

**CITY OF SALEM, MASSACHUSETTS  
PURCHASING DEPARTMENT**

**CONTRACT S-46**

**LORING / LAFAYETTE / WEST INTERSECTION  
AND SIGNALIZATION IMPROVEMENTS**

**June 14, 2017**



*Richard Azzalina*  
*6/14/17*

PREPARED BY:



Stantec Consulting Services Inc.  
5 Burlington Woods Drive Suite 210, Burlington MA 01803-4542



City of Salem, Massachusetts



Invitation for Bids

## CONTRACT S-46

# Loring / Lafayette / West Intersection and Signalization Improvements

June 14, 2017

**BIDS DUE:**

**Thursday, June 22, 2017 at 2:00 PM**

\*Late bids will be rejected

Whitney C. Haskell  
Purchasing Agent  
93 Washington Street, 3<sup>rd</sup> Floor  
Salem, MA 01970  
[whaskell@salem.com](mailto:whaskell@salem.com)  
(978) 619-5695



SALEM, MASSACHUSETTS  
 CONTRACT S-46 LORING / LAFAYETTE / WEST INTERSECTION  
 AND SIGNALIZATION IMPROVEMENTS

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGES</u>
BIDDING REQUIREMENTS	
00100 – INVITATION TO BID	1 to 3
00200 – INSTRUCTIONS TO BIDDERS	1 to 5
00400 – FORM FOR BID	1 to 15
00410 – BID BOND (FOR GENERAL BID)	1 to 2
CONTRACT FORMS	
00500 – AGREEMENT	1 to 8
00610 – PERFORMANCE BOND	1 to 2
00620 – LABOR AND MATERIAL PAYMENT BOND	1 to 2
CONDITIONS OF THE CONTRACT	
00700 – GENERAL CONDITIONS	1 to 41
00800 – SUPPLEMENTARY CONDITIONS	1 to 17
00950 – LIST OF DRAWINGS	1 to 1
SPECIAL PROVISIONS	
SCOPE OF WORK	1
WORK SCHEDULE	1
MAINTENANCE OF TRAFFIC	2
CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS	2
ENGINEERING DIRECTIVES	2
SUBSECTION 4.04 CHANGED CONDITIONS	3
PROTECTION OF UNDERGROUND FACILITIES	3
DESIGNER/PROJECT MANAGER	5
PROCEDURE FOR RELEASING AUTOCAD FILES TO THE GENERAL CONTRACTOR	5
HOLIDAY WORK RESTRICTIONS FOR CALENDAR YEAR 2017	6
PRESERVATION OF ROADSIDE GROWTH	6
PROMPT PAYMENT AND RELEASE OF RETAINAGE TO SUB CONTRACTORS	7
ARCHITECTURAL ACCESS BOARD TOLERANCES	7
MASSACHUSETTS WETLANDS PROTECTION ACT	7

TECHNICAL SPECIFICATIONS

APPENDIX

- A. MASSDOT SUPERPAVE STANDARD SPECIFICATIONS
- B. MASSACHUSETTS PREVAILING WAGE RATES

## SECTION 00100

### INVITATION TO BID

City of Salem, Massachusetts. Sealed bids for Construction of: Contract S-46 Loring / Lafayette / West Intersection and Signalization Improvements for the City of Salem, Massachusetts, will be received at the Office of the Purchasing Agent, City Hall, 93 Washington Street, Salem, Massachusetts 01970, until 2:00 o'clock p.m., prevailing time, on Thursday, June 22, 2017 and at that time opened publicly and read aloud in the 3<sup>rd</sup> floor conference room.

This scope of work includes the installation of new ornamental style traffic signals at the intersection of Loring Avenue, Lafayette Street and West Avenue in Salem, MA. The new traffic signals will include the installation of two mast arms, replacing older post mounted signal heads to increase the visibility of the intersection, and installation of post mounted pedestrian signals.

The improvements also include geometric changes to the northwest corner of the intersection. The existing corner has a very flat radius, resulting in drivers turning right on red without coming to a complete stop. The proposed alignment for this corner consists of bumping out this corner into the intersection with a sharper radius.

The project also includes the reconstruction of ADA compliant sidewalks and wheelchair ramps, installation of new signage and pavement markings and the construction of landscaped areas.

Adjacent to the intersection, on the northeast corner, a proposed commercial/residential development is currently under construction. The intersection and signal work shall be coordinated with the ongoing development construction.

The estimated cost of the project is \$400,000. It is the intention of the Owner to award the Contract to the lowest qualified responsive bidder.

The Invitation for Bids shall be available beginning, **Wednesday, June 14, 2017 by 10:00 AM.**

The Invitation for Bids and related documents shall be available for free download from the City's Purchasing Department website at [http://saalem.com/Pages/SalemMA\\_Purchasing/index](http://saalem.com/Pages/SalemMA_Purchasing/index) under the link titled "IFBs, RFPs, RFQs."

Hardcopies of the Invitation for Bids and related documents may be obtained at the Office of the Purchasing Agent, 93 Washington Street, 3rd Floor, Salem, MA 01970, between the hours of 8:00 AM-4:00 PM on Monday-Wednesday, 8:00-7:00 PM on Thursday, and 8:00 AM-12:00 PM on Friday.

Each Bid must be accompanied by bid security in the form of a bid bond, certified check, treasurer's check or cashier's check drawn on or issued by a responsible bank or trust company made payable to the City of Salem. The amount of such bid security shall be five per cent of the value of the bid.

No bid may be withdrawn within sixty (60) days (not including Saturdays, Sundays and legal holidays), after the date of opening thereof.

Contracts for work under this Invitation to Bid will obligate the Contractor not to discriminate in employment practices.

Attention of bidders is called particularly to the requirements as to conditions of employment to be observed and minimum rates to be paid under the contract.

The selected contractor shall comply with all applicable Federal, State and Local laws and ordinances.

A Performance Bond, and a Labor and Material Payment Bond, each in an amount equal to 100 percent of the Contract price will be required.

Prevailing Wage Rates as determined by the Deputy Director of Department of Labor and Workforce Development, Division of Occupational Safety, under the provision of the M.G.L. Ch. 149, sec. 26-27H, as amended, apply to this project. It is the responsibility of the Contractor, before bid opening, to request, if necessary, any additional information on Prevailing Wage Rates for those trades people who may be employed for the proposed work under this Contract.

Liquidated damages in the amount of One Thousand Dollars (\$1,000.00) per calendar day shall be affixed in accordance with the liquidated damages requirements stipulated in the Agreement.

The Contractor shall complete all work called for under the Contract Agreement in all parts and requirements by April 30, 2018 as specified in the Invitation to Bid.

The successful bidder shall be required to submit documentation that all employees to be employed in the work subject to this bid have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration. Any employee found on a worksite subject to this section without documentation of successful completion of a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration shall be subject to immediate removal.

Bids for this contract are subject to the applicable provisions of M.G.L. Ch. 30 sec. 39M.

The right is reserved to waive any informalities in or to reject any or all bids received and to award the Contract to any of the contractors bidding on the work if, in the City's opinion, the best interests of the City will thereby be promoted.

City of Salem, Massachusetts  
Purchasing Department

By

Whitney C. Haskell  
Purchasing Agent

Date: June 14, 2017

END OF SECTION



## SECTION 00200

## INSTRUCTIONS TO BIDDERS

The City of Salem, Massachusetts (hereinafter called the Owner) will receive sealed bids for the Loring / Lafayette / West Intersection and Signalization Improvements project. This Project is subject to the public bidding statutes, M.G.L. chapter 30 sec. 39M.

Bids must be addressed to Whitney C. Haskell, Purchasing Agent, City Hall, 3<sup>rd</sup> floor, 93 Washington Street, Salem, MA 01970, and endorsed "Bid for Contract S-46, Loring / Lafayette / West Intersection and Signalization Improvements". Bids will be received at the Office of the Purchasing Agent, City Hall, 93 Washington Street, Salem, Massachusetts 01970, until 2:00 p.m., prevailing time, on Thursday, June 22, 2017 and at that time opened publicly and read aloud in the 3<sup>rd</sup> floor conference.

The City of Salem, Massachusetts is exempt from payment of the Massachusetts Sales Tax. Therefore, Bidders shall make no allowance for said Sales Tax in the prices bid.

Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified will not be considered. The bidder agrees that this bid shall be good and may not be withdrawn for a period of 60 days, Saturdays, Sundays, and legal holidays excluded, after the opening of bids.

All **Bids/Proposals** shall be made as follows:

1. Fill in the number of each Addendum, if any, in the space provided on page 00400-2.
2. Fill in the Prices Bid in the SCHEDULE OF PRICES Pages 00400-2A through 00400-2F, inclusive. Bidders MUST include amounts for ALL items.  
  
**IMPORTANT:** The low bid shall initially be determined by the amount shown for the TOTAL CONTRACT PRICE.
3. Fill in all other blank spaces in the Proposal (pages 00400-3 to 00400-8 inclusive. Sign your bid on page 00400-7.
4. Execute acknowledgement of officer or agent who signs this document and attach certificate of clerk authorizing bid and execution by signing officers. (Use proper form on page 00400-9, 00400-10 or 00400-11).
5. Fill in and execute CONTRACTOR's CERTIFICATIONS on pages 00400-12 and 00400-13.
6. Fill in the SCHEDULE FOR PARTICIPATION BY MINORITY/WOMEN BUSINESS ENTERPRISES, Page 00400-14 and MINORITY/WOMEN BUSINESS PARTICIPATION, LETTER OF INTENT on Page 00400-15.

7. Not used.
8. **Submit as the Proposal** all pages of the PROPOSAL, form for Bid, Pages 00400-1 through 00400-15 intact, without changing any of the text, enclosed in a sealed envelope bearing the name and address of the Bidder, and endorsed "CONTRACT S-46 LORING / LAFAYETTE / WEST INTERSECTION AND SIGNALIZATION IMPROVEMENTS".
9. Submit to the City of Salem as bid security a bid bond, certified check, treasurer's check or cashier's check in the amount of five percent of the value of the Total Contract Price.

Checks shall be made payable to "City of Salem, Massachusetts". The bid security deposit shall be enclosed in a sealed envelope marked "Bid Security and Proposal for: Contract S-46 Loring / Lafayette / West Intersection and Signalization Improvements". The bid security deposit envelope shall be attached to the outside of the envelope containing the proposal.

Checks will be returned to all except the three lowest formal Bidders within five days (Saturdays, Sundays and legal holidays excluded) after the opening of the Bids, and the remaining deposits will be returned to the three lowest Bidders within 48 hours after the awarding of Contract, or, if no Contract is awarded, within 60 days (not including Saturday, Sunday and legal holidays), after the date of opening bids, then upon demand of the Bidder at any time thereafter so long as he has not been notified of the acceptance of his Bid. The successful Bidder will be notified by registered mail of the acceptance of his Bid.

If a bid bond is used as bid security, it shall be prepared in the Form of Bid Bond attached hereto, each duly executed by the Bidder as Principal and having as Security thereon a surety company approved by the Owner. A copy of the Form of Bid Bond will be furnished to the Bidder by the Engineer upon request.

The proposal shall be filed at the place and within the time specified herein, and no proposal shall be accepted after such time. The time at which a proposal is filed with the Owner shall be time/date stamped or otherwise prominently noted on the proposal envelope.

A Performance Bond and a Labor and Material Payment Bond by a company satisfactory to the Owner, each in an amount equal to One Hundred (100) percent of the Total Contract Price recorded in the Proposal Section of the Contract as executed, will be required from the successful Bidder for the faithful performance of the Contract and as security for payment of all persons performing labor and furnishing materials in connection with this Contract. The bonds shall be in accordance with the forms attached to the Contract Documents.

No Bidder may withdraw his Bid for a period of sixty (60) days (not including Saturdays, Sundays and legal holidays), after the date set for the opening thereof.

The items of work involved in the Contract are described in the Measurement and Payment section of the Specifications and are shown in the Proposal and the work is shown and the

Contract requirements are stated in the Instructions to Bidders, Proposal, Agreement, Bonds, General Conditions, Supplementary Conditions, Specifications, Appendix, Drawings and any Addenda.

In the case of each Proposal, the Owner reserves the right to satisfy itself as to the complete responsibility of the Bidder, toward which object every Bidder is required to furnish all information requested in the Proposal.

Notice of the acceptance of his Proposal will be given to the successful Bidder by the Owner by posting a registered letter to the Bidder's address stated in said Proposal. If, within five (5) days, Saturdays, Sundays, and legal holidays excluded, immediately after the receipt of notice, the successful Bidder shall fail to deliver his bonds properly executed and his Contract duly signed, in consideration of such failure the Proposal and acceptance, at the option of the Owner, may become null and void and the bid security accompanying his Proposal shall become the property of the Owner, which may proceed to accept another of the Proposals.

The Contractor shall start work under this Contract and shall continue it to completion with all practical dispatch and regularity; the work shall be started and completed within the times required by the Contract.

The sum of One Thousand Dollars (\$1,000.00) is to be agreed upon as liquidated damages, and shall be paid by the Contractor to the Owner (or, as a viable claim deducted from payments due to the Contractor) for each and every calendar day in which any work of this Contract is uncompleted or fails to achieve any other milestones set forth in the Contract Documents, after the time stipulated for such completion, and the prices bid shall be fixed with regard to this Provision.

Workmen's Compensation, Property Damage, Public Liability, Owner's Protective Liability, Contractor's Protective Liability, Contractual Liability, Completed Operations and Fire and Builder's Risk Insurance requirements are set forth in detail in the General Conditions and Supplementary Conditions of the Contract as applicable.

Massachusetts' Wage Rates as established pursuant to the provisions of M.G.L., ch. 149, sec. 26-27H as amended apply to this project. The Massachusetts' Wage Determination is attached to these Specifications as Appendix B. It is the responsibility of the Contractor, before bid opening, to request, if necessary, any additional information on Massachusetts' Wage Rates for those tradespeople who are not covered by the applicable Massachusetts' Wage Decision, but who may be employed for the proposed work under this contract.

The Contractor shall keep himself informed fully of, and comply with, all Laws, Ordinances, and Regulations of the Federal, State or Municipal governments which may be in force during the life of the Contract, in any manner affecting his employees or the conduct of work or the materials used or employed in the work.

Proposals must be submitted in strict compliance with the provisions of Chapter 30 sec. 39M, as amended, relating to fair competition for Bidders on construction projects of public roadways.

Bids shall be for the complete work as specified. Every Bid which is not accompanied by a bid deposit as prescribed by the Invitation to Bid, or which otherwise does not conform with Chapter 30 sec. 39M of the General Laws, and amendments thereto, or which is on a form not completely filled in, or which is incomplete, conditional or obscure, or which contains any addition not called for, shall be invalid, and the awarding authority shall reject every such Bid.

Any request from a prospective Bidder for the interpretation of meaning of the Drawings, Specifications or other Contract Documents shall be made in writing to the Engineer, Stantec, 5 Burlington Woods, Burlington, Massachusetts 01803 and to be given consideration must be received at least seven (7) days prior to the date fixed for the opening of Proposals.

Interpretations will be made by the Engineer as requested, and all interpretations will be made in the form of written Addenda to the Contract Documents, which Addenda will become a part of the Contract. Not later than three (3) days prior to the date fixed for the opening of Proposals, the Addenda will be sent to all persons who obtain Contract Documents in the manner described in the Invitation to Bid. Failure of any bidder to receive any such Addenda shall not relieve any Bidder from any obligation under his Proposal as submitted.

At the date fixed for the opening of Bids, it will be presumed that each Bidder has made an examination of the locations and sites of the work to be done under the Contract; has satisfied himself as to the actual conditions, requirements and quantities of work; and has read and become thoroughly familiar with the Contract Documents, including the Drawings, and all Addenda to them, if any.

Contracts for work under this Proposal will obligate the Contractors and Subcontractors not to discriminate in employment practices.

Successful Bidders must, if requested, submit a list of all subcontractors who will perform work on the project and written signed statements from authorized agents of the labor pools with which they will or may deal for employees on the work, together with supporting information, to the effect that said labor pools' practices and policies are in conformity with Executive Order No. 11246, and any amendments or supplements to that Executive Order, and that said labor pools will affirmatively cooperate in or offer no hindrance to the recruitment, employment and equal treatment of employees seeking employment and performing work under the contract or a certification as to what efforts have been made to secure such statements when such agents or labor pools have failed or refused to furnish same prior to award of the Contract.

The failure or omission of any Bidder to receive or examine and become familiar with any form, instrument or document shall in no way relieve the Bidder of any obligation in respect to his proposal.

The Owner reserves the right to waive any informalities in the Bids, to reject any or all Bids if it be in the public interest so to do, and to reject any Sub-Bid or any Sub-Trade if it is determined that such Sub-Bid does not represent the Sub-Bid of a person competent to perform the work as specified or that less than three such Sub-Bids are received and that the prices are not reasonable for acceptance without further competition. The Contract will be awarded to the lowest

responsible and eligible Bidder possessing the skill, ability and integrity necessary to the faithful performance of the work and who shall certify that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

This project is subject to the Safety and Health regulation of the U. S. Department of Labor set forth in 29 CFR Part 1926, and to the Massachusetts Department of Labor and Workforce Development, Division of Industrial Safety "Rules and Regulations for the Prevention of Accidents in Construction Operations (Industrial Bulletin No. 12)." Contractors shall be familiar with the requirements of these regulations.

Massachusetts General Laws, Chapter 30, Sections 39F, 39G, 39K, 39N, 39O and 39P are quoted in the General or Supplementary Conditions. Other sections of Massachusetts General Laws including Chapter 30, Sections 39I, 39J, 39L, 39M(b), and 39R; and Chapter 82 Section 40 are incorporated into the Supplementary Conditions by reference.

END OF SECTION



## SECTION 00400

## FORM FOR BID

To the City of Salem, Massachusetts, hereinafter called the Owner:

- A. The undersigned proposes to furnish all labor and materials required for Construction of: CONTRACT S-46 LORING / LAFAYETTE / WEST INTERSECTION AND SIGNALIZATION IMPROVEMENTS, in Salem, Massachusetts, in accordance with the accompanying Drawings and Specifications, the Instructions to Bidders, and other Contract Documents bound herewith and prepared by Stantec, for the Total Contract Price specified in the Schedule of Prices which follows, increased or decreased in a manner as provided for in the contract.

The undersigned, hereinafter referred to as singular and masculine, declares: that the only persons interested in this Proposal as principals are named herein as such; that no official of the Owner and no person acting for or employed by the Owner is interested directly or indirectly in this Proposal, or in any contract which may be made under it, or in any expected profits to arise therefrom; that this Proposal is made in good faith, without fraud, collusion or connection with any other person bidding or refraining from bidding for the same work; that he has examined carefully the said instructions and all other documents bound herewith, and the Drawings relating to the contract covered by this Proposal and hereby makes them part of this Proposal; that he has informed himself fully in regard to all conditions pertaining to the work and the place where it is to be done; and that he has made his own examination and estimates of cost and from them makes this Proposal.

The undersigned proposes and agrees that, if within sixty (60) days (Saturdays, Sundays and legal holidays excluded) after the date named in the Instructions to Bidders as that for submitting this Proposal to the Owner, notice that this Proposal has been accepted by the Owner shall be mailed to him at the business address given herein, he will, on some one of the five (5) days, (Saturdays, Sundays, and legal holidays excluded), immediately following receipt of such Notice of Acceptance of this Proposal, appear at the office of the City of Salem Purchasing Agent, 93 Washington Street, 3rd Floor, Salem, MA 01970 and deliver to the properly accredited representative of the Owner a contract, together with Performance Bond and Labor and Material Payment Bond furnished by a company satisfactory to the Owner, which contract and bonds shall be executed on the forms annexed hereto, and which contract shall provide that the Owner, as full compensation for doing and completing the work of carrying out the requirements of the Agreement, General Conditions, Supplementary Conditions, Specifications, Appendix, and Drawings, including everything furnished or done and for every injury or loss sustained by the Contractor in carrying on the contract, and for any liability of any nature arising under the contract, shall pay the Contractor the lump sums which he has recorded in the Proposal, or such lump sums increased or decreased in a manner as provided for in the contract.

The undersigned also agrees that the bid security which, as called for in the Instructions to Bidders, accompanies this Proposal shall become the property of the Owner as compensation for damage suffered by said Owner should the undersigned fail to execute the said contract and bonds if notified, as specified above, that this Proposal has been accepted. But if this Proposal is not accepted by the Owner, as specified above, within sixty (60) days of the date set for the submission of the Proposal, (not including Saturdays, Sundays and legal holidays), or if the Notice of Acceptance is received by the undersigned and he complies with the requirements as to execution of the contract and bonds, then the bid security referred to will be returned to him.

The undersigned understands that it is the intention of the Owner not to award a contract for this work under this or any other Proposal if the Bidder cannot furnish satisfactory evidence that he has the ability and experience to perform this class of work and that he has sufficient capital and equipment to enable him to prosecute the work successfully and to complete it within the time named in the contract, and that the Owner reserves the right to reject this or any other Proposal or to award the contract as is deemed to be to the best interest of the Owner.

The undersigned agrees that he will, upon request, furnish in confidence such information as will enable the Owner to judge of the financial responsibility of himself and his proposed Subcontractors.

The undersigned further agrees that he will commence work not later than 10 calendar days following the date of execution of the Contract, and will complete all work not later than 365 calendar days after starting the work and will achieve any other milestones set forth in the Contract Documents.

That the Contractor shall give to the Owner, as liquidated damages, for each and every calendar day lost by the Contractor in the completion of the Contract after the time herein stipulated, or for which the Contractor fails to achieve any other milestones set forth in the Contract Documents, the sum of One Thousand Dollars (\$1,000.00) per day.

B. This Bid includes Addenda numbered:

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C. The undersigned submits as his bid, the attached SCHEDULED OF PRICES, Pages 00400-2A through 00400-2F, inclusive, corrected as provided for therein, should there be any discrepancies between the prices bid in "words" or in "figures". The undersigned understands that the low bid shall initially be determined by the amount shown for the TOTAL CONTRACT PRICE.

SCHEDULE OF PRICES LORING / LAFAYETTE / WEST INTERSECTION AND SIGNALIZATION IMPROVEMENTS SALEM, MASSACHUSETTS							
Item No.	Approx. Quantity	Item with Unit Bid Price Written in Words	Unit Price		Amount		
			Dollars	Cents	Dollars	Cents	
120.	330	Earth Excavation, at  _____  _____ Per Cubic Yard					
145.	1	Drainage Structure Abandoned, at  _____  _____ Per Each					
150.	10	Ordinary Borrow, at  _____  _____ Per Cubic Yard					
151.	190	Gravel Borrow, at  _____  _____ Per Cubic Yard					
156.	1	Crushed Stone, at  _____  _____ Per Ton					
170.	700	Fine Grading and Compacting, at  _____  _____ Per Square Yard					
201.	1	Catch Basin, at  _____  _____ Per Each					
222.	1	Frame and Grate, at  _____  _____ Per Each					
415.	3,500	Pavement Micromilling, at  _____  _____ Per Square Yard					
<i>CARRIED FORWARD</i>							

SCHEDULE OF PRICES LORING / LAFAYETTE / WEST INTERSECTION AND SIGNALIZATION IMPROVEMENTS SALEM, MASSACHUSETTS						
Item No.	Approx. Quantity	Item with Unit Bid Price Written in Words	Unit Price		Amount	
			Dollars	Cents	Dollars	Cents
431.1	100	High Early Strength Cement Concrete Pavement, at  Per Cubic Yard				
443.	4	Water for Roadway Dust Control, at  Per MGal (1,000 Gallons)				
451.	25	HMA for Patching, at  Per Ton				
452.	35	Asphalt Emulsion for Tack Coat, at  Per Gallon				
453.	2,700	HMA Joint Sealant, at  Per Foot				
455.23	470	Superpave Surface Course – 12.5 (SSC – 12.5), at  Per Ton				
455.32	60	Superpave Intermediate Course 19.0 (SIC – 19.0), at  Per Ton				
482.4	65	Sawing Portland Cement Concrete, at  Per Foot				
504.	20	Granite Curb Type VA4 - Straight, at  Per Foot				
<i>CARRIED FORWARD</i>						

SCHEDULE OF PRICES LORING / LAFAYETTE / WEST INTERSECTION AND SIGNALIZATION IMPROVEMENTS SALEM, MASSACHUSETTS						
Item No.	Approx. Quantity	Item with Unit Bid Price Written in Words	Unit Price		Amount	
			Dollars	Cents	Dollars	Cents
504.1	90	Granite Curb Type VA4 - Curved, at  _____  _____ Per Foot				
509.	30	Granite Transition Curb for Wheelchair Ramps - Straight, at  _____  _____ Per Foot				
509.1	70	Granite Transition Curb for Wheelchair Ramps - Curved, at  _____  _____ Per Foot				
515.	1	Granite Curb Inlet - Curved, at  _____  _____ Per Each				
516.	3	Granite Curb Corner Type A, at  _____  _____ Per Each				
520.	10	Concrete Curb – Cast In Place, at  _____  _____ Per Foot				
580.	300	Curb Removed and Reset, at  _____  _____ Per Foot				
582.	1	Curb Corner Removed and Reset, at  _____  _____ Per Each				
701.	260	Cement Concrete Sidewalk, at  _____  _____ Per Square Yard				
<i>CARRIED FORWARD</i>						

SCHEDULE OF PRICES LORING / LAFAYETTE / WEST INTERSECTION AND SIGNALIZATION IMPROVEMENTS SALEM, MASSACHUSETTS						
Item No.	Approx. Quantity	Item with Unit Bid Price Written in Words	Unit Price		Amount	
			Dollars	Cents	Dollars	Cents
701.1	30	Cement Concrete Sidewalk at Driveways, at  _____ _____ Per Square Yard				
701.2	120	Cement Concrete Wheelchair Ramp, at  _____ _____ Per Square Yard				
748.	1	Mobilization, at  _____ _____ Per Lump Sum				
751.	20	Loam Borrow, at  _____ _____ Per Cubic Yard				
765.	110	Seeding, at  _____ _____ Per Square Yard				
804.3	310	3 Inch Electrical Conduit Type NM – Plastic –(UL), at  _____ _____ Per Linear Foot				
811.31	5	Pull Box 12 x 12 Inches – SD2.031, at  _____ _____ Per Each				
816.	1	Traffic Signal Reconstruction, at  _____ _____ Per Lump Sum				
832.	70	Warning-Regulatory and Route Marker – Alum. Panel (Type A), at  _____ _____ Per Square Foot				
<i>CARRIED FORWARD</i>						

SCHEDULE OF PRICES LORING / LAFAYETTE / WEST INTERSECTION AND SIGNALIZATION IMPROVEMENTS SALEM, MASSACHUSETTS						
Item No.	Approx. Quantity	Item with Unit Bid Price Written in Words	Unit Price		Amount	
			Dollars	Cents	Dollars	Cents
841.1	2	Supports for Guide Sign (D6 W D8-5 Inch Tubular Post ) Steel, at  Per Each				
847.1	3	Sign Sup (N/Guide)+Rte Mkr w/ Brkway Post Assembly - Steel, at  Per Each				
852.	470	Safety Signing for Construction Operations, at  Per Square Foot				
856.	50	Special Lighting Unit (Flashing Arrow), at  Per Unit Day				
856.12	100	Portable Changeable Message Sign, at  Per Unit Day				
859.	1,600	Reflectorized Drum, at  Per Drum Day				
864.04	500	Pavement Arrows and Legends Refl. White (Thermoplastic), at  Per Square Foot				
864.35	16	Slotted Pavement Marker – Two Way Yellow / Yellow, at  Per Each				
866.106	1,000	6 Inch Reflectorized White Line (Thermoplastic), at  Per Foot				
<i>CARRIED FORWARD</i>						

SCHEDULE OF PRICES LORING / LAFAYETTE / WEST INTERSECTION AND SIGNALIZATION IMPROVEMENTS SALEM, MASSACHUSETTS						
Item No.	Approx. Quantity	Item with Unit Bid Price Written in Words	Unit Price		Amount	
			Dollars	Cents	Dollars	Cents
866.112	1,000	12 Inch Reflectorized White Line (Thermoplastic), at _____ _____ Per Foot				
867.106	1,100	6 Inch Reflectorized Yellow Line (Thermoplastic), at _____ _____ Per Foot				
874.2	2	Traffic Sign Removed and Reset, at _____ _____ Per Each				
874.4	5	Traffic Sign Removed and Stacked, at _____ _____ Per Each				
877.	1	Sign Post Removed and Reset, at _____ _____ Per Each				
877.1	5	Sign Post Removed and Discarded, at _____ _____ Per Each				
		Traffic Police (Allowance) _____ _____			\$10,000	00
<i>ESTIMATED TOTAL CONTRACT PRICE</i>						

D. The proposed TOTAL CONTRACT PRICE is \_\_\_\_\_ Dollars (\$\_\_\_\_\_).

E. The undersigned agrees that if he is selected as the Contractor he will promptly confer with the City of Salem, Massachusetts, acting by its Purchasing Agent, without personal liability for the individual members thereof.

F. The undersigned agrees that, if he is selected as the Contractor he will within five (5) days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the City of Salem, acting by its Purchasing Agent, execute a contract in accordance with the terms of this Bid and furnish a Performance Bond and a Labor and Material Payment Bond of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the City of Salem acting by its Purchasing Agent, each in the sum of One Hundred percent of the Contract Price, the premium for which is to be paid by the Contractor and is included in the Contract Price.

G. The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

H. The undersigned offers the following information as evidence of his qualifications to perform the work as bid upon according to all the requirements of the Drawings and Specifications:

The names and residences of all persons and parties interested in this Bid as principals are as follows:

Note: Give the first and last names in full. In case of a corporation, give names of officers and directors. In case of a partnership, give name of all partners.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I. The undersigned submits answers to the following questions to enable the Owner to judge of his experience and ability in, and facilities for the work proposed to be done.

1. The work, if awarded to you, will have the resident personal supervision of whom? State his or their special qualifications.

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2. Describe equipment you proposed to furnish. (A) your own, (B) rented-

(A) \_\_\_\_\_

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(B) \_\_\_\_\_

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3. How many years has your organization been in business as a contractor under the name in which you propose to execute this contract?

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4. What projects has your present organization completed of character similar to that proposed? Please provide the information requested for three (3) projects.

(A) Owner/contact: Name/title: \_\_\_\_\_

Tel: \_\_\_\_\_ Email: \_\_\_\_\_

Work was done as Contractor [ ] or Subcontractor [ ] Value: \_\_\_\_\_

Dates/Description of work: \_\_\_\_\_

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(B) Owner/contact: Name/title: \_\_\_\_\_

Tel: \_\_\_\_\_ Email: \_\_\_\_\_

Work was done as Contractor [ ] or Subcontractor [ ] Value: \_\_\_\_\_

Dates/Description of work: \_\_\_\_\_

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(C) Owner/contact: Name/title: \_\_\_\_\_

Tel: \_\_\_\_\_ Email: \_\_\_\_\_

Work was done as Contractor [ ] or Subcontractor [ ] Value: \_\_\_\_\_

Dates/Description of work: \_\_\_\_\_

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5. Has your present organization ever failed to complete any work awarded to it? If so, state when, where, and why.

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**CERTIFICATION OF BID**

The undersigned bidder hereby certifies he/she will comply with the minority workforce percentage ratio and specific affirmative action steps contained in the EEO/AA provisions of this Contract including compliance with the Minority/ Woman Enterprise as required under these contract provisions. The Contractor receiving the award of the contract shall be required to obtain from each of its subcontractors a copy of the certification by said subcontractor, regardless of tier, that it will comply with the minority workforce ratio and specific affirmative action steps contained in these EEO/AA contract provisions and submit it to the contracting agency prior to the award of such subcontract.

The undersigned certifies under penalties of perjury that there have been no substantial changes in his financial position or business organization other than those changes noted within the application since the applicant's most recent pre-qualification statement and that the bid is in all respects bonafide, fair and made without collusion or fraud with any other person. "Person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity which sells materials, equipment or supplies used in or for, or engages in the performance of, the same or similar construction, reconstruction, installation, demolition, maintenance or repair work or any part thereof.

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards made subject to section forty-four A.

The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth of Massachusetts under the provision of Section Twenty-Nine F of Chapter Twenty-Nine, or any other applicable debarment provisions of any other Chapter of the General Laws or any rule or regulation promulgated thereunder.

---

(Name of Bidder)

---

(Date)

---

(FEIN)

---

(Signature)

---

(Name & Title of person signing bid)

---

(Business Address)

---

(Mailing Address, if different)

---

(Business Telephone No.)

---

(Business FAX No.)

\* IMPORTANT - Execute Acknowledgement of Officer or Agent who signs this document and attach Certificate of Clerk authorizing bid and execution by signing officers. (Use proper form on the following pages).







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CONTRACTOR'S CERTIFICATION

I, \_\_\_\_\_, hereby certify that

\_\_\_\_\_  
(Name of Contractor)

has complied with all laws of the Commonwealth of Massachusetts relating to taxes.

The undersigned also certifies that this bid is in all respects bonafide, fair and made without collusion or fraud with any other person. As used in this paragraph, the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

Signed and sworn by me under the penalties of perjury this

\_\_\_\_\_ day of \_\_\_\_\_, 2017.

Signed,

\_\_\_\_\_

\_\_\_\_\_  
(Title, if Contractor is other than individual)

City of Salem, MA  
Contract Compliance Action Plan  
Contractor's Certification

A. Contractor's Certification Name of Project \_\_\_\_\_

A contractor will not be eligible for award of a contract unless such contractor has submitted the following certification, which is deemed a part of the resulting contract.

CONTRACTOR'S CERTIFICATION

\_\_\_\_\_ certifies that

1. it tends to use the following listed construction trades in the work under this Contract \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ ; and
2. will comply with the minority manpower ratio and specific affirmative action steps contained herein; and
3. will obtain from each of its subcontractors and submit to the contracting or administering agency prior to the award of any subcontract under this Contract the subcontractor certification required by these bid conditions.

\_\_\_\_\_  
(Signature of authorized representative of contractor)

SCHEDULE FOR PARTICIPATION BY  
 MINORITY/WOMEN BUSINESS ENTERPRISES  
 City of Salem, MA  
 Contract Compliance Action Plan

(to be completed and submitted with the bid)

<u>Name of Minority/Women Business Enterprise</u>	<u>Total Price</u>
---	------------------------

Total Bid Amount \_\_\_\_\_

Total Amount to be Paid to  
Minority/Women Business Enterprises \_\_\_\_\_

PERCENT OF TOTAL BID PRICE WHICH IS TO  
BE PAID TO MINORITY/WOMEN BUSINESS  
ENTERPRISES FOR WORK PERFORMED  
UNDER THIS CONTRACT \_\_\_\_\_

MINORITY/WOMEN BUSINESS PARTICIPATION  
LETTER OF INTENT  
City of Salem, MA  
Contract Compliance Action Plan

(to be completed and submitted with the bid)

The undersigned intends to perform work in connection with the above project as (check one):

- an individual                       a corporation
- a partnership                       a joint venture

The minority status of the undersigned is (a) certified by the State Office of Minority/Women Business Assistance or (b) has applied for certification on the attached Minority/Women Business Certification Application.

The undersigned is prepared to perform the following described work in connection with the above project. (Specify in detail particular work items or parts thereof to be performed.)

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at the following price:

The above work will not be subcontracted to a non-minority/women business.

The undersigned will enter into a formal agreement with you for the above work conditioned upon your execution of a contract for the above project.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name of Minority/Women Business

By: \_\_\_\_\_

END OF SECTION



SECTION 00410

BID BOND

Know all men by these presents, that we, the Undersigned,

\_\_\_\_\_ as principal and

\_\_\_\_\_ as Surety, are hereby

held and firmly bound unto the City of Salem, Massachusetts, in the sum of

\_\_\_\_\_ Dollars, lawful

money of the United States, as liquidated damages for the payment of which sum, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 2017.

The condition of the above obligation is such that whereas the Principal has submitted to the City of Salem, Purchasing Agent, a certain Bid (Proposal), attached hereto and hereby made a part hereof, to enter into a contract in writing for Construction of: CONTRACT S-46 LORING / LAFAYETTE / WEST INTERSECTION AND SIGNALIZATION IMPROVMENTS.

Now, Therefore,

- (A) If said Bid shall be rejected, or, in the alternate,
- (B) If said Bid shall be accepted and the Principal shall execute and deliver a contract in the form of contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid, then this obligation shall be void, otherwise, the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Principal may accept such Bid; and said Surety does hereby waive notice of any such bid extension.

In Witness Whereof, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

\_\_\_\_\_(L.S.)  
Principal

\*By \_\_\_\_\_

\_\_\_\_\_  
Surety

(Seal)

\*By \_\_\_\_\_

\*IMPORTANT: Furnish proof of authority of officers or agents of surety to execute this document.

END SECTION

## SECTION 00500

## AGREEMENT

**SAMPLE AGREEMENT****CONTRACT S-46**CITY OF SALEM  
CONTRACT FOR SERVICES  
Over \$10,000

This agreement is made and entered into by and between the City of Salem (hereinafter the CITY), a municipal corporation organized and existing under the laws of the Commonwealth of Massachusetts, and \_\_\_\_\_ (hereinafter the CONTRACTOR).

**ARTICLE I. DEFINITION.**

This CONTRACT as used herein shall mean these articles, and the “contract documents” which include but are not limited to the following identified items and all documents, and forms submitted therewith, or attached hereby.

- Attachment A: Scope of Services, and/or other bid package materials
- Attachment B: Additional Contract Terms and Conditions
- Attachment C: Statement of Corporate Authority
- Addendum:

**ARTICLE II. AMOUNT AND DURATION.**

This CONTRACT in an amount not to exceed \_\_\_\_\_ shall commence upon issuance of the Notice to Proceed and terminate no later than \_\_\_\_\_, unless a written amendment to renew or extend this contract is executed in accordance with the provision of the CONTRACT.

**ARTICLE III. PERFORMANCE.**

The Contractor agrees to provide all goods and/or services set forth in the Invitation for Bid, Documents, Scope of Service, the Contractor's proposal for \_\_\_\_\_ and/or as outlined in ATTACHMENT A - SCOPE OF SERVICES.

**ARTICLE IV. TERMINATION.**

Without Cause. The CITY may terminate this CONTRACT on sixty (60) calendar days notice, or may suspend this CONTRACT for up to sixty (60) calendar days upon receipt of notice, when in the best interests of the City by providing notice to the CONTRACTOR, which shall be in writing and shall be deemed delivered and received when given in person to the CONTRACTOR, or when received by fax, express mail, certified mail return receipt requested,

regular mail postage prepaid or delivered by any other appropriate method evidencing actual receipt by the CONTRACTOR.

For Cause. If the CONTRACTOR is determined by the CITY to be in default of any term or condition of CONTRACT, the CITY may terminate this contract on thirty (30) days notice by providing notice to the CONTRACTOR, which shall be in writing and shall be deemed delivered and received when given in person to the CONTRACTOR, or when received by fax, express mail, certified mail return receipt requested, regular mail postage prepaid or delivered by any other appropriate method evidencing actual receipt by the CONTRACTOR. If the CITY is determined by the CONTRACTOR to be in default of any term or condition of this CONTRACT the CONTRACTOR may terminate this contract on thirty (30) days notice by providing notice to the CITY, which shall be in writing and shall be deemed delivered and received when given in person to the CITY, or when received by fax, express mail, certified mail return receipt requested, regular mail postage prepaid or delivered by any other appropriate method evidencing actual receipt by the CITY.

Default. The following shall constitute events of default under this CONTRACT: a) any material misrepresentation made by the CONTRACTOR to the CITY, b) any failure to perform any of its obligations under this CONTRACT including, but not limited to the following: (i) failure to commence performance of this CONTRACT at the time specified in this CONTRACT due to a reason or circumstance within the CONTRACTOR'S reasonable control, (ii) failure to perform this CONTRACT with sufficient personnel and equipment or with sufficient material to ensure the completion of this CONTRACT within the specified time due to a reason or circumstance within the CONTRACTOR'S reasonable control, (iii) failure to performance this CONTRACT in a manner reasonably satisfactory to the CITY, (iv) failure to promptly re-perform with reasonable time the services that were rejected by the CITY as unsatisfactory, or erroneous, (v) discontinuance of the services for reasons not beyond the CONTRACTOR'S reasonable control, (vi) failure to comply with a material term of this CONTRACT, including, but not limited to, the provision of insurance and nondiscrimination, and (vii) any other acts specifically and expressly stated in this CONTRACT as constituting a basis for termination of this CONTRACT, and (viii) failure to comply with any and all requirements of state law, and/or regulations, and City ordinances, and/or regulations.

#### **ARTICLE V. REMEDIES OF THE CITY.**

The CITY may deduct the cost of any substitute contract or performance for expenses, losses, and all damages, including incidental and consequential damages as a result of any event of non-conformance or non-performance of the CONTRACTOR in complying with the terms of this CONTRACT, and shall withhold such expenses, losses, and damages from sums due, or to become due.

#### **ARTICLE VI. REMEDIES OF THE CONTRACTOR.**

If the damages, other than loss, non-conformance, or non-performance, are actually sustained by the CONTRACTOR due to any act or omission for which the CITY is legally responsible the CITY shall allow a sum equal to the amount of such damages sustained by the Contractor as determined by the CITY in writing, provided the Contractor shall have provided to all signatories

of the contract a detailed written statement of such damages and cause thereof within 30 days of the act of omission by the CITY.

**ARTICLE VII. ASSIGNABILITY.**

The CONTRACTOR shall not assign, subcontract or in any way transfer any interest in this contract without the prior written consent of the Procurement Officer of said City. In the event of such occurrence the City reserves the right to deal with any assignee subcontractor or transferee directly and the contractor agrees to remain bound by all terms and conditions of this contract in accordance with its original tenor. The provisions of this CONTRACT shall be binding upon, and shall inure to the benefit of, the successors and assigns of the CONTRACTOR and any public body or bodies succeeding the interests of the CITY.

**ARTICLE VIII. INDEMNIFICATION.**

The CONTRACTOR shall assume the defense, indemnify and hold harmless the CITY, the CITY'S agents and employees, from and against all losses and all claims, demands, payments, suits, actions, recoveries and judgments of every nature and description brought or recovered against them by reason of acts, in actions, omissions, negligence, reckless or intentional misconduct of the said CONTRACTOR, its agent(s), officers, employees, or subcontractors; in the execution of the work or in guarding the same. Unless otherwise provided by law, the CITY may elect to indemnify the CONTRACTOR for claims arising in tort if it is determined that the CONTRACTOR performed its obligations under this CONTRACT pursuant to the direct supervision and control of the CITY or its designated agent(s).

**ARTICLE IX. WORKER'S COMPENSATION AND OTHER INSURANCE.**

The CONTRACTOR shall provide by insurance for the payment of compensation and the furnishing of other benefits under Chapter 152 of the General Laws of Massachusetts (The Worker's Compensation Act) to all employees of the CONTRACTOR who are subject to the provisions of Chapter 152 of the General Laws of Massachusetts.

Failure to provide and continue in force such insurance during the period of this contract shall be deemed a material breach of this contract, shall operate as an immediate termination thereof, and CONTRACTOR shall indemnify the CITY for all losses, claims, and actions resulting from the failure to provide the insurance required by this Article.

Prior to commencement of any work and until completion of its work under this CONTRACT shall maintain the following insurance coverage, at its cost, from insurance acceptable to the CITY, giving evidence of such coverage to the CITY prior to execution of this CONTRACT, a copy of such insurance coverage to be attached herewith:

General - The Vendor shall before commencing performance of the Contract be responsible for providing and maintaining insurance coverage in force for the life of the Contract of the kind and in adequate amounts to secure all of the obligations under the Contract and with insurance companies licensed to write insurance in the Commonwealth of Massachusetts. All such insurance carried shall not be less than the kinds and amounts designated herein, and the Vendor agrees that the stipulation herein of the kinds and limits of coverage shall in no way limit the liability of the Vendor to any such kinds and amounts of insurance coverage. All policies issued

shall indemnify and save harmless the City of Salem, its agents and employees from any and all claims for damages to persons or property as may rise out of the performance of this Contract.

Vendor's Comprehensive General Public Liability and Property Damage Liability Insurance -

The Vendor shall carry Comprehensive General Liability Insurance providing for a limit of not less than Five Hundred Thousand Dollars (\$500,000.00) for all damages arising out of bodily injury to or death of one person, and subject to that limit for each person, a total limit of not less than One Million Dollars (\$1,000,000.00) for all damages arising out of bodily injuries or death of two or more persons in any one accident; and Vendor's Comprehensive Property Damage Liability Insurance providing for a limit of not less than Five Hundred Thousand Dollars (\$500,000.00) for all damages arising out of injury to or destruction of property in any one accident, and subject to that limit per accident, a total (or aggregate) limit or not less than One Million Dollars (\$1,000,000.00) for all damages arising out of injury to or destruction of property during the policy period.

Comprehensive Automotive and Property Damage Insurance - The Vendor shall carry Automobile Insurance covering all owned vehicles, hired vehicles or non-owned vehicles under the control of the Vendor while performing work under the Contract in the amount of not less than Five Hundred Thousand Dollars (\$500,000.00) for all damages arising out of bodily injuries to or death of one person and subject to that limit for each person, a total of not less than One Million Dollars (\$1,000,000.00) for all damages arising out of bodily injuries to or death of two or more persons in any one accident; and Property Damage coverage in the amount of not less than Five Hundred Thousand Dollars (\$500,000.00) for all damages to or destruction of property.

The Vendor must carry Workman's Compensation Insurance in the amounts prescribed under Massachusetts State Law and meet all other City and State Laws and Regulations.

No cancellation(s) of such insurance, whether by the insurer or by the insured party shall be valid unless written notice thereof is given by the parties proposing cancellation to the other party and to the City of Salem at least fifteen (15) days prior to the intended effective date thereof, which date shall be expressed in said notice, which shall be sent by registered mail, return receipt requested. These provisions shall apply to the legal representative(s), trustee in bankruptcy, receiver, assignee, trustee, and successor(s) in interest of the Vendor.

All insurance coverage shall be at the sole expense of the Vendor and shall be placed with such company as may be acceptable to the City of Salem and shall constitute a material part of the contract documents.

Failure to provide written proof to City and continue in force such insurance as aforesaid shall be deemed a material breach of the contract, and may constitute sufficient grounds for immediate termination of the same.

All required insurance must be endorsed to name the CITY as Additional Insured. All required insurance shall be endorsed to waive the insurer's rights of subrogation against the City. All policies and certificate for insurance must contain language that the insurance shall not be canceled, materially changed or non-renewed without at least thirty (30) days advance written

notice to the CITY. The CONTRACTOR under this CONTRACT shall not allow it subcontractors to begin work until similar insurance has been so obtained and certificates of insurance approved by the CONTRACTOR.

**ARTICLE X. CORPORATE CONTRACTOR.**

If CONTRACTOR is a corporation, CONTRACTOR shall endorse the Certificate of Corporate Authority for the CONTRACTORS' signatory, or shall otherwise provide a form similar in nature and substance acceptable to the CITY.

If CONTRACTOR is a non-profit corporation, CONTRACTOR shall provide satisfactory proof of present status as a non-profit corporation. Such proof shall be in the form of a certification from the Massachusetts Secretary of State's office and/or from the Internal Revenue Service and shall provide the Federal Tax Identification Number of the non-profit corporation. This agreement shall not be enforceable against the CITY unless and until the CONTRACTOR complies with this section. Failure to inform the CITY in writing of revocation, or other loss of non-profit status shall be deemed a material breach of this contract and operate as an immediate termination thereof.

**ARTICLE XI. SUBJECT TO APPROPRIATION.**

The obligations of the CITY under this CONTRACT shall be subject to appropriation. In the absence of appropriation this CONTRACT shall be immediately terminated without liability for damages, penalties, or other charges.

**ARTICLE XII. DOCUMENTS, MATERIALS, ETC.**

Any materials, reports, information, data, etc. given to or prepared or assembled by the CONTRACTOR under this CONTRACT are to be kept confidential and shall not be made available to any individual or organization by the CONTRACTOR (except agents, servants, or employees of the CONTRACTOR) without the prior written approval of the CITY, except as otherwise required by law. The CONTRACTOR understands that he/she/it may acquire or have access to "personal data" otherwise kept by the CITY. The CONTRACTOR shall comply with the provisions Chapter 66A of the General Laws of Massachusetts as it relates to public documents, and all other state and federal laws and regulations relating to confidentiality, security privacy and use of confidential data.

Any materials produced in whole or in part under this CONTRACT shall not be subject to copyright, except by the CITY, in the United States or any other country. The CITY shall have unrestricted authority to, without payment of any royalty, commission, or additional fee of any type or nature, publicly disclose, reproduce, distribute and otherwise use, and authorize other to use, in whole or in part, any reports, data or other materials prepared under this CONTRACT.

All data, reports, programs, software, equipment, furnishings, and any other documentation or product paid for by the CITY shall vest in the CITY at the termination of this CONTRACT. The CONTRACTOR shall at all times, during or after termination of this CONTRACT, obtain the prior written approval of the CITY before making any statement bearing on the work performed or data collected under this CONTRACT to the press or issues any material for publication through any medium.

**ARTICLE XIII. AUDIT, INSPECTION, RECORD KEEPING.**

At any time during normal business hours, and as often as the CITY may deem it reasonably necessary, there shall be made available in the office of the CONTRACTOR for the purpose of audit, examination, and/or to make excerpts or transcripts, all records, contracts, invoices, materials, payrolls, records of personnel, conditions of employment and other data relating to all matters covered by this agreement.

Further the CONTRACTOR agrees to make its work papers, records and other evidence of audit available to the CITY for a period of three years after final payment under his CONTRACT. The CIT shall be entitled to reproduce any or all such documents at its own expense, for which provision shall be made at such time.

**ARTICLE XIV. WEEKLY PAYROLL RECORDS REPORT.**

In accordance with Massachusetts General Law ch. 149, sec. 26-27H as amended, a true and accurate record must be kept of all individuals employed on a public works construction project for which prevailing wage rates are applicable.

In addition, every contractor and subcontractor is required to submit, on a weekly basis, a copy of their weekly payroll records to the awarding authority. Once collected, the awarding authority is also required to preserve those records for three years.

**ARTICLE XV. CONFLICT OF INTEREST.**

CITY. No officer, member or employee of the CITY and no members of its governing body who exercise any function or responsibility in review or approval of the undertaking or carrying out of this CONTRACT shall participate in any decision relating to the CONTRACT which affects his/her personal interests or the interest of any corporation, partnership, or association in which he/she has a direct or indirect pecuniary interest. None of the services to be provided by the CONTRACTOR shall be used for any partisan political activity or further the election or defeat of any candidate for political office in the CITY. Compliance with this section shall be material to the CONTRACT.

CONTRACTOR. CONTRACTOR agrees that his/her/its agents, servants, and employees have neither presently nor during the period of this CONTRACT any interest direct or indirect which would impair, detract, or conflict in any manner or degree with the performance of services required under this CONTRACT. The CONTRACTOR, his/her/its agents, servants or employees further stipulates that in the performance of this CONTRACT, no person having any such interest shall be employed. Conflicts of Interest include but are not limited to (a) immediate family relationships with officials of the CITY, (b) instances where the CONTRACTOR, his/her/it agents, servants or employees during the period of this CONTRACT was connected as an officer, employee or member of the governing body of the CITY, and (c) instances where the CONTRACTOR has an interest in any CITY department, its agents, servants or employees or parcels of land within the CITY. Compliance with this section shall be material to the CONTRACT.

**ARTICLE XVI. PAYMENT.**

The CITY agrees to make all reasonable efforts to pay to the CONTRACTOR the sum set forth in the CONTRACTOR'S bid or proposal within thirty (30) days of receipt of an invoice at the Office of the City Auditor detailing the work completed.

Subject to pending statutory appeal rights, CONTRACTOR agrees that all sums otherwise due and payable to the CITY for outstanding taxes, fines, fees and or other municipal charges may be deducted from the sum(s) otherwise payable under this CONTRACT prior to disbursement to the CONTRACTOR.

**ARTICLE XVII. CONFLICT.**

In the event there is a conflict between these Articles and Attachment A. Attachment A shall supersede these Articles.

**ARTICLE XVIII. WAIVER AND AMENDMENT.**

The provisions contained in this CONTRACT may be modified only as specifically provided by ATTACHMENT B - ADDITIONAL TERMS AND CONDITIONS. Amendments, or waivers of any additional term, condition, covenant, duty or obligation contained in this CONTRACT may be made only by written amendment executed by all signatories to the original agreement, prior to the effective date of the amendment. To the extent allowed by law, all conditions, duties, and obligations contained in this CONTRACT may be waived only by written agreement by both parties.

Forbearance or indulgence in any form or manner by a party shall not be construed as a waiver, nor in any manner limit the legal or equitable remedies available to that party. No waiver by either party of any default or breach shall constitute a waiver of any subsequent default or breach of a similar or different matter.

**ARTICLE XIX. CERTIFICATION.**

IN WITNESS WHEREOF, THE CONTRACTOR CERTIFIES, UNDER THE PAINS AND PENALTIES OF PERJURY, THAT THE CONTRACTOR IS IN COMPLIANCE WITH EACH OF THE FOLLOWING:

TAXES. PURSUANT to M.G.L. c. 62C, s. 49A, the CONTRACTOR has filed all state tax returns and complied with all laws of the Commonwealth relating to taxes.

DEBARMENT. The CONTRACTOR is not currently debarred or suspended by the Commonwealth of Massachusetts, or any of its entities or subdivisions.

AMERICANS WITH DISABILITIES ACT. The CONTRACTOR is aware of the enacted Americans with Disabilities Act which prohibits discrimination based upon disability and shall meet any relevant standards, and/or conditions set out in the bid/proposal documents, bid/proposal specifications, and/or ATTACHMENT A - SCOPE OF SERVICES.

**ARTICLE XX. FORUM AND CHOICE OF LAW**

This CONTRACT and any performance herein shall be governed by and be construed in accordance with the laws of Commonwealth. Any and all proceedings or actions relating to

subject matter herein shall be brought and maintained in the courts of the Commonwealth or the federal district court sitting in the Commonwealth, which shall have exclusive jurisdiction thereof. This paragraph shall not be construed to limit any other legal rights of the parties.

IN WITNESS WHEREOF the parties have hereto and to three other identical instruments set forth their hands the day and year first above written.

THE CITY:

THE CONTRACTOR:

\_\_\_\_\_  
Kimberley Driscoll, Mayor

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Whitney Haskell, Purchasing Agent

\_\_\_\_\_  
Name and Title (Print)

Approved as to from:

\_\_\_\_\_  
Company

\_\_\_\_\_  
Elizabeth Rennard, Esq., City Solicitor.

\_\_\_\_\_  
Status (Corporate/Non-Corporate)

Approved as Contract Manager:

\_\_\_\_\_  
Taxpayer Identification Number

\_\_\_\_\_  
Authorized Signature

Date: \_\_\_\_\_

I CERTIFY THAT FUNDS HAVE BEEN ENCUMBERED  
IN THE AMOUNT OF:

\_\_\_\_\_  
Sarah Stanton, Finance Director

END OF SECTION

SECTION 00610

PERFORMANCE BOND

Know all men by these presents, that we, \_\_\_\_\_

\_\_\_\_\_

organized under the laws of the State of \_\_\_\_\_,

and having a usual place of business in \_\_\_\_\_

\_\_\_\_\_, as principal, and \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

organized under the laws of the State of \_\_\_\_\_,

and having a usual place of business at \_\_\_\_\_

\_\_\_\_\_

as Surety, are holden and stand firmly bound and obligated unto the City of Salem, Massachusetts, as obligee, in the sum

of \_\_\_\_\_ Dollars (\$) lawful money of the United States of America, to and for the true payment whereof, we hereby bind ourselves, and each of us, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Whereas, the said principal has, by means of a written Agreement, dated \_\_\_\_\_, entered into a Contract with the same obligee for the Construction of: CONTRACT S-46 LORING / LAFAYETTE / WEST INTERSECTION AND SIGNALIZATION IMPROVEMENTS, a copy of which Agreement is attached hereto and by reference made a part hereof.

Now, the condition of this obligation is such that, if the said Principal, his heirs, administrators, successors, or assigns, shall well and truly keep and perform all the agreements, terms and conditions of said Agreement on his part to be kept and performed, including the guarantee in the General Conditions, then this obligation shall be void; otherwise, it shall remain in full force and virtue.

And the said Surety, for value received, hereby stipulates and agrees that no change in, or extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder, or to the Specifications accompanying the same shall in any wise affect its obligations on this bond and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

In witness whereof, we have hereunto set our hands and seals

this \_\_\_\_\_ day of \_\_\_\_\_ in the year Two Thousand and Seventeen.

Principal

By \_\_\_\_\_  
(Seal)

Surety

By \_\_\_\_\_  
(Seal)

Important - Attach herewith proof of authority of officers or agents to sign bonds.

END OF SECTION

SECTION 00620

LABOR AND MATERIAL PAYMENT BOND

Know all men by these presents, that we, \_\_\_\_\_  
organized under the laws of the State of \_\_\_\_\_, and  
having a usual place of business in \_\_\_\_\_  
\_\_\_\_\_, as principal, and \_\_\_\_\_

organized under the laws of the State of \_\_\_\_\_, and  
having a usual place of business at \_\_\_\_\_

As Surety, are holden and stand firmly bound and obligated unto the City of Salem,  
Massachusetts, as obligee, in the sum of

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_), lawful money of the United States of America, to and for  
the true payment whereof, we hereby bind ourselves, and each of us, our heirs, executors,  
administrators, successors and assigns, jointly and severally, firmly by these presents.

Whereas, the said principal has, by means of a written Agreement, dated \_\_\_\_\_,  
entered into a Contract with the same obligee for the Construction of: CONTRACT S-46  
LORING / LAFAYETTE / WEST INTERSECTION AND SIGNALIZATION  
IMPROVEMENTS, a copy of which Agreement is attached hereto and by reference made a part  
hereof.

Now, the condition of this obligation is such that, if the said Principal, his heirs, administrators,  
successors, or assigns, shall pay for all labor performed or furnished, all materials, including  
material so employed which is not incorporated in the construction or repair work and is not  
wholly or necessarily consumed or made so worthless as to lose its identity but only to the extent

of its purchase price less its fair salvage value, and for the rental or hire of vehicles, power shovels and rollers, concrete mixers, tools and other appliances and equipment employed in the work, all persons who contract with the Principal for labor and materials, all insurance premiums on said work, and for the use of all patent rights, used or employed in the carrying out of said Agreement, then this obligation shall be void- otherwise it shall remain in full force and virtue. The obligation shall be in accordance with the Massachusetts General Laws, Chapter 30B.

And the said Surety, for value received, hereby stipulates and agrees that no change in, or extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder, or to the Specifications accompanying the same shall in any wise affect its obligations on this bond and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications. And that no final settlement between the Owner and the Principal shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

In witness whereof, we have hereunto set our hands and seals this \_\_\_\_\_ day of \_\_\_\_\_ in the year Two Thousand and Seventeen.

Principal

By \_\_\_\_\_  
(Seal)

Surety

By \_\_\_\_\_  
(Seal)

Important - Attach herewith proof of authority of officers or agents to sign bonds.

END OF SECTION

SECTION 00700

STANDARD  
GENERAL CONDITIONS  
OF THE  
CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By



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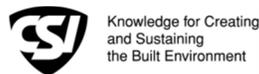
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Construction Specifications Institute

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These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor Nos. C-520 or C-525 (2002 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC Construction Documents, General and Instructions (No. C-001) (2002 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. C-800) (2002 Edition).

**TABLE OF CONTENTS**

Page

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY.....	6
1.01 <i>Defined Terms</i> .....	6
1.02 <i>Terminology</i> .....	8
ARTICLE 2 - PRELIMINARY MATTERS.....	9
2.01 <i>Delivery of Bonds and Evidence of Insurance</i> .....	9
2.02 <i>Copies of Documents</i> .....	9
2.03 <i>Commencement of Contract Times; Notice to Proceed</i> .....	9
2.04 <i>Starting the Work</i> .....	9
2.05 <i>Before Starting Construction</i> .....	9
2.06 <i>Preconstruction Conference</i> .....	9
2.07 <i>Initial Acceptance of Schedules</i> .....	9
ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE.....	10
3.01 <i>Intent</i> .....	10
3.02 <i>Reference Standards</i> .....	10
3.03 <i>Reporting and Resolving Discrepancies</i> .....	10
3.04 <i>Amending and Supplementing Contract Documents</i> .....	11
3.05 <i>Reuse of Documents</i> .....	11
3.06 <i>Electronic Data</i> .....	11
ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS.....	11
4.01 <i>Availability of Lands</i> .....	11
4.02 <i>Subsurface and Physical Conditions</i> .....	12
4.03 <i>Differing Subsurface or Physical Conditions</i> .....	12
4.04 <i>Underground Facilities</i> .....	13
4.05 <i>Reference Points</i> .....	13
4.06 <i>Hazardous Environmental Condition at Site</i> .....	13
ARTICLE 5 - BONDS AND INSURANCE.....	14
5.01 <i>Performance, Payment, and Other Bonds</i> .....	14
5.02 <i>Licensed Sureties and Insurers</i> .....	15
5.03 <i>Certificates of Insurance</i> .....	15
5.04 <i>Contractor's Liability Insurance</i> .....	15
5.05 <i>Owner's Liability Insurance</i> .....	16
5.06 <i>Property Insurance</i> .....	16
5.07 <i>Waiver of Rights</i> .....	17
5.08 <i>Receipt and Application of Insurance Proceeds</i> .....	17
5.09 <i>Acceptance of Bonds and Insurance; Option to Replace</i> .....	17
5.10 <i>Partial Utilization, Acknowledgment of Property Insurer</i> .....	18
ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES.....	18
6.01 <i>Supervision and Superintendence</i> .....	18
6.02 <i>Labor; Working Hours</i> .....	18
6.03 <i>Services, Materials, and Equipment</i> .....	18
6.04 <i>Progress Schedule</i> .....	18
6.05 <i>Substitutes and "Or-Equals"</i> .....	19
6.06 <i>Concerning Subcontractors, Suppliers, and Others</i> .....	20
6.07 <i>Patent Fees and Royalties</i> .....	21
6.08 <i>Permits</i> .....	21
6.09 <i>Laws and Regulations</i> .....	21
6.10 <i>Taxes</i> .....	22
6.11 <i>Use of Site and Other Areas</i> .....	22
6.12 <i>Record Documents</i> .....	22
6.13 <i>Safety and Protection</i> .....	22
6.14 <i>Safety Representative</i> .....	23
6.15 <i>Hazard Communication Programs</i> .....	23

6.16	<i>Emergencies</i> .....	23
6.17	<i>Shop Drawings and Samples</i> .....	23
6.18	<i>Continuing the Work</i> .....	24
6.19	<i>Contractor’s General Warranty and Guarantee</i> .....	24
6.20	<i>Indemnification</i> .....	24
6.21	<i>Delegation of Professional Design Services</i> .....	25
ARTICLE 7 - OTHER WORK AT THE SITE .....		25
7.01	<i>Related Work at Site</i> .....	25
7.02	<i>Coordination</i> .....	26
7.03	<i>Legal Relationships</i> .....	26
ARTICLE 8 - OWNER’S RESPONSIBILITIES .....		26
8.01	<i>Communications to Contractor</i> .....	26
8.02	<i>Replacement of Engineer</i> .....	26
8.03	<i>Furnish Data</i> .....	26
8.04	<i>Pay When Due</i> .....	26
8.05	<i>Lands and Easements; Reports and Tests</i> .....	26
8.06	<i>Insurance</i> .....	26
8.07	<i>Change Orders</i> .....	26
8.08	<i>Inspections, Tests, and Approvals</i> .....	26
8.09	<i>Limitations on Owner’s Responsibilities</i> .....	27
8.10	<i>Undisclosed Hazardous Environmental Condition</i> .....	27
8.11	<i>Evidence of Financial Arrangements</i> .....	27
ARTICLE 9 - ENGINEER’S STATUS DURING CONSTRUCTION.....		27
9.01	<i>Owner’s Representative</i> .....	27
9.02	<i>Visits to Site</i> .....	27
9.03	<i>Project Representative</i> .....	27
9.04	<i>Authorized Variations in Work</i> .....	27
9.05	<i>Rejecting Defective Work</i> .....	27
9.06	<i>Shop Drawings, Change Orders and Payments</i> .....	28
9.07	<i>Determinations for Unit Price Work</i> .....	28
9.08	<i>Decisions on Requirements of Contract Documents and Acceptability of Work</i> .....	28
9.09	<i>Limitations on Engineer’s Authority and Responsibilities</i> .....	28
ARTICLE 10 - CHANGES IN THE WORK; CLAIMS .....		28
10.01	<i>Authorized Changes in the Work</i> .....	28
10.02	<i>Unauthorized Changes in the Work</i> .....	29
10.03	<i>Execution of Change Orders</i> .....	29
10.04	<i>Notification to Surety</i> .....	29
10.05	<i>Claims</i> .....	29
ARTICLE 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK.....		30
11.01	<i>Cost of the Work</i> .....	30
11.02	<i>Allowances</i> .....	31
11.03	<i>Unit Price Work</i> .....	31
ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES .....		32
12.01	<i>Change of Contract Price</i> .....	32
12.02	<i>Change of Contract Times</i> .....	33
12.03	<i>Delays</i> .....	33
ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK.....		33
13.01	<i>Notice of Defects</i> .....	33
13.02	<i>Access to Work</i> .....	33
13.03	<i>Tests and Inspections</i> .....	33
13.04	<i>Uncovering Work</i> .....	34
13.05	<i>Owner May Stop the Work</i> .....	34
13.06	<i>Correction or Removal of Defective Work</i> .....	34
13.07	<i>Correction Period</i> .....	34
13.08	<i>Acceptance of Defective Work</i> .....	35
13.09	<i>Owner May Correct Defective Work</i> .....	35
ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION .....		36
14.01	<i>Schedule of Values</i> .....	36
14.02	<i>Progress Payments</i> .....	36
14.03	<i>Contractor’s Warranty of Title</i> .....	37
14.04	<i>Substantial Completion</i> .....	37

14.05	<i>Partial Utilization</i> .....	38
14.06	<i>Final Inspection</i> .....	38
14.07	<i>Final Payment</i> .....	38
14.08	<i>Final Completion Delayed</i> .....	39
14.09	<i>Waiver of Claims</i> .....	39
ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION .....		39
15.01	<i>Owner May Suspend Work</i> .....	39
15.02	<i>Owner May Terminate for Cause</i> .....	39
15.03	<i>Owner May Terminate For Convenience</i> .....	40
15.04	<i>Contractor May Stop Work or Terminate</i> .....	40
ARTICLE 16 - DISPUTE RESOLUTION .....		41
16.01	<i>Methods and Procedures</i> .....	41
ARTICLE 17 - MISCELLANEOUS .....		41
17.01	<i>Giving Notice</i> .....	41
17.02	<i>Computation of Times</i> .....	41
17.03	<i>Cumulative Remedies</i> .....	41
17.04	<i>Survival of Obligations</i> .....	41
17.05	<i>Controlling Law</i> .....	41
17.06	<i>Headings</i> .....	41

## GENERAL CONDITIONS

### ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

---

#### 1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*--The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder*--The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*--A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*-- Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*--The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*--The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*--See Paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*--The individual or entity named as such in the Agreement.

20. *Field Order*--A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

22. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

23. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*--The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*--A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*--The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*--Polychlorinated biphenyls.

31. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*--A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Related Entity* -- An officer, director, partner, employee, agent, consultant, or subcontractor.

37. *Resident Project Representative*--The authorized representative of Engineer who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Schedule of Submittals*--A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

40. *Schedule of Values*--A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

41. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

42. *Site*--Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

43. *Specifications*--That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

44. *Subcontractor*--An individual or entity having a direct contract with Contractor or with any other

Subcontractor for the performance of a part of the Work at the Site.

45. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

46. *Successful Bidder*--The Bidder submitting a responsive Bid to whom Owner makes an award.

47. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

48. *Supplier*--A manufacturer, fabricator, supplier, distributor, material man, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

49. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

50. *Unit Price Work*--Work to be paid for on the basis of unit prices.

51. *Work*--The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

52. *Work Change Directive*--A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

## 1.02 Terminology

A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.

### B. Intent of Certain Terms or Adjectives

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

### C. Day

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

### D. Defective

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents, or

b. does not meet the requirements of any applicable inspection, reference standard, test, or

approval referred to in the Contract Documents, or

c. has been damaged prior to Engineer's - recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

*E. Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

---

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule; indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

## 2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

## ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

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### 3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

### 3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of, their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

### 3.03 *Reporting and Resolving Discrepancies*

#### A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.

#### B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

- a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or
- b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

### 3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;
2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3); or
3. Engineer's written interpretation or clarification.

### 3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing all of the Work under a direct or indirect contract with Contractor, shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or
2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract.

Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

### 3.06 *Electronic Data*

A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party..

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

## ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

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### 4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as

necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

#### 4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

#### 4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

#### C. Possible Price and Times Adjustments

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous

areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

#### 4.04 *Underground Facilities*

*A. Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

#### *B. Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further

disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### 4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

#### 4.06 *Hazardous Environmental Condition at Site*

*A. Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

*B. Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified

in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on

a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06. G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

## ARTICLE 5 - BONDS AND INSURANCE

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### 5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the

Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

#### 5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

#### 5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

#### 5.04 *Contractor's Liability Insurance*

A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insured (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

#### 5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

#### 5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions,

and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, (other than caused by flood) and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

#### 5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

#### 5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order .

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

#### 5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract

Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

#### 5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

### ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

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#### 6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or

received from the superintendent shall be binding on Contractor.

#### 6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

#### 6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

#### 6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

#### 6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole,

3) it has a proven record of performance and availability of responsive service; and

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times, and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

#### 2. Substitute Items

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;

b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified, and

b) available engineering, sales, maintenance, repair, and replacement services;

4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change,

*B. Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

*C. Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

*D. Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

*E. Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract

Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

*F. Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

#### 6.06 Concerning Subcontractors, Suppliers, and Others

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor

2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual

or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

#### 6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

#### 6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

#### 6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

## 6.10 Taxes

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

## 6.11 Use of Site and Other Areas

### A. Limitation on Use of Site and Other Areas

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

*B. Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

*C. Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

*D. Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

## 6.12 Record Documents

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

## 6.13 Safety and Protection

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Draw-

ings or Specifications or to the acts or omissions of Owner or Engineer or , or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

#### 6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

#### 6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

#### 6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

#### 6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

##### 1. Shop Drawings

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples*: Contractor shall also submit Samples to Engineer for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals , any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

##### C. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents

with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

#### *D. Engineer's Review*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

#### *E. Resubmittal Procedures*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

#### *6.18 Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or

disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

#### *6.19 Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

#### *6.20 Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or

arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

#### 6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal

shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

## ARTICLE 7 - OTHER WORK AT THE SITE

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### 7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and
2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and

properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

#### 7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

#### 7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

## ARTICLE 8 - OWNER'S RESPONSIBILITIES

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### 8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

### 8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

### 8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

### 8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

### 8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

### 8.06 *Insurance*

A. Owner's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

### 8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

### 8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

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9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Engineer.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep

Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show

partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to, the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

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10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall

promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

#### 10.02 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

#### 10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

#### 10.04 *Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

#### 10.05 *Claims*

A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim, shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part,

2. approve the Claim, or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 - COST OF THE WORK;  
ALLOWANCES; UNIT PRICE WORK

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11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and

Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have

resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expresses, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

**B. Costs Excluded:** The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

**C. Contractor's Fee:** When all the Work is performed on the basis of cost-plus, Contractor's fee shall

be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

**D. Documentation:** Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

## 11.02 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

### B. Cash Allowances

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

### C. Contingency Allowance

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

## 11.03 Unit Price Work

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

## ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

### 12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an

allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

### 12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted

by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

### 12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

## ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

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### 13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

### 13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

### 13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to

be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

#### 13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### 13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

#### 13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

#### 13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or
2. correct such defective Work; or
3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications .

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

#### 13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

#### 13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

### ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

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#### 14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress

payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

#### 14.02 *Progress Payments*

##### A. Applications for Payments

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

##### B. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent

inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

*C. Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

*D. Reduction in Payment*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

- a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
- b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
- c. there are other items entitling Owner to a set-off against the amount recommended; or
- d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

*14.03 Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

*14.04 Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, , Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial

Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

#### 14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

#### 14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals

that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

#### 14.07 *Final Payment*

##### A. Application for Payment

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;

b. consent of the surety, if any, to final payment;

c. a list of all Claims against Owner that Contractor believes are unsettled; and

d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

##### B. *Engineer's Review of Application and Acceptance*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations

under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

#### C. Payment Becomes Due

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and , will be paid by Owner to Contractor.

#### 14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

#### 14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance

with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

## ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

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### 15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

### 15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety ) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

#### 15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

#### 15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

## ARTICLE 16 - DISPUTE RESOLUTION

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### 16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be

governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

## ARTICLE 17 - MISCELLANEOUS

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### 17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

### 17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

### 17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

### 17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

### 17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

### 17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.



## SECTION 00800

## SUPPLEMENTARY CONDITIONS

<u>Article No.</u>	<u>Title</u>	<u>Page</u>
1	DEFINITIONS AND TERMINOLOGY	00800-2
2	PRELIMINARY MATTERS	00800-3
3	CONTRACT DOCUMENTS: INTENT, AMENDING AND REUSE	00800-3
4	AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS	00800-3
5	BONDS AND INSURANCE	00800-4
6	CONTRACTOR'S RESPONSIBILITIES	00800-6
7	OTHER WORK AT THE SITE	00800-9
8	OWNER'S RESPONSIBILITY	00800-9
9	ENGINEER'S STATUS DURING CONSTRUCTION	00800-9
10	CHANGES IN THE WORK; CLAIMS	00800-9
11	COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK	00800-10
12	CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES	00800-10
13	TEST AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK	00800-11
14	PAYMENTS TO CONTRACTOR AND COMPLETION	00800-11
15	SUSPENSION OF WORK AND TERMINATION	00800-16
16	DISPUTE RESOLUTION	00800-16
17	MISCELLANEOUS	00800-16

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (No. C-700, 2002 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

**SUPPLEMENTARY CONDITIONS****ARTICLE 1 – DEFINITIONS AND TERMINOLOGY****SC-1.01 Defined Terms Delete Paragraph 1.01.45 in its entirety and insert the following language in its place:**

45. Substantial Completion shall mean either that the Work required by the Contract has been completed except for Work having a Contract Price of less than one (1) percent of the then adjusted total Contract Price, or substantially all of the work has been completed and opened to Owner's use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the Work required by the Contract (Based on MGL C30, S39G). The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

**SC-1.02 Terminology Add the following new paragraphs immediately after Paragraph 1.02.B.1:**

2. The words "As permitted", "As required", or words of like effect shall mean that the permission, or requirement of the Engineer is intended- the words "Approved", "Acceptable", "Satisfactory", or words of like import shall mean approved by, or acceptable to, or satisfactory to the Engineer- and the words "Necessary", "Suitable", or "Equal", or words of like import shall mean necessary, suitable, or equal in the opinion of the Engineer.

3. The words "Approval of the Owner" or "Approved by the Owner", "Approval of the Engineer" or "Approved by the Engineer", shall mean approval in writing.

**SC-1.02 Terminology Add the following new paragraphs immediately after Paragraph 1.02.E.4:**

5. "Furnish and Install" and "Provide" shall mean that items referred to shall be furnished and installed under this contract. The term "Furnish" shall mean that the items referred to shall be furnished, only, by the party to whom the term is directed. Similarly, the term "install" shall mean that the item referred to shall be installed, only, by the party to whom the term is directed.

**SC-1.02 Terminology Add the following new paragraphs immediately after Paragraph 1.02.F:**

G. The words "Schedule of Prices" shall mean the schedule of prices in the proposal.

H. The word "Owner" shall mean the City of Salem, MA. The Owner is treated as if it were singular number and neuter gender and the Contractor and the Engineer are treated as if each were in the singular and masculine gender.

Any communication to the Owner shall be addressed to:

Office of the Purchasing Agent  
Attention: Whitney C. Haskell  
City Hall, 3<sup>rd</sup> Floor  
93 Washington Street  
Salem, MA 01970

A copy of any communication shall be sent to the City Engineer at:

Attention: David Knowlton  
City Hall Annex, 4<sup>th</sup> Floor  
120 Washington Street  
Salem, MA 01970

I. The word "State" shall mean the Commonwealth of Massachusetts.

J. The word "City and/or Town" shall mean the City of Salem, MA.

**ARTICLE 2 PRELIMINARY MATTERS**

**SC-2.03 Commencement of Contract Times; Notice to Proceed** Amend the third sentence of Paragraph 2.03.A. by striking out the third sentence "In no event ..... is earlier." and substitute the following:

The Contractor shall commence the work not later than the time stipulated herein, after being notified to do so by the Owner, and shall continue it to completion with all practical dispatch and regularity so that it shall be completed no later than the time stipulated, as aforesaid, provided however, that, at its discretion, the Owner may in writing extend the time for the commencement and completion of the work.

**ARTICLE 3 CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE**

**SC-3.02 Reference Standards** Add the following new paragraph immediately after Paragraph 3.02.A.2.:

3. Where references are made on the Drawings or in these Specifications to Standard Specifications, codes, etc., of the U.S. Government, State, or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein, and shall include all revisions thereto in effect at the time of opening of Bids.

**SC-3.03 Reporting and Resolving Discrepancies** Add the following new paragraphs immediately after Paragraph 3.03.B.1.:

2. If any of the Contract Documents or their application to any situation shall be to any extent be invalidated or contrary to law, the remainder of such documents and the application to other situations of any provision found invalid as to any given situation, shall not be affected thereby.

3. No substitutions or deviations in the work as defined by the Contract Documents will be made without specific written permission of the Engineer.

4. In the event of conflicts or discrepancies among the Contract Documents, the Documents shall be interpreted on the basis of the following priorities:

First	Agreement
Second	Addenda, with later date having greater priority
Third	Supplementary Conditions
Fourth	General Conditions
Fifth	Drawings and Specifications

5. In Drawings, large scale details shall govern smaller scale drawings. In case of conflicts between Drawings and Specifications, the Engineer may interpret the Documents so as to secure the most substantial and comprehensive performance of the work consistent with the intent of requirements of the Contract. Such work shall be performed by the Contractor without extra cost to the Owner.

**ARTICLE 4 AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS**

**SC-4.02 Subsurface and Physical Conditions** Add the following new paragraphs immediately after Paragraph 4.02B:

C. Contractor is also required to visit the Site to become familiar with and satisfied as to the general, local, and Site conditions that may affect cost, progress, performance, and furnishing of the Work. This is to involve an alert, heads-up, eyes-open, reasonable examination of the area and the conditions under which the Work is to be performed (see GC-4.03.C.2.b).

**SC-4.03 Differing Subsurface or Physical Conditions Add the following new paragraph immediately after Paragraph 4.03.C.3:**

4. Any adjustment in compensation and/or any adjustment in contract time because of a change or changes resulting from one or more of the conditions described in the foregoing paragraph will be made in accordance with the provisions of the General Conditions.

**SC-4.03 Differing Subsurface or Physical Conditions Add the following new paragraph immediately after Paragraph 4.03.C:**

D. The following paragraph is hereby inserted in the contract in accordance with the provision of Section 39N of Chapter 30 of the Massachusetts General Laws.

If, during the progress of the work, the Contractor or the Awarding Authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the Contract Documents either the Contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a Contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the Contract Documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents and are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly.

**SC-4.05 Reference Points Add the following new paragraphs immediately after Paragraph 4.05.A:**

B. All levels or elevations shown on the civil drawings are referred to an assumed vertical datum as identified and described on the plans.

C. The Contractor shall furnish and maintain lasers for lines and grades and such assistance and facilities, including labor and materials, for giving and taking measurements, ties and grades as the Engineer may require".

**SC-4.06 Hazardous Environmental Conditions at Site Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:**

A. No reports or drawings related to Hazardous Environmental Conditions are known to Owner or Engineer.

B. Not Used.

**ARTICLE 5 BONDS AND INSURANCE****SC-5.03 Certificates of Insurance Add the following new paragraphs immediately after Paragraph 5.03.B:**

C. Failure of Owner to demand such certificates or other evidence of full compliance with these insurance requirements or failure of Owner to identify a deficiency from evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

D. By requiring such insurance and insurance limits herein, Owner does not represent that coverage and limits will necessarily be adequate to protect Contractor, and such coverage and limits shall not be deemed as a limitation

on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

**SC-5.04 Contractor's Liability Insurance Add the following new paragraphs immediately after Paragraph 5.04.B:**

C. The Contractor shall take out and maintain during the life of the Contract the following insurances:

1. Workmen's Compensation Insurance in accordance with the laws of the Commonwealth of Massachusetts, and Employer's Liability Insurance protection in the following amounts:

- (a) Bodily Injury by accident \$1,000,000 Each Accident;
- (b) Bodily Injury by disease \$1,000,000 Policy Limit; and
- (c) Bodily Injury by disease \$1,000,000 Each Employee.

2. Commercial General Liability Insurance with limits of liability available for the project of not less than \$2,000,000 per occurrence for Bodily Injury, Personal Injury and Property Damage Liability. This policy must be arranged on the "occurrence" form of coverage, and provide the following aggregates: General Aggregate, \$2,000,000 per project site and Products and Completed Operations, \$2,000,000. Coverage is to include the X,C,U (explosion, collapse, underground) hazards and provide a Broad form Property damage" endorsement. The aggregate limits are to be maintained continuously during the life of the Contract. The limits of liability required are applicable to the Contractor who may scale down the limits he requires of Subcontractors, subject to the approval of the Owner. The Commercial General Liability Insurance shall include, but not necessarily be limited to, coverage for:

- A) Products - Completed Operations Liability extending to two years after acceptance of the project by Owner.
- B) Independent Contractors, covering operations of any and all Subcontractors.
- C) Contractual liability, including the Contractor's obligations to the Owner and the Engineer and their agents and employees as written in Paragraph 6.20, Indemnification, of the General Conditions.

NOTE: An umbrella policy will be acceptable to meet the requirements of this Section.

3. Automobile Liability Insurance limits of not less than \$1,000,000 for any person and \$5,000,000 for any one accident for Bodily Injury including Death and \$500,000 for Property Damage covering:

- A) All owned vehicles.
- B) Hired cars and trucks.
- C) All other non-owned vehicles.

NOTE: An umbrella policy will be acceptable to meet the requirements of this Section.

4. The Contractor shall also take out and maintain, during the life of this Contract, "All Risk" Builder's Risk Insurance in a form acceptable to the Owner, upon the entire project in an amount not less than the full "completed value" of the project. The loss if any, is to be made payable to the Owner and/or to the Contractor as their interest may appear.

5. The Contractor shall take out and maintain, during the life of this Contract, Contractor's Protective Liability Insurance to protect himself against any liability which might attach to him as a result of an accident arising out of work performed by any Subcontractor.

6. The Contractor shall take out and maintain, during the life of this Contract, Owner's Protective Liability Insurance policy issued to the Owner and extended to include Stantec., in the amounts stated in Paragraph 5.04.C.2

7. The Contractor shall carry contractual liability in the same amounts as for Commercial General Liability Insurance. This insurance shall cover the liability assumed by the Contractor under Paragraph 6.20, Indemnification, of the General Conditions.
8. The Contractor shall carry Completed Operations insurance in the same amounts as for Commercial General Liability Insurance. This insurance shall be maintained for the full guarantee period.
9. All Subcontractors shall also take out and maintain during the life of their Contracts Commercial General Liability Insurance and Automobile Liability Insurance. The limits of Liability Insurance shall be not less than \$2,000,000 per occurrence for Bodily Injury, Personal Injury and Property Damage Liability. Automobile Liability Insurance shall be as outlined in Paragraph 5.04.C.3
- D. Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of the Contract and shall operate as an immediate termination thereof.
- E. All insurance required of the Contractor shall be in form and written with companies acceptable to the Owner. Certified copies of the Contractor's Insurance policies shall be delivered to the Owner prior to commencement of work under the Contract by the Contractor. Such policies shall show any special coverage provisions required and shall provide for at least 30 days prior written notice to the Owner, in case of cancellation or material change to any of the insurance coverages. The Owner is to be included as an Additional Named Insured as respects the operations of the Contractor.

#### ***ARTICLE 6 CONTRACTOR'S RESPONSIBILITIES***

##### ***SC-6.01 Supervision and Superintendence. Add the following new paragraphs immediately after Paragraph 6.01.A:***

1. In the case of real apparent error, inconsistency or omission, no work shall proceed without authorization from the Engineer.
2. The Drawings are generally drawn to scale; however the figured dimensions or notes thereon shall govern. Before ordering any materials or doing any work, the Contractor and each Subcontractor shall verify all measurements, and shall be responsible for the correctness of same. No extra charge or compensation will be allowed on account of differences between actual measurements and the dimensions indicated on the Drawings, except as otherwise allowed by law. Any differences which may be found shall be reported in writing to the Engineer for consideration before proceeding with the work.

##### ***SC-6.05 Substitutes and "Or-Equals". Add the following new paragraph immediately after Paragraph 6.05.A.2.d:***

- e. Reference in the Specifications or on the Drawings to any product, material, equipment, or method of construction by name, make, catalog number, or other identifying symbol shall limit the selection of the items to those types so identified. Substitutions will not be permitted in any event, with one exception: i.e. should the Contractor know of a product or system which may effect a savings to the Owner and at the same time is (1) of equal or better quality or is (2) more appropriate for use in the project than that specified.

##### ***SC-6.06 Concerning Subcontractors, Suppliers and Others Add the following new paragraphs immediately after Paragraph 6.06.G:***

- H. Each Subcontractor shall employ a competent trade foreman who shall be in attendance at the project site during the progress of his work. The trade foreman shall be satisfactory to the Engineer and Owner, and shall not be changed during the course of the subcontract work, except with the consent of the Engineer, unless the trade foreman proves to be unsatisfactory to the Subcontractor and ceases to be in his employ.

I. Owner or Engineer may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by a particular Subcontractor or Supplier.

**SC-6.10 Taxes Add a new paragraph immediately after Paragraph 6.10.A:**

B. Owner is exempt from payment of sales and compensating use taxes of the State and of cities and counties thereof on all materials to be incorporated into the Work.

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.

2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

**SC-6.17 Shop Drawings and Samples Add the following new paragraphs immediately after Paragraph 6.17.D.3.:**

4. The Contractor shall furnish to the Engineer shop drawings, samples and/or descriptive data for all work:

a. Where specifically called for in the Specifications.

b. Where shop drawings, samples, and/or descriptive data are normally submitted for Engineer's approval prior to the actual fabrication or installation of the work.

c. Where specifically requested by the Engineer.

5. Submittals shall be clearly identified as to project name, Owner, Engineer, Contractor, Subcontractor or Supplier, Manufacturer or Fabricator, and the item's name and location. Shop Drawings shall clearly show all significant details of materials, fabrications, finish, and installation. Samples shall be of adequate size to permit proper evaluation and show full range of variation of color, texture, dimensions, and other characteristics that will appear in the finished work. Descriptive data shall be sufficient to provide full verbal, and pictorial description of physical, technical and performance characteristics, and complete installation instructions, adequacy of submittals shall be subject to the Engineers approval.

6. The Contractor, immediately after being awarded the Contract, shall meet with the Engineer to discuss the required Schedule of Submittals. Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), the Contractor shall prepare and submit for approval a Schedule of Submittals for the work. The Schedule of Submittals shall be related to the entire project, and shall contain the following:

a. Shop Drawing Schedule (for Shop and setting drawings to be provided by Contractor)

b. Sample Schedule (for samples to be provided by Contractor)

c. Descriptive Data Schedule (for manufacturer's descriptive data, technical information, test reports, catalog cuts, etc., to be provided by Contractor).

7. The schedule shall list all of the submissions required of each trade; the item, description, type, quantity, and size (where applicable) of each submission; and the following dates as estimated.

a. Required date of submission.

b. Required date of approval.

c. Estimated date of beginning fabrication or manufacture of product (where applicable).

- d. Required date of submission of product to testing laboratory.
- e. Required date of testing laboratory approval.
- f. Required date for delivery of product to site.
- g. Required date for beginning of installation of product.
- h. Required date for completion of installation (and in place testing).

NOTE: Submissions of such complexity as to require additional time for review and correction shall be identified as such on the schedules to assure proper attention and time allotment.

Each schedule shall allow adequate time for review by Engineer. The Owner or Engineer will not be responsible for work performed in shop or field prior to approval. The schedules shall be subject to change in accordance with the progress of work.

8. The procedure for submission and approval of shop drawings shall be as specified in the General Conditions.

9. The following procedure for submission and approval of samples shall be followed:

a. The Contractor shall receive samples from the various Subcontractors and Suppliers. He shall verify under signature on a letter of transmittal that they have been checked for agreement with the Contract requirements. He shall then forward (at his own expense) the samples to the Engineer for approval, testing, etc. Samples will not be returned unless return is requested at the time of submission, and if returned, all packing and transportation costs will be paid by the Contractor.

b. Where it is impractical to submit a sample because of size or other reasons, the Contractor will, upon request of the Engineer or Owner, make provision for inspection of material at its point of origin.

c. The Engineer will review the samples for general appearance and arrangement and for general compliance with the information given in the Contract Documents. He will indicate which colors and finishes, or other variable factors within the ranges specified, will be required. The Engineer will, within a reasonable time after receipt of samples, notify the Contractor in writing of his acceptance or rejection of samples and basis for his decision. Rejected samples shall be replaced with acceptable materials, as approved by the Engineer.

d. The Contractor shall store one set of all approved samples in a secure place at the project site, where they shall remain until completion of the project.

10. The following procedure for submission and approval of descriptive data shall be followed:

a. The Contractor shall receive the descriptive data from the various Subcontractors and Suppliers. He shall verify under signature on a letter of transmittal that it has been checked for agreement with the Contract requirements, and shall forward the descriptive data (at his own expense) to the Engineer for approval.

b. The Engineer will review the descriptive data for general compliance with the information given in the Contract Documents. The Engineer will, within a reasonable time, notify the Contractor of his acceptance or rejection of the data, and the basis for his decision. Rejected data will be replaced with data on acceptable materials or systems as approved by the Engineer.

c. A copy of each piece of approved descriptive data shall be maintained at the project site until completion of the project.

11. It shall be the responsibility of the Contractor to submit shop drawings, samples, and descriptive data in accordance with the above schedules. Failure to do so will not justify a delay in time of completion of the work.

12. The Engineer's review of the above materials will be general in nature, and approval by Engineer shall not relieve the Contractor from responsibility for deviations from the Contract Documents, unless the Contractor has, in writing, called the Engineer's attention to such deviations at the time of submission and secured his written agreement to such deviations.

***SC-6.17 Shop Drawings and Samples. Add the following new paragraphs immediately after Paragraph 6.17.E:***

F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.

G. In the event that Contractor requests a substitution for a previously approved item, Contractor shall reimburse Owner for Engineer's charges for such time unless the need for such substitution is beyond the control of Contractor.

***SC-6.20 Indemnification: Amend the first sentence of paragraph 6.20.A. to delete "to the fullest extent permitted" and insert "to the extent not prohibited".***

***ARTICLE 7 OTHER WORK AT THE SITE***

HAVE NO SUPPLEMENTAL ADDITIONS OR CHANGES

***ARTICLE 8 OWNER'S RESPONSIBILITIES***

HAVE NO SUPPLEMENTAL ADDITIONS OR CHANGES

***ARTICLE 9 ENGINEER'S STATUS DURING CONSTRUCTION***

***SC-9.08 Decisions on Requirements of Contract Documents and Acceptability of Work Add the following new paragraphs immediately after Paragraph 9.08.D.:***

E. The Contractor shall at his own proper cost and expense provide and do everything necessary to prepare for and perform everything required under the conditions and requirements of the contract, and he hereby agrees that the Engineer shall in the first instance be the interpreter of the Contract Documents, and all the work contemplated and described therein shall be so done as to satisfy him that its intent is fulfilled. The Engineer shall promptly render impartial decision on all claims of either party against the other and on all other matters governed by this intent, including progress of the work, the quality and fitness of materials and workmanship, the suitability of methods, and costs and values. The determination and decision of the Engineer shall be final and binding on both parties, and shall be a condition precedent to the right of the Contractor to receive any money hereunder, except as to those areas of disputed work covered in Article 11 or Article 12.

F. In accordance with the provision of the Massachusetts General Laws, chapter 30, Section 39P, all decisions of the Engineer or interpretations of the Specifications, approval of equipment, material or any other approval, or progress of the work will be made no later than thirty days after the written submission for decision - but if such decision requires extended investigation and study, the Engineer will, within thirty days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty day period and the date by which the decision will be made.

***ARTICLE 10 CHANGES IN THE WORK; CLAIMS***

HAVE NO SUPPLEMENTAL ADDITIONS OR CHANGES

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**ARTICLE 11 COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK**

**SC-11.02 Allowances** Delete paragraphs 11.02.A, 11.02.B, and 11.02.C in their entirety.

**ARTICLE 12 CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES**

**SC-12.04 through 12.07** Add the following new paragraphs immediately after Paragraph 12.03.:

12.04 The Contractor shall commence the work not later than the time stipulated herein, after being notified to do so by the Owner, and shall continue it to completion with all practical dispatch and regularity so that it shall be completed not later than the time stipulated, as aforesaid, provided however, that, at its discretions, the Owner may in writing extend the time for the commencement and completion of the work.

A. The Contractor shall prosecute the work in accordance with a progress schedule prepared by him in advance and approved by the Engineer.

12.05 The following subparagraphs (a) and (b) are hereby inserted in this contract in accordance with the provisions of the Massachusetts General Laws, Chapter 30, Section 39(o).

- (a) The Awarding Authority may order the Contractor in writing to suspend, delay or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the Awarding Authority, provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the Awarding Authority to act within the time specified in this contract, the Awarding Authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the Contractor on such increase, and provided further, that the Awarding Authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.
- (b) The Contractor must submit the amount of a claim under provision (a) to the Awarding Authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the Awarding Authority shall not approve any costs in the claim incurred more than twenty days before the Contractor notified the Awarding Authority in writing of the act or failure to act involved in the claim.

12.06 The following 2 paragraphs shall apply to the completion of contracts terminated prior to completion of the work.

A. The excess, if any, of debit over credit is to be made good to Owner by the Contractor (to the limit stated below) from any moneys that are then due the Contractor, or that may thereafter become due the Contractor under this contract, or the excess is to be made good by the surety to the Owner. The excess to be so made good is to be limited to the amount owed the Contractor by the Owner under the contract at the time the Contractor is notified to discontinue said work, plus the amount of the bond of the contract, and it is further agreed, that, in case the Engineer shall certify to the Owner that the Contractor cannot complete fully the aforesaid work within the stipulated time, the Owner may thereupon, in lieu of the foregoing provisions, pay the Contractor for the parts already done, according to the provisions of the contract, and may treat parts remaining as if they had never been included in or contemplated by the contract.

B. And it is further agreed that in case the Engineer shall certify to the Owner that the Contractor cannot complete fully the aforesaid work within the stipulated time, the Owner, in lieu of any of the foregoing provisions, may call upon the surety company and the surety shall complete the performance of all requirements of the contract and the Owner shall pay the Contractor for the work done by the surety company according to the payment provision of the contract. In case the completion of the work is not performed by the Contractor, the amount of any

sums due the Owner for any delay in such completion shall be determined by the Engineer. No act, proceeding, or notice contemplated by this Article 12 on the part of the Owner, or the Engineer, and nothing herein contained shall operate as a waiver or release of any of the rights of the Owner under the contract against either the Contractor or the surety company.

12.07 It is mutually agreed that the timely completion of the work under this contract has a substantial financial value to the Owner, which value it is difficult or impossible to forecast or evaluate exactly. It is of considerable mutual advantage to the parties hereto that, even if not equal exactly to the real value of each day so lost in the completion of the work, the compensation therefor which the Contractor is to give to the Owner be a fixed sum and set in advance. In view of the foregoing and other considerations the parties hereby mutually agree in the place of said value as it may be truly and finally determined, to adopt arbitrarily for the purposes of this contract, the sum per day, which is stipulated in the Agreement as the sum which the Contractor shall give to the Owner as liquidated damages for each calendar day lost by the Contractor in the completion of the work of the contract, this sum to govern in all issues, and being adopted for the mutual use of the parties hereto and for no other use.

### ***ARTICLE 13 TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK***

#### ***SC-13.01 Notice of Defects Add the following new paragraphs immediately after Paragraph 13.01.A.:***

B. The Contractor guarantees that the work and services to be performed under the contract, and all workmanship, materials and equipment performed, furnished, used or installed in the construction of the same, shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Drawings, Specifications and other contract documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the Contractor shall be fulfilled. This guarantee shall be for a period of one year from and after the Date of Completion which date of completion shall be determined under the provisions of Article 14 hereof.

C. If at any time within the said period of guarantee any part of the work requires repairing, correction or replacement, the Owner may notify the Contractor in writing to make the required repairs, corrections, or replacements. If the Contractor neglects to commence making such repairs, corrections, or replacements to the satisfaction of the Owner within three (3) days from the date of receipt of such notice, or having commenced fails to prosecute such work with diligence, the Owner may employ other persons to make the same, and all direct and indirect costs of making said repairs, corrections or replacements, including compensation for additional professional services, shall be paid by the Contractor.

### ***ARTICLE 14 PAYMENTS TO CONTRACTOR AND COMPLETION***

#### ***SC-14.02 Progress Payments Add the following new paragraphs immediately after Paragraph 14.02.A.3.:***

4. The Owner shall pay and the Contractor shall receive as full compensation for providing and doing everything required to prepare for and perform everything called for by this contract, and as full compensation also for all loss or damage arising out of the nature of the work under the contract, or from the action of the elements, or from fire, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the said work; also for all risk of every description connected with said work; also for all expenses incurred by, or in consequence of, the suspension or discontinuance of said work as herein specified; and for well and faithfully completing said work in accordance with the contract, including all work incidental thereto; the prices stated in the Schedule of Prices, or the prices revised, if such are revised as provided for in Article 11 of the General Conditions.

5. It is understood and agreed that the lump sum prices, as opposed to the unit prices, listed in the Schedule of Prices submitted by the Contractor in his bid are for the information of the Owner and the guidance of the Engineer, and all references in the contract and Specifications relating to payment of the Contractor in accordance herewith are contingent upon the acceptance for each lump sum item price by the Owner as a fair value for such item at the time payment therefor is requisitioned. Nothing in this Article 14 shall be held to abrogate the obligation of the Owner to pay the Contractor the full contract price as determined by and in accordance with the contract documents and Massachusetts General Laws, Chapter 30B, and more specifically Section 39K of said Chapter 30.

## 6. Periodical Estimates

a. The Contractor shall, on or about the first of each month, issue a periodical estimate of the approximate amount of all materials furnished and work done during the preceding month, in accordance with the units of measurement and prices in the Schedule of Prices and for all change and extra work orders, including such portions of lump sums in the Schedule of Prices and also the value of materials furnished and delivered to the site of the work, as the Engineer deems proper. The Contractor shall furnish the Engineer satisfactory evidence that he has paid in full for all work, materials, equipment and labor included in each periodical estimate.

b. Periodical estimates shall be received by the Owner (Awarding Authority) on or before the first of each month at the office of the Engineer, Stantec, 5 Burlington Woods, Burlington, Massachusetts 01803.

c. The periodical estimates shall be in the form of AIA Documents G702 and G703, "Application and Certificate for Payment", latest edition, prepared by the American Institute of Engineers, Washington, DC. They shall be certified by the Engineer as to their conformity with the provisions of the contract, and shall be certified by the Contractor to the effect that all items, units, quantities, and prices of work and material in the estimate are approximately correct- that all work has been performed and materials supplied in full accordance with the contract, that all just and lawful bills against the Contractor for labor, materials, and expendable equipment covered by the estimate have been paid in full and that the Contractor has no claims for damage, losses, or expense against the Owner for compensation in addition to that provided for payment in the periodical estimates, except such claims as the Contractor has filed with the Engineer and Owner in writing previous to his certifying the estimate.

d. Within fifteen days after receipt from the Contractor, at the place designated by the Awarding Authority in the foregoing paragraph, of a periodic estimate requesting payment of the amount due for the preceding month, the Awarding Authority will make a periodic payment to the Contractor for the work performed during the preceding month and for materials not incorporated in the work but delivered and suitably stored at the site (or at some location agreed upon in writing) to which the Contractor has title or to which a Subcontractor has title and has authorized the Contractor to transfer title to the Awarding Authority, less (1) a retention based on its estimate of the fair value of its claims against the Contractor and less (2) a retention for direct payment to Subcontractors based on demands for same in accordance with the provisions of Section 39F, and less (3) a retention not exceeding five percent of the approved amount of the periodic payment.

e. The Owner may retain temporarily or permanently, at any time after fifty (50) percent of the work covered by this contract has been completed, a smaller amount than five (5) percent of the total amount of the latest periodical estimate, and the Owner may cause the Contractor to be paid from time to time during the progress of the work such portion of the reserve as it deems prudent or desirable. In case such payments are made, the Owner may at any time cause further payments to be withheld until the full five (5) percent reserve is reestablished. Payment may be withheld at any time, if, in the judgement of the Engineer, the work is not proceeding in accordance with the contract. The consent of the surety company shall not be required for any act or proceeding on the part of the Owner contemplated by this Article 14.

f. The Contractor shall not be entitled to demand or receive payment for any portion of the aforesaid work on materials, except in the manner above set forth in this Article 14, until the Engineer shall have been satisfied that said work has been completed in all parts and requirements in accordance with the intent of the contract, and the Engineer shall have issued a "Certificate of Completion" to that effect and shall have designated therein the date of completion.

### ***SC-14.07 Final Payment*** Add the following new paragraphs immediately after Paragraph 14.07.C.:

#### D. Final Estimate

1. After the date of completion, the Contractor shall issue and shall forthwith submit to the Owner a periodical estimate designated "Final Estimate" of all work done under the contract in which the approximate quantities of work done, as included in the periodical estimates, will be adjusted to the exact final quantities. The Contractor shall furnish the Engineer satisfactory evidence that he has paid in full for all work, materials, equipment, and labor included in the Final Estimate. The Final Estimate shall be certified by the Engineer as to its conformity with all provisions of the contract, and shall be certified by the Contractor to the effect that all just and lawful bills against the Contractor for labor, materials, and expendable equipment covered by the Final Estimate have been paid in full, that the total cost of the work and the amount due the Contractor for payment is full compensation for all work done under the terms of the contract in its original form, that the payment is full compensation for all other work done by the Contractor and for all damages, losses, and expenses incurred by the Contractor for doing and furnishing everything relating to or arising out of the work, and that the Contractor waives all rights to claim or receive any further compensation in addition to that provided for in the Final Estimate except as otherwise allowed by law.

2. After receipt of a periodic estimate requesting final payment and within sixty-five days after (a) the Contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the Awarding Authority, less than one percent of the original contract price, or (b) the Contractor substantially completes the work and the Awarding Authority takes possession for occupancy, whichever occurs first, the Awarding Authority shall pay the Contractor the entire balance due on the contract less, (1) a retention based on its estimate of the fair value of its claims against the Contractor and of the cost of completing the incomplete and unsatisfactory items of work and less (2) a retention for direct payment to Subcontractors based on demands for same in accordance with provisions of Section 39F, or based on the record of payments by the Contractor to the Subcontractors under this contract if such record of payment indicates that the Contractor has not paid Subcontractors as provided in Section 39F. If the Awarding Authority fails to make payment as herein provided, there shall be added to each payment daily interest at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston commencing on the first day after said payment is due and continuing until the payment is delivered or mailed to the Contractor; provided that no interest shall be due, in any event, on the amount due, on a periodic estimate for final payment until fifteen days after receipt of such a periodic estimate from the Contractor, at the place designated by the Awarding Authority if such a place is so designated. The Contractor agrees to pay to each Subcontractor a portion of any such interest paid in accordance with the amount due each Subcontractor.

3. The Owner (Awarding Authority) may make changes in any periodic estimate submitted by the Contractor and the payment due on said periodic estimate shall be computed in accordance with the changes so made, but such changes or any requirement for a corrected periodic estimate shall not affect the due date for the periodic payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with changes made, as provided herein, provided, that the owner (Awarding Authority) may, within seven days after receipt, return for correction any periodic estimate which is not in the required form or which contain computations not arithmetically correct and, in that event, the date of receipt of such periodic estimate shall be the date of receipt of the corrected periodic estimate in proper form and with arithmetically correct computations. The date of receipt of a periodic estimate received on a Saturday shall be the first working day thereafter. The provisions of Section 39G shall not apply to any contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building to which this section applies.

4. In the event any such contract has been substantially completed and the project has been opened to public use by order of the Owner or its duly authorized representative or agent, but final acceptance of the work is subject to delay because of minor uncompleted items which do not impair the usefulness of the project, a semi-final estimate shall also be prepared within a like period of sixty-five days after such contract has been substantially completed and placed in public use. Such semi-final estimate shall include an estimate of the value of all work performed in accordance with the terms of the contract, including the amount of retained percentage withheld by the contracting authority from previous periodic payments, but excluding (A) the same deductions and retainage as in the case of final estimates, as provided hereinbefore, (B) an estimate of the value of the work remaining to be performed and (C) any items or claims for extra work, or parts thereof, that may be in dispute- and payment for such excluded items or portions thereof may be deferred until such remaining work has been satisfactorily completed, or

in the case of disputed items or claims until such time as agreement has been reached thereon or such claim has been adjudicated.

5. The following subparagraphs (a) through (i) are hereby inserted in this contract in accordance with the provisions of Section 2 of Chapter 774 of the Acts of 1972, and in accordance with MGL Ch. 30, S. 39F.

- (a) Forthwith after the Contractor receives payment on account of a periodic estimate, the Contractor shall pay to each Subcontractor the amount paid for the labor performed and the material furnished by the Subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the Subcontractor by the Contractor.
- (b) Not later than the sixty-fifth day after each Subcontractor substantially completes his work in accordance with the Plans and Specifications, the entire balance due under the subcontract less amounts retained by the Awarding Authority as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the Subcontractor and the Awarding Authority shall pay that amount to the Contractor. The Contractor shall forthwith pay to the Subcontractor the full amount received from the Awarding Authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the Subcontractor by the Contractor.
- (c) Each payment made by the Awarding Authority to the Contractor pursuant to subparagraphs (a) and (b) of this paragraph for the labor performed and the materials furnished by a Subcontractor shall be made to the Contractor for the account of that Subcontractor; and the Awarding Authority shall take reasonable steps to compel the Contractor to make each such payment to each such Subcontractor. If the Awarding Authority has received a demand for direct payment from a Subcontractor for any amount which has already been included in a payment to the Contractor or which is to be included in a payment to the Contractor for payment to the Subcontractor as provided in subparagraphs (a) and (b), the Awarding Authority shall act upon the demand as provided in this section.
- (d) If, within seventy days after the Subcontractor has substantially completed the subcontract work, the Subcontractor has not received from the Contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the Contractor, less any amount retained by the Awarding Authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the Subcontractor may demand direct payment of that balance from the Awarding Authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the Awarding Authority, and a copy shall be delivered to or sent by certified mail to the Contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the Subcontractor has substantially completed the subcontract work. Within ten days after the Subcontractor has delivered or so mailed the demand to the Awarding Authority and delivered or so mailed a copy to the Contractor, the Contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the Awarding Authority and a copy shall be delivered to or sent by certified mail to the Subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the Contractor and of the amount due for each claim made by the Contractor against the Subcontractor.
- (e) Within fifteen days after receipt of the demand by the Awarding Authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the Awarding Authority shall make direct payment to the Subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the Contractor, less any amount (i) retained by the Awarding Authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii)

disputed by the Contractor in the sworn reply - provided, that the Awarding Authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d). The Awarding Authority shall make further direct payments to the Subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.

- (f) The Awarding Authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) in an interest-bearing joint account in the names of the Contractor and the Subcontractor in a bank in Massachusetts selected by the Awarding Authority or agreed upon by the Contractor and the Subcontractor and shall notify the Contractor and the Subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the Contractor and the Subcontractor or as determined by decree of a court of competent jurisdiction.
- (g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (f) shall be made out of amount payable to the Contractor at the time of receipt of a demand for direct payment from a subcontractor and out of amounts which later become payable to the Contractor and in the order of receipt of such demands from Subcontractors. All direct payments shall discharge the obligation of the Awarding Authority to the Contractor to the extent of such payment.
- (h) The Awarding Authority shall deduct from payment to a Contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (f), are sufficient to satisfy all unpaid balances of demands for direct payment received from Subcontractors. All such amounts shall be earmarked for such direct payments, and the Subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the Contractor.
- (i) If the Subcontractor does not receive payment as provided in subparagraph (a) or if the Contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the Subcontractor and the Subcontractor does not receive payment for same when due less the deductions provided or in subparagraph (a), the Subcontractor may demand indirect payment by following the procedures in subparagraph (d) and the Contractor may file a sworn reply as provided in that same subparagraph. A demand made after the first day of the month following that for which the Subcontractor performed or furnished the labor and materials for which the Subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the Contractor. Thereafter the Awarding Authority shall proceed as provided in subparagraph (e), (f), (g), and (h).

**SC-14.10 Add the following new paragraphs immediately after Paragraph 14.09:**

14.10 The payment of the final amount due under this contract, and payment for work done under change order as herein provided, for, shall release the Owner and every agent or employee of the Owner and the agents and employees of any such agent from any or all claims or liabilities on account of work performed under the contract of any alteration hereof.

***ARTICLE 15 SUSPENSION OF WORK AND TERMINATION***

HAVE NO SUPPLEMENTAL ADDITIONS OR CHANGES

***ARTICLE 16 DISPUTE RESOLUTION***

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**SC-16.0 Dispute Resolution Delete Article 16 in its entirety and all references thereto.****ARTICLE 17 MISCELLANEOUS****SC-17 Miscellaneous Add the following new paragraphs immediately after Paragraph 17.06:**

## 17.07 Erection of Shanties

A. Shanties or other structures for housing or storage of materials, or for office, shall be built only if permission in writing is given by the Engineer, and will then be permitted only at such places as the Engineer shall approve, and the sanitary conditions on the grounds in or about such shanties or other structures shall at all times be maintained in a manner approved by the Engineer.

## 17.08 Preservation of Trees

A. Within the actual lines of the structures to be built, the trees must of necessity be removed and all such removal of trees, including stumps, shall be done by the Contractor. No trees shall be cut down or otherwise injured by the Contractor except by approval of the Engineer. Should it be necessary, in the work, such removal shall be done by the Contractor. The Contractor shall protect trees and shall furnish guards or other protection of trees if required by the Engineer. Trees which are removed without prior approval or seriously damaged shall be replaced.

## 17.09 Fire Protection

A. The Contractor shall take all necessary precautions to prevent fires adjacent to the work and his buildings and he shall prevent the spread of fires to areas outside the limits of the work. He shall provide adequate facilities for extinguishing fires.

B. The Contractor shall limit the use of cutting torches and they shall be used only when absolutely necessary and by experienced operators. The Contractor shall have available at the point of cutting satisfactory equipment for extinguishing sparks and fire.

## 17.10 Weather Conditions

A. No work shall be done when, in the opinion of the Engineer, the weather is unsuitable. No concrete, masonry, earth backfill, embankment, paving, or paint shall be placed during freezing weather or upon frozen material. If there is delay or interruption in the work due to weather conditions, the necessary precautions shall be taken to bond new work to old.

## 17.11 Watertightness

A. All structures, pipes, and equipment which are to contain water shall be watertight under all operating conditions for which they are intended. The Contractor shall furnish at no cost to the Owner, all labor, materials and equipment and do all work required by the Engineer to make all such parts of the work watertight, or to replace them, if in the opinion of the Engineer any leakage is excessive. All such parts of the work filled with water for testing watertightness shall be left filled as ordered by the Engineer.

## 17.12 Use of Portions Before Entire Completion of Work

A. The Owner and its duly authorized representatives may enter upon and use any portions of the work before final completion of the whole work to be done under this contract, without any claim by the Contractor for payment for said use, or delay duly caused by such use.

## 17.13 Massachusetts Sales Tax Exemption

A. Chapter 757, Section 6, Legislative Acts of 1967, effective January 1, 1968, exempts the following sales and the gross receipts therefrom:

Sales of building materials and supplies to be used in the construction, reconstruction, alteration, remodeling or repair of any building, structure, public highway, bridge or other public works owned by or held in trust for the benefit of any governmental body or agency mentioned in paragraph (D) (D. sales to the United States, the Commonwealth or any political subdivision thereof, or their respective agencies) and used exclusively for public purposes provided, however, that such governmental body or agency shall have first obtained a certificate from the commissioner stating that it is entitled to such exemption and the vendor keeps a record of the sales of each such separate sale, the name of the purchaser, the date of each such separate sale and the number of such certificate. In this paragraph the words "building materials and supplies" shall include all materials and supplies consumed, employed or expended in the construction, reconstruction, alteration, remodeling or repair of any building, structure, public highway, bridge or other such public work, as well as such materials and supplies physically incorporated therein. Said term shall also include rental charges for construction vehicles, equipment and machinery rented specifically for use on the site of any such tax exempt project or while being used exclusively for the transportation of materials for any such tax exempt project.

#### 17.14 Remedies

A. Except as may be otherwise provided in this contract, all claims, counterclaims, disputes and other matters in question between the Owner and the Contractor arising out of or relating to this agreement or the breach thereof will be decided by a court of competent jurisdiction within the State in which the Owner is located.

#### 17.15 Statutory Citations

A. In addition, the following additional statutes and regulations are hereby incorporated into these Supplementary Conditions by reference:

M.G.L. C.30 S.39I	Deviation from Plans and Specifications
M.G.L. C. 30 S.39J	No Arbitrary Decisions are Final
M.G.L. C. 30 S.39L	Construction Work by Foreign Corporations
M.G.L. C. 30 S.39M(b)	Substitution of Equal Products
M.G.L. C. 30 S.39P	Decision on Interpretation of Specifications
M.G.L. C. 30 S.39R	Contractor's Records
M.G.L. C.149 S.34	Limitations on Hours of Work
M.G.L. C.149 S.44J	Advertising Invitations to Bid
M.G.L. C. 82 S.40	Excavations; Notices; Penalties

END OF SECTION



## SECTION 00950 – LIST OF DRAWINGS

## PART 1                    GENERAL

## 1.01                    LIST OF DRAWINGS

## A.                    SHEET NO.    TITLE

## GENERAL

01	Title Sheet & Index
02	Legend, Abbreviations & General Notes
03-04	Construction Plans
05-06	Curb Tie and Grading Plans
07-08	Sign and Pavement Marking Plans
09	Sign Summary Sheet
10	Traffic Signal Plan
11	Signal Timing Plan
12-18	Traffic Signal Details
19	Temporary Traffic Control Details
20	Temporary Traffic Control Pedestrian Details
21	Construction Sign Summary
22	Construction Details
23	Wheelchair Ramp and Driveway Details

END OF SECTION



SPECIAL PROVISIONS

for the

Lafayette / Loring / West Intersection  
and Signalization Improvements

**Salem, Massachusetts**

Prepared for:



The City of Salem

Prepared by:



**Stantec Consulting Services Inc.**  
5 Burlington Woods Drive Suite 210, Burlington MA 01803-4542

June 14, 2017



Labor participation goals for this project shall be 10.4% combined for minorities and women. The goals are applicable to both contractor's and subcontractor's on-site construction workforce.

Per the City of Salem (City) the Contractor shall use a DBE or Woman Owned Business for work requiring a Licensed Site Professional (LSP).

## **SCOPE OF WORK**

This scope of work includes the installation of a new ornamental style traffic signal at the intersection of Loring Avenue, Lafayette Street and West Avenue in Salem, MA. The new traffic signal will include the installation of two mast arms, replacing older post mounted signal heads to increase the visibility of the intersection.

The improvements also include geometric changes to the northwest corner of the intersection. The existing corner has a very flat radius, resulting in drivers turning right on red without coming to a complete stop. The proposed alignment for this corner consists of bumping out this corner into the intersection with a sharper radius.

The project also includes the reconstruction of ADA compliant sidewalks and wheelchair ramps, installation of new signage and pavement markings and the construction of landscaped areas.

Adjacent to the intersection, on the northeast corner, a proposed commercial/residential development is currently under construction. The intersection and signal work shall be coordinated with the ongoing development construction.

**All work under this contract shall be done in conformance with the Massachusetts Highway Department *Standard Specifications for Highways and Bridges* dated 1988, the *Supplemental Specifications* dated June 15, 2012, and the *Interim Supplemental Specifications*; the *2012 Construction Standard Details*, the *1990 Standard Drawings for Signs and Supports*; 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*. The MassDOT standard documents can be found on their website at <http://www.massdot.state.ma.us/highway/DoingBusinessWithUs.aspx>.**

## **WORK SCHEDULE**

(Supplementing Subsection 7.09)

The Contractor shall perform all work affecting the traveling public only between 7:00 AM and 3:30 PM, Monday through Friday only, no holidays, except with prior written approval by the City. All traffic control setups shall be placed and taken down within this work time window.

The Contractor shall schedule construction operations to ensure any portion of the roadway excavated during the construction season is paved prior to either the summer or winter shutdown.

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**MAINTENANCE OF TRAFFIC**

The Contractor shall give notice to the City and Salem Police Department at least 48 hours in advance of beginning any work affecting the maintenance of traffic. The Contractor shall not proceed with surfacing operations without specific notice to and the approval of the City and Salem Police Department.

All lane closures must be approved, by the City, in advance. Set-up and removal of all equipment and materials for construction and / or traffic maintenance shall be done only during working hours for the particular work being done. The roadway shall be free of the Contractor's personnel and operations during non-work hours.

The Contractor shall submit a construction schedule with lane closures to the City for approval prior to starting any work. The Contractor shall coordinate with the Salem Police Department to schedule police detail services and track the allowance provided with this Contract. Any extra funds remaining in the allowance shall be returned to the City and any additional funds needed for police details will require a Change Order.

The Contractor shall also coordinate with the City for use of and placement of two Changeable Message Signs. The Contractor shall pick up the Changeable Message Signs at the City's DPW Yard (5 Jefferson Avenue, Salem, MA 01970) and place the Changeable Message Signs as directed by the City at no additional cost to the City.

**CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS**

Prospective bidders are required to submit all questions to Whitney C. Haskell, Purchasing Agent, City Hall, 3<sup>rd</sup> floor, 93 Washington Street, Salem, MA 01970, 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 City.

Contractors should email questions and addendum acknowledgements to the following email address [whaskell@Salem.com](mailto:whaskell@Salem.com). Please put the project title in the subject line.

**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

**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).

**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.

Written notice shall be given by the Contractor to all public service corporations or officials owning or having charge of publicly or privately owned utilities in the project vicinity of the Contractor's intention to commence operations affecting such utilities at least two weeks in advance of the commencement of such operations, and the Contractor shall at that time file a copy of such notice with the City.

The Contract Plans indicate the approximate location of known utilities in the vicinity of the work. The accuracy and completeness of the information is not guaranteed.

Any damage to these utilities caused by negligence of the Contractor shall be repaired by the Contractor at their own expense and as required by the City.

It is the intent of these Special Provisions that the Contractor having been given due notice hereof will safeguard the utilities during construction and shall assume liability for damage, relieving the City of Salem from any liability.

Following are the names of owners and representatives of the principal utilities affected, but completeness of this list is not guaranteed by the City:

**POLE SET RESPONSIBILITY**

Verizon

**ELECTRIC**

National Grid  
1101 Turnpike Street  
North Andover, MA 01845  
Contact: John Estes  
Phone: 781-907-3303

**TELEPHONE**

Verizon  
385 Myles Standish Blvd  
Taunton, MA 02780  
Contact: Karen Mealey  
Phone: 774-409-3160

**CABLE**

Comcast  
P.O. Box 6505 – 5 Omni Way  
Chelmsford, MA 01824  
Contact: William Wasylak  
Phone: 978-848-5640

**WATER**

Salem DPW  
5 Jefferson Avenue  
Salem, MA 01970  
Contact: John Tomasz  
Phone: 978-744-3302

**SEWER**

Salem DPW  
5 Jefferson Avenue  
Salem, MA 01970  
Contact: John Tomasz  
Phone: 978-744-3302

South Essex Sewer District  
50 Fort Avenue, PO Box 989  
Salem, MA 01970  
Contact: David Michelsen  
Phone: 978-744-4550

**GAS**

National Grid Gas  
40 Sylvan Road  
3<sup>rd</sup> Floor – W3.244  
Waltham, MA 02451  
Contact: Melissa Owens  
Phone: 781-907-2845

Tennessee Gas Pipeline Company  
8 Anngina Drive  
Enfield, CT 06082  
Contact: David Wood

Phone: 860-763-6005

Spectra Energy Transmission, LLC  
8 Wilson Way  
Westwood, MA 02090  
Contact: Kathy M. Aruda  
Phone: 508-938-7725

**FIRE ALARM**

Salem City Electrician  
44 Lafayette Street  
Salem, MA 01970  
Contact: John Giardi  
Phone: 978-745-6300

**DEPARTMENT OF PUBLIC WORKS**

City of Salem  
Salem City Engineer  
120 Washington Street – 4<sup>th</sup> Floor  
Salem, MA 01970  
Contact: David Knowlton  
Phone: 978-619-5673

**RAILROAD**

MBTA  
100 Summer Street – Suite 1200  
Boston, MA 02110  
Contact: Christine Bresnahan  
Phone: 617-222-3361

**DESIGNER/PROJECT MANAGER**

DESIGNER  
Stantec Consulting Services, Inc.  
Mr. Richard A. Azzalina, P.E.  
781-221-1221

PROJECT MANAGER  
City of Salem  
Mr. David Knowlton, P.E., City Engineer  
978-619-5670

**PROCEDURE FOR RELEASING AUTOCAD FILES TO THE GENERAL CONTRACTOR**

After the bid opening the low bidder may submit a Request for Release of AutoCAD Files to the City.

**HOLIDAY WORK RESTRICTIONS FOR CALENDAR YEAR 2017**

(Supplementing Subsection 7.09)

The City may authorize work to continue during these specified time periods if it is determined by the City that the work will not negatively impact the traveling public.

Below are the work restrictions for the calendar year 2017 and 2018:

New Year's Day (Federal Holiday)  
Martin Luther King's Birthday (Federal Holiday)  
President's Day (Federal Holiday)  
Patriot's Day (State Holiday)  
Memorial Day (Federal Holiday)  
Independence Day (Federal Holiday)  
Labor Day (Federal Holiday)  
Columbus Day (Federal Holiday)  
Halloween (last two weeks of October, See Below)  
Veterans' Day (Federal Holiday)  
Thanksgiving Day (Federal Holiday)  
Christmas Day (Federal Holiday)

The City reserves the right to limit the contractors work on City streets during the last two weeks of October, due to traffic concerns related to the City's Haunted Happening events.

**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 insure 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 City with a copy of the certification prior to any work on trees.

Existing plants adjacent to construction may be protected as a group using temporary fencing as specified under Item 102.5, or in the event of construction close to individual trees, using Individual Tree Protection as specified under Item 102.51.

Trees that, in the judgment of the City, have been irreparably damaged by the Contractor shall be replaced in kind and in size, or, with a quantity of 2 inch caliper replacement trees (the quantity of which shall be determined by the City) 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 of replacement trees shall be paid by the Contractor.

Cost of removal of destroyed tree, including roots and stump, as well as the cost of replacement trees, shall be paid for by the Contractor.

### **PROMPT PAYMENT AND RELEASE OF RETAINAGE TO SUBCONTRACTORS**

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 the City. 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). The Contractor further agrees to make payment in full, including Retainage, to each Subcontractor no later than ten (10) business days after the Subcontractor has completed all of the work required under its subcontract.

### **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 wheel chair 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.

**EMERALD ASH BORER ADVISORY**

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

For more information see the following:

<http://www.mass.gov/eea/docs/dcr/news/2014/2013-3-26pr.pdf>

TECHNICAL SPECIFICATIONS

for the

Lafayette / Loring / West Intersection  
and Signalization Improvements

**Salem, Massachusetts**

Prepared for:



The City of Salem

Prepared by:



**Stantec Consulting Services Inc.**  
5 Burlington Woods Drive Suite 210, Burlington MA 01803-4542

June 14, 2017

**GENERAL STATEMENT**

Unless otherwise amended by these Technical Specifications or the Contract Drawings, all work and bid items shall conform to the requirements of the applicable "Sections" of The Commonwealth of Massachusetts, Department of Public Works Standard Specifications for Highways and Bridges, 1988 Edition, including any and all amendments or addenda thereto, hereinafter referred to as the "Standard Specifications".

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**ITEM 415. PAVEMENT MICROMILLING SQUARE YARD**

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All references to Section 130 Pavement Milling within Section 450 Hot Mix Asphalt Pavement shall be replaced by Item 415 Pavement Micromilling.

**DESCRIPTION**

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**

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.
- (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.

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  $\pm 3/4"$  ( $\pm 20\text{mm}$ ) 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.

#### 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. 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

Inspection Component	Items Inspected	Minimum Inspection Frequency	Point of Inspection	Inspection Method
Equipment	As specified in QC Plan	Per QC Plan	Per QC Plan	Per QC Plan
Environmental Conditions	Protection of Inlets & Utilities	Per QC Plan	Existing Surface	Visual Check
	Removal of Millings & Dust	Per QC Plan	Milled Surface	Visual Check
Workmanship	Milling Depth	Per QC Plan	Milled Surface	Check Measurement
	Cross-Slope & Profile	Per QC Plan	Milled Surface	Check Measurement
	Milled Surface Texture	Per QC Plan	Milled Surface	Visual Check
	Milled Surface Roughness	Once per 500 feet(150 meters) per milled lane	Milled Surface per Subsection 410.67	10 foot (3 meter) standard straightedge
	Sawcut Limit Vertical Face	Per QC Plan	Sawcut Limits	Visual Check

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Micromilling Equipment Requirements.

The micromilling machine shall be equipped with a drum specifically designed to provide the surface specified below.

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.

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.

## 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.

## 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.

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<b>ITEM 431.1</b>	<b>HIGH EARLY STRENGTH CEMENT</b>	<b>CUBIC YARD</b>
	<b><u>CONCRETE BASE COURSE</u></b>	

The work under this Item shall conform to the relevant provisions of Section 430 of the Standard Specifications for Highways and Bridges and the following:

The work shall include the furnishing and placing of high early strength cement concrete for pavement base as shown on the plans and as required by the Engineer.

The work shall also include the furnishing and placing of high early strength cement concrete base course for roadway patches, capping of trenches, cradles and/or caps for designated drainage and utility lines as determined at the time of construction and as required.

High early strength cement concrete base course shall be placed to a minimum depth of 6 inches.

High early strength cement concrete that is used for the installation of granite curb shall be paid for under the respective curb items.

#### METHOD OF MEASUREMENT

High early strength cement concrete will be measured for payment by the cubic yard, complete in place.

#### BASIS OF PAYMENT

High early strength cement concrete will be paid for at the contract unit price per cubic yard, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

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<b><u>ITEM 451.</u></b>	<b><u>HMA FOR PATCHING</u></b>	<b><u>TON</u></b>
<b><u>ITEM 452.</u></b>	<b><u>ASPHALT EMULSION FOR TACK COAT</u></b>	<b><u>GALLON</u></b>
<b><u>ITEM 453.</u></b>	<b><u>HMA JOINT SEALANT</u></b>	<b><u>FOOT</u></b>
<b><u>ITEM 455.23</u></b>	<b><u>SUPERPAVE SURFACE COURSE – 12.5(SSC-12.5)</u></b>	<b><u>TON</u></b>
<b><u>ITEM 455.32</u></b>	<b><u>SUPERPAVE INTERMEDIATE COURSE – 19.0(SIC-19.0)</u></b>	<b><u>TON</u></b>

Work under these Items shall conform to the relevant provisions of Document 00717 SUPERPAVE REQUIREMENTS contained herein (Appendix A) and the following:

The Equivalent Single Axle Loads (ESALs) for the design travel lane over a 20-year period is **4.9** Million 18-kip (80-kn) ESALs. The PGAB Grade selected for this Contract is **PG 64-28**

A Contractor's Quality Control Plan is required for this project.

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<b>ITEM 804.3</b>	<b>3 INCH ELECTRICAL CONDUIT</b>	<b>FOOT</b>
	<b><u>TYPE NM PLASTIC (UL)</u></b>	

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The work under this Item shall conform to the relevant provisions of Section 800 of the MassDOT Standard Specifications for Highways and Bridges, as amended, and the following:

#### DESCRIPTION

The work shall include the furnishing and installation of 3-inch non-metallic conduit for traffic signal and lighting systems in accordance with the plans and as required by the Engineer. Details have been attached.

#### MATERIALS

The conduit material shall be Schedule 80 polyvinyl chloride (PVC) plastic conduit. The conduit quantity may be increased or decreased by the Engineer depending upon actual conditions encountered as provided for in Section 4.06 of the Standard Specifications.

Gravel borrow for trench backfill, if required per the Engineer, shall be as specified in Section M1.03.0 Type c of the Standard Specifications.

#### CONSTRUCTION METHODS

##### Conduit in Grass or in Planted Areas

Where new conduits are installed in grass and planted areas, work shall include placement of a minimum of 4 inches of loam borrow, seed and any other materials replaced in kind to restore disturbed areas to their original condition. Any existing plants (bushes, flowers, etc.) removed or damaged as a result of this project shall be replaced in kind. No separate payment shall be made for this work, but all costs in connection therewith shall be included in the unit price bid for Item 804.3.

##### Conduit under Sidewalk, Paved Median or Driveways

Where conduit is installed in sidewalk or paved median or driveway areas, the work shall include excavating and backfilling of trenches, including the required compaction. Payment for cement concrete or asphalt pavement shall be paid for under the respective item.

##### Conduit Crossing Under Roadways

Trenches in existing asphalt pavements not subject to full depth reconstruction shall be sawcut to an 18 inch width. The existing pavements shall be sawcut through their full depth and the pavement removed.

After conduit installation, the trench shall be backfilled in accordance with the standard specifications and per the details shown on the contract drawings. The finished grade of the backfill shall be below existing pavement surface as shown on the construction details.

Where conduit crosses under roadways, no separate payment shall be made for the excavation, saw cutting of pavement, backfill or incidental materials, but all costs in connection therewith shall be included in the contract unit price for Item 804.3.

#### METHOD OF MEASUREMENT

Item 804.3, 3 Inch Electrical Conduit Type NM Plastic (UL), shall be measured per Foot of conduit actually installed.

#### BASIS OF PAYMENT

Item 804.3, 3 Inch Electrical Conduit Type NM Plastic (UL), shall be paid at the contract unit price bid, per Foot, which payment shall be considered as full compensation for all labor, tools, equipment, materials, and incidentals required to complete the work as described above.

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**ITEM 811.31                      PULL BOX 12 X 12 INCHES – SD2.031                      EACH**

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**GENERAL**

The work under this Item shall conform to the relevant provisions of Section 800 of the MassDOT Standard Specifications for Highways and Bridges, as amended, and the following:

Pull Boxes shall be built to the lines, grades and dimensions as shown on the Contract Drawings with the necessary frames, covers, etc. Construction methods for precast concrete units shall conform to the relevant provisions of Section 901, and Subsection M4.02.14 of the Standard Specifications.

**MATERIALS**

All pull boxes on this project shall be 12 inch by 12 inch (SD2.031) as detailed in the Standard Specifications. Frames and covers shall be furnished by a fabricator on the MassDOT Approved Fabricators list. The Approved Fabricators list can be found on the MassDOT website; <http://www.massdot.state.ma.us>. Cover shall be fabricated without any identifying marking on the face. Cover shall be blank with cover ribs.

**SUBMITTALS**

Shop Drawings, Samples, and Product Literature: Prior to ordering the below listed materials, submit Shop Drawings, samples, and product literature for all materials required to complete the work for approval. Delivered materials shall closely match the approved samples.

Coordinated Shop Drawings shall show required sizes, dimensions, sections, and profiles of units; and the arrangement of and provision for delivery and lifting devices required for the installation of work. Submit Shop Drawings with the minimum information as follows:

1. A pull box fabricator shall prepare Shop Drawings.
2. Indicate sizes, quantities, and coordination with adjacent work.
3. Deviations from the Bid Documents shall be clearly noted on the Shop Drawings.
4. No fabrication shall begin until the approval of all Shop Drawings.

**METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

Payment for Item 811.31 shall be at the contract unit price per each for the work specified and shall include the cost of furnishing all materials, labor, tools and equipment and all work and expense incidental and necessary to complete the work in accordance with the Contract Drawings and these specifications. Installation of temporary asphalt pavement for sidewalk repair shall be incidental to the work being performed.

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**ITEM 816. TRAFFIC SIGNAL RECONSTRUCTION LUMP SUM**

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**GENERAL**

The Work to be done under this Item shall conform to the relevant provisions of Section 815 of the MassDOT Standard Specifications for Highways and Bridges, the General Requirements for Demolition, Work Involving Painted Steel and the following:

The work to be done under this Item consists of the furnishing and installation of a new traffic control signal system, complete and ready for operation, at the following location:

- Location 1 – Lafayette Street/ Loring Avenue

The work at this location consists of the installation of one (1) traffic signal controller cabinet, foundation and pad (#1); three (3) ornamental traffic signal mast arms; two (2) mast arm foundations (#3 and #4); seven (7) pedestrian/traffic signal posts and foundations (#5, #6, #7, #8, #9, #10 and #11), five (5) pull boxes and the installation of traffic signal conduit between the foundations and pull boxes, as specified hereinafter and as shown on the drawings.

The work at this location shall be in compliance with ADA/AAB standards and shall include all or part of the following: furnishing and installing traffic control equipment including traffic signal mast arms and foundations, signal posts and foundations, a new controller, cabinet and foundation, installing signal heads, pedestrian pushbuttons, and a complete preemption system. Work shall also include furnishing and installing all materials and equipment necessary for a video detection system including video cameras, video detection processor, wire and cable, and all incidental materials and labor necessary for operating and controlling the traffic control signals at this location, as shown on the Contract Drawings and as specified herein, all in accordance with the applicable provisions of the Standard Specification for Traffic Control Devices (Section 800), NEMA Standards Publication No. TS-2, Type 1 Chassis Configuration, the Manual on Uniform Traffic Control Devices (2009 Edition) and the following:

Timing, sequence, and operation shall be as shown on the Sequence and Timing chart included in the Contract Drawings.

A list of major items required is included on the Signal Timing Plan. The lump sum price bid for Traffic Signal Reconstruction Location 1 shall be full compensation for all labor, materials, and equipment necessary or incidental to the installation of a new traffic control signal system.

Within 10 days following execution of the Contract, the Contractor shall submit shop drawings for signal supports, a list of equipment, and manufacturer's equipment specifications to the Engineer in accordance with the relevant provisions of Section 815.20. All equipment shall be listed on MassDOT's Qualified Construction Materials List.

The Contractor shall not commence any work until approval of the shop drawings and manufacturer's data has been received in writing from the Engineer. Approval of these drawings will be general in character and shall not relieve the Contractor from the responsibility of, or the

necessity of, furnishing materials and workmanship conforming to the plans and specifications.

The Contractor shall deliver to the Engineer a certificate of compliance by the manufacturer for all materials purchased from the manufacturer.

The cost of disposal of the existing signal equipment will be included in this lump sum item.

## REGULATIONS AND CODE

All electrical equipment shall conform to the standards of the NEMA and U.L. wherever applicable. In addition to the requirements of the Contract Drawings, Standard Specifications, and Special Provisions, all materials and workmanship shall conform to the requirements of the NEC, ASTM, OSHA and/or ANSI, all applicable State and Local codes and Department of Public Safety regulations.

## FINE TUNING, ADJUSTMENT AND TESTING PERIOD

After the Contractor has finished modifying the controller and installing all other associated signal equipment to operate as specified in the contract documents, the fine tuning, adjusting and testing period shall begin. During this period, the Contractor as required by the Engineer, will make necessary adjustments and conduct tests to insure safe and efficient operation of the equipment. This period shall not last for more than 30 days. No request for final acceptance will be considered until successful completion of the testing period.

## MAINTENANCE OF TRAFFIC SIGNALS

It shall be the responsibility of the Contractor to provide all labor, equipment and material required for the maintenance of the proposed traffic signal control equipment within the project limits, including damage by automobile accident from the date of written notice given to the Engineer that the Contractor will begin work on the proposed traffic signal control system until the date when the District Highway Director shall recommend acceptance of the completed project. This written notice must be given before the Contractor may proceed with any traffic signal system work.

## GUARANTEES OF THE TRAFFIC SIGNAL SYSTEM

The Contractor shall diagnose (troubleshoot) the system and at no additional charge to owner any part of the traffic signal control equipment installed by the Contractor that is found to be defective in workmanship, material, or manner of functioning within six months from date of final acceptance of the installation under this Contract.

The one-year warranty period on equipment stipulated in Subsection 815.20 of the Standard Specifications still applies.

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## ENTERING PRIVATE UTILITY COMPANY FACILITIES

The electrical service conduit and cable from the utility pole, to the traffic signal control cabinet will be provided by the Contractor. The local electric utility company will connect the terminals of the control cabinet to the source of supply.

The contractor will be responsible for all costs and fees related to the service connection provided by the utility. Their payment shall be the sole responsibility of the Contractor and considered incidental to the item.

The installation of conduit and wiring on or in local electric utility company facilities shall be in strict accordance with the regulations of the utility company. All work performed by the Contractor at local electric utility company structures shall be performed under the direct observation of a utility company inspector or representative.

The Contractor will be responsible for coordinating the electrical work in the vicinity of the control cabinets and for notifying the local electric utility company that construction has started and arranging the necessary time schedule with them for installation of electrical service to the control cabinets. Under no conditions shall the Contractor make permanent patch to the roadway or apply the final roadway surface if the roadway is to be resurfaced, or until services to the control cabinets have been completed.

For the purpose of these paragraphs, the phrase "Traffic Signal Control Equipment" is intended to include, but is not limited to: controllers, detectors, signal housings, supporting structures, cabinets, wires, conduit and all other ancillary electrical equipment used for traffic control.

## MAST ARM FOUNDATIONS

Cement Concrete foundations for mast arm structures shall conform to the "Massachusetts Department of Transportation Highway Division – Mast Arm & Foundation Details Standard Drawings", which are included in the Contract Drawings.

In the event that soil conditions or ledge prevent the use of the MassDOT standard foundation types, the Contractor is responsible for the selection and design of alternative foundation types. Alternative foundation types could include spread footings, coring and socketing into rock or other foundations previously used to support similar loads. The Contractor shall obtain the necessary soil borings and soil information required for use in the selection and design of the appropriate mast arm foundations.

The Contractor shall submit Shop Drawings of any bolt circle details for approval by the Engineer. Anchor bolts shall be set accurately and tops shall be formed neatly.

The top forming of cast in place units shall extend downward for a minimum of 24 inches on the side of the foundation. The lower portion of all foundations shall be placed directly against undisturbed earth. No forms or reinforcing for foundations for mast arms and control cabinet

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shall be set, nor shall concrete be placed until the excavation has been inspected by the Engineer and approval to proceed has been given.

Where soil conditions are such that, in the opinion of the Engineer, the typical foundation design is not suitable, the Engineer will provide a modified design for the foundation.

Cement Concrete foundations for mast arm structures shall conform to the “Massachusetts Department of Transportation Highway Division – Mast Arm & Foundation Details Standard Drawings”, which are included in the Contract Drawings. An assumed wind speed of 130 mph shall be used.

The Mast Arm Foundation for Foundation #2 has already been installed by others. The total depth for this 4-foot diameter mast arm foundation at the corner of Lafayette Street and West Avenue was constructed to be 19 feet deep to support a 45-foot mast arm.

Soil borings have been collected in the vicinity of the remaining proposed mast arm foundations (#3 and #4) at the corners of Lafayette Street and Loring Avenue (included hereinafter). Boring (B-1) was located in the existing sidewalk. The results indicate the soil is classified as dense dry sand. The foundation shall be a diameter of 4'-0" and a depth of 11'-0" to support a 45-foot mast arm. Boring (B-3) was located in the existing roadway. The results indicate the soil is classified as loose dry sand. The foundation shall be a diameter of 3'-6" and a depth of 13'-6" to support a 40-foot mast arm.

In the event that soil conditions or ledge prevent the use of the MassDOT standard foundation types, the Contractor is responsible for the selection and design of alternative foundation types. Alternative foundation types could include spread footings, coring and socketing into rock or other foundations previously used to support similar loads.

The Contractor shall submit Shop Drawings of bolt circle details for approval by the Engineer prior to any work being performed. Anchor bolts shall be set accurately and tops shall be formed neatly.

The top forming of cast in place units shall extend downward for a minimum of 24 inches on the side of the foundation. The lower portion of all foundations shall be placed directly against undisturbed earth. No forms or reinforcing for mast arm foundations shall be set, nor shall concrete be placed, until the excavation has been inspected by the Engineer and approval to proceed has been given.

TEST BORING LOG							SHEET 1																		
<b>Soil Exploration Corp.</b> Geotechnical Drilling Groundwater Monitor Well 148 Pioneer Drive Leominster, MA 01453 978 840-0391				<b>Stantec</b> <b>Site: Intersection of Loring Ave.</b> <b>and Lafayette St.</b> <b>Salem, MA</b>			BORING B-1 PROJECT NO. 17-0529 DATE: May 17, 2017																		
Ground Elevation: Date Started: May 17, 2017 Date Finished: May 17, 2017 Driller: TF Soil Engineer/Geologist:						GROUNDWATER OBSERVATIONS <table border="1"> <thead> <tr> <th>DATE</th> <th>DEPTH</th> <th>CASING</th> <th>STABILIZATION</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>				DATE	DEPTH	CASING	STABILIZATION												
DATE	DEPTH	CASING	STABILIZATION																						
Depth Ft.	Casing bl/ft	Sample			Blows/6"	Strata	Visual Identification of Soil and / or Rock Sample																		
		No.	Pen/Rec	Depth																					
1	1	4"	0'0"-2'0"	3-5-5-9	3'0"	Medium dense loam into fine to medium sand, some coarse sand, little fine gravel, some inorganic silt.																			
5	2	12"	5'0"-7'0"	7-14-12-12																					
10	3	12"	10'0"-12'0"	19-28-29-35		Medium dense to very dense, fine to coarse sand, fine to coarse gravel, cobbles and inorganic silt.																			
15	4	12"	15'0"-17'0"	21-25-37-46																					
20	5		20'0"-21'6"	53-71-88	20'0"	Very dense, fine to medium sand, inorganic silt, some coarse sand, little fine gravel.																			
25					21'6"	End of boring 21'6" Dry. No water encountered upon completion.																			
30																									
35																									
39																									
Notes: Hollow Stem Auger Size - 4 1/4"																									
Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 - 30 M Dense, 30 - 50 Dense, 50+ V Dense.				Trace 0 to 10% Little 10 to 20% Some 20 to 35% And 35% to 50%		CASING		SAMPLE		CORE TYPE															
Cohesive: 0 - 2 V Soft, 2 - 4 Soft, 4 - 8 M Stiff 8 - 15 Stiff, 15 - 30 V. Stiff, 30 + Hard.						ID SIZE (IN)		SS																	
						HAMMER WGT (LB)		140 lb.																	
						HAMMER FALL (IN)		30"																	

<b>TEST BORING LOG</b>							<b>SHEET 3</b>			
<b>Soil Exploration Corp.</b> Geotechnical Drilling Groundwater Monitor Well 148 Pioneer Drive Leominster, MA 01453 978 840-0391			<b>Stantec</b> Site: <b>Intersection of Loring Ave.</b> and <b>Lafayette St.</b> Salem, MA			BORING <b>B-3</b> PROJECT NO. <b>17-0529</b> DATE: <b>May 17, 2017</b>				
Ground Elevation: <input type="text"/> Date Started: <b>May 17, 2017</b> Date Finished: <b>May 17, 2017</b> Driller: <b>TF</b> Soil Engineer/Geologist: <input type="text"/>					<b>GROUNDWATER OBSERVATIONS</b>					
					DATE	DEPTH	CASING	STABILIZATION		
					<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
					<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
					<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
Depth Ft.	Casing to ft	Sample No. Pen. Rec.		Depth	Blows/6"	Strata	Visual Identification of Soil and / or Rock Sample			
1	1	12"	0'4"-2'4"	4-5-6-8	4"	Concrete sidewalk.	Medium dense, fine to medium sand, some crushed stone, some inorganic silt, little coarse sand.			
5	2	6"	5'0"-7'0"	8-10-8-11	3'0"		Medium dense, fine to coarse sand, fine gravel, little inorganic silt.			
10	3	10"	10'0"-12'0"	8-8-9-12	8'0"		Medium dense, fine sand, little inorganic silt, little medium to coarse sand.			
15	4	12"	15'0"-17'0"	9-10-10-18	15'0"		Medium dense to very dense, fine to coarse gravel, cobbles, little inorganic silt. Dry.			
20	5	10"	20'0"-22'0"	23-26-34-29	22'0"		End of boring 22'0" Dry. No water encountered upon completion.			
25										
30										
35										
39										
Notes: <b>Hollow Stem Auger Size - 4 1/4"</b>										
Cohesionless: 0-4 V. Loose, 4-10 Loose, 10-30 M Dense, 30-50 Dense, 50+ V Dense			Trace 0 to 10% Little 10 to 20% Some 20 to 35% And 35% to 50%			ID SIZE (IN)	CASING	SAMPLE	CORE TYPE	
Cohesive: 0-2 V Soft, 2-4 S Soft, 4-8 M Stiff 8-15 Stiff, 15-30 V. Stiff, 30+ Hard						HAMMER WGT (LB)	<input type="text"/>	140 lb.	<input type="text"/>	
						HAMMER FALL (IN)	<input type="text"/>	30"	<input type="text"/>	

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## MAST-ARM ASSEMBLIES

All Traffic Signal Mast Arm assemblies, including bases, shall follow MassDOT standards.

The assemblies shall conform to the relevant provisions of Subsection 815.43 of the Standard Specifications and shall be constructed of galvanized steel without a transformer base. Shoe bases shall be provided. Shop drawings and structural calculation submittals will be required for all mast arm assemblies. The wind speed utilized for the calculations shall be 130 mph. The length of mast arm shaft shall be according to the plans.

The Contractor shall furnish to the Engineer longhand design calculations and weld details for the mast arm assembly selected. Longhand design calculations shall be submitted with the Shop Drawings. All drawings and calculations must be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. The complete mast arm assembly shall be designed and constructed in accordance with the MassDOT Mast Arm & Foundation Details and Standard Drawings. Only poles from MassDOT prequalified manufacturers shall be used. A list of prequalified manufacturers can be obtained from the Bridge Engineer of the Massachusetts Department of Transportation (MassDOT).

Vertical mounting brackets of the type regularly supplied by the manufacturer and conforming to applicable provision of section 815 of the Standard Specifications shall be used for the attachment of signal heads to the mast arm. Sign brackets for mast arms shall be used in all locations where a sign is to be mounted to the mast arm. Mast arm sign brackets shall consist of a mast arm clamp assembly, mounting bracket, stainless steel bands, clamp screw, hardware, and all miscellaneous materials necessary to fix mount the sign to the mast arm.

## EQUIPMENT FINISH AND COLOR

All traffic signal equipment including but not limited to mast arms, signal posts, bases, signal heads, visors (outside), doors, controller cabinets, service meter socket boxes, pedestrian push button assemblies, hardware, and rigid mounting brackets for signals and signs shall be the color Black, as approved by the City of Salem. The color shall be Powder Coated Black which shall match color number 17038 of the Federal Standard 595C "Colors Used in Government Procurement." The inside of visors shall be Flat Black in accordance with Federal color number 37038. The Contractor shall submit to the Engineer and City of Salem for approval, paint chips and sample finishes on aluminum and steel of the intended color prior to any equipment being ordered.

## TRAFFIC SIGNAL POSTS AND BASES

All traffic signal posts and bases shall follow MassDOT standards. Shop drawings will be required for all traffic signal posts and bases.

Bases shall be provided with a door opening and a cast aluminum door, complete with a cap

screw fastening device and a tapped hole for a grounding lug.

## CONCRETE BASES

All sweeps to be installed in concrete bases shall be  $\frac{3}{4}$  inch steel sweeps with sufficient three inch steel riser to project above the finish grade of the base.

One spare sweep and riser, capped at both ends, shall be poured in place in each signal support foundation or base. The Engineer shall determine the location of the spare sweep. In any case no more than three sweeps shall be in any foundation.

## CONTROLLERS AND CABINETS

The controllers, malfunction management units, detector amplifiers, bus interface units and all other ancillary traffic signal control components included in the traffic control cabinet shall comply with the National Electrical Manufacturers Association (NEMA) Standard No. TS 2, Traffic Controller Assemblies.

The top of the concrete base for the controller cabinet shall be 18 in. above grade. Controller cabinet foundations shall not obstruct a sidewalk or crosswalk so that passage by physically challenged persons is impaired. Anchor bolts shall be internal to the cabinet. The foundation shall provide a spare sweep as required by the engineer.

All sweeps to be installed in cabinet foundation shall be 3-inch (PVC) sweeps with sufficient 3 inch PVC riser to project above the finish grade of the base. A cement concrete pad and walkway shall abut the front of the cabinet and shall be built in accordance with the MassDOT's sidewalk specifications. The width of the concrete pad and walkway shall be a minimum of 3 feet wide and shall be equal to the length of the long side of the cabinet foundation.

## TS 2 TYPE 1 CONTROLLERS

Controllers shall conform to Section 3, Controller Units of NEMA No. TS 2, Traffic Controller Assemblies. The controllers shall be supplied in an 8-phase TS 2 Type 1 configuration. Controllers shall utilize an input/output interface conforming to Section 3.3.1 of the NEMA TS 2 Standard for all input/output functions with the backpanel terminals and facilities, the malfunction management unit, detector rack assemblies and auxiliary devices.

The local controller shall be capable of being operated in the full-actuated mode, in the free mode and as semi-actuated in the coordinated mode. The controller shall be Type 8DW, keyboard entry, menu-driven unit mounted in an eight-phase cabinet. The controller unit shall meet all applicable requirements of the N.E.M.A. Standard Publication No. TS-2, Type 1, MassDOT's Current Standard Specifications, and include the following as minimum requirements for the "Keyboard Entry Controller Unit":

- a. The Keyboard Entry Controller Unit must be type-tested and approved by the Department.
- b. The controller shall have hard-wire interconnect capability and internal time base coordination logic. The coordination control shall have the capabilities to operate as described under Section 815.41 of the Standard Specifications.
- c. The controller shall have a data transfer/printer port for data transfer to another controller, printer or laptop PC computer. A port shall be provided for uploading or downloading controller-operating parameters from a laptop PC computer.
- d. The controller shall have a security code function.
- e. The controller unit shall have internal fire preemption control capabilities.
- f. The phase or phases selected for "call to non-actuated" (C.N.A.) modes shall be determined as needed by keyboard entries.

The Contractor's attention is directed to Table 2, Required Signal Light Switching Assemblies, Section 815.41 of the Standard Specifications. The Contractor shall furnish the appropriate type and number of load switches and place unutilized load switches in the control cabinet for future use. Load relays shall be easily replaced using a screwdriver. Component relays requiring soldering are not acceptable.

In addition to the convenience outlet as described under Subsection 815.41, a lamp with an on/off switch shall be installed in the controller cabinet.

### **Construction Methods**

The unit shall consist of a mainframe suitable for shelf mounting, with appropriate interface harnesses.

Operator programmable data entry shall be accomplished through a menu driven keyboard and a display located on the front panel.

Connectors shall be provided for interconnecting all inputs and outputs with their external control circuits.

Timing shall be accomplished by digital methods and with power applied shall use the power line frequency as the time base.

All components shall be operated in accordance with good commercial practice to optimize life and performance.

The design goal shall be such that, under 24 hour a day operating conditions in their circuit applications, all components shall have a life of not less than 5 years.

The circuit reference designation for each component on the printed circuit board shall be clearly

marked immediately adjacent to the component.

**Electrical**

The controller shall be designed for use of nominal 120 volt, 60 Hz single phase alternating current. It shall operate correctly in the voltage range of 95 to 135 volts AC.

All DC inputs and outputs shall conform to NEMA TS2 - Type 1 standards for transition zone, response time, current capability, surge and noise immunity, as well as all other applicable electrical specifications.

**Environmental**

The controller shall maintain all its programmed functions from -30 degrees F to +165 degrees F.

The unit shall perform to this specification when operated in relative humidity from 5% to 95%.

The unit shall conform to all applicable portions of the Environmental and Operating Standards as described in the NEMA Standards TS2-1992.

**Functional**

The control equipment shall also be capable of providing a yearly time program for selecting four cycle lengths, three splits, and three offsets plus flashing operation for control of local controllers. The schedule shall be as included and/or as shown on the plans.

The controller shall be fully compatible with all existing and proposed local controllers and capable of communicating with a computer at a remote location - via a telephone linkage (dial up modem) to the nearest telephone pole or manhole. The modem shall have a data rate of 1,200 baud minimum and use a 10- or 11-bit asynchronous protocol. The power on which the modem runs shall be 12 VDC. The interface shall be through an RS232 port. The modem shall have a 5-year warranty. The modem shall meet the environmental aspects of the NEMA specifications for controllers and corollary equipment.

The Contractor shall provide graphics required for intersection and system monitoring. These graphics shall be customized to reflect the exact geometry, detection, and signalization of the intersections included in the subsystem listed herein. All street names shall be labeled.

The Contractor shall program each programmable local hardware component according to the "Time of Day Schedule" as follows:

TIME OF DAY SCHEDULE (BACK UP)

	<b>6 AM- 10 AM</b>	<b>10 AM- 11 AM</b>	<b>11 AM- 3 PM</b>	<b>3 PM- 7 PM</b>	<b>7 PM- 9 PM</b>	<b>9 PM- 6AM</b>
Mon - Fri	Free	Free	Free	Free	Free	Free
Sat	Free	Free	Free	Free	Free	Free
Sun/Hol	Free	Free	Free	Free	Free	Free

NOTE: CYCLE-SPLIT-OFFSET

NOTE: Patterns shown on the plans are as follows:

AM	1-1-1
PM	2-2-2

Note: Following implementation of the system, thresholds shall be revised as fine tuning occurs.

CABINET

The TS 2 Type 1 cabinet shall meet the requirements of configuration 3 as defined in Table 5.3.1-1, "Type 1 Configurations" of the NEMA TS 2 Standard. The cabinet shall be fabricated of sheet aluminum to size six (6) dimensions as specified in Table 7.3-1 of the NEMA TS 2 Standards.

It is intended that equipment be mounted and that all necessary provisions for mounting and wiring all equipment shall be made at the factory of the controller equipment manufacturer prior to shipping the cabinet and the control components. All necessary terminal strips, brackets, etc., shall be installed at the factory. Thus, the amount of field wiring shall be kept to a minimum. Terminals for auxiliary equipment to be installed shall be clearly and permanently labeled as to functions.

No equipment components shall be stacked. Brackets, shelves, hangers, or other supports designed to assure convenient accessibility for inspection and maintenance shall be installed at the factory. Adjustable aluminum shelving is required. No plywood shelving, side panels or rear panels shall be used in any cabinet.

The cabinet shall include 4 video suppressors. The controller cabinet shall contain a video compressor mounted on the side of the cabinet for video detection.

FLASHER

Flashers shall comply with Subsection 6.3 of the NEMA TS 2 Standard and be equipped with two output indicator lights which will show flashing power out to the cabinet assembly.

## FLASH TRANSFER RELAYS

Flash transfer relays shall comply with Subsection 6.4 of the NEMA TS 2 Standard.

The field electrical loading for flash operation shall be wired through the transfer relays such that the load on the 2-circuit flasher is a balanced as possible within the limitations of the signal phasing.

## LOAD SWITCHES

Load switches shall comply with Subsection 6.3 of the NEMA TS 2 Standard and be equipped with two output indicator lights which will show flashing power out to the cabinet assembly. A full complement of load switches to accommodate each available position of the back panel shall be provided.

## BUS INTERFACE UNITS

The Bus Interface Unit (BIU) shall comply with Section 8 of the NEMA TS 2 Standard. The BIU shall be fully interchangeable with any other manufacturer's unit and interchangeable in a NEMA TS 2 Type 1 cabinet assembly.

The BIU shall perform the interface function between port 1 at the controller unit, the malfunction management unit, detector rack assembly, and the backpanel terminal and facilities.

At a minimum, two LED indicators shall be provided on the BIU front panel. One indicator shall serve a dual use; as a power-on indication and as a diagnostic indicator for proper operation of the device. The second indicator shall serve as a transmit indicator illuminating each time data is transmitted.

## MALFUNCTION MANAGEMENT UNIT

The malfunction management unit (MMU) shall comply with Section 4 of the NEMA TS 2 standard. The MMU shall be capable of operating as either a Type 16 with 16 channels (8-vehicle, 4-pedestrian, 4-overlap) or a Type 12 with 12 channels (8-vehicle, 4-overlap). The MMU's supplied shall be configured to operate as Type 16 units.

The MMU's, in either the Type 16 or Type 12 configuration, shall be capable of operating in a NEMA TS 2 Type 1 cabinet or a NEMA TS 1 cabinet without loss of functionality.

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## VIDEO DETECTION SYSTEM

The contractor shall install a “GridSmart” single 360° video camera detection system as manufactured by the Aldis Corporation. The camera with mounting hardware shall be located on the proposed 40 foot mast arm at the northeast corner of the intersection. The final location of the camera on the mast arm shall be determined in the field by the contractor to ensure a necessary field of view of the camera on all approaches to the intersection and shall conform to manufacturer’s recommendations.

The proposed Control Unit and all other equipment necessary for a fully functioning video detection system is to be installed in the existing traffic control cabinet.

All limbs and/or branches of trees, regardless of size, that restrict camera visibility shall be trimmed or removed. All locations for tree trimming shall be determined by, and all tree trimming work shall be done to the satisfaction of the City. The quality and method of work shall conform to accepted tree trimming practices. All trees to be trimmed must be within the City Right of Way.

## SPARE EQUIPMENT

The Contractor shall provide the following spare signal equipment in the traffic signal controller cabinet:

1. A full complement of load switches to accommodate each available position of the back panel;
2. A full complement of flash transfer relays to accommodate each available position of the back panel;
3. A 25 foot RS-232 cable for communication function with a laptop computer.
4. Two spare BIUs.

## OPTICAL FIRE PREEMPTION SYSTEM

To be consistent with equipment provided at other locations in the City of Salem, the optical Fire Preemption System shall be manufactured by OPTICOM.

The work consists of furnishing and installing optical traffic signal preemption systems ready for operation, as described herein and shown on the plans. Included in the work are the furnishing and installing of traffic signal preemption unit and related equipment, optical detection equipment and all necessary connections to the traffic signal controller. A separate cable shall be installed for the fire preemption equipment, apart from the traffic signal cable.

The fire preemption system shall consist of a data-encoded phase selector to be installed within the existing control cabinet. This unit will serve to validate, identify, classify, and record the signal from the optical detectors located on support structures at the intersection. Upon

receiving a valid signal from the detector, the phase selector shall generate a preempt call to the controller initiating a preemption operation as shown on the plans.

The phase selector shall be a rack-mounted plug-in four channel, dual priority device. Programming the phase selector shall be via a PC-based computer utilizing unit specific software. One copy of software on a disk shall be supplied and licensed to the City as part of this contract. A hard copy of final programming data shall be left in the control cabinet. The Contractor shall supply a complete set of interface cables for phase selector to laptop connection.

Emergency vehicles equipped with optical energy emitters transmit optical energy impulses to optical detectors mounted at the intersection. When optical energy impulses are received at the intersection, control of the signals shall transfer from the local controller to show a selected display shown on the plans to assist the vehicle through the intersection without conflict. After the vehicle has passed through the intersection, control of the signals shall then return to the local controller which shall restore the appropriate timings that were in effect prior to preemption.

## **1. General Operation and Description of Work**

The following description of work specifies the responsibilities involved in the installation of optical preemption equipment.

The Contractor is required to supply material and labor, required or shown for the complete installation of optical preemption equipment at the specified location in this project. Intersection preemption equipment required includes optical detectors, phase selectors, card rack, preemption indicator lights, cable, interfacing of preemption equipment to the local and system master, making electrical connections and all required incidentals.

The following area the operational requirements of the optical preemption system:

- Operating sequence, as specified, shall be initiated when detector receives optical energy of the required repetition rate from an emitter.
- Detector shall transform the optical signals into electrical signals and transmit the electrical signal to the phase selector for processing.
- Phase selector shall cause the local or closed loop system master to show a selected display identical to one of the color interval displays normally available in the controller which will assist the emergency vehicles through the intersection without conflict.
- Phase selector shall allow the controller to release from hold and resume normal operation after optical energy signals are lost provided the desired green display has already been obtained. The controller shall not allow service following released to

normal operation to any phase where an active call from a waiting vehicle or pedestrian does not exist. Detector cable for optical preemption equipment shall meet specifications of the system manufacturer.

The Contractor shall arrange for a trained representative of the manufacturer of the optical energy preemption equipment to perform the following field supervision and turn-on services:

- The representative shall select the proper quantity and place and method of installing all components on each controller, to comply with the operational requirements shown in the preemption schedule included in these special provisions.
- The representative shall instruct the Contractor and municipal personnel in the procedures of installation and operations.
- The representative shall be available to assist, supervise and check all wiring to insure proper operation.
- The representative shall perform a final checkout to include initial adjustment of range and timing to acceptable standards within the capabilities of the intersection.
- The representative shall initiate documentation for as-built drawings.
- The representative shall demonstrate the system and instruct the drivers of fire fighting vehicles in the operation of the system.
- Any operation problems occurring within the next 30 days shall be corrected by the Field Service representative. This requirement is not intended to modify the Contractor's six-month guarantee obligation, as set further in an earlier portion of these Special Provisions.

The cost of these field supervision and turn-on services shall be included in the lump sum prices bid for traffic signal controls and no additional payment shall be made therefor.

## **2. Installation**

The preemption equipment manufacturer shall be responsible for preemption system design and documentation.

Preemption System Design and documentation shall include the following:

- Provide the installing agency with locations for detector installation. Suggested detector locations are shown on the plans and may be changed to improve the operation. Notice shall be given to the Engineer prior to any change.

- Provide the controller manufacturer, Engineer and owner with electrical diagrams.

The installer shall install the equipment consistent with the preemption equipment manufacturer's recommended installation procedures and electrical diagrams in a neat and workmanlike manner.

Operating checkout includes the following:

- Verifying that the pre-emption system is properly installed as per the pre-emption equipment manufacturer's recommendations and the electrical diagrams as provided by the pre-emption equipment manufacturer.
- Verifying that the priority system timing and range are properly set. Pre-emption equipment warranties are put into effect.
- Instructing the vehicle drivers or their representative(s) in the operation of the pre-emption system.

### **3. Warranty**

All components of the preemption system specified herein, shall be warranted by the manufacturer to be free of defects in materials and workmanship for a period of two years from the date of delivery or one year from the date of installation, whichever occurs first.

The Contractor shall repair or replace, free of charge to the City of Salem, any part that fails in any manner during the warranty period, and six months after final acceptance of the project by the Owner.

### **PREEMPTION CONFIRMATION LIGHT**

A preemption confirmation light shall be provided and mounted as shown on the plans. It shall be located in a position where it may be visible from all preemption approaches to each intersection. The light shall be weather tight and consist of a double flash clear (white) strobe which shall be illuminated whenever the controller is in the emergency preemption phase. The indicator light shall meet ITE, NEMA, IMSA and MassDOT standards. It shall be capable of flashing at a rate of 60 to 75 flashes per minute. Candela intensity shall be a minimum of 1,000 for clear lenses.

### **SIGNAL HOUSINGS**

Vehicle Signal Heads - All indications shall be equipped with a cut-away visor, and red, yellow,

and green LED signal modules. All signal head shall have 5 inch backplates with a reflective border.

**Pedestrian Signal Heads** - All indications shall be equipped with a hood visor, and lunar white and portland orange LED signal modules.

The final adjustment of the facing of signals shall be made as required by the Engineer after all the signals at an intersection are operating, but prior to installing the through bolt above.

#### LIGHT EMITTING DIODE (LED) SIGNAL MODULE

Any equipment that has been type-tested and approved according to Section 815.21 of the Standard Specifications prior to the date of award of this Contract will be considered as meeting these Specifications.

All Red, Yellow and Green LED signal housings with the exception of optically programmed and fiber-optic housings shall conform to the following:

All Red and Green LED signal modules shall conform to "Interim LED Purchase Specification of the Institute of Transportation Engineers, Vehicle Traffic Control Signal Heads - Part 2: Light Emitting Diode (LED) Vehicle Traffic Signal Modules", July, 1998, or most current version, Institute of Transportation Engineers (ITE), 1627 Eye Street, NW, Suite 600, Washington, DC 20006.

Yellow LED signal modules shall conform to the above specifications with the exception that yellow modules shall meet maintained Minimum Luminous Intensity values of Table 1, Section 4 of the above referenced ITE specification of compliant green signal modules at 25°C at 120 volts AC, throughout the useful life based on normal use in traffic signal operation over the operating temperature range.

All signal modules shall conform to the following: (In the case of a conflict, the following special provision shall overrule.)

An independent laboratory shall certify that the LED signal module complies with Section 6 Quality Assurance of the above stated ITE LED Purchase Specification.

LED signal modules must be type-tested and approved by the Department according to the requirements of Subsection 815.21 of the Standard Specifications for Highways and Bridges.

On the backside of the LED signal module there shall be a permanently marked "up" arrow to aid in the proper orientation of the module during installation.

The manufacturer's name, trademark, serial number and other necessary identification shall be permanently marked on the backside of the LED signal module.

#### **Physical and Mechanical Requirements**

LED signal modules shall fit without modifications into existing traffic signal housings conforming to "Vehicle Traffic Control Signal Heads" (VTCSH) published in the Equipment and Materials Standards of the Institute of Transportation Engineers. The LED signal module shall be a single, self-contained device, not requiring on-site assembly for installation. The LED signal assembly construction shall conform to the applicable ASTM specifications for the materials used to fabricate the module.

Each red LED signal module shall be comprised of a smooth surfaced Red, UV stabilized polycarbonate outer shell, multiple LED light sources, a power supply and a polycarbonate back cover assembled in a gasketed or silicon sealed unit.

Each yellow LED signal module shall be comprised of a smooth surfaced Yellow, or transparent, UV stabilized polycarbonate outer shell, multiple LED light sources, a power supply and a polycarbonate back cover assembled in a gasketed or silicon sealed unit.

Each green LED signal module shall be comprised of a smooth surfaced Green, or transparent, UV stabilized polycarbonate outer shell, multiple LED light sources, a power supply and a polycarbonate back cover assembled in a gasketed or silicon sealed unit.

### **Optical and Light Output Requirements**

The minimum luminous intensity values and light output shall be maintained within the rated input voltage of 117 Volts AC. Red and Green LED signal modules shall not be allowed to fall short of the minimum intensity values at any of the 44 measuring points of the standard when the lamp is turned on cold for measurements and after a 30 minute warm-up time period at 100% duty cycle. Yellow LED signal modules shall not be allowed to fall short of the minimum intensity values for green modules as described above, at any of the 44 measuring points of the standard.

### **Electrical**

The maximum wattage for red and green 300-mm balls shall be 20 Watts and 10 Watts for the 300-mm red and green arrows. The maximum wattage for 300-mm yellow balls shall be 24 Watts and 12 Watts for the 300-mm yellow arrows.

The LED sources shall not be powered above 70% of the manufacturer's specified rated load. This shall be clearly shown in layman's terms through calculations, schematics, catalogue cuts, etc.

Red LED sources shall be AlInGaP (Aluminum Indium Gallium Phosphide) type shown clearly in a catalogue cut or similar literature.

Yellow LED sources shall be AlInGaP (Aluminum Indium Gallium Phosphide) type shown clearly in a catalogue cut or similar literature.

Green LED sources shall be InGaN (Indium Gallium Nitride) type shown clearly in a catalogue cut or similar literature.

**Warranty**

The LED signal module will be replaced or repaired by the manufacturer if it exhibits a failure due to workmanship or material defects within the first 60 months of field operation.

The LED signal module will be replaced or repaired by the manufacturer if it exhibits either a greater than 40 percent light output degradation or a fall below the minimum intensity levels within the first 36 months of field operation.

**PEDESTRIAN SIGNAL HEADS**

The pedestrian signal heads shall be 16 inch countdown pedestrian signals. The signal shall consist of international symbols of an LED upright hand symbolizing “DON’T WALK” and a walking person symbolizing “WALK”. The internal countdown module shall be comprised of two 7 segment digits, 8 inches high and made of 88 red LED’s. The countdown module shall display the number of seconds remaining throughout the flashing “DON’T WALK” pedestrian, and blank out when not activated. All LED indications on the pedestrian signal shall have an automatic dimming circuit for night illumination to reduce long-term degradation to the LED’s.

**PEDESTRIAN PUSH BUTTON**

Pedestrian push buttons shall be located as close as practicable to the sidewalk curb ramp serving the controlled crossing and shall permit operation from a clear ground space. If two crosswalks, oriented in different directions, end at or near the same location, the positioning of pedestrian push buttons and/or legends on the pedestrian push button signs should clearly indicate which crosswalk signal is actuated by each pedestrian push button.

Pedestrian pushbuttons shall be installed on a saddle of cast aluminum with the approved MassDOT, Highway Division instructional legend, firmly attached to the casting. The saddle shall have a clear coat finish. The plunger shall be a maximum of 42 inches above the finished sidewalk and a minimum of two inches in the smallest dimension. The force required to activate controls shall be no greater than 5 lbs. This sign and saddle shall be used in locations where a pushbutton is shown on the plans

**ACCESSIBLE PEDESTRIAN SIGNALS**

Audible pedestrian signals shall be provided at the locations shown on the Contract Drawings. The accessible pedestrian signals/pedestrian push button shall provide visually impaired pedestrians with a locator tone that will allow them to find the push button to actuate the walk signal. Once the push button call has been placed, the button will provide both an audible and a tactile response during the WALK phase of the cycle. The push buttons shall clearly indicate by means of tactile arrows which crosswalk signal is actuated by each push button. Audible pedestrian signals shall be of the type which produces a percussive tone during the walk signal. The assemblies shall be capable of adjusting audible volume to ambient noise levels. Audible

pedestrian signals shall conform to the requirements of the MUTCD, including sound level requirements for locator tone and percussive tone during the walk signal.

The push button assembly and hardware shall be the color Black , with approval by the City of Salem. The color shall match color number 17038 of the Federal Standard 595C “Colors Used in Government Procurement.”

## BACKPLATES

Backplates shall be aluminum with a non-louvered profile. Backplates shall have a 5 inch border width and which includes a 3” reflectorized yellow border. The border shall be made from an adhesive-backed retroreflective yellow micro-prismatic sheeting, Type III or IV, and cover the entire perimeter of the backplate. The sheeting shall be placed no closer than ½-inch to any single louver, and no sheeting shall cover any portion of a louver.

## VISORS

All vehicular traffic signal indications shall come equipped with cut-away visors.

Pedestrian signal heads shall come equipped with cut-away visors.

Pedestrian Signal Heads – Heavy duty blind clamp fittings are required for mounting hardware.

Where mast arm mounting is required, including at intermediate arm locations, signal heads shall be all vertically fixed-mounted.

The final adjustment of the facing of signals shall be made as required by the Engineer after all the signals at an intersection are operating, but prior to installing the through bolt above.

## TRAFFIC SIGNAL INTERSECTION CABLE

Intersection Cable - All traffic signal cable placed underground in conduit shall be stranded copper No. 12 AWG per IMSA 20-1. All traffic signal cable placed from the transformer base to the signal shall be stranded copper No. 14 AWG per IMSA 20-1.

Circuit protective device for the tap from No. 12 AWG to No. 14 AWG at the signal base shall not exceed 15 amps and shall comply with the N.E.C.

All traffic cables shall be labeled with suitable, durable, permanently legible tags or markers. Individual conductors, when not enclosed by the cable outer jacket, shall be bundled by phase and labeled with the appropriate phase designation.

A single cable shall be used in all conduit runs requiring up to 30 conductors. No more than

2 cables may be used for runs of 31 to 60 conductors, and no more than 3 cables may be used for runs of 61 to 90 conductors. These shall be the only cables carrying signal or pushbutton circuits in any one conduit.

A minimum of five (5) spare conductors shall be provided in the base of each signal post, mast arm pole and strain pole. Openings, where cables enter the base of a cabinet, shall be sealed with an approved elastic sealing compound. The open ends of conduits entering or leaving mast arms, posts and pull boxes shall also be sealed with the approved elastic sealing compound.

## WIRING DIAGRAMS

Five sets of modified wiring diagrams for the control cabinet and all accessories shall be furnished including one mylar reproducible copy for the control cabinet when installed. All actual and potential terminal strip connections shall be shown. Accessory equipment includes flashers, switches, relays, logic modules, detectors, etc. All identification on the diagrams shall be as installed, and all field labeling shall be consistent with the diagrams. Furthermore, the format symbols, identifications, operating sequence, etc., common to all the intersection wiring diagrams shall be standardized and consistent with appropriate MassDOT standards. Before acceptance of the job, the five copies of all operating and maintenance manuals and complete and accurate parts lists shall be supplied.

All tests and any necessary repairs and replacements required to produce a fault-free system shall be included in the lump sum price bid for this Item.

## SERVICE CONNECTION

All service cable shall be stranded copper No. 6 AWG. All power supply cable shall be labeled.

The Contractor shall furnish and install, or cause to be installed, all service equipment (120 volt, 60 cycle) to the satisfaction of the utility company (120/240 volt service connection will not be acceptable).

## METHOD OF MEASUREMENT

Traffic Signal Reconstruction Location 1 shall be measured per Lump Sum per location.

## BASIS OF PAYMENT

Traffic Signal Reconstruction Location 1 will be paid for at the Contract Lump Sum price for Item 816., which price shall include all labor, materials, equipment and incidental costs to complete the work and include disposal of the existing traffic signal equipment.

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**ITEM 841.1            SUPPORTS FOR GUIDE SIGN (D6 w/D8 - 5 INCH            EACH**  
**TUBULAR POST) STEEL**

The work under this Item shall conform to the relevant provisions of Section 840 Sign Supports of the MassDOT Standard Specifications for Highways and Bridges, as amended, and the following:

The Work shall include the removal, storage, protection, handling, and re-installation of ground mounted guide sign panels onto new supports at two locations as shown on the contract drawings. The work includes all associated excavations, concrete foundations, the supplying and placing of compacted gravel, as required by the Engineer, and the restoration to original condition of any adjacent natural features disturbed in any way or manner by the operation.

Work shall also include the excavation (including Class “B” rock) of any existing foundations to be removed to a depth of at least 6 inches below grade.

#### MATERIALS

If in the opinion of the Engineer, the existing sign panels are unsuitable for reuse, new sign panels of a size and composition equal to the existing sign panels shall be furnished, as required by the Engineer, at no additional cost.

#### CONSTRUCTION METHOD

The sign panels shall be mounted in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and the 1990 Standard Drawings for Signs and Supports.

When the visibility of the relocated sign panels is obstructed by trees and other vegetation, the Contractor shall clear the obstruction for proper sight distance. All clearing shall be done within the roadway layout, as approved by the Engineer.

Existing sign panels to be re-used shall be cleaned before being re-installed. Damage during removal or resetting to any sign panel designated for reuse by the Engineer shall be repaired or replaced by the Contractor at his own expense.

#### METHOD OF MEASUREMENT

The quantity of Supports for Guide Sign (D6 w/D8 – 5 inch Tubular Post) Steel to be installed shall be measured by EACH sign support installation, complete in place, including all excavations, foundations, backfill and the reinstallation of existing sign panels or the furnishing and installation of new sign panels, as required by the Engineer.

## BASIS OF PAYMENT

Payment for Supports for Guide Sign (D6 w/D8 – 5 inch Tubular Post) Steel to be installed at the locations shown on the contract drawings or as directed by the Engineer, will be made at the contract unit price per each complete installation, regardless of the number of existing or new sign panels installed on each new sign support.

The Contract Price shall constitute full compensation for furnishing and installing all materials, labor, equipment, tools, appurtenances and incidentals necessary to satisfactorily perform the work, complete in place, and accepted.

No separate payment will be made for all excavation including class “B” rock excavation; removal, storage, protection, handling, and re-installation of existing ground mounted guide sign panels or furnishing of new sign panels; gravel backfill, as required by the Engineer; compaction and restoration work but all costs in connection therewith shall be included in the price bid.

The cost of any work or materials required, due to the Contractor's negligence, shall be borne by the Contractor.

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<b>ITEM 864.35</b>	<b>SLOTTED PAVEMENT MARKER</b>	<b>EACH</b>
	<b><u>TWO WAY YELLOW/YELLOW</u></b>	

DESCRIPTION

The work to be done under these items shall consist of furnishing and installing two-way yellow, reflectorized pavement markers (slotted in pavement) in accordance with the construction plans, the relevant provisions of Traffic Standard TR.6.5 "Typical Pavement Markings for Conventional Roadways", and the following:

CONSTRUCTION METHODS

The work shall include cutting the tapered pavement slot to the dimensions shown on the typical details for the two-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 strictly in accordance with the manufacturer's instructions.

MATERIALS

Reflectorized pavement markers shall be 3M Series 291-2Y, Ennis-Flint Stimsonite C80, Ray-O-Lite Model 2004 Type D or an approved equal.

METHOD OF MEASUREMENT

The number of two-way yellow reflectorized pavement markers (slotted in pavement), completely furnished and installed, shall be measured by the Unit Each as a complete installation.

BASIS OF PAYMENT

Two-way yellow reflectorized pavement markers (slotted in pavement) will be paid at the contract unit price each under Item 864.35, and shall include cutting the tapered pavement slot, furnishing and installation of the reflectorized markers, including all necessary materials, labor, incidentals, and equipment to complete the work.

<b><u>ITEM 874.2</u></b>	<b><u>TRAFFIC SIGN REMOVED AND RESET</u></b>	<b><u>EACH</u></b>
<b><u>ITEM 874.4</u></b>	<b><u>TRAFFIC SIGN REMOVED AND STACKED</u></b>	<b><u>EACH</u></b>

The work under these Items shall conform to the relevant provisions of Section 840 of the Standard Specifications and the following:

The work to be done consists of removing and resetting existing street, warning and regulatory sign panels to new locations as shown on the Plans or as required by the Engineer and removing and stacking existing street, warning and regulatory sign panels as required by the Engineer.

The Contractor shall replace, at Contractor's own expense, all sign panels that are damaged or lost either directly or indirectly as a result of his carelessness.

#### MATERIALS

Materials for street sign and traffic sign panels removed and reset shall be the existing sign panels. If, in the opinion of the Engineer, an existing sign panel is unsuitable for reuse, a new sign panel of a size and composition equivalent to the existing sign panel, shall be furnished, as required by the Engineer.

#### CONSTRUCTION

Signs shall be mounted in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and the 1990 Standard Drawings for Signs and Supports.

When the visibility of sign panels, as reset, is obstructed by trees and other vegetation, the Contractor shall clear the obstruction for proper sight distance. All clearing shall be done within the roadway layout, as approved by the Engineer.

Existing sign panels shall not be removed until the new sign panels replacing them are in place and ready for traffic, unless otherwise required by the Engineer. Sign panels to be removed and reset shall be cleaned before being reset. Sign panels to be removed and stacked shall be stored at locations designated by the City of Salem.

Damage during removal or resetting to any sign panel designated for reuse by the Engineer shall be repaired or replaced by the Contractor at his own expense.

#### METHOD OF MEASUREMENT

Traffic Sign Removed and Reset and Traffic Sign Removed and Stacked will both be measured per Each unit, as determined by actual count of existing sign panels.

#### BASIS OF PAYMENT

Traffic Sign Removed and Reset and Traffic Sign Removed and Stacked shall each be paid for at the contract price per Each unit and shall include full compensation for furnishing all labor, tools,

materials, equipment and incidentals, and for doing all the work. The price paid per Each unit for Traffic Signs Removed and Reset shall also include all required mounting fixtures (nuts, bolts and other miscellaneous items) to complete the work.

If required by the Engineer, new Traffic Sign panels shall be furnished, installed and paid for under Item 832. Warning - Regulatory and Route Marker - Aluminum Panel (Type A).

The cost of any work or materials required as a result of any damage to sign panels due to the Contractor's negligence shall be paid for by the Contractor at his own expense.

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<b>ITEM 877.</b>	<b>SIGN POST REMOVED AND RESET</b>	<b>EACH</b>
<b>ITEM 877.1</b>	<b>SIGN POST REMOVED AND DISCARDED</b>	<b>EACH</b>

The work under these Items shall conform to the relevant provisions of Section 840 of the Standard Specifications and the following:

The work to be done consists of removing and resetting existing street, warning and regulatory sign posts to new locations as shown on the Plans or as required by the Engineer and removing and discarding existing street, warning and regulatory sign posts as required by the Engineer.

The Contractor shall replace, at Contractor's own expense, sign supports designated for reuse, that are damaged or lost either directly or indirectly as a result of his carelessness.

### MATERIALS

Materials for street sign and traffic sign posts removed and reset shall be the existing posts. If, in the opinion of the Engineer, an existing sign post is unsuitable for reuse, a new sign post of a size and composition equivalent to the existing sign post, shall be furnished, as required by the Engineer.

### CONSTRUCTION

Sign posts shall be installed in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and the 1990 Standard Drawings for Signs and Supports.

When the visibility of sign panels, as reset, is obstructed by trees and other vegetation, the Contractor shall clear the obstruction for proper sight distance. All clearing shall be done within the roadway layout, as approved by the Engineer. The exact locations for sign posts shall be determined in the field by the Engineer, in cooperation with a representative of the City of Salem Traffic Department.

Sign posts to be removed and reset shall be cleaned before being reset. All posts shall be reset prior to placing the cement concrete for the new sidewalks. Sign posts to be removed and discarded shall be properly discarded by the Contractor.

Damage during removal or resetting to any sign post designated for reuse by the Engineer shall be repaired or replaced by the Contractor at his own expense.

### METHOD OF MEASUREMENT

Sign Post Removed and Reset and Sign Post Removed and Discarded will both be measured per Each unit, as determined by actual count of existing sign posts. Measurement for Sign Post Removed and Reset will be measured in place by Each unit, complete and approved. Sign Posts Removed and Discarded shall be removed and properly discarded by the Contractor.

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BASIS OF PAYMENT

Sign Post Removed and Reset and Sign Post Removed and Discarded shall each be paid for at the contract price per Each unit and shall include full compensation for furnishing all labor, tools, materials, equipment and incidentals, and for doing all the work.

The price paid per Each unit for Sign Post Removed and Reset shall be full compensation for all other miscellaneous items to complete the work, including excavation and backfill.

The unit price bid for Item 877. Sign Post Removed and Reset shall be full compensation for removal and resetting existing sign posts, including all excavation (except rock); for all backfill, including 3,000 psi, 1-1/2 inch maximum aggregate cement concrete; and for all labor, equipment, tools and incidentals necessary to complete the work in accordance with these Specifications and as directed by the Engineer.

The unit price bid for ITEM 877.1 Sign Post Removed and Discarded shall be full compensation for the dismantling, removing and discarding of the sign post and for all labor, materials, equipment, tools, and incidentals necessary to complete the work, all as shown on the Contract Drawings, as specified in these Specifications and as required by the Engineer.

If required by the Engineer, new Sign Posts shall be furnished, installed and paid for under Item 847.1. Sign Support (Non-Guide) and Route Marker w/Breakaway Post Assembly - Steel.

The cost of any work or materials required as a result of any damage to sign posts due to the Contractor's negligence shall be paid for by the Contractor at his own expense.

# APPENDIX A

## MASSDOT SUPERPAVE STANDARD SPECIFICATIONS





Massachusetts Department Of Transportation

Project No. XXXXXX

DOCUMENT 00717

Highway Division

# **SUPERPAVE REQUIREMENTS**

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**SECTION 450**

**HOT MIX ASPHALT PAVEMENT**

**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.**



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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**

<b>Pavement Course</b>	<b>Mixture Type</b>	<b>Mixture Designation</b>
Friction Course	Open-Graded Friction Course - Polymer Modified	OGFC-P
Surface Course	SUPERPAVE Surface Course - 4.75	SSC - 4.75
	SUPERPAVE Surface Course - 9.5	SSC - 9.5
	SUPERPAVE Surface Course - 12.5	SSC - 12.5
	SUPERPAVE Surface Course - 19.0	SSC - 19.0
Intermediate Course	SUPERPAVE Intermediate Course - 12.5	SIC - 12.5
	SUPERPAVE Intermediate Course - 19.0	SIC - 19.0
Base Course	SUPERPAVE Base Course - 25.0	SBC - 25.0
	SUPERPAVE Base Course - 37.5	SBC - 37.5
	SUPERPAVE Leveling Course - 4.75	SLC - 4.75
Leveling Course	SUPERPAVE Leveling Course - 9.5	SLC - 9.5
	SUPERPAVE Leveling Course -12.5	SLC - 12.5
	SUPERPAVE Bridge Surface Course - 9.5	SSC-B - 9.5
Bridge Surface Course	SUPERPAVE Bridge Surface Course - 12.5	SSC-B - 12.5
	SUPERPAVE Bridge Protective Course - 9.5	SPC-B - 9.5
Bridge Protective Course	SUPERPAVE Bridge Protective Course - 12.5	SPC-B - 12.5

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## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

### **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**

<b>Quality Characteristic</b>	<b>Lot Size &amp; Unit of Measure</b>
PG Asphalt Binder Grading	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.
PG Asphalt Binder Content	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).
Volumetrics - Air Voids	
In-place Density	
Thickness	
Ride Quality (IRI)	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
Wheel Path Deviations	

**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  $\geq$  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  $\geq$  7,500 tons (6,875 Mg), but  $\leq$  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  $\leq$  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.

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**Table 450.3 - HMA Lot Categories & Quality Assurance Requirements**

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

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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

## 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.



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## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**Table 450.4 - PGAB Grades for HMA Mixtures Containing RAP**

<b>Amount of RAP in Mixture</b>	<b>PGAB Modifier Grade</b>	<b>Resulting PGAB Grade</b>
$\leq$ 25% RAP by Weight of Mixture	None	64-28
$>$ 25% to 40% RAP by Weight of Mixture	52-34	64-28 $\pm$ 2°C



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

## 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**

HMA Pavement Course	Lift Thickness Inches (mm)	Minimum Air	Minimum Surface
		Temperature °F (°C)	Temperature °F (°C)
Friction Course	1 (25)	50 (10)	55 (13)
Surface Course	< 1¾ (45)	45 (7)	50 (10)
Surface Course	≥ 1¾ (45)	40 (4)*	45 (7)
Intermediate Course	All	40 (4)*	45 (7)
Base Course	All	40 (4)*	45 (7)
Leveling Course	As Specified	45 (7)	50 (10)

\*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° to 500° F (10° 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° to 750° F (-18° 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.

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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.



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## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

### **(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



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2010 Quality Assurance Specifications for Hot Mix Asphalt 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.



XXXXXX

## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

- (d) An adjustable vibratory screed with full-width screw augers and heated for the full width of the screed.
- (e) Capable of spreading and finishing HMA pavement courses in widths at least 12 inches (300mm) more than the width of one travel lane.
- (f) 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.



XXXXXX

## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

### **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



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## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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



XXXXXX

## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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).



XXXXXX

2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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<sup>o</sup> F (60C) 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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

## 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

### Cover Page

### Table of Contents

#### Section 0: Terms and Definitions (*Optional*)

#### Section 1: Scope and Applicable Specifications

#### Section 2: Quality Control Organization

- 2.1 QC Organizational Chart
- 2.2 QC Personnel
- 2.3 Production Personnel

#### Section 3: Quality Control Laboratories

- 3.1 Primary QC Laboratory
- 3.2 First Alternate QC Laboratory
- 3.3 Second Alternate QC Laboratory

#### Section 4: Materials Control

- 4.1 Material Types and Source of Supply
- 4.2 Material Properties & Mix Designs
- 4.3 Processing of Materials at the Production Site
- 4.4 Material Storage and Handling

#### Section 5: Quality Control Sampling and Testing

- 5.1 Definition of Lot and Sublots
- 5.2 Define Random Sampling Plan
- 5.3 Sample Identification System
- 5.4 Quality Control Sampling & Testing
- 5.5 Split Sample Correlation Testing
- 5.6 Quality Control Sampling & Testing Reports
- 5.7 Quality Control Sample Storage and Retention

#### Section 6: Production Facilities

- 6.1 Preliminary Schedule of Production Operations
- 6.2 Production Facilities & Equipment
- 6.3 Production Facility QC Activities
- 6.4 Production Facility Control Chart
- 6.5 Evaluation of QC Data (from the production facility)
- 6.6 Production QC Inspection Reporting

#### Section 7: Field Operations

- 7.1 Preliminary Schedule of Field Operations
- 7.2 Placement Equipment and Procedures
- 7.3 Placement QC Activities
- 7.4 Placement Control Charts
- 7.5 Evaluation of QC Data (from the placement operations)
- 7.7 Placement QC Inspection Reporting

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**450.62 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.

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



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## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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).



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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**

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

### Profile Measurement

- (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.

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement  
**Table 450.7 - Minimum QC Inspection of Tack Coat Operations**

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

(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

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement  
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**

<b>Minimum</b>				
<b>Inspection Point of Inspection</b>	<b>Inspection Frequency</b>	<b>Inspection Method</b>	<b>Inspection Method</b>	<b>Inspection Method</b>
Equipment	As specified in QC Plan	Per QC Plan	Per QC Plan	Per QC Plan
	PG Binder (Correct Type)	Per QC Plan	HMA Production Facility	Visual Check + Manufacturer COC
	Aggregates (Correct Type)	Per QC Plan	HMA Production Facility	Visual Check
	RAP	Per QC Plan	HMA Production Facility	Visual Check
Materials	MAS Per QC Plan		HMA Production Facility	Visual Check + Manufacturer COC
	Release Agent Per QC Plan		Haul Vehicle Bed at Plant	Check QPL + Visual Check + Manufacturer COC
	Temperature of HMA Mix 4 per Day <sup>(1)</sup> at Plant		From Haul Vehicle at Plant	Check Measurement
	Stockpile Moisture Per QC Plan		HMA Production Facility	Visual Check
Environmental	Air Temperature & Conditions Precipitation 1 per Day <sup>(2)</sup>		HMA Production Facility	Check Measurement
Forecast	Uncoated Mixture	Per QC Plan	HMA Production Facility	Visual Check

	Excess Blue		Facility	
		Per QC Plan	HMA Production	
Workmanship	Smoke or Moisture		Facility	Visual Check
			HMA Production	
	Burnt Mix	Per QC Plan	Facility	Visual Check
			Facility	
	Physical HMA Production			
		Per QC Plan	Visual Check	
	Segregation Facility			

- (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.

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement  
**Table 450.8b - Minimum QC Inspection at HMA Placement Location**

<b>Minimum</b>				
<b>Inspection Point of Inspection</b>	<b>Component Items Inspected</b>	<b>Frequency</b>	<b>Inspection Method</b>	<b>Inspection Method</b>
	As specified in QC			
Equipment	Plan	Per QC Plan	Per QC Plan	Per QC Plan
Rubberized Asphalt Sealant (Correct Type) Materials	Per QC Plan		Per QC Plan	Check Manufacturer COC
Temperature of Delivered HMA 4 per Day <sup>(1)</sup>			From Haul Vehicle or Paver Hopper	Check Measurement
Mix Underlying			Underlying	
Surface Soundness	Per QC Plan		Surface	Visual Check
Environmental & Moisture Conditions Temperature of Air & Underlying 1 per Day <sup>(2)</sup>			At Paving Site	Check Measurement
Surface	Joint Location & Alignment	Per QC Plan	Per QC Plan	Visual Check
	Sawcut Joint Vertical Face	Per QC Plan	Joint Vertical Face	Visual Check
	Rubberized Asphalt Sealant	Once per 1,000 ft (300 meters)	Joint Vertical Face	Check Measurement
	Application Rate	per joint		
	Temperature	Once per 500 feet	HMA Mat	Per Subsection
	Differential in	(150 meters) per	Behind Paver	450.55C
	HMA Mat	pavement course	HMA Mat	
	Physical	Per QC Plan	Behind Paver &	Visual Check
Workmanship	Segregation		Compacted HMA	
	HMA Lift	Per QC Plan	HMA Lift	Check
	Thickness			Measurement Check

Cross-Slope	Per QC Plan	Compacted HMA	Measurement
Joint	Per QC Plan	Compacted HMA	Visual Check
Tightness	Once per 500 feet 10 foot (3 meter)		
Joint Surface	(150 meters) At Finished Joint standard		
Deviations	per joint straightedge		
Wheel Path	Once per 2,000 ft 10 foot (3 meter)		
Deviations	(600 meters) Wheel Path standard		
	per Wheel Path straightedge		

- (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.

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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**

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

**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.

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement  
**Table 450.10 - Minimum Quality Control Sampling & Testing of HMA Lots**

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

Wheel Path (150 meters) <sup>(1)</sup>Course Random  
standard 1 per Sublot  
Deviations per each Wheel Per Subsection Per QC Plan  
straightedge

Path 450.65F(12)

(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.

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**(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  $\pm 2^{\circ}\text{C}$  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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**Table 450.11 - Recommended Action limits for Combined Aggregate Gradation**

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

**(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

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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).



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**(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.

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**(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**

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

(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.

Section 450 – HMA Pavement (Pay Adjustment) 00717 - 37

November 1, 2010

XXXXXX

2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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.



2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**Table 450.13 - Control Strip Quality Limits**

Quality Characteristic	Specification Limits		Engineering Limits		Acceptance Limit
	Target	LSL USL	LEL UEL		
PG Asphalt Binder	Per Binder Per Per				
Grading	Grade N/A N/A AASHTO AASHTO N/A				
PG Asphalt Binder	specified M320 M320				
Content - 0.3 %	Target Target Target Target				
Volumetrics:	Per LTMF $\geq 70$ PWL				
Air Voids Combined	Content - 0.3 % + 0.3 % - 0.4 % + 0.4 %				
Gradation: Passing #4 (4.75mm) and Larger Sieves Combined	4 % 2.7 % 5.3 % 2 % 6 % $\geq 70$ PWL				
Gradation: Passing #8 (2.36mm) Sieve Combined	Target Target				
Gradation: Passing #16 (1.18mm) to #50 (300um) Sieve Combined	Per LTMF N/A N/A N/A				
Gradation: Passing #100 (150um) Sieve Combined	Per LTMF N/A N/A N/A				
Gradation: Passing #200 (75um) Sieve	Per LTMF N/A N/A N/A				
In-Place HMA	92.5 % of 97.5 % of				
Mat Density (Cores) Thickness*:	95 % of $G_{mm}$ 92 % of $G_{mm}$ 98 % of $G_{mm} \geq 70$ PWL				
(All Courses)	$G_{mm}$ $G_{mm}$				
1 inch (25mm) or greater	- 20 % of + 20 % of - 30 % of + 30 % of				
Ride Quality*:	Per Plans Target Target Target Target $\geq 70$ PWL				
Greater than	Thickness Thickness Thickness Thickness				

	50 in/mile	70 in/mile	80 in/mile
or equal to	N/A	N/A $\geq 70$ PWL	
		(0.79 m/km)	(1.10 m/km) (1.26 m/km)
	55 mph		
	(90 km/hr)		
Ride Quality*:			
	40mph		
		70 in/mile	100 in/mile 110 in/mile
(65 km/hr) to	N/A	N/A $>70$ PWL	
		(1.10 m/km)	(1.58 m/km) (1.74 m/km)
	55 mph		
	(90 km/hr)		

\*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.

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**(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 450.66 B paragraphs (3) and (4) above and the Lot Quality for each applicable Quality Characteristic in Table 450.13 is  $\geq 70$  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 2<sup>nd</sup> 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**

***1<sup>st</sup> Control Strip***

**(a) and 2**

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  $\geq 60$  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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

(b) 3<sup>rd</sup>

***Control Strip***

If a 3<sup>rd</sup> 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 3<sup>rd</sup> 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.

4<sup>th</sup>

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

If a 4<sup>th</sup> 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 4<sup>th</sup>

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.



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## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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.

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## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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**

<b>Inspection Component</b>	<b>Items Inspected</b>	<b>Minimum Inspection Frequency</b>	<b>Point of Inspection</b>	<b>Inspection Method</b>
Materials	Mixture Type + PG	1 per Day	HMA Production Facility At Paving Site	Visual Check + Manufacturer COC Check
	Binder Grade (Correct Type)	1 per Day		
	Rubberized Asphalt Sealant (Correct Type)			Manufacturer COC
	Sawcut Limit	25% of Patched		
	Vertical Face Rubberized	Areas	Sawcut Limits	Visual Check
		25% of Patched		Visual Check +
Workmanship	Asphalt Sealant		Sawcut Limits	Check
	Application Rate	Areas		Measurement
	Cross-Slope & Profile	25% of Patched Areas	Compacted HMA	Check Measurement



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**Table 450.15 - Department Acceptance Inspection of Tack Coat**

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

**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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**Table 450.16 - Department Acceptance Inspection of HMA Lots**

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

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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.



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## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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 un-tested 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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement  
**Table 450.17 - Department Acceptance Sampling and Testing of HMA Lots**

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

Ride Quality	AASHTO PP52	(160 meters)	Pavement	
(IRI)	per Subsection	per each Wheel	Course	per
	450.65F(11)	Path	Subsection	Subsection
			450.65F(11)	450.65F(11)

- (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.

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**(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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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 450.18 Split Sample Correlation Allowable Differences**

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

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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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.**

**A. Evaluation of Lot Category A 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.



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## 2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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**

Quality Characteristic	Target	Specification Limits		Engineering Limits		Acceptance Limit
		LSL	USL	LEL	UEL	
PG Asphalt Binder Grading	Per Binder Grade	N/A	N/A	AASHTO	AASHTO	N/A
PG Asphalt Binder Content Volumetrics:	Per JMF 4 %	Target - 0.3 %	Target + 0.3 %	Target - 0.4 %	Target + 0.4 %	60 PWL
Air Voids In-Place HMA Mat Density	95 % of Gmm	92.5 % of Gmm	97.5 % of Gmm	92 % of Gmm	98 % of Gmm	60 PWL
(Cores) In-Place HMA Mat Density	95 % of Gmm	N/A	N/A	90 % of Gmm	N/A	N/A
(Bridge Courses) Thickness:		-20 % of	+20 % of	-30 % of	+30 % of	
(All Courses 1 inch (25mm) or greater) Ride Quality: Greater than	Per Plans 50 in/mile	Target Thickness	Target Thickness	Target Thickness	Target Thickness	60 PWL
or equal to	(0.79 m/km)	N/A	70 in/mile (1.10 m/km)	N/A	80 in/mile (1.26 m/km)	60 PWL
55 mph (90 km/hr) Ride Quality:						

40mph (65 km/hr) to	70 in/mile (1.10 m/km)	N/A	100 in/mile (1.58 m/km)	N/A	110 in/mile (1.74 m/km)	60 PWL
55 mph (90 km/hr) Ride Quality: Less than						
			Not subject to ride testing			
40 mph (65 km/hr)						

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**B. Evaluation of Lot Category B Testing Data.**

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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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:

$$X = \frac{\sum x}{n}$$

Where:  $\sum$  = 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:

$$s = \sqrt{\frac{\sum (x^2) - (\sum x)^2}{n(n-1)}}$$

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

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

The Upper Quality Index (Qu) 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

Section 450 – HMA Pavement (Pay Adjustment) 00717 - 57

November 1, 2010

XXXXXX

2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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

**E. Step 5 – Determine Percentage of Lot Below Upper Specification Limit.**

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  $Q_U$  value determined in Step 3 above. If no USL is specified in Table 450.20, the  $P_U$  value is equal to 100.

**F. Step 6 – Determine Percentage of Lot Above Lower Specification Limit.**

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:

$$PWL = (P_U + P_L) - 100$$





50 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00

Note: If the calculated value of  $Q$  or  $Q$  does not correspond exactly to a value in the table, use the next lower value.

If  $Q$  or  $Q$  are negative values,  $P$  or  $P$  is equal to 100 minus the table value for  $P$  or  $P$ .

\*  $P$  or  $P$  = Percent Within limits for positive values of  $Q$  or  $Q$

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

## 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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

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**

<b>Quality Characteristic</b>	<b>Maximum Test Difference</b>
Maximum Specific Gravity ( $G_{mm}$ )	+/- 0.020
Bulk Specific Gravity ( $G_{mm}$ )	+/- 0.030
PG Asphalt Binder Content	+/- 0.4
Volumetrics - Air Voids	+/- 1.4
In-place HMA Mat Density	+/- 1.4
Thickness	+/- 10% of original value
Ride Quality (IRI)	+/- 10% of original value

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement  
**COMPENSATION**

**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.



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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, providing the field reference system, 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**

**HMA Quality Characteristics Pay Adjustment Weight**

PG Asphalt Binder Content	10 percent
Volumetrics - Air Voids	25 percent
In-Place HMA Mat Density	25 percent
Thickness	10 percent
Ride Quality (IRI)	30 percent

**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.

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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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:

$$PA_{PGAB} = \textcircled{C}(PF_i - 1) (Q_i) (P_i) (0.10)$$

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:

$$PA_{Air\ Voids} = \textcircled{C}(PF_i - 1) (Q_i) (P_i) (0.25)$$

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:

$$PA_{In-Place\ Density} = \textcircled{C}(PF_i - 1) (Q_i) (P_i) (0.25)$$

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



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2010 Quality Assurance Specifications for Hot Mix Asphalt Pavement

**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:

$$PA_{Thickness} = \square (PF_i - 1) (Q_i)(P_i) (0.10)$$

Where:  $PA_{Thickness}$  = 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:

$$PA_{Ride\ Quality} = \square (PF_i - 1) (\square Q_{pc})(P_{pc})/N_{wp} (0.30)$$

Where:  $PA_{Ride\ Quality}$  = 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.





**450.93**

**Payment Items**

**Payment Unit**

450.10 Open Graded Friction Course - Polymer Modified (OGFC-P) Ton (Megagram)

455.21 SUPERPAVE Surface Course - 4.75 (SSC - 4.75) Ton (Megagram)

455.22 SUPERPAVE Surface Course - 9.5 (SSC - 9.5) Ton (Megagram)

455.23 SUPERPAVE Surface Course - 12.5 (SSC - 12.5) Ton (Megagram)

455.24 SUPERPAVE Surface Course - 19.0 (SSC - 19.0) Ton (Megagram)

455.31 SUPERPAVE Intermediate Course - 12.5 (SIC - 12.5) Ton (Megagram)

455.32 SUPERPAVE Intermediate Course - 19.0 (SIC - 19.0) Ton (Megagram)

455.41 SUPERPAVE Base Course - 25.0 (SBC - 25.0) Ton (Megagram)

455.42 SUPERPAVE Base Course - 37.5 (SBC - 37.5) Ton (Megagram)

455.51 SUPERPAVE Leveling Course - 4.75 (SLC - 4.75) Ton (Megagram)

455.52 SUPERPAVE Leveling Course - 9.5 (SLC - 9.5) Ton (Megagram)

455.53 SUPERPAVE Leveling Course - 12.5 (SLC - 12.5) Ton (Megagram)

455.60 SUPERPAVE Bridge Surface Course - 9.5 (SSC-B - 9.5) Ton (Megagram)

455.61 SUPERPAVE Bridge Surface Course - 12.5 (SSC-B - 12.5) Ton (Megagram)

455.70 SUPERPAVE Bridge Protective Course - 9.5 (SPC-B - 9.5) Ton (Megagram)

455.71 SUPERPAVE Bridge Protective Course - 12.5 (SPC-B - 12.5) Ton (Megagram)

450.90 Contractor Quality Control Ton (Megagram)

451 HMA for Patching Ton (Megagram)

452 Asphalt Emulsion for Tack Coat

Gallon (Liter )

Linear Foot

453 HMA Joint Sealant

(Meter)

999.490 HMA Pay Adjustment – PG Asphalt Binder Content <sup>1</sup> Dollar

999.491 HMA Pay Adjustment – Volumetrics (Air Voids) <sup>1</sup> Dollar

HMA Pay Adjustment – In-place Mat Density <sup>1</sup>

Dollar

999.492

– Thickness <sup>1</sup>

999.493 HMA Pay Adjustment Dollar

– Ride Quality <sup>1</sup>

999.494 HMA Pay Adjustment Dollar

<sup>1</sup> Not a bid item



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2008 SUPERPAVE HMA Specifications

**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**

<b>Pavement Course Mixture Type</b>	<b>Mixture Designation</b>
Friction Course OGFC – P	<input type="checkbox"/> Open-Graded Friction Course - Polymer Modified
	<input type="checkbox"/> SUPERPAVE Surface Course - 4.75 SSC - 4.75
Surface Course	<input type="checkbox"/> SUPERPAVE Surface Course - 9.5 SSC - 9.5
	<input type="checkbox"/> SUPERPAVE Surface Course - 12.5 SSC - 12.5
Intermediate Course	<input type="checkbox"/> SUPERPAVE Surface Course - 19.0 SSC - 19.0
	<input type="checkbox"/> SUPERPAVE Intermediate Course - 12.5 SIC - 12.5
	<input type="checkbox"/> SUPERPAVE Intermediate Course - 19.0 SIC - 19.0
Base Course	<input type="checkbox"/> SUPERPAVE Base Course - 25.0 SBC - 25.0
	<input type="checkbox"/> SUPERPAVE Base Course - 37.5 SBC - 37.5
Leveling Course	<input type="checkbox"/> SUPERPAVE Leveling Course - 4.75 SLC - 4.75
	<input type="checkbox"/> SUPERPAVE Leveling Course - 9.5 SLC - 9.5
Bridge Surface Course	<input type="checkbox"/> SUPERPAVE Bridge Surface Course - 9.5 SSC-B - 9.5
	<input type="checkbox"/> SUPERPAVE Bridge Surface Course - 12.5 SSC-B - 12.5
Bridge Protective Course	<input type="checkbox"/> SUPERPAVE Bridge Protective Course - 9.5 SPC-B - 9.5
	<input type="checkbox"/> SUPERPAVE Bridge Protective Course - 12.5 SPC-B - 12.5

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.

Section 455 SUPERPAVE HMA Pavement

00717 - 67

March 13, 2009

XXXXXX

2008 SUPERPAVE HMA Specifications

**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.



XXXXXX

## 2008 SUPERPAVE HMA Specifications

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.



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2008 SUPERPAVE HMA Specifications

**Table 455.2 - Aggregate Consensus Property Requirements**

Traffic Level	Design ESALS 18-kip (80-kn))  (million)	Coarse Aggregate Angularity (1) (2) ASTM D5821 (Percent Minimum)		Fine Aggregate Angularity (1) AASHTO T 304 - Method A (Percent Minimum)		Flat or Elongated Particles (2) ASTM D4791 (Percent Maximum)	Sand Equivalent AASHTO T 176 (Percent Minimum)
		(Depth from final surface) ≤ 4 in (100 mm)	(Depth from final surface) > 4 in (100 mm)	(Depth from final surface) ≤ 4 in (100 mm)	(Depth from final surface) > 4 in (100 mm)		
-----						> # 4 (4.75 mm)	-----
1	< 0.3	55/--	--/--	--	--	--	40
2	0.3 to < 3.0	75/--	50/--	40	40	10	40
3	3 to < 10	85/80	60/--	45	40	10	45
4	10 to < 30.0	95/90	80/75	45	40	10	45
5	≥ 30.0	100/100	100/100	45	45	10	50
	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.



XXXXXX

## 2008 SUPERPAVE HMA Specifications

### 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 455.3 - Aggregate Source Property Requirements**

<b>Source Property Test</b>	<b>Limit</b>
Toughness (AASHTO T 96)	Maximum Loss < 30 %
Soundness (AASHTO T 104)	Maximum Loss < 10 %
Deleterious Materials (AASHTO T 112)	Maximum Permissible < 0.5 %

### 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**

**PCS Control Point for Mixture Nominal Maximum Aggregate Size  
 % Passing**

Nominal Maximum Aggregate Size	1-1/2"	1"	3/4"	1/2"	3/8"	(37.5 mm)	(25.0 mm)	(19.0 mm)	(12.5 mm)
Primary Control Sieve	3/8"	#4	#4	#8	#8	(9.5 mm)	(4.75 mm)	(4.75 mm)	(2.36 mm)
PCS Control point (% Passing)	47	40	47	39	47				

**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 ( $N_{initial}$ ), the design number of gyrations ( $N_{design}$ ), and the maximum number of gyrations ( $N_{max}$ ). 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  $N_{design}$  ( $V_a$ )
- Voids in the Mineral Aggregate at  $N_{design}$  (VMA)
- Voids Filled with Asphalt at  $N_{design}$  (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**

Traffic Level	Design ESALs (million)	Number of Gyration by Superpave Gyrotory Compactor		Percent Density of Gmm from HMA Specimen			Voids Filled with Asphalt (VFA)* Based on Nominal Maximum Aggregate Size							
		Nini	Ndes	Nmax	Nini	Ndes	Nmax	#4 (4.75 mm)	3/8" (9.5 mm)	1/2" (12.5 mm)	3/4" (19.0 mm)	1" (25.0 mm)	1-1/2" (37.5 mm)	
1	< 0.3	6	50	75	≤ 91.5	96.0	≤ 98.0	70 - 80	70 - 80	70 - 80	70 - 80	70 - 80	67 - 80	64 - 80
2	0.3 to < 3.0	7	75	115	≤ 90.5	96.0	≤ 98.0	65 - 78	65 - 78	65 - 78	65 - 78	65 - 78	65 - 78	64 - 78
3	3.0 to < 10	8	100	160	≤ 89.0	96.0	≤ 98.0	75 - 78	73 - 76	65 - 75	65 - 75	65 - 75	65 - 75	64 - 75
4	10 to < 30.0	8	100	160	≤ 89.0	96.0	≤ 98.0	75 - 78	73 - 76	65 - 75	65 - 75	65 - 75	65 - 75	64 - 75
5	≥ 30.0	9	125	205	≤ 89.0	96.0	≤ 98.0	75 - 78	73 - 76	65 - 75	65 - 75	65 - 75	65 - 75	64 - 75

\*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.



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2008 SUPERPAVE HMA Specifications

Table 455.6 - Gradation and Volumetric Requirements

		SUPERPAVE HMA Mixture Nominal Maximum Aggregate Size										LTMF Verification Limits	
Sieve	#4 (4.75 mm)	3/8" (9.5 mm)		1/2" (12.5 mm)		3/4" (19.0 mm)		1" (25.0 mm)		1-1/2" (37.5 mm)		Target ±	
		CONTROL POINTS	CONTROL POINTS	CONTROL POINTS	CONTROL POINTS (5)	CONTROL POINTS	CONTROL POINTS	CONTROL POINTS	CONTROL POINTS				
Inches	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	
2	-	-	-	-	-	-	-	-	-	-	100	-	6.0
1.5	-	-	-	-	-	-	-	100	-	-	90	100	6.0
1	-	-	-	-	-	-	-	100	-	-	90	90	6.0
3/4	-	-	-	-	-	-	-	90	-	-	90	-	6.0
1/2	100	-	100	100	-	-	-	-	-	-	-	-	6.0
3/8	95	100	90	100	-	-	-	-	-	-	-	-	6.0
#4	90	100	-	90	-	-	-	-	-	-	-	-	6.0
#8	-	-	35	67	31	58	26	49	19	45	15	41	5.0
#16	30	60	-	-	-	-	-	-	-	-	-	-	3.0
#30	-	-	-	-	-	-	-	-	-	-	-	-	3.0
#50	-	-	-	-	-	-	-	-	-	-	-	-	3.0
#100	-	-	-	-	-	-	-	-	-	-	-	-	2.0
#200	6	12	2	10	2	10	2	8	1	7	0	6	1.0
PB	-	-	-	-	-	-	-	-	-	-	-	-	0.3
VMA (3)	17.0	16.0	15.0	14.0	13.0	12.0	1.0						
Va (%)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0
VFA	Per Table 455.5 ± 5 off	Per Table 455.5 ± 5 off	Per Table 455.5 ± 5 off	Per Table 455.5 ± 5 off	Per Table 455.5 ± 5 off	Per Table 455.5 ± 5 off	Per Table 455.5 ± 5 off	Per Table 455.5 ± 5 off	Per Table 455.5 ± 5 off	Per Table 455.5 ± 5 off	Per Table 455.5 ± 5 off	Per Table 455.5 ± 5 off	1.0
Gse	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	0.02
Gmm	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	LTMF value	0.02
Dust/Pbe(2) Mixture Temp	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	0.6 - 1.2	0.6 - 1.2	0.6 - 1.2	0.6 - 1.2	0.02
PCS (4)	265 - 325F(1)	265 - 325F(1)	265 - 325F(1)	265 - 325F(1)	265 - 325F(1)	265 - 325F(1)	265 - 325F(1)	265 - 325F(1)	265 - 325F(1)	265 - 325F(1)	265 - 325F(1)	265 - 325F(1)	0.02
		Sieve #8	47	Sieve #8	39	Sieve #4	47	Sieve #4	40	Sieve #4	40	Sieve #4	47

(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.

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2008 SUPERPAVE HMA Specifications

**I. Evaluation of Moisture Sensitivity.**

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**

<b>Properties</b>	<b>LTMF Verification Limit</b>
Asphalt Binder Content (P <sub>b</sub> )	Target ± 0.3 percent
Gradation Passing #4 (4.75 mm) and Larger Sieves	Target ± 6.0 percent
Gradation Passing #8 (2.36 mm) Sieve	Target ± 5.0 percent
Gradation Passing #16 (1.18 mm) to #50 (0.30 mm) Sieve	Target ± 3.0 percent
Gradation Passing #100 (0.15 mm) Sieve	Target ± 2.0 percent
Gradation Passing #200 (75 μm) Sieve	Target ± 1.0 percent
Max. Theo. Specific Gravity (G <sub>mm</sub> )	Target ± 0.02
Air Voids (V <sub>a</sub> )	Target ± 1.0 percent
Voids in Mineral Aggregate (VMA)	Target ± 1.0 percent
Voids Filled With Asphalt (VFA)	Target ± 5.0 percent
Bulk Specific Gravity (G <sub>mb</sub> )	Target ± 0.022

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2008 SUPERPAVE HMA Specifications

**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.



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2008 SUPERPAVE HMA Specifications

**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:*

<b>455.93</b>	<b>Payment Items</b>	<b>Payment Unit</b>
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450.10	Open Graded Friction Course - Polymer Modified (OGFC - P) Ton (Megagram)	
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455.21	SUPERPAVE Surface Course - 4.75 (SSC - 4.75) Ton (Megagram)	
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455.22	SUPERPAVE Surface Course - 9.5 (SSC - 9.5) Ton (Megagram)	
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455.23	SUPERPAVE Surface Course - 12.5 (SSC - 12.5) Ton (Megagram)	
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455.24	SUPERPAVE Surface Course - 19.0 (SSC - 19.0) Ton (Megagram)	
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455.31	SUPERPAVE Intermediate Course - 12.5 (SIC - 12.5) Ton (Megagram)	
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455.32	SUPERPAVE Intermediate Course - 19.0 (SIC - 19.0) Ton (Megagram)	
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455.41	SUPERPAVE Base Course - 25.0 (SBC - 25.0) Ton (Megagram)	
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455.42	SUPERPAVE Base Course - 37.5 (SBC - 37.5) Ton (Megagram)	
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455.51	SUPERPAVE Leveling Course - 4.75 (SLC - 4.75) Ton (Megagram)	
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455.52	SUPERPAVE Leveling Course - 9.5 (SLC - 9.5) Ton (Megagram)	
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455.60	SUPERPAVE Bridge Surface Course - 9.5 (SSC-B - 9.5) Ton (Megagram)	
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455.61	SUPERPAVE Bridge Surface Course - 12.5 (SSC-B - 12.5) Ton (Megagram)	
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455.70	SUPERPAVE Bridge Protective Course - 9.5 (SPC-B - 9.5) Ton (Megagram)	
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455.71	SUPERPAVE Bridge Protective Course - 12.5 (SPC-B - 12.5) Ton (Megagram)	
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450.90	Contractor Quality Control Ton (Megagram)	
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451	HMA for Patching Ton (Megagram)	
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452	Asphalt Emulsion for Tack Coat Gallon (Liter )	
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453 HMA Joint Sealant Linear Foot (Meter)

Section 455 SUPERPAVE HMA Pavement

00717 - 77

March 13, 2009



Massachusetts Department Of Transportation  
Project No. XXXXXX  
2008 SUPERPAVE HMA Specifications

Highway Division

999.490	HMA Pay Adjustment – PG Asphalt Binder Content <sup>1</sup>	Dollar
999.491	HMA Pay Adjustment – Volumetrics (Air Voids) <sup>1</sup>	Dollar
999.492	HMA Pay Adjustment – In-place Mat Density <sup>1</sup>	Dollar
999.493	HMA Pay Adjustment – Thickness <sup>1</sup>	Dollar
999.494	HMA Pay Adjustment – Ride Quality <sup>1</sup>	Dollar

<sup>1</sup> Not a bid item



# APPENDIX B

## MASSACHUSETTS PREVAILING WAGE RATES





**THE COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT  
DEPARTMENT OF LABOR STANDARDS**

**Prevailing Wage Rates**

**As determined by the Director under the provisions of the  
Massachusetts General Laws, Chapter 149, Sections 26 to 27H**

RONALD L. WALKER, II  
Secretary

WILLIAM D MCKINNEY  
Director

CHARLES D. BAKER  
Governor

KARYN E. POLITO  
Lt. Governor

**Awarding Authority:** City of Salem  
**Contract Number:** S-46 **City/Town:** SALEM  
**Description of Work:** New traffic signal equipment and geometric changes to the Lafayette, Loring and West Intersection including resurfacing, ADA compliant sidewalks, pedestrian ramps, signs and pavement markings.  
**Job Location:** Lafayette-Loring-West Intersection, Salem. MA

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 Department of Labor Standards, Division of Apprentice Standards (DLS/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. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency 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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
<b>Construction</b>						
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.15	\$10.91	\$10.89	\$0.00	\$53.95
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.22	\$10.91	\$10.89	\$0.00	\$54.02
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.34	\$10.91	\$10.89	\$0.00	\$54.14
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2015	\$88.29	\$9.80	\$19.23	\$0.00	\$117.32
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$33.15	\$7.60	\$13.50	\$0.00	\$54.25
	12/01/2017	\$33.78	\$7.60	\$13.50	\$0.00	\$54.88
	06/01/2018	\$34.62	\$7.60	\$13.50	\$0.00	\$55.72
	12/01/2018	\$35.46	\$7.60	\$13.50	\$0.00	\$56.56
	06/01/2019	\$36.33	\$7.60	\$13.50	\$0.00	\$57.43
	12/01/2019	\$37.19	\$7.60	\$13.50	\$0.00	\$58.29
For apprentice rates see "Apprentice- LABORER"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. <i>HEAT &amp; FROST INSULATORS LOCAL 6 (BOSTON)</i>	06/01/2017	\$34.90	\$11.50	\$7.10	\$0.00	\$53.50
	12/01/2017	\$35.90	\$11.50	\$7.10	\$0.00	\$54.50
	06/01/2018	\$36.90	\$11.50	\$7.10	\$0.00	\$55.50
	12/01/2018	\$37.90	\$11.50	\$7.10	\$0.00	\$56.50
	06/01/2019	\$38.90	\$11.50	\$7.10	\$0.00	\$57.50
	12/01/2019	\$39.90	\$11.50	\$7.10	\$0.00	\$58.50
	06/01/2020	\$40.90	\$11.50	\$7.10	\$0.00	\$59.50
	12/01/2020	\$41.90	\$11.50	\$7.10	\$0.00	\$60.50
ASPHALT RAKER <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER LABORERS - ZONE 2	06/01/2017	\$33.15	\$7.60	\$13.50	\$0.00	\$54.25
	12/01/2017	\$33.78	\$7.60	\$13.50	\$0.00	\$54.88
	06/01/2018	\$34.62	\$7.60	\$13.50	\$0.00	\$55.72
	12/01/2018	\$35.46	\$7.60	\$13.50	\$0.00	\$56.56
	06/01/2019	\$36.33	\$7.60	\$13.50	\$0.00	\$57.43
	12/01/2019	\$37.19	\$7.60	\$13.50	\$0.00	\$58.29

For apprentice rates see "Apprentice- LABORER"

BOILER MAKER BOILERMAKERS LOCAL 29	01/01/2017	\$42.92	\$6.97	\$16.21	\$0.00	\$66.10
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**Apprentice - BOILERMAKER - Local 29**

**Effective Date - 01/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$27.90	\$6.97	\$10.54	\$0.00	\$45.41
2	65	\$27.90	\$6.97	\$10.54	\$0.00	\$45.41
3	70	\$30.04	\$6.97	\$11.35	\$0.00	\$48.36
4	75	\$32.19	\$6.97	\$12.16	\$0.00	\$51.32
5	80	\$34.34	\$6.97	\$12.97	\$0.00	\$54.28
6	85	\$36.48	\$6.97	\$13.78	\$0.00	\$57.23
7	90	\$38.63	\$6.97	\$14.59	\$0.00	\$60.19
8	95	\$40.77	\$6.97	\$15.40	\$0.00	\$63.14

Notes:

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

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) BRICKLAYERS LOCAL 3 (LYNN)	03/01/2017	\$50.76	\$10.75	\$19.22	\$0.00	\$80.73
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**Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Lynn**

**Effective Date - 03/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.38	\$10.75	\$19.22	\$0.00	\$55.35
2	60	\$30.46	\$10.75	\$19.22	\$0.00	\$60.43
3	70	\$35.53	\$10.75	\$19.22	\$0.00	\$65.50
4	80	\$40.61	\$10.75	\$19.22	\$0.00	\$70.58
5	90	\$45.68	\$10.75	\$19.22	\$0.00	\$75.65

Notes:

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

BULLDOZER/GRADER/SCRAPER OPERATING ENGINEERS LOCAL 4	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

<b>Classification</b>	<b>Effective Date</b>	<b>Base Wage</b>	<b>Health</b>	<b>Pension</b>	<b>Supplemental Unemployment</b>	<b>Total Rate</b>
CAISSON & UNDERPINNING BOTTOM MAN <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2016	\$37.45	\$7.60	\$14.35	\$0.00	\$59.40
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
CARPENTER <i>CARPENTERS -ZONE 2 (Eastern Massachusetts)</i>	03/01/2017	\$38.77	\$9.90	\$17.00	\$0.00	\$65.67
	09/01/2017	\$39.78	\$9.90	\$17.00	\$0.00	\$66.68
	03/01/2018	\$40.78	\$9.90	\$17.00	\$0.00	\$67.68
	09/01/2018	\$41.82	\$9.90	\$17.00	\$0.00	\$68.72
	03/01/2019	\$42.85	\$9.90	\$17.00	\$0.00	\$69.75

**Classification**

**Effective Date   Base Wage   Health   Pension   Supplemental Unemployment   Total Rate**

**Apprentice - CARPENTER - Zone 2 Eastern MA**

**Effective Date - 03/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.39	\$9.90	\$1.63	\$0.00	\$30.92
2	60	\$23.26	\$9.90	\$1.63	\$0.00	\$34.79
3	70	\$27.14	\$9.90	\$12.11	\$0.00	\$49.15
4	75	\$29.08	\$9.90	\$12.11	\$0.00	\$51.09
5	80	\$31.02	\$9.90	\$13.74	\$0.00	\$54.66
6	80	\$31.02	\$9.90	\$13.74	\$0.00	\$54.66
7	90	\$34.89	\$9.90	\$15.37	\$0.00	\$60.16
8	90	\$34.89	\$9.90	\$15.37	\$0.00	\$60.16

**Effective Date - 09/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.89	\$9.90	\$1.63	\$0.00	\$31.42
2	60	\$23.87	\$9.90	\$1.63	\$0.00	\$35.40
3	70	\$27.85	\$9.90	\$12.11	\$0.00	\$49.86
4	75	\$29.84	\$9.90	\$12.11	\$0.00	\$51.85
5	80	\$31.82	\$9.90	\$13.74	\$0.00	\$55.46
6	80	\$31.82	\$9.90	\$13.74	\$0.00	\$55.46
7	90	\$35.80	\$9.90	\$15.37	\$0.00	\$61.07
8	90	\$35.80	\$9.90	\$15.37	\$0.00	\$61.07

**Notes:**

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

CEMENT MASONRY/PLASTERING	01/01/2017	\$45.67	\$12.20	\$19.41	\$1.30	\$78.58
BRICKLAYERS LOCAL 3 (LYNN)	07/01/2017	\$46.30	\$12.20	\$19.41	\$1.30	\$79.21
	01/01/2018	\$46.54	\$12.20	\$19.41	\$1.30	\$79.45
	07/01/2018	\$46.79	\$12.20	\$19.41	\$1.30	\$79.70
	01/01/2019	\$47.03	\$12.20	\$19.41	\$1.30	\$79.94
	07/01/2019	\$47.27	\$12.20	\$19.41	\$1.30	\$80.18
	01/01/2020	\$47.52	\$12.20	\$19.41	\$1.30	\$80.43

**Classification**

**Effective Date   Base Wage   Health   Pension   Supplemental Unemployment   Total Rate**

**Apprentice - CEMENT MASONRY/PLASTERING - Eastern Mass (Lynn)**

**Effective Date - 01/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.84	\$12.20	\$12.41	\$0.00	\$47.45
2	60	\$27.40	\$12.20	\$14.41	\$1.30	\$55.31
3	65	\$29.69	\$12.20	\$15.41	\$1.30	\$58.60
4	70	\$31.97	\$12.20	\$16.41	\$1.30	\$61.88
5	75	\$34.25	\$12.20	\$17.41	\$1.30	\$65.16
6	80	\$36.54	\$12.20	\$18.41	\$1.30	\$68.45
7	90	\$41.10	\$12.20	\$19.41	\$1.30	\$74.01

**Effective Date - 07/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.15	\$12.20	\$12.41	\$0.00	\$47.76
2	60	\$27.78	\$12.20	\$14.41	\$1.30	\$55.69
3	65	\$30.10	\$12.20	\$15.41	\$1.30	\$59.01
4	70	\$32.41	\$12.20	\$16.41	\$1.30	\$62.32
5	75	\$34.73	\$12.20	\$17.41	\$1.30	\$65.64
6	80	\$37.04	\$12.20	\$18.41	\$1.30	\$68.95
7	90	\$41.67	\$12.20	\$19.41	\$1.30	\$74.58

**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	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79

For apprentice rates see "Apprentice- LABORER"

CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES OPERATING ENGINEERS LOCAL 4	06/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
	12/01/2017	\$48.38	\$10.00	\$15.25	\$0.00	\$73.63

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

COMPRESSOR OPERATOR OPERATING ENGINEERS LOCAL 4	06/01/2017	\$31.86	\$10.00	\$15.25	\$0.00	\$57.11
	12/01/2017	\$32.55	\$10.00	\$15.25	\$0.00	\$57.80

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

DELEADER (BRIDGE) PAINTERS LOCAL 35 - ZONE 2	01/01/2017	\$51.41	\$7.85	\$16.10	\$0.00	\$75.36
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**Classification**

**Effective Date   Base Wage   Health   Pension   Supplemental Unemployment   Total Rate**

**Apprentice - PAINTER Local 35 - BRIDGES/TANKS**

**Effective Date - 01/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.71	\$7.85	\$0.00	\$0.00	\$33.56
2	55	\$28.28	\$7.85	\$3.66	\$0.00	\$39.79
3	60	\$30.85	\$7.85	\$3.99	\$0.00	\$42.69
4	65	\$33.42	\$7.85	\$4.32	\$0.00	\$45.59
5	70	\$35.99	\$7.85	\$14.11	\$0.00	\$57.95
6	75	\$38.56	\$7.85	\$14.44	\$0.00	\$60.85
7	80	\$41.13	\$7.85	\$14.77	\$0.00	\$63.75
8	90	\$46.27	\$7.85	\$15.44	\$0.00	\$69.56

**Notes:**

Steps are 750 hrs.

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

DEMO: ADZEMAN LABORERS - ZONE 2	06/01/2017	\$37.00	\$7.60	\$14.65	\$0.00	\$59.25
	12/01/2017	\$37.85	\$7.60	\$14.65	\$0.00	\$60.10
	06/01/2018	\$38.80	\$7.60	\$14.65	\$0.00	\$61.05
	12/01/2018	\$39.75	\$7.60	\$14.65	\$0.00	\$62.00
	06/01/2019	\$40.75	\$7.60	\$14.65	\$0.00	\$63.00
	12/01/2019	\$41.75	\$7.60	\$14.65	\$0.00	\$64.00

For apprentice rates see "Apprentice- LABORER"

DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS - ZONE 2	06/01/2017	\$38.00	\$7.60	\$14.65	\$0.00	\$60.25
	12/01/2017	\$38.85	\$7.60	\$14.65	\$0.00	\$61.10
	06/01/2018	\$39.80	\$7.60	\$14.65	\$0.00	\$62.05
	12/01/2018	\$40.75	\$7.60	\$14.65	\$0.00	\$63.00
	06/01/2019	\$41.75	\$7.60	\$14.65	\$0.00	\$64.00
	12/01/2019	\$42.75	\$7.60	\$14.65	\$0.00	\$65.00

For apprentice rates see "Apprentice- LABORER"

DEMO: BURNERS LABORERS - ZONE 2	06/01/2017	\$37.75	\$7.60	\$14.65	\$0.00	\$60.00
	12/01/2017	\$38.60	\$7.60	\$14.65	\$0.00	\$60.85
	06/01/2018	\$39.55	\$7.60	\$14.65	\$0.00	\$61.80
	12/01/2018	\$40.50	\$7.60	\$14.65	\$0.00	\$62.75
	06/01/2019	\$41.50	\$7.60	\$14.65	\$0.00	\$63.75
	12/01/2019	\$42.50	\$7.60	\$14.65	\$0.00	\$64.75

For apprentice rates see "Apprentice- LABORER"

DEMO: CONCRETE CUTTER/SAWYER LABORERS - ZONE 2	06/01/2017	\$38.00	\$7.60	\$14.65	\$0.00	\$60.25
	12/01/2017	\$38.85	\$7.60	\$14.65	\$0.00	\$61.10
	06/01/2018	\$39.80	\$7.60	\$14.65	\$0.00	\$62.05
	12/01/2018	\$40.75	\$7.60	\$14.65	\$0.00	\$63.00
	06/01/2019	\$41.75	\$7.60	\$14.65	\$0.00	\$64.00
	12/01/2019	\$42.75	\$7.60	\$14.65	\$0.00	\$65.00

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: JACKHAMMER OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$37.75	\$7.60	\$14.65	\$0.00	\$60.00
	12/01/2017	\$38.60	\$7.60	\$14.65	\$0.00	\$60.85
	06/01/2018	\$39.55	\$7.60	\$14.65	\$0.00	\$61.80
	12/01/2018	\$40.50	\$7.60	\$14.65	\$0.00	\$62.75
	06/01/2019	\$41.50	\$7.60	\$14.65	\$0.00	\$63.75
	12/01/2019	\$42.50	\$7.60	\$14.65	\$0.00	\$64.75
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER <i>LABORERS - ZONE 2</i>	06/01/2017	\$37.00	\$7.60	\$14.65	\$0.00	\$59.25
	12/01/2017	\$37.85	\$7.60	\$14.65	\$0.00	\$60.10
	06/01/2018	\$38.80	\$7.60	\$14.65	\$0.00	\$61.05
	12/01/2018	\$39.75	\$7.60	\$14.65	\$0.00	\$62.00
	06/01/2019	\$40.75	\$7.60	\$14.65	\$0.00	\$63.00
	12/01/2019	\$41.75	\$7.60	\$14.65	\$0.00	\$64.00
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2015	\$58.86	\$9.80	\$19.23	\$0.00	\$87.89
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2015	\$42.04	\$9.80	\$19.23	\$0.00	\$71.07
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2015	\$63.06	\$9.80	\$19.23	\$0.00	\$92.09
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2015	\$88.23	\$9.80	\$19.23	\$0.00	\$117.26
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) <i>ELECTRICIANS LOCAL 103</i>	03/01/2017	\$48.33	\$13.00	\$17.45	\$0.00	\$78.78
	09/01/2017	\$49.28	\$13.00	\$17.48	\$0.00	\$79.76
	03/01/2018	\$50.48	\$13.00	\$17.51	\$0.00	\$80.99
	09/01/2018	\$51.67	\$13.00	\$17.55	\$0.00	\$82.22
	03/01/2019	\$52.87	\$13.00	\$17.59	\$0.00	\$83.46
For apprentice rates see "Apprentice- ELECTRICIAN"						
ELECTRICIAN <i>ELECTRICIANS LOCAL 103</i>	03/01/2017	\$48.33	\$13.00	\$17.45	\$0.00	\$78.78
	09/01/2017	\$49.28	\$13.00	\$17.48	\$0.00	\$79.76
	03/01/2018	\$50.48	\$13.00	\$17.51	\$0.00	\$80.99
	09/01/2018	\$51.67	\$13.00	\$17.55	\$0.00	\$82.22
	03/01/2019	\$52.87	\$13.00	\$17.59	\$0.00	\$83.46

**Classification**

**Effective Date   Base Wage   Health   Pension   Supplemental Unemployment   Total Rate**

**Apprentice - ELECTRICIAN - Local 103**

**Effective Date - 03/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.33	\$13.00	\$0.58	\$0.00	\$32.91
2	40	\$19.33	\$13.00	\$0.58	\$0.00	\$32.91
3	45	\$21.75	\$13.00	\$13.37	\$0.00	\$48.12
4	45	\$21.75	\$13.00	\$13.37	\$0.00	\$48.12
5	50	\$24.17	\$13.00	\$13.75	\$0.00	\$50.92
6	55	\$26.58	\$13.00	\$14.11	\$0.00	\$53.69
7	60	\$29.00	\$13.00	\$14.48	\$0.00	\$56.48
8	65	\$31.41	\$13.00	\$14.85	\$0.00	\$59.26
9	70	\$33.83	\$13.00	\$15.22	\$0.00	\$62.05
10	75	\$36.25	\$13.00	\$15.60	\$0.00	\$64.85

**Effective Date - 09/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.71	\$13.00	\$0.59	\$0.00	\$33.30
2	40	\$19.71	\$13.00	\$0.59	\$0.00	\$33.30
3	45	\$22.18	\$13.00	\$13.39	\$0.00	\$48.57
4	45	\$22.18	\$13.00	\$13.39	\$0.00	\$48.57
5	50	\$24.64	\$13.00	\$13.76	\$0.00	\$51.40
6	55	\$27.10	\$13.00	\$14.12	\$0.00	\$54.22
7	60	\$29.57	\$13.00	\$14.50	\$0.00	\$57.07
8	65	\$32.03	\$13.00	\$14.87	\$0.00	\$59.90
9	70	\$34.50	\$13.00	\$15.25	\$0.00	\$62.75
10	75	\$36.96	\$13.00	\$15.62	\$0.00	\$65.58

**Notes :**  
 App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

**Apprentice to Journeyworker Ratio:2:3\*\*\***

ELEVATOR CONSTRUCTOR ELEVATOR CONSTRUCTORS LOCAL 4	01/01/2017	\$55.86	\$15.28	\$15.71	\$0.00	\$86.85
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**Apprentice - ELEVATOR CONSTRUCTOR - Local 4**

**Effective Date - 01/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.93	\$15.28	\$0.00	\$0.00	\$43.21
2	55	\$30.72	\$15.28	\$15.71	\$0.00	\$61.71
3	65	\$36.31	\$15.28	\$15.71	\$0.00	\$67.30
4	70	\$39.10	\$15.28	\$15.71	\$0.00	\$70.09
5	80	\$44.69	\$15.28	\$15.71	\$0.00	\$75.68

**Notes:**

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

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

ELEVATOR CONSTRUCTOR HELPER <i>ELEVATOR CONSTRUCTORS LOCAL 4</i>	01/01/2017	\$39.10	\$15.28	\$15.71	\$0.00	\$70.09
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For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

FENCE & GUARD RAIL ERECTOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79

For apprentice rates see "Apprentice- LABORER"

FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2017	\$42.15	\$10.00	\$15.25	\$0.00	\$67.40
	11/01/2017	\$42.88	\$10.00	\$15.25	\$0.00	\$68.13
	05/01/2018	\$43.59	\$10.00	\$15.25	\$0.00	\$68.84

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2017	\$43.61	\$10.00	\$15.25	\$0.00	\$68.86
	11/01/2017	\$44.34	\$10.00	\$15.25	\$0.00	\$69.59
	05/01/2018	\$45.06	\$10.00	\$15.25	\$0.00	\$70.31

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2017	\$22.41	\$10.00	\$15.25	\$0.00	\$47.66
	11/01/2017	\$22.83	\$10.00	\$15.25	\$0.00	\$48.08
	05/01/2018	\$23.26	\$10.00	\$15.25	\$0.00	\$48.51

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 103</i>	03/01/2017	\$48.33	\$13.00	\$17.45	\$0.00	\$78.78
	09/01/2017	\$49.28	\$13.00	\$17.48	\$0.00	\$79.76
	03/01/2018	\$50.48	\$13.00	\$17.51	\$0.00	\$80.99
	09/01/2018	\$51.67	\$13.00	\$17.55	\$0.00	\$82.22
	03/01/2019	\$52.87	\$13.00	\$17.59	\$0.00	\$83.46

For apprentice rates see "Apprentice- ELECTRICIAN"

FIRE ALARM REPAIR / MAINTENANCE <i>LOCAL 103</i> / COMMISSIONING <i>ELECTRICIANS</i>	03/01/2017	\$36.25	\$13.00	\$15.60	\$0.00	\$64.85
	09/01/2017	\$36.96	\$13.00	\$15.62	\$0.00	\$65.58
	03/01/2018	\$37.86	\$13.00	\$15.65	\$0.00	\$66.51
	09/01/2018	\$38.75	\$13.00	\$15.67	\$0.00	\$67.42
	03/01/2019	\$39.65	\$13.00	\$15.70	\$0.00	\$68.35

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) OPERATING ENGINEERS LOCAL 4	06/01/2017	\$38.49	\$10.00	\$15.25	\$0.00	\$63.74
	12/01/2017	\$39.32	\$10.00	\$15.25	\$0.00	\$64.57
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER LABORERS - ZONE 2	06/01/2017	\$20.50	\$7.60	\$13.50	\$0.00	\$41.60
	12/01/2017	\$21.50	\$7.60	\$13.50	\$0.00	\$42.60
	06/01/2018	\$21.50	\$7.60	\$13.50	\$0.00	\$42.60
	12/01/2018	\$22.50	\$7.60	\$13.50	\$0.00	\$43.60
	06/01/2019	\$22.50	\$7.60	\$13.50	\$0.00	\$43.60
	12/01/2019	\$23.50	\$7.60	\$13.50	\$0.00	\$44.60
For apprentice rates see "Apprentice- LABORER"						
FLOORCOVERER FLOORCOVERERS LOCAL 2168 ZONE 1	03/01/2016	\$42.13	\$9.80	\$17.62	\$0.00	\$69.55

**Apprentice - FLOORCOVERER - Local 2168 Zone 1**

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

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.07	\$9.80	\$1.79	\$0.00	\$32.66
2	55	\$23.17	\$9.80	\$1.79	\$0.00	\$34.76
3	60	\$25.28	\$9.80	\$12.25	\$0.00	\$47.33
4	65	\$27.38	\$9.80	\$12.25	\$0.00	\$49.43
5	70	\$29.49	\$9.80	\$14.04	\$0.00	\$53.33
6	75	\$31.60	\$9.80	\$14.04	\$0.00	\$55.44
7	80	\$33.70	\$9.80	\$15.83	\$0.00	\$59.33
8	85	\$35.81	\$9.80	\$15.83	\$0.00	\$61.44

**Notes:**

Steps are 750 hrs.

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

FORK LIFT/CHERRY PICKER OPERATING ENGINEERS LOCAL 4	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS OPERATING ENGINEERS LOCAL 4	06/01/2017	\$31.86	\$10.00	\$15.25	\$0.00	\$57.11
	12/01/2017	\$32.55	\$10.00	\$15.25	\$0.00	\$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) GLAZIERS LOCAL 35 (ZONE 2)	01/01/2017	\$40.91	\$7.85	\$16.10	\$0.00	\$64.86

**Classification**

**Effective Date   Base Wage   Health   Pension   Supplemental Unemployment   Total Rate**

**Apprentice - GLAZIER - Local 35 Zone 2**

**Effective Date - 01/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.46	\$7.85	\$0.00	\$0.00	\$28.31
2	55	\$22.50	\$7.85	\$3.66	\$0.00	\$34.01
3	60	\$24.55	\$7.85	\$3.99	\$0.00	\$36.39
4	65	\$26.59	\$7.85	\$4.32	\$0.00	\$38.76
5	70	\$28.64	\$7.85	\$14.11	\$0.00	\$50.60
6	75	\$30.68	\$7.85	\$14.44	\$0.00	\$52.97
7	80	\$32.73	\$7.85	\$14.77	\$0.00	\$55.35
8	90	\$36.82	\$7.85	\$15.44	\$0.00	\$60.11

**Notes:**  
Steps are 750 hrs.

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

HOISTING ENGINEER/CRANES/GRADALLS	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
OPERATING ENGINEERS LOCAL 4	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63

**Classification**

**Effective Date   Base Wage   Health   Pension   Supplemental Unemployment   Total Rate**

**Apprentice - OPERATING ENGINEERS - Local 4**

**Effective Date - 06/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$25.51	\$10.00	\$0.00	\$0.00	\$35.51
2	60	\$27.83	\$10.00	\$15.25	\$0.00	\$53.08
3	65	\$30.15	\$10.00	\$15.25	\$0.00	\$55.40
4	70	\$32.47	\$10.00	\$15.25	\$0.00	\$57.72
5	75	\$34.79	\$10.00	\$15.25	\$0.00	\$60.04
6	80	\$37.10	\$10.00	\$15.25	\$0.00	\$62.35
7	85	\$39.42	\$10.00	\$15.25	\$0.00	\$64.67
8	90	\$41.74	\$10.00	\$15.25	\$0.00	\$66.99

**Effective Date - 12/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$26.06	\$10.00	\$0.00	\$0.00	\$36.06
2	60	\$28.43	\$10.00	\$15.25	\$0.00	\$53.68
3	65	\$30.80	\$10.00	\$15.25	\$0.00	\$56.05
4	70	\$33.17	\$10.00	\$15.25	\$0.00	\$58.42
5	75	\$35.54	\$10.00	\$15.25	\$0.00	\$60.79
6	80	\$37.90	\$10.00	\$15.25	\$0.00	\$63.15
7	85	\$40.27	\$10.00	\$15.25	\$0.00	\$65.52
8	90	\$42.64	\$10.00	\$15.25	\$0.00	\$67.89

**Notes:**

**Apprentice to Journeyworker Ratio:1:6**

HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 17 - A	02/01/2017	\$43.72	\$11.45	\$23.07	\$2.35	\$80.59
	08/01/2017	\$44.82	\$11.45	\$23.07	\$2.35	\$81.69
	02/01/2018	\$45.97	\$11.45	\$23.07	\$2.35	\$82.84

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 103	03/01/2017	\$48.33	\$13.00	\$17.45	\$0.00	\$78.78
	09/01/2017	\$49.28	\$13.00	\$17.48	\$0.00	\$79.76
	03/01/2018	\$50.48	\$13.00	\$17.51	\$0.00	\$80.99
	09/01/2018	\$51.67	\$13.00	\$17.55	\$0.00	\$82.22
	03/01/2019	\$52.87	\$13.00	\$17.59	\$0.00	\$83.46

For apprentice rates see "Apprentice- ELECTRICIAN"

HVAC (TESTING AND BALANCING - AIR) SHEETMETAL WORKERS LOCAL 17 - A	02/01/2017	\$43.72	\$11.45	\$23.07	\$2.35	\$80.59
	08/01/2017	\$44.82	\$11.45	\$23.07	\$2.35	\$81.69
	02/01/2018	\$45.97	\$11.45	\$23.07	\$2.35	\$82.84

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (TESTING AND BALANCING -WATER) PIPEFITTERS LOCAL 537 (Local 138)	03/01/2017	\$48.86	\$9.70	\$16.14	\$0.00	\$74.70
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For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

HVAC MECHANIC PIPEFITTERS LOCAL 537 (Local 138)	03/01/2017	\$48.86	\$9.70	\$16.14	\$0.00	\$74.70
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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS LABORERS - ZONE 2	06/01/2017	\$33.15	\$7.60	\$13.50	\$0.00	\$54.25
	12/01/2017	\$33.78	\$7.60	\$13.50	\$0.00	\$54.88
	06/01/2018	\$34.62	\$7.60	\$13.50	\$0.00	\$55.72
	12/01/2018	\$35.46	\$7.60	\$13.50	\$0.00	\$56.56
	06/01/2019	\$36.33	\$7.60	\$13.50	\$0.00	\$57.43
	12/01/2019	\$37.19	\$7.60	\$13.50	\$0.00	\$58.29
For apprentice rates see "Apprentice- LABORER"						
INSULATOR (PIPES & TANKS) HEAT & FROST INSULATORS LOCAL 6 (BOSTON)	09/01/2016	\$45.09	\$11.75	\$14.20	\$0.00	\$71.04
	09/01/2017	\$47.09	\$11.75	\$14.20	\$0.00	\$73.04
	09/01/2018	\$49.34	\$11.75	\$14.20	\$0.00	\$75.29
	09/01/2019	\$51.84	\$11.75	\$14.20	\$0.00	\$77.79

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

**Effective Date - 09/01/2016**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.55	\$11.75	\$10.45	\$0.00	\$44.75
2	60	\$27.05	\$11.75	\$11.20	\$0.00	\$50.00
3	70	\$31.56	\$11.75	\$11.95	\$0.00	\$55.26
4	80	\$36.07	\$11.75	\$12.70	\$0.00	\$60.52

**Effective Date - 09/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.55	\$11.75	\$10.45	\$0.00	\$45.75
2	60	\$28.25	\$11.75	\$11.20	\$0.00	\$51.20
3	70	\$32.96	\$11.75	\$11.95	\$0.00	\$56.66
4	80	\$37.67	\$11.75	\$12.70	\$0.00	\$62.12

**Notes:**

Steps are 1 year

**Apprentice to Journeyworker Ratio:1:4**

IRONWORKER/WELDER IRONWORKERS LOCAL 7 (BOSTON AREA)	03/16/2017	\$44.65	\$7.80	\$20.85	\$0.00	\$73.30
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**Classification**

**Effective Date    Base Wage    Health    Pension    Supplemental Unemployment    Total Rate**

**Apprentice - IRONWORKER - Local 7 Boston**

**Effective Date - 03/16/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.79	\$7.80	\$20.85	\$0.00	\$55.44
2	70	\$31.26	\$7.80	\$20.85	\$0.00	\$59.91
3	75	\$33.49	\$7.80	\$20.85	\$0.00	\$62.14
4	80	\$35.72	\$7.80	\$20.85	\$0.00	\$64.37
5	85	\$37.95	\$7.80	\$20.85	\$0.00	\$66.60
6	90	\$40.19	\$7.80	\$20.85	\$0.00	\$68.84

**Notes:**

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

**Apprentice to Journeyworker Ratio:\*\***

JACKHAMMER & PAVING BREAKER OPERATOR LABORERS - ZONE 2	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79

For apprentice rates see "Apprentice- LABORER"

LABORER LABORERS - ZONE 2	06/01/2017	\$32.40	\$7.60	\$13.50	\$0.00	\$53.50
	12/01/2017	\$33.03	\$7.60	\$13.50	\$0.00	\$54.13
	06/01/2018	\$33.87	\$7.60	\$13.50	\$0.00	\$54.97
	12/01/2018	\$34.71	\$7.60	\$13.50	\$0.00	\$55.81
	06/01/2019	\$35.58	\$7.60	\$13.50	\$0.00	\$56.68
	12/01/2019	\$36.44	\$7.60	\$13.50	\$0.00	\$57.54

**Classification**

**Effective Date    Base Wage    Health    Pension    Supplemental Unemployment    Total Rate**

**Apprentice - LABORER - Zone 2**

**Effective Date - 06/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$19.44	\$7.60	\$13.50	\$0.00	\$40.54
2	70	\$22.68	\$7.60	\$13.50	\$0.00	\$43.78
3	80	\$25.92	\$7.60	\$13.50	\$0.00	\$47.02
4	90	\$29.16	\$7.60	\$13.50	\$0.00	\$50.26

**Effective Date - 12/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$19.82	\$7.60	\$13.50	\$0.00	\$40.92
2	70	\$23.12	\$7.60	\$13.50	\$0.00	\$44.22
3	80	\$26.42	\$7.60	\$13.50	\$0.00	\$47.52
4	90	\$29.73	\$7.60	\$13.50	\$0.00	\$50.83

**Notes:**

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

LABORER: CARPENTER TENDER LABORERS - ZONE 2	06/01/2017	\$32.40	\$7.60	\$13.50	\$0.00	\$53.50
	12/01/2017	\$33.03	\$7.60	\$13.50	\$0.00	\$54.13
	06/01/2018	\$33.87	\$7.60	\$13.50	\$0.00	\$54.97
	12/01/2018	\$34.71	\$7.60	\$13.50	\$0.00	\$55.81
	06/01/2019	\$35.58	\$7.60	\$13.50	\$0.00	\$56.68
	12/01/2019	\$36.44	\$7.60	\$13.50	\$0.00	\$57.54

For apprentice rates see "Apprentice- LABORER"

LABORER: CEMENT FINISHER TENDER LABORERS - ZONE 2	06/01/2017	\$32.40	\$7.60	\$13.50	\$0.00	\$53.50
	12/01/2017	\$33.03	\$7.60	\$13.50	\$0.00	\$54.13
	06/01/2018	\$33.87	\$7.60	\$13.50	\$0.00	\$54.97
	12/01/2018	\$34.71	\$7.60	\$13.50	\$0.00	\$55.81
	06/01/2019	\$35.58	\$7.60	\$13.50	\$0.00	\$56.68
	12/01/2019	\$36.44	\$7.60	\$13.50	\$0.00	\$57.54

For apprentice rates see "Apprentice- LABORER"

LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER LABORERS - ZONE 2	06/01/2017	\$32.60	\$7.60	\$13.45	\$0.00	\$53.65
	12/01/2017	\$33.23	\$7.60	\$13.45	\$0.00	\$54.28
	06/01/2018	\$34.07	\$7.60	\$13.45	\$0.00	\$55.12
	12/01/2018	\$34.91	\$7.60	\$13.45	\$0.00	\$55.96
	06/01/2019	\$35.78	\$7.60	\$13.45	\$0.00	\$56.83
	12/01/2019	\$36.64	\$7.60	\$13.45	\$0.00	\$57.69

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MASON TENDER <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.40	\$7.60	\$13.50	\$0.00	\$53.50
	12/01/2017	\$33.03	\$7.60	\$13.50	\$0.00	\$54.13
	06/01/2018	\$33.87	\$7.60	\$13.50	\$0.00	\$54.97
	12/01/2018	\$34.71	\$7.60	\$13.50	\$0.00	\$55.81
	06/01/2019	\$35.58	\$7.60	\$13.50	\$0.00	\$56.68
	12/01/2019	\$36.44	\$7.60	\$13.50	\$0.00	\$57.54
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.40	\$7.60	\$13.50	\$0.00	\$53.50
	12/01/2017	\$33.03	\$7.60	\$13.50	\$0.00	\$54.13
	06/01/2018	\$33.87	\$7.60	\$13.50	\$0.00	\$54.97
	12/01/2018	\$34.71	\$7.60	\$13.50	\$0.00	\$55.81
	06/01/2019	\$35.58	\$7.60	\$13.50	\$0.00	\$56.68
	12/01/2019	\$36.44	\$7.60	\$13.50	\$0.00	\$57.54
This classification applies to all tree work associated with the removal of standing trees, and trimming and removal of branches and limbs when the work is not done for a utility company for the purpose of operation, maintenance or repair of utility company equipment. For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE &amp; TILE</i>	02/01/2017	\$38.78	\$10.75	\$17.67	\$0.00	\$67.20

**Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile**

**Effective Date - 02/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.39	\$10.75	\$17.67	\$0.00	\$47.81
2	60	\$23.27	\$10.75	\$17.67	\$0.00	\$51.69
3	70	\$27.15	\$10.75	\$17.67	\$0.00	\$55.57
4	80	\$31.02	\$10.75	\$17.67	\$0.00	\$59.44
5	90	\$34.90	\$10.75	\$17.67	\$0.00	\$63.32

**Notes:**

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

MARBLE MASONS, TILELAYERS & TERRAZZO MECH <i>BRICKLAYERS LOCAL 3 - MARBLE &amp; TILE</i>	02/01/2017	\$50.80	\$10.75	\$19.22	\$0.00	\$80.77
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**Classification**

**Effective Date   Base Wage   Health   Pension   Supplemental Unemployment   Total Rate**

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

**Effective Date - 02/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.40	\$10.75	\$19.22	\$0.00	\$55.37
2	60	\$30.48	\$10.75	\$19.22	\$0.00	\$60.45
3	70	\$35.56	\$10.75	\$19.22	\$0.00	\$65.53
4	80	\$40.64	\$10.75	\$19.22	\$0.00	\$70.61
5	90	\$45.72	\$10.75	\$19.22	\$0.00	\$75.69

**Notes:**

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

MECH. SWEEPER OPERATOR (ON CONST. SITES) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 1) <i>MILLWRIGHTS LOCAL 1121 - Zone 1</i>	04/01/2017	\$38.62	\$9.90	\$18.50	\$0.00	\$67.02
	10/01/2017	\$39.52	\$9.90	\$18.50	\$0.00	\$67.92
	04/01/2018	\$40.42	\$9.90	\$18.50	\$0.00	\$68.82
	10/01/2018	\$41.32	\$9.90	\$18.50	\$0.00	\$69.72
	04/01/2019	\$42.22	\$9.90	\$18.50	\$0.00	\$70.62

**Apprentice - MILLWRIGHT - Local 1121 Zone 1**

**Effective Date - 04/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$21.24	\$9.90	\$5.31	\$0.00	\$36.45
2	65	\$25.10	\$9.90	\$15.13	\$0.00	\$50.13
3	75	\$28.97	\$9.90	\$16.10	\$0.00	\$54.97
4	85	\$32.83	\$9.90	\$17.06	\$0.00	\$59.79

**Effective Date - 10/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$21.74	\$9.90	\$5.31	\$0.00	\$36.95
2	65	\$25.69	\$9.90	\$15.13	\$0.00	\$50.72
3	75	\$29.64	\$9.90	\$16.10	\$0.00	\$55.64
4	85	\$33.59	\$9.90	\$17.06	\$0.00	\$60.55

**Notes:**

Steps are 2,000 hours

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MORTAR MIXER <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$23.47	\$10.00	\$15.25	\$0.00	\$48.72
	12/01/2017	\$23.99	\$10.00	\$15.25	\$0.00	\$49.24
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$27.54	\$10.00	\$15.25	\$0.00	\$52.79
	12/01/2017	\$28.15	\$10.00	\$15.25	\$0.00	\$53.40
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) <i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2017	\$51.41	\$7.85	\$16.10	\$0.00	\$75.36

**Apprentice - PAINTER Local 35 - BRIDGES/TANKS**

**Effective Date -** 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.71	\$7.85	\$0.00	\$0.00	\$33.56
2	55	\$28.28	\$7.85	\$3.66	\$0.00	\$39.79
3	60	\$30.85	\$7.85	\$3.99	\$0.00	\$42.69
4	65	\$33.42	\$7.85	\$4.32	\$0.00	\$45.59
5	70	\$35.99	\$7.85	\$14.11	\$0.00	\$57.95
6	75	\$38.56	\$7.85	\$14.44	\$0.00	\$60.85
7	80	\$41.13	\$7.85	\$14.77	\$0.00	\$63.75
8	90	\$46.27	\$7.85	\$15.44	\$0.00	\$69.56

**Notes:**

Steps are 750 hrs.

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

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2017	\$42.31	\$7.85	\$16.10	\$0.00	\$66.26
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\* If 30% or more of surfaces to be painted are new construction,

NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*

**Classification**

**Effective Date   Base Wage   Health   Pension   Supplemental Unemployment   Total Rate**

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

**Effective Date - 01/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.16	\$7.85	\$0.00	\$0.00	\$29.01
2	55	\$23.27	\$7.85	\$3.66	\$0.00	\$34.78
3	60	\$25.39	\$7.85	\$3.99	\$0.00	\$37.23
4	65	\$27.50	\$7.85	\$4.32	\$0.00	\$39.67
5	70	\$29.62	\$7.85	\$14.11	\$0.00	\$51.58
6	75	\$31.73	\$7.85	\$14.44	\$0.00	\$54.02
7	80	\$33.85	\$7.85	\$14.77	\$0.00	\$56.47
8	90	\$38.08	\$7.85	\$15.44	\$0.00	\$61.37

**Notes:**

Steps are 750 hrs.

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

PAINTER (SPRAY OR SANDBLAST, REPAINT) PAINTERS LOCAL 35 - ZONE 2	01/01/2017	\$40.37	\$7.85	\$16.10	\$0.00	\$64.32
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**Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint**

**Effective Date - 01/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.19	\$7.85	\$0.00	\$0.00	\$28.04
2	55	\$22.20	\$7.85	\$3.66	\$0.00	\$33.71
3	60	\$24.22	\$7.85	\$3.99	\$0.00	\$36.06
4	65	\$26.24	\$7.85	\$4.32	\$0.00	\$38.41
5	70	\$28.26	\$7.85	\$14.11	\$0.00	\$50.22
6	75	\$30.28	\$7.85	\$14.44	\$0.00	\$52.57
7	80	\$32.30	\$7.85	\$14.77	\$0.00	\$54.92
8	90	\$36.33	\$7.85	\$15.44	\$0.00	\$59.62

**Notes:**

Steps are 750 hrs.

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

PAINTER (TRAFFIC MARKINGS) LABORERS - ZONE 2	06/01/2017	\$32.40	\$7.60	\$13.50	\$0.00	\$53.50
	12/01/2017	\$33.03	\$7.60	\$13.50	\$0.00	\$54.13
	06/01/2018	\$33.87	\$7.60	\$13.50	\$0.00	\$54.97
	12/01/2018	\$34.71	\$7.60	\$13.50	\$0.00	\$55.81
	06/01/2019	\$35.58	\$7.60	\$13.50	\$0.00	\$56.68
	12/01/2019	\$36.44	\$7.60	\$13.50	\$0.00	\$57.54

For Apprentice rates see "Apprentice- LABORER"

PAINTER / TAPER (BRUSH, NEW) *	01/01/2017	\$40.91	\$7.85	\$16.10	\$0.00	\$64.86
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\* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2

**Classification**

**Effective Date   Base Wage   Health   Pension   Supplemental Unemployment   Total Rate**

**Apprentice - PAINTER - Local 35 Zone 2 - BRUSH NEW**

**Effective Date - 01/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.46	\$7.85	\$0.00	\$0.00	\$28.31
2	55	\$22.50	\$7.85	\$3.66	\$0.00	\$34.01
3	60	\$24.55	\$7.85	\$3.99	\$0.00	\$36.39
4	65	\$26.59	\$7.85	\$4.32	\$0.00	\$38.76
5	70	\$28.64	\$7.85	\$14.11	\$0.00	\$50.60
6	75	\$30.68	\$7.85	\$14.44	\$0.00	\$52.97
7	80	\$32.73	\$7.85	\$14.77	\$0.00	\$55.35
8	90	\$36.82	\$7.85	\$15.44	\$0.00	\$60.11

**Notes:**

Steps are 750 hrs.

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

PAINTER / TAPER (BRUSH, REPAINT) PAINTERS LOCAL 35 - ZONE 2	01/01/2017	\$38.97	\$7.85	\$16.10	\$0.00	\$62.92
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**Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT**

**Effective Date - 01/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.49	\$7.85	\$0.00	\$0.00	\$27.34
2	55	\$21.43	\$7.85	\$3.66	\$0.00	\$32.94
3	60	\$23.38	\$7.85	\$3.99	\$0.00	\$35.22
4	65	\$25.33	\$7.85	\$4.32	\$0.00	\$37.50
5	70	\$27.28	\$7.85	\$14.11	\$0.00	\$49.24
6	75	\$29.23	\$7.85	\$14.44	\$0.00	\$51.52
7	80	\$31.18	\$7.85	\$14.77	\$0.00	\$53.80
8	90	\$35.07	\$7.85	\$15.44	\$0.00	\$58.36

**Notes:**

Steps are 750 hrs.

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

PANEL & PICKUP TRUCKS DRIVER TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2012	\$30.28	\$9.07	\$8.00	\$0.00	\$47.35
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PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$42.04	\$9.80	\$19.23	\$0.00	\$71.07
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For apprentice rates see "Apprentice- PILE DRIVER"

PILE DRIVER PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$42.04	\$9.80	\$19.23	\$0.00	\$71.07
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**Classification**

**Effective Date   Base Wage   Health   Pension   Supplemental Unemployment   Total Rate**

**Apprentice - PILE DRIVER - Local 56 Zone 1**

**Effective Date - 08/01/2015**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.02	\$9.80	\$19.23	\$0.00	\$50.05
2	60	\$25.22	\$9.80	\$19.23	\$0.00	\$54.25
3	70	\$29.43	\$9.80	\$19.23	\$0.00	\$58.46
4	75	\$31.53	\$9.80	\$19.23	\$0.00	\$60.56
5	80	\$33.63	\$9.80	\$19.23	\$0.00	\$62.66
6	80	\$33.63	\$9.80	\$19.23	\$0.00	\$62.66
7	90	\$37.84	\$9.80	\$19.23	\$0.00	\$66.87
8	90	\$37.84	\$9.80	\$19.23	\$0.00	\$66.87

**Notes:**

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

PIPEFITTER & STEAMFITTER <i>PIPEFITTERS LOCAL 537 (Local 138)</i>	03/01/2017	\$48.86	\$9.70	\$16.14	\$0.00	\$74.70
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**Apprentice - PIPEFITTER Local 537 (Local 138)**

**Effective Date - 03/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.54	\$9.70	\$5.50	\$0.00	\$34.74
2	45	\$21.99	\$9.70	\$16.14	\$0.00	\$47.83
3	60	\$29.32	\$9.70	\$16.14	\$0.00	\$55.16
4	70	\$34.20	\$9.70	\$16.14	\$0.00	\$60.04
5	80	\$39.09	\$9.70	\$16.14	\$0.00	\$64.93

**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:\*\***

PIPELAYER <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79

For apprentice rates see "Apprentice- LABORER"

PLUMBER <i>PLUMBERS &amp; GASFITTERS LOCAL 12 (Local 138)</i>	03/01/2017	\$48.61	\$11.32	\$15.46	\$0.00	\$75.39
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**Apprentice - PLUMBER/GASFITTER - Local 12 (Local 138)**

**Effective Date - 03/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$17.01	\$11.32	\$5.74	\$0.00	\$34.07
2	40	\$19.44	\$11.32	\$6.49	\$0.00	\$37.25
3	55	\$26.74	\$11.32	\$8.73	\$0.00	\$46.79
4	65	\$31.60	\$11.32	\$10.23	\$0.00	\$53.15
5	75	\$36.46	\$11.32	\$11.72	\$0.00	\$59.50

**Notes:**

Steps are 1 yr  
Step 4 with lic\$55.65 Step5 with lic\$61.89

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

PNEUMATIC CONTROLS (TEMP.) PIPEFITTERS LOCAL 537 (Local 138)	03/01/2017	\$48.86	\$9.70	\$16.14	\$0.00	\$74.70
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For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

PNEUMATIC DRILL/TOOL OPERATOR LABORERS - ZONE 2	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79

For apprentice rates see "Apprentice- LABORER"

POWDERMAN & BLASTER LABORERS - ZONE 2	06/01/2017	\$33.40	\$7.60	\$13.50	\$0.00	\$54.50
	12/01/2017	\$34.03	\$7.60	\$13.50	\$0.00	\$55.13
	06/01/2018	\$34.87	\$7.60	\$13.50	\$0.00	\$55.97
	12/01/2018	\$35.71	\$7.60	\$13.50	\$0.00	\$56.81
	06/01/2019	\$36.58	\$7.60	\$13.50	\$0.00	\$57.68
	12/01/2019	\$37.44	\$7.60	\$13.50	\$0.00	\$58.54

For apprentice rates see "Apprentice- LABORER"

POWER SHOVEL/DERRICK/TRENCHING MACHINE OPERATING ENGINEERS LOCAL 4	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

PUMP OPERATOR (CONCRETE) OPERATING ENGINEERS LOCAL 4	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

PUMP OPERATOR (DEWATERING, OTHER) OPERATING ENGINEERS LOCAL 4	06/01/2017	\$31.86	\$10.00	\$15.25	\$0.00	\$57.11
	12/01/2017	\$32.55	\$10.00	\$15.25	\$0.00	\$57.80

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

READY-MIX CONCRETE DRIVER TEAMSTERS LOCAL 42	05/01/2017	\$24.21	\$8.49	\$11.54	\$0.00	\$44.24
	04/30/2018	\$24.21	\$8.49	\$11.96	\$0.00	\$44.66
	05/01/2018	\$24.24	\$8.49	\$12.46	\$0.00	\$45.19
	04/30/2019	\$24.24	\$8.49	\$12.92	\$0.00	\$45.65

RECLAIMERS OPERATING ENGINEERS LOCAL 4	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
RESIDENTIAL WOOD FRAME (All Other Work) <i>CARPENTERS -ZONE 2 (Residential Wood)</i>	06/01/2016	\$25.32	\$9.80	\$16.82	\$0.00	\$51.94
RESIDENTIAL WOOD FRAME CARPENTER **	04/01/2017	\$26.31	\$7.07	\$7.18	\$0.00	\$40.56
** 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. <i>CARPENTERS -ZONE 2 (Residential Wood)</i>	10/01/2017	\$26.93	\$7.07	\$7.18	\$0.00	\$41.18
	04/01/2018	\$27.35	\$7.07	\$7.18	\$0.00	\$41.60
	10/01/2018	\$27.77	\$7.07	\$7.18	\$0.00	\$42.02
	04/01/2019	\$28.20	\$7.07	\$7.18	\$0.00	\$42.45
	10/01/2019	\$28.63	\$7.07	\$7.18	\$0.00	\$42.88

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

**Apprentice - CARPENTER (Residential Wood Frame) - Zone 2**

**Effective Date - 04/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$15.79	\$7.07	\$0.00	\$0.00	\$22.86
2	60	\$15.79	\$7.07	\$0.00	\$0.00	\$22.86
3	65	\$17.10	\$7.07	\$7.18	\$0.00	\$31.35
4	70	\$18.42	\$7.07	\$7.18	\$0.00	\$32.67
5	75	\$19.73	\$7.07	\$7.18	\$0.00	\$33.98
6	80	\$21.05	\$7.07	\$7.18	\$0.00	\$35.30
7	85	\$22.36	\$7.07	\$7.18	\$0.00	\$36.61
8	90	\$23.68	\$7.07	\$7.18	\$0.00	\$37.93

**Effective Date - 10/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$16.16	\$7.07	\$0.00	\$0.00	\$23.23
2	60	\$16.16	\$7.07	\$0.00	\$0.00	\$23.23
3	65	\$17.50	\$7.07	\$7.18	\$0.00	\$31.75
4	70	\$18.85	\$7.07	\$7.18	\$0.00	\$33.10
5	75	\$20.20	\$7.07	\$7.18	\$0.00	\$34.45
6	80	\$21.54	\$7.07	\$7.18	\$0.00	\$35.79
7	85	\$22.89	\$7.07	\$7.18	\$0.00	\$37.14
8	90	\$24.24	\$7.07	\$7.18	\$0.00	\$38.49

**Notes:**

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

RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79

For apprentice rates see "Apprentice- LABORER"

ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofing Waterproofing &Roofing Damproofing)	02/01/2017	\$41.36	\$11.10	\$13.80	\$0.00	\$66.26
ROOFERS LOCAL 33	08/01/2017	\$42.46	\$11.10	\$13.80	\$0.00	\$67.36
	02/01/2018	\$43.61	\$11.10	\$13.80	\$0.00	\$68.51
	08/01/2018	\$44.71	\$11.10	\$13.80	\$0.00	\$69.61
	02/01/2019	\$45.86	\$11.10	\$13.80	\$0.00	\$70.76

**Apprentice - ROOFER - Local 33**

**Effective Date - 02/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.68	\$11.10	\$3.44	\$0.00	\$35.22
2	60	\$24.82	\$11.10	\$13.80	\$0.00	\$49.72
3	65	\$26.88	\$11.10	\$13.80	\$0.00	\$51.78
4	75	\$31.02	\$11.10	\$13.80	\$0.00	\$55.92
5	85	\$35.16	\$11.10	\$13.80	\$0.00	\$60.06

**Effective Date - 08/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.23	\$11.10	\$3.44	\$0.00	\$35.77
2	60	\$25.48	\$11.10	\$13.80	\$0.00	\$50.38
3	65	\$27.60	\$11.10	\$13.80	\$0.00	\$52.50
4	75	\$31.85	\$11.10	\$13.80	\$0.00	\$56.75
5	85	\$36.09	\$11.10	\$13.80	\$0.00	\$60.99

**Notes:** \*\* 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1  
 Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.  
 (Hot Pitch Mechanics' receive \$1.00 hr. above ROOFER)

**Apprentice to Journeyworker Ratio:\*\***

ROOFER SLATE / TILE / PRECAST CONCRETE	02/01/2017	\$41.61	\$11.10	\$13.80	\$0.00	\$66.51
ROOFERS LOCAL 33	08/01/2017	\$42.71	\$11.10	\$13.80	\$0.00	\$67.61
	02/01/2018	\$43.86	\$11.10	\$13.80	\$0.00	\$68.76
	08/01/2018	\$44.96	\$11.10	\$13.80	\$0.00	\$69.86
	02/01/2019	\$46.11	\$11.10	\$13.80	\$0.00	\$71.01

For apprentice rates see "Apprentice- ROOFER"

SHEETMETAL WORKER	02/01/2017	\$43.72	\$11.45	\$23.07	\$2.35	\$80.59
SHEETMETAL WORKERS LOCAL 17 - A	08/01/2017	\$44.82	\$11.45	\$23.07	\$2.35	\$81.69
	02/01/2018	\$45.97	\$11.45	\$23.07	\$2.35	\$82.84

**Apprentice - SHEET METAL WORKER - Local 17-A**

**Effective Date - 02/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.49	\$11.45	\$5.24	\$0.00	\$34.18
2	40	\$17.49	\$11.45	\$5.24	\$0.00	\$34.18
3	45	\$19.67	\$11.45	\$10.31	\$1.24	\$42.67
4	45	\$19.67	\$11.45	\$10.31	\$1.24	\$42.67
5	50	\$21.86	\$11.45	\$11.21	\$1.34	\$45.86
6	50	\$21.86	\$11.45	\$11.46	\$1.34	\$46.11
7	60	\$26.23	\$11.45	\$13.02	\$1.52	\$52.22
8	65	\$28.42	\$11.45	\$13.93	\$1.61	\$55.41
9	75	\$32.79	\$11.45	\$15.74	\$1.80	\$61.78
10	85	\$37.16	\$11.45	\$17.05	\$1.97	\$67.63

**Effective Date - 08/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.93	\$11.45	\$5.24	\$0.00	\$34.62
2	40	\$17.93	\$11.45	\$5.24	\$0.00	\$34.62
3	45	\$20.17	\$11.45	\$10.31	\$1.26	\$43.19
4	45	\$20.17	\$11.45	\$10.31	\$1.26	\$43.19
5	50	\$22.41	\$11.45	\$11.21	\$1.35	\$46.42
6	50	\$22.41	\$11.45	\$11.46	\$1.36	\$46.68
7	60	\$26.89	\$11.45	\$13.02	\$1.54	\$52.90
8	65	\$29.13	\$11.45	\$13.93	\$1.64	\$56.15
9	75	\$33.62	\$11.45	\$15.74	\$1.82	\$62.63
10	85	\$38.10	\$11.45	\$17.05	\$2.00	\$68.60

**Notes:**  
Steps are 6 mos.

**Apprentice to Journeyworker Ratio:1:4**

SIGN ERECTOR PAINTERS LOCAL 35 - ZONE 2	06/01/2013	\$25.81	\$7.07	\$7.05	\$0.00	\$39.93
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**Classification**

**Effective Date   Base Wage   Health   Pension   Supplemental Unemployment   Total Rate**

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

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

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$12.91	\$7.07	\$0.00	\$0.00	\$19.98
2	55	\$14.20	\$7.07	\$2.45	\$0.00	\$23.72
3	60	\$15.49	\$7.07	\$2.45	\$0.00	\$25.01
4	65	\$16.78	\$7.07	\$2.45	\$0.00	\$26.30
5	70	\$18.07	\$7.07	\$7.05	\$0.00	\$32.19
6	75	\$19.36	\$7.07	\$7.05	\$0.00	\$33.48
7	80	\$20.65	\$7.07	\$7.05	\$0.00	\$34.77
8	85	\$21.94	\$7.07	\$7.05	\$0.00	\$36.06
9	90	\$23.23	\$7.07	\$7.05	\$0.00	\$37.35

**Notes:**  
Steps are 4 mos.

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

SPECIALIZED EARTH MOVING EQUIP < 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.44	\$10.91	\$10.89	\$0.00	\$54.24
SPECIALIZED EARTH MOVING EQUIP > 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.73	\$10.91	\$10.89	\$0.00	\$54.53
SPRINKLER FITTER <i>SPRINKLER FITTERS LOCAL 550 - (Section B) Zone 2</i>	03/01/2017	\$50.47	\$8.77	\$17.20	\$0.00	\$76.44

**Apprentice - SPRINKLER FITTER - Local 550 (Section B) Zone 2**

**Effective Date - 03/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$17.66	\$8.77	\$8.70	\$0.00	\$35.13
2	40	\$20.19	\$8.77	\$8.70	\$0.00	\$37.66
3	45	\$22.71	\$8.77	\$8.70	\$0.00	\$40.18
4	50	\$25.24	\$8.77	\$8.70	\$0.00	\$42.71
5	55	\$27.76	\$8.77	\$8.70	\$0.00	\$45.23
6	60	\$30.28	\$8.77	\$10.20	\$0.00	\$49.25
7	65	\$32.81	\$8.77	\$10.20	\$0.00	\$51.78
8	70	\$35.33	\$8.77	\$10.20	\$0.00	\$54.30
9	75	\$37.85	\$8.77	\$10.20	\$0.00	\$56.82
10	80	\$40.38	\$8.77	\$10.20	\$0.00	\$59.35

**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 <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN OPERATING ENGINEERS LOCAL 4	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN ELECTRICIANS LOCAL 103	03/01/2017	\$36.25	\$13.00	\$15.60	\$0.00	\$64.85
	09/01/2017	\$36.96	\$13.00	\$15.62	\$0.00	\$65.58
	03/01/2018	\$37.86	\$13.00	\$15.65	\$0.00	\$66.51
	09/01/2018	\$38.75	\$13.00	\$15.67	\$0.00	\$67.42
	03/01/2019	\$39.65	\$13.00	\$15.70	\$0.00	\$68.35

**Apprentice - TELECOMMUNICATION TECHNICIAN - Local 103**

**Effective Date - 03/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$14.50	\$13.00	\$0.44	\$0.00	\$27.94
2	40	\$14.50	\$13.00	\$0.44	\$0.00	\$27.94
3	45	\$16.31	\$13.00	\$12.54	\$0.00	\$41.85
4	45	\$16.31	\$13.00	\$12.54	\$0.00	\$41.85
5	50	\$18.13	\$13.00	\$12.81	\$0.00	\$43.94
6	55	\$19.94	\$13.00	\$13.09	\$0.00	\$46.03
7	60	\$21.75	\$13.00	\$13.37	\$0.00	\$48.12
8	65	\$23.56	\$13.00	\$13.65	\$0.00	\$50.21
9	70	\$25.38	\$13.00	\$13.93	\$0.00	\$52.31
10	75	\$27.19	\$13.00	\$14.21	\$0.00	\$54.40

**Effective Date - 09/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$14.78	\$13.00	\$0.44	\$0.00	\$28.22
2	40	\$14.78	\$13.00	\$0.44	\$0.00	\$28.22
3	45	\$16.63	\$13.00	\$12.55	\$0.00	\$42.18
4	45	\$16.63	\$13.00	\$12.55	\$0.00	\$42.18
5	50	\$18.48	\$13.00	\$12.82	\$0.00	\$44.30
6	55	\$20.33	\$13.00	\$13.10	\$0.00	\$46.43
7	60	\$22.18	\$13.00	\$13.39	\$0.00	\$48.57
8	65	\$24.02	\$13.00	\$13.66	\$0.00	\$50.68
9	70	\$25.87	\$13.00	\$13.95	\$0.00	\$52.82
10	75	\$27.72	\$13.00	\$14.22	\$0.00	\$54.94

**Notes:**

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

TERRAZZO FINISHERS BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2017	\$49.70	\$10.75	\$19.22	\$0.00	\$79.67
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**Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile**

**Effective Date - 02/01/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.85	\$10.75	\$19.22	\$0.00	\$54.82
2	60	\$29.82	\$10.75	\$19.22	\$0.00	\$59.79
3	70	\$34.79	\$10.75	\$19.22	\$0.00	\$64.76
4	80	\$39.76	\$10.75	\$19.22	\$0.00	\$69.73
5	90	\$44.73	\$10.75	\$19.22	\$0.00	\$74.70

**Notes:**

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

TEST BORING DRILLER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2016	\$37.70	\$7.60	\$14.35	\$0.00	\$59.65
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For apprentice rates see "Apprentice- LABORER"

TEST BORING DRILLER HELPER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2016	\$36.42	\$7.60	\$14.35	\$0.00	\$58.37
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For apprentice rates see "Apprentice- LABORER"

TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25
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For apprentice rates see "Apprentice- LABORER"

TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$33.02	\$10.91	\$10.89	\$0.00	\$54.82
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TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	12/01/2016	\$48.58	\$7.60	\$14.75	\$0.00	\$70.93
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For apprentice rates see "Apprentice- LABORER"

TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	12/01/2016	\$50.58	\$7.60	\$14.75	\$0.00	\$72.93
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For apprentice rates see "Apprentice- LABORER"

TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2016	\$40.65	\$7.60	\$14.75	\$0.00	\$63.00
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For apprentice rates see "Apprentice- LABORER"

TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2016	\$42.65	\$7.60	\$14.75	\$0.00	\$65.00
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For apprentice rates see "Apprentice- LABORER"

VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.44	\$10.91	\$10.89	\$0.00	\$54.24
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WAGON DRILL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2017	\$32.65	\$7.60	\$13.50	\$0.00	\$53.75
	12/01/2017	\$33.28	\$7.60	\$13.50	\$0.00	\$54.38
	06/01/2018	\$34.12	\$7.60	\$13.50	\$0.00	\$55.22
	12/01/2018	\$34.96	\$7.60	\$13.50	\$0.00	\$56.06
	06/01/2019	\$35.83	\$7.60	\$13.50	\$0.00	\$56.93
	12/01/2019	\$36.69	\$7.60	\$13.50	\$0.00	\$57.79

For apprentice rates see "Apprentice- LABORER"

<b>Classification</b>	<b>Effective Date</b>	<b>Base Wage</b>	<b>Health</b>	<b>Pension</b>	<b>Supplemental Unemployment</b>	<b>Total Rate</b>
<b>WASTE WATER PUMP OPERATOR</b> <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
<b>WATER METER INSTALLER</b> <i>PLUMBERS &amp; GASFITTERS LOCAL 12 (Local 138)</i>	03/01/2017	\$48.61	\$11.32	\$15.46	\$0.00	\$75.39
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
<b>Outside Electrical - East</b>						
<b>CABLE TECHNICIAN (Power Zone)</b> <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$26.61	\$7.50	\$1.80	\$0.00	\$35.91
	09/03/2017	\$27.14	\$7.75	\$1.81	\$0.00	\$36.70
For apprentice rates see "Apprentice- LINEMAN"						
<b>CABLEMAN (Underground Ducts &amp; Cables)</b> <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$37.70	\$7.50	\$8.87	\$0.00	\$54.07
	09/03/2017	\$38.45	\$7.75	\$9.53	\$0.00	\$55.73
For apprentice rates see "Apprentice- LINEMAN"						
<b>DRIVER / GROUNDMAN CDL</b> <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$31.05	\$7.50	\$8.89	\$0.00	\$47.44
	09/03/2017	\$31.66	\$7.75	\$9.44	\$0.00	\$48.85
For apprentice rates see "Apprentice- LINEMAN"						
<b>DRIVER / GROUNDMAN -Inexperienced (&lt;2000 Hrs)</b> <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$24.39	\$7.50	\$1.73	\$0.00	\$33.62
	09/03/2017	\$24.88	\$7.75	\$1.75	\$0.00	\$34.38
For apprentice rates see "Apprentice- LINEMAN"						
<b>EQUIPMENT OPERATOR (Class A CDL)</b> <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$37.70	\$7.50	\$12.95	\$0.00	\$58.15
	09/03/2017	\$38.45	\$7.75	\$13.61	\$0.00	\$59.81
For apprentice rates see "Apprentice- LINEMAN"						
<b>EQUIPMENT OPERATOR (Class B CDL)</b> <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$33.26	\$7.50	\$9.63	\$0.00	\$50.39
	09/03/2017	\$33.92	\$7.75	\$10.21	\$0.00	\$51.88
For apprentice rates see "Apprentice- LINEMAN"						
<b>GROUNDMAN</b> <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$24.39	\$7.50	\$1.73	\$0.00	\$33.62
	09/03/2017	\$24.88	\$7.75	\$1.75	\$0.00	\$34.38
For apprentice rates see "Apprentice- LINEMAN"						
<b>GROUNDMAN -Inexperienced (&lt;2000 Hrs.)</b> <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$19.96	\$7.50	\$1.60	\$0.00	\$29.06
	09/03/2017	\$20.35	\$7.75	\$1.61	\$0.00	\$29.71
For apprentice rates see "Apprentice- LINEMAN"						
<b>JOURNEYMAN LINEMAN</b> <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/28/2016	\$44.35	\$7.50	\$15.83	\$0.00	\$67.68
	09/03/2017	\$45.23	\$7.75	\$16.61	\$0.00	\$69.59

**Classification**

**Effective Date   Base Wage   Health   Pension   Supplemental Unemployment   Total Rate**

**Apprentice - LINEMAN (Outside Electrical) - East Local 104**

**Effective Date - 08/28/2016**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.61	\$7.50	\$3.30	\$0.00	\$37.41
2	65	\$28.83	\$7.50	\$3.36	\$0.00	\$39.69
3	70	\$31.05	\$7.50	\$3.43	\$0.00	\$41.98
4	75	\$33.26	\$7.50	\$5.00	\$0.00	\$45.76
5	80	\$35.48	\$7.50	\$5.06	\$0.00	\$48.04
6	85	\$37.70	\$7.50	\$5.13	\$0.00	\$50.33
7	90	\$39.92	\$7.50	\$7.20	\$0.00	\$54.62

**Effective Date - 09/03/2017**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$27.14	\$7.75	\$3.31	\$0.00	\$38.20
2	65	\$29.40	\$7.75	\$3.38	\$0.00	\$40.53
3	70	\$31.66	\$7.75	\$3.45	\$0.00	\$42.86
4	75	\$33.92	\$7.75	\$5.02	\$0.00	\$46.69
5	80	\$36.18	\$7.75	\$5.09	\$0.00	\$49.02
6	85	\$38.45	\$7.75	\$5.15	\$0.00	\$51.35
7	90	\$40.71	\$7.75	\$7.22	\$0.00	\$55.68

**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 Apprentices 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. Apprentices ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

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

All steps are six months (1000 hours.)

Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

\*\* Multiple ratios are listed in the comment field.

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

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