



Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Stephanie Pollack, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator



January 16, 2018

604173-102269

ADDENDUM NO. 6

To Prospective Bidders and Others on:

BOSTON
Federal Aid Project No. NHP(BR-ON)-003S(054)
Bridge Replacement Br. No. B-16-016 (Steel)
North Washington Street over the Boston Inner Harbor

OPENING OF BIDS POSTPONED TO: WEDNESDAY, FEBRUARY 21, 2018 AT 2:00 P.M.

Transmitting revisions to the Contract Documents as follows:

<u>COVER PAGE:</u>	Revised cover page volume 1 of 2 and cover page volume 2 of 2.
<u>DOCUMENT 00010:</u>	Revised page 1.
<u>DOCUMENT 00104:</u>	Revised page 1.
<u>DOCUMENT 00715:</u>	Deleted document in its entirety and inserted new document (24 pages).

Take note of the above, substitute the revised pages for the originals, delete document indicated, insert new document in proper order, and acknowledge Addendum No. 6 in your Expedite Proposal file before submitting your bid.

Very truly yours,

Frank Kucharski, P.E.
Construction Contracts Engineer

SP
c: Michael O'Dowd, Project Manager

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VOLUME 1 OF 2

COMMONWEALTH OF MASSACHUSETTS



**CONTRACT DOCUMENTS
 AND SPECIAL PROVISIONS**

PROPOSAL NO.	604173-102269
P.V. =	\$143,977,000.00
PLANS	YES

FOR

**Federal Aid Project No. NHP(BR-ON)-003S(054)
 Bridge Replacement Br. No. B-16-016 (Steel)
 North Washington Street over the Boston Inner Harbor**

in the City of

BOSTON

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

⑥ ② This Proposal to be opened and read: **WEDNESDAY, FEBRUARY 21, 2018 at 2:00 P.M.**

① A Pre-Bid Conference will be held on December 5, 2017 from 10:00 AM to 12:00 PM. at
 MassDOT 185 Kneeland St., Boston, 1st Floor Conference Room.

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VOLUME 2 OF 2

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⑥ Addendum No.6, January 16, 2018

② Addendum No.2, November 28, 2017

**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.

⑥ ②

WEDNESDAY, FEBRUARY 21, 2018 at 2:00 P.M.****BOSTON****Federal Aid Project No. NHP(BR-ON)-003S(054)****Bridge Replacement Br. No. B-16-016 (Steel)****North Washington Street over the Boston Inner Harbor******Date Subject to Change**PROJECT VALUE = \$143,977,000.00

Bidders must be pre-qualified by the Department in the BRIDGE-CONSTRUCTION categories 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.

Proposal documents for official bidders are posted on www.bidx.com. Other interested parties may receive an informational copy of the Compact Disc (CD) containing the Plans and Specifications, free of charge.

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

NOTICE TO CONTRACTORS (Continued)

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.

Bid Document Distribution Center
MassDOT Highway Division
10 Park Plaza - Suite 6260
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 and United States Department of Labor.

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

The Department, in compliance with Title 49 Code of Federal Regulations Part 21 (NONDISCRIMINATION IN FEDERALLY-ASSISTED PROGRAMS OF THE DEPARTMENT OF TRANSPORTATION - EFFECTUATION OF TITLE VI OF THE CIVIL RIGHTS ACT OF 1964), hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement that minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on grounds of race, color, or national origin in consideration for an award.

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

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 \$405.00 per ton, Portland cement \$122.89 per ton, diesel fuel \$2.220 per gallon, and gasoline \$2.163 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



INTERIM SUPPLEMENTAL SPECIFICATIONS (English / Metric Units)

DATE: December 31, 2017

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 1.00 DEFINITION OF TERMS

SUBSECTION 1.02 Abbreviations.

(page SUPPLEMENT C2015-1) Add the following abbreviation in alphabetical order;

MASH – AASHTO Manual for Assessing Safety Hardware

NTPEP – National Transportation Product Evaluation Program

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.

SUBSECTION 5.11 (continued)

(page 19 English, page I.24 Metric) Replace the last paragraph with the following:

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 7.00**LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC****SUBSECTION 7.09 Public Safety and Convenience.**

(page 27 English, page I.36 Metric, page SUPPLEMENT C-2015-19) Replace the third paragraph from the end (including additional English version supplement language) with the following (Metric):

Trenches shall not be opened in traveled ways until all materials and equipment required for the work are at the site and available for immediate use. When work is not in progress trenches in areas subject to public travel shall be covered with steel plates capable of safely sustaining an HS20 Loading with 33% impact. The work at each trench shall be practically continuous, with the placing of conduit and piping, backfilling and patching of the surface closely following each preceding operation.

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:

SUBSECTION 8.10 (continued)

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* and 4.05 – *Validity of Extra Work*.

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*.

SUBSECTION 8.10 (continued)

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.

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 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.

SECTION 9.00
MEASUREMENT AND PAYMENT

SUBSECTION 9.03 PAYMENT FOR EXTRA WORK

(page SUPPLEMENT C2015-25) Under C. Equipment Rates, replace the language in (b) with the following:

b) When the Department ascertains that it is not practicable to determine actual equipment cost rates from the Contractor's records, hourly equipment cost rates for equipment owned by the Contractor may be determined by the use of rate schedules (with adjustments) supplied by EquipmentWatch Cost Recovery™.

The Contractor shall provide to the Department, in a format prescribed by the Department, sufficient descriptive ownership and operating records and documentation for each piece of equipment subject to the extra work so that the equipment rates may be determined and adjusted as follows:

- 1) Hourly equipment rates shall be the FHWA rate supplied by EquipmentWatch adjusted by application of the Rate Adjustment Tables (for machine age adjustment) plus adjustments to eliminate equipment overhead (indirect ownership) plus regional adjustments (the weekly, hourly and daily rates listed in EquipmentWatch will not be used). This rate shall be defined as 'Adjusted FHWA Rate'.
- 2) Equipment standby rates shall be the 'Adjusted FHWA Rate' as described in (1) above, minus the operating rate and reduced by 50%. Standby rates shall not include operating rates:
Equipment standby rate = (Adjusted FHWA Rate – Estimated Operating Rate)/2

The number of equipment hours to be paid for under the extra work or force account work shall be the number of hours that the equipment is actually used on a specific extra work or force account activity.

The current version of EquipmentWatch will be used in establishing equipment rates. The version applicable to specific extra work or force account work will be the version in effect as of the first day that work is performed on that force account work and that rate shall apply throughout the period during which the force account work is being performed.

In all cases, the Department reserves the right to utilize equipment rates based upon the contractor's actual equipment ownership costs, other equipment rate books and guides (i.e. Construction Equipment Ownership and Operating Expense Schedule, Region One published by the Army Corps of Engineer's) or hybrid rates determined to be reasonable by the Department.

SUBSECTION 9.05 Final Acceptance and Final Payment.

(page 47 English, page 1.59 and 60 Metric) Replace the last sentence of the second paragraph with the following:

If the Contractor has not filed valid (as determined by the Engineer) written reasons for not accepting the final estimate within three months from the date the final estimate is forwarded to the Contractor, the final estimate will be considered acceptable to the Contractor and payment of the final estimate made.

**DIVISION II
CONSTRUCTION DETAILS**

**SECTION 140
EXCAVATION OF STRUCTURES**

SUBSECTION 140.63 Drainage Structures Abandoned or Removed.

(page 67 English, II.19 Metric) Replace the second paragraph with the following;

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.

(page 69 English, II.21 Metric) Replace the last two paragraphs with the following;

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.

(page SUPPLEMENT C2015-46) Replace this subsection with the following;

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.

SUBSECTION 482.82 Payment Items.

(page SUPPLEMENT C2015-59) Revise these subsections to read as follows:

COMPENSATION

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 501
CURB AND EDGING**

SUBSECTION 501.40 General.

(page 153 English, page II.113 Metric) Replace the M4.02.00 designation with the following;

Cement Concrete	M4.02.00
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**SECTION 601
HIGHWAY GUARD**

SECTION 601 Highway Guard.

(page 159 English, page II.120 Metric, page SUPPLEMENT C2015-60) Replace the section with the following;

**SECTION 601
GUARDRAIL**

DESCRIPTION

601.20 General.

This work shall consist of the construction of guardrail and guardrail end treatments in accordance with these specifications and in close conformity with the lines and grades shown on the plans or established by the Engineer.

MATERIALS

601.40 General.

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

Guardrail	M8.07.0
Guardrail End Treatment	M8.07.1
Guardrail Delineator	M9.30.7
Guardrail Termini Delineator	M9.30.10

The contractor shall provide a detailed list of all of the system components for maintenance purposes. No work shall commence under these items until the Engineer has received all documentation.

CONSTRUCTION METHODS

601.60 Posts.

Posts shall be set plumb, in hand or mechanically dug holes, or driven, then backfilled with acceptable material placed in layers and thoroughly compacted.

If driven, the posts shall be provided with suitable driving caps and equipment used which will prevent battering or injury of posts. Posts damaged or distorted as a result of driving shall be removed and replaced with approved posts.

Posts to be set in areas of proposed bituminous concrete surfacing shall be erected prior to laying the surrounding finished surface.

Posts set in areas of bituminous concrete or cement concrete surfacing shall conform to the special post design shown on the plans.

601.62 Guardrail Panel.

The rail shall be erected in a smooth continuous rail conforming to the required line and grade. All rail elements and splices shall be per the plans. The rail shall make full contact at each splice.

All bolts, except where otherwise required at expansion joints shall be drawn tight. Bolts through expansion joints shall be drawn up as tightly as possible without being too tight to prevent the rail elements from sliding past one another longitudinally.

Curved guardrail shall be used when the radius is 150 feet or less.

Guardrail delineators shall be installed at intervals as indicated on the plans. Retroreflective sheeting shall conform to the following colors:

- a. White on the upstream face in the right shoulder.
- b. Yellow on the upstream face in the left shoulder.
- c. Red on the downstream (wrong-way travel direction) face within 1000' upstream of a median break of a divided highway or interchange.

601.63 Guardrail End Treatment.

Proprietary end treatment systems shall be installed in accordance with the manufacturers' specifications and recommendations.

COMPENSATION

601.80 Method of Measurement.

Guardrail and curved guardrail will be measured along the top edge of the rail element from the center of the first mid-span splice to the center of the last mid-span splice.

Transition to NCHRP 350 Guardrail will be measured as individual units 34 feet 4.5 inches in length, measured over two 12 foot 6 inch and one 9 foot 4.5 inch panels, as shown on the plans.

Transition to Rigid Barrier (Single Faced) will be measured as individual units 39 feet 10.75 inches in length, measured from the mid-span splice with the guardrail or end terminal to the end of the W beam terminal connector, as shown on the plans.

Transition to Rigid Barrier (Double Faced) will be measured as individual units 45 feet 7.75 inches in length, measured from the mid-span splice with the guardrail or end terminal to the end of the thrie beam terminal connector, as shown on the plans.

Transition to Bridge Rail will be measured as individual units 33 feet 9 inches in length, measured from the mid-span splice with the guardrail or end terminal to the end of the thrie beam terminal connector, as shown on the plans.

Transition to Thrie Beam, for connections between new guardrail and existing thrie beam guardrail, will be measured as individual units 6 feet 3 inches in length, measured from the W Beam post bolt slots to the thrie beam post bolt slots, as shown on the plans.

Trailing Anchorage will be measured as an individual unit 9 feet 4.5 inches in length, measured from the mid-span splice with the guardrail to the centerline of the short timber breakaway post, as shown on the plans.

Flared end treatments, tangent end treatments and guardrail end treatments will be measured as individual units, measured from the Begin Length of Need to the face of the impact head, as shown on the plans.

601.81 Basis of Payment.

The construction of all guardrail items shall include the assembly and erection of all components, parts and materials complete at the intended locations.

Guardrail and curved guardrail will be paid for at the contract price per foot, complete in place, including posts, offset blocks, panels and connecting hardware.

Transition to NCHRP 350 Guardrail, Transition to Rigid Barrier (Single Faced), Transition to Rigid Barrier (Double Faced), Transition to Bridge Rail, and Transition to Thrie Beam Guardrail will be paid for at the contract unit price each, complete in place.

Trailing Anchorage will be paid for at the contract unit price each. Guardrail flared end treatments, tangent end treatments and guardrail terminal ends will be paid for at the contract unit price each, complete in place.

Guardrail delineators shall be considered incidental to the cost of the guardrail, guardrail end treatment or guardrail trailing anchorage.

The use of special post designs, where necessary or directed by the Engineer, shall be incidental to the work with no additional compensation.

Rock excavation, if necessary, will be paid for at the contract unit price per cubic foot under the item for Class B Rock Excavation.

601.82 Payment Items.

620.12	Guardrail, TL-2 (Single Faced)	Foot
620.13	Guardrail, TL-3 (Single Faced)	Foot
620.32	Guardrail - Curved, TL-2 (Single Faced)	Foot
620.33	Guardrail - Curved, TL-3 (Single Faced)	Foot
621.12	Guardrail, TL-2 (Double Faced)	Foot
621.13	Guardrail, TL-3 (Double Faced)	Foot
621.32	Guardrail - Curved, TL-2 (Double Faced)	Foot
621.33	Guardrail - Curved, TL-3 (Double Faced)	Foot
627.1	Trailing Anchorage	Each
627.72	Guardrail End Treatment, TL-2 (Double Faced)	Each
627.73	Guardrail End Treatment, TL-3 (Double Faced)	Each
627.82	Guardrail Tangent End Treatment, TL-2	Each
627.83	Guardrail Tangent End Treatment, TL-3	Each
627.92	Guardrail Flared End Treatment, TL-2	Each
627.93	Guardrail Flared End Treatment, TL-3	Each
628.21	Transition to NCHRP 350 Guardrail	Each
628.22	Transition to Rigid Barrier (Single Faced)	Each
628.23	Transition to Rigid Barrier (Double Faced)	Each
628.24	Transition to Bridge Rail	Each
628.25	Transition to Thrie Beam	Each
144.	Class B Rock Excavation	Cubic Yard

SECTION 629 CONCRETE BARRIER

SUBSECTION 629.40 General.

(page 161 English, page II.123 Metric) Replace the M4.02.00 designation with the following;

Cement Concrete	M4.02.00
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SUBSECTION 629.60 General.

(page 161 English, page II.123 Metric) Replace the first sentence of this subsection with the following;

Concrete barriers shall be either precast or cast-in-place and conform to Section M4.02.00 Cement Concrete.

SECTION 630
HIGHWAY GUARD REMOVED AND RESET, AND
REMOVED AND STACKED

SECTION 630. Highway Guard Removed and Reset, and Removed and Stacked.

(page 163 English, page II.126 Metric, page Supplement C2015-64) Change the title of the section to:

SECTION 630
MAINTENANCE OF HIGHWAY GUARD

SUBSECTION 630.20 General.

(page 163 English, page II.126 Metric, page Supplement C2015-64) Replace this Subsection with the following:

This work consists of removing present highway guard, replacing individual components (posts, offset blocks and panels) and resetting in accordance with the drawings for new guardrail, these specifications and in close conformity with established lines and grades, or stacking them as directed.

SUBSECTION 630.80 Method of Measurement.

(page 164 English, page II.127 Metric) Replace this Subsection with the following:

Highway Guard Removed and Reset will be measured in its final position. Highway Guard Removed and Stacked and Highway Guard Removed and Discarded will be measured in its original position. Measurements shall be from center to center of end post to which the guard is attached, along the top edge of rail element.

Individual guard rail posts, offset brackets and panels will be measured by the unit each.

Individual posts removed and reset and individual posts removed and stacked, shall be measured by the unit each including all hardware.

SUBSECTION 630.81 Basis of Payment.

(page 164 English, page II.127 Metric, page Supplement C2015-64) Replace this Subsection with the following:

Removing and resetting highway guard will be paid for at the contract unit price per foot (m) of Highway Guard Removed and Reset, complete in its final position, including posts, offset blocks, panels and connecting hardware. Offset blocks and connecting hardware, will be incidental to the work under this item.

Individual posts, panels and offset blocks shall include all hardware and will be paid for at the contract unit price each, in addition to the payment for Highway Guard Removed and Reset.

Guard panels shall include all hardware and will be paid for at the contract unit price each.

Individual posts removed and reset shall include all hardware and which shall be paid for at the contract unit price each.

Realignment of existing posts shall be incidental to the work with no additional compensation.

Removing and resetting individual posts will be paid for at the contract unit price each for Individual Posts Removed and Reset, complete in place.

Removing and stacking of highway guard will be paid for at the contract unit price per foot of Highway Guard Removed and Stacked.

Removing and stacking individual posts will be paid for at the contract unit price each for Individual Posts Removed and Stacked.

Rock excavation, if necessary, will be paid for at the contract unit price per cubic foot under the item for Class B Rock Excavation.

SUBSECTION 630.82 General.

(page 165 English, page II.127 Metric, page Supplement C2015-64) Replace this Subsection with the following:

630.	Highway Guard Removed and Reset	Foot (m)
630.1	Highway Guard Removed and Stacked	Foot (m)
630.2	Highway Guard Removed and Discarded	Foot (m)
632.	Guardrail Post – Steel	Each
632.1	Guardrail Post – Wood	Each
632.2	Individual Post Removed and Reset	Each
632.3	Individual Post Removed and Stacked	Each
632.4	Individual Post Removed and Discarded	Each
633.	Guardrail Offset Block – W Beam	Each
633.1	Guardrail Offset Block – Thrie Beam	Each
634.	W Beam Guard Panel	Each
634.1	Thrie Beam Guard Panel	Each
144.	Class B Rock Excavation	Cubic Yard (m ³)

SECTION 660
METAL PIPE RAIL

SUBSECTION 660.40 General.

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

SECTION 740
ENGINEER'S FIELD OFFICE AND MATERIALS LABORATORY
(EACH WITH PERTINENT EQUIPMENT)

SUBSECTION 740.41 Engineers Field Office (Type A).

(page 186 English, page II.147 Metric, SUPPLEMENT C2015-73) Replace number 17(as re-numbered in English) with the following:

17. The Contractor shall assume the cost of all equipment, including installation, service, maintenance, and removal. A working telephone with an answering machine shall be provided at the Engineer's Field Office.

SUBSECTION 740.43 Engineers Field Office (Type C).

(page 187 English, page II.147 Metric) Delete this subsection.

SUBSECTION 740.44 Engineers Field Office (Type D).

(page 187 English, page II.148 Metric) Delete this subsection.

SUBSECTION 740.81 Basis of Payment.

(page 189 English, page II.150 Metric) Replace the second paragraph of this subsection with the following:

Payment as described above shall be compensation for all services (heat, gas, light, water, sanitary, telephone, etc.) for all labor, material, fencing, surfacing, equipment service (including general inside cleaning at least once each week) and incidentals necessary to provide, equip, maintain, insure, remove and dispose of the buildings and clean the site as specified and directed. The contract unit bid price will prevail for buildings built or furnished as described, for equivalent trailer space, or office space rented in existing buildings, when such substitution has been approved.

SUBSECTION 740.82 Payment Items.

(page 189 English, page II.150 Metric) Delete pay items 742., 743. and 999.740.

SECTION 769
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 850.44 Temporary Pavement Markings and Temporary Raised Pavement Markers.

(page SUPPLEMENT C2015-104) Replace this subsection with the following:

Glass beads, tapes and paints used for temporary pavement markings shall be lead free, conform to Subsections M7.01.07, M7.01.16, M7.01.23 and M7.01.24 and meet the retroreflectivity requirements of the MUTCD for a period of 90 days. Final determination as to pavement marking quality shall be made by the Engineer. The Contractor shall supply a retroreflectometer for this purpose.

The colors of the marking materials shall be the standard highway colors of white or yellow and as outlined in the MUTCD.

Temporary Raised Pavement Markers shall conform to Subsection M9.30.6.

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 850.49 Temporary Barrier.

(page SUPPLEMENT C2015-105) Replace this subsection with the following:

The Contractor shall use a temporary barrier system that meets the requirements of MASH TL-2 and is listed on the Qualified Traffic Control Equipment List.

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.

SUBSECTION 850.82 Payment Items.

(page SUPPLEMENT C2015-115) Replace pay item 853.2 with the following:

853.2	Temporary Barrier (TL-2)	Foot
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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 retroreflectorimeter 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 860.62 Application of Markings.

(page SUPPLEMENT C2015-117) Change the heading of the last column of the table to Glass Bead Application.

(page 267 English, page II.232 Metric) Add the following after the third paragraph of the Subsection:

Glass beads for water-borne traffic paint and thermoplastic pavement markings shall be applied by the single drop method using AASHTO M247 Type 1 glass beads sprayed or dropped on pavement marking material.

Glass beads for epoxy and polyurea pavement markings shall be both standard gradation beads and large gradation beads. Standard gradation beads shall be applied by the double drop method. Large gradation beads shall be injected into or dropped onto the liquid pavement marking material. Large gradation beads shall be applied first, immediately followed by standard gradation beads. The beads shall adhere to the cured pavement marking material or all pavement marking operations shall cease until corrections are made.

SUBSECTION 860.82 Payment Items.

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

860.106	6 Inch Reflectorized White Line (Painted)	Foot
860.112	12 Inch Reflectorized White Line (Painted)	Foot
861.106	6 Inch Reflectorized Yellow Line (Painted)	Foot
861.112	12 Inch Reflectorized Yellow Line (Painted)	Foot
864.	Pavement Arrow Reflectorized White (Painted)	Square Foot
864.01	Pavement Arrow and Legends Reflectorized White – Inlay Tape	Square Foot
864.02	Pavement Arrow and Legends - Tape	Square Foot
864.04	Pavement Arrows and Legends Reflectorized White (Thermoplastic)	Square Foot
866.106	6 Inch Reflectorized White Line (Thermoplastic)	Foot
866.112	12 Inch Reflectorized White Line (Thermoplastic)	Foot
867.106	6 Inch Reflectorized Yellow Line (Thermoplastic)	Foot
867.112	12 Inch Reflectorized Yellow Line (Thermoplastic)	Foot

SECTION 950
SHEETING

SUBSECTION 950.80 Method of Measurement.

(page 304 English, page II.273 Metric) Replace the last sentence of the first paragraph with the following:

Otherwise the Contractor may remove or abandon the sheeting, but only to the extent permitted by the Engineer.

(page 304 English, page II.273 Metric) Replace the second paragraph with the following:

Lumber or Wood Sheeting, when indicated on the plans or in the Special Provisions to be left in place or when ordered by the Engineer to be left in place as a permanent part of the foundation, will be measured by the thousand board foot measure (MBF) of lumber or wood sheeting. The quantity to be paid for will be the area of sheeting left in place multiplied by the nominal thickness.

SUBSECTION 950.81 Basis of Payment.

(page 304 English, page II.273 Metric) Replace the second paragraph with the following:

Lumber or Wood when indicated on the plans or in the Special Provisions to be left in place or when ordered by the Engineer in writing to be left in place as a permanent part of the foundation will be paid for at the contract unit price per thousand board foot measure (MBF) for Lumber Sheeting or Wood Sheeting.

SUBSECTION 950.82 Payment Items.

(page 304 English, page II.273 Metric) Change Cubic Meter and MBM where encountered to MBF.

SECTION 901
CEMENT CONCRETE

SUBSECTION 901.66 Placement, Finishing and Curing of Concrete Bridge Decks.

(page SUPPLEMENT C-131) Replace the first paragraph with the following:

This work shall consist of the placement of concrete bridge decks, bridge sidewalk, bridge safety curb and bridge median by using self-propelled finishing machines, all as indicated on the Plans and in accordance with these Specifications.

(page SUPPLEMENT C-136) Replace the first paragraph under F. Curing with the following:

All concrete bridge decks, bridge sidewalk, bridge safety curb and bridge median shall be kept wet with clean fresh water for a curing period of at least 14 days after placement of concrete.

SECTION 955
TREATED TIMBER

SUBSECTION 955.40 General.

(page 305 English, page II.274 Metric) Replace this Subsection with the following:

Material shall meet the requirements specified in the following Subsections of Division III, Materials:	
Wood Products	M9.05.1
Wood Preservative	M9.05.5
Fastenings	M8.01.5
Tar Paper	M9.06.2

SUBSECTION 955.60 General.

(page 305 English, page II.274 Metric) Replace the first two paragraphs of this Subsection with the following:

Treated timber shall be carefully handled, stored, and fabricated in accordance with AWPA M4 without sudden dropping, breaking of outer fibers, bruising or penetrating the surface with tools. It shall be handled with rope slings. Cant hooks, peaveys, pikes or hooks shall not be used. Borings, cuts, holes and other machining of wood shall be done prior to preservative treatment whenever possible. All cuts, holes, and injuries such as abrasions which occur after preservative treatment shall be field treated in accordance with AWPA M4. The Contractor shall provide the Engineer with a written copy of AWPA M4 Treatment Specification before any field treatment work is performed.

SUBSECTION 955.80 Method of Measurement.

(page 305 English, page II.274 Metric) Replace the first paragraph of this Subsection with the following:

All treated timber used will be measured by the thousand board foot measure (MBF), in place.

SUBSECTION 955.81 Basis of Payment.

(page 305 English, page II.275 Metric) Replace this Subsection with the following:

Treated timber will be paid for at the contract unit price per thousand board foot measure under the item for Treated Timber complete in place.

SUBSECTION 955.82 Payment Items.

(page 305 English, page II.275 Metric) Replace this Subsection with the following:

955.	Treated Timber	MBF
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SECTION 961
MAINTENANCE PAINTING OF STEEL BRIDGES

SUBSECTION 961.40 Materials.

(page SUPPLEMENT C2015-177) Replace this subsection with the following:

Coatings systems shall conform to the requirements of M7.02 Structural Paints.

SECTION 995
BRIDGE STRUCTURE

SUBSECTION 995.82 Payment Item.

(page 324 English, page II.297 Metric) Delete payment items 999.995 and 999.996.

DIVISION III MATERIALS SPECIFICATIONS

SECTION M1 SOILS AND BORROW MATERIALS

SUBSECTION M1.10.0 Pavement Milling Mulch.

(page 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:

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

SECTION M4 CEMENT AND CEMENT CONCRETE MATERIALS

SUBSECTION M4.02.17 Self-Consolidating Concrete for Precast Concrete Products.

(page 357 English, page III.41 Metric) Add this new Section.

Self-Consolidating Concrete (SCC) may be used at the Fabricator's discretion. SCC is a non-segregating concrete that is sufficiently flowable to fill formwork, spread into place, and encapsulate reinforcing steel, requiring minimal or no mechanical vibration to avoid segregation of the plastic concrete mixture. The following provision shall apply in addition to the other requirements specified in Section M4.

A. Fine Aggregates.

The fine aggregate portion of a given mix shall not exceed 50 percent by weight of the total aggregate in the mix, unless otherwise approved by the Department.

B. Chemical Admixtures.

Chemical admixtures shall be selected from the MassDOT Qualified Construction Materials List (QCML), shall be used in accordance with manufacturer's recommendations, and shall be compatible with all mix components. Any type of chemical admixture that is not included in the QCML (such as shrinkage reducing admixtures) shall be used in accordance with the manufacturer's recommendations, shall be compatible with all mix components and shall conform to AASHTO M 194 and the following:

1. Air entraining admixtures shall comply with AASHTO M 154.
2. VMA shall comply with the ASTM C 494 Type S.
3. High-range water-reducing admixtures (HRWRA) shall comply with the requirements of ASTM C 494 Type F (water-reducing, high range) or G (water-reducing, high range, and retarding) or ASTM C 1017. Such HRWRA can be used in combination with regular water-reducing admixtures or mid-range water-reducing admixtures. High-Range Water-Reducing Admixture (HRWR).
4. All corrosion inhibitors shall comply with AASHTO M 194.

C. SCC Mix Design.

Prior to concrete production, the Contractor shall submit a copy of the SCC mix design to the MassDOT Research & Materials Section for review and approval.

SCC Compressive strength specimens shall be fabricated in accordance to ASTM C1758. Multiple samples from the same batch shall be made simultaneously. Prior to testing for compressive strength, the de-molded cylinders shall be visually examined for evidence of segregation. The results of the observations shall be reported as part of the strength results.

SUBSECTION M4.02.17 (continued)

In addition to the testing provided in M4.02, the following tests shall be performed by qualified staff, in the presence of the Engineer and submitted to the MassDOT Research and Materials Section for the prequalification of the SCC mix design;

Table 1: Additional Material Acceptance Criteria for SCC Trial Batch Testing

Property	Test Method	Target Value
Filling Ability	Slump Flow (AASHTO T 347)	22 – 29 in.
Passing Ability	Slump Flow (AASHTO T 347) J-Ring Flow (AASHTO T 345)	The measured difference between the Slump Flow and the J-Ring Flow shall be < 2 in.
Static Stability	Column Segregation (ASTM C 1610)	Percent static segregation (S) ≤ 15%
	Visual Stability Index (AASHTO T 351)	0 or 1

Note: Slump flow values outside of the above range will be considered, provided mock-ups performed during the trial batch process demonstrate full consolidation of concrete without segregation as approved by the Engineer.

D. Production Sampling and Testing.

In addition to production sampling and testing defined in M4.02, the following testing shall be performed during production. These tests shall apply whether performed by MassDOT for acceptance or by the Contractor for Quality Control. Sampling and testing requirements shall be performed in accordance with the specifications for the precast concrete unit.

Table 2: Additional Material Criteria for SCC Production Testing

Property	Test Method	Target Value	Testing Frequency
Filling Ability	Slump Flow (AASHTO T 347)	+/- 2 in. of Trial Batch Slump Flow Target Value and within Range of 22 – 29 in.	1 per Sublot
Static Stability	Visual Stability Index (AASHTO T 351)	0 or 1	1 per Sublot

SUBSECTION M4.05.2 Clay Brick.

(page 363 English, page III.48 Metric) Change AASHTO M91 to ASTM C32.

**SECTION M7
PAINTS AND PROTECTIVE COATINGS**

SECTION M7 PAINTS AND PROTECTIVE COATINGS

(page 377 English, page III.66 Metric) Change title of this section to read as follows.

**SECTION M7
PAINTS, PROTECTIVE COATINGS AND PAVEMENT MARKINGS**

SUBSECTION M7.01 Pavement Markings.

(page 378 English, page III.67 Metric) Replace M7.01.7 Glass Bead with the followings.

M7.01.07 Glass Beads.

This specification covers the requirements for glass beads which are to be dropped or sprayed on pavement markings.

Glass bead suppliers and approved batch numbers are listed on the MassDOT Qualified Construction Materials List.

SUBSECTION M7.01 (continued)

All glass beads shall meet the requirements of AASHTO M 247, AASHTO T 346 and the following:

1. A minimum of 80% of the glass beads shall be true spheres when tested in accordance with ASTM D1155, Procedure A.
2. The glass beads shall be manufactured from commercial grade soda lime glass cullet meeting EPA and DEP requirements for concentrations of lead and arsenic. The silica content shall be 60% minimum (ASTM C 169).
3. Moisture Resistance - The Type 1 and Type 4 glass beads shall be treated with a moisture proof coating and be moisture resistant as tested by AASHTO T 346, Referee Method.
4. Adherence - The Type 4 glass beads shall be coated with a silane-type adherence coating to enhance embedding in, and adherence to, the applied binder film. The coated beads shall emit a yellow-green fluorescence when tested by the Dansyl Chloride test procedure.
5. Intermix glass beads used in the manufacture of thermoplastic pavement markings shall meet the requirements of AASHTO M247, Type 1 glass beads. A moisture proof coating is optional.

A. Gradation

The glass beads shall be tested in accordance with ASTM D1214 (By use of U.S. Standard Sieves).

Standard gradation beads shall meet the requirements of AASHTO M 247, Type 1.

Large gradation beads shall meet the requirements of AASHTO M 247, Type 4.

B. Packaging.

The beads shall be packaged in 50 pound or greater polyethylene-lined burlap bags or equal container; such containers guaranteed to furnish dry and undamaged beads. The following information shall be indelibly labeled in a clear and legible manner on each container:

- (a) The name of the manufacturer.
- (b) The place of manufacture.
- (c) The words: "Glass Beads-Traffic".
- (d) Size/Type/Coating.
- (e) Materials Specification Number.
- (f) The date of shipment (month and year).
- (g) The batch number.
- (h) Net weight.

C. Approval Procedure.

Requests for approval shall be submitted to the MassDOT Research and Materials Section, accompanied by;

- a. Certificate of Compliance stating that the material complies with AASHTO M 247, AASHTO T 346 and all applicable MassDOT requirements,
- b. Independent lab test results,
- c. Three bags of glass beads per batch in sample bags meeting the specifications above for verification testing.

SUBSECTION M7.02 Structural Paint

(page 379 English, page III.67 Metric) Replace this subsection with the following;

Coatings systems shall be non-lead (Pb), non-chromate, low VOC, (450 grams/liter, max.) systems. Coating systems shall be selected from the NEPCOAT Qualified Products List for Protective Coatings.

SECTION M8 METALS AND RELATED MATERIALS

SUBSECTION M8.07.0 Steel Beam Highway Guard.

(page 385 English, page III.75 Metric, page SUPPLEMENT C2015-246) Replace the subsection with the following:

M8.07.0 Guardrail

The materials for this work shall conform to AASHTO M180 and the following requirements:

The manufacturer of guardrail and guardrail components shall have an audit certificate indicating compliance with the NTPEP Guardrail Technical Committee Project Work Plan.

All steel components and hardware shall be galvanized. All metal fabrication work shall be done in the shop. No punching, cutting or welding shall be done in the field. Fabrication shall include all operations such as shearing, cutting, punching, forming, drilling, milling, bending, welding and riveting. Components of bolted assemblies shall be galvanized separately before assembly. When it is necessary to straighten any sections after galvanizing, such work shall be performed without damage to the zinc coating.

Galvanized surfaces that are abraded or damaged at any time after application of the zinc coating shall be repaired by thoroughly wire brushing the damaged areas and removing all loose and cracked coating after which the cleaned areas shall be painted with two coats of paint, high zinc dust content, conforming to the requirements of M7.04.11.

A. Posts.

Steel Posts.

Steel posts and channel members for anchor posts shall be fabricated from new structural steel sections conforming to the dimensions and design shown on the plans.

Posts shall conform to the requirements of ASTM A36. Galvanizing shall meet the requirements of M7.10.0.

Wood Posts.

The posts shall be rough sawn (unplaned) with nominal dimensions as indicated on the plans and with tolerances of 1 inch in length and 1/4 inch in width and thickness. All holes in the posts shall be drilled prior to pressure application of the preservative at a wood preserving facility.

The stress grade shall be 1000 psi or more in extreme fiber bending. Grading for stress-graded timber shall be in accordance with AASHTO M168.

Prior to treatment, all posts shall be seasoned, conditioned and completely machined in accordance with AWP A M1.

Posts shall be treated with chromated copper arsenate, type C (CCA-C) conforming to AWP A P23, to a minimum retention of 0.60 pcf (9.6 kg/m³). Treatment shall be full length under pressure by the empty-cell or full-cell process in accordance with AWP A U1.

Manufacturers shall adhere to the processing and treatment limitations in AWP A T1. No unnecessary cutting of treated posts will be allowed after treatment. All posts with surfaces damaged by cutting, drilling or any other cause shall be field treated with a preservative solution in accordance with AWP A M4.

Certificates of compliance and certificates of inspection bearing the independent inspection agency's verification for each lot of wood must be presented before installation and contain the species of wood, the type of preservative, the retention rate and penetration of the preservative.

The certificates of inspection and compliance do not signify mandatory acceptance of the entire lot. The Department still has the option of rejecting posts (included in any particular lot) that the Engineer considers sub-standard because of unsound knots and shakes, excessive checking or other defects that may be detrimental to the structural integrity of the posts.

The fabricator shall retain an independent inspection agency to inspect and certify the treated posts in accordance with these specifications and AWP A M2, Part A.

All treated posts shall be marked in accordance with AWP A U1 (and M6 as required). (The mark is to include the identifying lot and/or charge number). The post shall also be stamped with the Inspector's identification. The mark is to be placed on the upper side head of the post and located so that it is not obstructed by the offset blocks, rails, or any other appurtenances. The Inspector's stamp shall be legibly hammer-stamped on the head of the post, in accordance with AWP A M2 and the above.

B. Offset Blocks.

The blocks shall be of the same type throughout the project. Requirements for specific material types are as follows;

Wood Offset Blocks - Wood offset blocks shall meet the requirements of B. Posts, Wood Posts. above. When wood offset blocks are used on wood posts, they shall be the same species as the posts.

Plastic Offset Blocks - Plastic offset blocks shall meet all applicable performance requirements of MASH and be listed on the Qualified Traffic Control Equipment list. Each block shall be stamped at the factory with the manufacturer's identification and lot number and conform to the dimensions shown on the plans.

Prior to approval and use of the plastic guardrail offset blocks, the manufacturer shall submit to the Engineer, the manufacturer's name, the product brand name and/or model number, a copy of the MASH test results, a Material Safety Data Sheet, and a sample block. Acceptance of the material will be based on the manufacturer's certification.

C. Rail Element and Terminal Sections.

The steel rail element, transition panels, terminal sections and connecting hardware shall conform to AASHTO M 180, Type II, Class A with the following additions:

The length of the rail shall be according to the plans.

Each end of the steel rail for every stretch of guard shall be fitted with a terminal section as shown on the plans.

The projecting heads of all connection and splice bolts shall be button head type so no appreciable projection will obstruct a vehicle sliding along the rail.

Steel rail elements with a radius of 150 feet or less shall be shop bent.

SUBSECTION M8.07.1 Steel Beam Highway Guard End Treatments.

(page 387 English, page III.77 Metric, page SUPPLEMENT C-248) Replace this subsection with the following;

M8.07.1 Guardrail End Treatment.

The same type of tangent end or flared end treatment shall be used throughout the project.

All steel components and hardware shall conform to Section M8.07.0. All metal work shall be done in the shop.

The approach end shall have Type 3 Object Marker sheeting that conforms to the requirements of Section 2C.65 of the MUTCD. The sheeting material shall meet the requirements of M9.30.0, Type VIII (High Intensity Prismatic) or better.

SECTION M9 MISCELLANEOUS MATERIALS

SUBSECTION M9.05.01 Treated Timber.

(page 401 English, page III.90 Metric) Replace the existing Subsection with the following:

M9.05.1 Wood Products.

Timber shall conform to the requirements of AASHTO M 168, Wood Products, Structural Timber, Lumber, and Piling.

Preservative treatment shall meet the requirements of M9.05.5.

SUBSECTION M9.05.02 Wood Posts and Braces.**SUBSECTION M9.05.03 Wooden Rails and Posts.****SUBSECTION M9.05.04 Wooden Pegs.**

(page SUPPLEMENT C-254, page 401 English, page III.90 Metric) Delete these Subsections.

SUBSECTION M9.05.05 Timber Preservatives.

(page 402 English, page III.91 Metric) Replace the existing Subsection with the following:

M9.05.5 Wood Preservatives.

Preservative treatment shall meet the requirements of AASHTO M133 and AWWA U1, except that only preservative materials meeting current EPA or DEP regulations will be allowed.

Certificates of compliance and certificates of inspection bearing the independent inspection agencies verification for each lot of wood must be presented before installation and contain the species of wood, the type of preservative, the retention rate and penetration of the preservative.

SUBSECTION M9.05.06 Timber Piles.

(page 402 English, page III.91 Metric) Under A. General Requirements., replace the second paragraph with the following:

Untreated timber piles shall have the bark unpeeled. Treated timber piles shall be clean-peeled so that all of the outer bark and at least 95% of the inner bark well distributed over the outer surface of the pile shall be removed.

(page 402 English, page III.91 Metric) Under C. Specific Requirements., replace the first and second paragraphs with the following:

All treated piles shall have not less than 1 inch of sapwood at any point on the butt end for Douglas-fir and not less than 2 inches of sapwood at any point on the butt end for Southern Pine.

Treated timber piles shall be Douglas-fir treated with ACZA or Southern Yellow Pine treated with CCA-C in accordance AWWA U1 Treated timber piles used in a marine environment shall be Southern Yellow Pine or Douglas-fir treated with creosote in accordance with AWWA U1 Certificates of compliance and certificates of inspection bearing the independent inspection agencies verification for each lot of wood must be presented before installation and contain the species of wood, the type of preservative, the retention rate and penetration of the preservative.

(page 403 English, page III.92 Metric) Delete D. Preservative Treatment and the paragraph under it.

