
ITEM 971.2 (Continued)

with a continuous agitation system and temperature controls that can accurately maintain the material temperatures.

The binder shall be poured into the joint gap. The binder shall overfill the roadway joint gap to allow the binder to be spread onto the adjacent concrete deck in order to form a bond breaker between the deck and the bridge plate.

The bridge plate shall be centered and placed over the entire length of the roadway joint gap. The plate shall be secured by placing locating pins through the pre-drilled holes into the joint gap backer rod. The bridge plate sections shall not overlap.

The final layer shall be raked level and compacted flush with adjacent deck surface. This layer shall be compacted to the point of refusal with a 1½ to 2½ ton (1½ to 2½ Mg) roller to ensure the proper density and interlocking of the aggregate in the layer.

Immediately following the compaction, the surface of the joint and surrounding road shall be dried and cleaned using the H.C.A. lance.

Sufficient binder shall immediately be spread over the joint and adjacent road surface to fill surface voids and seal the surface stone. The finished joint shall then be dusted with a fine, dry aggregate to prevent tackiness.

Quality Control

The Contractor shall have sufficient mixers and personnel at the site to assure continuous and timely installation of the joint.

The Installer shall have previously demonstrated the ability to have successfully produced a joint of similar nature and shall provide documentation of a working joint to the Department.

The Contractor shall furnish Certified Test reports, Materials Certificates and Certificates of Compliance for the asphaltic polymeric binder. The backer rod and locating pins require Certificates of Compliance.

PAYMENT

Method of Measurement

Item 971.2 Temporary Asphaltic Bridge Joint System will be paid for at the contract unit bid price per foot, as measured along the center median complete in place.

The joint treatment at the terminations at the abutments shall be considered incidental to the work to be done under these items.
ITEM 971.2 (Continued)

Basis of Payment

Payment shall be considered full compensation for installation of the Temporary Asphaltic Bridge Joint System including all labor, material, equipment, manufacturer’s representative and all items incidental to the satisfactory completion of the work. Removal of existing joints and materials and removal of temporary asphaltic bridge joint system will be paid for under Item 115.01 Partial Demolition of Bridge No. F-07-045.

ITEM 992.1 ALTERATIONS TO BRIDGE STRUCTURE NO. F-07-045 LUMP SUM

Work under this Item shall conform to the applicable provisions of Section 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: complete deck replacement, complete barrier replacement, (including portions of adjacent wingwall replacement shown on plans), new stringer shear studs, beam pedestal seats at the abutments, elastomeric sliding bearings with anchor bolts at the abutments, approach slabs, guardrail transition bases, snow fence, spray applied waterproofing membrane on bridge deck, superpave wearing surface, and bridge joints (asphaltic and pavement sawcut). Repair of holes in the new concrete deck for the temporary barriers shall be included in this item.

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.
ITEM 992.1 (Continued)

SAWING & SEALING JOINTS IN ASPHALT PAVEMENT AT BRIDGES

Work under this section shall consist of cutting straight vertical joints in the asphalt pavement at locations shown on the plans and/or as directed by the Engineer.

The asphalt pavement shall be cut straight with an approved power driven saw with an abrasive blade. The saw cut shall consist of a 1/8 inch wide by 1 ½” deep sawcut combined with a 3/8” wide by ½” deep saw cut as detailed on the plans. The saw cut shall extend from curb to curb.

The work under this Item consists of saw cutting the existing pavement at the bridge to the depth, width and shape shown on the Plans.

Prior to the start of the asphalt pavement operation, the Contractor shall place a mark on each curb or barrier on either side of the paved roadway. These marks shall be aligned with the actual end of the bridge deck and shall be placed so that they will not be covered or otherwise obscured by the asphalt pavement.

After the completion of the paving operation, the Contractor shall snap a straight chalk line on the pavement between these two marks. The Contractor shall then saw cut the pavement along this line to the depth, width and shape shown on the Plans. The equipment shall be approved by the Engineer prior to commencing work.

After completing the saw cutting, the Contractor shall clean the saw groove of any dust and debris with an oil free air blast. If the groove was wet sawn, the groove shall be cleaned with a water blast to remove any remaining slurry and debris, vacuumed with a Wet-or-Dry vacuum to remove any standing water, and then dried with an air blast from a Hot-Air-Lance.

Once the groove is clean and dry, the Contractor shall fill it completely with a hot-applied bituminous crack sealer meeting the requirements of M3.05.4 in accordance with the manufacturer’s application instructions and restrictions regarding ambient and material temperatures. The crack sealer shall be thoroughly cured prior to opening the road to traffic. To reduce tackiness, only boiler slag aggregate (black beauty) shall be scattered over the sealer when deemed necessary by the Engineer. Conventional sand shall not be used for this purpose.

The hot-poured joint sealer shall conform to the material specifications of M3.05.0. Payment will be incidental to the cost of Item 992.1.
ITEM 992.1 (Continued)

CONCRETE STRUCTURES

Concrete structures shall meet the requirements of Section 900 and the following:

The work under this heading does not include any items listed separately. Form liners, threaded inserts, miscellaneous steel, Styrofoam, preformed fillers, closed cell foam, joint sealers, waterstops, expansion joints, construction joints, mechanical reinforcing bar splicers, utility sleeves, and brickwork for closing utility openings shall be considered incidental to the work involved in the furnishing and placing of concrete.

4000 PSI, ¾ IN., 585 HP CEMENT CONCRETE

The work to be done under this heading shall conform to the relevant provisions of Subsection 901 of the Supplemental Specifications and the following:

4000 PSI, ¾ IN., 585 HP Cement Concrete shall be used to construct the deck slab and at those areas designated by the Engineer, and/or as designated on the Plans.

4000 PSI, ¾ IN., 585 HP Cement Concrete shall conform to all material requirements contained in Subsection M4.06.1 of the Standard Special Provisions, with the exception of cementitious content, which shall be limited to a maximum of 585 pounds per cubic yard.

PLACEMENT, FINISHING AND CURING OF CAST IN PLACE CONCRETE DECKS

The construction of the cast in place concrete deck shall be in accordance with Subsection 901.66 of the Supplemental Specifications and as modified by the following.

Subsection 901.66 A

The entire existing Subsection 901.66 A shall be replaced by the following:

At least 30 calendar days prior to the proposed start of placing the concrete bridge deck, the Contractor shall submit to the Engineer for approval a Placement and Curing Plan that will specify all of the steps, methods, equipment and personnel that Contractor shall use to construct the concrete deck in compliance with these specifications. Approval of this plan will not relieve the Contractor of the responsibility for the satisfactory performance of his/her methods and equipment. The Placement and Curing Plan shall, at a minimum, specify:
ITEM 992.1 (Continued)

1. The method that will be used to convey the concrete from the truck to all locations on the
deck where it will be placed. This will also include the conveyance equipment, rate of
concrete placement and the estimated time for the completion of all concrete placement,
consolidation and finishing operations up to the start of curing.

2. The type and number of finishing machines and work bridges including the plan for
erecting the rails and operating the finishing machine. This will include proof of the
following minimum operator qualifications for the bridge deck finishing machine:
   a) Five years experience operating machines or similar type and manufacturer as that
      proposed.
   b) Proof of no less than five bridge decks of similar size, placed using a machine of
      the same manufacturer as that proposed.
   Or, as a substitute for a. and b.:
   c) A representative of the manufacturer of the bridge deck finishing machine shall be
      present on the site a minimum of 24 hours in advance of the proposed deck
      placement to approve the setup of the machine and rail system, and the
      representative shall be present for the entire duration of the placement of the deck
      concrete using the bridge deck finishing machine.

3. The sequence of concrete pours, including any retarders or other concrete admixtures and
dosage rates required to complete the placement, consolidation and finishing operations
prior to curing in accordance with the Contractor’s intended sequence of operations.

4. The provisions for consolidating the concrete including the number of vibrators and
number of personnel that will be dedicated exclusively for this operation.

5. The method for curing the concrete deck. This will include the number of personnel that
will be exclusively dedicated for this operation, the means for pre-wetting the burlap, the
location of the wet burlap at the work site, the means for conveying the wet burlap to the
work bridges and the amount of wet burlap that will be required to completely cover the
deck. It shall also include a letter certifying that the fogging equipment attached to the
finishing machine produces atomized water droplets with an average droplet diameter of
0.003 inches (76 μm) or less that are uniformly distributed at a rate of at least 0.10
gallons/square foot/hour (4 liters/square meter/hour)

6. Consideration of weather conditions that can be anticipated at the time of placement of
the deck concrete. When cold weather can be reasonably expected either within 7 days
before the anticipated concrete placement, or during the 14 day wet curing period, the
Contractor shall include detailed procedures for the production, transportation, and
placement of the concrete, including: provisions for enclosures to protect the placed
concrete, including a plan of heating devices, types and locations around structure and the
means for holding the enclosure securely in place; cold weather curing procedures; and
the means for monitoring the temperature of concrete during cold weather.

7. Equipment that will be used to measure ambient air temperature, concrete temperature
and relative humidity of the air at the construction site.
ITEM 992.1 (Continued)

8. The number of all other personnel, in addition to the ones already identified in bullets 4 and 5, who will be engaged in the concrete placement operation and their assigned tasks. All personnel, including the ones already identified in bullets 4 and 5, shall have the experience and skills appropriate to their working assignment.

9. A contingency and backup plan in case of equipment failure.

A pre-placement meeting shall be held between the Contractor and the Engineer at least 2 weeks prior to the start of any concrete placement for the deck slab. The Contractor and the Engineer shall review all aspects of the approved Placement and Curing Plan.

Twenty four (24) hours before the scheduled start of concrete placement, the Engineer shall verify that all equipment and materials identified in the Placement and Curing Plan are onsite and have been tested to insure that they are in working order and are functioning as required. Upon the successful completion of this verification, the Engineer shall allow the concrete placement to proceed. If any equipment or material such as burlap is missing or equipment is malfunctioning, the concrete placement operations shall be canceled and shall not be rescheduled until such time as the missing equipment or material is delivered to the site or the equipment has been repaired and is demonstrated to be in working order and functioning as required. The Contractor shall be responsible for any costs associated with the cancellation and rescheduling of the concrete placement operation that is due to missing equipment or material or malfunctioning equipment.

Subsection 901.66 B
The following shall be added to the requirements of the existing Subsection 901.66 B:

Cement concrete for bridge decks shall not be placed when the ambient air temperature exceeds 85°F (29°C) or is expected to exceed 85°F (29°C) during the placement of the deck. The Contractor shall measure the ambient air temperature, relative humidity of the air at the construction site and concrete temperature. Concrete temperature will be taken from the same sample used for slump and air content tests. These measurements will be taken prior to the commencement of concrete placement to determine the evaporation rate using Figure 1 and every hour thereafter until the end of the concrete placement, consolidation and finishing operation to check the evaporation rate in order to determine if it remains within the limits specified. To document the readings, the Bridge Deck Placement Environment form shown below shall be filled out by the Contractor and submitted to the Engineer.
### ITEM 992.1 (Continued)

#### Bridge Deck Placement Environment

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<tr>
<th>City/Town:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge Number:</td>
<td>Contract Number:</td>
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<tr>
<td>Start Station:</td>
<td>End Station:</td>
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<th>Time</th>
<th>Air Temp.</th>
<th>Relative Humidity (%)</th>
<th>Concrete Temp.</th>
<th>Wind Velocity</th>
<th>Evaporation Rate</th>
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<tbody>
<tr>
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<td>Hourly</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>After Casting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Signature - Contractor’s Authorized Representative: Printed Name:

Signature - MassDOT Resident Engineer: Printed Name:

The existing Subsection 901.66 B 1 shall be replaced by the following:

1. Misting the surface of the concrete with pressurized equipment attached to the finishing machine until the curing cover is applied. The water mist shall be distributed at a rate of at least 0.10 gallons/square foot/hour (4 liters/square meter/hour). For example, on a deck that is 30 feet (9.1 meters) wide, the system must be able to apply at least 3.0 gallons of water per linear foot per hour (36.4 liters/meter-hour). The nozzles must produce an atomized fog mist that will maintain a sheen of moisture on the concrete surface without ponding. The atomized water droplets shall have an average droplet diameter of 0.003 inches (76 μm) or less. The area of coverage from each nozzle shall overlap all adjacent coverage areas by at least 12 inches (305 millimeters). Water that drips from the nozzles shall not be allowed to fall onto the concrete that is being cured.

The following shall be added to the requirements of the existing Subsection 901.66 B:

4. Reschedule the placement until such time as the environmental conditions are acceptable, such as at night or during early morning hours.
ITEM 992.1 (Continued)

Subsection 901.66 D
The entire existing Subsection 901.66 D shall be replaced by the following:

The concrete shall be consolidated by means of approved high frequency internal vibrators (9000 – 12,500 vibrations per minute in concrete) that shall be applied in a manner to ensure the consolidation of the concrete throughout the full depth of the deck in advance of the finishing machine. The Contractor shall take preventive measures to insure that the vibrators during operation shall not damage the epoxy coated reinforcement. The Contractor shall have no less than 2 approved vibrators in service at all times during the placement of the first 30 cubic yards (27 cubic meters) per hour of cement concrete placed and shall have additional vibrators in service at all times at the rate of one vibrator per each additional 30 cubic yards (27 cubic meters) per hour of cement concrete placed. These vibrators shall be in operation in addition to the surface vibratory action from the vibrating pan(s) of the finishing machine. Consolidation by the vibrators shall leave the concrete free from voids and insure a dense surface texture, but the vibration of the concrete shall not be continued so long as to cause segregation or bleeding. A small uniform quantity of concrete shall be maintained ahead of the screed on each pass. At no time shall the quantity of concrete carried ahead of the screed be so great as to cause slipping or lifting.

SHEAR CONNECTORS

The work included in this item includes furnishing and installing shear connectors as indicated on the plans. All shear connectors shall conform to the requirements of Section M8.04.1 of the MassDOT Standard Specifications.

CORING AND GROUTING ANCHOR BOLTS

The work to be done under this heading shall consist of drilling holes in the existing structure for steel anchor bolts for bearing replacements, as shown on the Contract Plans. Anchor bolts are to be installed in place in the new or existing holes as part of this item.

Anchor bolt embedment shall be as shown on the Plans.
ITEM 992.1 (Continued)

Materials
The grout to be used for these anchor bolts shall be one of the following:
   1. “Garonite HD”, as manufactured by Garon Products, Inc. of Wall, New Jersey
   2. “FX-228”, as manufactured by Fox Industries, Inc. of Baltimore, Maryland

Epoxy, vinyl, or polyester resin adhesives shall not be used.

The Contractor shall submit to the Engineer for approval the product data on the grout selected along with the manufacturer’s recommended hole size prior to coring and grouting the anchor bolts.

The Non-Shrink Grout shall have a minimum compression strength of 8,000 psi after 28 days as determined by testing under ASTM C 109. The grout mix shall exhibit no shrinkage on setting but may exhibit slight expansion of no more than 3% when tested by methods conforming the requirements of ASTM C 827. All grout materials shall be on the MassDOT's Qualified Construction Materials List (QCML).

Anchor bolts, nuts and washers shall meet the requirements of ASTM F1554, Grade 105. All bolts, nuts and washers shall be hot-dip galvanized in accordance with ASTM A153 (AASHTO M232).

Construction Methods

All anchor bolt holes shall be diamond core drilled. The inner surfaces of diamond core drilled holes shall be scored to develop sufficient keying action. The method of scoring of the hole’s inner surfaces shall be subject to the approval of the Engineer.

The diameter of the core drilled 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 anchor bolt installation.

Core drilling anchor rod holes in the existing abutment beam seats shall be as shown on the plans. Existing reinforcing in the abutment stem shall be cut as needed by the core drilling. Any damage to the existing concrete 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.
ITEM 992.1 (Continued)

The Contractor shall strictly follow the recommendations of the manufacturer for mixing and placing the grout material prior to the placement of the anchor bolts. The Contractor shall adhere to the ACI code requirements regarding minimum and maximum temperatures while placing the grout or any manufacturer recommendations, whichever is more stringent. Any excessive grout around the hole after placement of the anchor bolt shall be struck off smooth while the grout is still fresh.

Anchor bolts shall be set as shown on the plans unless the Engineer permits changes. Templates, or other suitable means, shall be used to keep the bolts vertical at the required embedment and in the correct horizontal position during placement. If the Contractor elects to drill the finished, cured concrete in order to set the anchor bolts, the reinforcing steel in the pedestals shall be positioned prior to casting the concrete so that it will not be damaged during drilling.

DRILLING AND GROUTING Dowels

The work to be done under this heading shall consist of drilling and grouting holes in the existing structure for steel reinforcing dowels in concrete, as shown on the Contract Plans. Dowels are to be grouted in place in the new holes as part of this item.

Dowel spacing and embedment shall be as shown on the Plans.

Materials

The grout to be used for these anchor bolts shall be one of the following:
1. “Garonite HD”, as manufactured by Garon Products, Inc. of Wall, New Jersey
2. “FX-228”, as manufactured by Fox Industries, Inc. of Baltimore, Maryland

Epoxy, vinyl, or polyester resin adhesives shall not be used.

The Contractor shall submit to the Engineer for approval the product data on the grout selected along with the manufacturer’s recommended hole size prior to drilling and grouting the dowels.

The Non-Shrink Grout shall have a minimum compression strength of 8,000 psi after 28 days as determined by testing under ASTM C 109. The grout mix shall exhibit no shrinkage on setting but may exhibit slight expansion of no more than 3% when tested by methods conforming the requirements of ASTM C 827. All grout materials shall be on the MassDOT’s Approved List of Materials.

Steel reinforcing bars used for dowels shall be epoxy coated and shall meet the requirements of Section 901.
ITEM 992.1 (Continued)

Construction Methods

All holes for dowels shall be air drilled provided that the minimum edge distance of 3" is observed. Should, in the Engineer’s opinion, air drilling be inappropriate due to questionable strength of the existing substrate, or insufficient edge distance, the holes shall be diamond core drilled. The inner surfaces of diamond core drilled holes shall be scored to develop sufficient keying action. The method of scoring of the hole’s inner surfaces shall be subject to the approval of the Engineer.

The diameter of the drilled 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 existing reinforcing or portion of the structure that is to remain in place. Any damage to the existing concrete 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 dowels. The Contractor shall adhere to the ACI code requirements regarding minimum and maximum temperatures while placing the grout or any manufacturer recommendations, whichever is more stringent. Any excessive grout around the hole after placement of the dowel shall be struck off smooth while the grout is still fresh.

Dowels shall be set as shown on the plans unless the Engineer permits changes. If dowels are cast in substructure concrete, templates, or other suitable means, shall be used to keep the dowels in the correct alignment and at the required embedment during concrete placement.

MEMBRANE WATERPROOFING FOR BRIDGES – SPRAY APPLIED

Description

The work under this Item shall conform to applicable sections of Section 965 of the Standard Specifications and the following:

The work to be performed shall consist of the furnishing and application of an approved cold liquid spray applied, seamless methylmethacrylate or polyurea membrane system and all concrete surface preparation work necessary to install the membrane system.
**ITEM 992.1 (Continued)**

The membrane system shall consist of the primer, the membrane, aggregated keycoat layer, and polymer modifier tack coat.

**General**

Membrane application shall be in accordance with the manufacturer’s instructions. The Manufacturer’s representative shall be present during the entire application and shall oversee surface preparation, installation and quality control testing. The handling, mixing, and addition of membrane components shall be performed in a safe manner to achieve the desired results in accordance with the manufacturer’s recommendations. All open flames and spark producing equipment shall be removed from the work area prior to commencement of application. No smoking signs shall be posted at the entrances to the work. The Applicator shall be responsible for the protection of equipment and adjacent areas from overspray or other contamination.

The Contractor and the Applicator shall agree upon a schedule for coordination between trades working in the areas that are to receive the membrane system. Before beginning the application, the Contractor shall schedule and conduct a meeting at the site to review the approved submittals, and other pertinent matters related to the application including the schedule for coordination between trades. Present, as a minimum, shall be the Contractor, the Applicator, the Manufacturer’s Field Representative and the Engineer.

All components of the membrane system shall be delivered to the site in the manufacturer’s original packaging, clearly identified with the products type and batch number. The Contractor shall provide the Applicator with a storage area for all components. The area shall be cool, dry, out of direct sunlight, and complies with relevant health and safety regulations. Copies of material safety data sheets for all components shall be kept on site at the Contractor’s field office.

Only products pre-approved by MassDOT will be accepted for use. Product approval shall require the demonstration by the manufacturer that the membrane system meets the material specifications and that the entire membrane system is designed and tested as waterproofing for use on bridge deck applications. The manufacturer shall demonstrate through testing prior to approval that the system meets material properties and performance requirements stated herein.

**Submittals**

The Contractor shall submit to the Engineer for approval the membrane system material specifications, installation procedure, application equipment and testing results as specified in the materials section as well as product performance data, storage and protection instructions, handling and mixing instructions, material safety data sheets (MSDS) for all components.
ITEM 992.1 (Continued)

An 8 inch square sample of the proposed membrane representing in color, texture and thickness satisfactory field application shall be provided to the Engineer. All submittals shall be certified to be in conformance with the manufacturer’s instructions.

Materials

The waterproofing membrane shall consist of an approved one or two coat rapid curing cold liquid spray applied, seamless methylmethacrylate or polyurea membrane, a primer, polymer modified tack coat and aggregated keycoat layer. The total minimum base thickness for membrane shall be 80 mils not counting primer or aggregated keycoat, measured over peaks. The membrane shall easily accommodate the need for day joints and patch repairs. The membrane shall be able to bridge live cracks up to 1/8 inch in width. Prior to priming, submit to the Engineer for approval, certified independent test reports demonstrating conformance to the following performance criteria:

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<thead>
<tr>
<th>PROPERTY</th>
<th>TEST</th>
<th>REQUIREMENTS</th>
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<tbody>
<tr>
<td>Minimum Thickness (Membrane)</td>
<td>ASTMD 4541</td>
<td>100 psi minimum. Failure in concrete below this value will require additional concrete preparation</td>
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<tr>
<td>Water Vapor Transmission</td>
<td>ASTM E 96 Procedure B</td>
<td>Permeance &lt; 1.17 Perms (grains/(hr-ft²-in. Hg))</td>
</tr>
<tr>
<td>Adhesion to concrete</td>
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<td></td>
</tr>
<tr>
<td>Tensile</td>
<td>ASTM D 638</td>
<td>&gt; 1,700 psi</td>
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<tr>
<td>Elongation at Break</td>
<td>ASTM D 638</td>
<td>130 % Typical</td>
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<tr>
<td>Crack Bridging (Neat Material + Aggregated Keycoat)</td>
<td>ASTM C 1305</td>
<td>Pass ≥ 25* cycles at -15°F no failure at 1/8 inch</td>
</tr>
</tbody>
</table>

* MassDOT requirement
ITEM 992.1 (Continued)

The primer shall promote adhesion of the membrane to the concrete surface. The chemical composition of the primer, membrane, aggregate keycoat and tack coat that make up the membrane system shall conform to the manufacturer’s specifications for the material and shall be approved by the manufacture as being compatible for use with the specified membrane. Cleaning solvents shall also be as approved by the manufacturer for use with the membrane.

Membrane Waterproofing (Spray Applied) for Existing Decks shall be asbestos-free.

Only products pre-approved by the Department will be accepted for use.

Applicator

The system shall be applied by an Applicator who is approved by the membrane system manufacturer. The Applicator installing the membrane shall have at least 2 years of experience on membrane installation with applicator certified by the membrane manufacturer. The Engineer shall receive manufacturer’s written approval of the Applicator’s qualifications at least seven days prior to the application of any system component. This approval shall apply only to the named individuals performing the application.
ITEM 992.1 (Continued)

Application Procedure

The application procedure shall consist of concrete surface preparation, applying primer, applying membrane, applying aggregated keycoat layer, applying Polymer Modified tack coat. Special attention shall be paid to the bridge deck surface preparation prior to the membrane system application. A representative from the membrane manufacturing company shall be present for the entire duration of the membrane application. The manufacturer’s representative shall be responsible for the field testing, testing including but not limited to adhesion bond test and deck moisture content and all other required documentation and reporting.

The membrane system shall not be applied in either wet, damp or foggy weather, or when the ambient temperature is 40° F or below or is forecast to fall below 40° F during the application period.

The membrane waterproofing on bridge decks shall not be placed until the Contractor is ready to follow within 24 hours with the first layer of Hot Mix Asphalt pavement; a longer period of time will be allowed only with the approval of the Engineer.

Where the areas to be waterproofed are bound by a vertical surface including, but not limited to, a curb or a wall, the membrane system shall be continued up the vertical as necessary. A neat finish with well defined boundaries and straight edges shall be provided.

1. CONCRETE SURFACE PREPARATION: Concrete surfaces which are to be waterproofed shall be screeded to the true cross section, sounded and all spalls and depressions shall be repaired prior to the application of the prime coat. Depressions shall be filled to a smooth flush surface with 1:2 mortar (1 part cement to two parts sand) or an approved rapid setting patching mortar that is compatible with the waterproofing system. Other surfaces shall be trimmed free of rough spots, projections or other defects which might cause puncture of the membrane so that the surface profile of the prepared concrete surface shall not exceed a ¼ inch amplitude, peak to valley.

The use of resin or wax-based deck curing membranes is not acceptable.

Immediately prior to the application of the primer, the concrete to which the membrane is to be applied shall be cleaned of all existing bond inhibiting materials using an abrasive blast. Dust or loose particles shall be removed using clean, dry oil-free compressed air or industrial vacuums. The surface preparation shall insure that the concrete surface shall be free of bituminous product, surface laitance, oil staining, soiling, and dust and produce a clean dry surface.
ITEM 992.1 (Continued)

Random tests for adequate tensile bond strength of the membrane shall be conducted on the concrete in accordance with ASTM D 4541 using the membrane manufacturer’s primer and membrane to achieve minimum bond strength of 100 psi with failure in the concrete. Additional preparation of the concrete shall be required if a bond strength of at least 100 psi is not demonstrated in the concrete-membrane interface.

2. APPLYING PRIMER: The primer shall only be applied when the temperature of the concrete deck surface exceeds the dew point by at least 5º F and when the concrete deck surface has moisture content of 5.0% or less as confirmed by a portable electronic surface moisture meter supplied by the Contractor. The primer shall be applied to ensure full coverage. In general, for conventional concrete mixes, the concrete to which the membrane is to be applied shall have cured a minimum of 7 days prior to the application of the primer. For precast and high early mixes or rapid sets for closure pours, MassDOT may consider less than 7 days subject to the approval of the manufacturer and the results of moisture test results and adhesion pull test results performed by the manufacturer’s representative in accordance with these specifications and submitted to the Engineer for approval prior to primer placement. A second coat of primer shall be required if first coat of primer is absorbed by the concrete. The primer shall be over sprayed with the membrane for up to the manufacture allowed re-coat drying time but in no case it shall exceed 24 hours. Beyond this period, the surface shall be prepared again and re-primed following the manufacturer’s recommendations prior to membrane application.

3. APPLYING MEMBRANE: The waterproofing membrane shall be applied in a methodical manner. The Applicator shall follow the approved mixing and application procedure. Unless approved by the Engineer, the membrane shall be spray applied, with the mixing of the two components taking place at the nozzle, and shall be applied to the primed deck in accordance with the manufacturer’s instructions. The spray equipment shall be computer controlled, monitoring mixing ratios and quantities applied, and the latter allowing coverage rates to be checked. Following the application of membrane system and before holiday testing, the cured surface shall be visually inspected. If any defects or pinholes are found, an appropriate quantity of membrane shall be mixed by hand and repairs effected by touch-in with a putty-knife hand tool, ensuring in all cases that the thickness of the repair is sufficient to bring the area up to the specified thickness and that the thickness of the repair patch is a minimum 80 mils. minimum measured over peaks, or the thickness used to pass the ASTM C 1305 Crack Bridging Test.
ITEM 992.1 (Continued)

4. APPLYING AGGREGATED KEYCOAT: Following the membrane application, a layer of resin, compatible with the membrane shall be spray applied to a thickness of 30 to 40 mils into which a crushed basalt aggregate approved by the membrane manufacturer shall be broadcast ensuring minimum 95% coverage.

5. APPLYING POLYMER MODIFIED TACK COAT: The manufacturer’s tack coat shall be applied in accordance with the membrane manufacturer’s recommendations after a minimum of three hours from initial membrane application. Polymer modified tack coat consisting of either a polymer modified asphalt emulsion or a polymer modified asphalt binder approved for use by the Engineer. The Tack Coat shall be allowed to cool for a minimum of 1 hour prior to the application of the hot rolled asphalt.

Certificate of Analysis (COA): A minimum of 48 hours prior to placement of Polymer Modified Tack Coat (PMTC), a COA shall be submitted by the supplier of the PMTC to the Engineer for Research and Materials approval.

During paving, a light soap spray should be applied to the paving equipment wheels to prevent removal of the tack coat.

6. REPAIRS: If an area of membrane requires repair or if the membrane becomes damaged, a patch repair shall be carried out to restore the integrity of the membrane system. The damaged area shall be cut back to sound materials and wiped with a solvent up to a width of at least 6 inches beyond the periphery of the damaged area, removing contaminants. The concrete shall be primed as necessary, followed by the application of the membrane. A continuous layer shall be obtained over the concrete with a 6 inch overlap onto the existing membrane. The solvent shall be as approved by the membrane waterproofing manufacturer. Repairs shall comply with the manufacturer’s guidelines for any over-coating times. Where the membrane is to be joined to existing cured material and at day joints, the new application shall overlap the existing membrane/day joint by at least 4 inch. This condition shall also apply at the longitudinal stage construction joints. Remove existing waterproofing at the temporary longitudinal joints for 4 inch onto the existing deck prior and lap new waterproofing across joint or as per manufacturer recommendation. As existing and proposed top of concrete will be at different elevations spray will also be applied to the vertical surface. The existing membrane/day joint shall be cleaned of all contamination including tack coat material or dirt to an edge distance of a least 6 inch and wiped with a solvent as approved by the membrane waterproofing manufacturer.
ITEM 992.1 (Continued)

7. TRIAL PLACEMENT TO VALIDATE BOND STRENGTH OF SPRAY APPLIED: A trial placement using the approved spray applied waterproofing membrane shall be required before and as close as possible to the intended date of the deck slab waterproofing placement to emulate actual placement conditions. Mock up as placed shall be representative of final bridge placement including HMA topping as specified. The intent is to validate the Adhesion Tensile Bond Strength in accordance with ASTM D 4541 using the membrane manufactures primer and membrane for those projects where the available cure time may adversely affect the required bond strength of the spray applied membrane system. The minimum tensile bond strength required per this specification is 100 psi. The trial specimens should be taken as directed by the Engineer. These specimens shall be used to test the adhesion bond strength and the moisture content on the deck. The moisture content shall not exceed 5% per this specification. (See below, Item (a) under Field Quality Control). Trial placement shall simulate the actual job conditions in all respects including air temperature, transit equipment, travel conditions, admixtures, forming, placement equipment, and personnel. If there are problems, the Engineer may require the Contractor to conduct more trial placements. If weather conditions change between completion of trial testing and actual placement, adhesion bond testing and deck moisture testing shall be repeated as directed by the Engineer. Removal of the trial placement concrete from the job site is the responsibility of the Contractor. In addition to the requirements contained herein, all weather and concrete temperature requirements contained in Subsection 901.64 shall be satisfied.

8. FIELD QUALITY CONTROL: The following tests shall be conducted by the manufacturer’s representative and recorded on a test report form to be submitted to the Engineer. All test reports shall be submitted to the Engineer within 5 working days of the test completion.

a. Deck moisture: The concrete deck surface moisture content cannot exceed 5% as confirmed by a portable electronic surface moisture meter supplied by the Contractor. Submit moisture test results to the Engineer for approval, prior to priming.

b. Film Thickness:

1. Wet film thickness shall be checked every 300 square feet using a gauge pin or standard comb type thickness gauge or a magnetic gauge. Film thickness checks shall be carried throughout the application process. During the Final Review, the cured membrane film thickness shall be checked by a dial thickness gauge.

2. Dry Film Thickness: If membrane system cures too quickly to perform wet film thickness testing, dry film thickness shall be checked every 300 square feet using magnetic or ultrasonic gauges, or using a destructive method. If destructive method is used, repair areas by respraying or filling with special two component gun grade material provided by the waterproofing manufacturer.
ITEM 992.1 (Continued)

c. Pin Hole/Holidays: The entire surface of the membrane shall be inspected for pin holes and/or holidays by the manufacturer’s representative. All pin hole/holidays shall be located, marked for repair, documented, and repaired in accordance with a repair procedure developed by the manufacturer and approved by the Engineer. Adhesion Tensile Bond: Random tests for adequate tensile bond strength shall be conducted in accordance with ASTM D 4541 using the membrane manufacture’s primer and membrane. The test shall be conducted using the membrane as the adhesive to the test dolly. Minimum bond strength of 100 psi will be required for acceptance. Failure in the concrete will require additional surface preparation of the concrete. Tester Model 106, or approved similar equipment shall be used. A frequency of 1 test per 5,000 square feet or fraction thereof shall be conducted. Areas smaller than 5,000 square feet shall receive a minimum of 3 tests.

d. Visual inspections shall be conducted throughout the application process. The Manufacturer’s Field Representative shall take progress photos for incorporation with his final review report to the Engineer.

Final Review

The final review visual inspection shall be conducted jointly by the Applicator, Contractor, Manufacturer’s Field Representative and Engineer. Irregularities or other items that do not meet the requirements of the Special Provisions and the Plans shall be addressed/repaired at this time, at no additional cost to the MassDOT.

PAYMENT

Schedule of Basis For Partial Payment

Within 10 (ten) days after the date of the “Notice to Proceed”, the Contactor shall submit on his/her proposal form a schedule of unit prices for the major component Sub-Items that make up Item 992.1 as well as his/her total bridge structure Lump Sum cost for Bridge Structure No. F-07-045. The bridge structure Lump Sum breakdown quantities provided in the proposal form are estimated and not guaranteed. The total of all partial payments to the Contractor shall equal the Lump Sum Contract price regardless of the accuracy of the quantities furnished by the Engineer for the individual bridge components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 992.1 and no further compensation will be allowed.

The schedule on the proposal form applies only to Bridge Structure No. F-07-045. 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 992.1 (Continued)

<table>
<thead>
<tr>
<th>Sub-Item No.</th>
<th>Description</th>
<th>Qty.</th>
<th>Unit</th>
<th>Price Per Unit</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>901</td>
<td>4000 psi, 1.5 in., 565 Cement Concrete</td>
<td>117</td>
<td>CY</td>
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<td>904</td>
<td>4000 psi, 3/4 in., 610 Cement Concrete</td>
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<td>904.3</td>
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<td>910</td>
<td>Steel Reinforcement for Structures</td>
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<td>910.1</td>
<td>Steel Reinforcement for Structures – Coated</td>
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<td>911.1</td>
<td>Shear Connectors</td>
<td>13,300</td>
<td>EA</td>
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<tr>
<td>912.1</td>
<td>Drilling and Grouting Dowels</td>
<td>1,980</td>
<td>FT</td>
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<tr>
<td>913.2</td>
<td>Coring and Grouting Anchor Bolts</td>
<td>64</td>
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<td>923.1</td>
<td>Lam. Sliding Elastomeric Bearing W/Anchor Bolts (0-50)</td>
<td>32</td>
<td>EA</td>
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<tr>
<td>965.2</td>
<td>Membrane Waterproofing for Bridges – Spray Applied</td>
<td>16,055</td>
<td>SF</td>
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<tr>
<td>971</td>
<td>Asphalitic Bridge Joint System</td>
<td>121</td>
<td>FT</td>
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<tr>
<td>975.41</td>
<td>Snow Fence</td>
<td>164</td>
<td>FT</td>
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**TOTAL LUMP SUM CONTRACT BID PRICE OF ITEM 992.1 =**

*** END OF DOCUMENT ***
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TOWN/CITY: Framingham
STA. 461+00.00 to 484+50.00
TYPE OF PROJECT: BRIDGE RECONSTRUCTION

YEAR: Federal Fiscal Year 2016
ROAD: Interstate 90
CLASS: Non Federal Aid
DATE: March 2016

Unclassified Excavation 1,700 Cu. Yards Bridge Excavation 32 Cu. Yards
Class A Trench Excavation 5 Cu. Yards Gravel Borrow Type b 600 Cu. Yards
Class B Trench Excavation 0 Cu. Yards Controlled Density Fill 196 Cu. Yards
Class B Rock Excavation 5 Cu. Yards Ordinary Borrow 50 Cu. Yards
Loam Borrow Excavation 25 Cu. Yards Special Borrow 20 Cu. Yards

PAVEMENT NOTES

PROPOSED FULL DEPTH CONSTRUCTION
AREA = 217 SY

SURFACE COURSE: 1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5)
INTERMEDIATE COURSE: 2-1/2" SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0)
BASE COURSE: 4-1/2" SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)
SUBBASE: 8" GRAVEL TYPE B

PROPOSED FULL DEPTH PAVEMENT (AT APPROACH SLAB)
AREA = 400 SY

SURFACE COURSE: 1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5)
INTERMEDIATE COURSE: 2-1/2" SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0)
BASE COURSE: 4-1/2" SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)
SUBBASE: 6" DENSE GRADED CRUSHED STONE OVER CONCRETE
APPROACH SLAB
PROPOSED BRIDGE DECK PAVEMENT

SURFACE COURSE: 2-1/2" SUPERPAVE BRIDGE PROTECTIVE COURSE - 12.5 (SPC-B-12.5)

AREA = 1,770 SY

PROPOSED PAVEMENT MILLING & OVERLAY

SURFACE COURSE: 1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5) OVER TACK COAT @ 0.05 GAL/SY OVER

INTERMEDIATE COURSE: 2-1/2" TO 4-1/2" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER TACK COAT @ 0.07 GAL/SY OVER EXISTING PAVEMENT

SURFACE COURSE: PAVEMENT MICRO MILLING VARIABLE DEPTH, 2 1/2" MIN. TO MEET PROPOSED GRADING

AREA = 25,625 SY

PROPOSED TEMPORARY PAVEMENT

SURFACE COURSE: 2" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5) OVER

INTERMEDIATE COURSE: 3" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER

BASE COURSE: 4" SUPERPAVE BASE COURSE 37.5 (SBC-37.5) OVER

SUBBASE: 4" DENSE GRADED CRUSHED STONE FOR SUBBASE OVER 12" GRAVEL BORROW (TYPE b) OVER EXISTING SUBGRADE

AREA = 2,280 SY
**PRELIMINARY ESTIMATE OF QUANTITIES**
**DETAIL SHEETS**

ALL ITEMS NOT COMPLETELY DESCRIBED AND LOCATED ON THE PLANS ARE TO BE DETAILED AS SHOWN BELOW:

<table>
<thead>
<tr>
<th>ITEM 109.31</th>
<th>WIND SCREEN FOR DUST CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>On or against barriers for roadways that are located immediately adjacent to an active work zone and as per direction by Engineer.</td>
</tr>
<tr>
<td></td>
<td>Stage 1: STA 464+00 LT &amp; RT to 480+00 LT &amp; RT</td>
</tr>
<tr>
<td></td>
<td>Stage 2: STA 470+00 LT to 474+00 LT</td>
</tr>
<tr>
<td></td>
<td>Stage 3: STA 470+00 RT to 473+50 RT</td>
</tr>
<tr>
<td></td>
<td>Stage 4: STA 464+00 to 480+00 LT &amp; RT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM 109.33</th>
<th>WIND SCREEN REMOVE AND RESET</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As needed when work zones are changed, per TMP drawings, and as per direction by Engineer.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM 109.4</th>
<th>POWER SWEEPER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sweeping will be each week for project duration, and as per direction by Engineer.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM 170.</th>
<th>FINE GRADING AND COMPACTING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For grading and compacting of full depth pavement, temporary pavement, and as directed by the Engineer.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM 222.4</th>
<th>LARGE HOOK LOCK BAR GRATE-FURNISHED AND INSTALLED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At the locations of existing catchbasins within the limit of work prior to any lane shifts if existing is not lock down.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM 222.5</th>
<th>FRAME - TURNPIKE (2 FT. X 4FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At the locations Item 222.4, if directed by Engineer.</td>
</tr>
<tr>
<td>ITEM 231.12</td>
<td>SLOTTED DRAIN</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------</td>
</tr>
<tr>
<td></td>
<td>Along EB I-90 swale, per temporary drainage plans.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM 440.</th>
<th>CALCIUM CHLORIDE FOR ROADWAY DUST CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For use in areas of full depth pavement construction and temporary pavement.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM 443.</th>
<th>WATER FOR ROADWAY DUST CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For use in areas of full depth pavement construction and temporary pavement.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM 451.</th>
<th>HMA FOR PATCHING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As contingency, For repairing pavement at milled rumble strips, And per direction of Engineer.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM 452.</th>
<th>ASPHALT EMULSION FOR TACK COAT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For use on milled surfaces at 0.07 gal/sy For use on base, intermediate, and surface courses at 0.05 gal/sy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM 453.</th>
<th>HMA JOINT SEALANT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Applied at longitudinal edges of paving joints and where pavement abuts curbing Applied at transverse joints between proposed and existing pavement Assumed 12' wide pavement placement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM 470.</th>
<th>HOT MIX ASPHALT BERM, TYPE A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For use if and where to repair existing berm.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM 472.</th>
<th>HOT MIX ASPHALT FOR MISCELLANEOUS WORK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As contingency, and per direction of Engineer.</td>
</tr>
</tbody>
</table>
### PRELIMINARY ESTIMATE OF QUANTITIES

#### DETAIL SHEETS

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITEM 505</td>
<td><strong>GRANITE CURB TYPE VA5 – STRAIGHT</strong></td>
<td>At each corner of the bridge, from end of bridge parapet wall to post 6 of guardrail transition.</td>
</tr>
<tr>
<td>ITEM 509</td>
<td><strong>GRANITE TRANSITION CURB FOR WHEELCHAIR RAMPS - STRAIGHT</strong></td>
<td>At each corner of the bridge, to transition from granite curb to berm or edge of pavement.</td>
</tr>
<tr>
<td>ITEM 635.1</td>
<td><strong>HIGHWAY GUARD REMOVED AND DISCARDED</strong></td>
<td>At each corner of bridge, 25+/- feet from end of bridge parapet wall.</td>
</tr>
<tr>
<td>ITEM 657</td>
<td><strong>TEMPORARY FENCE</strong></td>
<td>Along all work zones, per the TMP drawings, and as per direction by Engineer.</td>
</tr>
<tr>
<td>ITEM 657.5</td>
<td><strong>TEMPORARY FENCE REMOVED AND RESET</strong></td>
<td>Removed and reset around the changed work zones, per stage, as per the TMP drawings and as per direction by Engineer.</td>
</tr>
<tr>
<td>ITEM 697.1</td>
<td><strong>SILT SACK</strong></td>
<td>At all existing and temporary catch basins.</td>
</tr>
<tr>
<td>ITEM 765</td>
<td><strong>SEEDING</strong></td>
<td>Where Loam borrow is placed.</td>
</tr>
<tr>
<td>ITEM 834.17</td>
<td><strong>REFLECTORIZED FLEXIBLE DELINEATOR POST (AMBER)</strong></td>
<td>At each corner of bridge, along proposed median barrier every 1/20 mi.</td>
</tr>
<tr>
<td>ITEM 852</td>
<td><strong>SAFETY SIGNING FOR TRAFFIC MANAGEMENT</strong></td>
<td>As shown on the Temporary Traffic Control Plans and as directed by the Engineer</td>
</tr>
<tr>
<td>ITEM 853.211</td>
<td><strong>TEMPORARY BARRIER REMOVED AND RESET</strong></td>
<td>For Contingency</td>
</tr>
<tr>
<td>ITEM 853.23</td>
<td><strong>TEMPORARY BARRIER (TL-3)</strong></td>
<td>For Contingency</td>
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### PRELIMINARY ESTIMATE OF QUANTITIES
#### DETAIL SHEETS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Description</th>
<th>Details</th>
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<tbody>
<tr>
<td>ITEM 853.24</td>
<td>TEMPORARY RESTRAINED BARRIER ON ROAD</td>
<td>As shown on the Temporary Traffic Control Plans and as directed by the Engineer</td>
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<tr>
<td>ITEM 853.241</td>
<td>TEMPORARY RESTRAINED BARRIER ON ROAD REMOVED AND RESET</td>
<td>As shown on the Temporary Traffic Control Plans and as directed by the Engineer</td>
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<td>ITEM 853.32</td>
<td>TEMPORARY RESTRAINED BARRIER ON BRIDGE</td>
<td>As shown on the Temporary Traffic Control Plans and as directed by the Engineer</td>
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<tr>
<td>ITEM 853.33</td>
<td>TEMPORARY RESTRAINED BARRIER ON BRIDGE REMOVED AND RESET</td>
<td>As shown on the Temporary Traffic Control Plans and as directed by the Engineer</td>
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<tr>
<td>ITEM 853.501</td>
<td>TEMPORARY IMPACT ATTENUATOR REMOVED AND RESET</td>
<td>As shown on the Temporary Traffic Control Plans and as directed by the Engineer</td>
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<tr>
<td>ITEM 853.63</td>
<td>TEMPORARY IMPACT ATTENUATOR, REDIRECTIVE (TL-3)</td>
<td>As shown on the Temporary Traffic Control Plans and as directed by the Engineer</td>
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<tr>
<td>ITEM 874.2</td>
<td>TRAFFIC SIGN REMOVED AND RESET</td>
<td>As shown on the Traffic Sign &amp; Pavement Marking Plans and as directed by the Engineer</td>
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</table>
PROJECT UTILITY COORDINATION FORM (PUC)
**Project Utilities Coordination (PUC) Form**

**CONTACTS AND GENERAL UTILITY INFORMATION**

<table>
<thead>
<tr>
<th>Utility Company</th>
<th>Contact</th>
<th>Office #</th>
<th>Cell #</th>
<th>Email</th>
<th>Scope, Budget, Duration Submitted</th>
<th>Reimbursement</th>
<th>Potential for District Initiated Early Relocation</th>
<th>Utilities On Bridge/Structure</th>
<th>Notes</th>
<th>Utilities Underground (UG)/Aerial (OH)</th>
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</thead>
<tbody>
<tr>
<td>Siena/AT&amp;T</td>
<td>David Edgar</td>
<td>781-221-8400</td>
<td>ext. 7005</td>
<td><a href="mailto:David.Edgar@sienaengineeringgroup.com">David.Edgar@sienaengineeringgroup.com</a></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Level 3</td>
<td>Mike Wiemer</td>
<td>617-860-4861</td>
<td></td>
<td><a href="mailto:mike.wiemer@level3.com">mike.wiemer@level3.com</a></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Verizon Business/MCI</td>
<td>Stephen Parretti</td>
<td>508-248-1305</td>
<td></td>
<td><a href="mailto:stephen.parretti@verizon.com">stephen.parretti@verizon.com</a></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>MassDOT Fiber</td>
<td>Tony Wade</td>
<td>617-946-3185</td>
<td></td>
<td><a href="mailto:tony.wade@state.ma.us">tony.wade@state.ma.us</a></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

**Utility Relocation Notes for MassDOT Contractor**

Unless otherwise noted by Contract, the MassDOT Contractor is to provide the District Construction Office with 7 Calendar Days advance notification in order to validate the current progress and provide the required 30 Days advance notice-to-proceed for the first Utility - and each subsequent Utility. These advance notifications are to be identified in the Contractor’s Schedules (Pre-Con preparation, Baseline, Subnets, and Updated/Monthly Schedules) as specified in Subsection 8.02 (for DBB Contracts) and/or Section 9 (of DB Contracts). Note: The durations included below do not include these lead-times. See Additional “Important Basis notes for Contractor” - on last PUC Form page.

**Additional notes:**

1. The contact information above is for information purposes only. There are no proposed relocations on the bridge. The utilities over the bridge are proposed to be held in place and temporary support should be coordinated between the contractor and the respective utility. (Please refer to the special provisions and plans.
2. The AT&T conduit shown on the plans houses an AT&T cable, Verizon Business/MCI cable and a MassDOT fiber cable. The East and West abutments on I-90 Eastbound and the AT&T conduit will be repaired by AT&T/Siena. This work should be coordinated with the utilities within the conduit as well as AT&T and completed during the appropriate stage. Please refer to the special provisions and plans.

**Utility Suggested Sequence of Relocation (Based on Consultant proposed construction staging)**

The sequence as detailed on the following pages is based on the consultants proposed staging plan. This information was compiled through meetings that included all of the utilities listed below along with the designer and the (Town of Framingham). The information provided is the best available information prior to project advertisement.
### DESCRIPTION - Utility Relocation Phases, Tasks and Activities

#### Stage 1

**Phase A**

- Completing Stage 1 and then coordinating with AT&T to replace conduit during Stage 2.

#### Task 1

<table>
<thead>
<tr>
<th>Utility Co.</th>
<th>Repair conduit at the East and West abutments on the Eastbound side of I-90.</th>
<th>U</th>
<th>5*</th>
<th>X</th>
<th>Yes</th>
</tr>
</thead>
</table>

#### Task 2

| Utility Co. | Repair conduit at the East and West abutments on the Eastbound side of I-90. | U | 0 |

#### IMPORTANT BASIS NOTES - FOR CONTRACTOR

1. Unless otherwise specified in the MassDOT Construction Contract, or unless specifically noted within this PUC Form, these durations (herein) are based upon the Contractor providing unimpeded access to the Utility company to perform Utility relocations (see Note 5 - Access).

2. "Concurrent Utilities" operations noted herein, are to signify those Utility Company operations that can be worked concurrently (e.g. Utility A and Utility B work on-site together) - MassDOT and the Contractor are to prepare NTPs to Utilities accordingly.

3. "Potential Access Restraints" noted within this PUC Form are for planning purposes. See MassDOT Contract for Contractual Access Restraints (refer to Subsections 8.02, 8.03, and/or 8.06 for Design Bid Build Contracts and Volume II Section 9 for Design Build Contracts).

4. Utility non-work periods - For planning purposes, the durations above contain some non-work days (contingency) for New England conditions (precipitation, high temperatures, low temperatures, snow, ice). Gas line work however, typically has a seasonal restriction and cannot 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, oranes, etc) to the Utilities, to allow for the proposed relocation(s) - including but not limited to snow removal, clearing and grubbing, guardrail removal, barrier removal, tree removal, and grading.

6. For all MassDOT construction contracts issued after January 2014, the new Utility Coordination/documentation specification is required. This is Section 8.14 in Design-Bid-Build Contracts (See Design-Build index reference for applicable section #).

7. Prior to starting any and all enabling work for Utilities, the Contractor is to plan in advance with submittals and approved durations.

8. Potential District Initiated Early Utility Relocation - if noted herein, the District reserves the right to initiate early utility relocation in advance of the Contract NTP. In submitting a bid price and in the development/basis of the Baseline Schedule, the Contractor shall not plan the Work with the potential benefit of any form of ‘early utility relocation.’ As a requirement of the Baseline submission, unless otherwise noted in this Specification, the earliest that the first Utility company is to receive the 30 days advance notification to mobilize to the site, will be 7 calendar days after the pre-construction meeting and never sooner than 7 days after the Contract NTP.

9. This is an estimated duration for informational purposes only.
### DESCRIPTION - Utility Relocation Phases, Tasks and Activities

<table>
<thead>
<tr>
<th>RESPONSIBLE PARTY</th>
<th>Concurrent / Exclusive Utility Work</th>
<th>Access Restraint &amp; Limitations of Operations Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C = Contractor</strong></td>
<td><strong>U = Utility Co.</strong></td>
<td><strong>Estimated Duration (Weeks) by Utilities (Lead time not included)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exclusive Utility on site</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Utility working with no other Utilities on site</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Utility working with no other Utilities in vicinity</td>
</tr>
</tbody>
</table>

**MassDOT Proposal No. 606091-93654**

**PROJECT UTILITY COORDINATION FORM (PUC)**

**Document No. A00808**

**A00808-5**
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: FRAMINGHAM
Project File Number: 606091
Contract Number: 93654
Project Description: Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir

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 mailed to:

Highway Design Engineer
MassDOT – Highway Division
10 Park Plaza, Room 6260
Boston, MA 02116
Attn: AutoCAD Files

Name of person requesting AutoCAD files: __________________________________
Affiliation/Company: __________________________________
Address: __________________________________
Telephone number: __________________________________
Email address: __________________________________
Signature/Date: __________________________________

A00820 - 1
Appendix 2
DECONTAMINATION CERTIFICATION
Aquatic Invasive Species Decontamination Protocol for
MWRA/DCR Reservoirs

Please complete and submit this checklist before deploying a boat/equipment to MWRA/DCR
reservoirs (For Quabbin Reservoir, including O’Loughlin Pond and Pottapaug Pond, please comply
with the Quabbin Boat Seal Program requirements):

1. CLEAN: Carefully inspect boat, trailer, and equipment for any possible contamination
(this includes all interior and exterior boat surfaces, engines, anchors, lines, downriggers,
fishing gear, boots, clothing, wetsuits, dive gear, nets, buckets, tools, and any other items
exposed to water). Remove all plant fragments (even those that are native), mud, and
debris. Dispose of these materials in an upland area well away from open water and catch
basins or watercourses that might discharge into a water body. If a boat or motor were used
in a water body that contains zebra mussels, feel the surface for any rough spots. Any rough
areas should be thoroughly cleaned until smooth to the touch (see below).

2. DRAIN: Drain all water from boat, bilge, engines, jet drives, live wells, and other
equipment, and remove standing water from every nook and cranny that cannot be drained.
Water should be released in an area that is “high and dry” just as with disposal of removed
plant fragments, mud, and debris.

3. EACH piece of equipment to be utilized must be subjected to one of the following,
depending on the equipment to be used and time available.

   DRY OR DECONTAMINATE

If time permits, impose downtime for boat,
trailer, and all equipment so that they are
FULLY DRY for the time periods listed below:

<table>
<thead>
<tr>
<th>Time of Year</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>July and August</td>
<td>1 week</td>
</tr>
<tr>
<td>June and September</td>
<td>2 weeks</td>
</tr>
<tr>
<td>Before and after these dates</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
</tr>
</tbody>
</table>

Exposure to freezing temperatures over
the winter is considered to be sufficient
for decontamination*

* preferred method

If drying downtime is not practicable and a visit
to another water body is planned, use one, or a
combination of the following methods:

<table>
<thead>
<tr>
<th>Disinfectant</th>
<th>Concentration</th>
<th>Contact Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam/scalding</td>
<td>&gt;140°F</td>
<td>10 seconds</td>
</tr>
<tr>
<td>hot water*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorine/Bleach</td>
<td>1 oz. per gallon water</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Solution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lysol</td>
<td>1% solution</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Vinegar</td>
<td>As sold – 100%</td>
<td>20 minutes</td>
</tr>
<tr>
<td>Freezing</td>
<td>&lt;32°F</td>
<td>24 hours</td>
</tr>
</tbody>
</table>

4. Please fill out and submit following checklist for each set of equipment to be utilized for the
duration of the project.

Last updated: 1/16/2014
Appendix 2
DECONTAMINATION CERTIFICATION

Last water body visited: ____________________________
name, town, state

The following pieces of equipment that will be utilized in/on have been decontaminated as follows:
name of MWRA/DCR reservoir

Please check each decontamination method used. Note ‘n/a’ if listed equipment will not be used.

<table>
<thead>
<tr>
<th></th>
<th>Dry</th>
<th>Frozen</th>
<th>Steam/scalding water &gt;140°F*</th>
<th>Chlorine/Bleach Solution</th>
<th>Lysol</th>
<th>Vinegar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boat</strong></td>
<td>F</td>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hull / engine housing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deck</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilge and live well</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transom well</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rope, anchors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine cooling system</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant collection equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Frame</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Trailer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheels</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bunks/rollers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Survey Equipment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throw rake including rope</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Secchi disk including rope</td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td><strong>Boots</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nets</strong></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td><strong>Water samplers</strong></td>
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<tr>
<td><strong>Wetsuit</strong></td>
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<tr>
<td><strong>Weights</strong></td>
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<td><strong>RCD</strong></td>
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<tr>
<td><strong>Mask, fins, snorkel</strong></td>
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<tr>
<td><strong>Air hoses and tanks</strong></td>
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</tr>
<tr>
<td><strong>Plant collection bags/tools</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Please list:</td>
<td></td>
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</tr>
</tbody>
</table>

* preferred method

I hereby certify that the water craft and all other equipment to be utilized on this MWRA/DCR reservoir have been decontaminated as listed above.

Print name: ____________________________
Company/Position: ____________________________
Signature: ____________________________

Project/Contract: ____________________________

MWRA/DCR Personnel:
Inspection: Pass
Reason: ____________________________
Fail
Staff Name/Signature: ____________________________
Date: ____________________________

Last updated: 1/16/2014
LARGE FRAME AND HOOK LOCK BAR GRATE DETAILS
CASTING TOLERANCES:
SHALL CONFORM TO AASHTO M306

CLASSIFICATION:
GRATE—CAST DUCTILE IRON ASTM A536
55 + KSI YIELD
FINISH: NO PAINT

WEIGHT:
GRATE 460 LBS MINIMUM
AASHTO HS 20 PROOF LOAD
TEST BARS REQUIRED

SECTION A–A

SECTION C–C

#5 LOCK TUMBLER ASSEMBLY CONSISTS OF:
(1) 5/8" X 7" STNL. STYL. HEX. BOLT, 5/8" STNL. STYL. FLAT WASHER, CAST IRON TUMBLER
WITH 5/8" TAPPED HOLE AND STYL. STYL. CAPTURE NUT. GRADE 304 STAINLESS STEEL.
TUMBLER SHOULD BE SET AT 1 3/4" BELOW THE GRATE SEAT FOR INSTALLATION. ONCE
GRATE IS SET IN FRAME, TORQUE BOLT 1/4 TURN PAST HAND SNUG.
DOCUMENT B00420

PROPOSAL

FRAMINGHAM

For: Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir

COMMONWEALTH OF MASSACHUSETTS

LOCATION

The work referred to herein is in the Town of Framingham 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:

Bridge No. F-07-045 (4PH & 4PJ) Interstate 90 over the Foss Resevoir

  Beginning – Station 461+00.00 +/-
  Ending – Station 484+50.00 +/-

The contract prices shall include the furnishing of all materials (except as otherwise herein specified), the performing of all the labor requisite or proper, the providing of all necessary machinery, tools, apparatus and other means of construction, the doing of all the abovementioned work in the manner set forth, described and shown in the specifications and on the drawings for the work, and in the form of contract, and the completion thereof within 790 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.
**Description:** Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir.

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>QUANTITY</th>
<th>ITEM WITH UNIT BID PRICE WRITTEN IN WORDS</th>
<th>UNIT PRICE</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
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<td>100.</td>
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<td>SCHEDULE OF OPERATIONS - FIXED PRICE $18250</td>
<td>$18,250.00</td>
<td>$18,250.00</td>
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<tr>
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<td></td>
<td>AT Eighteen Thousand Two Hundred Fifty Dollars LUMP SUM</td>
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<td></td>
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<tr>
<td>106.87</td>
<td>1</td>
<td>JACKING SUPERSTRUCTURE</td>
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<td></td>
<td>AT</td>
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<td>LUMP SUM</td>
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<td>109.31</td>
<td>1,430</td>
<td>WIND SCREEN FOR DUST CONTROL</td>
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<td></td>
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<td>PER SQUARE YARD</td>
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<td>109.33</td>
<td>3,950</td>
<td>WIND SCREEN REMOVE AND RESET</td>
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<td>80</td>
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<td></td>
<td>AT</td>
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<td>PER HOUR</td>
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<td>PARTIAL DEMOLITION OF BRIDGE NO. F-07-045</td>
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<td>AT</td>
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<td>LUMP SUM</td>
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<td>120.1</td>
<td>1,700</td>
<td>UNCLASSIFIED EXCAVATION</td>
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<td></td>
<td></td>
<td>PER CUBIC YARD</td>
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<td>127.1</td>
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<td>REINFORCED CONCRETE EXCAVATION</td>
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<td></td>
<td></td>
<td>AT</td>
<td></td>
<td></td>
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<td></td>
<td>PER CUBIC YARD</td>
<td></td>
<td></td>
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<tr>
<td>140.</td>
<td>32</td>
<td>BRIDGE EXCAVATION</td>
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<td></td>
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<td>AT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PER CUBIC YARD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ITEM #</td>
<td>QUANTITY</td>
<td>ITEM WITH UNIT BID PRICE WRITTEN IN WORDS</td>
<td>UNIT PRICE</td>
<td>AMOUNT</td>
</tr>
<tr>
<td>-------</td>
<td>----------</td>
<td>------------------------------------------</td>
<td>------------</td>
<td>--------</td>
</tr>
<tr>
<td>141.</td>
<td>5</td>
<td>CLASS A TRENCH EXCAVATION</td>
<td></td>
<td></td>
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<tr>
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697.1 | 29 | SILT SACK | AT EACH | 
740. | 11 | ENGINEERS FIELD OFFICE AND EQUIPMENT (TYPE A) | AT PER MONTH | 
748. | 1 | MOBILIZATION | AT LUMP SUM | 
751. | 25 | LOAM BORROW | AT PER CUBIC YARD | 
756. | 1 | NPDES STORMWATER POLLUTION PREVENTION PLAN | AT LUMP SUM | 
765. | 225 | SEEDING | AT PER SQUARE YARD | 
767.12 | 9,162 | COMPOST FILTER TUBES | AT PER FOOT | 
769. | 188 | PAVEMENT MILLING MULCH UNDER GUARD RAIL | AT PER FOOT | 
834.17 | 10 | REFLECTORIZED FLEXIBLE DELINEATOR POST (AMBER) | AT EACH | 

### Location
FRAMINGHAM

### Description
Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir.

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<td>PER FOOT</td>
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<td>UNIT PRICE</td>
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<td>TEMPORARY SHORING</td>
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<td>LUMP SUM</td>
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<td>STRUCTURAL STEEL - COATED STEEL</td>
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<td>EACH</td>
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<td>963.201</td>
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<td>CLEAN (FULL REMOVAL) &amp; PAINT STEEL BRIDGE NO. F-07-045</td>
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<td>AT</td>
<td>LUMP SUM</td>
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<td>EPOXY BONDING COMPOUND</td>
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<td></td>
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<td>AT</td>
<td>PER SQUARE FOOT</td>
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</table>
Project # 606091  Contract # 93654
Location : FRAMINGHAM
Description : Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir.

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>QUANTITY</th>
<th>ITEM WITH UNIT BID PRICE WRITTEN IN WORDS</th>
<th>UNIT PRICE</th>
<th>AMOUNT</th>
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<td>TEMPORARY ASPHALTIC BRIDGE JOINT SYSTEM AT ________ PER FOOT</td>
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<tr>
<td>992.1</td>
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<td>ALTERATION TO BRIDGE STRUCTURE NO. F-07-045 AT ________ LUMP SUM</td>
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Total Qty: 275,841
DOCUMENT B00842

SCHEDULE OF PARTICIPATION
BY MINORITY OR WOMEN BUSINESS ENTERPRISES (M/WBE)

MASSDOT PROJECT NUMBER: 606091

PROJECT LOCATION: FRAMINGHAM

DATE OF BID OPENING: 

NAME OF PRIME BIDDER: 

<table>
<thead>
<tr>
<th>Name Address and Phone Number of M/WBE</th>
<th>Name of Activity</th>
<th>(a) M/WBE Contractor Activity Amount</th>
<th>(b) M/WBE Other Business Amount</th>
<th>(c) Total amount eligible for credit under rules in Section VIII of the Special Provisions</th>
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<tr>
<th>Total Bid Amount</th>
<th>TOTALS:</th>
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<tbody>
<tr>
<td>$</td>
<td>M/WBE Percentage of Total bid:</td>
<td>%</td>
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<td>%</td>
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</table>

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 ***
THIS PAGE IS INTENTIONALLY LEFT BLANK.
DOCUMENT B00843

MINORITY OR WOMEN'S BUSINESS ENTERPRISE PARTICIPATION LETTER OF INTENT
PAGE 1 OF 2

MASSDOT PROJECT NUMBER: 606091

PROJECT LOCATION: FRAMINGHAM

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:  606091

PROJECT LOCATION:  FRAMINGHAM

DATE OF BID OPENING:  

NAME OF PRIME BIDDER:  

<table>
<thead>
<tr>
<th>Item number if applicable</th>
<th>Description of Activity with notations such as Labor Only, Material Only, or Complete</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Amount</th>
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</table>

TOTAL AMOUNT: 

M/WBE COMPANY NAME:  

M/WBE AUTHORIZED SIGNATURE:  

NAME AND TITLE (PRINT):  

TELEPHONE NUMBER:  ______________________ FAX NUMBER:  ____________________________

*** END OF DOCUMENT ***
M/WBE OR SDVOBE JOINT CHECK ARRANGEMENT APPROVAL FORM
(to be submitted by Prime Contractor)

Contract No: 93654  Project No. 606091

Location: FRAMINGHAM  Bid Opening Date:

Project Description: Bridge Rehabilitation (Including Painting) Br. No. F-07-045 (Steel) Interstate 90 over the Foss Reservoir

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 ***
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.

<table>
<thead>
<tr>
<th>Trade</th>
<th>Firm 1 (number)</th>
<th>Firm 2 (number)</th>
<th>Joint Venture (number)</th>
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<tr>
<td>Administrative/Clerical</td>
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<tr>
<td>Unskilled Labor</td>
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</table>
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                   Signature
   Duly Authorized             Duly Authorized

   ___________________________  ___________________________
   Printed Name and Title      Printed Name and Title

   ___________________________  ___________________________
   Date                       Date

*** END OF DOCUMENT ***