



THE HONORABLE THOMAS P. KOCH MAYOR

**JAMES J FATSEAS
PLANNING AND COMMUNITY
DEVELOPMENT DIRECTOR**

**KATHRYN R. LOGAN
CHIEF PROCUREMENT OFFICER**

Walter Hannon Parkway & General McConville Way Intersection Improvement Project

Bidding Documents For Construction



**229256.29
City of Quincy, MA**

woodardcurran.com

February 2023

This page intentionally left blank

SECTION 00 01 07

SEALS PAGE

The engineering material and data contained in these Bidding and Contract Documents were prepared under the supervision and direction of the undersigned, whose seal as registered professional engineer is affixed below.

Date of Issue: February 15, 2023

Civil



Bradford Hart, P.E.
Woodard & Curran, Inc.

Transportation

A handwritten signature of Paul Furgal, P.E.



Paul Furgal, P.E.
McMahon, a BOWMAN company

Electrical



Andy Fitzpatrick, P.E.
Woodard and Curran

Structural



A handwritten signature of Michael S. Van Dusseldorp, P.E.

Mike Van Dusseldorp, P.E.
Woodard and Curran

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 00 01 10

TABLE OF CONTENTS – BIDDING DOCUMENTS

DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

INTRODUCTORY INFORMATION

- 00 01 07 Seals Page
- 00 01 10 Table of Contents
- 00 01 15 List of Drawing Sheets

PROCUREMENT/BIDDING REQUIREMENTS

- 00 11 16 Invitation to Bid
- 00 11 16A *Quincy Invitation to Bid*
- 00 21 13 Instructions to Bidders
- 00 22 13 Supplementary Instructions to Bidders
 - Required Tax Compliance Cert MAC30-c149
 - Sample Tax Certification MAC30-c149
 - Accounting Controls Letters MAC30-c149
- 00 31 00 Available Project Information
- 00 41 01 Bid Form
 - Bid Bond – Penal Sum Form (C-00 43 13)
 - Unit Prices Form
- 00 43 22 Proposed Subcontractors Form
- 00 43 36 Proposed Suppliers Form
- 00 43 37 Information, Schedules and Data
- 00 43 39 Bid Submittal Checklist
- 00 45 05 Bidder's Representations and Certifications
- 00 45 13 Bidder's Qualifications
- 00 45 19 Non-Collusion Affidavit

CONTRACTING REQUIREMENTS

- Sample Notice of Intent to Award (C-00 50 55)
- Sample Notice of Award (C-00 51 00)
- Quincy Agreement Form Signature Page
- Quincy Signature Authorization (Contractor)
- 00 52 10 Agreement Form
 - Performance Bond Form (C-00 61 13.13)*
 - Payment Bond Form (C-00 61 13.16)*
 - Quincy Signature Authorization*
- 00 54 00 Agreement Form Supplements
- 00 60 00 Sample Notice to Proceed (C-00 55 00)
Project Forms (listing)
 - Submittal Transmittal (Form 00 62 11)*
 - Application for Payment (Form C-00 62 76)*
 - Request for Interpretation/Information (Form C-00 63 15)*
 - Field Order (Form C-00 63 36)*

DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS (CONTINUED)

Work Change Directive (Form C-00 63 49)
Change Request (Form C- 00 63 60)
Change Order (Form C-00 63 63 MA)
City of Quincy Standard Change Order Form
Notice of Substantial Completion (Form C-00 65 15)
Certificate of Substantial Completion (Form C-00 65 16)
Notice of Completion (Form C-00 65 18)

00 72 05	Standard General Conditions of the Construction Contract (EJCDC C-700, 2007) <i>Including modifications</i>
00 73 05	<u>Supplementary Conditions(listing)</u> 00 73 10 General Supplementary Conditions <i>00 73 10A Quincy, Ma Municipal Code</i> <i>00 73 10B Quincy, Ma Zoning Code</i> 00 73 19 Health and Safety Requirements 00 73 43 Wage Rate Requirements 00 73 46 Wage Determination Schedule 00 73 73 Statutory Requirements

SPECIFICATIONS

DIVISION 01 GENERAL REQUIREMENTS

01 11 00	Summary of Work
01 15 00	Specific Project Requirements and Procedures
01 15 30	Payment and Administrative Procedures and Quality Requirements
01 20 25	Measurement and Payment
01 50 00	Temporary Facilities and Controls
01 50 40	Temporary Sewage Bypass
01 51 42	Temporary Stormwater Drainage Bypass
01 57 17	Temporary Rodent Control
01 60 00	Product Requirements
01 70 00	Execution and Closeout Requirements

DIVISION 02 - EXISTING CONDITIONS

02 41 13.26	Existing Structure Removal
02 41 13.27	Existing Structure Modifications
02 41 14	Selective Site Demolition and Restoration

DIVISION 03 - CONCRETE

03 11 00	Concrete Forming
03 16 00	Concrete Specialties
03 20 00	Concrete Reinforcing
03 30 00	Cast-In-Place Concrete
03 30 20	Concrete Placing Curing Finishing

DIVISION 05 - METALS

05 50 00	Metal Fabrications
05 52 00	Metal Railings

DIVISION 09 - FINISHES

09 90 00 Painting and Coating

DIVISION 26 - ELECTRICAL

26 05 00 Common Work Results for Electrical
26 05 19 Low-Voltage Electrical Power Conductors and Cables
26 05 26 Grounding and Bonding for Electrical Systems
26 05 33 Raceways and Boxes for Electrical Systems
26 05 43 Underground Ducts and Raceways for Electrical Systems
26 08 00 Commissioning of Electrical Systems
26 24 16 Panelboards
26 27 26 Wiring Devices
26 28 16 Enclosed Switches & Circuit Breakers
26 56 00 Exterior Lighting

DIVISION 31 - EARTHWORK

31 00 00 Earthwork
31 05 05 Selective Demolition for Earthwork
31 05 19.13 Geotextiles for Earthwork
31 14 13.16 Soil Stockpiling
31 25 00 Erosion and Sedimentation Controls
31 50 00 Excavation Support and Protection

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 05 23 Cement and Concrete for Exterior Improvements
32 12 16 Asphalt Paving
32 12 18 Utility Protector Rings
32 14 00 Brick Unit Pavers
32 16 14 Granite Curbs
32 17 23 Pavement Markings
32 30 00 Site Improvements
32 80 00 Irrigation
32 90 00 Planting and Seeding

DIVISION 33 - UTILITIES

33 31 11 Sanitary Sewerage Gravity Piping
33 39 13 Sanitary Sewerage Manholes, Frames and Covers
33 41 00 Storm Utility Drainage Piping
33 49 00 Stormwater Structures
33 50 00 Trenchless System

DIVISION 34 - TRANSPORTATION

34 41 13 Traffic Signals

END OF SECTION

This page intentionally left blank

SECTION 00 01 15

LIST OF DRAWING SHEETS

DRAWING NUMBER	DRAWING TITLE
G-000	Cover Sheet
G-001	General Notes, Legend, Abbreviations & Sheet Index
C-100	Existing Conditions Plan
C-200	Site Preparation Plan
C-300	Layout and Materials Plan
C-400	Grading and Drainage Plan
C-500	Sewer Plan
C-600	Civil Details 1
C-601	Civil Details 2
C-602	Civil Details 3
C-603	Civil Details 4
C-604	Civil Details 5
C-605	Civil Details 6
TS-100	Traffic Signal Layout Plan
TS-200	Traffic Signal Data Plan
TS-201	Traffic Signal Details
TS-202	Boring Logs
TS-203	Sign Summary
E-001	Electrical Legend
E-010	Electrical Riser Diagram and Panel Schedules
E-100	Electrical Site Plan

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

- E-800 Electrical Details 1
- S-001 Haunched Slab General Notes and Details
- S-002 Haunched Slab Details and Profiles

SECTION 00 11 16

INVITATION TO BID

The City of Quincy, MA (Owner) invites Bidders to submit sealed Bids for **Walter Hannon Parkway & General McConville Way Intersection Improvement Project**, which includes, but is not limited to the construction of a new signalized intersection at the south end of General James C. McConville Way; construction of the realigned Parkingway south of Walter Hannon Parkway to meet the new signalized intersection; Walter Hannon Parkway and Parkingway utility and surface improvements that include sanitary and stormwater infrastructure improvements, electrical/communication duct banks, roadway improvements, new sidewalks, hardscapes, installation of new street lighting, site walls, landscaping, green spaces and all materials, equipment, services and construction inherent to the Work

The Work shall be substantially completed by April 30, 2024 and completed and ready for final payment by May 31, 2024.

The Project being bid is subject to Massachusetts General Laws, Chapter 30, Section 39M.

Bids will be received until 1:00 p.m. local time on Thursday, March 16, 2023 at the offices of the Purchasing Department, City Hall, 1305 Hancock Street, Quincy, Massachusetts 02169. Bids will then be publicly opened and read aloud. Bids received after the time of announced opening will not be accepted. Clearly label bids, “**WALTER HANNON PARKWAY & GENERAL McCONVILLE WAY INTERSECTION IMPROVEMENT PROJECT**”.

Sets of Bidding Documents may be obtained:

(1) **electronically at no cost** by registering at:

https://www.quincyma.gov/govt/depts/purchasing/current_bids.htm

Bidders shall send a confirming email to “purchasing@quincyma.gov” to allow Owner to maintain a plan holders list. If Bidding Documents are downloaded and/or printed from Owner’s website, it is Bidder’s responsibility to check the website for any addenda before submitting a Bid. The Owner will not be responsible for any Bid that omits addenda acknowledgement. *Note: the “Standard General Conditions of the Construction Contract (CH.30-39m)” on the Owner’s website are superseded by the General Conditions included in these Bidding Documents.*

OR

Bidding Documents will also be made available upon written request to the Office of the Purchasing Agent, Quincy City Hall, 1305 Hancock Street, Quincy, Massachusetts, 02169, between the hours of 8:30 AM and 4:30 PM by means of delivered documents for a refundable printing charge of \$100.00 if returned 10 days within Bid opening and in unused condition.

Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents, Bidding Documents or any portion thereof provided by third parties, or for modifications to the Bidding Documents not made by official Addenda, including electronic conversion.

Bid security in the amount of 5 percent of the Bid must accompany the Bid in accordance with the Instructions to Bidders.

Prevailing wage rates as issued by the Director of the Executive Office of Labor and Workforce Development, Department of Labor Standards under the provisions of Massachusetts General Laws, Chapter 149, Sections 26 to 27D inclusive, as amended, apply to this Project. It is the responsibility of the Bidders, 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 the resulting Contract.

Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, not to be responsible or eligible. Owner may also reject the Bid of any Bidder if Owner reasonably believes that it would not be in the best interest of the Project or the public to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

END OF SECTION



CITY OF QUINCY, MASSACHUSETTS **Department of Planning and Community Development**

**Thomas P. Koch, Mayor
James Fatseas, Director of Planning and Community Development**

INVITATION TO BID

The Department of Public Works for the City of Quincy, Massachusetts is seeking sealed bids for **Walter Hannon Parkway and General McConville Way Intersection Improvement Project** until **1:00 P.M.** local time, **March 16, 2023**, in the offices of the Purchasing Agent, 1305 Hancock St., Quincy, Massachusetts 02169, at which time and place all bids will be opened, read aloud.

Bids will be received via U.S. mail or courier or in the Purchasing Department, 1305 Hancock Street, Quincy, MA. The Bid opening will be performed in accordance with the Inspector General's and Attorney General's guidelines (as applicable) for Bid openings.

The Work under this Contract includes, but is not limited to, roadway construction; street lighting; traffic signalization; traffic signage; electrical, stormwater and sewer infrastructure improvements including removing and disposing existing infrastructure; installing new infrastructure; construction of retaining walls; landscaping; hardscape; removal of select existing street lighting and signalization and all materials, equipment, services and construction inherent to the Work at the intersection of Walter Hannon Parkway and General McConville Way. in Quincy, MA.

The Work shall be substantially completed by April 30, 2024, and completed and ready for final payment by May 31, 2024.

Detailed specifications will be available February 15, 2023, at no cost on-line at the City of Quincy's Website, https://www.quincyma.gov/govt/depts/purchasing/current_bids.htm. Bidders shall send a confirming email to "purchasing@quincyma.gov" to allow Owner to maintain a plan holders list. If Bidding Documents are downloaded and/or printed from Owner's website, it is Bidder's responsibility to check the website for any addenda before submitting a Bid. The Owner will not be responsible for any Bid that omits addenda acknowledgement. Bidding Documents will also be made available upon written request to the Office of the Purchasing Agent, Quincy City Hall, 1305 Hancock Street, Quincy, Massachusetts, 02169, between the hours of 8:30 AM and 4:30 PM by means of delivered documents for a refundable printing charge of \$100.00 if returned 10 days within Bid opening and in unused condition.

Each Bid shall be accompanied by a Bid security in the amount of five percent (5%) of the total value of the Bid in the form of a Bid bond or certified/treasurer's check. The bidding and award of this Contract shall be in full compliance with Massachusetts General Laws, Chapter 30, Section 39M, as last revised, all Federal, State and City of Quincy regulations when applicable in relation to Minority Business Enterprise, Women's Business Enterprise, Minority Work Force, Equal Employment Opportunity, and subject to the minimum wage rates set under the Massachusetts Prevailing Wage Law Chapter 149, §26 to 27H and/or any applicable federal rates. The City reserves the right to waive any informality in or to reject any or all Bids when such an action is deemed in the best interests of the City.

Non-responsive and/or unbalanced Bids may be rejected.

Thomas P. Koch
Mayor

James Fatseas
Director, Dept. Planning and Community Development

Kathryn R. Logan
Chief Procurement Officer

This page intentionally left blank

SECTION 00 21 13

INSTRUCTIONS TO BIDDERS

ARTICLE 1 – DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions, if any. Additional terms used in these Instructions to Bidders have the meanings indicated below and as may be included in the Supplementary Instructions to Bidders.
- A. *Issuing Office* – The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered identified in the Invitation to Bid.
 - B. *Supplements* – Those portions of the Bidding Requirements to be submitted with and made a condition of a Bid including required submittals.
 - C. *Notice of Intent to Award* – The written notice to the Successful Bidder indicating, conditions precedent to receiving a Notice of Award and Agreement for execution.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Sets of Bidding Documents may be examined and obtained as stated in the Invitation to Bid.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents, Bidding Documents or any portion thereof provided by third parties, or for modifications to the Bidding Documents not made by official Addenda, including electronic conversion.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidders' qualifications to perform the Work, Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data requested in the Bidding Documents, and within the time frames stipulated upon Owner's request.
- 3.02 Bidders shall meet minimum criteria regarding experience and qualifications set forth in the General Requirements and the Specifications.

ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

4.01 *Subsurface and Physical Conditions*

- A. Section 00 73 10 of the Supplementary Conditions identifies:
 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. Copies of reports and drawings referenced in Section 00 73 10, if any, are included in the Bidding Documents as indicated in Section 00 31 00. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions, has been identified and established in Section 00 73 10 of the Supplementary Conditions.
- C. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.02 *Underground Facilities*

- A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

4.03 *Hazardous Environmental Condition*

- A. Section 00 73 10 of the Supplementary Conditions identifies any reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.
 - B. Copies of reports and drawings referenced in Section 00 73 10, if any, are included in the Bidding Documents as indicated in Section 00 31 00. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.06 of the General Conditions has been identified and established in Section 00 73 10 of the Supplementary Conditions.
 - C. Bidder is responsible for any interpretation or conclusion Bidder draws from any “technical data” or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
- 4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions and Section 00 73 10 of the Supplementary Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 4.06 of the General Conditions and Section 00 73 10 of the Supplementary Conditions.
- 4.05 Upon request, Owner may provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall be responsible for obtaining permission and necessary permits and insurance for access to the Site. Bidder shall clean up and restore the Site to its former condition upon completion of any such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.
- 4.06 Reference is made to Article 7 of the General Conditions and Section 00 73 10 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, Owner will provide to each Bidder for examination access to or copies of contract documents (other than portions thereof related to price) for such other work.

INSTRUCTIONS TO BIDDERS

WOODARD & CURRAN

00 21 13-3

4.07 It is the responsibility of each Bidder before submitting a Bid to:

- A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;
- B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Section 00 73 10, as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Section 00 73 10, as containing reliable "technical data";
- E. consider the information known to Bidder; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;
- F. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;

- I. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and
 - J. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.
- 4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 – PRE-BID CONFERENCE

5.01 A pre-Bid conference will not be held.

ARTICLE 6 – SITE AND OTHER AREAS

- 6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to the Issuing Office, attention Kathryn R. Logan, Chief Procurement Officer, via email (klogan@quincyma.gov) with a copy to Meredith A. Marini at (mmarini@quincyma.gov) and purchasing@quincyma.gov.
- 7.01 **The deadline for questions is 4:00 p.m. on March 10, 2023.** Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. Interpretations or clarifications considered necessary in response to such questions will be issued by Addenda.
- 7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer, will be available for examination at the Issuing Office, will be posted on the Owner's website as stated in the Invitation to Bid, and will not be mailed or faxed to registered Bidders. **It is each Bidder's responsibility to check the website for Addenda.**

ARTICLE 8 – BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price and in the form of a certified check, treasurer's or cashier's check, or money order, or a Bid bond on or consistent with the form included in the Bidding Documents in Section 00 43 13 issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General and Supplementary Conditions, if any.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the Contract to such Bidder, and such Bidder has furnished the required Contract security, insurance documentation and met the other conditions of the Notice of Intent to Award, Notice of Award, and executed the Contract Documents, whereupon the Bid security will be released. If the Successful Bidder fails to furnish the required Contract security, insurance documentation, and meet the other conditions as stated in the Notice of Intent to Award, Notice of Award, and execute and deliver the Contract Documents, Owner may consider Bidder to be in default, annul the Notice of Intent to Award or Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Agreement or 91 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned. See Supplementary Instructions to Bidders (if any) for additional information.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be returned within 5 days after the Bid opening.

INSTRUCTIONS TO BIDDERS

WOODARD & CURRAN

00 21 13-6

ARTICLE 9 – CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS

- 11.01 The Contract, if awarded, will be on the basis of materials and equipment and construction methods or procedures specified or described in the Bidding Documents without consideration of possible substitute or “or-equal” items. Whenever it is specified or described in the Bidding Documents that a substitute or “or-equal” item of material or equipment and construction methods or procedures may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS AND OTHERS

- 12.01 The Bidding Documents may require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner with the Bid.
- 12.02 As required in the Bidding Documents, or within 5 days after Bid opening if requested by Owner, Bidder shall submit a listing and experience statement with pertinent information regarding similar projects and other evidence of qualification for each Subcontractor, Supplier, individual, or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute without an increase in the Bid.
- 12.03 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest responsible Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the General and Supplementary Conditions, if any.
- 12.04 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

INSTRUCTIONS TO BIDDERS

WOODARD & CURRAN

00 21 13-7

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form and Supplements are included with the Bidding Documents.
- 13.02 Bids are to be submitted as indicated in the Bid Form. All blanks on the Bid Form shall be completed in ink or typewritten and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form.
- 13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.
- 13.04 A Bid by a partnership shall be executed in the partnership name and signed by a general partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown.
- 13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member or manager and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 13.06 A Bid by an individual shall show the Bidder's name and official address.
- 13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 13.08 All names shall be printed in ink below the signatures.
- 13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.10 Postal and e-mail addresses and telephone numbers for communications regarding the Bid shall be shown.
- 13.11 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form. See Supplementary Instructions to Bidders for additional requirements, if any.
- 13.12 Bidders are advised to carefully review those portions of the Bid Form and Supplements requiring Bidder's representations and certifications that are to be submitted with a Bid or subsequent to the Bid opening, and made a condition of the Bid.

ARTICLE 14 – BASIS OF BID; COMPARISON OF BIDS

14.01 *Bid Pricing*

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed on the Unit Prices Form in Section 00 43 22. Bid prices shall be stated in both words and figures.
- B. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price included on the Unit Prices Form in Section 00 43 22. The final quantities and Contract Price will be determined in accordance with Paragraph 11.03 of the General and Supplementary Conditions, if any.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between prices written in words and prices written in figures will be resolved in favor of prices written in words.

14.02 *Alternates (if any)*

- A. Bidders shall include a separate price for each alternate described in the Bidding Documents as provided for in the Bid Form and Supplements, if any. The price for each alternate will be considered in accordance with Article 19.

14.03 *Completion Time Comparisons*

- A. Bid prices will be compared after adjusting for exceptions taken by Bidders for the number of days or dates set for Substantial Completion per Article 9 above if allowed in Bid Form. The adjusting amount will be determined at the rate set forth in the Agreement for liquidated damages for failing to achieve Substantial Completion.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished a copy of the Bid Form, the Bid Security Form and Supplements. An original signed hard copy of the Bid Form, the original of the Bid security, Supplements as listed in the Bid Form are to be completed and submitted to the Issuing Office.

A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Invitation to Bid and shall be enclosed in a plainly marked package with the Project title, the name and address of Bidder, and shall be accompanied by the Bid security and other required documents.

If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." **A Bid sent by mail or courier shall be addressed to the Issuing Office.**

Bidders shall be responsible to confirm the ability of overnight mailing or courier services to deliver to the Issuing Office.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered in hard copy to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Such modifications and withdrawals may not be transmitted by email.
- 16.02 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is re-Bid, that Bidder will be disqualified from submitting a Bid on the Work.

ARTICLE 17 – OPENING OF BIDS

- 17.01 Bids will be opened at the time and place indicated in the Invitation to Bid and, unless obviously non-responsive, read aloud publicly.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, not to be responsible or not to meet the specified qualification or quality requirements, based on poor references or otherwise. Owner may also reject the Bid of any Bidder if Owner reasonably believes that it would not be in the best interest of the Project or public to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work.
- 19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder

has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

- 19.03 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data as may be requested in the Bid Form or prior to the Notice of Intent to Award or Notice of Award.
- 19.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities are submitted.
 - A. Owner may also consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.
- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.
 - A. Owner may conduct reference checks for the Bidder. Poor references may be a basis for deeming Bidder as not responsible. Reference questions will include, but are not limited to, product quality and durability, overall work quality, performance, timely delivery/completion, customer service, and general customer satisfaction.
- 19.06 If the Contract is to be awarded, Owner may award the Contract to the responsible and eligible Bidder, offering the lowest price for the Bid and whose Bid is in the best interests of the Project or public.
- 19.07 The Owner will issue a Notice of Intent to Award to the Successful Bidder in the form included in Bidding Documents. Within 15 days of receipt of the Notice of Intent to Award, the Successful Bidder shall comply with the conditions set forth therein and provide requested information. After required reviews and approvals by Owner of bonds and insurance documentation, and other conditions set forth in the Notice of Intent to Award, the Owner may issue a Notice of Award in accordance with Article 21.

ARTICLE 20 – CONTRACT SECURITY AND INSURANCE

- 20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds.

- 20.02 The Successful Bidder who receives the Notice of Intent to Award will be required to provide the Performance Bond and Payment Bond and required insurance documentation within 15 calendar days from the date of receipt of the Notice of Intent to Award.
- 20.03 In case the bonds or insurance documentation submitted by the Successful Bidder do not meet the requirements of the Contract Documents, and changes are to be made before these documents can be accepted by the Owner, the Successful Bidder is obligated to accept an extension of the date of award of the Contract, or the date of issuance of Notice to Proceed, as the case may be, for that period of additional time required to furnish acceptable documents.

ARTICLE 21 – SIGNING OF AGREEMENT

- 21.01 After required reviews and approvals by Owner of bonds and insurance documentation and other conditions set forth in the Notice of Intent to Award, Owner will issue a Notice of Award to the Successful Bidder. When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents which are identified in the Agreement as attached thereto. Within 10 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. After required reviews and approvals, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

ARTICLE 22 – RETAINAGE

- 22.01 Provisions regarding retainage are set forth in the Agreement.

ARTICLE 23 – CONTRACTOR'S WARRANTY AND GUARANTEES; CORRECTION PERIOD

- 23.01 Provisions regarding Contractor's general warranty and guarantees and correction period are set forth in Articles 6.19, 13.06, 13.07, 13.09 and 14.03 of the General and Supplementary Conditions, if any.

ARTICLE 24 – SAFETY AND HEALTH REGULATIONS

- 24.01 The Project is subject to the Safety and Health Regulations of the U.S. Department of Labor set forth in Title 29 CFR, Part 1926 and to all subsequent amendments, as a minimum, and other specific requirements identified in the Supplementary Conditions.

ARTICLE 25 – EQUAL EMPLOYMENT OPPORTUNITY, ANTI-DISCRIMINATION, AND AFFIRMATIVE ACTION

25.01 Provisions regarding the requirements for equal employment opportunity, anti-discrimination, and affirmative action programs, if any, are set forth in the Supplementary Conditions.

ARTICLE 26 – WAGE RATE REQUIREMENTS

26.01 Wage rate requirements, if any, are set forth in the Supplementary Conditions.

ARTICLE 27 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

27.01 Supplementary Instructions to Bidders, if any, are included in Section 00 22 13 and may include certain provisions required by Laws and Regulations and funding agencies. Bidders are solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

WOODARD & CURRAN

**INSTRUCTIONS TO BIDDERS
00 21 13-14**

Based on EJCDC C-200. Revised by Woodard & Curran on behalf of and as approved by Owner
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.

SECTION 00 22 13

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

The following supplement or modify the Instructions to Bidders. This section includes certain provisions required by Laws and Regulations, but does not represent or reflect all applicable provisions and policies or Laws and Regulations, and may only include excerpts and portions thereof. Other required provisions and policies, and Laws and Regulations, shall be deemed to be so included and incorporated herein. Bidders are solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations. Representations, certifications, compliance statements and forms relating to the subject matter in this Section are included in Section 00 45 05 and must be submitted by each Bidder as part of its Bid. Failure to do so may render a Bid non-responsive.

1.01 APPLICABLE LAWS FOR BID AND AWARD; GENERAL

- A. This Contract is being bid under the provisions of Massachusetts General Law (MGL) Chapter 30, Section 39M, *Contracts for construction and materials; manner of awarding*.
- B. The Bid and Contract are subject to MGL Chapter 43, Section 27 *Interest In Public Contracts By Public Employees Prohibited; Penalty* and provisions of MGL Chapter 268A, Section 20 *Municipal Employees; Financial Interest In Contracts; Holding One Or More Elected Positions*.
- C. Pursuant to Paragraphs 19.01 and 19.06 of the Instructions to Bidder, Bidders must be “eligible” as defined by MGL Chapter 30, Section 39M.

1.02 ADDITIONAL DEFINED TERMS

- A. *Bid security* – per the Instructions to Bidders. Also “bid deposit” as used in MGL Chapter 30, Section 39M.
- B. *Lowest Responsible and Eligible Bidder* – Also the Successful Bidder. As defined in MGL Chapter 30, Section 39M,

“The term “lowest responsible and eligible bidder” shall mean the bidder: (1) whose bid is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the work; (2) 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 in the work; (3) who shall certify that all employees to be employed at the worksite will 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 at the time the employee begins work and who shall furnish documentation of successful completion of said course with

the first certified payroll report for each employee; (4) who, where the provisions of section 8B of chapter 29 apply, shall have been determined to be qualified thereunder; and (5) who obtains within 10 days of the notification of contract award the security by bond required under section 29 of chapter 149; provided that for the purposes of this section the term “security by bond” shall mean the bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority; provided further, that if there is more than 1 surety company, the surety companies shall be jointly and severally liable.”

1.03 APPLICABLE REQUIREMENTS OF THE MGL

- A. **Foreign Corporations:** The provisions of MGL Chapter 30, Section 39L, *Public construction work by foreign corporations; restrictions and reports*, requires that if a Bidder is a foreign corporation, it shall provide with its Bid, a certificate from the Commonwealth of Massachusetts Secretary of State stating that the corporation has complied with requirements of Section 15.03 of subdivision A of Part 15 of MGL Chapter 156D and the date of compliance, and further has filed all annual reports required by Section 16.22 of subdivision B of Part 16 of said Chapter 156D, and further, will provide such certificate for each Subcontractor that is a foreign corporation if it receives a Notice of Intent to Award. Also see Section 00 45 05 of the Bidding Requirements.
- B. **Taxes:** Bidder shall submit with its Bid, a “Certificate of Good Standing” with respect to all returns due and taxes from the Commonwealth of Massachusetts Department of Revenue certifying Bidder has complied with all laws relating to taxes, reporting of employees and contractors, and withholding and remitting of child support. Bidder will provide such certificate for each Subcontractor if it receives a Notice of Intent to Award. Bidders are encouraged to obtain such Certificate of Good Standing online at

<https://www.mass.gov/how-to/request-a-certificate-of-good-standing-tax-compliance-or-a-corporate-tax-lien-waiver>

See explanation, instructions, and sample at the end of this Section.
- C. **Debarment:** A Bidder is ineligible to bid or enter into a public contract in the Commonwealth of Massachusetts if it has been debarred from bidding on or entering into a public contract under the provisions of MGL Chapter 29, Section 29F, *Debarment from bidding; definitions; lists; notice; affiliates; mitigating circumstances*, or any other applicable debarment provisions of any other chapter of the MGL or any rule or regulations promulgated thereunder.
- D. **Financial Statements:** The following shall be submitted prior to execution of the Agreement in accordance with MGL Chapter 30, Section 39R *Definitions; contract*

provisions; management and financial statements; enforcement as requested in the Notice of Intent to Award issued to the Successful Bidder.

- To Owner - A statement by management on internal accounting control and a statement prepared by an independent certified public accountant regarding management's statement (samples at the end of this section); and
- To DCAMM - An audited financial statement for the most recent completed fiscal year.

E. Labor Preferences and Work Hours

1. The provisions of MGL Chapter 149, Section 26, *Public works; preference to veterans and citizens; wages*, requires that employment in the construction of public works be subject to preference being given to citizens of the Commonwealth of Massachusetts, citizens of the town or city where the Project is located, veterans and service-disabled veterans, and citizens of the United States. The provisions of MGL Chapter 149, Section 179A, *Preference to citizens in awarding public work contracts, violations*, requires that award of contracts for public work be subject to preference being given to persons who are citizens of the United States.
2. The provisions of MGL Chapter 149, Sections 26, 27, and 27A through 27D, as amended, set forth requirements for prevailing wage rates as issued by the Executive Office of Labor and Workforce Development, Department of Labor Standards. It is the responsibility of the Bidders, 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 the resulting Contract. See Section 00 73 43.
3. The provisions of MGL Chapter 149, Section 30, *Eight hour day and six day week; emergencies; work on highways*, and Section 34, *Public contracts; stipulation as to hours and days of work; void contracts*, apply to this Project.

- F. **Sales Tax Exemption:** MGL Chapter 64H, Section 6, *Exemptions*, subsection (f), exempts building materials and supplies to be used in the Project from Commonwealth of Massachusetts sales tax and Bidder shall not include any amount therefor. 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 words shall also include rental charges for construction vehicles, equipment and machinery rented specifically for use on the Project Site, or while being used exclusively for the transportation of materials for the Project.

G. **Safety and Health:** This Project is subject to Safety and Health Regulations of the U.S. Department of Labor set forth in Title 29 CFR, Part 1926 and to all subsequent amendments, and to Massachusetts Department of Labor and Industries, Division of Occupational Safety 454 CMR 10.00 et seq. "*Construction Industry Rules and Regulations*"; Massachusetts Department of Public Safety 520 CMR 14.00 et seq. "*Excavation and Trench Safety*"; MGL Chapter 82, *The Laying Out, Alteration, Relocation and Discontinuance Of Public Ways and Specific Repairs Thereon*; MGL Chapter 82A, *Excavation and Trench Safety*, and MGL Chapter 149 Section 129A, *Shoring Trenches for local governments*.

1. In addition, MGL Chapter 30, Section 39S, requires that all employees to be employed at the Work Site will 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 at the time the employee begins Work, and documentation of successful completion of said course shall be submitted with the first certified payroll report for each employee. Any employee found on a Work Site 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.
2. Comply with the State and Federal COVID-19 guidelines and procedures for the construction sector (as may be amended).

H. **Special Licensing**

1. Work involving the removal, containment, or encapsulation of asbestos or material containing asbestos must be performed by a contractor licensed in accordance with MGL Chapter 149, Section 6B.
2. Sheet metal work must be performed by a contractor licensed in accordance with 271 CMR 1.00, et seq. governing licensing, permitting, and sheet metal work in Massachusetts.

I. **Public Records:** The Bid and Contract are subject to MGL Chapter 66 et seq., *Public Records*, and as such, related submittals, purchase orders, related pricing documents, and invoices will be public documents, and may be available for public and private distribution, except as specifically excluded. The Bidder agrees to provide the Owner copies of any documents requested under this law at no charge to the Owner or the requestor.

J. **Price Adjustments for Certain Materials:** As required by Chapter 150 of the Acts of 2013, the provisions of MGL Chapter 30, Section 38A, *Price adjustment clause in contracts for road, bridge, water and sewer projects awarded under*

Sec. 39M, adjustments for fuel (both diesel and gasoline), liquid asphalt and Portland cement shall be made as set forth in Section 00 73 73, SC-12.01.

1.04 REQUIREMENTS OF THE CITY OF QUINCY

- A. Bidders shall submit information per Section 00 45 13 regarding any labor disputes during the past 5 years.

1.05 SPECIAL SEQUENCING AND REQUIREMENTS

- A. Work shall be sequenced by the Priority Locations specified in Section 01 11 00 Summary of Work.
- B. Allocate sufficient personnel and provide for orderly progression of Work in accordance with the approved Progress Schedule to meet the Milestones in the Agreement.

ATTACHMENTS

- A. MA Department of Revenue – Instructions for Requesting a Certificate of Good Standing-Tax Compliance or Corporate Tax Lien Waiver
- B. Sample Certificate of Good Standing and/or Tax Compliance
- C. Accounting Controls Letters MGLc30s39R

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank



Mass.gov

Request a Certificate of Good Standing-Tax Compliance or a Corporate Tax Lien Waiver

Whether you are a business or an individual, learn how to request proof you're in good tax standing with the Massachusetts Department of Revenue.

If filed online with MassTaxConnect, you should hear back within a day or two.

Request for a business with MassTaxConnect

(<https://mtc.dor.state.ma.us/mtc/?link=COGS>)

Request for an individual with MassTaxConnect

(<https://mtc.dor.state.ma.us/mtc/?Link=COGSIND>)

THE DETAILS

What you need

- Your Social Security number or Employee Identification Number (EIN)
- If you're selling your business, a legal description of assets to be sold

There is no fee to obtain a Certificate of Good Standing-Tax Compliance or a Corporate Tax Lien Waiver.

A **Certificate of Good Standing-Tax Compliance or a Corporate Tax Lien Waiver** is the answer when individuals, corporations, and other organizations need proof they've filed their tax returns and paid tax bills in order to:

- Obtain financing
- Renew a liquor or professional license
- Enter into a business transaction

CONTACT

Certificate of Good of Standing

Phone

(617) 887-6400 (tel:6178876400)
8:30 a.m.-4:30 p.m., Monday through Friday

RELATED

Video - How to File for a Certificate of Good Standing When you are Logged in (<https://www.youtube.com/watch?v=vLtlJZmc8>;

Set up a payment agreement ([/info-details/dor-payment-agreement](#))

AP 613: Requesting Certification of Tax Compliance (<http://www.mass.gov/dor/businesses/help-and->

- Get a job
- Sell a business (Corporate Tax Lien Waiver).

If requested with MassTaxConnect, authorized practitioners can obtain a Certificate within a day or two.

Before making a request, practitioners should have:

- The entity's identification number and
- A list of tax types filed with the Department of Revenue (DOR).

How to request

Online

Apply online with MassTaxConnect:

- [Businesses](https://mtc.dor.state.ma.us/mtc/?link=COGS) (<https://mtc.dor.state.ma.us/mtc/?link=COGS>)
- [Individuals](https://mtc.dor.state.ma.us/mtc/_/?Link=COGSIND) (https://mtc.dor.state.ma.us/mtc/_/?Link=COGSIND)

Video - [How to File for a Certificate of Good Standing](#)

[When you are Logged](#)

[in](https://www.youtube.com/watch?v=vLtlJZmc87o&pbjreload=10) (<https://www.youtube.com/watch?v=vLtlJZmc87o&pbjreload=10>)

By mail

File a [Request for a Certificate of Good Standing and/or Tax Compliance or Waiver of Corporate Tax Lien](#) (</doc/request-for-a-certificate-of-good-standing-and-or-tax-compliance-or-waiver-of-corporate-tax-0/download>).

Processing of a paper application can take 4 to 6 weeks. We strongly recommend filing your request online if that option is available to you.

More info

Once you've submitted your request, a search will be made to identify any:

- Returns you need to file, or
- Bills you need to pay.

You will receive an email letting you know the results of this search and what you need to do.

Fully compliant taxpayers will be able to:

- Print a Certificate, or
- Request a mailed copy to the address of record.

If you need to pay a bill, you'll be given an opportunity to pay via electronic funds withdrawal or credit card. You can file and pay most non-filed tax returns with

MassTaxConnect (https://mtc.dor.state.ma.us/mtc/_/).

Please be aware that you have to wait at least 24 hours to reapply for a Certificate of Good Standing if you:

- Pay a bill through electronic funds withdrawal,
- Pay a bill by credit card, or
- File returns online.

You can also request a Professional License Renewal Certificate using MassTaxConnect by selecting:

- The Individual tab on
MassTaxConnect (<https://mtc.dor.state.ma.us/mtc/?Link=COGSIND>),
then
- Certificate of Good Standing under Individuals,
then
- Professional License Renewal Certificate.

Contact

Certificate of Good of Standing

Phone

(617) 887-
6400 (tel:6178876400)
8:30 a.m.-4:30 p.m., Monday
through Friday

RELATED

Video - How to File for a Certificate of Good Standing

When you are Logged

in (<https://www.youtube.com/watch?v=vLtlJZmc87o&pbjreload=10>)

Set up a payment

agreement (</info-details/dor-payment-agreement-frequently-asked-questions>)

AP 613: Requesting Certification of Tax Compliance

<http://www.mass.gov/dor/businesses/help-and-resources/legal-library/administrative-procedures/ap-613-requesting-certificatio>

Did you find what you were looking for on this webpage? *

Yes No

SEND FEEDBACK



Commonwealth of Massachusetts
Department of Revenue
Christopher C. Harding, Commissioner
mass.gov/dor

Letter ID: L0 #####
Notice Date: ####-##-##
Case ID: 0-000-####



SAMPLE

CERTIFICATE OF GOOD STANDING AND/OR TAX COMPLIANCE



Why did I receive this notice?

The Commissioner of Revenue certifies that, as of the date of this certificate, **COMPANY NAME** is in compliance with its tax obligations under Chapter 62C of the Massachusetts General Laws.

This certificate doesn't certify that the taxpayer is compliant in taxes such as unemployment insurance administered by agencies other than the Department of Revenue, or taxes under any other provisions of law.

This is not a waiver of lien issued under Chapter 62C, section 52 of the Massachusetts General Laws.

What if I have questions?

If you have questions, call us at (617) 887-6367 or toll-free in Massachusetts at (800) 392-6089, Monday through Friday, 8:30 a.m. to 4:30 p.m..

Visit us online!

Visit mass.gov/dor to learn more about Massachusetts tax laws and DOR policies and procedures, including your Taxpayer Bill of Rights, and MassTaxConnect for easy access to your account:

- Review or update your account
- Contact us using e-message
- Sign up for e-billing to save paper
- Make payments or set up autopay

Edward W. Coyle, Jr., Chief
Collections Bureau

SAMPLE

**Massachusetts
Department of Revenue**

PO BOX 7073 BOSTON, MA 02204



CHRISTOPHER C. HARDING, COMMISSIONER
CHARLENE HANNAFORD, DEPUTY COMMISSIONER

Collections Bureau, Certificate Unit
Telephone: (617) 887-6400
Date:

Company

Name

T/P ID XXX XX XXXX

The Massachusetts Department of Revenue has received a request for a Certificate of Good Standing for the above listed taxpayer. The Massachusetts Department of Revenue currently considers this taxpayer to be in compliance with the tax laws of the Commonwealth of Massachusetts.

A handwritten signature of Charlene Hannaford.

Charlene Hannaford
Deputy Commissioner

SAMPLE LETTER 1
FROM CONTRACTOR REGARDING ACCOUNTING CONTROLS
Pursuant to MGL Chapter 30, Section 39R

TO BE SUBMITTED ON CONTRACTOR'S LETTERHEAD

DATE

INSERT Owner name and address

RE: [INSERT CONTRACT #/PROJECT # AND NAME]

Dear [_____]:

This letter is being submitted pursuant to MGL Chapter 30 §39R(c). Please be advised that our firm has a system of internal accounting controls which assure that:

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

Sincerely,

[Name and title of authorized representative of Contractor]

SAMPLE LETTER 2
FROM CPA REGARDING CONTRACTOR ACCOUNTING CONTROLS
Pursuant to MGL Chapter 30, Section 39R

TO BE SUBMITTED ON CPA'S LETTERHEAD

DATE

INSERT Owner name and address

RE: [INSERT CONTRACT #/PROJECT # AND NAME]

Dear [_____]:

Please be advised that we have reviewed the Statement of Internal Accounting Controls prepared by [NAME OF CONTRACTOR], in connection with the above-captioned Project as required under MGL Chapter 30, § 39R. In our opinion, representations of management are consistent with our evaluations of the system of internal accounting controls and such representations are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to [NAME OF CONTRACTOR]'s financial statements.

Sincerely,

_____, CPA
[Name]

SECTION 00 31 00

AVAILABLE PROJECT INFORMATION

INFORMATION	LOCATION OF INFORMATION
Reports <i>Geotechnical Report, prepared by Northeast Geotechnical, Inc., prepared for Woodard & Curran, dated January 31, 2023.</i>	Appendices
Survey <i>Nitsch Engineering- As-Built & Layout Plan Quincy Center Concourse dated March 8, 2013</i>	Appendices
<i>Feldman Land Surveyors- Intersection of Walter Hannon Parkway and Parking Way Partial Existing Condition Plan dated January 28, 2021.</i>	
Reference Drawings <i>Mass Highway Quincy Center Concourse Section 1 dated October 14, 1998</i>	Appendices
<i>SDG-Quincy Center Redevelopment Town Brook Enhancement Project (Phase 2A) dated November 16, 2011</i>	
Record Drawings <i>Brightview- Irrigation As-Built McConville Way dated September 16, 2021</i>	Appendices
<i>Woodard and Curran- General McConville Way Roadway and Utility Improvements Project As-Built Documents date September 2021</i>	
<i>J. Derenzo Company- McGrath Highway at Quincy Center, Utility As-Built Drawing Dec 1, 2011.</i>	
<i>SDG-Verizon Duct Bank Relocation Project Utility Improvements dated September 14, 2012</i>	

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

END OF SECTION

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 00 41 01

BID FORM

ARTICLE 1 – DEFINED TERMS

- 1.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions and Supplementary Conditions, if any.

ARTICLE 2 – BID RECIPIENT

- 2.01 This Bid is submitted to:

**City of Quincy Massachusetts
Purchasing Department
Quincy City Hall
1305 Hancock Street
Quincy, MA 02169**

- 2.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 3 – BIDDER'S ACKNOWLEDGEMENTS

- 3.01 Bidder accepts all of the terms and conditions of the Bidding Documents including, without limitation:
- those dealing with disposition of Bid security;
 - insurance and bonding requirements (Payment Bond and Performance Bond each equal to 100% of the total Contract Price) set forth in the General Conditions and Supplementary Conditions, if any;
 - Contract Times as set forth in the Agreement; and
 - provisions for liquidated damages as set forth in the Agreement.
- 3.02 This Bid will remain subject to acceptance for 90 days after the Bid opening or for such longer period of time that Bidder may agree to in writing upon request of Owner.

3.03 Bidder acknowledges receipt of the following Addenda.

Addendum No. Addendum Date

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

3.04 Bidder acknowledges the representations and certifications included in Section 00 45 05 are made a condition of the Bid.

ARTICLE 4 – BASIS OF BID

4.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s) based on unit prices included in Section 00 43 22. **Bidder must complete all items.**

BID PRICES SHALL EXCLUDE SALES AND USE TAX.

TOTAL BID PRICE (based on Section 00 43 22 Unit Prices Form)

(Use words) Dollars and _____ Cents
\$
(Use figures) _____

WOODARD & CURRAN

BID FORM
00 41 01-2

- 4.02 Unit Prices have been computed in accordance with Paragraph 11.03.A of the General Conditions and Supplementary Conditions, if any.
- 4.03 Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for unit price items will be based on actual quantities determined and based on the unit prices included in Section 00 43 22, as provided in the General Conditions and Supplementary Conditions, if any.

ARTICLE 5 – TIME OF COMPLETION

- 5.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions and Supplementary Conditions, if any, on or before the dates or within the number of calendar days indicated in the Agreement.
- 5.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 6 – ATTACHMENTS TO THIS BID

6.01 The following documents are fully completed, submitted with and made a part of and a condition of this Bid.

- 00 43 13 Bid Bond

OR

- Required Bid security in the form of _____

Supplements

- 00 43 22 Unit Prices Form

- 00 43 36 Proposed Subcontractors Form

- 00 43 37 Proposed Suppliers Form

- 00 43 40 Information, Schedules and Data

- 00 45 05 Bidder's Representations and Certifications including required submittals

- 00 45 13 Bidder's Qualifications

- 00 45 19 Non-collusion Affidavit

ARTICLE 7 – BID SUBMITTAL

7.01 This Bid is submitted by:

A Corporation

Corporation Name: _____

State of incorporation: _____

Type: _____
(General Business, Professional, Service, other)

By: _____
(Signature – attach evidence of authority to sign)

Name (*typed or printed*): _____

Title: _____
(CORPORATE SEAL) _____

Attest: _____
(Signature of Corporate Secretary)

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

Date of qualification to do business as out-of-state corporation: _____

A Limited Liability Company (LLC)

LLC Name: _____

State in which organized: _____

By: _____
(Signature – attach evidence of authority to sign)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

A Joint Venture

First Joint Venturer Name: _____

By: _____
(Signature – attach evidence of authority to sign)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

Second Joint Venturer Name: _____

By: _____
(Signature – attach evidence of authority to sign)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation and limited liability company that is a party to the joint venture should be in the manner indicated above.)

A Partnership

Partnership Name: _____ (SEAL)

By: _____
(Signature of general partner – attach evidence of authority to sign)

Name (*typed or printed*): _____

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

An Individual

Name (*typed or printed*): _____

By: _____
(Individual's signature)

Doing business as: _____

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

SUBMITTED ON:

EIN/FEIN:

Communications concerning this Bid shall be addressed to:

Name: _____

Title: _____

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

END OF SECTION

BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (*Name and Address*):

SURETY (*Name and Address of Principal Place of Business*):

OWNER (*Name and Address*):

BID

Bid Due Date:

Description (*Project Name and Include Location*):

BOND

Bond Number:

Date (*Not earlier than Bid due date*):

Penal sum

(Words)

\$

(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

Bidder's Name and Corporate Seal

(Seal)

SURETY

Surety's Name and Corporate Seal

By:

Signature

By:

Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest:

Signature

Attest:

Signature

Title

Title

Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

SECTION 00 43 22

UNIT PRICES FORM

Provide unit pricing for each Bid item in both words and figures. Provide Bid item totals in figures. Discrepancies between prices written in words and prices written in figures will be resolved in favor of prices written in words. Discrepancies between the multiplication of estimated quantities and unit prices will be resolved in favor of the unit prices.

BID PRICES SHALL EXCLUDE SALES AND USE TAX.

Item No.	Item Description with Unit or Lump Sum Price in Written Words	Estimated Quantity & Unit	Unit Bid Price (Figures)	Total Bid Item Price (Figures)
1	Remove and Dispose Bituminous Asphalt Pavement @ _____ Dollars and _____ Cents PER SQUARE YARD	1,500 SY		
2	Remove and Dispose Concrete Sidewalk @ _____ Dollars and _____ Cents PER SQUARE YARD	1,400 SY		
3	Remove and Dispose Trees @ _____ Dollars and _____ Cents PER EACH	18 EA		
4	Remove and Dispose Existing Drainage Pipe @ _____ Dollars and _____ Cents PER LINEAR FOOT	110 LF		
5	Remove and Dispose Existing Catch Basins and Drain Manholes @ _____ Dollars and _____ Cents PER EACH	8 EA		
6	Remove, Store, Stack and Deliver Frame, Grates and Covers @ _____ Dollars and _____ Cents PER EACH	8 EA		

0229256.29

Issue Date: February 2023

Walter Hannon Parkway & General McConville Way

Intersection Improvement Project

Quincy, Massachusetts

Item No.	Item Description with Unit or Lump Sum Price in Written Words	Estimated Quantity & Unit	Unit Bid Price (Figures)	Total Bid Item Price (Figures)
7	Remove, Store and Deliver Street Light Poles and Light Fixtures @ _____	7		
	Dollars and _____ Cents PER EACH	EA		
8	Remove, Store and Reset Street Light @ _____	2		
	Dollars and _____ Cents EACH	EA		
9	Remove, Stack Deliver Traffic Controls/Equipment @ _____	1		
	Dollars and _____ Cents PER LUMP SUM	LS		
10	Remove and Dispose Traffic Control Appurtenances @ _____	1		
	Dollars and _____ Cents PER LUMP SUM	LS		
11	Remove, Store, Stack and Deliver Granite Curbing @ _____	500		1
	Dollars and _____ Cents PER LINEAR	LF		
12	Remove, Store, Stack and Reset Granite Curbing @ _____	500		1
	Dollars and _____ Cents PER LINEAR FOOT	LF		
13	Remove, Store and Deliver Monument @ _____	1		
	Dollars and _____ Cents PER EACH	EA		
14	Remove, Protect, Store and Reset Bollards @ _____	4		
	Dollars and _____ Cents PER EACH	EA		
15	Remove and Dispose Bollards @ _____	10		
	Dollars and _____ Cents PER EACH	EA		
16	Remove and Dispose Signs/Sign Post @ _____	8		
	Dollars and _____ Cents PER EACH	EA		

0229256.29

Issue Date: February 2023

Walter Hannon Parkway & General McConville Way

Intersection Improvement Project

Quincy, Massachusetts

Item No.	Item Description with Unit or Lump Sum Price in Written Words	Estimated Quantity & Unit	Unit Bid Price (Figures)	Total Bid Item Price (Figures)
17	Roadway Milling and Overlay Pavement @ _____ Dollars and _____ Cents PER SQUARE YARD	4,460 SY		
18	Full Depth Bituminous Asphalt Pavement @ _____ Dollars and _____ Cents PER SQUARE YARD	950 SY		
19	Vertical Granite Curb @ _____ Dollars and _____ Cents PER LINEAR FOOT	1,200 LF		
20	Concrete Sidewalk @ _____ Dollars and _____ Cents PER SQUARE YARD	1,100 SY		
21	Brick Banding and Brick Island Pavers @ _____ Dollars and _____ Cents PER SQUARE YARD	180 SY		
22	Accessible Curb Ramps @ _____ Dollars and _____ Cents PER EACH	14 EA		
23	Concrete Driveway Aprons @ _____ Dollars and _____ Cents PER EACH	1 EA		
24	Street/Traffic Signs @ _____ Dollars and _____ Cents PER EACH	31 EA		
25	Street/Traffic Sign Post @ _____ Dollars and _____ Cents PER EACH	10 EA		

0229256.29

Issue Date: February 2023

Walter Hannon Parkway & General McConville Way

Intersection Improvement Project

Quincy, Massachusetts

Item No.	Item Description with Unit or Lump Sum Price in Written Words	Estimated Quantity & Unit	Unit Bid Price (Figures)	Total Bid Item Price (Figures)
26	Pavement Markings @ _____	1	LS	
	Dollars and Cents PER LUMP SUM	LS		
27	Loam @ _____	200	CY	
	Dollars and Cents PER CUBIC YARD	CY		
28	Seeding @ _____	1,100	SY	
	Dollars and Cents PER SQUARE YARD	SY		
29	Owner's Contingency Allowance for Landscape Plantings @ Fifty Thousand Dollars and	1	NTE	
	Zero Cents NOT TO EXCEED	NTE		
30	Owner's Contingency Allowance for Irrigation System @ Fifty Thousand Dollars and	1	NTE	
	Zero Cents NOT TO EXCEED	NTE		
31	Retaining Wall @ _____	175	LF	
	Dollars and Cents PER LINEAR FOOT	LF		
32	Decorative Steel Fence @ _____	175	LF	
	Dollars and Cents PER LINEAR FOOT	LF		
33	Handrail @ _____	130	LF	
	Dollars and Cents PER LINEAR FOOT	LF		
34	12" Reinforced Concrete Pipe @ _____	250	LF	
	Dollars and Cents PER LINEAR FOOT	LF		
35	18" Polyvinyl Chloride Pipe @ _____	180	LF	
	Dollars and Cents PER LINEAR FOOT	LF		

0229256.29

Issue Date: February 2023

Walter Hannon Parkway & General McConville Way

Intersection Improvement Project

Quincy, Massachusetts

Item No.	Item Description with Unit or Lump Sum Price in Written Words	Estimated Quantity & Unit	Unit Bid Price (Figures)	Total Bid Item Price (Figures)
36	Trenchless System @ _____	1	LS	
	Dollars and _____ Cents PER LUMP SUM			
37	Drain Manhole @ _____	2	EA	
	Dollars and _____ Cents PER EACH			
38	Catch Basin @ _____	5	EA	
	Dollars and _____ Cents PER EACH			
39	Double Catch Basin @ _____	1	EA	
	Dollars and _____ Cents PER EACH			
40	Water Quality Structure @ _____	1	EA	
	Dollars and _____ Cents PER EACH			
41	Sewer Manhole @ _____	3	EA	
	Dollars and _____ Cents PER EACH			
42	Catch Basin Frame and Grate @ _____	5	EA	
	Dollars and _____ Cents PER EACH			
43	Catch Basin Double Frame and Grate @ _____	1	EA	
	Dollars and _____ Cents PER EACH			
44	Manhole Frame and Cover @ _____	5	EA	
	Dollars and _____ Cents PER EACH			

Item No.	Item Description with Unit or Lump Sum Price in Written Words	Estimated Quantity & Unit	Unit Bid Price (Figures)	Total Bid Item Price (Figures)
45	Electrical/Communication/Traffic Handholes @ _____	1	LS	
	Dollars and _____ Cents PER LUMP SUM	LS		
46	Electrical/Communication/Traffic Raceway @ _____	1	LS	
	Dollars and _____ Cents PER LUMP SUM	LS		
47	Electrical/Communication/Traffic Conductors @ _____	1	LS	
	Dollars and _____ Cents PER LUMP SUM	LS		
48	Street Lights and Bases @ _____	12	EA	
	Dollars and _____ Cents PER EACH	EA		
49	Traffic Control Signalization @ _____	1	LS	
	Dollars and _____ Cents PER LUMP SUM	LS		
50	Control Density Fill @ _____	25	CY	
	Dollars and _____ Cents PER CUBIC YARD	CY		
51	Excavation of Unsuitable Materials @ _____	50	CY	
	Dollars and _____ Cents PER CUBIC YARD	CY		
52	Rock and Boulder Excavation @ _____	50	CY	
	Dollars and _____ Cents PER CUBIC YARD	CY		
53	Owner's Contingency Allowance for Traffic Police Details @ Two Hundred Thousand Dollars and Zero Cents NOT TO EXCEED	\$200,000	NTE	
		NTE		

Item No.	Item Description with Unit or Lump Sum Price in Written Words	Estimated Quantity & Unit	Unit Bid Price (Figures)	Total Bid Item Price (Figures)
54	Mobilization and Demobilization @ _____	1	LS	
	Dollars and _____ Cents PER LUMP SUM			
55	Materials Escalation Price Adjustment (Statutory) @ Twenty-Five Thousand Dollars and Zero Cents NOT TO EXCEED	1	NTE	
56	Civic Open Space Improvements @ One Hundred Thousand Dollars and Zero Cents NOT TO EXCEED	1	NTE	
57	Test Pits @ _____	50	CY	
	Dollars and _____ Cents PER CUBIC YARD			

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 00 43 36

PROPOSED SUBCONTRACTORS FORM

The following Subcontractors, other persons and organizations are proposed to be employed to furnish portions of the Work. Attach additional sheets as necessary.

CONSTRUCTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

DESIGN PROFESSIONALS

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

SECTION 00 43 37

PROPOSED SUPPLIERS FORM

The following Suppliers are proposed to furnish the identified products, material and equipment to be incorporated into the Work. Attach additional sheets as necessary.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 00 43 40

INFORMATION, SCHEDULES AND DATA

SCHEDULE

Provide a proposed Project Schedule based on a Notice to Proceed on approximately April 14, 2023, a Substantial Completion by April 30, 2024, and final completion by May 31, 2024.

The schedule shall be presented in sufficient detail for the Owner to evaluate the Bidder's ability to perform the Work within the Contract Times and, at a minimum, shall include:

- milestones related to submittal schedules, procurement, construction, and checkout & functional testing;
- sequencing to limit impacts from construction;
- milestones related to mobilization, start of construction, testing and completion of Work, including milestones.
- number of anticipated crews; and
- **special sequencing specified in Section 01 11 00 Summary of Work.**

WORK PLAN

Submit a narrative work plan describing the Bidder's approach to the successful execution of the Work to accommodate the proposed Project Schedule and provide for special requirements. Allow for review of submittals, coordination, and development of detailed construction sequencing and coordination; and compliance with special requirements.

Describe:

- how schedule progress will be measured and tracked;
- how the Schedule of Values and cash flow will be determined and how progress for payment will be determined; and
- how documents will be controlled to assure that the appropriate revision is used in design, procurement, and construction/installation.

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 00 43 93

BID SUBMITTAL CHECKLIST

Bidder confirms that the following documents are fully completed, included in and made part of its Bid.

- 00 41 01 Bid Form
 - 00 43 13 Bid Bond – Penal Sum Form
- OR*
- Required Bid security in the form of _____

Supplements

- 00 43 22 Unit Prices Form
- 00 43 36 Proposed Subcontractors Form
- 00 43 37 Proposed Suppliers Form
- 00 43 40 Information, Schedules and Data
- 00 45 05 Bidder's Representations and Certifications
 - including required documents and submittals**
- 00 45 13 Bidder's Qualifications
- 00 45 19 Non-collusion Affidavit
- One original signed hardcopy (with original Bid security) has been submitted to the Owner in accordance with Section 00 21 13.

CONFIRMED BY BIDDER ON:
By:
<i>Authorized person per Bid Form</i>

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 00 45 05

BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

The undersigned, under the penalties of perjury, represents and certifies the following which is made a condition of the Bid.

1.01 BIDDER'S REPRESENTATIONS

- A. Bidder has examined and carefully studied the Bidding Documents and other related data identified in the Bidding Documents.
- B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Section 00 73 10 of the Supplementary Conditions Paragraph 4.02 as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Section 00 73 10 of the Supplementary Conditions Paragraph 4.06 as containing reliable "technical data."
- E. Bidder has considered the information known to Bidder; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.
- F. Based on the information and observations referred to in Paragraph E above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of the Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which the Bid is submitted.

1.02 BIDDER'S CERTIFICATIONS

- A. The Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid and has not solicited or induced any individual or entity to refrain from bidding.
- C. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph:
 - 1. “corrupt practice” means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
 - 2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish Bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 - 4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.
- D. Bidder will comply with the requirements of the Contract Documents, and if Bidder is awarded a Contract, agrees to incorporate applicable provisions into all subcontracts and Purchase Orders so that such provisions will be binding upon each Subcontractor or Supplier, including as a minimum, Statutory Requirements, safety and health regulations; and Wage Rate Requirements.

1.03 BIDDER'S CERTIFICATIONS REQUIRED BY MASSACHUSETTS GENERAL LAW (MGL)

- A. The Bid is in all respects bona fide, 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.
- B. Bidder certifies no official or employee of the Owner has a financial interest in this Contract or in the expected profit to arise from the Contract, unless the Bidder and Owner, employee or official both have notified public authorities in writing, that the Bidder and the employee fully complied with the provisions of MGL Chapter 43, Section 27 *Interest In Public Contracts By Public Employees Prohibited; Penalty* and provisions of MGL Chapter 268A, Section 20 *Municipal Employees; Financial Interest In Contracts; Holding One Or More Elected Positions*.
- C. Bidder has submitted a certificate from the Secretary of State of the Commonwealth of Massachusetts that the corporation has complied with requirements of Section 15.03 of subdivision A of Part 15 of MGL Chapter 156D and the date of compliance, and further has filed all annual reports required by Section 16.22 of subdivision B of Part 16 of said Chapter 156D if Bidder is a foreign corporation. Bidder certifies it will provide such certificate for each Subcontractor that is a foreign corporation if it receives a Notice of Intent to Award.
- D. Bidder certifies, under the penalties of perjury, to the best of its knowledge and belief, that all state tax returns have been filed and all state taxes paid pursuant to MGL Chapter 62C, Section 49A, and has submitted a Certificate of Good Standing with respect to all returns due and taxes from the Commonwealth of Massachusetts Department of Revenue certifying Bidder has complied with all laws relating to taxes, reporting of employees and contractors, and withholding and remitting of child support. Bidder certifies it will provide such certificate for each Subcontractor if it receives a Notice of Intent to Award.
- E. Bidder certifies that if awarded the Contract, the following will be submitted prior to execution of the Agreement in accordance with MGL Chapter 30, Section 39R *Definitions; contract provisions; management and financial statements; enforcement*.
 - To Owner - A statement by management on internal accounting control and a statement prepared by an independent certified public accountant regarding management's statement; and
 - To DCAMM - An audited financial statement for the most recent completed fiscal year.

- F. Bidder certifies that if awarded the Contract, any Work involving the removal, containment, or encapsulation of asbestos or material containing asbestos will only be performed by a licensed contractor in accordance with MGL Chapter 149, Section 6B and any sheet metal Work will be performed by a contractor licensed in accordance with 271 CMR 1.00, et seq. governing licensing, permitting, and sheet metal work in Massachusetts.
- G. Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work and further certifies that all employees to be employed at the Work Site will 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 at the time the employee begins Work and if Bidder is awarded a Contract, shall furnish documentation of successful completion of said course with the first certified payroll report for each employee.
- H. Bidder is not presently debarred from bidding on or entering into a public contract in the Commonwealth of Massachusetts under the provisions of MGL Chapter 29, Section 29F, or any other applicable debarment provisions of any other chapter of the MGL or any rule or regulations promulgated thereunder; and is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.
- I. Bidder understands the Bid is subject to MGL Chapter 66 et seq, *Public Records*, and as such, related submittals, purchase orders, related pricing documents, and invoices will be public documents, and may be available for public and private distribution, except as specifically excluded. The Bidder agrees to provide the Owner copies of any documents requested under this law at no charge to the Owner or the requestor.
- J. Bidder will comply with the State and Federal COVID-19 guidelines and procedures for the construction sector (as may be amended).

SUBMITTED ON:

By:

Authorized person per Bid Form

END OF SECTION

SECTION 00 45 13

BIDDER'S QUALIFICATIONS

The following data, statements of experience, personnel, equipment and general qualifications are submitted as a part of the Bid and the Bidder represents and guarantees the truthfulness and accuracy thereof and **its ability to meet the qualifications requirements specified in Section 01 43 05 and the Specifications.** Attach additional sheets as necessary properly cross referenced.

1.01 GENERAL

- A. Bidder's organization is a _____
(entity type) and has been in business continuously from the year _____.
- B. Bidder has operated under the same business name and organization structure for the last 10 years on at least 5 projects yes no
- C. If no, indicate other business names: _____
- D. Bidder's organization has had experience in construction comparable to that required by the Contract Documents as a prime contractor for _____ years and as a subcontractor for _____ years.

1.02 BIDDER EXPERIENCE

- A. Identify at least 3 projects with a total value in excess of \$2,000,000 in the state the Project is located completed within the past 5 years **which are similar in type, character, physical size, and complexity to that required by the Contract Documents.**

Client/Owner Name/Address	Project Name/Location	CURRENT Contact Name, Phone, Email	Contract Value	Time Period

1.04 SPECIALTY EXPERIENCE OF BIDDER OR SUBCONTRACTORS

A. Identify at least 3 projects that included traffic signalization installation within public streets within the last 10 years.

Client/Owner Name/Address	Project Name/Location	CURRENT Contact Name, Phone, Email	Bidder or Subcontractor (Name)	Time Period

1.05 SPECIALTY EXPERIENCE OF BIDDER OR SUBCONTRACTORS

- A. Identify at least 5 projects that included roadway construction, pavement and street repair within public streets within the last 10 years.

Client/Owner Name/Address	Project Name/Location	CURRENT Contact Name, Phone, Email	Bidder or Subcontractor (Name)	Time Period

1.06 SPECIALTY EXPERIENCE OF BIDDER OR SUBCONTRACTORS

- A. Identify at least 5 projects that included either or a combination of stormwater, water and sewerage utilities within public streets within the last 10 years.

Client/Owner Name/Address	Project Name/Location	CURRENT Contact Name, Phone, Email	Bidder or Subcontractor (Name)	Time Period

1.07 CURRENT LICENSES

B. Indicate Bidder and Subcontractor(s) current licenses including design professionals and surveyors.

1.08 PERSONNEL

- A. Identify supervisory personnel that are currently employed by the Bidder and available for assignment to the Project (project manager, superintendents, principal foremen and engineers).
1. Identify full-time on-Site superintendent in responsible charge of the Work with at least 10 years' experience as superintendent on comparable projects.
 2. Identify project manager assigned full-time with at least 10 years' experience as project manager on comparable projects.

Name	Title	Years of Experience
	Full time, on-Site Superintendent	
	Full time Project Manager assigned	

- B. Attach detailed resumes of qualifications, previous employers and experience for each supervisory staff listed above.

1.09 PROPOSED DESIGN PROFESSIONALS AND SURVEYORS

- A. The following design professionals and surveyors are to be employed or retained by the Bidder and available for assignment to the Project.

Name	Address	Area of Responsibility	Years of Experience

- B. Attach detailed resumes of qualifications, previous employers and experience for each design professional and surveyor listed above.

1.10 EMERGENCY RESPONSE CAPABILITIES

- A. Describe Bidder's 24 hour/7 days per week emergency response and communication capabilities. Attach additional documentation as necessary.

1.08 EQUIPMENT

- A. Identify equipment available for use on the Project. Indicate whether owned by Bidder's organization or rented. Attach additional sheets as necessary.

1.09 BUSINESS INTERESTS

- A. Identify the names and addresses of the members of the Board of Directors of corporation, or the names and addresses of all persons and parties interested in this Bid as partners of a partnership or as individuals. Attach additional sheets as necessary.

- B. Identify the bank or banks representing the financial responsibility of the Bidder.

Name of Bank	Address	Contact Name and Telephone No.

1.10 VIOLATIONS

- A. Following is a list of violations Bidder and its main Subcontractors have received or been the subject of, or otherwise been involved in, regarding any state or local ethic laws, regulation, code, ordinance, policy, or standard, or offenses arising out of submission of bids or the performance of work on public works projects or contracts over the last 10 years. Attach additional sheets as necessary.

Name and Location of the Project	
Nature of the Violation/Offense	
Duration and dates during which the violation/offense took place	
Name and Location of the Project	
Nature of the Violation/Offense	
Duration and dates during which the violation/offense took place	
Name and Location of the Project	
Nature of the Violation/Offense	
Duration and dates during which the violation/offense took place	

1.11 LABOR DISPUTES

- A. Identify labor disputes the Bidder has been the subject of, or otherwise been involved in, during the last 5 years. For these purposes, "labor disputes" shall include picketing or any other activity which disrupted or delayed the work. Attach additional sheets as necessary.

Name and Location of the Project	
Nature of the Dispute	
Duration and dates during which the dispute took place	
How the dispute was resolved	
Name and Location of the Project	
Nature of the Dispute	
Duration and dates during which the dispute took place	
How the dispute was resolved	

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This Page Intentionally Left Blank

SECTION 00 45 19

NON-COLLUSION AFFIDAVIT

, being duly sworn, depose and, under the penalty of perjury, say that the following is true:

1. I am the person responsible within my firm for the final decision as to the price(s) and amount of this Bid or, if not, that I have written authorization, enclosed herewith, from that person to make the statements set out below on his or her behalf and on the behalf of my firm.
2. The price(s) and amount of this Bid have been arrived at independently, without collusion, consultation, communication, or agreement for the purpose of restricting competition with any other contractor, competitor, Bidder, or potential Bidder.
3. Unless otherwise required by law, neither the price(s) nor the amount of this Bid have been disclosed to any other firm or person who is a Bidder, competitor, or potential Bidder on the Project, and will not be so disclosed either directly or indirectly prior to Bid opening.
4. No attempt has been made or will be made to solicit, cause, or induce any firm, partnership, corporation, or person to submit or not submit a Bid on this Project, or to submit a Bid higher than the Bid of this firm, or submit an intentionally high or noncompetitive Bid or other form of complementary Bid, or for the purpose of restricting competition.
5. The Bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary Bid.
6. My firm has not offered or entered into a subcontracting agreement regarding the purchase of materials or services from any firm or person, or offered, promised, or paid cash or anything of value to any firm or person, whether in connection with this or any other Project, in consideration for an agreement or promise by any firm or person to refrain from proposing or to submit a complementary Bid on the Project.
7. My firm has not accepted nor been promised any subcontract or agreement regarding the sale of materials or services to any firm or person, and has not been promised or paid cash or anything of value to any firm or person, whether in connection with this or any other project, in consideration for my firm's submitting a complementary Bid or agreeing to do so, on the Project.

8. I have made a diligent inquiry of all members, officers, employees, and agents of my firm with responsibilities relating to the preparation, approval, or submission of my firm's Bid on the Project and have been advised by each of them that he or she has not participated in any communication, consultation, discussion, agreement, collusion, act, or other conduct inconsistent with any of the statements and representations made in this affidavit.

Company Name

Signature

Company Position

Date: _____

Attest: _____

Date: _____

END OF SECTION

SAMPLE NOTICE OF INTENT TO AWARD (C-00 50 55)

TO BE COMPLETED & ISSUED AFTER BID REVIEW ON OWNER LETTERHEAD

Date

[Bidder Contact

Bidder Company

Bidder Address]

**SUBJECT: NOTICE OF INTENT TO AWARD
[PROJECT TITLE/OWNER]**

You are notified that your Bid dated _____ for the above Contract has been considered.

You are the apparent Successful Bidder and the Owner intends that the above Contract be awarded to you. The Total Contract Price of the awarded Contract will be \$_____ [Lump Sum OR based on Unit Prices], subject to the following conditions being met and subject to required reviews and approvals [OPTIONAL and specifically, funding agency approval by _____].

You must comply with the following conditions precedent **within 15 days** of the date of receipt of this Notice of Intent to Award:

1. Deliver the Contract security (Bonds) and insurance documentation as specified in the General Conditions and Supplementary Conditions (Articles 2 and 5).
2. Provide a letter from your insurance company or agent confirming types and limits of coverage as required in Paragraph 5.03 of the General Conditions.
3. Deliver the following completed and executed certifications and documents:
 - a.
 - b.
 - c. Items to be provided by Subcontractors:
 -

SAMPLE NOTICE OF INTENT TO AWARD (C-00 50 55)

4. Other conditions precedent:

- *LIST OTHERS IF ANY*

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Intent to Award, and declare your Bid security forfeited.

After confirming that you have complied with the above conditions and required approvals are obtained, Owner will deliver a Notice of Award and the conformed Contract Documents with the Agreement for execution.

INSERT OWNER NAME (Owner)

By: _____
[Name and Title]

Copy to Engineer

SAMPLE NOTICE OF AWARD (C-00 51 00)

TO BE COMPLETED & ISSUED WITH CONFORMED AGREEMENT & CONTRACT ON OWNER LETTERHEAD

Date

*[Bidder Contact
Bidder Company
Bidder Address]*

**SUBJECT: NOTICE OF AWARD
[PROJECT TITLE/OWNER]**

You are notified that your Bid dated [insert date] for the above Contract has been considered, and that you are the Successful Bidder and are awarded a Contract for [insert description].

The Total Contract Price of the awarded Contract is \$ _____ [Lump Sum OR based on Unit Prices].

_____ unexecuted counterparts of the Agreement and 1 copy of the Contract Documents [(except for Drawings)] accompanies this Notice of Award. [OR have been transmitted or made available electronically.] [Sets Drawings will be delivered separately from the other Contract Documents.]

You must comply with the following conditions precedent.

- Return all executed counterparts of the Agreement to Owner **within 10 days** of receipt of this Notice of Award.
- [Add others as necessary]

After obtaining required reviews and approvals for Contract execution, Owner shall deliver one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions and Supplementary Conditions, if any.

INSERT OWNER NAME (Owner)

By: _____
[Name and title]

Copy to Engineer

This page intentionally left blank



CITY OF QUINCY, MASSACHUSETTS
PURCHASING DEPARTMENT
1305 HANCOCK STREET, QUINCY, MA 02169

Thomas P. Koch
MAYOR

AGREEMENT

Made in quadruplicate this day DATE, between the City of Quincy, Massachusetts, Municipal Corporation, within the County of Norfolk, party of the first part and:

CONTRACTOR NAME
CONTRACTOR ADDRESS

party of the second part. The contract date will commence as of the stamped date of execution.

WITNESSETH: That for and in consideration of the following mutual covenants contained herein the parties agree with each other as follows:

ARTICLE I: The party of the second part agrees to sell and deliver to the party of the first part the following:

CONSTRUCTION FOR
INSERT PROJECT TITLE

All in accordance with the detailed specifications and considerations attached to and made a part this contract.

TERMS: **AS PER SPECIFICATIONS ATTACHED**
SPECIFICATIONS ARE ATTACHED TO AND MADE A PART THEREOF.

All in accordance with attached Bid dated DATE.

ORDERED BY: **Mayor's Office**

ARTICLE II: The party of the first part agrees to pay to the party of the second part upon satisfactory completion of the delivery of the above mentioned.

FOR THE SUM OF: \$INSERT AMOUNT
Insert amount in Words Dollars and No OR insert words Cents

Sufficient funds are available to cover
this contract in the account to be charged.

CITY OF QUINCY

DIRECTOR OF MUNICIPAL FINANCE

MAYOR

CITY DEPARTMENT HEAD

CITY SOLICITOR

VENDOR'S SIGNATURE

PURCHASING AGENT

*The City is self insured and will not purchase additional insurance.

CONTRACT #:

P.O. #:

This page intentionally left blank

SAMPLE



CITY OF QUINCY
Purchasing Department
1305 Hancock Street, Quincy, MA 02169

Phone: (617) 376-1060
Fax: (617) 376-1074

SIGNATURE AUTHORIZATION

At a duly authorized meeting of the Board of Directors of the

(NAME OF CORPORATION)

held on _____, at which all the Directors were present or waived notice, it was
(DATE)
VOTED, that:

_____ (NAME)

_____ (TITLE)

of this company, be and he/she hereby is authorized to execute Contracts and Bonds in the name and behalf of said Company, and affix its Corporate Seal thereto, and such execution of any Contract or obligation in this Company's name on its behalf by such _____ under seal of the Company, shall be valid
(TITLE)

and binding upon this Company. It was further voted that the City of Quincy may rely on such authorization of future Contracts until notified to the contrary.

A true copy,

ATTEST:

_____ (CLERK'S SIGNATURE)

PLACE OF BUSINESS: _____

DATE OF THIS CONTRACT: _____

I hereby certify that I am the Clerk of the:

_____ (COMPANY) that _____ (NAME) is the

duly elected _____ of said Company, and that the above VOTE has not been
(TITLE)

amended or rescinded and remains in full force and effect as of the date of this Contract.

_____ CORPORATE SEAL

SECTION 00 52 10

AGREEMENT FORM

THIS AGREEMENT is by and between City of Quincy, MA ("Owner") and _____ ("Contractor"). Owner and Contractor hereby agree as follows.

ARTICLE 1 – WORK

- 1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as the Walter Hannon Parkway & General McConville Way Intersection Improvement Project which includes, but is not limited to, the construction of a new signalized intersection at the south end of General McConville Way; construction of the realigned Parkingway south of Walter Hannon Parkway to meet the new signalized intersection; full depth pavement reconstruction; asphalt milling and overlay; concrete sidewalks; curbing; utility infrastructure improvements including sanitary, stormwater, electrical, communications, duct banks; installation of street lighting, light poles and light pole foundations, retaining walls; ornamental fencing; landscaping, irrigation, hardscape, and improved green spaces and all materials, equipment, services and construction inherent to the Work.

ARTICLE 2 – THE PROJECT

- 2.01 The Project under the Contract Documents is generally described as "**Walter Hannon Parkway & General McConville Way Intersection Improvement Project**".

ARTICLE 3 – ENGINEER

- 3.01 The Project has been designed by Woodard & Curran, Inc. (Engineer), which is to act as Owner's representative, assume all duties and responsibilities and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

- 4.01 *Time of the Essence*

- A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Substantial Completion and Final Payment*

- A. The Work shall be substantially complete by April 30, 2023, and completed and ready for final payment by May 31, 2023, in accordance with Paragraph 14.07 of the Standard General and Supplementary Conditions, if any.

4.03 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the Standard General Conditions and Supplementary Conditions, if any. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$2,000 for each day that expires after the time specified in Paragraph 4.02 above for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner \$2,000 for each day that expires after the time specified in Paragraph 4.02 above for completion and readiness for final payment until the Work is completed and ready for final payment.

ARTICLE 5 – CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraph 5.01.A below based on unit pricing stated in Contractor's Bid attached hereto:

TOTAL PRICE

[IN WORDS] Dollars and [IN WORDS] Cents

\$[DOLLAR AMOUNT]

- A. Unit Prices have been computed in accordance with Paragraph 11.03.A of the Standard General Conditions and Supplementary Conditions, if any.
- B. The prices for Unit Price Work set forth as of the Effective Date of the Agreement are based on estimated quantities. As provided in Paragraph 11.03 of the Standard General Conditions and Supplementary Conditions, if any, estimated quantities are not guaranteed (except for those that may be estimated by the Contractor), and

determinations of actual quantities and classifications are to be made by Engineer as provided in Paragraph 9.07 of the Standard General Conditions and Supplementary Conditions, if any. Final payment for unit price items will be based on actual quantities determined and based on the unit prices in the Unit Prices Form.

- C. When the accepted quantity of any item of Unit Price Work performed by the Contractor (as measured in accordance with 9.07 of the General and Supplementary Conditions, if any) differs from the estimated quantity indicated in the attachment(s) to this Agreement for an item of Unit Price Work, no adjustment or allowance will be made for any increased expenses, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor resulting either directly or indirectly from such increased or decreased quantities, or from unbalanced allocation of overhead expense among the Unit Price Work items on the part of the Contractor, or subsequent loss of expected reimbursements therefor.

5.02 *Adjustments to the Contract Price*

- A. Adjustments to the Contract Price for Owner's Contingency Allowances will be made in accordance with the General Conditions, Paragraph 11.02.C.
1. Adjustments to the Contract Price will be made for diesel fuel, gasoline, liquid asphalt, and portland cement in cast-in-place concrete based on the Base Prices and index established for adjustments in accordance with price adjustment clauses included in Section 00 73 73, SC-12.01.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 14 of the Standard General Conditions and Supplementary Conditions, if any. Applications for Payment will be processed by Engineer as provided in the Standard General Conditions and Supplementary Conditions, if any, and the General Requirements.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 1st day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the Standard General Conditions and Supplementary Conditions, if any, (and in the case of Unit Price Work based on the number of units completed).

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the Standard General Conditions and Supplementary Conditions, if any, and additional retainage allowed by Laws and Regulations.
 - a. Progress Payments of 95 percent for Work completed (with the balance of 5 percent being retainage); and
 - b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance of 5 percent being retainage).
2. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 99 percent of the Work completed (with the balance of 1 percent being retainage), less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and Supplementary Conditions, if any, and less the Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected (Punch List) attached to the certificate of Substantial Completion and subject to Paragraph 14.04 of the General Conditions and Supplementary Conditions, if any.

However, retainage for items planted in the ground shall remain at 5 percent of the cost of such items until Final Payment per Massachusetts General Laws Chapter 30, Section 39G.

3. Upon completion and acceptance of the Work, **except for Warranty Inspection and final paving (completion of Post Substantial Completion Punchlist)**, Owner shall pay remainder of the Contract Price as recommended by Engineer **less the value of the Warranty Inspection and final paving** identified by the Contractor in the Schedule of Values, in accordance with 14.07 of the General and Supplementary Conditions, if any.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General and Supplementary Conditions, if any, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

ARTICLE 7 – INTEREST

- 7.01 All moneys not paid when due as provided in Article 14 of the General and Supplementary Conditions, if any, shall bear interest at the rate 3 percentage points above the rediscount

rate then charged by the Federal Reserve Bank of Boston per Massachusetts General Laws Chapter 30, Section 39G. Interest shall not be accrued on retainage.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS AND CERTIFICATIONS

8.01 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

- A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
- B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in Paragraph SC-4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 of the Supplementary Conditions as containing reliable "technical data."
- E. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.
- F. Based on the information and observations referred to in Paragraph 8.01.E above, Contractor does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- 8.02 The Contractor certifies, under the penalties of perjury, that:
- A. Contractor has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph:
2. “corrupt practice” means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 3. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 4. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 5. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract;
- B. Contractor certifies no official or employee of the Owner has a financial interest in this Contract or in the expected profit to arise from the Contract, unless the Contractor and Owner, employee or official both have notified public authorities in writing, that the Contractor and the employee fully complied with the provisions of MGL Chapter 43, Section 27 *Interest In Public Contracts By Public Employees Prohibited; Penalty* and provisions of MGL Chapter 268A, Section 20 *Municipal Employees; Financial Interest In Contracts; Holding One Or More Elected Positions*.
- C. Contractor has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting of child support and, has provided for itself and each Subcontractor, a Certificate of Good Standing from the Department of Revenue with respect to all returns due and taxes and further, certifies that, to the best of its knowledge and belief, all state tax returns have been filed and all state taxes have been paid as required by Law pursuant to Massachusetts General Laws Chapter 62C, Section 49A;

- D. If a foreign corporation, Contractor has provided for itself (through MassDOT prequalification) and each Subcontractor that is a foreign corporation, a certificate of the state secretary stating that the corporation has complied with requirements of Massachusetts General Laws Chapter 156D, Part 15, Section 15.03 of subdivision A and the date of compliance, and further has filed all annual reports required by Section 16.22 of subdivision B of Part 16 of said Chapter 156D, pursuant to Massachusetts General Laws Chapter 30, Section 39L;
 - E. Contractor is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work and further certifies that all employees to be employed at the Work Site will 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 at the time the employee begins Work and shall furnish documentation of successful completion of said course with the first certified payroll report for each employee, all as required by Massachusetts General Laws Chapter 30, Section 39S;
 - F. Contractor is not presently debarred from entering into a public contract Commonwealth of Massachusetts under the provisions of Massachusetts General Laws Chapter 29, Section 29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulations promulgated thereunder; and is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency; and
 - G. Pursuant to Massachusetts General Laws Chapter 30, Section 39R, Contractor has provided a statement by management on internal accounting controls, a statement prepared by an independent certified public accountant regarding management's statement, and an audited financial statement to DCAMM for the most recent completed fiscal year.
 - H. Contractor shall not participate in or cooperate with an international boycott, as defined in Section 999 (b)(3) and (4) of the Internal Revenue code 1986, as amended, or engage in conduct declared to be unlawful by Section 2 of Chapter 151E of the Massachusetts General Laws.
- 8.03 The representations and certifications Contractor submitted with its Bid remain shall valid during the period of this Agreement.
- 8.04 Contractor agrees to incorporate the applicable provisions of the Contract Documents into all subcontracts and Purchase Orders so that such provisions will be binding upon each Subcontractor or Supplier.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement and attachments

COMPLETE LISTING AFTER AWARD

- Bid and Bid Supplements with required documentation as submitted
- Performance Bond
- Payment Bond
- Insurance certificates

2. Forms listed in 00 60 00
 3. Standard General Conditions in Section 00 72 05
 4. Supplementary Conditions as listed in Section 00 01 10, Table of Contents
 5. General Requirements and Specifications as listed in Section 00 01 10, Table of Contents
 6. Drawings listed in Section 00 01 15, List of Drawing Sheets
 7. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Notice to Proceed
 - b. Work Change Directives
 - c. Change Orders
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement and made a part hereof.
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the Standard General Conditions and Supplementary Conditions, if any.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

- A. Terms used in this Agreement will have the meanings stated in the Standard General Conditions and Supplementary Conditions, if any.

10.02 *Assignment of Contract*

- A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contract is Public Record*

- A. The Contract is subject to MGL Chapter 66 et seq, *Public Records*, and as such, related submittals, purchase orders, related pricing documents, and invoices will be public documents, and may be available for public and private distribution, except as specifically excluded. The Contractor agrees to provide the Owner copies of any documents requested under this law at no charge to the Owner or the requestor.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

This Agreement will be effective as indicated on the Owner's Agreement page.

SIGNATURES ARE INCLUDED ON THE CITY OF QUINCY'S AGREEMENT FORM PAGE AND CONTRACTOR SIGNATURE AUTHORIZATION FORM PRECEDING THIS SECTION

END OF SECTION

WOODARD & CURRAN

**AGREEMENT FORM
00 52 10-10**

Based on EJCDC C-520. Revised by Woodard & Curran on behalf of and as approved by Owner
Copyright © 2007 Prepared by National Society of Professional Engineers for EJCDC. All rights reserved.

PERFORMANCE BOND (Form C-006113.13)

CONTRACTOR (*name and address*):

SURETY (*name and address of principal place of business*):

OWNER (*name and address*):

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description (*name and location*):

BOND

Bond Number:

Date (*not earlier than the Effective Date of the Agreement of the Construction Contract*):

Amount:

Modifications to this Bond Form: None See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal

(*seal*)
Surety's Name and Corporate Seal

By: _____
Signature

By: _____
(*seal*)
Signature (*attach power of attorney*)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of

the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within

two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

This page intentionally left blank

PAYMENT BOND (Form C-006113.16)

CONTRACTOR (*name and address*):

SURETY (*name and address of principal place of business*):

OWNER (*name and address*):

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description (*name and location*):

BOND

Bond Number:

Date (*not earlier than the Effective Date of the Agreement of the Construction Contract*):

Amount:

Modifications to this Bond Form: None See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

Contractor's Name and Corporate Seal

By: _____
Signature

Print Name

Title

Attest: _____
Signature

Title

SURETY

Surety's Name and Corporate Seal

By: _____
Signature (*attach power of attorney*)

Print Name

Title

Attest: _____
Signature

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
 2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
 3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
 4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
 5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
 6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
 8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
 9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
 10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
 11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
 12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or

- (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. **Definitions**
- 16.1 **Claim:** A written statement by the Claimant including at a minimum:
1. The name of the Claimant;
 2. The name of the person for whom the labor was done, or materials or equipment furnished;
 3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 4. A brief description of the labor, materials, or equipment furnished;
 5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 7. The total amount of previous payments received by the Claimant; and
 8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
- 16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond
- shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
- 16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
- 16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.
18. Modifications to this Bond are as follows:

This page intentionally left blank

SECTION 00 54 00

AGREEMENT FORM SUPPLEMENTS

The following items included in this Section are attached to and are incorporated into the Agreement and made a part thereof.

TO BE COMPLETED AFTER AWARD LISTING ITEMS FROM SUCCESSFUL BIDDER

- Performance Bond
- Payment Bond
- Insurance certificates
- **Certifications**
 - Certificate of good standing from the Secretary of State with respect to all returns due and taxes
 - Certification from the Secretary of State for foreign corporations
 - A statement by management on internal accounting controls
 - A statement prepared by an independent certified public accountant
 - An audited financial statement for the most recent completed fiscal year
 - Subcontractor certificates of good standing from the Secretary of State with respect to all returns due and taxes
 - Subcontractor certification from the Secretary of State for foreign corporations

END OF SECTION

This page intentionally left blank

SAMPLE NOTICE TO PROCEED (C-00 55 00)

TO BE COMPLETED ON OWNER LETTERHEAD

Date

[*Bidder Contact
Bidder Company
Bidder Address*]

**SUBJECT: NOTICE TO PROCEED
[PROJECT TITLE/OWNER]**

You are notified that the Contract Times under the above Contract will commence to run on _____ . On or before that date, you are to start performing your obligations under the Contract Documents.

[OR for the following portion(s) of the Work:

[Describe the limits of the Work covered if option above chosen]

A Notice to Proceed for the remaining Work will follow.]

In accordance with Article 4 of the Agreement, the number of days to achieve Substantial Completion is _____ , and the number of days to achieve readiness for final payment is _____

OR [*the date of Substantial Completion is _____ , and the date of readiness for final payment is _____]

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions and Supplementary Conditions if any, provide that you must have delivered to Owner (with copies to Engineer and other identified additional insureds and loss payees) certificates of insurance which you are required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

- Comply with Articles 2.05 and 2.06 of the General and Supplementary Conditions (if any)
- [*add other requirements*]

INSERT OWNER NAME (Owner)

By: _____
[Name and title]

Copy to Engineer

This page intentionally left blank

SECTION 00 60 00

PROJECT FORMS

The following forms are included in this Section and shall be used for the Project as specified in the General Conditions and Supplementary Conditions if any, and the General Requirements. Completed and execution versions of these forms used during the Project shall be incorporated into the Agreement and made a part thereof.

Submittal Transmittal (Form C-00 62 11)
Application for Payment (Form C-00 62 76)
Request for Interpretation/Information (Form C-00 63 15)
Field Order (Form C-00 63 36)
Work Change Directive (Form C-00 63 49)
Change Request (Form C-00 63 60)
Change Order (Form C-00 63 63 MA)
City of Quincy Standard Change Order Form
Notice of Substantial Completion (Form C-00 65 15)
Certificate of Substantial Completion (Form C-00 65 16)
Notice of Completion (Form C-00 65 18)

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Way Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SUBMITTAL TRANSMITTAL (Form C-00 62 11)

- The material and equipment, and requirements for construction/installation contained in Submittal No.(s) _____ have been reviewed and we certify that they are correct and in strict conformance with the requirements specified (no exceptions or deviations)

- The material and equipment and requirements for construction/installation contained in Submittal No.(s) _____ have been reviewed and we certify that they are correct and in strict conformance with the requirements specified except for the following deviations (list below or attach listing):

CONTRACTOR'S NAME

ADDRESS

BY:

DATE:

This page intentionally left blank

Contractor's Application for Payment No. [Redacted]

To (Owner):	Application Period: From (Contractor):	Application Date: Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

Application For Payment

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

1. ORIGINAL CONTRACT PRICE..... \$ _____
 2. Net change by Change Orders..... \$ _____
 3. Current Contract Price (Line 1 ± 2)..... \$ _____
4. TOTAL COMPLETED AND STORED TO DATE
 (Column F on Progress Estimate)..... \$ _____
5. RETAINAGE:
 a. X Work Completed..... \$ _____
 b. X Stored Material..... \$ _____
 c. Total Retainage (Line 5a + Line 5b)..... \$ _____
6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)..... \$ _____
7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)..... \$ _____
8. AMOUNT DUE THIS APPLICATION..... \$ _____
9. BALANCE TO FINISH, PLUS RETAINAGE
 (Column G on Progress Estimate + Line 5 above)..... \$ _____

Contractor's Certification

The undersigned Contractor certifies that to the best of its knowledge: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By:	Date:
-----	-------

Payment of: \$ _____
 (Line 8 or other - attach explanation of the other amount)

is recommended by: _____ (Engineer) _____ (Date)

Payment of: \$ _____
 (Line 8 or other - attach explanation of the other amount)

is approved by: _____ (Owner) _____ (Date)

Approved by: _____ Funding Agency (if applicable) _____ (Date)

Approved by: _____

Progress Estimate - Lump Sum Work

FORM C-00 62 76

Contractor's Application

For (Contract):			Application Number:						
Application Period:			Application Date:						
				Work Completed		E	F		G
A Specification Section No.	B Description	C Scheduled Value (\$)	D From Previous Application (C+D)	E This Period	F Materials Presently Stored (not in C or D)	G Total Completed and Stored to Date (C + D + E)	H % (F / B)	I Balance to Finish (B - F)	
Totals									

Progress Estimate - Unit Price Work

FORM C-00 62 76

Contractor's Application

Stored Material Summary

FORM C-00 62 76

Contractor's Application

**REQUEST FOR
INTERPRETATION/INFORMATION
(Form C-00 63 15)**

RFI #: _____ Attachment

To: _____

From: _____

Attn: _____

Issue Date: _____

Project: _____

Required Reply Date: _____

DISTRIBUTION:

Contractor

Owner

Engineer

REFERENCES:

- Specifications: _____ Section: _____ Page/Paragraph: _____
- Drawings: _____ Issue Date: _____ Detail/Sections: _____
- Work Area: _____ Grid/Level: _____

RFI DESCRIPTION:

From: _____ Tel No: _____ Fax: No: _____

Initial: _____ E-mail: _____

RFI REPLY: (response may be transmitted in separate document)

Possible Cost Effect Yes: No:

Possible Schedule Effect Yes: No:

From: _____ Reply Date: _____ xc: _____

Initial: _____

This page intentionally left blank

Field Order (C-00 63 36)

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

Attention:

You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.04.A, for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work.

Reference: _____ (Specification Section(s)) _____ (Drawing(s) / Detail(s))

Description: _____

Attachments: _____

Engineer: _____

Receipt Acknowledged by Contractor: _____ Date: _____

Copy to Owner

This page intentionally left blank

Work Change Directive (Form C-00 63 49)

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

Contractor is directed to proceed promptly with the following change(s):

Item No.	Description

Attachments (list documents supporting change):

Authorization for Work described herein

- Nonagreement on pricing of proposed change.
 - Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

Estimated change in Contract Price and Contract Times:

Recommended for Approval by Engineer:	Date
Authorized for Owner by:	Date
Received for Contractor by:	Date
Received by Funding Agency (if applicable):	Date:

This page intentionally left blank

CHANGE REQUEST (FORM C-00 63 60)

(Design Changes/Deviations/Substitutions)

CR NO.
DATE

Project:

Request Initiated by:

- Contractor
- Owner
- Engineer

Impact to Contract Price expected

Impact to Contract Time expected

Change Orders will be processed separately

Request submitted as (format):

Description of Change (documentation attached)

Reason for Change

Response: This constitutes a Written Amendment to the Agreement.

Review of the proposed change/deviation/substitution by Engineer is for general compatibility with the design concept of the Project. This review does not extend to means, methods, sequences, or procedures of construction or to issues of safety incident thereto. This review shall not relieve the Contractor from responsibility for full compliance with the requirements specified in the Contract Documents and to determine and verify the information contained therein.

<p>Recommended By Engineer for Acceptance (subject to above comments if any) <input type="checkbox"/> recommended for processing and approval under a separate Change Order</p> <p>NAME:</p> <hr/> <p>Signature</p>	<p><input type="checkbox"/> Approved by Owner (no schedule or cost impact) <input type="checkbox"/> Acknowledged by Owner – to be processed and approved under a separate Change Order</p> <p>NAME:</p> <hr/> <p>Signature</p>
<p>Approved by Contractor <input type="checkbox"/> Change Order to be requested</p> <p>NAME:</p> <hr/> <p>Signature</p>	<p>Date</p> <p>Date</p>

This page intentionally left blank

Change Order (Form C-00 63 63)

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:

Original Contract Price:

\$ _____

[Increase] [Decrease] from previously approved
Change Orders No. ____ to No. ____:

\$ _____

Contract Price prior to this Change Order:

\$ _____

[Increase] [Decrease] of this Change Order:

\$ _____

Contract Price incorporating this Change Order:

\$ _____

CHANGE IN CONTRACT TIMES:

Original Contract Times: Working days Calendar days

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] from previously approved Change Orders
No. ____ to No. ____:

Substantial completion (days): _____

Ready for final payment (days): _____

Contract Times prior to this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] of this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

Contract Times with all approved Change Orders:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

RECOMMENDED:

By: _____

Engineer (Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable):

Date: _____

ACCEPTED:

By: _____

Owner (Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable):

Date: _____

ACCEPTED:

By: _____

Contractor (Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable):

Date: _____

Change Order

Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.



CITY OF QUINCY, MASSACHUSETTS

Choose an item.

Thomas P. Koch, Mayor

Choose an item.

CHANGE ORDER/AMENDMENT NO.

Made in Quintuplicate this day _____ between the City of Quincy, Massachusetts, a Municipal Corporation, within the County of Norfolk, Party of the First Part and:

Contractor name:

Contractor address:

Party of the Second Part.

WITNESSETH: That for and in consideration of the following mutual covenants contained herein the parties

Agree to amend Contract (**insert contract number**) dated (insert Contract date) between the same parties as follows:

ARTICLE I: In the Agreement, we are (**INCREASING/ DECREASING**) by
\$_____

Because (insert justification):

ARTICLE II: In the Agreement of the Contract, for _____

Between the same parties, strike out the words and figures:

(Insert Figures)

(Insert Words)

and substitute the words and figures:

(Insert Figures)

(Insert Words)

CITY OF QUINCY

MAYOR

Sufficient Funds are available to cover the contract in the account _____
to be charged.

CITY SOLICITOR

DIRECTOR OF MUNICIPAL FINANCE

PURCHASING AGENT

VENDOR SIGNATURE

DEPT. _____

DIRECTOR OF POLICY

P.O. # : _____

CODE: _____

PROJECT NAME:

CONTRACT NUMBER:

CHANGE ORDER NUMBER:

ORIGINAL CONTRACT AMOUNT: \$

PREVIOUS CHANGE ORDERS (#__-#__): \$

CURRENT CONTRACT AMOUNT: \$

CHANGE IN CONTRACT PRICE (this change order): \$

TOTAL ADJUSTED CONTRACT PRICE:
(include all change orders): \$

Reason for Change Order:

(1) Additional Work _____ (3) Change in Bid Quantities _____

(2) Field Change _____ (4) Change in Schedule _____

(5) Other: _____

(a) Time to complete the work is extended by ___ calendar days.

(b) Extended completion date is _____

Reason & Description of Change:

Supporting Documents (list or attached, as necessary):

This Change Order has been requested by: ____ CONTRACTOR ____ CITY

This Change Order has been reviewed by: _____
(TITLE) _____ (Date)

Notice of Substantial Completion (C-00 65 15)

Project:	Owner:	Owner's Contract No.:
Contract:	Date of Contract:	
Contractor:		

This NOTICE of Substantial Completion applies to:

The following Systems, Equipment or specified portions : All Work under the Contract Documents

:

Date of Substantial Completion for above

The following documents are attached to and made part of this Notice.

Submitted by Contractor

Date

This page intentionally left blank

Certificate of Substantial Completion (Form C-00 65 16)

Project:

Owner:

Owner's Contract No.:

Contract:

Engineer's Project No.:

This [tentative] [definitive] Certificate of Substantial Completion applies to:

All Work under the Contract Documents: The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

Amended Responsibilities Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer _____ Date _____

Accepted by Contractor _____ Date _____

Accepted by Owner _____ Date _____

Notice of Completion (Form C-00 65 18)

Project:	Owner:	Owner's Contract No.:
Contract:	Date of Contract:	
Contractor:		

This NOTICE of Completion applies to:

All Work under the Contract Documents: The following specified portions:

Date of final Completion

The Work to which this Notice applies is ready for inspection by authorized representatives of Engineer and Owner. Contractor has completed all corrections, delivered all required documentation, and the Project, or portion designated above, is complete. The Date of Completion of the Project or portion thereof designated above is hereby declared by the Contractor.

The following documents are attached to and made part of this Certificate:

Final Punchlist

Final Application for Payment

Only the **making and acceptance of final payment** will constitute:

1. A waiver of all claims by Owner against Contractor, except claims arising from any unsettled liens, from Defective Construction appearing after final inspection; 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 timely made in writing and still unsettled.

Submitted by Contractor

Date

This page intentionally left blank

See various sections of the Supplementary Conditions for additional modifications and supplements

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

SECTION 00 72 05 STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by



AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

**REVISIONS HIGHLIGHTED WITHIN THE TEXT OF THIS SECTION
HAVE BEEN PREPARED BY WOODARD & CURRAN**

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 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 Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

Copyright © 2007 National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

Associated General Contractors of America
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308
(703) 548-3118
www.agc.org

The copyright for this EJCDC document is owned jointly by the four EJCDC sponsoring organizations and held in trust for their benefit by NSPE.

SECTION 00 72 05
STANDARD GENERAL CONDITIONS OF THE
CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology	1
1.01 Defined Terms.....	1
1.02 Terminology	6
Article 2 – Preliminary Matters.....	7
2.01 Delivery of Bonds and Evidence of Insurance.....	7
2.02 Copies of Documents.....	7
2.03 Commencement of Contract Times; Notice to Proceed	7
2.04 Starting the Work.....	8
2.05 Before Starting Construction	8
2.06 Preconstruction Conference; Designation of Authorized Representatives	8
2.07 Initial Acceptance of Schedules	9
Article 3 – Contract Documents: Intent, Amending, Reuse.....	9
3.01 Intent.....	9
3.02 Reference Standards	10
3.03 Reporting and Resolving Discrepancies	10
3.04 Amending and Supplementing Contract Documents	11
3.05 Reuse of Documents	11
3.06 Electronic Data.....	12
Article 4 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions; Reference Points	12
4.01 Availability of Lands	12
4.02 Subsurface and Physical Conditions	13
4.03 Differing Subsurface or Physical Conditions.....	13
4.04 Underground Facilities	15
4.05 Reference Points	16
4.06 Hazardous Environmental Condition at Site.....	16
Article 5 – Bonds and Insurance	18
5.01 Performance, Payment, and Other Bonds	18
5.02 Licensed Sureties and Insurers	18
5.03 Certificates of Insurance	19
5.04 Contractor's Insurance.....	19
5.05 Owner's Liability Insurance	22

See various sections of the Supplementary Conditions for additional modifications and supplements

5.06 Property Insurance	22
5.07 Waiver of Rights	23
5.08 Receipt and Application of Insurance Proceeds (Not used)	24
5.09 Acceptance of Bonds and Insurance; Option to Replace.....	<u>2525</u>
5.10 Partial Utilization, Acknowledgment of Property Insurer.....	<u>2525</u>
 Article 6 – Contractor’s Responsibilities	25
6.01 Supervision and Superintendence	25
6.02 Labor; Working Hours.....	26
6.03 Services, Materials, and Equipment	26
6.04 Progress Schedule	26
6.05 Substitutes and “Or-Equals”.....	27
6.06 Concerning Subcontractors, Suppliers, and Others	29
6.07 Patent Fees and Royalties	31
6.08 Permits.....	31
6.09 Laws and Regulations.....	32
6.10 Taxes	32
6.11 Use of Site and Other Areas	32
6.12 Record Documents.....	33
6.13 Safety and Protection.....	33
6.14 Safety Representative	34
6.15 Hazard Communication Programs	34
6.16 Emergencies	35
6.17 Shop Drawings and Samples	35
6.18 Continuing the Work	37
6.19 Contractor’s General Warranty and Guarantee.....	37
6.20 Indemnification	39
6.21 Delegation of Professional Design Services	40
 Article 7 – Other Work at the Site.....	40
7.01 Related Work at Site	40
7.02 Coordination.....	41
7.03 Legal Relationships.....	41
 Article 8 – Owner’s Responsibilities	42
8.01 Communications to Contractor.....	42
8.02 Replacement of Engineer.....	42
8.03 Furnish Data	42
8.04 Pay When Due	42
8.05 Lands and Easements; Reports and Tests	42
8.06 Insurance	42
8.07 Change Orders.....	42
8.08 Inspections, Tests, and Approvals	42
8.09 Limitations on Owner’s Responsibilities	43
8.10 Undisclosed Hazardous Environmental Condition.....	43
8.11 Evidence of Financial Arrangements	43

8.12 Compliance with Safety Program.....	43
Article 9 – Engineer’s Status During Construction	43
9.01 Owner’s Representative.....	43
9.02 Visits to Site	43
9.03 Project Representative	44
9.04 Authorized Variations in Work	47
9.05 Rejecting Defective Work	47
9.06 Shop Drawings, Change Orders and Payments	48
9.07 Determinations for Unit Price Work	48
9.08 Decisions on Requirements of Contract Documents and Acceptability of Work	48
9.09 Limitations on Engineer’s Authority and Responsibilities.....	49
9.10 Compliance with Safety Program.....	49
Article 10 – Changes in the Work; Claims	50
10.01 Authorized Changes in the Work	50
10.02 Unauthorized Changes in the Work	50
10.03 Execution of Change Orders.....	50
10.04 Notification to Surety.....	51
10.05 Claims.....	51
Article 11 – Cost of the Work; Allowances; Unit Price Work.....	52
11.01 Cost of the Work	52
11.02 Allowances.....	55
11.03 Unit Price Work	55
Article 12 – Change of Contract Price; Change of Contract Times.....	56
12.01 Change of Contract Price	56
12.02 Change of Contract Times	57
12.03 Delays.....	58
Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work.....	58
13.01 Notice of Defects	58
13.02 Access to Work	59
13.03 Tests and Inspections	59
13.04 Uncovering Work	60
13.05 Owner May Stop the Work.....	60
13.06 Correction or Removal of Defective Work.....	60
13.07 Correction Period	61
13.08 Acceptance of Defective Work	62
13.09 Owner May Correct Defective Work	62
Article 14 – Payments to Contractor and Completion.....	63
14.01 Schedule of Values	63
14.02 Progress Payments	63
14.03 Contractor’s Warranty of Title	66

14.04 Substantial Completion.....	66
14.05 Partial Utilization	67
14.06 Final Inspection.....	68
14.07 Final Payment	68
14.08 Final Completion Delayed.....	69
14.09 Waiver of Claims	70
 Article 15 – Suspension of Work and Termination.....	70
15.01 Owner May Suspend Work	70
15.02 Owner May Terminate for Cause	70
15.03 Owner May Terminate For Convenience.....	72
15.04 Contractor May Stop Work or Terminate	72
 Article 16 – Dispute Resolution	73
16.01 Methods and Procedures.....	73
 Article 17 – Miscellaneous	74
17.01 Giving Notice	74
17.02 Computation of Times	74
17.03 Cumulative Remedies	74
17.04 Survival of Obligations	75
17.05 Controlling Law	75
17.06 Headings.....	75
17.07 Professional Fees and Court Costs Included.....	75

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. May also be referred to as “Proposal” which may be used interchangeably and shall have the same meaning.
 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, Supplementary 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 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 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 and complement the Specifications. Shop Drawings and other Contractor submittals are not Drawings as so defined. May also be referred to as "Plans", which may be used interchangeably and shall have the same meaning. Notes on Drawings are directed to Contractor unless specifically noted otherwise.
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 01 of the Specifications which govern the Work in 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.
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. May also be referred to as "Construction Schedule", which may be used interchangeably and shall have the same meaning.
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. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *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.

38. *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.
39. *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.
40. *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.
41. *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.
42. *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. The Specifications are based on the guidelines of the Construction Specifications Institute (CSI) Project Resource Manual, and are directed to Contractor unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases in the Specifications.
43. *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.
44. *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.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, 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 Subcontractor.

48. *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.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *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.
51. *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.

B. Additional Terms

1. *Final Completion*—The time at which all Work is completed and ready for final payment in accordance with Paragraph 14.07 of these General Conditions.
 2. *Industry Practice*—The written practices, methods, materials, supplies and equipment, as changed from time to time, that are commonly used in the industry applicable to the Project to design, construct and operate facilities and plants, or any practices, methods and acts, which in the exercise of reasonable judgment in light of the facts known at the time, could have been expected to accomplish the desired results consistent with good business practices, reliability, safety and expedition.
 3. *Installer*—The entity engaged by Contractor or a Subcontractor for installation, erection, application and similar required operations of a particular portion of the Work at the Site, including who has specialty experience in the Work they are engaged to perform.
 4. *Punch List*—A list of open items representing portions of the Work which Contractor, Engineer, Owner reasonably agree is not complete on the date of Substantial Completion but which items will not significantly interfere with the safe, reliable operation and integrity of the Project or its intended use.
- 52.5. *Purchase Order***—A written agreement between Contractor and a Supplier for provision of material and equipment.

See various sections of the Supplementary Conditions for additional modifications and supplements

6. *Warranty Period*—The correction period after the date of Substantial Completion per Paragraph 13.07 of these General Conditions.

1.02 *Terminology*

- A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated 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 information in the Contract Documents and with the design concept of the 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. See also Paragraph 17.02 of these General Conditions.
- 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 that 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~~Prior to execution of the Agreement ~~to Owner~~, Contractor shall ~~also~~ deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* ~~Prior to execution of the Agreement and b~~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 2~~ printed or hard copies of the Contract Documents and 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-90th~~ day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, unless mutually agreed otherwise, 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 and the lead times for equipment and materials per the listing in subparagraph 2.05.A.4;
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 which will be confirmed in writing by Contractor at the time of submission. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work; and.
4. a complete listing of equipment and materials with lead times between placing orders and delivery, including normal allowances of time for processing and correcting Shop Drawings.

B. *Evidence of Insurance:* In accordance with Paragraph 2.01.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- 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.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

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.
 4. Contractor's listing of equipment and materials with lead times must be reflected in the Progress Schedule. All orders for long lead items shall be placed within 30 days after Effective Date of the Agreement if delivery is critical to scheduling. Failure to place orders in accordance with the Progress Schedule may result in full liability for liquidated damages if Milestones and Contract Times are not met.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 Intent

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all and comprise the entire agreement between Owner and Contractor concerning the Work. If any term or provision of any of the Contract Documents, or the application thereof to any party or circumstance shall, to any extent, be determined to be invalid or unenforceable, the remaining provisions of the Contract Documents, or the application of such term or provision to parties or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected thereby, and each term and provision of each of the Contract Documents shall be valid and shall be enforced to the fullest extent permitted by Laws and Regulations.
- 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 reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated 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, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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 discovers, or has actual knowledge of, 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 (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then 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 such conflict, error, ambiguity, or discrepancy in the Contract Documents ~~unless if~~ Contractor ~~had actual knowledge~~knew or reasonably should have known of such conflict, error, ambiguity, or discrepancy 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, or code, or the instruction of any Supplier (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 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 its consultants, including electronic media editions; or
 2. reuse any 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 prohibitions 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. ~~Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies), files transmitted in portable document format (PDF), and other electronic media formats of text, data, graphics or other file types supported by any digital document exchange system implemented for the Project, all of which are understood by all parties to constitute official Project correspondence and submittals. 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

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 known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the 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 officers, directors, members, partners, employees, agents, consultants, or subcontractors 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 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. ~~(Not Used) 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 may~~ 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,or
 - d. written notice is submitted after final payment.
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, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall 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 provided by others; 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.

See various sections of the Supplementary Conditions for additional modifications and supplements

3. Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, shall not be liable to Contractor for any Claims for losses or damages incurred by Contractor related to Underground Facilities not shown or indicated (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).

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:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the 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 officers, directors, members, partners, employees, agents, consultants, or subcontractors 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 unless Contractor caused or contributed to such Hazardous Environmental Condition. 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. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.
- 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 written notice to Contractor: (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, members, 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, members, 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

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 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 or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- 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 20-5 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 and loss payee identified in the Supplementary Conditions, certificates of insurance and a letter from Contractor's insurance company(s) and agents confirming types and limits of coverage (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 and loss payee 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.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed, complies with the requirements of Article 5, 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;~~s~~
- 7. claims arising out of violation of Laws or Regulations; and
- 8. claims for damages because of negligent acts, errors and omissions arising out of performing or providing professional services.

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.~~68~~ inclusive, be written on an occurrence basis, include as additional insureds (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 included as additional insureds, and include coverage for the respective officers, directors, members, 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 herein and in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
- 3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
- 4. 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) and will contain waiver provisions in accordance with Paragraph 5.07;
- 5. 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
- 6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.

- b. 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.
7. In the event general liability insurance is provided on a claims-made policy, the retroactive date of such policy shall not be later than the date of the Notice to Proceed or the Effective Date of the Agreement, whichever is earlier. For construction periods extending beyond the expiration date of an initial claims-made policy, the retroactive date of all subsequent claims-made policies shall not be later than the date of the Notice to Proceed.

- C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation and related coverage:

<u>Minimum limit of liability</u>	<u>Statutory</u>
<u>Applicable Federal (e.g., Longshoreman's)</u>	<u>Statutory</u>
<u>Employer's Liability</u>	<u>\$1,000,000</u>

2. Contractor's General Liability:

\$1,000,000 per occurrence; \$2,000,000 general aggregate; including:

- Broad Form Property Damage Liability including coverage for acts of terrorism
- Completed Operations and Product Liability
- Contractual Liability
- Independent Contractors
- Explosion, Collapse & Underground Hazards
- Personal Injury Coverage, Exclusion Deleted
- Damage to Rented Premises
- Medical Expenses

Pollution Liability (covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from the Contractor's operations and completed operations maintained for no less than three years after final completion): \$1,000,000

Excess or Umbrella Liability: \$5,000,000 per occurrence; \$5,000,000 general aggregate

3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:

Combined Single Limit of \$1,000,000 for bodily injury & property damage covering Contractor and any vehicles owned, hired and non-owned by the Contractor

See various sections of the Supplementary Conditions for additional modifications and supplements

4. Professional Liability (E&O for engineers, architects or surveyors): \$1,000,000 for each claim with an annual aggregate of at least \$2,000,000 if professional services are required under the Specifications

5. Owners Protective Liability: as may be specified in the Supplementary Conditions

D. Any self-insured retention (not allowed for Worker's Compensation) and/or deductibles must be identified and cannot exceed \$100,000 per occurrence without the prior approval of the Owner. Contractor must provide either an audited financial statement to confirm solvency or a letter of credit guaranteeing the \$100,000 in case of loss for the duration of the Project and for the Correction Period.

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 (ongoing and completed) under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Owner may, in its discretion, purchase and maintain property insurance upon the Work at the Site. Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. Contractor shall be responsible for any (subject to such deductible amounts or self-insured retention 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, members, 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 a loss payee;
2. be written on a Builder's Risk "all-risk" or Special Forms policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following special form perils or causes of loss, including but not limited to: fire, lightning, flood, pollution, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that 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 loss payee to whom a certificate of insurance has been issued; and

7.8. comply with the requirements of Paragraph 5.06.C of the General Conditions.

- B. ~~(Not used) Owner shall purchase and maintain such equipment breakdown 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, members, 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 a loss payee.~~
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this 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 loss payee 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 this 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 as loss payees (and the officers, directors, members, 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 loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, 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 as loss payees (and the officers, directors, members, 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, members, 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, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 Receipt and Application of Insurance Proceeds (Not used)

- 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 loss payees, 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~~

See various sections of the Supplementary Conditions for additional modifications and supplements

~~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~~ Contractor in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the ~~objecting party~~ Owner shall so notify the ~~other party~~ Contractor 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 ~~ether~~ Owner, such additional information in respect of insurance provided as ~~the other~~ may ~~be~~ reasonably requested. If ~~either party~~ Contractor does not purchase or maintain all of the bonds and insurance required ~~of such party~~ by the Contract Documents, ~~such party~~ Contractor shall notify the ~~other party~~ Owner 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~~ Owner may elect to obtain equivalent bonds or insurance to protect ~~such other party's~~ Owner's interests at the expense of the ~~party~~ Contractor 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

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.

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, startup, 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.

D. Provision of any instructions:

1. will not be effective to assign to Owner, or any of Owner's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 8.09; and
2. will not be effective to assign to Engineer, or any of Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09.

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, make or catalogue number, 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; and
 - 3) it has a proven record of performance and availability of responsive service.
 - 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 if 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 by 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 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 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; and

- 4) 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 a Change Order in the case of a substitute and 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 so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable 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 Bidding Requirements or 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 the Contractor has submitted a list thereof in accordance with the Bidding Requirements or Supplementary Conditions (which shall be included as an attachment to the Agreement), 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 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.
 - 1. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee 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, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, 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.

2. Such agreement between Contractor and the Subcontractor or Supplier shall specifically include dispute resolution provisions similar to those in Article 16 (if any) and provisions required by Laws and Regulations identified in the various Supplementary Conditions.

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, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors 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 specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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.
- D. At the Owner's option, Contractor shall defend claims in connection with any alleged infringement of such rights.

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 observes that the Specifications or Drawings are at variance with any Laws or Regulations, Contractor shall give Engineer prompt written notice thereof, and any necessary changes will be authorized by one of the methods set forth in Paragraph 3.04. 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 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, except as may be set forth in the Supplementary Conditions.

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, members, 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 and other closeout submittals specified 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. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. 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. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs (if any) and other safety requirements that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. 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 Drawings or Specifications or to the acts or omissions of Owner or Engineer 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).
- F. 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 accepted 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:*

- 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:

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

- c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
- 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 Drawings 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. or for errors or omissions in a Shop Drawing or Sample.

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.
2. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than 3 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.
3. In the event that Contractor requests a change of a previously approved item, Contractor shall reimburse Owner for Engineer's charges for its review time unless the need for such change is beyond the control of Contractor.

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 in accordance with Subcontractor warranties, manufacturers and Suppliers warranties on equipment and material, and extended or special warranties and will not be defective for the correction period specified in 13.07. Owner and Engineer and its their officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

1. Contractor shall obtain and preserve for the benefit of the Owner:

- a. manufacturers' and Suppliers' written warranties and guarantees on equipment and material incorporated into the Work;
- b. written warranties and guarantees from each Subcontractor engaged in the performance of the Work; and

2. extended or special warranties.

- 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; ~~or~~
 8. any acceptance by Owner or any failure to do so.
- D. Contractor shall prepare and execute a written general warranty and guarantee applicable to the Work reflecting the provisions of this Paragraph 6.19, Article 13 and other applicable provisions of the Contract Documents pertaining to warranties and guarantees, Subcontractor, manufacturers and Supplier warranties and guarantees, and extended or special warranties and guarantees. Contractor shall submit this written general warranty and guarantee in accordance with Article 14 and the General Requirements.
- E. Provision of any warranties or guarantees:
1. will not be effective to assign to Owner, or any of Owner's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 8.09; and
 - 8.2. will not be effective to assign to Engineer, or any of Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09.
- D.F. The warranty and guarantee provisions of this Paragraph 6.19 shall be in addition to and not in limitation of any other warranties, guarantees or remedies allowed by Law or required by the Contract Documents.

6.20 Indemnification

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend, and hold harmless Owner and Engineer, and the officers, directors, members, 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 or wrongful 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 officers, directors, members, partners, employees, agents, consultants, or subcontractors 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.
 1. Without limiting the generality of the preceding Paragraph, the Contractor hereby specifically agrees to indemnify, defend, and hold harmless the Owner and Engineer from all such claims, losses or expenses which arise out of injuries of employees of the Contractor or any of its Subcontractors or Suppliers of any tier related to performance of the Work. It is the Owner's intention that all financial risk of injuries related to the Work be borne by the Contractor, and that the Owner have no financial responsibility, direct or indirect, for any such claims.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, 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, provided however, that if the claim, cost, loss or damage referred to in this Paragraph 6.20 results from failure of the Engineer to discover a condition, Underground Facilities or object which is underground or otherwise not reasonably observable by the Engineer, and if said failure to discover either was or should have been apparent to the Contractor in that the said condition or object is omitted from the Engineer's maps, Drawings, opinions, reports, surveys, Change Orders, designs or Specifications, then the Contractor shall be liable for indemnification of the Engineer and Owner under Paragraph 6.20 for claims, costs, losses and damages resulting from said failure to discover unless Contractor shall have notified Engineer of the existence

See various sections of the Supplementary Conditions for additional modifications and supplements

and location of such condition or object prior to the occurrence of such claims, costs, losses and damages and in sufficient time for Engineer to have made provisions therefor; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage; or
 3. caused by the negligent acts, errors or omissions of any of them.

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

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through 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, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and 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 such work; provided, however, that Contractor may cut or alter others' 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 wrongful actions or inactions.

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

ARTICLE 8 – OWNER'S RESPONSIBILITIES

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 with respect to 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 relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

- A. Owner's responsibilities, if any, with 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 with 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. However, the Owner shall have the right to direct the Contractor to perform the Work according to any sequence schedule set forth in the Contract Documents or established pursuant thereto. 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. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

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.

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. However, the Engineer shall have the right to direct the Contractor to perform the Work according to any sequence schedule set forth in the Contract Documents or established pursuant thereto.

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 herein, 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.
- B. The Resident Project Representative (RPR) will be Engineer's employee or agent at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall be through or with the full knowledge and approval of Contractor. The RPR shall perform the following.
1. Schedules: Review the Progress Schedule, schedule of Shop Drawing and Samples submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
 2. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences and other Project-related meetings, and prepare and circulate copies of minutes thereof.
 3. Liaison:
 - a. Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, to assist in providing information regarding the intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.

See various sections of the Supplementary Conditions for additional modifications and supplements

4. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

5. Shop Drawings and Samples:

- a. Record date of receipt of Samples and approved Shop Drawings.
- b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.

6. Modifications:

- a. Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to Engineer.
- b. Transmit to Contractor in writing, decisions as issued by Engineer.

7. Review of Work and Rejection of Defective Work:

- a. Conduct onSite observations of Contractor's Work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
- b. Report to Engineer whenever RPR believes that any part of Contractor's Work in progress will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of Work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

8. Inspections, Tests, and System Startups:

- a. Verify that tests, equipment, and systems startups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
- b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems startups.

See various sections of the Supplementary Conditions for additional modifications and supplements

9. Records:

- a. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of Contractor, Subcontractors, and major Suppliers.
- b. Maintain records for use in preparing Project documentation.

10. Reports:

- a. Furnish periodic reports to Engineer as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition or conditions that may impede the compliant operation of existing facilities on Site.

11. Payment Requests: Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

12. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

13. Completion:

- a. Participate in a Substantial Completion inspection, assist in the determination of Substantial Completion and the preparation of the Punch List (lists of items to be completed or corrected).
- b. Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final Punch List (list of items to be completed and deficiencies to be remedied).
- c. Observe whether all items on the final Punch List have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the Notice of Acceptability of the Work.

See various sections of the Supplementary Conditions for additional modifications and supplements

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment, including “or-equal” items.
2. Exceed limitations of Engineer’s authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor’s superintendent.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor’s Work unless such advice or directions are specifically required by the Contract Documents.
5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-Site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part or determine operational protocol that may affect the compliant operation of existing facilities.

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 believes 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. However, the Engineer shall have the right to direct the Contractor to perform the Work according to any sequence schedule set forth in the Contract Documents or established pursuant thereto. 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.

F. Engineer will have no responsibility or authority:

- 1. To order changes in construction which will result in additional costs or which will require extensions of Contract Times;
- 2. To suspend all or any portion of Contractor's operations;
- 3. To terminate all or any portion of the Work;
- 4. To make final acceptance of all or any portion of the Work; and
- 5. To operate or maintain any portion of the Work.

9.10 Compliance with Safety Program

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

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.D.

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 the provisions of any bond require notice to be given to a surety 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), 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 30-14 days) after the start of the event giving rise thereto. Failure to comply with this notice requirement shall constitute a waiver of the Claim. 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 60-30 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 Times 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.

G. Contractor shall not have the right to stop performance of the Work pending resolution of a Claim.

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

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 not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
 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 on the Work. 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. Small tools and manual equipment are not allowable and considered to be included in overhead.
 - 1) Rentals of construction equipment and machinery and the parts thereof whether rented from Contractor or others in accordance with rates published in current edition of the Rental Rate Blue Book® for construction equipment published by EquipmentWatch® (www.equipmentwatch.com). When Contractor-owned equipment is ordered by Owner or Engineer to be held at standby, equipment rental rates shall be 50% of normal rate. Rental or standby shall not include time that equipment is inoperative because of malfunction or breakdown and shall cease when the use thereof is no longer necessary for the Work. The rental rate, shall be determined as follows.
 - a) For equipment already on the Project: the monthly prorated rental rate by hourly use.
 - b) For equipment not on the Project: most cost effective daily, weekly or monthly rate. 1 month normal use = 176 hours.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as 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, express and courier services, 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.
- 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: (Not used)
 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. Owner's Contingency Allowances:
 1. Contractor agrees that Owner's~~a~~ contingency allowance, if any, is for the sole use of Owner to cover unestimated anticipated costs for certain items.
 - 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 Owner's contingency allowances, and the Contract Price shall be correspondingly adjusted. Contractor shall not receive payment for any unused portion of the contingency allowance.

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 to 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 15-10 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 Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15-10 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, provided, however, that on any subcontracted work the total maximum fee to be paid by Owner under this subparagraph shall be no greater than 27 percent of the costs incurred by the Subcontractor who actually performs the Work;
 - 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, acts of war or terrorism, or acts of God (force majeure).
- 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 war or terrorism, 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 their officers, directors, members, partners, employees, agents, consultants, or subcontractors 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

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. 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, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's 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. ~~(Not Used) 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 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. Except where responsibility for a specific inspection or test is expressly allocated to Owner in the Specifications or by Laws and Regulations, 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, Contractor shall, if requested by Engineer, uncover such Work 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 written 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 and may be deducted from amounts otherwise due the 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, including materials, equipment and supplies or as defined in manufacturers' and Suppliers' warranties (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 and the terms of this Paragraph 13.07 will continue to apply.
- 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 for 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, or immediately in the case of an emergency, 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

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 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, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and 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. 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 and provides an indemnity satisfactory to Owner for all claims, costs, losses and damages arising out of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended including liability for liquidated damages and correction of defective work by Owner or others; 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 remedies the reasons for such action.
3. Upon a subsequent determination 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 and subject to interest as provided in the Agreement.

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 and final testing has been completed in accordance with the General Requirements, Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor in the Punchlist as incomplete) using the Notice of Substantial Completion form included in the Contract Documents, submit the Contractor's written general warranty and guarantee per Paragraph 6.19.D., 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 using the Certificate of Substantial Completion included in the Contract Documents. There shall be attached to the certificate a Punch List (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 Punch List (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 remove its property and complete or correct items on the tentative listPunch 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, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D 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.

B. Owner may request in writing that Contractor permit Owner to separately operate any part of the Work although it is not substantially complete subject to the following conditions.

1. A copy of such request will be sent to Engineer and, within a reasonable time thereafter, Owner, Contractor and Engineer shall make an inspection of that part of the Work not substantially complete to determine the status of completion and will prepare a Punch List before final payment.

See various sections of the Supplementary Conditions for additional modifications and supplements

2. If Contractor does not indicate in writing to Owner and Engineer that such part of the Work is not ready for separate operation by Owner, Engineer will finalize the Punch List and will deliver such list to Owner and Contractor, together with a written recommendation as to the division of responsibilities between Owner and Contractor with respect to security, operation, safety, maintenance, utilities, insurance, warranties and guarantees for that part of the Work pending final payment.
3. The Engineer's recommendation and Punch List will become binding upon Owner and Contractor at the time the Owner takes over and separately operates such part of the Work unless otherwise agreed in writing and so informed Engineer.
4. During such separate operation by Owner and prior to Substantial Completion of such part of the Work, Owner shall allow Contractor reasonable access to complete or correct Punch List and to complete other related Work.

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, warranties, updated Contractor's written general warranty and guarantee per Paragraph 6.19.D if modified, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, and Engineer has indicated that the Work is acceptable (subject to the provisions of Paragraph 14.09), 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.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled;
 - d. Notice of Completion; and

- d.e. 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 might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, 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 as detailed on the Notice of Completion. 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

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 repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents;
or-
 5. Contractor commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if Contractor takes any equivalent or similar action by filing a petition or otherwise under any Laws and Regulations in effect at such time relating to the bankruptcy or insolvency; or

See various sections of the Supplementary Conditions for additional modifications and supplements

6. a petition is filed against Contractor under any chapter of the Bankruptcy Code as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against Contractor under any Laws and Regulations in effect at the time relating to bankruptcy or insolvency; or
 7. Contractor makes a general assignment for the benefit of creditors; or
 8. a trustee, receiver, custodian or agent of Contractor is appointed under applicable law or under contract, whose appointment or authority to take charge of property of Contractor is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of Contractor's creditors; or
 9. Contractor admits in writing its inability to pay its debts generally as they become due.
- 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-reasonable~~ claims, costs, losses, and damages (including but not limited to ~~all-reasonable~~ fees and charges of engineers, architects, attorneys, and other professionals and ~~all-reasonable~~ 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

16.01 *Methods and Procedures*

A. Subject to the requirements in Paragraph 10.05, Owner and Contractor shall attempt in good faith to resolve all unsettled Claims, counterclaims, disputes and other matters in question between them arising out of or relating to the Contract Documents ("Disputes") promptly by negotiation, as follows. All negotiations pursuant to this clause are confidential and shall be treated as compromise and settlement negotiations for purposes of the Federal Rules of Evidence and state Rules of Evidence.

1. Either party may give the other party written notice of any Dispute not resolved.
2. Managers of both parties at levels at least one level above the Project personnel involved in the dispute shall meet at a mutually acceptable time and place within 5 business days after delivery of such notice, and thereafter as often as they reasonably deem necessary, to exchange relevant information and to attempt to resolve the Dispute.
3. If the matter has not been resolved within 30 days from the referral of the Dispute to the managers, or if no meeting has taken place within 10 days after such referral, either party may initiate mediation as provided hereinafter.

A.B. Subject to Paragraph 16.01.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.C. 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.D. 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 the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

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.

17.07 *Professional Fees and Court Costs Included*

- A. In any action or proceeding to enforce or interpret any contractual provision or to resolve any conflict or dispute relating to or arising from this Contract, the prevailing party shall be entitled to recover, as part of its claim, award or judgment, reasonable attorneys' fees and associated costs and expenses, including expenses of engineering, claims and other consultants.

END OF SECTION

See various sections of the Supplementary Conditions for additional modifications and supplements

This page intentionally left blank

SECTION 00 73 05

SUPPLEMENTARY CONDITIONS

The following sections modify or supplement the Standard General Conditions of the Construction Contract (“General Conditions”) included in Section 00 72 05 and are in addition to the modifications highlighted within the text thereof. All provisions which are not so modified or supplemented remain in full force and effect. The Supplementary Conditions may include certain provisions required by Laws and Regulations. Contractor is responsible to determine and obtain applicable Laws and Regulations and to review and interpret the full text of such Laws and Regulations.

The terms used in these Supplementary Conditions have the meanings stated in the Standard General Conditions and as may be included within the Sections listed below.

- 00 73 10 General Supplementary Conditions
- 00 73 19 Health and Safety Requirements
- 00 73 43 Wage Rate Requirements
- 00 73 46 Wage Determination Schedule
- 00 73 73 Statutory Requirements

This page intentionally left blank

SECTION 00 73 10

GENERAL SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2007 Edition) included in Section 00 72 05. All provisions that are not so amended or supplemented remain in full force and effect unless amended or supplemented in another Section. The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in this Section have the meanings stated below, if any, which are applicable to both the singular and plural thereof. The address system used herein is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

This Section may include certain provisions required by Laws and Regulations but does not represent or reflect all applicable provisions and policies or Laws and Regulations and may only include excerpts and portions thereof. Other required provisions and policies, and Laws and Regulations, shall be deemed to be so included and incorporated herein. Contractor is solely responsible to determine, obtain, review and interpret the full text of applicable provisions and policies, Regulations, and Laws.

SC-1.01 Defined Terms

Modify Paragraph B. *Additional Terms* as follows.

In the definition of *Punch List*, replace “Final Completion” with “prior to Warranty Inspection (Post Substantial Completion)”.

Add the following new definitions.

7. *Warranty Inspection* – the inspection Work specified to be performed during the Correction Period.
8. *Completion of Post Substantial Completion Punchlist* – Completion of all Work except for Warranty Inspection and final paving.

SC-2.05 Before Starting Construction

Pursuant to subparagraph 2.05.A.1 regarding Progress Schedule, do not include weekends in Work hours.

Pursuant to subparagraph 2.05.A.3 regarding the Schedule of Values, the prices in the Unit Prices Form included as Section 00 43 22 will constitute the minimum items for the preliminary Schedule of Values for this Project.

Add the following immediately after Paragraph 2.05.B.

- C. Additionally, within 10 days after the Effective Date of the Agreement, Contractor shall submit a Construction Operations Plan incorporating the schedules submitted pursuant to Paragraph 2.05.A and covering the following.
1. Construction methods and sequence of operations
 2. Proposed Site access
 3. Proposed erosion control measures and proposed measures to minimize impacts to existing vegetation and impacts to water quality in compliance with the General Requirements
 4. Proposed traffic control measures
 5. Proposed bypass procedures
 6. Allocation of sufficient personnel and orderly progression of Work to meet the Milestones set forth in the Agreement
- D. Within 30 calendar days of the Notice to Proceed, submit the plan detailed in Section 01 15 20 to maintain access to businesses and roadway operations.

SC-2.07 Initial Acceptance of Schedules

Add the following immediately after subparagraph 2.07.A.4.

5. Contractor's Construction Operations Plan submitted pursuant to Paragraph 2.05.C. will be acceptable to Engineer if it accurately and reasonably addresses all aspects of the Work.

SC 4.01 Availability of Lands

Pursuant to Paragraph 4.01.A, easements and rights-of-way exist for the Project and are reflected on the Drawings. Documentation is on file with Owner and available upon request.

SC-4.02 Subsurface and Physical Conditions

Pursuant to Paragraph 4.02.A,

1. the following reports of explorations and tests of subsurface conditions at or contiguous to the Site are known to Owner:
 - a. Report dated January 31, 2023 prepared by Northeast Geotechnical, Inc., entitled Geotechnical Engineering Report Proposed Retaining Wall Walter Hannon Parkway and General McConville Way Quincy, MA consisting of 36 pages

The "technical data" contained in such report upon which Contractor may rely is as indicated in report.

The “technical data” shall be limited to facts, measurements, field observations, boring logs, soil type and similar data. “Technical data” shall not include opinions regarding suitability of material, dewatering methodologies, soil stability, slope stabilization methods and other opinions or professional judgments.

2. The following drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) are known to Owner:

- a. Drawings dated March 8,2013 prepared by Nitsch Engineering, for Quincy Center Concourse, consisting of As-Built & Layout Plan Quincy Center Concourse, 1 sheet numbered EX2
- b. Drawings dated January 28,2021 prepared by Feldman Land Surveyors, for Partial Existing Condition Plan, consisting of Intersection of Walter Hannon Parkway & Parking Way, Hancock Court sheet numbered 1 of 1
- c. Drawings dated October 14,1998 prepared by Mass Highway, for Quincy Center Concourse, consisting of design plans, 1 to 110
- d. Drawings dated November 16,2011 prepared by Stephenson Design Group, for Quincy Center Redevelopment, consisting of Town Brook Enhancement Project (Phase 2A), 1 sheet numbered C-8
- e. Drawings dated September 2021 prepared by Woodard and Curran, for General McConville Way Roadway and Utility Improvements Project consisting of As-Built Documents. sheets 1 to 60
- f. Drawings dated September 16,2021 prepared by Brightview, for McConville Way, consisting of Irrigation As-builts sheet 1 to 9.
- g. Drawings dated December 1,2011 prepared by J.Derenzo, for McGrath Highway at Quincy Center, consisting of Utility As-Built Drawing, sheet 2 of 3.
- h. Drawings dated September 14,2012 prepared by SDG, for City of Quincy consisting of Verizon Duct Bank Relocation Project Utility Improvements, sheet 3 of 4 numbered C-3

All the information in such drawings constitutes “technical data” on which Contractor may rely, except for:

The “technical data” shall be limited to facts, measurements, field observations, boring logs, soil type and similar data. “Technical data” shall not include opinions regarding suitability of material, dewatering methodologies, soil stability, slope stabilization methods and other opinions or professional judgments.

SC-4.05 Reference Points

Pursuant to Paragraph 4.05.A, surveys exist for the Project. and are reflected on the Drawings. Copies of surveys are included as specified in 00 31 00.

SC-4.06 Hazardous Environmental Conditions at Site

Pursuant to Paragraph 4.06.A,

1. the following reports regarding Hazardous Environmental Conditions at the Site are known to Owner:
 - a. NONE
2. The following drawings regarding Hazardous Environmental Conditions at the Site are known to Owner:
 - a. NONE

SC-5.04 Contractor's Insurance

Pursuant to Paragraph 5.04.A, in addition to the individuals and entities specified in subparagraph 5.04.B.1, include the following as loss payees.

NONE

Pursuant to subparagraph 5.04.C.5, also provide Owner's Protective Liability in the amount of \$3,000,000* general aggregate (\$1,000,000 per occurrence for bodily injury & property damage).

SC-6.02 Labor; Working Hours

Add the following immediately after Paragraph 6.02.B.

1. Regular working hours for this Project are 7:30 a.m. to 3:30 p.m., Monday through Friday.
2. Work on weekends and holidays is not permitted unless requested in writing by contractor and granted by Owner.

SC-6.08 Permits

MAKE CHOICE

Add the following immediately after Paragraph 6.08.A.

- B. Pursuant to Paragraph 6.08.A, comply with permit requirements included in Quincy Code of Ordinances, in particular, Chapters 12.08 and 17.36 and Title 15, portions of which are included as attachments to this section. Owner will waive fees associated with road opening and trench permits to be obtained by Contractor.

SC-6.09 Laws and Regulations

Add the following immediately after Paragraph 6.09.A.

1. The Contractor shall comply with the following included as attachments to this section.
 - Applicable sections of the Quincy Code of Ordinances
 - Quincy Zoning Ordinance (Title 17 of the Code of Ordinances)

Add the following immediately after Paragraph 6.09.C.

- D. Contractor shall allow access to the Site and Project records by authorized local, State, and Federal agencies and representatives.

SC-6.13 Safety and Protection

Add the following immediately after Paragraph 6.13.B.

1. Contractor shall comply with the following minimum requirements and is solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.
 - Hazard Communication Standard 1910.1200 regulated by OSHA, including providing and maintaining Safety Data Sheets, labeling of hazardous substances, and providing required protective equipment and training and instruction to personnel on the Site including Owner and Engineer's personnel
 - Code of Federal Regulations, Chapter XVII-Occupational Safety and Health Administration (OSHA), Department of Labor, Title 29, Part 1926, Safety and Health Regulations for Construction
 - 1926 Subpart AA Confined Spaces in Construction
 - ANSI/ASSE A10 series of safety construction standards including the "Manual of Accident Prevention In Construction" published by The Associated General Contractors of America
 - AASHTO Guide on Occupational Safety on Highway Construction Projects, Subpart N, 1926.550, relating to protection of personnel and equipment under electric lines and construction equipment clearances at overhead electric lines especially during operations using large vehicles

SC-7.01 Related Work at Site

Pursuant to Paragraph 7.01, Owner has not separately contracted for other work on the Project at the Site.

SC-9.03 Project Representative

Delete Paragraph 9.03.B. in its entirety and insert the following in its place.

The Resident Project Representative (RPR) will be Owner's employee or agent at the Site, will act as directed by and under the supervision of Owner, and will confer with Owner regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with Owner and Contractor. RPR's dealings with Subcontractors shall be through or with the full knowledge and approval of Contractor. The RPR shall:

1. *Schedules:* Review the Progress Schedule, schedule of Shop Drawing and Samples submittals, and Schedule of Values prepared by Contractor and consult with Owner concerning acceptability.
2. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences and other Project-related meetings, and prepare and circulate copies of minutes thereof.
3. *Liaison:*
 - a. Serve as Owner's liaison with Contractor, working principally through Contractor's authorized representative, to assist in providing information regarding the intent of the Contract Documents.
 - b. Assist Owner in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
4. *Interpretation of Contract Documents:* Report to Owner when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Owner.
5. *Shop Drawings and Samples:*
 - a. Record date of receipt of Samples and approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Owner of availability of Samples for examination.
6. *Modifications:*
 - a. Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to Owner.

- b. Transmit to Contractor in writing, decisions as issued by Owner.
- 7. *Review of Work and Rejection of Defective Work:*
 - a. Conduct on-Site observations of Contractor's Work in progress to assist Owner in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Owner whenever RPR believes that any part of Contractor's Work in progress will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Owner of that part of Work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
- 8. *Inspections, Tests, and System Startups:*
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
 - b. Observe, record, and report to Owner appropriate details relative to the test procedures and systems start-ups.
- 9. *Records:*
 - a. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of Contractor, Subcontractors, and major Suppliers.
 - b. Maintain records for use in preparing Project documentation.
- 10. *Reports:*
 - a. Furnish periodic reports to Owner as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
 - b. Draft and recommend to Owner proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
 - c. Immediately notify Owner of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous

Environmental Condition or conditions that may impede the compliant operation of existing facilities on Site.

11. *Payment Requests:* Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Owner, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
12. *Certificates, Operation and Maintenance Manuals:* During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Owner for review and forwarding to Owner prior to payment for that part of the Work.
13. *Completion:*
 - a. Participate in a Substantial Completion inspection, assist in the determination of Substantial Completion and the preparation of the Punch List (lists of items to be completed or corrected).
 - b. Participate in a final inspection in the company of Owner, and Contractor and prepare a final Punch List (list of items to be completed and deficiencies to be remedied).
 - c. Observe whether all items on the final Punch List have been completed or corrected and make recommendations to Owner concerning acceptance and issuance of the Notice of Acceptability of the Work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment, including "or-equal" items.
2. Exceed limitations of Owner's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor's superintendent.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's Work unless such advice or directions are specifically required by the Contract Documents.

5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-Site by others except as specifically authorized by Owner.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part or determine operational protocol that may affect the compliant operation of existing facilities.

SC-8.09 Limitations on Owner's Responsibilities

Add the following immediately following Paragraph 8.09.A.

- B. No officer, member or employee of the City of Quincy or its designees or agents, and no member of its governing body, and no other public official of the governing body of the locality or localities in which the Project is situated or being carried out, who exercises any function or responsibilities in the review or approval or the undertaking or carrying out of this Project, shall participate in any decisions relating to this Contract which affects his personal interest or the interest of any corporation, partnership, or associations in which he is directly or indirectly interested or have any personal or pecuniary interest, direct or indirect, in this Contract or proceeds thereof.

SC-14.02 Progress Payments

Add the following language at the end of subparagraph 14.02.C.1.

For the purposes of this Paragraph, "Owner" shall mean "Owner's approving authorities".

SC-14.07 Final Payment

Add the following language at the end of subparagraph 14.07.C.1.

For the purposes of this Paragraph, "Owner" shall mean "Owner's approving authorities".

Add the following new Article.

14.10 Final Payment

- A. Upon completion of the Warranty Inspection and final paving, issuance of the results of the Inspection along with the plan to repair and replace defective Work, Owner will make final payment in accordance with the Agreement.

SC-16 DISPUTE RESOLUTION

Add the following immediately after Paragraph 16.01.D.

16.02 Arbitration

- A. All Claims or counterclaims, disputes, or other matters in question between Owner and Contractor arising out of or relating to the Contract Documents or the breach thereof (except for Claims which have been waived by the making or acceptance of final payment as provided by Paragraph 14.09) including but not limited to those not resolved under the provisions of Paragraphs 10.05 or 16.01, will be subject to arbitration in accordance with the rules of Construction Industry Rules of the American Arbitration Association, subject to the conditions and limitations of this Paragraph 16.02. This agreement to arbitrate, and any other agreement or consent to arbitrate entered into, will be specifically enforceable under the prevailing Laws of any court having jurisdiction.
- B. The demand for arbitration will be filed in writing with the other party to this Contract and with the selected arbitrator or arbitration provider, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the 30-day period specified in Paragraph 16.01.D, and in all other cases, within a reasonable time after the Claim or counterclaim, dispute, or other matter in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such Claim or other dispute or matter in question would be barred by the applicable statute of limitations.
- C. No arbitration arising out of or relating to the Contract Documents shall include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:
 1. the inclusion of such other individual or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration; and
 2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings.
- D. Consolidation shall be by order of the arbitrator(s) in any pending case, or if the arbitrator(s) fail to make an order, a party may apply to a court of competent jurisdiction for such order. The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity shall be specifically enforceable in accordance with the Laws of any court having jurisdiction thereof.

- E. The award rendered by the arbitrator(s) shall be consistent with the agreement of the parties, in writing, and include: (i) a concise breakdown of the award; (ii) a written explanation of the award specifically citing the Contract Document provisions deemed applicable and relied on in making the award.
- F. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the controlling Laws relating to vacating or modifying an arbitral award.
- G. If the parties decline to arbitrate, such Claims, disputes and other matters shall be decided by a court having jurisdiction.

16.03 General

- A. The Contractor will require similar dispute resolution provisions in agreements with its Subcontractors and Suppliers.
- B. Contractor shall not have the right to stop performance of the Work pending resolution of a Claim or dispute.
- C. Notwithstanding any provision contained in this Article or elsewhere in the Contract Documents, the Owner reserves the following rights in connection with Claims and disputes between the Owner and the Contractor:
 - 1. The right to institute legal action against the Contractor in any court of competent jurisdiction in lieu of demanding arbitration pursuant to this Article, in which case the Claims or disputes which are the subject of such action shall be decided by such court, and not by arbitration.
 - 2. The right to obtain from any court of competent jurisdiction a stay of any arbitration instituted by the Contractor, provided that the application for such stay is made before the appointment of the neutral arbitrator in such arbitration, in which case the Claims or disputes which are the subject of such arbitration shall be decided by such court, and not by arbitration.
 - 3. The right to require the Contractor to join as a party in any arbitration between the Owner and the Engineer relating to the Project, in which case the Contractor agrees to be bound by the decision of the arbitrator or arbitrators in such arbitration.

ATTACHMENTS

- A. Quincy Code of Ordinances, Chapters 12.08 and 17.36
- B. Quincy Code of Ordinances, cover, preface, contents and Quincy Zoning Ordinance June, 2011, contents and website

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

END OF SECTION

12.08.010 - Streets—Defined.

Whenever the word "street" is used in this title, it shall be understood as meaning to include lanes, alleys, courts, public squares and sidewalks, unless otherwise expressed.

(Prior code Ch. 18, § 1)

12.08.020 - Permit for digging in public ways.

No entity (person, business, utility, government agency) shall dig into or break-up any public street in the city without first having obtained a permit from the commissioner of public works. The permit (hereafter known as a street opening permit) shall be in a form acceptable to the commissioner, consistent with this code and other laws. The commissioner may attach general and specific conditions under which a permit is granted. In all cases, the permit must be signed by the utility or property owner and contractor.

(Ord. 94-226 (part))

12.08.021 - Fees for street opening permits.

- A. A one hundred dollar nonrefundable application fee is required.
- B. A five hundred dollar, cash or certified check refundable deposit is required and will be held until the municipal contractor completes the permanent patch and payment is received. Interest on retained money is considered to be the property of the municipality. Trenches not inspected due to the failure of the permittee to properly notify the governing authority shall be subject to loss of deposit, and/or repeat of reconstruction procedures.
- C. A five thousand dollar performance and payment bond is required for each street opening permit granted. The governing authority may allow a blanket bond commensurate with anticipated permit activity for routine excavators. Under no circumstances will this blanket bond be less than fifty thousand dollars.
- D. The contractor must furnish the municipality with a certificate of insurance for general liability in the amount of one million five hundred thousand dollars.

(Ord. 94-226 (part))

12.08.022 - Notification.

- A. The designated municipal coordinator of the governing authority shall be notified twenty-four hours before the commencement of any work.
- B. Dig safe must be notified.

(Ord. 94-226 (part))

12.08.023 - Construction procedures.

- A. The pavement shall be pre-cut and may only be disturbed within the area requiring excavation for repair, replacement or new installation. When the opening occurs within two feet of the curb and/or edge of the hardened surface, the paved area between the excavation and the curb and/or edge must also be removed.
- B.

In the backfill process, the backfill shall be comprised of suitable material (subject to approval of the governing authority or his authorized representative). Concrete should be used around all electric and telephone conduit in trenches. Controlled density fill (CDF) may be required. Compaction, (when CDF is not in use) will be executed in six inch layers. Each layer shall be ninety-five percent compacted by mechanical means. When the total surface area of an individual opening in bituminous concrete is less than nine square feet, all backfill material(s) will be placed to within a minimum of six inches of the pavement surface, or the thickness of the original pavement structure, whichever is greater. For individual openings with surface areas of nine square feet and larger, the backfill materials will be installed to within four inches of the pavement surface or the thickness of the existing structure, whichever is greater. "Pavement structure" will incorporate all previous paving materials used above the gravel sub-base, including but not limited to bituminous concrete, cement concrete, cobblestone, macadam, etc.

- C. The hardened pavement shall then be cut back and removed six to twelve inches from all sides of the initial excavation to the depth of the original pavement structure, exposing the undisturbed gravel sub-base. Edges will be cut perpendicular to the surrounding surface and have a clean vertical face, particularly in the corners. All structures shall be leveled to the adjacent surfaces. The cut back shall be in straight lines with ninety degree angles at the point(s) of intersection.
- D. All surplus and/or unacceptable excavated materials shall be removed from the job site immediately. The excavation site shall be maintained in a clean and safe condition at all times. Sidewalks and streets shall be cleaned and opened to traffic at the end of each working day, unless otherwise authorized by the governing authority. Access to properties are to be maintained. The removal and disposal of materials, including pavement, is the responsibility of the permittee. This shall be achieved in such a manner to minimize interference with pedestrian and vehicular traffic.
- E. The permittee shall be liable for the condition of the street and sidewalk openings and protection thereof prior to the temporary repair, and will be held responsible for all damage due to any failure of barricades, barriers, warning signs, lights or steel plates to properly protect the work from traffic, pedestrians or other causes. Other than while work is actually being performed, all open ditches shall be protected by uniform traffic control devices in conformance with the Massachusetts Highway Department Manual. All excavations must be properly secured to insure the safety of the travelling public, and immediately reported to the designated municipal coordinator.
- F. Temporary patching shall be performed by a contract representative of the governing authority and shall be the financial responsibility of the permittee. All barricades and/or safety devices shall be immediately removed from the vicinity upon completion of the temporary bituminous patching application.
- G. Any improperly prepared excavations, including those left with unacceptable backfill material or insufficient pavement depth, shall be temporarily paved by the municipal contract representative and charged to the refundable deposit of the permittee. The deposit shall immediately replenished to the original amount. At a later date, the trench shall be re-excavated and prepared correctly by the permittee. Under these conditions the permittee may also be subject to permit cancellation, inspection fees, fines, and loss of deposit and bond.
- H. All excavations will be required to settle and/or consolidate for a period of time before the contract representative of the governing authority is directed to perform a permanent repair. This term will be defined as a minimum of thirty days when controlled density fill was used as backfill material. Compacted gravel sub-base must experience at least one seasonal

freeze/thaw cycle. The governing authority reserves the right to address any sub-base deficiency within, or adjacent to, the original excavated area with whatever measure deemed effective, during this period. These corrective procedures will be the financial responsibility of the permittee.

- I. Immediately after the specified settling and/or consolidation period, all excavations shall be permanently restored by the contract representative for the governing authority. The following procedures shall be strictly adhered to:
 1. The infrared process shall be utilized as the primary method of permanent restoration in bituminous concrete surfaces.
 2. Temporary asphalt patches installed in cement concrete surfaces shall be re-excavated to the extremities of the square(s) in which the excavation is contained. The finished concrete shall be replaced to the depth, strength, and contour of the original structure. Any concrete surface damaged during construction shall also be replaced in a like manner.
 3. All other surfaces, including but not limited to asphalt, brick, grass and wood shall be replaced consistent with the original and in strict accordance with municipal specifications.

The permittee shall also be responsible for any and all necessary appurtenant measures including, but not limited to, complete surface reconstruction, curbing, resetting utility structures, "bar holes," compatible crackfilling, tack coating and infrared integration of pavement. All the required processes shall be determined by a site inspection with an authorized representative of the governing authority. All restoration procedures shall be the financial obligation of the permittee.

- J. The permittee shall be responsible for any settlement, sub-base failure and pavement cracks that develop in, or adjacent to, the original excavated area for a period of three years from the date of the final accepted permanent repair or, if controlled density fill is used, for a period of one year from the date of the final accepted permanent repair. Any surface disorder caused by settlement and/or sub-base movement within the general area containing a street or sidewalk opening, shall be addressed by the municipal contract representative, at the direction of the governing authority. All related corrective measures will be charged to the permittee, and the term of obligation will begin again.
- K. Excavations opened without the permit may be subject to cancellation and refusal of existing and future permits, and associated fines.
- L. Police protection, if required, shall be paid by the permittee either directly or billed by the municipal representative of the municipality and billed directly to the permittee.
- M. All surface restorations, bituminous concrete replacements, and permanent repairs will be done by a contract representative of the municipality and billed directly to the permittee.

(Ord. 94-226 (part))

12.08.024 - Billing and collections.

- A. The contract representative of the municipality shall bill the permittee for the above mentioned services. All invoices will be paid within thirty days. One past due invoices, a service charge of one and one-half percent per month will be allowed on accounts thirty days past due, provided the rate does not exceed that which is permitted by law, in which case the highest allowable legal rate will apply. Invoices exceeding ninety days shall be paid by the municipality from the refundable deposit and/or bond, at which point the municipality shall fine the permittee that cost plus one hundred dollars per day, and continue to accrue the

- service charges on any uncollected monies together with all costs of collection including attorney's fees.
- B. The governing authority reserves the right to assume the billing function, including assessment and conveyance of reasonable handling charges, as provided by Massachusetts General Laws.

On ninety days past-due invoices, the municipality will revoke existing and future permits until payment of such invoices, including all service charges and fines.

If the account is found to be uncollectible, there shall be a lien upon such real estate in the manner provided in M.G.L. Ch. 40, Sec. 42A to 42F.

(Ord. 94-226 (part))

12.08.030 - Street construction—Safeguarding—Requirements—Fencing and lighting.

During the progress of any work referred to in the preceding section, the person holding the permit shall guard the area of such work by a proper fence or railing, and by lights during the nighttime, subject to the approval of the commissioner of public works.

(Prior code Ch. 18, § 5)

12.08.040 - Street construction—Safeguarding—Police detail required—Cost liability.

- A. Any person, except the commissioner of public works, his agent or servant, receiving a permit to open, occupy, obstruct, use, dig into or break up any public street of the city, or portion thereof, in accordance with the provisions of Sections [12.08.020](#) and [12.08.030](#), shall maintain at his or its expense such police officer of the city, but in no event less than one police officer at each street location designated in each permit required to be issued, as the chief of police may deem necessary, to avoid, so far as reasonably possible, danger to the safety of persons and interference with the free circulation of vehicular traffic. For the purposes of this section, no emergency or like permits shall be issued granting blanket or similar permission to open, occupy, obstruct, use, dig into or break up more than one particular or separate street location per permit.
- B. Opening Manholes. A person receiving a permit to open a manhole in any public street of the city shall maintain at his or its expense such police officers of the city as the chief of police may deem necessary, to avoid, so far as reasonably possible, danger to the safety of persons and interference with vehicular traffic.
- C. Failure to Comply. Failure on the part of any such person to maintain such detail shall be cause for revocation of such permit, or the closing down of the opening, obstructing, using, digging into or breaking up of any public street of the city by police officers of the city until such detail is maintained.
- D. Emergency Construction. In the event of an emergency which requires the opening, obstructing, using, digging into, or breaking up of any public street of or private way in the city by a person not able to obtain a permit because of the hour, such person shall immediately notify the officer in charge of Quincy police headquarters in order that the necessary police officers, but in no event less than one police officer, as designated by said officer, at each separate street location or place of such opening, obstructing, using, digging into, or breaking up of such street shall be assigned at the expense of such person.

(Ord. 1978-100; Ord. 1977-271: prior code Ch. 18, § 5A)

12.08.050 - Digging near streets—Fencing required—Time limits.

If any person shall dig a cellar, or other cavity in the ground near to or adjoining any street, he shall, so long as the commissioner of public works may require, keep a railing or fence on or near the line of such street sufficient to protect travelers from falling into the place so dug, or being injured thereby.

(Prior code Ch. 18, § 36)

12.08.060 - Obstructing—Depositing trash or debris—Permitted for collection when.

No person shall place or cause to be placed or deposited, upon any street or other public place in this city, merchandise, ashes, shavings, house dirt, filth, offal or rubbish which shall in any way obstruct and disfigure the same; nor suffer his wood and coal to remain unnecessarily on any street. And no person shall place or deposit, or cause to be placed or deposited, any newspaper, circular, card or wastepaper of any kind or description upon any street or other public place in this city. And no person shall saw or split wood, or pile the same on any sidewalk; provided, that ashes or rubbish in suitable containers may be placed in the streets for collection, in such manner and on such days as the commissioner of public works may direct. No person shall place or cause to be placed on the public sidewalk rubbish barrels or rubbish containers fifteen hours before seven a.m. on the date of collections.

(Prior code Ch. 18, § 2)

12.08.070 - Obstructing during construction—Permit required—Requirements—Indemnification of city.

No person, unless authorized by law, shall erect on any street any staging for building, or place thereon any lumber, brick or other building materials, without a written permit from the commissioner of public works. Any person intending to erect or repair any building upon land abutting on a street shall give notice to the commissioner of public works, who may, at the owner's request, set apart such portion of the street as he shall deem expedient for such use. Such person shall, before the expiration of his permit, remove all rubbish, and restore such street, square or park to its former condition, to the satisfaction of the commissioner of public works. Every person so permitted shall, in writing, agree to indemnify the city against all damage or loss to the city, accruing from the doing of any act or thing under such permit, and sureties may be required by the commissioner of public works, and every person who, when so permitted, shall obstruct or render unsafe any public street, shall guard the same by a proper fence or railing, and by lights during the nighttime, subject to the approval of the commissioner of public works. Such permit may be revoked at any time by the commissioner of public works or by the city council.

(Prior code Ch. 18, § 3)

12.08.080 - Obstructing—Signs and awnings—Permission required—Requirements.

No person shall place or maintain over any street any sign, awning, shade or other obstruction, unless permission shall have first been obtained in writing from the commissioner of

public works. All such signs, awnings, shades or other obstructions shall be safely and securely supported. No awning shall be less than seven feet from the ground at its lowest point. All signs, awnings, shades and other obstructions, if built over a sidewalk, shall be of such width as shall be determined by the commissioner of public works.

(Prior code Ch. 18, § 7)

12.08.090 - Obstructing free passage.

No person shall stand, or remain alone, or with or near others, in any street of this city, in such a manner as to obstruct a free passage for passengers therein, or over any footway or sidewalk.

(Prior code Ch. 18, § 8)

12.08.100 - Placing obstructions on flagstones, stepping stones or footwalks.

No person shall place any obstruction of any kind upon any flagstone or stepping stone or other footwalks across any street in this city.

(Prior code Ch. 18, § 9)

Quincy, Massachusetts, Code of Ordinances >> **Title 17 - ZONING** >> **Chapter 17.36 - ENVIRONMENTAL CONTROLS** >>

Chapter 17.36 - ENVIRONMENTAL CONTROLS

Sections:

- [17.36.010 - Illumination—Residence districts.](#)
- [17.36.020 - Earth removal—Permit required.](#)
- [17.36.030 - Earth removal—Permit—Application—Procedures—Contents.](#)
- [17.36.040 - Earth removal—Permit—Conditions and restrictions.](#)
- [17.36.050 - Earth removal—Permit—Duration—Renewal—Bond required when.](#)
- [17.36.060 - Earth removal—Permit—Exceptions.](#)
- [17.36.070 - Fencing and screening—Industrial and Business districts—Requirements.](#)
- [17.36.080 - Traffic visibility across corners.](#)
- [17.36.090 - Blasting—Permits—Pre-blasting survey—Required—Requirements.](#)
- [17.36.100 - Blasting—Pre-blasting survey—Disposition of survey data.](#)
- [17.36.110 - Blasting—Pre-blasting survey—Not required when.](#)
- [17.36.120 - Blasting—Posting of bond—Required when—Amount.](#)
- [17.36.130 - Blasting—Fire department supervision—Required—Costs.](#)
- [17.36.140 - Blasting—Violations—Penalties.](#)

17.36.010 - Illumination—Residence districts.

- A. In a Residence district, no outdoor decorative or floodlighting shall be permitted except lighting primarily designed to illuminate walks, driveways, parking areas, doorways, outdoor living areas or outdoor recreational facilities, and except temporary holiday lighting, and except decorative floodlighting of institutions, public or historic buildings. Any permanent lighting permitted by the preceding sentence shall be continuous indirect light installed in such a manner that will prevent direct light from shining onto any street or adjacent property. No neon type or exposed illuminated gas tube type light shall be allowed.

(Prior code Ch. 24, § 82)

17.36.020 - Earth removal—Permit required.

No soil, loam, sand, gravel or stone shall be removed from any lot not in public use in the city without first obtaining a special permit from the board of appeals except as exempted in Section [17.36.060.](#)

(Prior code Ch. 24, § 83 (part))

17.36.030 - Earth removal—Permit—Application—Procedures—Contents.

- A. Each application for a special permit for earth removal shall be accompanied by a plan, submitted in triplicate, prepared at the expense of the applicant by a registered land surveyor or civil engineer, showing:
1. The existing contours of the land;

2. The contours after completion of the operation;
3. All public roads and private means of vehicular access;
4. Proposed drainage;
5. Any other information as may be required by the board of appeals.

(Prior code Ch. 24, § 83 (part))

17.36.040 - Earth removal—Permit—Conditions and restrictions.

- A. In granting a permit hereunder, the board of appeals may impose reasonable conditions and restrictions as it deems to be in the public interest, including, but not limited to:
1. Method of removal;
 2. Type and location of temporary structures;
 3. Hours of operation;
 4. Operations of removal trucks;
 5. Area, depth and contours of excavations;
 6. Distance of excavation to street and lot lines;
 7. Reestablishment of ground lands and grades;
 8. Provisions for temporary and permanent drainage;
 9. Disposition of boulders and tree stumps;
 10. Replacement of loam over the area of removal;
 11. Planting of the area to suitable cover;
 12. Cleaning, repair and/or resurfacing of streets used in removal activities which have been adversely affected by the removal activity.

(Prior code Ch. 24, § 83 (part))

17.36.050 - Earth removal—Permit—Duration—Renewal—Bond required when.

No permit for removal shall be issued for a period of more than three years, although such a permit may be renewed for additional periods in the same manner. The board of appeals shall require a cash bond or surety company bond to insure compliance with its conditions of authorization unless in a particular case it specifically finds that such security is not warranted and so states in its decision, giving the reason for its finding.

(Prior code Ch. 24, § 83 (part))

17.36.060 - Earth removal—Permit—Exceptions.

Sections 17.36.020 through 17.36.050 shall not apply to the following:

- A. The removal of less than ten cubic yards of material in the aggregate in any year from one premise;
- B. The transfer of material from one part of a premise to another part of the same premise for immediate use in such other part of the premise;
- C. The removal of material necessarily excavated in connection with the lawful construction of a building or structure, driveway, parking area, sidewalk or path incidental to any such building or structure, as indicated on plans and profiles prepared by a registered engineer and approved by the director of inspections;
- D.

The removal of material necessarily excavated in connection with the lawful construction of public or private ways as indicated on plans and profiles prepared by a registered engineer and approved by the planning board.

(Ord. 97-337 § 6 (part); prior code Ch. 24, § 83 (part))

17.36.070 - Fencing and screening—Industrial and Business districts—

Requirements.

- A. Required when — Permitted Types. In an Industrial or Business district, the outdoor storage of goods, products, materials or equipment shall, if visible at normal eye level from any point beyond the boundaries of the premises and less than five hundred feet distant, be screened from such view. Screening, as defined herein, shall be an ornamental lattice, opaque fence, plantings or sight-obscuring screening which shall not be less than six nor more than ten feet high and not less than fifty percent opaque. Plantings shall be at least ten feet in width and contain at least two rows of alternate live deciduous and evergreen trees. Said trees shall not be more than five feet apart, shall have an original planting height of at least six feet, shall be able to attain a height of at least ten feet, and shall be maintained in a healthy growing condition by the property owner. Any existing open storage in any district shall within one year of the effective date of the ordinance codified in this title be properly screened or removed.
- B. Adjacent to Residential Districts. Where an Industrial district is located adjacent to a Residence district or a public park or playground and is not separated therefrom by a public way, a compact planting screen as defined in subsection A of this section along the property or lot line adjoining said district boundary shall be provided and maintained by the owners of said premises. Said screening area shall contain no structures or parking or be devoted to any other use or purpose, and shall be maintained in a healthy growing condition by the property owner.

(Prior code Ch. 24, § 84)

17.36.080 - Traffic visibility across corners.

In any district, no structure, fence or sign shall be constructed and no vegetation shall be planted or maintained between a plane two and one-half feet above curb level and a plane ten feet above curb level, so as to interfere with traffic visibility across a corner within that part of the lot which is within a triangle formed by the street lines and a third line joining points on the street lot lines twenty-five feet from their intersection.

(Ord. 1988-6: prior code Ch. 24, § 85)

17.36.090 - Blasting—Permits—Pre-blasting survey—Required—Requirements.

- A. Permitted Surveyors. For all permits issued for blasting (rock excavation) in the city, a pre-blast survey must be made by the contractor or by an approved firm in this kind of work and satisfactory to the contractor's insurance company.
- B. Requirements.
 1. Approval. The pre-blast survey will include a survey of the interior and exterior of existing buildings and stone walls adjacent to the project as specified herein, before any excavation or blasting is done. Written approval must be secured from the fire chief, city engineer and director of inspections serving as the committee on blasting.
 - 2.

- Adjacent Area. The adjacent area requiring the pre-blast survey is specified as all buildings and stone walls within a radius of three hundred fifty feet from said blast.
3. Structural Defects. The survey shall record all visible structural defects such as cracks, settlement and lines out of plumb.

(Ord. 97-337 § 6 (part); Ord. 1988-236 (part); prior code Ch. 24, § 87 (part))

17.36.100 - Blasting—Pre-blasting survey—Disposition of survey data.

The survey data shall be recorded in a permanent manner in approved hardbound notebooks. The survey data shall include polaroid photographs showing the building constructions surveyed referenced to the notebook pages. Also a tape recording of all data pertinent to the survey shall be made. The scope and format of the record survey data shall be satisfactory to the committee on blasting. Before commencing any blasting or ledge excavation, copies of the survey must be on file at the offices of the Quincy city engineer and the Quincy city clerk, City Hall, Quincy, MA.

(Ord. 1988-236 (part); prior code Ch. 24, § 87 (part))

17.36.110 - Blasting—Pre-blasting survey—Not required when.

No pre-blasting survey shall be required if blasting is within the following limits: The total charge weight per blast does not exceed five pounds and the maximum weight per delay does not exceed two pounds per delay.

(Ord. 1988-236 (part); prior code Ch. 24, § 87 (part))

17.36.120 - Blasting—Posting of bond—Required when—Amount.

If blasting is designed to excavate more than a ten-cubic-yard area, the contractor must post a bond with the city. The amount of said bond shall be determined by the committee on blasting. The committee on blasting will not release the bond until it is convinced that all judgments and claims have been reasonably dealt with by the contractor.

(Ord. 1988-236 (part); prior code Ch. 24, § 87 (part))

17.36.130 - Blasting—Fire department supervision—Required—Costs.

All blasting is to be supervised on site by an authorized member of the fire department, assigned by the chief, and the cost of said supervision shall be the sole responsibility of the contractor.

(Ord. 1988-236 (part); prior code Ch. 24, § 87 (part))

17.36.140 - Blasting—Violations—Penalties.

Any person who shall violate any of the provisions of Sections 17.36.090 through 17.36.130, as determined by the committee on blasting, or who fails to comply therewith, shall severally, for each and every violation and noncompliance respectively, be liable to a penalty of two hundred dollars for each offense.

(Ord. 1988-236 (part); prior code Ch. 24, § 87 (part))

This page intentionally left blank

Quincy, Massachusetts, Code of Ordinances >> - >> **QUINCY, MASSACHUSETTS - MUNICIPAL CODE**
>>

QUINCY, MASSACHUSETTS - MUNICIPAL CODE

**A Codification of the General Ordinances of
the City of Quincy, Massachusetts**

**Beginning in September 2009,
Supplemented by Municipal Code Corporation**



PREFACE

HOW TO USE YOUR CODE

Quincy, Massachusetts, Code of Ordinances >> - >> **QUINCY, MASSACHUSETTS - MUNICIPAL CODE**
>> PREFACE >>

PREFACE

The Quincy, Massachusetts Municipal Code, originally published by Book Publishing Company in 1992, has been kept current by regular supplementation by Matthew Bender & Company, Inc., its successor in interest.

Beginning in September 2009, Municipal Code Corporation will be keeping this code current by regular supplementation.

During original codification, the ordinances were compiled, edited and indexed by the editorial staff of Book Publishing Company under the direction of Stephen J. McGrath, city solicitor, Joseph P. Shea, city clerk, and John M. Gillis, former city clerk.

The code is organized by subject matter under an expandable three-factor decimal numbering system which is designed to facilitate supplementation without disturbing the numbering

of existing provisions. Each section number designates, in sequence, the numbers of the Title, chapter, and section. Thus, Section 2.12.040 is Section .040, located in [Chapter 2.12 of Title 2](#). In most instances, sections are numbered by tens (.010, .020, .030, etc.), leaving nine vacant positions between original sections to accommodate future provisions. Similarly, chapters and titles are numbered to provide for internal expansion.

In parentheses following each section is a legislative history identifying the specific sources for the provisions of that section. This legislative history is complemented by an ordinance disposition table, following the text of the code, listing by number all ordinances, their subjects, and where they appear in the codification; and beginning in September 2009, legislation can be tracked using the "Code Comparative Table and Disposition List."

A subject-matter index, with complete cross-referencing, locates specific code provisions by individual section numbers.

This supplement brings the Code up to date through Ordinance __, passed __ (Month, Date, Year)___.

Municipal Code Corporation
1700 Capital Circle SW
Tallahassee, FL 32310
800-262-2633

Quincy, Massachusetts, Code of Ordinances >> - >> [QUINCY, MASSACHUSETTS - MUNICIPAL CODE](#)
>> HOW TO USE YOUR CODE >>

HOW TO USE YOUR CODE

This code is organized to make the laws of the city as accessible as possible to city officials, city employees and private citizens. Please take a moment to familiarize yourself with some of the important elements of this code.

Numbering System.

The numbering system is the backbone of a Code of Ordinances; Municipal Code Corporation uses a unique and versatile numbering structure that allows for easy expansion and amendment of this Code. It is based on three tiers, beginning with title, then chapter, and ending with section. Each part is represented in the code section number. For example, Section [2.04.010](#) is Section .010, in [Chapter 2.04 of Title 2](#).

Title.

A title is a broad category under which ordinances on a related subject are compiled. This code contains about 15 to 20 titles. For example, the first title is [Title 1](#), General Provisions, which may contain ordinances about the general penalty, code adoption and definitions. The titles in this code are separated by tabbed divider pages for quick reference. Some titles are Reserved for later use.

Chapter.

Chapters deal with more specific subjects, and are often derived from one ordinance. All of the chapters on a related subject are grouped in one title. The chapters are numbered so that new chapters which should logically be placed near certain existing chapters can be added at a later

time without renumbering existing material. For example, Chapter 2.06, City Manager, can be added between 2.04, City Council, and Chapter 2.08, City Attorney.

Section.

Each section of the code contains substantive ordinance material. The sections are numbered by "tens" to allow for expansion of the code without renumbering.

Tables of Contents.

There are many tables of contents in this code to assist in locating specific information. At the beginning of the code is the main table of contents listing each title. In addition, each title and chapter has its own table of contents listing the chapters and sections, respectively.

Ordinance History Note.

At the end of each code section, you will find an "ordinance history note," which lists the underlying ordinances for that section. The ordinances are listed by number, section (if applicable) and year. (Example: (Ord. 272 § 1, 1992).)

Beginning in September 2009, a secondary ordinance history note will be appended to affected sections. Ordinance history notes will be amended with the most recent ordinance added to the end. These history notes can be cross referenced to the code comparative table and disposition list appearing at the back of the volume preceding the index.

Statutory References.

The statutory references direct the code user to those portions of the state statutes that are applicable to the laws of the municipality. As the statutes are revised, these references will be updated.

Cross-Reference Table.

When a code is based on an earlier codification, the cross-reference table will help users find older or "prior" code references in the new code. The cross-reference table is located near the end of the code, under the tabbed divider "Tables." This table lists the prior code section in the column labeled "Prior Code Section" and the new code section in the column labeled "Herein."

As of September 2009, this table will no longer be updated.

Ordinance List and Disposition Table.

To find a specific ordinance in the code, turn to the section called "Tables" for the Ordinance List and Disposition Table. This very useful table tells you the status of every ordinance reviewed for inclusion in the code. The table is organized by ordinance number and provides a brief description and the disposition of the ordinance. If the ordinance is codified, the chapter (or chapters) will be indicated. (Example: (2.04, 6.12, 9.04).) If the ordinance is of a temporary nature or deals with subjects not normally codified, such as budgets, taxes, annexations or rezones, the disposition will be "(Special)." If the ordinance is for some reason omitted from the code, usually at the direction of the municipality, the disposition will be "(Not codified)." Other dispositions sometimes used are "(Tabled)," "(Pending)," "(Number Not Used)" or "(Missing)."

Beginning in September 2009, this table will be replaced with the "Code Comparative Table and Disposition List."

Code Comparative Table and Disposition List.

Beginning in September 2009, a Code Comparative Table and Disposition List has been added for use in tracking legislative history. Located in the back of this volume, this table is a chronological listing of each ordinance considered for codification. The Code Comparative Table and Disposition List specifies the ordinance number, adoption date, description of the ordinance and the disposition within the code of each ordinance. By use of the Code Comparative Table and Disposition List, the reader can locate any section of the code as supplemented, and any subsequent ordinance included herein.

Index.

If you are not certain where to look for a particular subject in this code, start with the index. This is an alphabetical multi-tier subject index which uses section numbers as the reference, and cross-references where necessary. Look for the main heading of the subject you need, then the appropriate subheadings:

BUSINESS LICENSE

See also BUSINESS TAX

Fee [5.04.030](#)

Required when [5.04.010](#)

The index will be updated as necessary when the code text is amended.

Instruction Sheet.

Each supplement to the new code will be accompanied by an Instruction Sheet. The Instruction Sheet will tell the code user the date of the most recent supplement and the last ordinance contained in that supplement. It will then list the pages that must be pulled from the code and the new pages that must be inserted. Following these instructions carefully will assure that the code is kept accurate and current. Removed pages should be kept for future reference.

Page Numbers.

When originally published, the pages of this code were consecutively numbered. As of September 2009, when new pages are inserted with amendments, the pages will follow a "Point Numbering System". (Example: 32, 32.1, 32.2, 32.2.1, 32.2.2., 33). Backs of pages that are blank (in codes that are printed double-sided) will be left unnumbered but the number will be "reserved" for later use.

Electronic Submission.

In the interests of accuracy and speed, we encourage you to submit your ordinances electronically if at all possible. We can accept most any file format, including Word, WordPerfect or text files. If you have a choice, we prefer Word, any version. You can send files to us as an e-mail attachment, by FTP, on a diskette or CD-ROM. Electronic files enable us not only to get you your code more quickly but also ensure that it is error-free. Our e-mail address is:
[**ords@municode.com**](mailto:ords@municode.com).

For hard copy, send two copies of all ordinances passed to:

Municipal Code Corporation
P.O. Box 2235
Tallahassee, FL 32316

Customer Service.

If you have any questions about this code or our services, please contact Municipal Code Corporation at 1-800-262-2633 or:

Municipal Code Corporation
1700 Capital Circle SW
Tallahassee, FL 32310

TITLE 1 - GENERAL PROVISIONS

Chapters:

[Chapter 1.01 - CODE ADOPTION\(Reserved\)](#)
[Chapter 1.04 - GENERAL PROVISIONS\(Reserved\)](#)
[Chapter 1.08 - CITY SEAL](#)
[Chapter 1.12 - MUNICIPAL STANDARD AND CITY FLAG](#)
[Chapter 1.16 - GENERAL PENALTIES](#)

TITLE 2 - ADMINISTRATION AND PERSONNEL

Chapters:

[Chapter 2.04 - CITY BRANCHES, DEPARTMENTS AND DIVISIONS](#)
[Chapter 2.08 - CITY COUNCIL](#)
[Chapter 2.12 - CLERK OF COMMITTEES](#)
[Chapter 2.16 - CITY CLERK](#)
[Chapter 2.20 - CITY AUDITOR](#)
[Chapter 2.24 - CITY SOLICITOR](#)
[Chapter 2.28 - TREASURER AND COLLECTOR](#)
[Chapter 2.36 - PUBLIC WORKS](#)
[Chapter 2.40 - HEALTH COMMISSIONER](#)
[Chapter 2.44 - BUDGET COORDINATOR](#)
[Chapter 2.48 - PURCHASING AGENT](#)
[Chapter 2.52 - DEPARTMENT OF INSPECTIONS](#)
[Chapter 2.56 - HARBOR MASTER](#)
[Chapter 2.60 - DIRECTOR OF VETERANS' SERVICES](#)
[Chapter 2.68 - POLICE DEPARTMENT](#)
[Chapter 2.72 - FIRE DEPARTMENT](#)
[Chapter 2.76 - DEPARTMENT OF INFORMATION AND TECHNOLOGY AND TELECOMMUNICATIONS SYSTEMS](#)
[Chapter 2.80 - DEPARTMENT OF TRAFFIC ENGINEERING AND CONTROL](#)
[Chapter 2.84 - COMMUNICATION DIVISION](#)
[Chapter 2.88 - EMERGENCY MANAGEMENT](#)
[Chapter 2.92 - PLANNING BOARD](#)
[Chapter 2.96 - BOARD OF ASSESSORS](#)
[Chapter 2.100 - BOARD OF REGISTRARS OF VOTERS](#)
[Chapter 2.104 - BOARD OF MANAGERS OF HOSPITAL DEPARTMENT](#)
[Chapter 2.108 - BOARD OF MANAGERS OF ELIZABETH SERPOSS CLINIC](#)
[Chapter 2.116 - CONSERVATION COMMISSION](#)
[Chapter 2.117 - RECYCLING COMMISSION](#)
[Chapter 2.120 - COMMISSION ON DISABILITY](#)
[Chapter 2.124 - QUINCY HISTORICAL COMMISSION](#)
[Chapter 2.128 - RENT GRIEVANCE BOARD](#)
[Chapter 2.132 - TRAFFIC COMMISSION](#)
[Chapter 2.136 - COUNCIL FOR THE AGING](#)
[Chapter 2.137 - COMMISSION ON THE FAMILY](#)
[Chapter 2.138 - COMMUNITY ORIENTED POLICING AND PROBLEM SOLVING COMMISSION](#)
[Chapter 2.140 - MANAGEMENT OF ADAMS ACADEMY](#)
[Chapter 2.144 - ADAMS TEMPLE AND SCHOOL FUND](#)
[Chapter 2.148 - JOB CLASSIFICATIONS AND SALARIES](#)
[Chapter 2.150 - HUMAN RIGHTS COMMISSION](#)

TITLE 3 - REVENUE AND FINANCE

Chapters:

Chapter 3.04 - FISCAL YEAR
Chapter 3.08 - ASSESSMENT PROCEDURES
Chapter 3.12 - CITY LEASES, CONVEYANCES AND CONTRACTS
Chapter 3.16 - PURCHASES OF CITY-OWNED LAND

TITLE 4 - RESERVED

TITLE 5 - BUSINESS LICENSES AND REGULATIONS

Chapters:

Chapter 5.04 - LICENSES AND PERMITS
Chapter 5.08 - GAS STATIONS
Chapter 5.12 - HACKNEY CARRIAGES
Chapter 5.16 - SOLICITORS AND CANVASSERS
Chapter 5.20 - HAWKERS AND PEDDLERS
Chapter 5.24 - JUNK AND SECONDHAND DEALERS
Chapter 5.28 - PRECIOUS METAL DEALERS
Chapter 5.32 - PAWNBROKERS
Chapter 5.36 - PUBLIC CONCERTS, DANCES AND OTHER ENTERTAINMENTS
Chapter 5.40 - MISCELLANEOUS BUSINESS LICENSE FEES AND REGULATIONS

TITLE 6 - ANIMALS

Chapters:

Chapter 6.04 - DOGS AND ANIMALS GENERALLY

TITLE 7 - RESERVED

TITLE 8 - HEALTH AND SAFETY

Chapters:

Chapter 8.04 - FIRE ALARM SYSTEMS
Chapter 8.08 - FLAMMABLE LIQUIDS
Chapter 8.12 - GARBAGE COLLECTION AND DISPOSAL
Chapter 8.16 - QUINCY DISPOSAL FACILITY
Chapter 8.20 - INFECTIOUS WASTE DISPOSAL
Chapter 8.24 - PETROLEUM AND PETROLEUM PRODUCTS
Chapter 8.28 - SMOKING
Chapter 8.30 - ACCESS OF TOBACCO PRODUCTS TO MINORS
Chapter 8.32 - MISCELLANEOUS HEALTH REGULATIONS
Chapter 8.36 - REGULATION OF BODY ART

TITLE 9 - PUBLIC PEACE AND GENERAL WELFARE

Chapters:

Chapter 9.04 - ALCOHOLIC BEVERAGES
Chapter 9.08 - OFFENSES AGAINST PUBLIC PEACE AND DECENCY
Chapter 9.12 - OFFENSES RELATING TO PROPERTY
Chapter 9.16 - OFFENSES BY OR AGAINST MINORS

TITLE 10 - VEHICLES AND TRAFFIC

Chapters:

Chapter 10.04 - GENERAL PROVISIONS
Chapter 10.08 - RULES OF THE ROAD
Chapter 10.12 - SIGNS, SIGNALS AND MARKERS
Chapter 10.16 - PEDESTRIANS
Chapter 10.20 - STOPPING, STANDING AND PARKING
Chapter 10.24 - PARKING METERS
Chapter 10.28 - ABANDONED, WRECKED, DISMANTLED AND DISCARDED VEHICLES
Chapter 10.32 - ONE-WAY STREETS

TITLE 11 - RESERVED

TITLE 12 - STREETS, SIDEWALKS, WATERWAYS AND PUBLIC PLACES

Chapters:

Chapter 12.04 - STREET AND SIDEWALK CONSTRUCTION AND MAINTENANCE
Chapter 12.08 - STREET AND SIDEWALK USE REGULATIONS
Chapter 12.12 - PUBLIC PARKS AND PLAYGROUNDS
Chapter 12.16 - WATER RECREATION REGULATIONS
Chapter 12.20 - SCHOOL GROUNDS
Chapter 12.24 - CITY HARBOR
Chapter 12.26 - MOORING PERMIT
Chapter 12.28 - PUBLIC CONSTRUCTION PROJECTS

TITLE 13 - PUBLIC SERVICES

Chapters:

Chapter 13.04 - WATER SERVICE SYSTEM
Chapter 13.08 - SEWER SERVICE SYSTEM
Chapter 13.12 - UTILITIES PERMITTING

TITLE 14 - RESERVED

TITLE 15 - BUILDINGS AND CONSTRUCTION

Chapters:

Chapter 15.04 - BUILDING PERMIT FEES
Chapter 15.08 - PLUMBING AND GAS PERMIT FEES
Chapter 15.12 - ELECTRICAL PERMITS
Chapter 15.16 - SEWERAGE REHABILITATION FUND
Chapter 15.20 - NUMBERING OF BUILDINGS
Chapter 15.24 - HISTORICAL DISTRICTS
Chapter 15.26 - RESPONSIBLE EMPLOYER POLICY

WITHDRAWN

TITLE 16 - SUBDIVISIONS

RESERVED

TITLE 17 - ZONING

Chapters:

[Chapter 17.04 - ADMINISTRATION](#)
[Chapter 17.08 - DEFINITIONS](#)
[Chapter 17.12 - ZONING DISTRICTS](#)
[Chapter 17.16 - USE REGULATIONS](#)
[Chapter 17.20 - DIMENSIONAL REQUIREMENTS](#)
[Chapter 17.24 - SUPPLEMENTARY PROVISIONS](#)
[Chapter 17.28 - PARKING AND LOADING](#)
[Chapter 17.32 - SIGNS](#)
[Chapter 17.36 - ENVIRONMENTAL CONTROLS](#)
[Chapter 17.40 - FLOOD PLAIN DISTRICT](#)

TITLE 18 - ENVIRONMENTAL PROTECTION

Chapters:

[Chapter 18.04 - SHELLFISH AND SEAWORMS](#)
[Chapter 18.08 - WETLANDS PROTECTION REGULATIONS](#)
[Chapter 18.12 - FEEDING OF WATERFOWL](#)
[Chapter 18.16 - ENVIRONMENTAL ASSESSMENT AND CONTROLS FOR CITY PROJECTS](#)

APPENDICES

Appendix A	General Acts Accepted by City Council of Quincy
Appendix B	General Acts Accepted by Citizens of Quincy
Appendix C	Special Acts Applicable to Quincy
Appendix D	Special Acts Accepted by City Council of Quincy
Appendix E	Special Acts Accepted by Citizens of Quincy
Appendix F	Statutory References



CITY of QUINCY

QuincyMA.Gov

Thomas P. Koch, Mayor



Residents

Business

Visitors

Government

Online Services

Quick Links



Select a Quick Link



Online Services & Forms



For Business



For Residents



For Visitors



Inspectional Services Links



+ Zoning Ordinances

[Section One: Purpose and Authority](#)

[Section Two: Districts](#)

[Section Three: Use Regulations](#)

[Section Four: Dimensional Regulations](#)

[Section Five: General Regulations](#)

[Section Six: Special Regulations](#)

[Section Seven: Special Residential Regulations](#)

Zoning Ordinances

Thank you for visiting the City of Quincy Zoning Ordinance Page. Mayor Koch commissioned the biggest overhaul of the City's Zoning Code in a generation, and the process was completed in the summer of 2011.

We have divided the zoning code into sections, with links below and on the left sidebar. To access the full .pdf Zoning Ordinance document, [click here](#).

If you have any questions about zoning, please contact Jay Duca, Director of Inspectional Services, at 617-376-1456, or email him at jduca@quincyma.gov.

[Section One: Purpose and Authority](#)

[Section Two: Districts](#)

[Section Three: Use Regulations](#)

[Section Four: Dimensional Regulations](#)

[Section Five: General Regulations](#)

[Section Six: Special Regulations](#)

[Section Seven: Special Residential Regulations](#)

[Section Eight: Special Districts](#)

[Section Nine: Administration and Procedures](#)

[Section Ten: Definitions](#)

City of Quincy, Massachusetts

Zoning Code



*Mayor Thomas P. Koch
Quincy, Massachusetts
Updated ~ June 2011*

QUINCY ZONING ORDINANCE

June 14, 2011

TABLE OF CONTENTS

1.0 PURPOSE AND AUTHORITY	1
1.1 TITLE	1
1.2 PURPOSE	1
1.3 AUTHORITY	2
1.4 SCOPE	2
1.5 APPLICABILITY	2
1.5.1 Commencement of Construction or Operation	2
1.6 AMENDMENTS	2
1.7 SEPARABILITY	2
2.0 DISTRICTS	3
2.1 ESTABLISHMENT	3
2.1.1 General	3
2.1.2 Special Districts	3
2.2 MAP	3
2.2.1 Establishment	3
2.2.2 District Boundaries; Uncertainties and Resolution	4
3.0 USE REGULATIONS	5
3.1 PRINCIPAL USES	5
3.1.1 Symbols	5
3.1.2 Applicability	5
3.1.3 Major Nonresidential Use	5
3.1.4 Table of Use Regulations	5

3.2 ACCESSORY USES AND STRUCTURES	5
3.2.1 General	5
3.2.2 Accessory Uses; All Districts	6
3.2.3 Accessory Uses in the Residence Districts	6
3.2.4 Accessory Uses in the Business and Industrial Districts	7
3.3 HOME OCCUPATIONS	8
3.3.1 Home Occupation - As of Right	8
3.3.2 Home Occupation - By Special Permit	8
3.4 NONCONFORMING USES AND STRUCTURES	9
3.4.1 Applicability	9
3.4.2 Nonconforming Uses	9
3.4.3 Nonconforming Structures	9
3.4.4 Variance Required	9
3.4.5 Nonconforming Single and Two Family Residential Structures	10
3.4.6 Abandonment or Non-Use	10
3.4.7 Catastrophe or Demolition	10
3.4.8 Reversion to Nonconformity	11
4.0 DIMENSIONAL REGULATIONS	12
4.1 TABLE OF DIMENSIONAL REQUIREMENTS	12
4.1.1 Conformance	12
4.1.2 Notes to Table	13
4.2 GENERAL REQUIREMENTS	13
4.2.1 Urban Renewal Use	13
4.2.2 Lot or Yard Areas	14
4.2.3 Dwelling Unit Equivalents	14
4.2.4 Building Bulk	14
4.2.5 Lot Size, Area and Width	14
4.2.6 Minimum Frontage and Width	14
4.2.7 Open Space	14
4.2.8 Fences and Hedges	14
4.3 YARDS	14
4.3.1 Urban Renewal Use	15
4.3.2 Minimum Requirements	15
4.3.3 Appurtenances Projecting into Yards	15
4.3.4 Certain Structures	15
4.3.5 Front Yard Requirements for Lots Abutting More Than One Street	15
4.3.6 Exceptions to Yard Regulations	15

4.4	SPECIAL REQUIREMENTS	16
4.4.1	Urban Renewal Use	16
4.4.2	Exceptions to Height Requirements	16
4.4.3	Certain Districts Abutting Residence Districts	16
5.0	GENERAL REGULATIONS	17
5.1	OFF-STREET PARKING	17
5.1.1	Location	17
5.1.2	Ownership or Control	17
5.1.3	Ownership; Two or More Buildings	17
5.1.4	Setbacks	17
5.1.5	Prohibited Uses	18
5.1.6	Lighting	18
5.1.7	Parking Space Requirements	18
5.1.8	Table of Off-Street Parking Requirements	18
5.1.9	Notes to Table of Off-Street Parking Requirements	19
5.1.10	Driveway Grades	20
5.1.11	Parking Spaces	20
5.1.12	Construction	20
5.1.13	Landscaping Requirements for Parking Areas	21
5.1.14	Paving Permit	21
5.1.15	Paving Contractor Licensing	22
5.1.16	Paving of Yards	22
5.1.17	Special Permit	22
5.2	LOADING FACILITIES	23
5.2.1	Requirements	23
5.2.2	Proximity to Residence Districts	24
5.2.3	Accessory Driveways	24
5.2.4	Serving Two or More Facilities	24
5.2.5	Reduction in Size	24
5.2.6	Special Permit	24
5.3	SIGNS	24
5.3.1	Definitions	24
5.3.2	Applicability	24
5.3.3	Exemptions	24
5.3.4	Prohibited Signs; Performance Standards	25
5.3.5	Prohibited Signs; By Type	25
5.3.6	Signs Authorized by Special Permit	26
5.3.7	General Sign Standards	26

5.3.8	Specific Types of Signs; Standards	27
5.3.9	Special Regulations; Contiguous Commercial Areas	31
5.3.10	Design Standards; Contiguous Commercial Areas	34
5.3.11	Special Regulations; Commercial Arterial Areas	35
5.3.12	Administration and Enforcement	36
5.3.13	Special Permit	37
5.4	PERFORMANCE STANDARDS	37
5.4.1	Lighting	38
5.4.2	Fencing and Screening in the Industrial and Business Districts	38
5.4.3	Screening Adjacent to Residential Districts	38
5.4.4	Maintenance and Replacement	38
5.4.5	Urban Renewal Use	38
6.0	SPECIAL REGULATIONS	39
6.1	MOTOR VEHICLE SERVICE STATIONS	39
6.1.1	Dimensional Requirements	39
6.1.2	Driveways	39
6.1.3	Standards	39
6.2	EARTH REMOVAL	40
6.2.1	General	40
6.2.2	Procedures	40
6.2.3	Conditions and Restrictions	40
6.2.4	Time Limits; Performance Guarantee	41
6.2.5	Exceptions	41
6.3	TRAFFIC VISIBILITY ACROSS CORNERS	42
6.3.1	General	42
6.3.2	Urban Renewal Use	42
6.4	ADULT USES	42
6.4.1	Purpose	42
6.4.2	General	42
6.4.3	Prohibition	42
6.4.4	Separation	42
6.5	BODY ART ESTABLISHMENTS.	43
6.5.1	General	43
6.5.2	Conditions	43
6.6	WIRELESS COMMUNICATIONS FACILITIES	43
6.6.1	Purpose	43

6.6.2	Location	43
6.6.3	Special Permit	43
6.6.4	Contents of Application	43
6.6.5	Procedures; Balloon Test	45
6.6.6	Independent Review	46
6.6.7	Criteria; Special Permit	46
6.6.8	Conditions	46
6.6.9	Abandonment	47
6.6.10	Term	48
6.6.11	Insurance	48
6.6.12	Compliance with Other Laws	48
6.6.13	Maintenance	48
6.6.14	Indemnification	49
6.6.15	Exemptions	49
6.7	WIND FACILITIES	49
6.7.1	Purpose	49
6.7.2	Applicability	49
6.7.3	Application Procedures	50
6.7.4	Zoning Districts	51
6.7.5	Compliance with Laws, Ordinances and Regulations	52
6.7.6	Insurance	52
6.7.7	Site Control	52
6.7.8	General Siting Standards	52
6.7.9	Lighting, Signage, Utilities and Other Structures	52
6.7.10	Utility Connections	53
6.7.11	Appurtenant Structures	53
6.7.12	Ancillary Structures	53
6.7.13	Support Towers	53
6.7.14	Safety, Aesthetic and Environmental Standards	53
6.7.15	Waiver of Setbacks, Sound and Shadow Flicker Provisions.	54
6.7.16	Facility Conditions	55
6.7.17	Abandonment or Decommissioning	55
6.7.18	Financial Surety	56
6.7.19	Term of Special Permit	56
6.7.20	Notice of Operation	56
6.7.21	Public Inquiries and Complaints	56
6.8	SATELLITE RECEIVING ANTENNA	56
6.8.1	Small Dishes	56
6.8.2	Large Dishes	56
6.8.3	Requirements for Large Dishes	56
7.0	SPECIAL RESIDENTIAL REGULATIONS	58

7.1 AFFORDABLE HOUSING ORDINANCE	58
7.1.1 Applicability	58
7.1.2 Requirements	58
7.1.3 Affordable Housing Trust Committee	58
7.1.4 Monitoring Compliance with AHTC Conditions	60
7.1.5 Fractional Dwelling Unit	62
7.1.6 Construction of Affordable Housing Units	62
7.1.7 Standards for Construction and Occupancy of Affordable Units	63
7.1.8 Occupancy	63
7.1.9 Affordable Housing Trust Committee	63
7.1.10 Income Eligible Households	64
7.1.11 Subsequent Sales	65
7.1.12 Affordable Housing Trust Fund	67
7.1.13 Adoption of Prior Acts	67
8.0 SPECIAL DISTRICTS	68
8.1 FLOOD PLAIN OVERLAY DISTRICT	68
8.1.1 Purpose	68
8.1.2 Location	68
8.1.3 Overlay District	68
8.1.4 Duties of Building Commissioner	68
8.1.5 Use Regulations	68
8.1.6 Coastal High Hazard Areas	69
8.1.7 Floodway	69
8.1.8 National Flood Insurance Program	69
8.1.9 Special Permit	69
8.1.10 Variances	70
8.2 OPEN SPACE DISTRICT	71
8.2.1 Purpose	71
8.2.2 Regulations	71
8.2.3 Public Agencies	71
8.3 QUINCY CENTER DISTRICTS	71
8.3.1 Purpose	71
8.3.2 Available Uses; Special Permit Required	72
8.3.3 Dimensional Requirements	74
8.3.4 Off-Street Parking	74
8.3.5 [Reserved]	75
8.3.6 Site Plan Review	75
8.3.7 Special Permit Granting Authority	75
8.3.8 Special Permit and Site Plan Approval Criteria	75

8.3.9	Public Art and Place-Making Program	77
8.3.10	Public Art Commission	77
8.3.11	Powers and Duties of Commission	77
8.3.12	On-site and Off-site Contributions	77
8.3.13	Public Art Fund	78
8.3.14	Public Art and Place-Making Program Guidelines	78
8.4	PLANNED UNIT DEVELOPMENT DISTRICTS	78
8.4.1	Permitted Uses	78
8.4.2	Dimensional Requirements	79
8.4.3	Off-Street Parking	79
8.4.4	Off-Street Loading	79
8.4.5	Location of Structures; Open Space	79
8.4.6	Special Permit Required	80
8.4.7	Age Restricted Housing	80
8.4.8	Congregate Elderly Facility	80
8.4.9	Congregate Elderly Facility; Dimensional Requirements	80
8.4.10	Congregate Elderly Facility; Special Permit	81
8.4.11	Congregate Elderly Facility; Required Facilities	81
8.4.12	Congregate Elderly Facility; Transportation	81
9.0	ADMINISTRATION AND PROCEDURES	82
9.1	GENERAL	82
9.1.1	Building Commissioner	82
9.1.2	Building Permit	82
9.1.3	Enforcement	82
9.1.4	Certificate of Occupancy	82
9.1.5	Grievances	83
9.1.6	Appeal to Board of Appeals	83
9.1.7	Penalties	83
9.2	BOARD OF APPEALS	83
9.2.1	Establishment	83
9.2.2	Powers	83
9.2.3	Procedures	84
9.2.4	Conditions	84
9.2.5	Regulations	84
9.2.6	Fees	84
9.3	PLANNING BOARD	84
9.3.1	Establishment	84
9.3.2	Powers	84
9.3.3	Rules and Regulations	84

9.3.4 Fees	85
9.4 SPECIAL PERMITS	85
9.4.1 Special Permit Granting Authority	85
9.4.2 Criteria	85
9.4.3 Procedures	85
9.4.4 Conditions	85
9.4.5 Plans	85
9.4.6 Lapse	86
9.4.7 Regulations	86
9.4.8 Fees	86
9.5 SITE PLAN REVIEW	86
9.5.1 Applicability	86
9.5.2 Procedures	86
9.5.3 Preparation of Plans; Contents	87
9.5.4 Waiver	88
9.5.5 Approval	88
9.5.6 Existing Residential Structures	89
9.5.7 Lapse	90
9.5.8 Regulations; Fees	90
9.5.9 Appeal	90
9.6 ZONING ADMINISTRATOR	90
10.0 DEFINITIONS	91

SECTION 00 73 19

HEALTH AND SAFETY REQUIREMENTS

Contractor shall comply with the following minimum requirements and is solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

- A. Code of Federal Regulations, Chapter XVII-Occupational Safety and Health Administration (OSHA), Department of Labor, Title 29, Part 1926, Safety and Health Regulations for Construction
 - 1. Contractor shall strictly comply with the Hazard Communication Standard 1910.1200 regulated by OSHA, including providing and maintaining Safety Data Sheets, labeling of hazardous substances, and providing required protective equipment and training and instruction to personnel on the Site including Owner and Engineer's personnel.
 - 2. Perform confined space work in accordance with OSHA General Industry 1910.146: Permit Required Confined Space Entry.
- B. ANSI/ASSE A10 series of safety construction standards including the "Manual of Accident Prevention In Construction" published by The Associated General Contractors of America
- C. AASHTO Guide on Occupational Safety on Highway Construction Projects, Subpart N, 1926.550, relating to protection of personnel and equipment under electric lines and construction equipment clearances at overhead electric lines especially during operations using large vehicles
- D. Pursuant to MGL Chapter 30, Section 39S, all employees to be employed at the Work Site will 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 at the time the employee begins Work, and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee. Any employee found on a Work Site 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.

E. This Project is also subject to the following.

- MGL Chapter 82, *The Laying Out, Alteration, Relocation and Discontinuance Of Public Ways, And Specific Repairs Thereon, Section 40:*

Section 40 Definitions
Section 40A Excavations; notice
Section 40B Designation of location of underground facilities
Section 40C Excavator's responsibility to maintain designation markings; damage caused by excavator
Section 40D Local laws requiring excavation permits; public ways

- MGL Chapter 82A, *Excavation and Trench Safety*

Section 1 Unattended open trenches; safety hazards; rules and regulations; fines
Section 2 Trench excavating permits; permits issued by board or officer; certificate of insurance; fees
Section 3 Form of trench excavation permits; required statements
Section 4 Definitions
Section 5 Additional requirements

- MGL Chapter 149

Section 6C Health and safety of general public and asbestos workers; rules and regulations
Section 18A Sanitary and safety conditions; tools
Section 18B Confined spaces; ventilation
Section 18C Power transmission equipment
Section 18D Ropes, hooks and cranes; use and operation
Section 18E Safety precautions in dangerous undertakings
Section 18F Explosives
Section 18G Industrial truck and internal combustion equipment
Section 129A Shoring Trenches for local governments

- Massachusetts Department of Labor and Industries, Division of Occupational Safety (Chapter 454 CMR 10.00 et seq.)
- Massachusetts Department of Public Safety “*Excavation and Trench Safety*” (Chapter 520 CMR 14.00 et seq.)

END OF SECTION

SECTION 00 73 43

WAGE RATE REQUIREMENTS

The content of this Section does not represent or reflect all applicable Laws and Regulations and may only include excerpts and portions of certain Laws and Regulations. Other provisions required by statute shall be deemed to be so included and incorporated herein. Contractor is solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

The Project is subject to minimum wage rates as issued by the Director of the Executive Office of Labor and Workforce Development, Department of Labor Standards and the requirements of MGL Chapter 149, Sections 26, 27 and 27A to 27H. Wage Determination Schedules are included in Section 00 73 46. Pursuant to MGL Chapter 149, Section 34B, wages paid to reserve police officers shall be the same prevailing rate of wage paid to regular police officers at the location of the Project.

Submit required records and statements of compliance in accordance with MGL Chapter 149, Section 27B using the latest Weekly Payroll and Compliance forms available on the following website. Copies included in this section are for information only.

<https://www.mass.gov/prevailing-wage-program>

ATTACHMENTS

- A. Massachusetts Prevailing Wage Law guidance and forms

END OF SECTION

This page intentionally left blank

SECTION 00 73 43

WAGE RATE REQUIREMENTS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2007 Edition) included in Section 00 72 05. All provisions that are not so amended or supplemented remain in full force and effect unless amended or supplemented in another Section. 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 within the Sections listed below, if any, which are applicable to both the singular and plural thereof.

The content of this Section does not represent or reflect all applicable Laws and Regulations and may only include excerpts and portions of certain Laws and Regulations. Other provisions and policies, and Laws and Regulations, shall be deemed to be so included and incorporated herein. Contractor is solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

The Project is subject to prevailing wage rates as issued by the Director of the Executive Office of Labor and Workforce Development (EOLWD), Department of Labor Standards (DLS) and the requirements of MGL Chapter 149, Sections 26, 27 and 27A to 27H. Pursuant to MGL Chapter 149, Section 34B, wages paid to reserve police officers shall be the same prevailing rate of wage paid to regular police officers at the location of the Project.

Comply with requirements available on the Executive Office of Labor and Workforce Development website at <https://www.mass.gov/prevailing-wage-program>. See Guide to Contractors at <https://www.mass.gov/files/2017-07/dls-pw-bro-for-contractors-6-12.pdf>.

Submit required records and statements of compliance in accordance with MGL Chapter 149, Section 27B using the latest Weekly Payroll and Compliance forms available on the EOLWD website. Copies included in this section are for information only.

Wage determination schedules are included at the end of this section. In case of discrepancy between state wage rates and Federal wage rates, if any, the higher wage rates shall apply.

ATTACHMENTS

- A. Massachusetts Prevailing Wage Law guidance and forms (samples)
- B. Wage Determination Schedules

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

WEEKLY PAYROLL RECORDS REPORT & STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form is available from the Department of Labor Standards (DLS) at www.mass.gov/dols/pw and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

On a weekly basis, every contractor and subcontractor is required to submit a certified copy of their weekly payroll records to the awarding authority; this includes the payroll forms and the Statement of Compliance form. The certified payroll records must be submitted either by regular mail or by e-mail to the awarding authority. Once collected, the awarding authority is required to preserve those records for three years from the date of completion of the project.

Each such contractor and subcontractor shall furnish weekly **and** within 15 days after completion of its portion of the work, to the awarding authority directly by first-class mail or e-mail, a statement, executed by the contractor, subcontractor or by any authorized officer thereof who supervised the payment of wages, this form, accompanied by their payroll:

STATEMENT OF COMPLIANCE

_____, 20_____

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

That I pay or supervise the payment of the persons employed by
on the _____
(Contractor, subcontractor or public body) (Building or project)
and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on
said project have been paid in accordance with wages determined under the provisions of
sections twenty-six and twenty-seven of chapter one hundred and forty nine of the
General Laws.

Signature _____
Title _____

MASSACHUSETTS WEEKLY CERTIFIED PAYROLL REPORT FORM



All nonconforming anomalies identified above currently registered with the MA Division of Abortion Standard.

For all apprentices performing work during the reporting period, attach a copy of the apprentice identification card issued by the Massachusetts Department of Labor Standards / Division of Apprenticeship Standards.

NOTE: Pursuant to MGL c. 149, s. 27B, every contractor and subcontractor is required to submit a true and accurate copy of their certified weekly payroll records to the awarding authority by first-class mail or e-mail. In addition, each weekly payroll must be accompanied by a statement of compliance signed by the employer. Failure to comply may result in the revocation of the contractor's license.

authority by first-class mail or e-mail. In addition, each weekly payroll m

Date Received by Awarding Authority



**THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS**

Prevailing Wage Rates

MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

**As determined by the Director under the provisions of the
Massachusetts General Laws, Chapter 149, Sections 26 to 27H**

LAUREN JONES
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: City of Quincy

Contract Number:

CITY/TOWN: QUINCY

Description of Work: The Work includes roadway construction; street lighting; traffic signalization; traffic signage; electrical, stormwater and sewer infrastructure improvements; retaining walls; landscaping; hardscape.

Job Location: Walter Hannon Parkway and General McConville Way

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

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

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction							
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>		12/01/2021	\$37.05	\$13.41	\$16.01	\$0.00	\$66.47
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>		12/01/2021	\$37.12	\$13.41	\$16.01	\$0.00	\$66.54
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>		12/01/2021	\$37.24	\$13.41	\$16.01	\$0.00	\$66.66
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>		08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"							
AIR TRACK OPERATOR <i>LABORERS - ZONE 1</i>		12/01/2022	\$43.93	\$9.10	\$17.57	\$0.00	\$70.60
		06/01/2023	\$44.93	\$9.10	\$17.57	\$0.00	\$71.60
		12/01/2023	\$46.18	\$9.10	\$17.57	\$0.00	\$72.85
For apprentice rates see "Apprentice- LABORER"							
AIR TRACK OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>		12/01/2022	\$43.33	\$9.35	\$17.82	\$0.00	\$70.50
		06/01/2023	\$44.33	\$9.35	\$17.82	\$0.00	\$71.50
		12/01/2023	\$45.58	\$9.35	\$17.82	\$0.00	\$72.75
		06/01/2024	\$47.06	\$9.35	\$17.82	\$0.00	\$74.23
		12/01/2024	\$48.53	\$9.35	\$17.82	\$0.00	\$75.70
		06/01/2025	\$50.03	\$9.35	\$17.82	\$0.00	\$77.20
		12/01/2025	\$51.53	\$9.35	\$17.82	\$0.00	\$78.70
		06/01/2026	\$53.08	\$9.35	\$17.82	\$0.00	\$80.25
		12/01/2026	\$54.58	\$9.35	\$17.82	\$0.00	\$81.75
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. <i>HEAT & FROST INSULATORS LOCAL 6 (BOSTON)</i>		12/01/2020	\$38.10	\$12.80	\$9.45	\$0.00	\$60.35
ASPHALT RAKER <i>LABORERS - ZONE 1</i>		12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
		06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
		12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"							
ASPHALT RAKER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>		12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
		06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
		12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
		06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
		12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
		06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
		12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
		06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
		12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.93	\$9.10	\$17.57	\$0.00	\$70.60
	06/01/2023	\$44.93	\$9.10	\$17.57	\$0.00	\$71.60
	12/01/2023	\$46.18	\$9.10	\$17.57	\$0.00	\$72.85
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$43.33	\$9.35	\$17.82	\$0.00	\$70.50
	06/01/2023	\$44.33	\$9.35	\$17.82	\$0.00	\$71.50
	12/01/2023	\$45.58	\$9.35	\$17.82	\$0.00	\$72.75
	06/01/2024	\$47.06	\$9.35	\$17.82	\$0.00	\$74.23
	12/01/2024	\$48.53	\$9.35	\$17.82	\$0.00	\$75.70
	06/01/2025	\$50.03	\$9.35	\$17.82	\$0.00	\$77.20
	12/01/2025	\$51.53	\$9.35	\$17.82	\$0.00	\$78.70
	06/01/2026	\$53.08	\$9.35	\$17.82	\$0.00	\$80.25
	12/01/2026	\$54.58	\$9.35	\$17.82	\$0.00	\$81.75
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2023	\$47.37	\$7.07	\$20.31	\$0.00	\$74.75
	01/01/2024	\$48.12	\$7.07	\$20.60	\$0.00	\$75.79

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$30.79	\$7.07	\$13.22	\$0.00	\$51.08
2	65	\$30.79	\$7.07	\$13.22	\$0.00	\$51.08
3	70	\$33.16	\$7.07	\$14.23	\$0.00	\$54.46
4	75	\$35.53	\$7.07	\$15.24	\$0.00	\$57.84
5	80	\$37.90	\$7.07	\$16.25	\$0.00	\$61.22
6	85	\$40.26	\$7.07	\$17.28	\$0.00	\$64.61
7	90	\$42.63	\$7.07	\$18.28	\$0.00	\$67.98
8	95	\$45.00	\$7.07	\$19.32	\$0.00	\$71.39

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$31.28	\$7.07	\$13.22	\$0.00	\$51.57
2	65	\$31.28	\$7.07	\$13.22	\$0.00	\$51.57
3	70	\$33.68	\$7.07	\$14.23	\$0.00	\$54.98
4	75	\$36.09	\$7.07	\$15.24	\$0.00	\$58.40
5	80	\$38.50	\$7.07	\$16.25	\$0.00	\$61.82
6	85	\$40.90	\$7.07	\$17.28	\$0.00	\$65.25
7	90	\$43.31	\$7.07	\$18.28	\$0.00	\$68.66
8	95	\$45.71	\$7.07	\$19.32	\$0.00	\$72.10

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) <i>BRICKLAYERS LOCAL 3 (QUINCY)</i>	02/01/2023	\$60.35	\$11.49	\$22.34	\$0.00	\$94.18
	08/01/2023	\$62.40	\$11.49	\$22.34	\$0.00	\$96.23
	02/01/2024	\$63.65	\$11.49	\$22.34	\$0.00	\$97.48
	08/01/2024	\$65.75	\$11.49	\$22.34	\$0.00	\$99.58
	02/01/2025	\$67.05	\$11.49	\$22.34	\$0.00	\$100.88
	08/01/2025	\$69.20	\$11.49	\$22.34	\$0.00	\$103.03
	02/01/2026	\$70.55	\$11.49	\$22.34	\$0.00	\$104.38
	08/01/2026	\$72.75	\$11.49	\$22.34	\$0.00	\$106.58
	02/01/2027	\$74.15	\$11.49	\$22.34	\$0.00	\$107.98

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Quincy

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.18	\$11.49	\$22.34	\$0.00	\$64.01
2	60	\$36.21	\$11.49	\$22.34	\$0.00	\$70.04
3	70	\$42.25	\$11.49	\$22.34	\$0.00	\$76.08
4	80	\$48.28	\$11.49	\$22.34	\$0.00	\$82.11
5	90	\$54.32	\$11.49	\$22.34	\$0.00	\$88.15

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.20	\$11.49	\$22.34	\$0.00	\$65.03
2	60	\$37.44	\$11.49	\$22.34	\$0.00	\$71.27
3	70	\$43.68	\$11.49	\$22.34	\$0.00	\$77.51
4	80	\$49.92	\$11.49	\$22.34	\$0.00	\$83.75
5	90	\$56.16	\$11.49	\$22.34	\$0.00	\$89.99

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

CAISSON & UNDERPINNING BOTTOM MAN <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$43.73	\$9.35	\$17.97	\$0.00	\$71.05
	06/01/2023	\$44.73	\$9.35	\$17.97	\$0.00	\$72.05
	12/01/2023	\$45.98	\$9.35	\$17.97	\$0.00	\$73.30
	06/01/2024	\$47.46	\$9.35	\$17.97	\$0.00	\$74.78
	12/01/2024	\$48.93	\$9.35	\$17.97	\$0.00	\$76.25
	06/01/2025	\$50.43	\$9.35	\$17.97	\$0.00	\$77.75
	12/01/2025	\$51.93	\$9.35	\$17.97	\$0.00	\$79.25
	06/01/2026	\$53.48	\$9.35	\$17.97	\$0.00	\$80.80
	12/01/2026	\$54.98	\$9.35	\$17.97	\$0.00	\$82.30

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CAISSON & UNDERPINNING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$42.58	\$9.35	\$17.97	\$0.00	\$69.90
	06/01/2023	\$43.58	\$9.35	\$17.97	\$0.00	\$70.90
	12/01/2023	\$44.83	\$9.35	\$17.97	\$0.00	\$72.15
	06/01/2024	\$46.31	\$9.35	\$17.97	\$0.00	\$73.63
	12/01/2024	\$47.78	\$9.35	\$17.97	\$0.00	\$75.10
	06/01/2025	\$49.28	\$9.35	\$17.97	\$0.00	\$76.60
	12/01/2025	\$50.78	\$9.35	\$17.97	\$0.00	\$78.10
	06/01/2026	\$52.33	\$9.35	\$17.97	\$0.00	\$79.65
	12/01/2026	\$53.83	\$9.35	\$17.97	\$0.00	\$81.15
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$42.58	\$9.35	\$17.97	\$0.00	\$69.90
	06/01/2023	\$43.58	\$9.35	\$17.97	\$0.00	\$70.90
	12/01/2023	\$44.83	\$9.35	\$17.97	\$0.00	\$72.15
	06/01/2024	\$46.31	\$9.35	\$17.97	\$0.00	\$73.63
	12/01/2024	\$47.78	\$9.35	\$17.97	\$0.00	\$75.10
	06/01/2025	\$49.28	\$9.35	\$17.97	\$0.00	\$76.60
	12/01/2025	\$50.78	\$9.35	\$17.97	\$0.00	\$78.10
	06/01/2026	\$52.33	\$9.35	\$17.97	\$0.00	\$79.65
	12/01/2026	\$53.83	\$9.35	\$17.97	\$0.00	\$81.15
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
CARPENTER <i>CARPENTERS -ZONE 2 (Eastern Massachusetts)</i>	09/01/2022	\$45.18	\$8.68	\$19.97	\$0.00	\$73.83
	03/01/2023	\$45.78	\$8.68	\$19.97	\$0.00	\$74.43

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - CARPENTER - Zone 2 Eastern MA

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.59	\$8.68	\$1.73	\$0.00	\$33.00
2	60	\$27.11	\$8.68	\$1.73	\$0.00	\$37.52
3	70	\$31.63	\$8.68	\$14.78	\$0.00	\$55.09
4	75	\$33.89	\$8.68	\$14.78	\$0.00	\$57.35
5	80	\$36.14	\$8.68	\$16.51	\$0.00	\$61.33
6	80	\$36.14	\$8.68	\$16.51	\$0.00	\$61.33
7	90	\$40.66	\$8.68	\$18.24	\$0.00	\$67.58
8	90	\$40.66	\$8.68	\$18.24	\$0.00	\$67.58

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.89	\$8.68	\$1.73	\$0.00	\$33.30
2	60	\$27.47	\$8.68	\$1.73	\$0.00	\$37.88
3	70	\$32.05	\$8.68	\$14.78	\$0.00	\$55.51
4	75	\$34.34	\$8.68	\$14.78	\$0.00	\$57.80
5	80	\$36.62	\$8.68	\$16.51	\$0.00	\$61.81
6	80	\$36.62	\$8.68	\$16.51	\$0.00	\$61.81
7	90	\$41.20	\$8.68	\$18.24	\$0.00	\$68.12
8	90	\$41.20	\$8.68	\$18.24	\$0.00	\$68.12

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 \$30.71/ 3&4 \$36.93/ 5&6 \$56.82/ 7&8 \$63.06

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME CARPENTERS -ZONE 2 (Wood Frame)	04/01/2022	\$28.62	\$7.21	\$5.80	\$0.00	\$41.63
	04/01/2023	\$28.97	\$7.21	\$5.80	\$0.00	\$41.98

All Aspects of New Wood Frame Work

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - CARPENTER (Wood Frame) - Zone 2

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$14.31	\$7.21	\$0.00	\$0.00	\$21.52
2	50	\$14.31	\$7.21	\$0.00	\$0.00	\$21.52
3	55	\$15.74	\$7.21	\$2.00	\$0.00	\$24.95
4	55	\$15.74	\$7.21	\$2.00	\$0.00	\$24.95
5	70	\$20.03	\$7.21	\$5.80	\$0.00	\$33.04
6	70	\$20.03	\$7.21	\$5.80	\$0.00	\$33.04
7	80	\$22.90	\$7.21	\$5.80	\$0.00	\$35.91
8	80	\$22.90	\$7.21	\$5.80	\$0.00	\$35.91

Effective Date - 04/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$14.49	\$7.21	\$0.00	\$0.00	\$21.70
2	50	\$14.49	\$7.21	\$0.00	\$0.00	\$21.70
3	55	\$15.93	\$7.21	\$2.00	\$0.00	\$25.14
4	55	\$15.93	\$7.21	\$2.00	\$0.00	\$25.14
5	70	\$20.28	\$7.21	\$5.80	\$0.00	\$33.29
6	70	\$20.28	\$7.21	\$5.80	\$0.00	\$33.29
7	80	\$23.18	\$7.21	\$5.80	\$0.00	\$36.19
8	80	\$23.18	\$7.21	\$5.80	\$0.00	\$36.19

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 \$20.09/ 3&4 \$24.95/ 5&6 \$33.04/ 7&8 \$35.91

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING BRICKLAYERS LOCAL 3 (QUINCY)	01/01/2023	\$49.45	\$12.75	\$22.74	\$0.87	\$85.81
	07/01/2023	\$50.59	\$12.75	\$22.74	\$0.87	\$86.95
	01/01/2024	\$51.73	\$12.75	\$22.74	\$0.87	\$88.09

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - CEMENT MASONRY/PLASTERING - Eastern Mass (Quincy)

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.73	\$12.75	\$15.49	\$0.00	\$52.97
2	60	\$29.67	\$12.75	\$22.74	\$0.87	\$66.03
3	65	\$32.14	\$12.75	\$22.74	\$0.87	\$68.50
4	70	\$34.62	\$12.75	\$22.74	\$0.87	\$70.98
5	75	\$37.09	\$12.75	\$22.74	\$0.87	\$73.45
6	80	\$39.56	\$12.75	\$22.74	\$0.87	\$75.92
7	90	\$44.51	\$12.75	\$22.74	\$0.87	\$80.87

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.30	\$12.75	\$15.49	\$0.00	\$53.54
2	60	\$30.35	\$12.75	\$22.74	\$0.87	\$66.71
3	65	\$32.88	\$12.75	\$22.74	\$0.87	\$69.24
4	70	\$35.41	\$12.75	\$22.74	\$0.87	\$71.77
5	75	\$37.94	\$12.75	\$22.74	\$0.87	\$74.30
6	80	\$40.47	\$12.75	\$22.74	\$0.87	\$76.83
7	90	\$45.53	\$12.75	\$22.74	\$0.87	\$81.89

Notes:

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

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$54.68	\$14.25	\$16.05	\$0.00	\$84.98
	06/01/2023	\$55.95	\$14.25	\$16.05	\$0.00	\$86.25
	12/01/2023	\$57.23	\$14.25	\$16.05	\$0.00	\$87.53
	06/01/2024	\$58.55	\$14.25	\$16.05	\$0.00	\$88.85
	12/01/2024	\$60.03	\$14.25	\$16.05	\$0.00	\$90.33
	06/01/2025	\$61.36	\$14.25	\$16.05	\$0.00	\$91.66
	12/01/2025	\$62.83	\$14.25	\$16.05	\$0.00	\$93.13
	06/01/2026	\$64.16	\$14.25	\$16.05	\$0.00	\$94.46
	12/01/2026	\$65.64	\$14.25	\$16.05	\$0.00	\$95.94

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
COMPRESSOR OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$35.08	\$14.25	\$16.05	\$0.00	\$65.38
	06/01/2023	\$35.90	\$14.25	\$16.05	\$0.00	\$66.20
	12/01/2023	\$36.72	\$14.25	\$16.05	\$0.00	\$67.02
	06/01/2024	\$37.57	\$14.25	\$16.05	\$0.00	\$67.87
	12/01/2024	\$38.52	\$14.25	\$16.05	\$0.00	\$68.82
	06/01/2025	\$39.37	\$14.25	\$16.05	\$0.00	\$69.67
	12/01/2025	\$40.32	\$14.25	\$16.05	\$0.00	\$70.62
	06/01/2026	\$41.18	\$14.25	\$16.05	\$0.00	\$71.48
	12/01/2026	\$42.13	\$14.25	\$16.05	\$0.00	\$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) <i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2023	\$56.06	\$8.65	\$23.05	\$0.00	\$87.76
	07/01/2023	\$57.26	\$8.65	\$23.05	\$0.00	\$88.96
	01/01/2024	\$58.46	\$8.65	\$23.05	\$0.00	\$90.16
	07/01/2024	\$59.66	\$8.65	\$23.05	\$0.00	\$91.36
	01/01/2025	\$60.86	\$8.65	\$23.05	\$0.00	\$92.56

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.03	\$8.65	\$0.00	\$0.00	\$36.68
2	55	\$30.83	\$8.65	\$6.27	\$0.00	\$45.75
3	60	\$33.64	\$8.65	\$6.84	\$0.00	\$49.13
4	65	\$36.44	\$8.65	\$7.41	\$0.00	\$52.50
5	70	\$39.24	\$8.65	\$19.63	\$0.00	\$67.52
6	75	\$42.05	\$8.65	\$20.20	\$0.00	\$70.90
7	80	\$44.85	\$8.65	\$20.77	\$0.00	\$74.27
8	90	\$50.45	\$8.65	\$21.91	\$0.00	\$81.01

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$8.65	\$0.00	\$0.00	\$37.28
2	55	\$31.49	\$8.65	\$6.27	\$0.00	\$46.41
3	60	\$34.36	\$8.65	\$6.84	\$0.00	\$49.85
4	65	\$37.22	\$8.65	\$7.41	\$0.00	\$53.28
5	70	\$40.08	\$8.65	\$19.63	\$0.00	\$68.36
6	75	\$42.95	\$8.65	\$20.20	\$0.00	\$71.80
7	80	\$45.81	\$8.65	\$20.77	\$0.00	\$75.23
8	90	\$51.53	\$8.65	\$21.91	\$0.00	\$82.09

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"							
DEMO: BACKHOE/LOADER/HAMMER OPERATOR <i>LABORERS - ZONE 1</i>		12/01/2022	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
		06/01/2023	\$45.33	\$9.10	\$17.57	\$0.00	\$72.00
		12/01/2023	\$46.58	\$9.10	\$17.57	\$0.00	\$73.25
For apprentice rates see "Apprentice- LABORER"							
DEMO: BURNERS <i>LABORERS - ZONE 1</i>		12/01/2022	\$44.08	\$9.10	\$17.57	\$0.00	\$70.75
		06/01/2023	\$45.08	\$9.10	\$17.57	\$0.00	\$71.75
		12/01/2023	\$46.33	\$9.10	\$17.57	\$0.00	\$73.00
For apprentice rates see "Apprentice- LABORER"							
DEMO: CONCRETE CUTTER/SAWYER <i>LABORERS - ZONE 1</i>		12/01/2022	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
		06/01/2023	\$45.33	\$9.10	\$17.57	\$0.00	\$72.00
		12/01/2023	\$46.58	\$9.10	\$17.57	\$0.00	\$73.25
For apprentice rates see "Apprentice- LABORER"							
DEMO: JACKHAMMER OPERATOR <i>LABORERS - ZONE 1</i>		12/01/2022	\$44.08	\$9.10	\$17.57	\$0.00	\$70.75
		06/01/2023	\$45.08	\$9.10	\$17.57	\$0.00	\$71.75
		12/01/2023	\$46.33	\$9.10	\$17.57	\$0.00	\$73.00
For apprentice rates see "Apprentice- LABORER"							
DEMO: WRECKING LABORER <i>LABORERS - ZONE 1</i>		12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
		06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
		12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25
For apprentice rates see "Apprentice- LABORER"							
DIRECTIONAL DRILL MACHINE OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>		12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
		06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
		12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
		06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
		12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
		06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
		12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
		06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
		12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
DIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>		08/01/2020	\$68.70	\$9.40	\$23.12	\$0.00	\$101.22
For apprentice rates see "Apprentice- PILE DRIVER"							
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>		08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
For apprentice rates see "Apprentice- PILE DRIVER"							
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>		08/01/2020	\$73.60	\$9.40	\$23.12	\$0.00	\$106.12
For apprentice rates see "Apprentice- PILE DRIVER"							
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>		08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"							
DRAWBRIDGE OPERATOR (Construction) <i>DRAWBRIDGE - SEIU LOCAL 888</i>		07/01/2020	\$26.77	\$6.67	\$3.93	\$0.16	\$37.53
ELECTRICIAN <i>ELECTRICIANS LOCAL 103</i>		09/01/2022	\$58.28	\$13.00	\$21.35	\$0.00	\$92.63
		03/01/2023	\$59.23	\$13.00	\$21.63	\$0.00	\$93.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - ELECTRICIAN - Local 103

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$23.31	\$13.00	\$0.70	\$0.00	\$37.01
2	40	\$23.31	\$13.00	\$0.70	\$0.00	\$37.01
3	45	\$26.23	\$13.00	\$15.87	\$0.00	\$55.10
4	45	\$26.23	\$13.00	\$15.87	\$0.00	\$55.10
5	50	\$29.14	\$13.00	\$16.36	\$0.00	\$58.50
6	55	\$32.05	\$13.00	\$16.86	\$0.00	\$61.91
7	60	\$34.97	\$13.00	\$17.36	\$0.00	\$65.33
8	65	\$37.88	\$13.00	\$17.86	\$0.00	\$68.74
9	70	\$40.80	\$13.00	\$18.35	\$0.00	\$72.15
10	75	\$43.71	\$13.00	\$18.86	\$0.00	\$75.57

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$23.69	\$13.00	\$0.71	\$0.00	\$37.40
2	40	\$23.69	\$13.00	\$0.71	\$0.00	\$37.40
3	45	\$26.65	\$13.00	\$16.13	\$0.00	\$55.78
4	45	\$26.65	\$13.00	\$16.13	\$0.00	\$55.78
5	50	\$29.62	\$13.00	\$16.63	\$0.00	\$59.25
6	55	\$32.58	\$13.00	\$17.13	\$0.00	\$62.71
7	60	\$35.54	\$13.00	\$17.63	\$0.00	\$66.17
8	65	\$38.50	\$13.00	\$18.13	\$0.00	\$69.63
9	70	\$41.46	\$13.00	\$18.62	\$0.00	\$73.08
10	75	\$44.42	\$13.00	\$19.13	\$0.00	\$76.55

Notes:

App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

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

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - ELEVATOR CONSTRUCTOR - Local 4

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$32.81	\$16.03	\$0.00	\$0.00	\$48.84
2	55	\$36.09	\$16.03	\$20.21	\$0.00	\$72.33
3	65	\$42.65	\$16.03	\$20.21	\$0.00	\$78.89
4	70	\$45.93	\$16.03	\$20.21	\$0.00	\$82.17
5	80	\$52.50	\$16.03	\$20.21	\$0.00	\$88.74

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER <i>ELEVATOR CONSTRUCTORS LOCAL 4</i>	01/01/2022	\$45.93	\$16.03	\$20.21	\$0.00	\$82.17
---	------------	---------	---------	---------	--------	---------

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25

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

FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/05/2022	\$48.67	\$14.25	\$16.05	\$0.00	\$78.97
	05/01/2023	\$49.91	\$14.25	\$16.05	\$0.00	\$80.21
	11/01/2023	\$51.15	\$14.25	\$16.05	\$0.00	\$81.45
	05/01/2024	\$52.39	\$14.25	\$16.05	\$0.00	\$82.69
	11/01/2024	\$53.68	\$14.25	\$16.05	\$0.00	\$83.98
	05/01/2025	\$55.12	\$14.25	\$16.05	\$0.00	\$85.42
	11/01/2025	\$56.41	\$14.25	\$16.05	\$0.00	\$86.71
	05/01/2026	\$57.85	\$14.25	\$16.05	\$0.00	\$88.15
	11/01/2026	\$59.14	\$14.25	\$16.05	\$0.00	\$89.44
	05/01/2027	\$60.57	\$14.25	\$16.05	\$0.00	\$90.87

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2022	\$50.22	\$14.25	\$16.05	\$0.00	\$80.52
	05/01/2023	\$51.47	\$14.25	\$16.05	\$0.00	\$81.77
	11/01/2023	\$52.72	\$14.25	\$16.05	\$0.00	\$83.02
	05/01/2024	\$53.97	\$14.25	\$16.05	\$0.00	\$84.27
	11/01/2024	\$55.27	\$14.25	\$16.05	\$0.00	\$85.57
	05/01/2025	\$56.72	\$14.25	\$16.05	\$0.00	\$87.02
	11/01/2025	\$58.02	\$14.25	\$16.05	\$0.00	\$88.32
	05/01/2026	\$59.47	\$14.25	\$16.05	\$0.00	\$89.77
	11/01/2026	\$60.77	\$14.25	\$16.05	\$0.00	\$91.07
	05/01/2027	\$62.22	\$14.25	\$16.05	\$0.00	\$92.52
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2022	\$24.31	\$14.25	\$16.05	\$0.00	\$54.61
	05/01/2023	\$25.05	\$14.25	\$16.05	\$0.00	\$55.35
	11/01/2023	\$25.78	\$14.25	\$16.05	\$0.00	\$56.08
	05/01/2024	\$26.51	\$14.25	\$16.05	\$0.00	\$56.81
	11/01/2024	\$27.27	\$14.25	\$16.05	\$0.00	\$57.57
	05/01/2025	\$28.12	\$14.25	\$16.05	\$0.00	\$58.42
	11/01/2025	\$28.88	\$14.25	\$16.05	\$0.00	\$59.18
	05/01/2026	\$29.73	\$14.25	\$16.05	\$0.00	\$60.03
	11/01/2026	\$30.49	\$14.25	\$16.05	\$0.00	\$60.79
	05/01/2027	\$31.34	\$14.25	\$16.05	\$0.00	\$61.64
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 103</i>	09/01/2022	\$58.28	\$13.00	\$21.35	\$0.00	\$92.63
	03/01/2023	\$59.23	\$13.00	\$21.63	\$0.00	\$93.86
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING <i>ELECTRICIANS LOCAL 103</i>	09/01/2022	\$46.42	\$13.00	\$18.87	\$0.00	\$78.29
	03/01/2023	\$48.34	\$13.00	\$19.01	\$0.00	\$80.35
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$43.54	\$14.25	\$16.05	\$0.00	\$73.84
	06/01/2023	\$44.56	\$14.25	\$16.05	\$0.00	\$74.86
	12/01/2023	\$45.57	\$14.25	\$16.05	\$0.00	\$75.87
	06/01/2024	\$46.63	\$14.25	\$16.05	\$0.00	\$76.93
	12/01/2024	\$47.81	\$14.25	\$16.05	\$0.00	\$78.11
	06/01/2025	\$48.87	\$14.25	\$16.05	\$0.00	\$79.17
	12/01/2025	\$50.04	\$14.25	\$16.05	\$0.00	\$80.34
	06/01/2026	\$51.10	\$14.25	\$16.05	\$0.00	\$81.40
	12/01/2026	\$52.28	\$14.25	\$16.05	\$0.00	\$82.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FLAGGER & SIGNALER (HEAVY & HIGHWAY)	12/01/2022	\$25.23	\$9.35	\$17.82	\$0.00	\$52.40
LABORERS - ZONE 1 (HEAVY & HIGHWAY)	06/01/2023	\$25.98	\$9.35	\$17.82	\$0.00	\$53.15
	12/01/2023	\$25.98	\$9.35	\$17.82	\$0.00	\$53.15
	06/01/2024	\$27.01	\$9.35	\$17.82	\$0.00	\$54.18
	12/01/2024	\$27.01	\$9.35	\$17.82	\$0.00	\$54.18
	06/01/2025	\$28.09	\$9.35	\$17.82	\$0.00	\$55.26
	12/01/2025	\$28.09	\$9.35	\$17.82	\$0.00	\$55.26
	06/01/2026	\$29.21	\$9.35	\$17.82	\$0.00	\$56.38
	12/01/2026	\$29.21	\$9.35	\$17.82	\$0.00	\$56.38

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

FLOORCOVERER	03/01/2022	\$49.93	\$8.68	\$20.27	\$0.00	\$78.88
<i>FLOORCOVERERS LOCAL 2168 ZONE I</i>						

Apprentice - FLOORCOVERER - Local 2168 Zone I

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.97	\$8.68	\$1.79	\$0.00	\$35.44
2	55	\$27.46	\$8.68	\$1.79	\$0.00	\$37.93
3	60	\$29.96	\$8.68	\$14.90	\$0.00	\$53.54
4	65	\$32.45	\$8.68	\$14.90	\$0.00	\$56.03
5	70	\$34.95	\$8.68	\$16.69	\$0.00	\$60.32
6	75	\$37.45	\$8.68	\$16.69	\$0.00	\$62.82
7	80	\$39.94	\$8.68	\$18.48	\$0.00	\$67.10
8	85	\$42.44	\$8.68	\$18.48	\$0.00	\$69.60

Notes: Steps are 750 hrs.

% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)

Step 1&2 \$32.94/ 3&4 \$39.66/ 5&6 \$60.32/ 7&8 \$67.10

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
<i>OPERATING ENGINEERS LOCAL 4</i>						
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
GENERATOR/LIGHTING PLANT/HEATERS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$35.08	\$14.25	\$16.05	\$0.00	\$65.38
	06/01/2023	\$35.90	\$14.25	\$16.05	\$0.00	\$66.20
	12/01/2023	\$36.72	\$14.25	\$16.05	\$0.00	\$67.02
	06/01/2024	\$37.57	\$14.25	\$16.05	\$0.00	\$67.87
	12/01/2024	\$38.52	\$14.25	\$16.05	\$0.00	\$68.82
	06/01/2025	\$39.37	\$14.25	\$16.05	\$0.00	\$69.67
	12/01/2025	\$40.32	\$14.25	\$16.05	\$0.00	\$70.62
	06/01/2026	\$41.18	\$14.25	\$16.05	\$0.00	\$71.48
	12/01/2026	\$42.13	\$14.25	\$16.05	\$0.00	\$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) <i>GLAZIERS LOCAL 35 (ZONE 2)</i>	01/01/2023	\$45.56	\$8.65	\$23.05	\$0.00	\$77.26
	07/01/2023	\$46.76	\$8.65	\$23.05	\$0.00	\$78.46
	01/01/2024	\$47.96	\$8.65	\$23.05	\$0.00	\$79.66
	07/01/2024	\$49.16	\$8.65	\$23.05	\$0.00	\$80.86
	01/01/2025	\$50.36	\$8.65	\$23.05	\$0.00	\$82.06

Apprentice - GLAZIER - Local 35 Zone 2

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.78	\$8.65	\$0.00	\$0.00	\$31.43
2	55	\$25.06	\$8.65	\$6.27	\$0.00	\$39.98
3	60	\$27.34	\$8.65	\$6.84	\$0.00	\$42.83
4	65	\$29.61	\$8.65	\$7.41	\$0.00	\$45.67
5	70	\$31.89	\$8.65	\$19.63	\$0.00	\$60.17
6	75	\$34.17	\$8.65	\$20.20	\$0.00	\$63.02
7	80	\$36.45	\$8.65	\$20.77	\$0.00	\$65.87
8	90	\$41.00	\$8.65	\$21.91	\$0.00	\$71.56

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.38	\$8.65	\$0.00	\$0.00	\$32.03
2	55	\$25.72	\$8.65	\$6.27	\$0.00	\$40.64
3	60	\$28.06	\$8.65	\$6.84	\$0.00	\$43.55
4	65	\$30.39	\$8.65	\$7.41	\$0.00	\$46.45
5	70	\$32.73	\$8.65	\$19.63	\$0.00	\$61.01
6	75	\$35.07	\$8.65	\$20.20	\$0.00	\$63.92
7	80	\$37.41	\$8.65	\$20.77	\$0.00	\$66.83
8	90	\$42.08	\$8.65	\$21.91	\$0.00	\$72.64

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HOISTING ENGINEER/CRANES/GRADALLS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68

Apprentice - OPERATING ENGINEERS - Local 4

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$29.50	\$14.25	\$0.00	\$0.00	\$43.75
2	60	\$32.18	\$14.25	\$16.05	\$0.00	\$62.48
3	65	\$34.86	\$14.25	\$16.05	\$0.00	\$65.16
4	70	\$37.54	\$14.25	\$16.05	\$0.00	\$67.84
5	75	\$40.22	\$14.25	\$16.05	\$0.00	\$70.52
6	80	\$42.90	\$14.25	\$16.05	\$0.00	\$73.20
7	85	\$45.59	\$14.25	\$16.05	\$0.00	\$75.89
8	90	\$48.27	\$14.25	\$16.05	\$0.00	\$78.57

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$30.18	\$14.25	\$0.00	\$0.00	\$44.43
2	60	\$32.93	\$14.25	\$16.05	\$0.00	\$63.23
3	65	\$35.67	\$14.25	\$16.05	\$0.00	\$65.97
4	70	\$38.42	\$14.25	\$16.05	\$0.00	\$68.72
5	75	\$41.16	\$14.25	\$16.05	\$0.00	\$71.46
6	80	\$43.90	\$14.25	\$16.05	\$0.00	\$74.20
7	85	\$46.65	\$14.25	\$16.05	\$0.00	\$76.95
8	90	\$49.39	\$14.25	\$16.05	\$0.00	\$79.69

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	02/01/2023	\$55.31	\$14.11	\$26.64	\$2.83	\$98.89
	08/01/2023	\$57.01	\$14.11	\$26.64	\$2.83	\$100.59
	02/01/2024	\$58.71	\$14.11	\$26.64	\$2.83	\$102.29
	08/01/2024	\$60.46	\$14.11	\$26.64	\$2.83	\$104.04
	02/01/2025	\$62.21	\$14.11	\$26.64	\$2.83	\$105.79
	08/01/2025	\$64.06	\$14.11	\$26.64	\$2.83	\$107.64
	02/01/2026	\$66.01	\$14.11	\$26.64	\$2.83	\$109.59

For apprentice rates see "Apprentice- SHEET METAL WORKER"

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (ELECTRICAL CONTROLS)	<i>ELECTRICIANS LOCAL 103</i>	09/01/2022	\$58.28	\$13.00	\$21.35	\$0.00	\$92.63
		03/01/2023	\$59.23	\$13.00	\$21.63	\$0.00	\$93.86
For apprentice rates see "Apprentice- ELECTRICIAN"							
HVAC (TESTING AND BALANCING - AIR)	<i>SHEETMETAL WORKERS LOCAL 17 - A</i>	02/01/2023	\$55.31	\$14.11	\$26.64	\$2.83	\$98.89
		08/01/2023	\$57.01	\$14.11	\$26.64	\$2.83	\$100.59
		02/01/2024	\$58.71	\$14.11	\$26.64	\$2.83	\$102.29
		08/01/2024	\$60.46	\$14.11	\$26.64	\$2.83	\$104.04
		02/01/2025	\$62.21	\$14.11	\$26.64	\$2.83	\$105.79
		08/01/2025	\$64.06	\$14.11	\$26.64	\$2.83	\$107.64
		02/01/2026	\$66.01	\$14.11	\$26.64	\$2.83	\$109.59
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (TESTING AND BALANCING -WATER)	<i>PIPEFITTERS LOCAL 537</i>	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HVAC MECHANIC	<i>PIPEFITTERS LOCAL 537</i>	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HYDRAULIC DRILLS	<i>LABORERS - ZONE 1</i>	12/01/2022	\$43.93	\$9.10	\$17.57	\$0.00	\$70.60
		06/01/2023	\$44.93	\$9.10	\$17.57	\$0.00	\$71.60
		12/01/2023	\$46.18	\$9.10	\$17.57	\$0.00	\$72.85
For apprentice rates see "Apprentice- LABORER"							
HYDRAULIC DRILLS (HEAVY & HIGHWAY)	<i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$43.33	\$9.35	\$17.82	\$0.00	\$70.50
		06/01/2023	\$44.33	\$9.35	\$17.82	\$0.00	\$71.50
		12/01/2023	\$45.58	\$9.35	\$17.82	\$0.00	\$72.75
		06/01/2024	\$47.06	\$9.35	\$17.82	\$0.00	\$74.23
		12/01/2024	\$48.53	\$9.35	\$17.82	\$0.00	\$75.70
		06/01/2025	\$50.03	\$9.35	\$17.82	\$0.00	\$77.20
		12/01/2025	\$51.53	\$9.35	\$17.82	\$0.00	\$78.70
		06/01/2026	\$53.08	\$9.35	\$17.82	\$0.00	\$80.25
		12/01/2026	\$54.58	\$9.35	\$17.82	\$0.00	\$81.75
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
INSULATOR (PIPES & TANKS)	<i>HEAT & FROST INSULATORS LOCAL 6 (BOSTON)</i>	09/01/2022	\$53.85	\$13.80	\$17.14	\$0.00	\$84.79

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

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.93	\$13.80	\$12.42	\$0.00	\$53.15
2	60	\$32.31	\$13.80	\$13.36	\$0.00	\$59.47
3	70	\$37.70	\$13.80	\$14.31	\$0.00	\$65.81
4	80	\$43.08	\$13.80	\$15.25	\$0.00	\$72.13

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER IRONWORKERS LOCAL 7 (BOSTON AREA)	09/16/2022	\$51.59	\$8.25	\$26.70	\$0.00	\$86.54

Apprentice - IRONWORKER - Local 7 Boston

Effective Date - 09/16/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$30.95	\$8.25	\$26.70	\$0.00	\$65.90
2	70	\$36.11	\$8.25	\$26.70	\$0.00	\$71.06
3	75	\$38.69	\$8.25	\$26.70	\$0.00	\$73.64
4	80	\$41.27	\$8.25	\$26.70	\$0.00	\$76.22
5	85	\$43.85	\$8.25	\$26.70	\$0.00	\$78.80
6	90	\$46.43	\$8.25	\$26.70	\$0.00	\$81.38

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR LABORERS - ZONE 1	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35

For apprentice rates see "Apprentice- LABORER"

LABORER LABORERS - ZONE 1	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10

Apprentice - LABORER - Zone 1

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$25.91	\$9.10	\$17.57	\$0.00	\$52.58
2	70	\$30.23	\$9.10	\$17.57	\$0.00	\$56.90
3	80	\$34.54	\$9.10	\$17.57	\$0.00	\$61.21
4	90	\$38.86	\$9.10	\$17.57	\$0.00	\$65.53

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.51	\$9.10	\$17.57	\$0.00	\$53.18
2	70	\$30.93	\$9.10	\$17.57	\$0.00	\$57.60
3	80	\$35.34	\$9.10	\$17.57	\$0.00	\$62.01
4	90	\$39.76	\$9.10	\$17.57	\$0.00	\$66.43

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY)	12/01/2022	\$42.58	\$9.35	\$17.82	\$0.00	\$69.75
LABORERS - ZONE 1 (HEAVY & HIGHWAY)	06/01/2023	\$43.58	\$9.35	\$17.82	\$0.00	\$70.75
	12/01/2023	\$44.83	\$9.35	\$17.82	\$0.00	\$72.00
	06/01/2024	\$46.31	\$9.35	\$17.82	\$0.00	\$73.48
	12/01/2024	\$47.78	\$9.35	\$17.82	\$0.00	\$74.95
	06/01/2025	\$49.28	\$9.35	\$17.82	\$0.00	\$76.45
	12/01/2025	\$50.78	\$9.35	\$17.82	\$0.00	\$77.95
	06/01/2026	\$52.33	\$9.35	\$17.82	\$0.00	\$79.50
	12/01/2026	\$53.83	\$9.35	\$17.82	\$0.00	\$81.00

Apprentice - LABORER (Heavy & Highway) - Zone 1

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$25.55	\$9.35	\$17.82	\$0.00	\$52.72
2	70	\$29.81	\$9.35	\$17.82	\$0.00	\$56.98
3	80	\$34.06	\$9.35	\$17.82	\$0.00	\$61.23
4	90	\$38.32	\$9.35	\$17.82	\$0.00	\$65.49

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.15	\$9.35	\$17.82	\$0.00	\$53.32
2	70	\$30.51	\$9.35	\$17.82	\$0.00	\$57.68
3	80	\$34.86	\$9.35	\$17.82	\$0.00	\$62.03
4	90	\$39.22	\$9.35	\$17.82	\$0.00	\$66.39

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER LABORERS - ZONE 1	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER LABORERS - ZONE 1	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER LABORERS - ZONE 1	12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER LABORERS - ZONE 1	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	06/01/2024	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MASON TENDER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.18	\$9.10	\$17.57	\$0.00	\$69.85
	06/01/2023	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	12/01/2023	\$45.43	\$9.10	\$17.57	\$0.00	\$72.10
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2023	\$46.25	\$11.49	\$20.37	\$0.00	\$78.11
	08/01/2023	\$47.89	\$11.49	\$20.37	\$0.00	\$79.75
	02/01/2024	\$48.89	\$11.49	\$20.37	\$0.00	\$80.75
	08/01/2024	\$50.57	\$11.49	\$20.37	\$0.00	\$82.43
	02/01/2025	\$51.61	\$11.49	\$20.37	\$0.00	\$83.47
	08/01/2025	\$53.33	\$11.49	\$20.37	\$0.00	\$85.19
	02/01/2026	\$54.41	\$11.49	\$20.37	\$0.00	\$86.27
	08/01/2026	\$56.17	\$11.49	\$20.37	\$0.00	\$88.03
	02/01/2027	\$57.29	\$11.49	\$20.37	\$0.00	\$89.15

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.13	\$11.49	\$20.37	\$0.00	\$54.99
2	60	\$27.75	\$11.49	\$20.37	\$0.00	\$59.61
3	70	\$32.38	\$11.49	\$20.37	\$0.00	\$64.24
4	80	\$37.00	\$11.49	\$20.37	\$0.00	\$68.86
5	90	\$41.63	\$11.49	\$20.37	\$0.00	\$73.49

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.95	\$11.49	\$20.37	\$0.00	\$55.81
2	60	\$28.73	\$11.49	\$20.37	\$0.00	\$60.59
3	70	\$33.52	\$11.49	\$20.37	\$0.00	\$65.38
4	80	\$38.31	\$11.49	\$20.37	\$0.00	\$70.17
5	90	\$43.10	\$11.49	\$20.37	\$0.00	\$74.96

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2023	\$60.37	\$11.49	\$22.31	\$0.00	\$94.17
	08/01/2023	\$62.42	\$11.49	\$22.31	\$0.00	\$96.22
	02/01/2024	\$63.67	\$11.49	\$22.31	\$0.00	\$97.47
	08/01/2024	\$65.77	\$11.49	\$22.31	\$0.00	\$99.57
	02/01/2025	\$67.07	\$11.49	\$22.31	\$0.00	\$100.87
	08/01/2025	\$69.22	\$11.49	\$22.31	\$0.00	\$103.02
	02/01/2026	\$70.57	\$11.49	\$22.31	\$0.00	\$104.37
	08/01/2026	\$72.77	\$11.49	\$22.31	\$0.00	\$106.57
	02/01/2027	\$74.17	\$11.49	\$22.31	\$0.00	\$107.97

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

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

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.19	\$11.49	\$22.31	\$0.00	\$63.99
2	60	\$36.22	\$11.49	\$22.31	\$0.00	\$70.02
3	70	\$42.26	\$11.49	\$22.31	\$0.00	\$76.06
4	80	\$48.30	\$11.49	\$22.31	\$0.00	\$82.10
5	90	\$54.33	\$11.49	\$22.31	\$0.00	\$88.13

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.21	\$11.49	\$22.31	\$0.00	\$65.01
2	60	\$37.45	\$11.49	\$22.31	\$0.00	\$71.25
3	70	\$43.69	\$11.49	\$22.31	\$0.00	\$77.49
4	80	\$49.94	\$11.49	\$22.31	\$0.00	\$83.74
5	90	\$56.18	\$11.49	\$22.31	\$0.00	\$89.98

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 1) <i>MILLWRIGHTS LOCAL 1121 - Zone 1</i>	01/02/2023	\$47.27	\$8.58	\$21.57	\$0.00	\$77.42
---	------------	---------	--------	---------	--------	---------

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - MILLWRIGHT - Local 1121 Zone 1

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$26.00	\$8.58	\$5.72	\$0.00	\$40.30
2	65	\$30.73	\$8.58	\$17.93	\$0.00	\$57.24
3	75	\$35.45	\$8.58	\$18.98	\$0.00	\$63.01
4	85	\$40.18	\$8.58	\$20.01	\$0.00	\$68.77

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension,
but do receive annuity. (Step 1 \$5.72, Step 2 \$6.66)

Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

MORTAR MIXER <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$24.37	\$14.25	\$16.05	\$0.00	\$54.67
	06/01/2023	\$24.94	\$14.25	\$16.05	\$0.00	\$55.24
	12/01/2023	\$25.51	\$14.25	\$16.05	\$0.00	\$55.81
	06/01/2024	\$26.11	\$14.25	\$16.05	\$0.00	\$56.41
	12/01/2024	\$26.77	\$14.25	\$16.05	\$0.00	\$57.07
	06/01/2025	\$27.37	\$14.25	\$16.05	\$0.00	\$57.67
	12/01/2025	\$28.03	\$14.25	\$16.05	\$0.00	\$58.33
	06/01/2026	\$28.62	\$14.25	\$16.05	\$0.00	\$58.92
	12/01/2026	\$29.29	\$14.25	\$16.05	\$0.00	\$59.59
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$29.57	\$14.25	\$16.05	\$0.00	\$59.87
	06/01/2023	\$30.27	\$14.25	\$16.05	\$0.00	\$60.57
	12/01/2023	\$30.96	\$14.25	\$16.05	\$0.00	\$61.26
	06/01/2024	\$31.68	\$14.25	\$16.05	\$0.00	\$61.98
	12/01/2024	\$32.48	\$14.25	\$16.05	\$0.00	\$62.78
	06/01/2025	\$33.20	\$14.25	\$16.05	\$0.00	\$63.50
	12/01/2025	\$34.00	\$14.25	\$16.05	\$0.00	\$64.30
	06/01/2026	\$34.72	\$14.25	\$16.05	\$0.00	\$65.02
	12/01/2026	\$35.52	\$14.25	\$16.05	\$0.00	\$65.82
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PAINTER (BRIDGES/TANKS)		01/01/2023	\$56.06	\$8.65	\$23.05	\$0.00	\$87.76
PAINTERS LOCAL 35 - ZONE 2		07/01/2023	\$57.26	\$8.65	\$23.05	\$0.00	\$88.96
		01/01/2024	\$58.46	\$8.65	\$23.05	\$0.00	\$90.16
		07/01/2024	\$59.66	\$8.65	\$23.05	\$0.00	\$91.36
		01/01/2025	\$60.86	\$8.65	\$23.05	\$0.00	\$92.56

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.03	\$8.65	\$0.00	\$0.00	\$36.68
2	55	\$30.83	\$8.65	\$6.27	\$0.00	\$45.75
3	60	\$33.64	\$8.65	\$6.84	\$0.00	\$49.13
4	65	\$36.44	\$8.65	\$7.41	\$0.00	\$52.50
5	70	\$39.24	\$8.65	\$19.63	\$0.00	\$67.52
6	75	\$42.05	\$8.65	\$20.20	\$0.00	\$70.90
7	80	\$44.85	\$8.65	\$20.77	\$0.00	\$74.27
8	90	\$50.45	\$8.65	\$21.91	\$0.00	\$81.01

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$8.65	\$0.00	\$0.00	\$37.28
2	55	\$31.49	\$8.65	\$6.27	\$0.00	\$46.41
3	60	\$34.36	\$8.65	\$6.84	\$0.00	\$49.85
4	65	\$37.22	\$8.65	\$7.41	\$0.00	\$53.28
5	70	\$40.08	\$8.65	\$19.63	\$0.00	\$68.36
6	75	\$42.95	\$8.65	\$20.20	\$0.00	\$71.80
7	80	\$45.81	\$8.65	\$20.77	\$0.00	\$75.23
8	90	\$51.53	\$8.65	\$21.91	\$0.00	\$82.09

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2023	\$46.96	\$8.65	\$23.05	\$0.00	\$78.66
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.PAINTERS LOCAL 35 - ZONE 2						
	07/01/2023	\$48.16	\$8.65	\$23.05	\$0.00	\$79.86
	01/01/2024	\$49.36	\$8.65	\$23.05	\$0.00	\$81.06
	07/01/2024	\$50.56	\$8.65	\$23.05	\$0.00	\$82.26
	01/01/2025	\$51.76	\$8.65	\$23.05	\$0.00	\$83.46

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

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

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.48	\$8.65	\$0.00	\$0.00	\$32.13
2	55	\$25.83	\$8.65	\$6.27	\$0.00	\$40.75
3	60	\$28.18	\$8.65	\$6.84	\$0.00	\$43.67
4	65	\$30.52	\$8.65	\$7.41	\$0.00	\$46.58
5	70	\$32.87	\$8.65	\$19.63	\$0.00	\$61.15
6	75	\$35.22	\$8.65	\$20.20	\$0.00	\$64.07
7	80	\$37.57	\$8.65	\$20.77	\$0.00	\$66.99
8	90	\$42.26	\$8.65	\$21.91	\$0.00	\$72.82

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.08	\$8.65	\$0.00	\$0.00	\$32.73
2	55	\$26.49	\$8.65	\$6.27	\$0.00	\$41.41
3	60	\$28.90	\$8.65	\$6.84	\$0.00	\$44.39
4	65	\$31.30	\$8.65	\$7.41	\$0.00	\$47.36
5	70	\$33.71	\$8.65	\$19.63	\$0.00	\$61.99
6	75	\$36.12	\$8.65	\$20.20	\$0.00	\$64.97
7	80	\$38.53	\$8.65	\$20.77	\$0.00	\$67.95
8	90	\$43.34	\$8.65	\$21.91	\$0.00	\$73.90

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) PAINTERS LOCAL 35 - ZONE 2	01/01/2023	\$45.02	\$8.65	\$23.05	\$0.00	\$76.72
	07/01/2023	\$46.22	\$8.65	\$23.05	\$0.00	\$77.92
	01/01/2024	\$47.42	\$8.65	\$23.05	\$0.00	\$79.12
	07/01/2024	\$48.62	\$8.65	\$23.05	\$0.00	\$80.32
	01/01/2025	\$49.82	\$8.65	\$23.05	\$0.00	\$81.52

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

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

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.51	\$8.65	\$0.00	\$0.00	\$31.16
2	55	\$24.76	\$8.65	\$6.27	\$0.00	\$39.68
3	60	\$27.01	\$8.65	\$6.84	\$0.00	\$42.50
4	65	\$29.26	\$8.65	\$7.41	\$0.00	\$45.32
5	70	\$31.51	\$8.65	\$19.63	\$0.00	\$59.79
6	75	\$33.77	\$8.65	\$20.20	\$0.00	\$62.62
7	80	\$36.02	\$8.65	\$20.77	\$0.00	\$65.44
8	90	\$40.52	\$8.65	\$21.91	\$0.00	\$71.08

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.11	\$8.65	\$0.00	\$0.00	\$31.76
2	55	\$25.42	\$8.65	\$6.27	\$0.00	\$40.34
3	60	\$27.73	\$8.65	\$6.84	\$0.00	\$43.22
4	65	\$30.04	\$8.65	\$19.06	\$0.00	\$57.75
5	70	\$32.35	\$8.65	\$19.63	\$0.00	\$60.63
6	75	\$34.67	\$8.65	\$20.20	\$0.00	\$63.52
7	80	\$36.98	\$8.65	\$20.77	\$0.00	\$66.40
8	90	\$41.60	\$8.65	\$21.91	\$0.00	\$72.16

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	01/01/2023	\$45.56	\$8.65	\$23.05	\$0.00	\$77.26
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	07/01/2023	\$46.76	\$8.65	\$23.05	\$0.00	\$78.46
	01/01/2024	\$47.96	\$8.65	\$23.05	\$0.00	\$79.66
	07/01/2024	\$49.16	\$8.65	\$23.05	\$0.00	\$80.86
	01/01/2025	\$50.36	\$8.65	\$23.05	\$0.00	\$82.06

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - PAINTER - Local 35 Zone 2 - BRUSH NEW

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.78	\$8.65	\$0.00	\$0.00	\$31.43
2	55	\$25.06	\$8.65	\$6.27	\$0.00	\$39.98
3	60	\$27.34	\$8.65	\$6.84	\$0.00	\$42.83
4	65	\$29.61	\$8.65	\$7.41	\$0.00	\$45.67
5	70	\$31.89	\$8.65	\$19.63	\$0.00	\$60.17
6	75	\$34.17	\$8.65	\$20.20	\$0.00	\$63.02
7	80	\$36.45	\$8.65	\$20.77	\$0.00	\$65.87
8	90	\$41.00	\$8.65	\$21.91	\$0.00	\$71.56

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.38	\$8.65	\$0.00	\$0.00	\$32.03
2	55	\$25.72	\$8.65	\$6.27	\$0.00	\$40.64
3	60	\$28.06	\$8.65	\$6.84	\$0.00	\$43.55
4	65	\$30.39	\$8.65	\$7.41	\$0.00	\$46.45
5	70	\$32.73	\$8.65	\$19.63	\$0.00	\$61.01
6	75	\$35.07	\$8.65	\$20.20	\$0.00	\$63.92
7	80	\$37.41	\$8.65	\$20.77	\$0.00	\$66.83
8	90	\$42.08	\$8.65	\$21.91	\$0.00	\$72.64

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) PAINTERS LOCAL 35 - ZONE 2	01/01/2023	\$43.62	\$8.65	\$23.05	\$0.00	\$75.32
	07/01/2023	\$44.82	\$8.65	\$23.05	\$0.00	\$76.52
	01/01/2024	\$46.02	\$8.65	\$23.05	\$0.00	\$77.72
	07/01/2024	\$47.22	\$8.65	\$23.05	\$0.00	\$78.92
	01/01/2025	\$48.42	\$8.65	\$23.05	\$0.00	\$80.12

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.81	\$8.65	\$0.00	\$0.00	\$30.46
2	55	\$23.99	\$8.65	\$6.27	\$0.00	\$38.91
3	60	\$26.17	\$8.65	\$6.84	\$0.00	\$41.66
4	65	\$28.35	\$8.65	\$7.41	\$0.00	\$44.41
5	70	\$30.53	\$8.65	\$19.63	\$0.00	\$58.81
6	75	\$32.72	\$8.65	\$20.20	\$0.00	\$61.57
7	80	\$34.90	\$8.65	\$20.77	\$0.00	\$64.32
8	90	\$39.26	\$8.65	\$21.91	\$0.00	\$69.82

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.41	\$8.65	\$0.00	\$0.00	\$31.06
2	55	\$24.65	\$8.65	\$6.27	\$0.00	\$39.57
3	60	\$26.89	\$8.65	\$6.84	\$0.00	\$42.38
4	65	\$29.13	\$8.65	\$7.41	\$0.00	\$45.19
5	70	\$31.37	\$8.65	\$19.63	\$0.00	\$59.65
6	75	\$33.62	\$8.65	\$20.20	\$0.00	\$62.47
7	80	\$35.86	\$8.65	\$20.77	\$0.00	\$65.28
8	90	\$40.34	\$8.65	\$21.91	\$0.00	\$70.90

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY)	12/01/2022	\$42.58	\$9.35	\$17.82	\$0.00	\$69.75
LABORERS - ZONE 1 (HEAVY & HIGHWAY)	06/01/2023	\$43.58	\$9.35	\$17.82	\$0.00	\$70.75
	12/01/2023	\$44.83	\$9.35	\$17.82	\$0.00	\$72.00
	06/01/2024	\$46.31	\$9.35	\$17.82	\$0.00	\$73.48
	12/01/2024	\$47.78	\$9.35	\$17.82	\$0.00	\$74.95
	06/01/2025	\$49.28	\$9.35	\$17.82	\$0.00	\$76.45
	12/01/2025	\$50.78	\$9.35	\$17.82	\$0.00	\$77.95
	06/01/2026	\$52.33	\$9.35	\$17.82	\$0.00	\$79.50
	12/01/2026	\$53.83	\$9.35	\$17.82	\$0.00	\$81.00

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

PANEL & PICKUP TRUCKS DRIVER	12/01/2021	\$36.88	\$13.41	\$16.01	\$0.00	\$66.30
TEAMSTERS JOINT COUNCIL NO. 10 ZONE A						

PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK)	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
PILE DRIVER LOCAL 56 (ZONE 1)						

For apprentice rates see "Apprentice- PILE DRIVER"

PILE DRIVER	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
PILE DRIVER LOCAL 56 (ZONE 1)						

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - PILE DRIVER - Local 56 Zone I

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.54	\$9.40	\$23.12	\$0.00	\$57.06
2	60	\$29.44	\$9.40	\$23.12	\$0.00	\$61.96
3	70	\$34.35	\$9.40	\$23.12	\$0.00	\$66.87
4	75	\$36.80	\$9.40	\$23.12	\$0.00	\$69.32
5	80	\$39.26	\$9.40	\$23.12	\$0.00	\$71.78
6	80	\$39.26	\$9.40	\$23.12	\$0.00	\$71.78
7	90	\$44.16	\$9.40	\$23.12	\$0.00	\$76.68
8	90	\$44.16	\$9.40	\$23.12	\$0.00	\$76.68

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 \$34.01/ 3&4 \$41.46/ 5&6 \$62.80/ 7&8 \$69.25

Apprentice to Journeyworker Ratio:1:5

PIPEFITTER & STEAMFITTER PIPEFITTERS LOCAL 537	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
---	------------	---------	---------	---------	--------	---------

Apprentice - PIPEFITTER - Local 537

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$23.18	\$11.70	\$8.25	\$0.00	\$43.13
2	45	\$26.07	\$11.70	\$20.24	\$0.00	\$58.01
3	60	\$34.76	\$11.70	\$20.24	\$0.00	\$66.70
4	70	\$40.56	\$11.70	\$20.24	\$0.00	\$72.50
5	80	\$46.35	\$11.70	\$20.24	\$0.00	\$78.29

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 LABORERS - ZONE I	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35

For apprentice rates see "Apprentice- LABORER"

PIPELAYER (HEAVY & HIGHWAY) LABORERS - ZONE I (HEAVY & HIGHWAY)	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PLUMBERS & GASFITTERS	09/04/2022	\$63.49	\$14.07	\$18.36	\$0.00	\$95.92
PLUMBERS & GASFITTERS LOCAL 12	02/26/2023	\$65.19	\$14.07	\$18.36	\$0.00	\$97.62
	09/03/2023	\$66.94	\$14.07	\$18.36	\$0.00	\$99.37
	03/03/2024	\$68.74	\$14.07	\$18.36	\$0.00	\$101.17
	09/01/2024	\$70.54	\$14.07	\$18.36	\$0.00	\$102.97
	03/02/2025	\$72.34	\$14.07	\$18.36	\$0.00	\$104.77

Apprentice - PLUMBER/GASFITTER - Local 12

Effective Date - 09/04/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$22.22	\$14.07	\$6.63	\$0.00	\$42.92
2	40	\$25.40	\$14.07	\$7.52	\$0.00	\$46.99
3	55	\$34.92	\$14.07	\$10.24	\$0.00	\$59.23
4	65	\$41.27	\$14.07	\$12.04	\$0.00	\$67.38
5	75	\$47.62	\$14.07	\$13.85	\$0.00	\$75.54

Effective Date - 02/26/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$22.82	\$14.07	\$6.63	\$0.00	\$43.52
2	40	\$26.08	\$14.07	\$7.52	\$0.00	\$47.67
3	55	\$35.85	\$14.07	\$10.24	\$0.00	\$60.16
4	65	\$42.37	\$14.07	\$12.04	\$0.00	\$68.48
5	75	\$48.89	\$14.07	\$13.85	\$0.00	\$76.81

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic\$69.00, Step5 with lic\$76.87

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.) PIPEFITTERS LOCAL 537	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
---	------------	---------	---------	---------	--------	---------

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

PNEUMATIC DRILL/TOOL OPERATOR LABORERS - ZONE 1	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35

For apprentice rates see "Apprentice- LABORER"

PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) LABORERS - ZONE 1 (HEAVY & HIGHWAY)	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER <i>LABORERS - ZONE 1</i>	12/01/2022	\$44.18	\$9.10	\$17.57	\$0.00	\$70.85
	06/01/2023	\$45.18	\$9.10	\$17.57	\$0.00	\$71.85
	12/01/2023	\$46.43	\$9.10	\$17.57	\$0.00	\$73.10
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$43.58	\$9.35	\$17.82	\$0.00	\$70.75
	06/01/2023	\$44.58	\$9.35	\$17.82	\$0.00	\$71.75
	12/01/2023	\$45.83	\$9.35	\$17.82	\$0.00	\$73.00
	06/01/2024	\$47.31	\$9.35	\$17.82	\$0.00	\$74.48
	12/01/2024	\$48.78	\$9.35	\$17.82	\$0.00	\$75.95
	06/01/2025	\$50.28	\$9.35	\$17.82	\$0.00	\$77.45
	12/01/2025	\$51.78	\$9.35	\$17.82	\$0.00	\$78.95
	06/01/2026	\$53.33	\$9.35	\$17.82	\$0.00	\$80.50
	12/01/2026	\$54.83	\$9.35	\$17.82	\$0.00	\$82.00
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$35.08	\$14.25	\$16.05	\$0.00	\$65.38
	06/01/2023	\$35.90	\$14.25	\$16.05	\$0.00	\$66.20
	12/01/2023	\$36.72	\$14.25	\$16.05	\$0.00	\$67.02
	06/01/2024	\$37.57	\$14.25	\$16.05	\$0.00	\$67.87
	12/01/2024	\$38.52	\$14.25	\$16.05	\$0.00	\$68.82
	06/01/2025	\$39.37	\$14.25	\$16.05	\$0.00	\$69.67
	12/01/2025	\$40.32	\$14.25	\$16.05	\$0.00	\$70.62
	06/01/2026	\$41.18	\$14.25	\$16.05	\$0.00	\$71.48
	12/01/2026	\$42.13	\$14.25	\$16.05	\$0.00	\$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
READY-MIX CONCRETE DRIVER <i>TEAMSTERS 653 - Southeastern Concrete (Weymouth)</i>	08/01/2022	\$24.50	\$13.41	\$6.90	\$0.00	\$44.81
	05/01/2023	\$25.00	\$13.41	\$6.90	\$0.00	\$45.31
	08/01/2023	\$25.00	\$13.91	\$6.90	\$0.00	\$45.81
RECLAIMERS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofing Waterproofng &Roofing Damproofg) <i>ROOFERS LOCAL 33</i>	02/01/2023	\$48.53	\$12.78	\$20.20	\$0.00	\$81.51
	08/01/2023	\$50.03	\$12.78	\$20.20	\$0.00	\$83.01
	02/01/2024	\$51.28	\$12.78	\$20.20	\$0.00	\$84.26
	08/01/2024	\$52.78	\$12.78	\$20.20	\$0.00	\$85.76
	02/01/2025	\$54.03	\$12.78	\$20.20	\$0.00	\$87.01
	08/01/2025	\$55.53	\$12.78	\$20.20	\$0.00	\$88.51
	02/01/2026	\$56.78	\$12.78	\$20.20	\$0.00	\$89.76

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - ROOFER - Local 33

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.27	\$12.78	\$5.59	\$0.00	\$42.64
2	60	\$29.12	\$12.78	\$20.20	\$0.00	\$62.10
3	65	\$31.54	\$12.78	\$20.20	\$0.00	\$64.52
4	75	\$36.40	\$12.78	\$20.20	\$0.00	\$69.38
5	85	\$41.25	\$12.78	\$20.20	\$0.00	\$74.23

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.02	\$12.78	\$5.59	\$0.00	\$43.39
2	60	\$30.02	\$12.78	\$20.20	\$0.00	\$63.00
3	65	\$32.52	\$12.78	\$20.20	\$0.00	\$65.50
4	75	\$37.52	\$12.78	\$20.20	\$0.00	\$70.50
5	85	\$42.53	\$12.78	\$20.20	\$0.00	\$75.51

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 <i>ROOFERS LOCAL 33</i>	02/01/2023	\$48.78	\$12.78	\$20.20	\$0.00	\$81.76
	08/01/2023	\$50.28	\$12.78	\$20.20	\$0.00	\$83.26
	02/01/2024	\$51.53	\$12.78	\$20.20	\$0.00	\$84.51
	08/01/2024	\$53.03	\$12.78	\$20.20	\$0.00	\$86.01
	02/01/2025	\$54.28	\$12.78	\$20.20	\$0.00	\$87.26
	08/01/2025	\$55.78	\$12.78	\$20.20	\$0.00	\$88.76
	02/01/2026	\$57.03	\$12.78	\$20.20	\$0.00	\$90.01

For apprentice rates see "Apprentice- ROOFER"

SHEETMETAL WORKER <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	02/01/2023	\$55.31	\$14.11	\$26.64	\$2.83	\$98.89
	08/01/2023	\$57.01	\$14.11	\$26.64	\$2.83	\$100.59
	02/01/2024	\$58.71	\$14.11	\$26.64	\$2.83	\$102.29
	08/01/2024	\$60.46	\$14.11	\$26.64	\$2.83	\$104.04
	02/01/2025	\$62.21	\$14.11	\$26.64	\$2.83	\$105.79
	08/01/2025	\$64.06	\$14.11	\$26.64	\$2.83	\$107.64
	02/01/2026	\$66.01	\$14.11	\$26.64	\$2.83	\$109.59

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - SHEET METAL WORKER - Local 17-A

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	\$23.23	\$14.11	\$6.13	\$0.00	\$43.47
2	42	\$23.23	\$14.11	\$6.13	\$0.00	\$43.47
3	47	\$26.00	\$14.11	\$11.90	\$1.54	\$53.55
4	47	\$26.00	\$14.11	\$11.90	\$1.54	\$53.55
5	52	\$28.76	\$14.11	\$12.88	\$1.65	\$57.40
6	52	\$28.76	\$14.11	\$13.13	\$1.65	\$57.65
7	60	\$33.19	\$14.11	\$14.54	\$1.83	\$63.67
8	65	\$35.95	\$14.11	\$15.52	\$1.94	\$67.52
9	75	\$41.48	\$14.11	\$17.48	\$2.16	\$75.23
10	85	\$47.01	\$14.11	\$18.94	\$2.36	\$82.42

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	\$23.94	\$14.11	\$6.13	\$0.00	\$44.18
2	42	\$23.94	\$14.11	\$6.13	\$0.00	\$44.18
3	47	\$26.79	\$14.11	\$11.90	\$1.58	\$54.38
4	47	\$26.79	\$14.11	\$11.90	\$1.58	\$54.38
5	52	\$29.65	\$14.11	\$12.88	\$1.70	\$58.34
6	52	\$29.65	\$14.11	\$13.13	\$1.70	\$58.59
7	60	\$34.21	\$14.11	\$14.54	\$1.89	\$64.75
8	65	\$37.06	\$14.11	\$15.52	\$2.00	\$68.69
9	75	\$42.76	\$14.11	\$17.48	\$2.23	\$76.58
10	85	\$48.46	\$14.11	\$18.94	\$2.45	\$83.96

Notes:

Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SPECIALIZED EARTH MOVING EQUIP < 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 ZONE A	12/01/2021	\$37.34	\$13.41	\$16.01	\$0.00	\$66.76
SPECIALIZED EARTH MOVING EQUIP > 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 ZONE A	12/01/2021	\$37.63	\$13.41	\$16.01	\$0.00	\$67.05
SPRINKLER FITTER SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1	10/01/2022	\$65.56	\$15.50	\$22.10	\$0.00	\$103.16
	03/01/2023	\$67.26	\$15.50	\$22.10	\$0.00	\$104.86
	10/01/2023	\$69.01	\$15.50	\$22.10	\$0.00	\$106.61
	03/01/2024	\$70.81	\$15.50	\$22.10	\$0.00	\$108.41
	10/01/2024	\$72.61	\$15.50	\$22.10	\$0.00	\$110.21
	03/01/2025	\$74.41	\$15.50	\$22.10	\$0.00	\$112.01

Classification		Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	--	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - SPRINKLER FITTER - Local 550 (Section A) Zone 1

Effective Date - 10/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$22.95	\$15.50	\$9.60	\$0.00	\$48.05
2	40	\$26.22	\$15.50	\$9.60	\$0.00	\$51.32
3	45	\$29.50	\$15.50	\$9.60	\$0.00	\$54.60
4	50	\$32.78	\$15.50	\$9.60	\$0.00	\$57.88
5	55	\$36.06	\$15.50	\$9.60	\$0.00	\$61.16
6	60	\$39.34	\$15.50	\$11.10	\$0.00	\$65.94
7	65	\$42.61	\$15.50	\$11.10	\$0.00	\$69.21
8	70	\$45.89	\$15.50	\$11.10	\$0.00	\$72.49
9	75	\$49.17	\$15.50	\$11.10	\$0.00	\$75.77
10	80	\$52.45	\$15.50	\$11.10	\$0.00	\$79.05

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$23.54	\$15.50	\$9.60	\$0.00	\$48.64
2	40	\$26.90	\$15.50	\$9.60	\$0.00	\$52.00
3	45	\$30.27	\$15.50	\$9.60	\$0.00	\$55.37
4	50	\$33.63	\$15.50	\$9.60	\$0.00	\$58.73
5	55	\$36.99	\$15.50	\$9.60	\$0.00	\$62.09
6	60	\$40.36	\$15.50	\$11.10	\$0.00	\$66.96
7	65	\$43.72	\$15.50	\$11.10	\$0.00	\$70.32
8	70	\$47.08	\$15.50	\$11.10	\$0.00	\$73.68
9	75	\$50.45	\$15.50	\$11.10	\$0.00	\$77.05
10	80	\$53.81	\$15.50	\$11.10	\$0.00	\$80.41

Notes: Apprentice entered prior 9/30/10:

40/45/50/55/60/65/70/75/80/85

Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

STEAM BOILER OPERATOR OPERATING ENGINEERS LOCAL 4	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN <i>ELECTRICIANS LOCAL 103</i>	09/01/2022	\$46.42	\$13.00	\$18.87	\$0.00	\$78.29
	03/01/2023	\$48.34	\$13.00	\$19.01	\$0.00	\$80.35

Apprentice - TELECOMMUNICATION TECHNICIAN - Local 103

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$20.89	\$13.00	\$0.63	\$0.00	\$34.52
2	45	\$20.89	\$13.00	\$0.63	\$0.00	\$34.52
3	50	\$23.21	\$13.00	\$15.13	\$0.00	\$51.34
4	50	\$23.21	\$13.00	\$15.13	\$0.00	\$51.34
5	55	\$25.53	\$13.00	\$15.51	\$0.00	\$54.04
6	60	\$27.85	\$13.00	\$15.88	\$0.00	\$56.73
7	65	\$30.17	\$13.00	\$16.26	\$0.00	\$59.43
8	70	\$32.49	\$13.00	\$16.62	\$0.00	\$62.11
9	75	\$34.82	\$13.00	\$17.00	\$0.00	\$64.82
10	80	\$37.14	\$13.00	\$17.37	\$0.00	\$67.51

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$21.75	\$13.00	\$0.65	\$0.00	\$35.40
2	45	\$21.75	\$13.00	\$0.65	\$0.00	\$35.40
3	50	\$24.17	\$13.00	\$15.20	\$0.00	\$52.37
4	50	\$24.17	\$13.00	\$15.20	\$0.00	\$52.37
5	55	\$26.59	\$13.00	\$15.58	\$0.00	\$55.17
6	60	\$29.00	\$13.00	\$15.96	\$0.00	\$57.96
7	65	\$31.42	\$13.00	\$16.34	\$0.00	\$60.76
8	70	\$33.84	\$13.00	\$16.73	\$0.00	\$63.57
9	75	\$36.26	\$13.00	\$17.11	\$0.00	\$66.37
10	80	\$38.67	\$13.00	\$17.48	\$0.00	\$69.15

Notes:

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2023	\$59.29	\$11.49	\$22.34	\$0.00	\$93.12
	08/01/2023	\$61.34	\$11.49	\$22.34	\$0.00	\$95.17
	02/01/2024	\$62.59	\$11.49	\$22.34	\$0.00	\$96.42
	08/01/2024	\$64.69	\$11.49	\$22.34	\$0.00	\$98.52
	02/01/2025	\$65.99	\$11.49	\$22.34	\$0.00	\$99.82
	08/01/2025	\$68.14	\$11.49	\$22.34	\$0.00	\$101.97
	02/01/2026	\$69.49	\$11.49	\$22.34	\$0.00	\$103.32
	08/01/2026	\$71.69	\$11.49	\$22.34	\$0.00	\$105.52
	02/01/2027	\$73.09	\$11.49	\$22.34	\$0.00	\$106.92

Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.65	\$11.49	\$22.34	\$0.00	\$63.48
2	60	\$35.57	\$11.49	\$22.34	\$0.00	\$69.40
3	70	\$41.50	\$11.49	\$22.34	\$0.00	\$75.33
4	80	\$47.43	\$11.49	\$22.34	\$0.00	\$81.26
5	90	\$53.36	\$11.49	\$22.34	\$0.00	\$87.19

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.67	\$11.49	\$22.34	\$0.00	\$64.50
2	60	\$36.80	\$11.49	\$22.34	\$0.00	\$70.63
3	70	\$42.94	\$11.49	\$22.34	\$0.00	\$76.77
4	80	\$49.07	\$11.49	\$22.34	\$0.00	\$82.90
5	90	\$55.21	\$11.49	\$22.34	\$0.00	\$89.04

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER LABORERS - FOUNDATION AND MARINE	12/01/2022	\$46.58	\$9.35	\$17.97	\$0.00	\$73.90
	06/01/2023	\$47.58	\$9.35	\$17.97	\$0.00	\$74.90
	12/01/2023	\$48.83	\$9.35	\$17.97	\$0.00	\$76.15
	06/01/2024	\$50.31	\$9.35	\$17.97	\$0.00	\$77.63
	12/01/2024	\$51.78	\$9.35	\$17.97	\$0.00	\$79.10
	06/01/2025	\$53.28	\$9.35	\$17.97	\$0.00	\$80.60
	12/01/2025	\$54.78	\$9.35	\$17.97	\$0.00	\$82.10
	06/01/2026	\$56.33	\$9.35	\$17.97	\$0.00	\$83.65
	12/01/2026	\$57.83	\$9.35	\$17.97	\$0.00	\$85.15

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER HELPER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$42.70	\$9.35	\$17.97	\$0.00	\$70.02
	06/01/2023	\$43.70	\$9.35	\$17.97	\$0.00	\$71.02
	12/01/2023	\$44.95	\$9.35	\$17.97	\$0.00	\$72.27
	06/01/2024	\$46.43	\$9.35	\$17.97	\$0.00	\$73.75
	12/01/2024	\$47.90	\$9.35	\$17.97	\$0.00	\$75.22
	06/01/2025	\$49.40	\$9.35	\$17.97	\$0.00	\$76.72
	12/01/2025	\$50.90	\$9.35	\$17.97	\$0.00	\$78.22
	06/01/2026	\$52.45	\$9.35	\$17.97	\$0.00	\$79.77
	12/01/2026	\$53.95	\$9.35	\$17.97	\$0.00	\$81.27
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$42.58	\$9.35	\$17.97	\$0.00	\$69.90
	06/01/2023	\$43.58	\$9.35	\$17.97	\$0.00	\$70.90
	12/01/2023	\$44.83	\$9.35	\$17.97	\$0.00	\$72.15
	06/01/2024	\$46.31	\$9.35	\$17.97	\$0.00	\$73.63
	12/01/2024	\$47.78	\$9.35	\$17.97	\$0.00	\$75.10
	06/01/2025	\$49.28	\$9.35	\$17.97	\$0.00	\$76.60
	12/01/2025	\$50.78	\$9.35	\$17.97	\$0.00	\$78.10
	06/01/2026	\$52.33	\$9.35	\$17.97	\$0.00	\$79.65
	12/01/2026	\$53.83	\$9.35	\$17.97	\$0.00	\$81.15
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>	12/01/2021	\$37.92	\$13.41	\$16.01	\$0.00	\$67.34
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	12/01/2022	\$54.81	\$9.35	\$18.42	\$0.00	\$82.58
	06/01/2023	\$55.81	\$9.35	\$18.42	\$0.00	\$83.58
	12/01/2023	\$57.06	\$9.35	\$18.42	\$0.00	\$84.83
	06/01/2024	\$58.54	\$9.35	\$18.42	\$0.00	\$86.31
	12/01/2024	\$60.01	\$9.35	\$18.42	\$0.00	\$87.78
	06/01/2025	\$61.51	\$9.35	\$18.42	\$0.00	\$89.28
	12/01/2025	\$63.01	\$9.35	\$18.42	\$0.00	\$90.78
	06/01/2026	\$64.56	\$9.35	\$18.42	\$0.00	\$92.33
	12/01/2026	\$66.06	\$9.35	\$18.42	\$0.00	\$93.83
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	12/01/2022	\$56.81	\$9.35	\$18.42	\$0.00	\$84.58
	06/01/2023	\$57.81	\$9.35	\$18.42	\$0.00	\$85.58
	12/01/2023	\$59.06	\$9.35	\$18.42	\$0.00	\$86.83
	06/01/2024	\$60.54	\$9.35	\$18.42	\$0.00	\$88.31
	12/01/2024	\$62.01	\$9.35	\$18.42	\$0.00	\$89.78
	06/01/2025	\$63.51	\$9.35	\$18.42	\$0.00	\$91.28
	12/01/2025	\$65.01	\$9.35	\$18.42	\$0.00	\$92.78
	06/01/2026	\$66.56	\$9.35	\$18.42	\$0.00	\$94.33
	12/01/2026	\$68.06	\$9.35	\$18.42	\$0.00	\$95.83
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2022	\$46.88	\$9.35	\$18.42	\$0.00	\$74.65
	06/01/2023	\$47.88	\$9.35	\$18.42	\$0.00	\$75.65
	12/01/2023	\$49.13	\$9.35	\$18.42	\$0.00	\$76.90
	06/01/2024	\$50.61	\$9.35	\$18.42	\$0.00	\$78.38
	12/01/2024	\$52.08	\$9.35	\$18.42	\$0.00	\$79.85
	06/01/2025	\$53.58	\$9.35	\$18.42	\$0.00	\$81.35
	12/01/2025	\$55.08	\$9.35	\$18.42	\$0.00	\$82.85
	06/01/2026	\$56.63	\$9.35	\$18.42	\$0.00	\$84.40
	12/01/2026	\$58.13	\$9.35	\$18.42	\$0.00	\$85.90
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2022	\$48.88	\$9.35	\$18.42	\$0.00	\$76.65
	06/01/2023	\$49.88	\$9.35	\$18.42	\$0.00	\$77.65
	12/01/2023	\$51.13	\$9.35	\$18.42	\$0.00	\$78.90
	06/01/2024	\$52.61	\$9.35	\$18.42	\$0.00	\$80.38
	12/01/2024	\$54.08	\$9.35	\$18.42	\$0.00	\$81.85
	06/01/2025	\$55.58	\$9.35	\$18.42	\$0.00	\$83.35
	12/01/2025	\$57.08	\$9.35	\$18.42	\$0.00	\$84.85
	06/01/2026	\$58.63	\$9.35	\$18.42	\$0.00	\$86.40
	12/01/2026	\$60.13	\$9.35	\$18.42	\$0.00	\$87.90
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE A</i>	12/01/2021	\$37.34	\$13.41	\$16.01	\$0.00	\$66.76
WAGON DRILL OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2022	\$43.43	\$9.10	\$17.57	\$0.00	\$70.10
	06/01/2023	\$44.43	\$9.10	\$17.57	\$0.00	\$71.10
	12/01/2023	\$45.68	\$9.10	\$17.57	\$0.00	\$72.35
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 1 (HEAVY & HIGHWAY)</i>	12/01/2022	\$42.83	\$9.35	\$17.82	\$0.00	\$70.00
	06/01/2023	\$43.83	\$9.35	\$17.82	\$0.00	\$71.00
	12/01/2023	\$45.08	\$9.35	\$17.82	\$0.00	\$72.25
	06/01/2024	\$46.56	\$9.35	\$17.82	\$0.00	\$73.73
	12/01/2024	\$48.03	\$9.35	\$17.82	\$0.00	\$75.20
	06/01/2025	\$49.53	\$9.35	\$17.82	\$0.00	\$76.70
	12/01/2025	\$51.03	\$9.35	\$17.82	\$0.00	\$78.20
	06/01/2026	\$52.58	\$9.35	\$17.82	\$0.00	\$79.75
	12/01/2026	\$54.08	\$9.35	\$17.82	\$0.00	\$81.25
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER <i>PLUMBERS & GASFITTERS LOCAL 12</i>	09/04/2022	\$63.49	\$14.07	\$18.36	\$0.00	\$95.92
	02/26/2023	\$65.19	\$14.07	\$18.36	\$0.00	\$97.62
	09/03/2023	\$66.94	\$14.07	\$18.36	\$0.00	\$99.37
	03/03/2024	\$68.74	\$14.07	\$18.36	\$0.00	\$101.17
	09/01/2024	\$70.54	\$14.07	\$18.36	\$0.00	\$102.97
	03/02/2025	\$72.34	\$14.07	\$18.36	\$0.00	\$104.77
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$29.67	\$9.25	\$1.89	\$0.00	\$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$42.03	\$9.25	\$10.27	\$0.00	\$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$34.62	\$9.25	\$10.07	\$0.00	\$53.94
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$27.20	\$9.25	\$1.82	\$0.00	\$38.27
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$42.03	\$9.25	\$14.35	\$0.00	\$65.63
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$37.09	\$9.25	\$10.87	\$0.00	\$57.21
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$27.20	\$9.25	\$1.82	\$0.00	\$38.27
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$22.25	\$9.25	\$1.82	\$0.00	\$33.32
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$49.45	\$9.25	\$17.48	\$0.00	\$76.18

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
----------------	----------------	-----------	--------	---------	---------------------------	------------

Apprentice - LINEMAN (Outside Electrical) - East Local 104

Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$29.67	\$9.25	\$3.39	\$0.00	\$42.31
2	65	\$32.14	\$9.25	\$3.46	\$0.00	\$44.85
3	70	\$34.62	\$9.25	\$3.54	\$0.00	\$47.41
4	75	\$37.09	\$9.25	\$5.11	\$0.00	\$51.45
5	80	\$39.56	\$9.25	\$5.19	\$0.00	\$54.00
6	85	\$42.03	\$9.25	\$5.26	\$0.00	\$56.54
7	90	\$44.51	\$9.25	\$7.34	\$0.00	\$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/04/2019	\$30.73	\$4.70	\$3.17	\$0.00	\$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/04/2019	\$28.93	\$4.70	\$3.14	\$0.00	\$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/04/2019	\$28.93	\$4.70	\$3.14	\$0.00	\$36.77

Additional Apprentice Information:

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

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

All steps are six months (1000 hours.)

Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.

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

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

SECTION 00 73 73

STATUTORY REQUIREMENTS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2007 Edition) included in Section 00 72 05. Provisions not so amended or supplemented remain in full force and effect unless amended or supplemented in another section. The terms used in this section have the meanings stated in the General Conditions. Additional terms used in this section, if any, have the meanings stated below which are applicable to both the singular and plural thereof. The address system used herein is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

This section includes certain provisions required by Laws and Regulations, but does not represent or reflect all applicable provisions and policies or Laws and Regulations, and may only include excerpts and portions thereof. Other required provisions and policies, and Laws and Regulations, shall be deemed to be so included and incorporated herein. Contractor is solely responsible to determine, obtain, review and interpret the full text of applicable provisions and policies, Regulations, and Laws.

The Project is specifically subject to the provisions of the Massachusetts General Laws (“MGL”).

SC-1.01.A.15 Contractor

Add the following language at the end of the definition.

Also referred to as “general Contractor” in applicable statutory provisions which may be used interchangeably and shall have the same meaning.

SC-1.01.A.29 Owner

Add the following language at the end of the definition.

Also referred to as “Awards Authority” or “contracting authority” in applicable statutory provisions which may be used interchangeably and shall have the same meaning.

SC-1.01.A.44 Substantial Completion

Add the following language at the end of the definition.

For the purposes of MGL Chapter 30, Section 39G, *Completion of public works; semi-final and final estimates; payments; extra work; disputed items*, Substantial Completion shall also mean either that the Work has been completed except for Work having a valued at less than 1 percent of the then adjusted total Contract Price, or substantially all of the Work has been completed and opened to public use except for minor incomplete or unsatisfactory Work items that do not materially impair the usefulness of the Work as required by the Contract.

SC-1.01.B Additional Terms

Add the following new definition.

7. *material or Material* -- As used in MGL Chapter 30, Section 39M, *Contracts for construction and materials; manner of awarding*, regarding items equal to those specified, the word "material" shall mean and include any article, assembly, system, included in the Work, or any component part thereof.

SC-3 CONTRACT DOCUMENTS: INTENT, AMEND, REUSE

Add the following new paragraph immediately after Paragraph 3.06.

3.07 Public Records

- B. Pursuant to MGL Chapter 66 et seq, *Public Records*, related submittals, purchase orders, related pricing documents, and invoices will be public documents, and may be available for public and private distribution, except as specifically excluded. The Contractor will provide the Owner copies of any documents requested under this Law at no charge to the Owner or the requestor.

SC-4.03 Differing Subsurface or Physical Conditions

Delete Paragraph 4.03.B in its entirety and insert the following in its place.

- B. Pursuant to MGL Chapter 30, Section 39N, *Construction contracts; equitable adjustment in contract price for differing subsurface or latent physical conditions*:

"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-5.01 Performance, Payment, and Other Bonds

Add the following new subparagraphs immediately after Paragraph 5.01.A.

1. Pursuant to MGL Chapter 30, Section 39A, *Construction contracts for public ways, airports or public works; truck rentals; security for payment*, and MGL Chapter 149, Section 29, *Bonds for payment for labor, materials, rentals or transportation charges (et al)*, the required payment bond shall also cover payment by the Contractor and Subcontractors for the rental or hire of dump trucks and “. . . the rental or hire of vehicles, steam shovels, rollers propelled by steam or other power, concrete mixers, tools and other appliances and equipment employed in such construction, . . .” and “. . . for payment of transportation charges directly related to such rental or hire. . .” Such security for payment of transportation charges shall be incorporated by appropriate reference thereto as an additional obligation or condition in the required bonds.
2. In addition, such bonds shall cover “. . . payment by Contractor and Subcontractors of any sums due trustees or other persons authorized to collect such payments from the Contractor or Subcontractors, for health and welfare plans, supplementary unemployment benefit plans and other fringe benefits which are payable in cash and provided for in collective bargaining agreements between organized labor and the Contractor or Subcontractors. . .”

SC-5.02 Licensed Sureties and Insurers

Add the following new subparagraphs immediately after Paragraph 5.02.A.

1. Pursuant to MGL Chapter 149, Section 29D, *Surety company; bonds*:
“Every bid bond, every performance bond and every payment bond issued for any construction work in the commonwealth shall be the bond of a surety company organized pursuant to section 105 of chapter 175 or of a surety company authorized to do business in the commonwealth under the provisions of section 106 of said chapter 175 and be approved by the U.S. Department of Treasury and are acceptable as sureties and reinsurers on federal bonds under Title 31 of the United States Code, sections 9304 to 9308. “
2. If there is more than one surety company, the surety companies shall be jointly and severally liable.

SC-5.04 Contractor's Insurance:

Add the following language at the end of subparagraph 5.04.A.1.

, pursuant to MGL Chapter 149, Section 34A, *Contracts for public works; workers' compensation insurance; breach of contract; enforcement and violation of statute:*

"Every Contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public building or other public works for the commonwealth or any political subdivision thereof shall contain stipulations requiring that the Contractor shall, before commencing performance of such Contract, provide by insurance for the payment of compensation and the furnishing of other benefits under chapter one hundred and fifty-two to all persons to be employed under the Contract, and that the Contractor shall continue such insurance in full force and effect during the term of the Contract. No officer or agent contracting in behalf of the commonwealth or any political subdivision thereof shall award such a Contract until he has been furnished with sufficient proof of compliance with the aforesaid stipulations. 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. No cancellation of such insurance, whether by the insurer or by the insured, shall be valid unless written notice thereof is given by the party proposing cancellation to the other party and to the officer or agent who awarded the Contract at least fifteen days prior to the intended effective date thereof, which date shall be expressed in said notice. Notice of cancellation sent by the party proposing cancellation by registered mail, postage prepaid, with a return receipt of the addressee requested, shall be a sufficient notice. An affidavit of any officer, agent or employee of the insurer or of the insured, as the case may be, duly authorized for the purpose, that he has so sent such notice addressed as aforesaid shall be *prima facie* evidence of the sending thereof as aforesaid. This section shall apply to the legal representative, trustee in bankruptcy, receiver, assignee, trustee and the successor in interest of any such Contractor. The superior court shall have jurisdiction in equity to enforce this section.

"Whoever violates any provision of this section shall be punished by a fine of not more than one hundred dollars or by imprisonment for six months, or both; and, in addition, any contractor who violates any provision of this section shall be prohibited from contracting, directly or indirectly, with the commonwealth or any political subdivision thereof, for the construction, alteration, demolition, maintenance or repair of, or addition to, any public works or public building for a period of two years from the date of conviction of said violation."

Delete the words "materially changed" per Massachusetts insurance Laws in subparagraph 5.04.B.4. line 2.

Add the following immediately after subparagraph 5.04.B.7.

8. The provisions of MGL Chapter 258, *Claims and Indemnity Procedure for the Commonwealth, its Municipalities, Counties and Districts and the Officers and Employees Thereof* and MGL Chapter 260, Section 2B *Tort Actions Arising from Improvements to Real Property* shall apply.

Add the following language at the end of subparagraph 5.04.C.1,

, in compliance with MGL Chapter 152

SC-5.06 Property Insurance

Delete the words “or materially changed” per Massachusetts insurance Laws in Paragraph 5.04.C. line 3.

SC-6.02 Labor; Working Hours

Add the following new subparagraphs immediately after Paragraph 6.02.A.

1. Pursuant to MGL Chapter 30, Section 39S, *Contracts for construction; requirements*, Contractor shall furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work.
2. Pursuant to MGL Chapter 149, Section 26, *Public works; preference to veterans and citizens; wages*, preference shall be given to citizens of the Commonwealth of Massachusetts, citizens of the town or city where the Project is located, veterans and service-disabled veterans, and citizens of the United States.
3. The Contractor shall comply with the provisions of MGL Chapter 151B, *Unlawful Discrimination Because of Race, Color, Religious Creed, National Origin, Ancestry or Sex*.
4. The Contractor shall not participate in or cooperate with an international boycott, as defined in Section 999 (b)(3) and (4) of the Internal Revenue Code as amended, or engage in conduct declared to be unlawful by MGL Chapter 151E, *Prohibition Of Certain Discrimination By Businesses, Section 2*.

Add the following new subparagraph immediately after Paragraph 6.02.B.

1. Pursuant to MGL Chapter 149, Section 30, *Eight hour day and six day week; emergencies; work on highways*, and Section 34, *Public contracts; stipulation as to hours and days of work; void contracts*:

“Every contract, except for the purchase of material or supplies, involving the employment of laborers, workmen, mechanics, foremen or inspectors, to which the commonwealth or any county or any town, subject to section thirty, is a party, shall contain a stipulation that no laborer, workman, mechanic, foreman or inspector working within the commonwealth, in the employ of the contractor, sub-contractor or other person doing or contracting to do the whole or a part of the work contemplated by the contract, shall be required or permitted to work more than eight hours in any one day or more than forty-eight hours in any one week, or more than six days in any one week, except in cases of emergency, or, in case any town subject to section thirty-one is a party to such a contract, more than eight hours in any one day, except as aforesaid; provided, that in contracts entered into by the department of highways for the construction or reconstruction of highways there may be inserted in said stipulation a provision that said department, or any contractor or sub-contractor for said department, may employ laborers, workmen, mechanics, foremen and inspectors for more than eight hours in any one day in such construction or reconstruction when, in the opinion of the commissioner, public necessity so requires. Every such contract not containing the aforesaid stipulation shall be null and void.”

SC-6.05 Substitutes and “Or-Equals”

Add the following language at the end of Paragraph 6.05.A.

The provisions of MGL Chapter 30, Section 39M, subsection (b) also apply to this Paragraph.

SC-6.09 Laws and Regulations

Add the following immediately after Paragraph 6.09.A

1. MGL Chapter 260, Section 2B *Tort Actions Arising from Improvements to Real Property* shall apply.

SC-6.10 Taxes

Add the following new subparagraph immediately after Paragraph 6.10.A.

1. MGL Chapter 64H, Section 6, *Exemptions*, subsection (f), exempts from Massachusetts sales tax, building materials and supplies to be used in the Project, and Contractor shall not include any amount therefor. 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 words shall also include rental

charges for construction vehicles, equipment and machinery rented specifically for use on the Project Site, or while being used exclusively for the transportation of materials for the Project.

SC-6.12 Record Documents

Add the following new paragraph and subparagraphs immediately after Paragraph 6.12.A.

B. Subject to the provisions of MGL Chapter 266, Section 67C, *Capital facility construction projects, etc.; false entries in records; penalties*, and pursuant to MGL Chapter 30, Section 39R, *Definitions; contract provisions; management and financial statements; enforcement*:

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

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

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

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

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

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

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

“(2) transactions are recorded as necessary

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

ii. to maintain accountability for assets;

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

“(4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference. Every Contractor awarded a contract shall also file with the Awarding Authority a statement prepared and signed by an independent certified public accountant, stating that he has examined the statement of management on internal accounting controls, and expressing an opinion as to (1) whether the representations of management in response to this paragraph and paragraph (b) above are consistent with the result of management’s evaluation of the system of internal accounting controls; and (2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant’s financial statements.

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

“(e) . . . A Contractor’s failure to satisfy any of the requirements of this section may be grounds for debarment pursuant to section forty-four C of chapter one hundred and forty-nine.

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

and statements shall be made available pursuant to the provisions of clause (2) of paragraph (b)."

SC-6.13 Safety and Protection

Add the following immediately after subparagraph 6.13.B.1. (added in Section 00 73 10).

2. Pursuant to *MGL Chapter 30, Section 39S*, all employees to be employed at the Work Site will 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 at the time the employee begins Work, and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee. Any employee found on a Work Site 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.
3. This Project is also subject to the following.
 - MGL Chapter 82, *The Laying Out, Alteration, Relocation and Discontinuance Of Public Ways, And Specific Repairs Thereon, Section 40*
Section 40 Definitions
Section 40A Excavations; notice
Section 40B Designation of location of underground facilities
Section 40C Excavator's responsibility to maintain designation markings; damage caused by excavator
Section 40D Local laws requiring excavation permits; public ways
 - MGL Chapter 82A, *Excavation and Trench Safety*
Section 1 Unattended open trenches; safety hazards; rules and regulations; fines
Section 2 Trench excavating permits; permits issued by board or officer; certificate of insurance; fees
Section 3 Form of trench excavation permits; required statements
Section 4 Definitions
Section 5 Additional requirements
 - MGL Chapter 149
Section 6C Health and safety of general public and asbestos workers; rules and regulations
Section 129A Shoring Trenches for local governments
 - Massachusetts Department of Labor and Industries, Division of Occupational Safety (Chapter 454 CMR 10.00 et seq.)
 - Massachusetts Department of Public Safety "Excavation and Trench Safety" (Chapter 520 CMR 14.00 et seq.)
 - State and Federal COVID-19 guidelines and procedures for the construction sector (as may be amended)

SC-6.20 Indemnification

Add the following immediately after subparagraph 6.20.C.3.

- D. The provisions of MGL Chapter 258, *Claims and Indemnity Procedure for the Commonwealth, its Municipalities, Counties and Districts and the Officers and Employees Thereof* shall apply.

SC-8.09 Limitations on Owner's Responsibilities

Add the following new subparagraph immediately after Paragraph 8.09.A.

1. Pursuant to MGL Chapter 30, Section 39J *Public construction contracts; effect of decisions of contracting body or administrative board*, a decision on a dispute shall not be final or conclusive if such decision is made in bad faith, fraudulently, capriciously, or arbitrarily, is unsupported by substantial evidence, or is based upon error of law.

SC-9.08 Decisions on Requirements of Contract Documents and Acceptability of Work

Replace “with reasonable promptness” with “within 30 days pursuant to MGL Chapter 30, Section 39P, *Contracts for construction and materials; awarding authority's decisions on interpretation of specifications, etc.; time limit; notice* in Paragraph 9.08.B.”

Add the following new paragraph immediately after Paragraph 9.08.D.

- E. Pursuant to MGL Chapter 30, Section 39J *Public construction contracts; effect of decisions of contracting body or administrative board*, a decision on a dispute shall not be final or conclusive if such decision is made in bad faith, fraudulently, capriciously, or arbitrarily, is unsupported by substantial evidence, or is based upon error of law.

SC-10.01 Authorized Changes in the Work

Add the following subparagraph immediately after Paragraph 10.01.A.

3. Changes to the Work are subject to the requirements of MGL Chapter 30, Section 39I, *Deviations from plans and specifications*.

SC-10.05 Claims: Add the following paragraph immediately after Paragraph 10.05.G.

- H. Presentation of false, fictitious, or fraudulent Claims is subject to the provisions of MGL Chapter 266, Section 67B, *Presentation of false claims*.

SC-11.01. Cost of the Work

Add the following immediately after subparagraph 11.01.A.1.

- b. Comply with prevailing wage requirements included in Section 00 73 43.

Add the following immediately after subparagraph 11.01.A.4.

- a. Pursuant to MGL Chapter 149, Section 34B, *Contracts for public works; wages for reserve police officer*, the Contractor shall pay to any reserve police officer employed by him in any city or town, the prevailing rate of wage paid to regular police officers in such city or town.

Add the following immediately after subparagraph 11.01.A.5.d.

- 1) The Project is exempt from sales tax as set forth in SC-6.10.

SC-12.01 *Change of Contract Price*

Add the following immediately after subparagraph 12.01.B.3. as required by MGL Chapter 30, Section 38A *Price adjustment clause in contracts for road, bridge, water and sewer projects awarded*.

4. ***Monthly Price Adjustments for Certain Materials:*** As required by Massachusetts Chapter 150 of the Acts of 2013, the following price adjustment clauses for fuel (both diesel and gasoline), liquid asphalt and Portland cement contained in cast-in-place concrete shall be applicable to the Project. The following Base Prices are established for the Project, based on period prices shown below as published by the Massachusetts Department of Transportation - Highway Division at

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

Liquid Asphalt – \$665.00 per TON (January 2023)
Diesel - \$3.830 per GALLON (January 2023)
Gasoline - \$2.767 per GALLON (January 2023)
Portland Cement - \$181.15 per TON (February 2023)

b.

Monthly Price Adjustment for Hot Mix Asphalt (HMA)

Mixtures: This adjustment will provide for either additional compensation to the Contractor or repayment to the Owner, depending on an increase or decrease in the Period Price of Liquid Asphalt.

- 1) **Base Price:** The Base Price of liquid asphalt listed above is the fixed price determined at the time of Bid by the Owner by using the same method as for the determination of the Period Price detailed below.
- 2) **Price Adjustment:** The Price Adjustment will be based on the variance in price for the liquid asphalt component only from the Base Price to the Period Price. It shall not include transportation or other charges. This Price Adjustment will occur on a monthly basis.
- 3) **Period Price:** The Period Price for this Contract shall be the Liquid Asphalt Period Price, per Ton.
- 4) **Applicability:** The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the Project in accordance with the Contract Documents.
- 5) **Payment/Credit of Price Adjustment:** The Contract Price of the hot mix asphalt mixture will be paid under the respective items in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the Work has been performed, using the monthly Period Price for the month during which the Work was performed. The Price Adjustment will be a separate payment item and processed by Change Order. It will be determined by multiplying the number of tons of hot mix asphalt mixtures placed within pay limits during each monthly period as shown on submitted certified weigh slips times the liquid asphalt content percentage times the variance in price between Base Price and Period Price of liquid asphalt. This Price Adjustment will be paid or credited if the variance from the Base Price is 5 percent or more for a monthly period. No further Price Adjustments will be processed after the Contract is finally complete, unless an extension of Contract Time is approved by the Owner.

- c. **Monthly Price Adjustment for Diesel Fuel and Gasoline:** This adjustment will provide for either additional compensation to the Contractor or repayment to the Owner, depending on an increase or decrease in the Period Price of Diesel Fuel or Gasoline.
- 1) **Base Price:** The Base Price of Diesel Fuel and Gasoline listed above is the fixed price determined at the time of Bid by the Owner by using the same method as for the determination of the Period Price detailed below.
 - 2) **Price Adjustment:** The Price Adjustment will be based on fuel usage factors for various items of Work included. These factors will be multiplied by the quantities of Work completed in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.
 - 3) **Period Price:** The Period Price for this Contract shall be the current Diesel Period Price and Gasoline Period Price per Gallon.
 - 4) **Applicability:** The fuel Price Adjustment will apply only to the following items of Work listed at the fuel factors shown.
 - 5) **Payment/Credit of Price Adjustment:** The Price Adjustment will be a separate payment item and processed by Change Order. The Contract Price of items listed below will be paid under the respective items in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the Work has been performed, using the monthly Period Price for the month during which the Work was performed.

ITEMS OF WORK COVERED (PER UNIT PRICES FORM)	FUEL FACTORS	
	DIESEL	GASOLINE
Items 17,18	2.9 Gallons per Ton	Does not Apply
Items 51,52,57	0.29 Gallons per CY	0.15 Gallons per CY

- d. **Monthly Price Adjustment for Portland Cement Concrete Mixes:** This adjustment will provide for either additional compensation to the Contractor or repayment to the Owner, depending on an increase or decrease in the Period Price of Portland cement.
- 1) **Base Price:** The Base Price of Portland cement listed above is the fixed price determined at the time of Bid by the Owner by using the same method as for the determination of the Period Price detailed below.
 - 2) **Price Adjustment:** The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price. It shall not include transportation or other charges. This Price Adjustment will occur on a monthly basis.
 - 3) **Period Price:** The Period Price for this Contract shall be the current Portland cement Period Price per Ton.
 - 4) **Applicability:** The price adjustment applies only to the actual Portland cement content in the mix placed on the Project in accordance with the Contract Documents.
 - 5) **Payment/Credit of Price Adjustment:** The Contract Price of the Portland cement content in the mix will be paid under the respective items in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the Work has been performed, using the monthly Period Price for the month during which the Work was performed. The Price Adjustment will be a separate payment item and processed by Change Order. It will be determined by multiplying the number of cubic yards of Portland cement concrete placed during each monthly period times the Portland cement content percentage times the variance in price between the Base Price and Period Price of Portland cement. This Price Adjustment will be paid or credited if the variance from the Base Price is 5 percent or more for a monthly period. No further Price Adjustments will be processed after the Contract is finally complete, unless an extension of Contract Time is approved by the Owner.

SC-14.02. Progress Payments

Add the following language to Paragraph 14.02.A.

The provisions of MGL Chapter 30, Section 39G, *Completion of public works; semi-final and final estimates; payments; extra work; disputed items*, covering “periodic estimate” and “periodic payment” apply to this Project and shall be considered Progress Payments per Paragraph 14.02. The forms listed in Section 00 60 00 and included in the Contract Documents will be utilized.

Add the following new subparagraph immediately after subparagraph 14.02.A.1.

- a. Pursuant to MGL Chapter 30, Section 39S, *Contracts for construction; requirements*, provide certification for each employee employed at the Work Site 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 at the time the employee begins Work.

Add the following new paragraph and subparagraphs immediately after subparagraph 14.02.D.3.

- E. Pursuant to MGL Chapter 30, Section 39F, *Construction contracts; assignment and subrogation; subcontractor defined; enforcement of claim for direct payment; deposit, reduction of disputed amounts* regarding payment to Subcontractors, the following provisions shall be included in any subcontract in connection with Work under the Contract Documents.

“(a) Forthwith after the general Contractor receives payment on account of a periodic estimate, the general Contractor shall pay to each Subcontractor the amount paid for the labor performed and the materials furnished by that Subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the Subcontractor by the general Contractor.

“(b) Not later than the 65th 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 general Contractor. The general 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 general Contractor.

“(c) Each payment made by the Awarding Authority to the general Contractor pursuant to subparagraphs (a) and (b) above for the labor performed and the materials furnished by a Subcontractor shall be made to the general Contractor for the account of that Subcontractor; and the

Awarding Authority shall take reasonable steps to compel the general 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 general Contractor or which is to be included in a payment to the general Contractor for payment to the Subcontractor as provided in subparagraphs (a) and (b) above, the Awarding Authority shall act upon the demand as provided in this section of the MGL.

“(d) If, within seventy days after the Subcontractor has substantially completed the subcontract Work, the Subcontractor has not received from the general Contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general 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 general 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 10 days after the Subcontractor has delivered or so mailed the demand to the Awarding Authority and delivered or so mailed a copy to the general Contractor, the general 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 general Contractor and of the amount due for each Claim made by the general 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 general 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 general 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) above in an interest-bearing joint account in the names of the general Contractor and the Subcontractor in a bank in Massachusetts selected by the Awarding Authority or agreed upon by the general Contractor and the Subcontractor and shall notify the general 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 general 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) above shall be made out of amounts payable to the general 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 general 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 general Contractor to the extent of such payment.

“(h) The Awarding Authority shall deduct from payments to a general Contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (f) above, 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 general Contractor.”

SC 14.04 Substantial Completion

Add the following new paragraph immediately after Paragraph 14.04.E.

- F. The provisions of MGL Chapter 30, Section 39G, *Completion of public works; semi-final and final estimates; payments; extra work; disputed items*, covering substantial completion apply to this Project. The forms listed in Section 00 60 00 and included in the Contract Documents will be utilized.

SC 14.07 Final Payment

Add the following new subparagraphs immediately after subparagraph 14.07.A.1.

- a. The provisions of MGL Chapter 30, Section 39G, *Completion of public works; semi-final and final estimates; payments; extra work; disputed items* covering the final estimate and completion of the Work apply to this Project. The forms listed in Section 00 60 00 and included in the Contract Documents will be utilized.

SC-15.01 Owner May Suspend Work

Add the following new subparagraphs immediately after Paragraph 15.01.A.

1. Pursuant to MGL Chapter 30, Section 39O, *Contracts for construction and materials; suspension, delay or interruption due to order of awarding authority; adjustment in contract price; written claim*:

“. . . (a) The Awarding Authority may order the general Contractor in writing to suspend, delay, or interrupt all or any part of the Work for such period of time as it may determine to be appropriate for the convenience of the Awarding Authority; provided however, that if there is a suspension, delay or interruption for 15 days or more or due to a failure of the Awarding Authority to act within the time specified in the Contract, the Awarding Authority shall make an adjustment in the Contract Price for any increase in the cost of performance of the Contract but shall not include any profit to the general Contractor on such increase; and provided further, that the Awarding Authority shall not make any adjustment in the Contract Price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this Contract provides for an equitable adjustment of the Contract Price under any other Contract provisions.

“(b) The general Contractor must submit the amount of a Claim under provision 1 above 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 the Contract and, except for costs due to a suspension order, the Awarding

Authority shall not approve any costs in the Claim incurred more than 20 days before the general Contractor notified the Awarding Authority in writing of the act or failure to act involved in the Claim.

“In the event a suspension, delay, interruption or failure to act of the Awarding Authority increases the cost of performance to any Subcontractor, that Subcontractor shall have the same rights against the general Contractor for payment for an increase in the cost of his performance as provisions (a) and (b) above give the general Contractor against the Awarding Authority, but nothing in provisions (a) and (b) above shall in any way change, modify or alter any other rights which the general Contractor or the Subcontractor may have against each other.”

SC-17.05 Controlling Law

Add the following new subparagraphs immediately after Paragraph 17.05.A.

1. This Contract is subject to all Laws and Regulations of the United States of America (including the U.S. Code of Federal Regulations), the Commonwealth of Massachusetts and other public authorities, and all amendments thereto. Where any requirements contained herein do not conform to or are inconsistent with such Laws and Regulations to which the Contract is subject or by which it is governed, such Laws and Regulations shall have precedence over any matters set forth herein.
2. The Project is specifically subject to MGL Chapters 30 and 149 for contracts awarded pursuant to MGL Chapter 30, Section 39M.
3. Statutes, Regulations, and portions and summaries thereof which are set forth or referred to in the Contract Documents shall be construed to include all amendments thereto in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids). The Owner and Engineer make no representation as to and assume no responsibility for the correctness or completeness of such statutory matters referred to or set forth herein.
4. Any provision in violation of the foregoing shall be deemed null, void and of no effect. Where conflicts with Laws and Regulations exist, the more stringent requirement shall apply.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Way Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 01 11 00

SUMMARY OF WORK

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Project Description
- B. Description of the Work
- C. Work Sequence and Coordination
- D. Special Requirements
- E. Attachments

1.02 PROJECT DESCRIPTION

- A. The Project is generally described as the Walter Hannon Parkway & General McConville Way Intersection Improvement Project which includes, but is not limited to, the construction of a new signalized intersection at the south end of General McConville Way; construction of the realigned Parkingway south of Walter Hannon Parkway to meet the new signalized intersection; full depth pavement reconstruction; asphalt milling and overlay; concrete sidewalks; curbing; utility infrastructure improvements including sanitary, stormwater, electrical, communications, duct banks; installation of street lighting, light poles and light pole foundations, retaining walls; ornamental fencing; landscaping, irrigation, hardscape, and improved green spaces and all materials, equipment, services and construction inherent to the Work

1.03 DESCRIPTION OF THE WORK

- A. The Work includes labor, material and equipment, services required for construction, testing, and commissioning of the Project in accordance with the Contract Documents and as more specifically described in the Specifications and Drawings and includes, but is not limited to, the following principal features.
 - 1. Construction of new Signalized Intersection at Walter Hannon Parkway and McConville Way.
 - 2. Construction of new roadway realigning Parkingway to meet new Signalized Intersection.
 - 3. Walter Hannon Parkway and Parkingway utility and surface improvements that include sanitary and stormwater infrastructure and connections to existing structures, electrical, communications, duct banks; installation of

street lighting, light poles and light pole foundations, retaining walls; ornamental fencing; landscaping, irrigation, hardscape, and improved green spaces.

4. Traffic control
 5. All materials and equipment, services and construction inherent to the Work.
- B. Work Site locations: generally, as shown on the Drawings.
- C. Existing conditions and Site data: per the Drawings and Section 00 31 00.

1.04 WORK SEQUENCE AND COORDINATION

- A. Initiate Work **immediately upon Notice to Proceed**.
- B. Coordinate all work with Quincy Department of Planning and Community Development, Quincy Department of Public Works, Department of Traffic, Parking and Lights, Quincy Police Department for traffic control and the Quincy Engineer Department.
- C. Vehicular and pedestrian movements shall remain operational for Walter Hannon Parkway and Parkingway during construction activities.
- D. Provisions for project adjacent parcels and business shall be incorporated into project work plans, sequencing and schedule to minimize disruption and access during construction.
- E. Existing traffic signal equipment on Walter J. Hannon Parkway at Parkingway shall not be removed and stacked until the new traffic signal at the intersection of Walter J. Hannon Parkway at General McConville Way is complete with all equipment in place and the traffic signal in full color operation.
- F. Maintain access to facilities for the Owner throughout the Project.
- G. Coordinate Work with the City and provide public notice, as required.

1.05 SPECIAL REQUIREMENTS

- A. Coordinate with Owner and Engineer for and provide public notification on the Project as specified below.
 1. Notification to Owner and Engineer no less than 7 days prior to beginning Work in a new area of the Project to allow for Owner and Engineer to complete pre-Project notification to residents.

2. Notification to residents who will be connected to the temporary bypass system, no less than 24 hours prior to connection to temporary bypass. See Bypass Notification attached to this section.

1.06 ATTACHMENTS

- A. Temporary Bypass Notification

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

Water Service Interruption Notification Text

WATER SERVICE INTERRUPTION

The [INSERT OWNER NAME] is completing repairs on the distribution system in this area. As a result of the Work on this Project, your water service will be disrupted on _____, _____ starting at _____ for approximately _____ hours. Please make any necessary arrangements as you may be without water during this period. When your water service is restored, it is recommended that you clean removable aerators or faucet screens, if present, and run an interior cold and an outside faucet for several minutes. If you experience discolored water even after flushing for several minutes, please run your outside faucet until the water runs clear. If you have any questions, please contact the [INSERT CITY/TOWN] [Department of Public Works] at [phone number]. Thank you for your cooperation with these essential repairs.

Temporary Water Bypass Notification Text

TEMPORARY WATER SYSTEM CONNECTION NOTICE

The [INSERT OWNER NAME] is completing repairs on the distribution system in this area. As a result of the work on this project, the City will supply your water through a temporary bypass system for the duration of the work. In order to complete the temporary bypass connection, the [INSERT CITY/TOWN] Contractor will need to access your water meter between _____, 20__ and _____, 20__. Please contact the Contractor's Office at [Phone Number] to schedule this service.

Once you are connected to the temporary bypass system, your water will operate as normal. Should you experience issues with the temporary water system, please contact the [INSERT CITY/TOWN] [Department of Public Works] at [Phone Number]. If you experience an unexpected interruption in water service, please contact the Contractor's emergency response personnel:

1. [Name of Emergency Contact 1] at [Phone Number]
2. [Name of Emergency Contact 2] at [Phone Number]
3. [Name of Emergency Contact 3] at [Phone Number]

Thank you for your cooperation with these essential repairs.

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 01 15 00

SPECIFIC PROJECT REQUIREMENTS AND PROCEDURES

The following supplement the requirements and procedures of Sections 01 15 30, 01 50 00, 01 60 00, and 01 70 00 using the same titles, headings, and paragraph numbers to which the supplement applies.

Certain provisions required by Laws and Regulations may be referenced. Contractor is responsible to determine and obtain applicable Laws and Regulations and to review and interpret the full text of such Laws and Regulations.

SECTION 01 15 30 - PAYMENT AND ADMINISTRATIVE PROCEDURES AND QUALITY REQUIREMENTS

1.02 PRICE AND PAYMENT PROCEDURES

Pursuant to Paragraph B. **Payment Procedures**, submit the following specific items.

- Copy of cashed check paid and copy of receipts for Traffic Police Details invoices paid showing: Project name; the officers' names; location of assignment; date of assignment; hours of assignment; and number of hours being invoiced

Pursuant to Paragraph C. **Change Procedures**, also use the City of Quincy standard Change Order Form provided.

1.03 ADMINISTRATIVE REQUIREMENTS

Pursuant to Paragraph A. **Project Management and Coordination; Meetings**,

subparagraph 4, **identify documents** and items for the Project as follows.

Walter Hannon Parkway & General McConville Way Intersection Improvement
Project

Pursuant to Paragraph B. **Documentation of Progress**,

subparagraph 4. **Reports**, submit the following additional reports.

- Updates to the Construction Operations Plan approved pursuant to SC 2.07 of Section 00 73 10 when it is modified

Pursuant to Paragraph C. **Submittal Procedures**, subparagraph 1., address submittals as follows.

Engineer:

Woodard & Curran
33 Broad St, Floor 7
Providence, Rhode Island 02903
Attn: RJ Dowling
Phone: 1-401-484-6136
Email: rdowling@woodardcurran.com

Owner:

City of Quincy
1305 Hancock St
Quincy, MA 02169
Attn: James J Fatseas
Phone: 617-376-1959
Email: jfatseas@quincyma.gov

1.04 QUALITY REQUIREMENTS

Pursuant to Paragraph A. **Reference Standards and Regulatory Requirements**, specific requirements applicable to the Project include the following.

- Requirements of the Quincy Code of Ordinances and Zoning Code portions of which are included in Section 00 73 10.
- Comply with the Massachusetts Department of Transportation - Highway Division's (referred to as "MassDOT") Construction Specifications (including Interim Supplemental Specifications and Supplemental Specifications but not including Compensation sections), Construction Details (including Standard Drawings), and Design Guides as incorporated into the Specifications and Drawings, and as may be modified therein or superseded by the Owner's requirements through the direction of the Engineer.
- Specific sections of the MassDOT documents are referenced in the Specifications and Drawings. References to "Department" in the MassDOT documents shall mean Owner or Resident Project Representative for this Project. See MassDOT Highway Division website.

<https://www.mass.gov/massdot-highway-division-manuals-and-publications>

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

1.02 TEMPORARY CONSTRUCTION FACILITIES

Pursuant to Paragraph G. **Field Offices**, locate field offices at location determined by the Contractor and accepted by the Engineer.

1.04 TEMPORARY CONTROLS

Pursuant to Paragraph C. **Temporary Facilities and Controls**, comply with the following additional requirements.

- Quincy Conservation Commission Requirements
- Quincy Health Department and Inspection Services
- MassDEP requirements
- MassDOT requirements within State rights of way
- Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, prepared by the MassDEP

Pursuant to Paragraph F. **Traffic Regulation**,

subparagraph 1. regarding a **plan for traffic control**, also submit a schedule of road closures/detours and obtain a road closure and road blockage permit for every location where Work is being performed. Detours and street closures are subject to the approval of the City Traffic Engineer who will strictly control the periods when traffic is being detoured or streets can be closed. A traffic control plan will be required for Victory Road and work within property owned by the Massachusetts Department of Conservation & Recreation.

subparagraph 2. regarding the **MUTCD**, comply with the following additional requirements.

- Applicable portions of the “Massachusetts Amendments to the 2009 Manual on Uniform Traffic Control Devices and the Standard Municipal Traffic Code” published by the Massachusetts Department of Transportation Highway Division.

subparagraph 4. regarding **use of police officers**, comply with the following additional requirements.

- Coordinate schedule of police details with Owner which will be direct billed to the Owner per Section 01 20 25.
- Relevant provisions of Section 7.00 of the MassDOT Standard Specifications and Supplements, and the following.
 - The intent of posting police details is to ensure public safety and protection of property through appropriate traffic control. Police personnel are not to be employed as watchmen to protect the Contractor's equipment and materials.

- All uniformed traffic police personnel required for traffic control for construction shall be authorized by Owner's Safety Officer and/or the Engineer.
- Payment will be made by Owner for uniformed traffic police only.
- Submit a forecast weekly traffic police detail schedule, at least 72 hours prior to the start of the Work describing: the nature and location of the Work, the number of police personnel, the estimated number of police hours required for each location, and justification for each uniformed officer being requested. Payment to the police for work under this Contract shall be in accordance with the Massachusetts General Laws, Chapter 149, Section 34B* and paid directly by Owner*.
- If uniformed police have been arranged to work, and weather or some other situation prohibits the Work, notify the Police Department Detail before 5:30 a.m. on the day of intended Work to cancel the work order. Unless the work order is canceled in time, the Contractor shall be charged at the rate of minimum four hours for each officer included in the detail and shall be fully responsible for payment of all charges thus incurred.

subparagraph 5, regarding **maintaining one moving lane**, comply with the following additional requirements.

- Contractor is required to maintain one lane in either direction at all times.

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

1.02 OVERALL EXECUTION REQUIREMENTS

Pursuant to Paragraph A. **Coordination**,

- Coordinate with Owner and Engineer prior to performing any Work that will impact the surrounding roadways.
- Technical requirements included in the Quincy Code of Ordinances (referenced portions and list of contents are included in Section 00 73 10)

subparagraph 4. **regarding space requirements**, a primary Site restriction is the width of the streets and volume of traffic within the Project Site which may require complete shut down or partial blocking of the streets during construction. Coordinate with the Fire Department and Police Department.

Pursuant to Paragraph B. **Existing Conditions**,

subparagraph 1. regarding **availability of lands**, easement information for the Project is included on the Drawings.

subparagraph 2. regarding **subsurface/physical conditions**, the reports and drawings identified in SC-4.02 of Section 00 73 10 are included as attachments to Section 00 31 00.

subparagraph 3. regarding **underground utilities**, comply with the following additional requirements.

- Contact DIGSAFE (www.digsafe.com) by dialing 811.

subparagraph 4. regarding **reference points**, survey information is included on the Drawings.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 01 15 30

PAYMENT AND ADMINISTRATIVE PROCEDURES AND QUALITY REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements relating to payment, the process of contract administration, and the methods of communicating, controlling, and assuring quality. This Section applies to all Specifications and Drawings.
- B. Certain provisions required by Laws and Regulations may be referenced. Contractor is responsible to determine and obtain applicable Laws and Regulations and to review and interpret the full text of such Laws and Regulations.
- C. Section Includes

1.02 PAYMENT PROCEDURES

- Schedule of Values
- Payment Procedures
- Change Procedures
- Measurement and Payment Procedures
- Correlation of Submittals

1.03 ADMINISTRATIVE REQUIREMENTS

- Project Management and Coordination; Meetings
- Documentation of Progress
- Submittal Procedures

1.04 QUALITY REQUIREMENTS

- Reference Standards and Regulatory Requirements

1.02 PAYMENT PROCEDURES

- A. **Schedule of Values:** in accordance with Article 2 of the Standard General and Supplementary Conditions, if any.
 1. Provide sufficient detail to allow for determination of the value of the Work at any degree of completion.
 2. For each line item, identify number and title of Specification section in accordance with the Table of Contents.
 3. The unit price breakdown included in the Bid Form will constitute the preliminary Schedule of Values for this Project.
 4. Submit electronically by email in PDF format.
- B. **Payment Procedures:** in accordance with Article 14 of Standard General and Supplementary Conditions, if any.
 1. Submit Application for Payment using the form included in the Project Forms section. Utilize latest approved Schedule of Values for listing items in Application for Payment. Provide supporting documentation for items included in the Application for Payment.
 - a. Number of hardcopies: 6
 - b. Submit electronically by email in PDF format.
 2. Payment Period: at intervals stipulated in the Agreement.
 3. Submit an updated Progress Schedule with each Application for Payment.
 4. Submit the following items for the Project.
 - a. Copy of cashed check paid and copy of receipts for Traffic Police Details invoices paid showing: the Project name; the officers' names; location of assignment; date of assignment; hours of assignment; and number of hours being invoiced

- C. **Change Procedures:** in accordance with Articles 10 and 12 of Standard General and Supplementary Conditions, if any, utilizing forms included in Section 00 60 00 Project Forms.

Number of hardcopies: 6

Submit electronically by email in PDF format.

1. **Field Order:** as authorized by Paragraph 9.04 of the Standard General and Supplementary Conditions, if any.
2. **Change Request:** issued by Engineer, Owner or Contractor to request or authorize minor variations and deviations, amendments or supplements to the Contract Documents. Initiate requests for substitute items per Paragraph 6.05 of the Standard General and Supplementary Conditions, if any, using a Change Request.
 - a. Engineer or Owner to include a detailed description of a proposed change with supplementary or revised Drawings and Specifications, including a change in Contract Times related to the change (with a stipulation for any overtime work required) and the period of time during which the requested price (if any) will be considered valid. Prepare and submit an estimate within 15 days.
 - b. Describe the proposed change and its full effect on the Work. Describe the reason for the change and the effect on the Contract Price and Contract Time with full documentation (and a statement describing the effect on Work by separate or other contractors).
3. **Work Change Directive:** as defined in subparagraph 1.01.A.51 of the Standard General and Supplementary Conditions, if any.
4. **Change Order:** in accordance with Articles 10 and 12 of the Standard General and Supplementary Conditions, if any.
 - a. *Stipulated Price Change Order:* based on Contractor's maximum price quotation or Contractor's request for a Change Order as approved by Engineer or Owner.
 - b. *Unit Price Change Order:* for pre-determined unit prices and quantities and executed on a fixed unit price basis. Execute Work under a Work Change Directive for unit costs or quantities of Work not pre-determined. Changes in Contract Price and Contract Time to be computed as specified for Time and Material Change Order.

- c. *Time and Material Change Order:* based on itemized account and supporting data after completion of change within time limits indicated in the Standard General and Supplementary Conditions, if any. Engineer or Owner and Contractor to determine the change allowable in Contract Price and Contract Time as provided in the Standard General and Supplementary Conditions, if any. Maintain detailed records of Work completed on this basis, provide full information for evaluation of proposed changes, and substantiate costs for changes in the Work.
 - d. Use the City of Quincy standard Change Order Form provided in addition to the EJCDC form and any funding agency form.
5. “Or Equals” and Substitutes: Request “Or-Equal” and substitute items as a Change Request per subparagraph 1.02.C.2 above, with complete data substantiating compliance with Contract Documents.
- a. “Or-Equal” and substitute items will be processed in accordance with Paragraph 6.05 of the Standard General and Supplementary Conditions, if any, and subparagraph 1.03.C.6 below.

D. Measurement and Payment Procedures

1. Payment includes full compensation for required labor, material and equipment, tools, plant, transportation, services and incidentals; erection, application or installation and construction of an item of the Work; and overhead and profit, unless otherwise indicated.
2. See Section 01 20 25 Measurement and Payment.

E. Correlation of Submittals

1. Promptly revise Schedule of Values and Applications for Payment to record each authorized Change Order as a separate line item and adjust the Contract Price.
2. Promptly revise Progress Schedule to reflect any change in Contract Times and revise sub-schedules to adjust time for other items of the Work affected by the change.
3. Promptly enter changes in Project record documents.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Project Management and Coordination; Meetings

1. Contact information for Owner and other entities related to the Project and special coordination requirements and contacts during prosecution of the Work will be provided at the Preconstruction Conference and Site Mobilization Meeting.
2. Inform Owner and Engineer of the address for sending official correspondence and the address and telephone number of Contractor's representative who will be project manager and Site superintendent for the Contract.
3. During periods of construction and testing keep Owner and Engineer informed in writing with name, address, and telephone number of Contractor's representative who will be responsible and available outside of normal working hours for emergency repairs and the maintenance of safety devices.
4. Identify the 24 hour, 7 days per week emergency response telephone or cell phone number that is staffed by a person (not a passive answering machine) or provide that a phone call will be returned within one hour.
5. Identify correspondence, submittals, drawings, data and materials, packing slips or other items associated with this Contract as follows.

Walter Hannon Parkway & General McConville Way Intersection
Improvement Project

6. Coordinate scheduling, submittals, and Work of the various Specifications to effectuate an efficient and orderly sequence for installing interdependent construction elements, with provisions for accommodating items installed later.
7. Preconstruction Conference and Site Mobilization Meeting
 - a. Owner to schedule an initial preconstruction conference in accordance with Paragraph 2.06 of the Standard General and Supplementary Conditions, if any.
 - b. Attendance required by Owner, Contractor, Engineer, Contractor's Superintendent, Project Manager, and Subcontractors as a minimum.

- c. Sample Agenda
 - Distribute Contract Documents
 - Discuss design concepts
 - Discuss preliminary Progress Schedule, Schedule of Submittals, Schedule of Values and preliminary cash flow projections.
 - Designate personnel representing each party; communication procedures
 - Procedures and processing of submittals, substitutions, applications for payments, Change Orders and Contract closeout procedures
 - Scheduling
 - Use of premises by Owner and Contractor
 - Owner's requirements and partial occupancy
 - Construction facilities and controls provided by Owner
 - Temporary utilities provided by Owner and Contractor
 - Survey and Site Layout
 - Security and housekeeping procedures
 - Schedules
 - Procedures for testing
 - Procedures for maintaining record documents
 - Requirements for start-up
 - Inspection and acceptance of equipment put into service during construction period
 - Access, laydown and coordination with others
- d. Engineer will record minutes and distribute draft copies promptly after meeting to Owner and Contractor for review, then revise as required and distribute thereafter to meeting participants, with copies to Owner and Contractor, and those affected by decisions made.

8. Progress Meetings

- a. In addition to other regular Project meetings for other purposes (as indicated elsewhere in the Contract Documents), Engineer to schedule progress meetings beginning no later than 60 days after the Initial Conference and continue throughout progress of the Work thereafter on a **weekly** basis with times coordinated with preparation of payment requests.
- b. Every entity then involved in the planning, coordination, or performance of Work is required to be properly represented at each meeting. Attendance is required by Contractor, Contractor's Superintendent, major Subcontractors and Suppliers, Owner and Engineer as appropriate to agenda topics for each meeting. When applicable, consultants, separate contractors (if any), principal

Subcontractors, Suppliers, manufacturers/ fabricators, governing authorities, insurers, special supervisory personnel and others with an interest or expertise in the progress of the Work will be included.

- c. During each meeting, review each entity's present and future needs including interface requirements, time, sequence, deliveries, access, Site utilization, temporary facilities and services, hours of Work, hazards and risks, housekeeping, submittals, change orders, and documentation of information for payment requests. Discuss whether each element of current Work is ahead of schedule. Determine how behind-time Work will be expedited and secure commitments from the entities involved in doing so. Discuss whether schedule revisions are required to ensure current Work and subsequent Work will be completed within the Contract Times. Review everything of significance which could affect the progress of Work.
- d. Sample Agenda
 - Review minutes of previous meetings – unresolved issues
 - Overall project status
 - Work Completed
 - Anticipated Work
 - Schedule
 - Pay Applications
 - Change Orders
 - Submittals
 - Observations, problems, and decisions
 - General Discussion/Comments
 - Action Items
 - Date and time for next meeting
- e. Engineer will record minutes and distribute draft copies within 7 days after each meeting to Owner and Contractor for review, then revise as required and distribute thereafter to meeting participants, with copies to Owner and Contractor, and those affected by decisions made.

9. Pre-installation Conference and Coordination Meetings

- a. When required, convene a pre-installation conference at Site before commencing certain Work that requires coordination or has special requirements or approval.
- b. Convene coordination meetings as may be generally required.
- c. Attendance required by parties directly affecting, or affected by, Work of the specific Specification section.

- 1) For pre-installation conference, notify Owner and Engineer 5 days in advance.
- 2) For coordination meetings, party requesting coordination meeting to notify other party(s).
- d. Review conditions, preparation and procedures, and coordination with related Work.

B. Documentation of Progress

1. Submit preliminary and final Progress Schedules as specified in Paragraphs 2.05 and 2.07 of the Standard General and Supplementary Conditions, if any, or as established in Notice to Proceed.

Submit electronically by email in PDF format.

- a. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
- b. Indicate estimated percentage of completion for each item of Work at each submission.
- c. Indicate dates for fabrication, factory testing, delivery, shipping and field testing, and material and equipment delivery dates, including those furnished by Owner. Coordinate with Schedule of Submittals.
2. Submit revised Progress Schedule on monthly basis and with each Application for Payment, identifying changes since previous version. Coordinate content with Schedule of Values, if any.
3. Documentation of Pre-Construction Conditions, Construction Progress, and Final Conditions

a. Documentation of Pre-Construction Conditions

- 1) Submit photographs prior to starting construction to record Site conditions. Ensure existing conditions that might be affected by the Work are clearly recorded. Identify photographs with date, time, orientation and Project identification. Re-take any photograph furnished which, in the opinion of the Engineer, is of poor quality or incomplete at no additional cost to Owner. Documentation to record Site conditions, to ensure existing conditions of roadway surfaces, curbing, berms, sidewalks, driveways, property bounds, landscaped areas, abutter's property and any other

items that might be affected by the Work are clearly recorded.

- 2) Arrange for video recordings to be conducted by a professional videographer in digital videodisc (DVD) format. Include clear and concise audio descriptions of the existing Project Site conditions with date, time, orientation and Project identification.
 - 3) Submit 1 copy of the first completed video recording to the Engineer for review of visual and audio quality. Re-record any recording furnished which, in the opinion of the Engineer, are poor quality or incomplete at no additional cost to Owner.
 - 4) Submit 2 hardcopies of approved videos.
- b. Documentation of Construction Progress: not required for the Project.
 - c. Documentation of Final Conditions
 - 1) Submit photographs with Application for Final Payment to record final conditions. Identify photographs with date, time, orientation and Project identification. Re-take any photograph furnished which, in the opinion of the Engineer, is of poor quality or incomplete at no additional cost to Owner.
 - 2) Submit digital video record in color, of final conditions of all areas of the Project Site with Application for Final Payment to record final conditions. Include clear and concise audio descriptions of the Project Site conditions with date, time, orientation and Project identification. Re-take any DVD furnished which, in the opinion of the Engineer, is of poor quality or incomplete at no additional cost to Owner.
 - 3) Submit 2 hardcopies of approved videos.
 - 4) Submit electronically by email in PDF format.
4. Reports
 - a. Submit weekly Safety Reports signed by the Safety Representative.
 - b. Other reports to be submitted:

- 1) Updates to the Construction Operations Plan approved pursuant to SC 2.07 of Section 00 73 10 when it is modified

Submit electronically by email in PDF format.

C. Submittal Procedures

1. Schedule submittals to expedite the Project and coordinate with schedules required by Paragraph 1.03.B above. Deliver each submittal in the quantity and electronic form indicated to Engineer via PDF. Coordinate submission of related items hardcopies with Engineer.
2. Present submittals in a clear and thorough manner, in English and using English units. Provide space for Contractor, Engineer, and Owner's review stamps. Use sheet size of not less than 8 1/2 by 11 inches and not more than 24 by 36 inches.
3. Revise and resubmit documents as required. Identify all changes made since previous submittal. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions. Submittals not requested on the submittal schedule may not be recognized or processed.
4. Submit preliminary and final Schedule of Submittals as specified in Article 2 of the Standard General and Supplementary Conditions, if any, or as established in Notice to Proceed. Include all submittals specified in the Standard General and Supplementary Conditions, if any, General Requirements, and other Specification sections.

Submit electronically by email in PDF format.

- a. Include description of each submittal, date by which each submittal will be delivered to Engineer and Owner date by which each submittal must be approved to maintain project schedule, and relevant section reference.
- b. Allow 10-15 days from receipt of submittal/resubmittal for Engineer review of submittals and possible resubmittal.
5. Shop Drawings and Samples: Submit in accordance with Paragraph 6.17 of the Standard General and Supplementary Conditions, if any, and as follows, and coordinate with the Schedule of Submittals required in subparagraph 4 above.

Samples to be delivered to Engineer

Submit Shop Drawings electronically by email in PDF format.

- a. Complete a Submittal Transmittal (Form 00 62 11) as is indicated, numbering each submittal consecutively. Assign resubmittals the same Transmittal number as the original with a suffix of a sequential letter to indicate the resubmittal (e.g. the first resubmittal of submittal 25 would be number 25A.) Include only those documents previously issued under original Submittal Transmittal number in resubmittals. Do not combine new submittals with resubmittals.
 - b. Attach a Submittal Transmittal to each group of Shop Drawings, manufacturer's literature, equipment data and Samples submitted. Use a sufficient number of Submittal Transmittal forms so that: items on a single Submittal Transmittal form pertain to the same equipment item, Specification section or element of Work; items on a single Submittal Transmittal form are either original submittals or the same number resubmittal; and each Sample is listed on a separate Submittal Transmittal form.
 - c. Submittals which do not have a fully completed Submittal Transmittal form will be returned along with unreviewed attachments. Returned submittals, even though incomplete, will be counted as a submittal.
 - d. Submission of any Shop Drawing or Sample bearing Contractor's and Engineer's approval shall constitute a representation to Owner that the requirements of Paragraph 6.17 of the Standard General and Supplementary Conditions, if any, have been fulfilled.
 - e. Engineer to complete review in accordance with Paragraph 6.17.D. of the Standard General and Supplementary Conditions, if any.
6. Variations: Identify variations from Contract Documents and material and equipment or system limitations which may be detrimental to successful performance of the completed Work and identify reasons therefor in accordance with subparagraph 6.17.C.3 of the Standard General and Supplementary Conditions, if any.
 - a. Clearly identify requests for "Or-Equal" and substitute items and submit per Paragraph 6.05 of Standard General and Supplementary Conditions, if any, and subparagraph 1.02.C.5 above. Substitute items will not be considered when indicated or implied on Shop Drawing or material and equipment data submittals without separate written request, or when acceptance will require revision to the Contract Documents.
 7. Manufacturers' Installation Instructions and Certificates: Submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing.

Submit electronically by email in PDF format.

- a. Indicate special procedures, perimeter conditions requiring special attention and special environmental criteria required for application or installation.
 - b. Submit manufacturers' certificates for recent or previous test results on material or equipment, but they must be acceptable to Engineer and Owner. Indicate material or equipment conforms to or exceeds specified requirements and provide supporting reference date, affidavits, and certifications as appropriate.
 - c. Submit test results, data, and reports and certifications to Engineer based on tests performed. Submit test reports and certifications for independent testing services specified.
8. Record Documents and Closeout Submittals: submit in accordance with Paragraph 6.12 of the Standard General and Supplementary Conditions, if any.
- a. *As-Builts for Material and Equipment*

Number of prints: **1**
Electronic format: PDF
Submit electronically by email.
Indicate "As-Supplied" in revision block and sign. Show all changes and revisions to Final Completion per execution and closeout requirements. Include with subparagraph d. Operation and Maintenance Data per Part 2 below
 - b. *Drawings Conformed by Contractor to Construction Records:*
Submit the following.

Number of prints: **1**
Electronic format: DWG & PDF
Submit electronically by email.
Indicate "Conformed by Contractor to Construction Records" in revision block and sign. Show all changes and revisions to Final Completion per execution and closeout requirements.
 - c. *Warranties and Guarantees:* Submit duplicate notarized copies of warranty documents which are executed and transferable from Subcontractors, Suppliers, and manufacturers. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of Warranty Period.

- 1) Submit in searchable PDF format by email.
 - 2) Submit 2 copies in ring binders with durable plastic covers and table of contents.
- d. *Operation and Maintenance Data*
- 1) Submit draft of completed volumes 30 days prior to equipment startup. Revise content of all sets as required prior to final submission.

Number of hardcopies: **2**
Submit in searchable PDF format by email.
 - 2) Submit final volumes within 10 days after final inspection.
Submit in searchable PDF format by email.

Submit 1 copies of data in ring binders with durable plastic covers with 8 1/2 by 11 inch text pages. Cover: title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of Project, and subject matter of binder when multiple binders are required.
 - 3) Subdivide binder contents with permanent page dividers, logically organized as described below with laminated plastic tabs and clearly print the contents. Prepare a Table of Contents for each volume, with material, equipment, or system description identified, in three parts as follows.

Part 1: Directory, listing names, addresses, and telephone numbers of Contractor, Subcontractors, and major equipment Suppliers, and service representative.

Part 2: Operation and maintenance instructions arranged by system and subdivided by Specification section.

For each system, identify names, addresses, and telephone numbers of Subcontractors and Suppliers. Identify the following:

- Significant design criteria
- List of equipment with As-Builts certified “As-Supplied”
- Parts list for each component
- Operating instructions

- Inspection, maintenance and adjustment instructions for equipment and systems
- Lubrication and maintenance schedules
- Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents
- Troubleshooting guides
- Schematic diagrams

Part 3: Material Safety Data Sheets

Part 4: Other Project documents and certificates, including certificates and copies of warranties

1.04 QUALITY REQUIREMENTS

A. Reference Standards and Regulatory Requirements

1. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or Laws or Regulations of any governmental authority are used in accordance with Paragraph 3.02 of the Standard General and Supplementary Conditions, if any.
2. Acronyms and abbreviations used are defined in the applicable versions of the Encyclopedia of Associations published by Gale (part of Cengage Learning) generally available in large libraries and on the internet.
3. Specific requirements applicable to the Project include the following.
 - a. Comply with the Massachusetts Department of Transportation - Highway Division's (referred to as "MassDOT") Standard Specifications (but not including Compensation sections), Construction Details (including Standard Drawings), and Design Guides as incorporated into the Specifications and Drawings, and as may be modified therein or superseded by the Owner's requirements through the direction of the Engineer. Specific sections of the MassDOT documents are referenced in the Specifications and Drawings. References to "Department" in the MassDOT documents shall mean Owner or Resident Project Representative for this Project. See MassDOT Highway Division website for latest documents.

<https://www.mass.gov/massdot-highway-division-manuals-and-publications>

- b. Requirements of the Quincy Code of Ordinances and Zoning Code portions of which are included in Section 00 73 10.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 01 20 25

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the measurement and payment for the Work to be completed under each item in Section 00 43 22 Unit Prices Form, which may also be referred to as “pay item”.
- B. Payment procedures are in accordance with the Agreement, Article 14 of the General Conditions, the Supplementary Conditions (if any), and the General Requirements.
- C. Measurement: as determined, verified, or approved by Engineer or Owner in accordance with Paragraph 11.03 of the General Conditions, the Supplementary Conditions (if any), and the General Requirements, except as otherwise specified.
- D. The Work described in each pay item shall be as described in the Specifications and shown on the Drawings and not included in other pay items.
 - 1. Pay item descriptions are general and may not specifically describe all associated Work or elements thereof, do not constitute Specifications, and do not supersede the content of the Specifications and Drawings.
 - 2. Review the Specifications and Drawings for Work associated with each pay item. Claims for being unfamiliar with the content of the Specifications and Drawings will not be considered.
- E. The following Work is not specifically described or designated as a pay item, is considered incidental to all pay items, and shall not be measured separately for payment.
 - 1. Division 01 General Requirements EXCEPT those items included in Mobilization/Demobilization and included as a separate pay item.
 - a. temporary traffic control and regulation; temporary changeable message board/signage; saw cutting of existing pavements and sidewalks; installation of temporary pavement markings; restoration of pavement markings disturbed by Work; temporary trench pavement; temporary pavement ramping for steel plates, pavement edges, and securing work; utility casting and box protection (including casting and box protector rings, temporary pavement ramping); re-building existing structures, raising casting to grade environmental protection (including material, installation, relocating, operation, maintenance, removal and off-Site disposal

of: silt sacks, sedimentation barrier, erosion control devices, silt fence, dust control – calcium chloride, construction entrances, water truck); pipe abandonment; construction dewatering (including compliance with applicable Laws and Regulations, filter bags, sedimentation barrier, hosing, pumps); temporary construction fencing and gates; Health and Safety Plan; and temporary construction project signs.

2. Public notification of work schedule and parking requirements.
 3. Field and laboratory testing and reporting by independent laboratory, including but not limited to compaction of backfill materials; aggregate gradation; and concrete testing.
 4. Provision and operation of temporary bypass operations, pumping and plugging of flows for water, sewer and drainage shall be considered incidental to the Work and shall not be measured separately for payment.
 5. Removal and disposal of existing trees/ vegetation 3-inches and less in diameter at breast height as indicated by plan shall be considered incidental to the Work and shall not be measured separately for payment. Including: remove and/or cut, as required, the tree stumps and root systems for trees removed; disposal of stumps, roots, organic matter and the other unsuitable materials associated with the removal and disposal of existing trees 3-inches and less in diameter at breast height; and all other Work incidental to the satisfactory completion of the Work.
 6. Protection of buildings, street poles, utility poles, traffic light poles, signs, gates, fences, walls, retaining walls, shrubs, plantings, existing features to remain.
 7. Removal, storage, protection, and reinstallation of mailboxes and signs (sign posts to be replaced through unit price item), and miscellaneous sidewalk and driveway treatments.
- F. Payment will not be made for restoration of areas disturbed by the Contractor outside the limits of Work.
- G. Payment will only be made for those utility services, including stormwater service, specifically identified for replacement on the Drawings. Relocation or replacement for the Contractor's convenience or due to breakage by the Contractor of any other utility services shown on the Drawings, or at locations which could reasonably be assumed, shall be at no cost to Owner.
- H. Design, installation and removal of excavation support systems, temporary and permanent utility/structure support systems associated with a pay item shall be considered incidental to that pay item.
- I. Additional dewatering and erosion control (including installation, operation, maintenance, removal and off-Site disposal of erosion control devices) associated with a pay item shall be considered incidental to that pay item.

- J. Pay items identified as a Contingency Allowance will be processed per Article 11.02 of the General Conditions and Supplementary Conditions.
- K. All police details will be direct billed by the police department to the Contractor. Contractor **must** pay police details immediately upon receipt of Police Detail invoice. Reimbursement shall be made through monthly payment requisition.
- L. Contractor and its Subcontractor(s) shall comply with all requirements stipulated within all permits that apply to this Project. Work required to coordinate, communicate, and comply with permit requirements shall be considered incidental to the various pay items.

1.02 MEASUREMENT AND PAYMENT BASIS

START OF SITE PREPARATION

Item 1– Remove and Dispose Bituminous Concrete Pavement	
Item 2– Remove and Dispose Cement Concrete Sidewalk	
Measurement	Per square yard measured in place
Payment	Per price per square yard
Schedule of Payment	Per square yard of concrete or bituminous pavement demolished, removed and disposed as measured
Includes all labor, materials and equipment to remove and dispose of bituminous concrete pavement and cement concrete sidewalk, subbase and excavated materials required to saw cut as indicated, demolish, remove and dispose concrete or asphalt paving sidewalk, curb at the locations and limits indicated on the Drawings and all other Work incidental to the satisfactory completion of the Work..	

Item 3– Tree Remove and Dispose	
Measurement	Work completed to date
Payment	Unit price per each tree removed & disposed
Schedule of Payment	Completion of Work - 100%
Includes labor, services, materials, tools and equipment necessary to cut existing trees and expose by excavation, remove and/or cut, as required, the tree stumps and root systems for trees removed during project, includes removal of stumps with tree being removed and protection of adjacent surface features where indicated, includes removal and delivery of tree grates to a location determined by the Owner, within limits of Work as shown on the Drawings and as directed. The Work shall also include removal and disposal of tree stumps, roots, organic matter, and the other unsuitable materials resulting from the operation.	

Item 4– Remove and Dispose Existing Drainage Pipe	
Measurement	Along the horizontal projection of the centerline of the pipe
Payment	Unit price per linear foot
Schedule of Payment	Completion of Work – 100%
Includes all labor, materials, handling, transportation and equipment for removal and disposal of existing drain pipe located outside of new drain line trench or as indicated on the Drawings; removal and off-Site disposal of old drain pipe; capping and abandonment of old drain pipe; backfill and compaction of trench, removal and off-Site disposal of materials and excess soils; and other incidentals necessary to complete the Work.	

Item 5 – Remove and Dispose Catch Basins and Drainage Manholes	
Measurement	Actual catch basin or manhole removed and disposed
Payment	Unit price per each
Schedule of Payment	Completion of Work – 100%
Includes all labor, materials, handling, transportation and equipment for removal and disposal of existing catch basins and drainage manholes; removal and off-Site disposal of structures; backfill and compaction of excavation, removal and off-Site disposal of materials and excess soils; and other incidentals necessary to complete the Work.	

Item 6 – Remove, Store, Stack and Deliver Frame, Grates and Covers	
Measurement	Actual frame and grate or cover removed, stored, stacked and delivered
Payment	Unit price per each pair of frame and grate or cover removed, stored, stacked, and delivered
Schedule of Payment	Completion of Work - 100%
Includes all labor, services, materials, handling, transportation, tools and equipment required to remove, store, stack and deliver existing frame, grates and covers to the Quincy DPW yard at 55 Sea St. Frame, grates and cover maybe removed and disposed by the contractor at the Owners discretion at no additional cost to the owner. Includes the transportation, removal, storing, stacking, trucking, loading and unloading items, and other incidentals necessary to complete the Work.	

Item 7 – Remove, Store and Deliver Light Poles and Light Fixtures	
Measurement	Per Each Removed and Disposed
Payment	Unit price per Each
Schedule of Payment	Completion of Work - 100%
Includes all labor, services, materials, handling, transportation, tools and equipment associated with removing existing light poles, foundation, handholes and light fixtures as indicated on the Drawings or as field conditions dictate; coordination & delivery of salvaged lighting and other items to DPW or disposal of light poles and light fixtures as directed by Owner and all other Work incidental to the satisfactory completion of the Work. This works includes the removal and disposal of old foundations and handholes associated with the light pole and fixtures.	

Item 8 – Remove, Store and Reset Street Light	
Measurement	Per each light reset
Payment	Unit price per Each
Schedule of Payment	Completion of Work - 100%
Includes all labor, services, materials, handling, transportation, tools and equipment associated with storing and resetting existing light poles/light fixtures as indicated on the Drawings or as field conditions dictate; including new foundation for reset light. Owner and all other Work incidental to the satisfactory completion of the Work	

Item 9– Remove, Stack and Deliver Traffic Controls/ Equipment	
Measurement	Portion of Work completed and accepted
Payment	Lump Sum
Schedule of Payment	Completion of Work - 100%
Includes all labor, services, materials, handling, transportation, tools and equipment required to remove, store, stack and deliver existing traffic control/ equipment at the intersection of Walter Hannon Parkway and Parking way to a location determined by the Owner at no additional cost to the owner; transportation, removal, storing, stacking, trucking, loading and unloading items , but not limited to, the delivery of mast arms assembly, traffic equipment, control cabinets, traffic control devices, signalized post, signal control components, video detection devices and the as indicated on the plans; excavation; storing in a secure location during excavation, and other incidentals necessary to complete the Work.	

Item 10 – Remove and Dispose Traffic Control Appurtenance	
Measurement	Portion of Work completed and accepted
Payment	Lump Sum
Schedule of Payment	Completion of Work - 100%
Includes all labor, services, materials, handling, transportation, tools and equipment required to remove and dispose traffic control appurtenance at the intersection of Walter Hannon Parkway and Parkingway removal but not limited to, mast arms foundations, concrete pads, signalized post foundations, traffic handholes, conduit, wiring, traffic equipment, owner selected traffic control devices, and the as indicated on the plans; excavation; excavation, and other incidentals necessary to complete the Work.	

Item 11 – Remove, Stack and Deliver Vertical Granite Curbing	
Measurement	Linear foot of curbing removed and replaced
Payment	Unit price per linear foot
Schedule of Payment	Completion of Work – 100%
Includes all labor, services, materials, handling, transportation, tools and equipment required to remove, store, stack and deliver vertical granite curbing to a location determined by the Owner at no additional cost to the owner; transportation, removal, storing, stacking, trucking, loading and unloading items ; excavation; storing in a secure location during excavation, saw cutting of the existing pavement where indicated or directed, the removal of the existing pavement, excavation, all handling, , trimming, cleaning all sections, removal of old concrete and all other required	

Item 12 – Remove, Store, Stack and Reset Vertical Granite Curbing	
Measurement	Linear foot of curbing removed and reset
Payment	Unit price per linear foot
Schedule of Payment	Completion of Work – 100%
Includes all labor, services, material and equipment associated with removing existing granite curbs, storing in a secure location during excavation, saw cutting of the existing pavement where indicated or directed, the removal of the existing pavement, excavation, removal and resetting, all handling, cutting ends square, trimming exposed and hidden faces, cleaning all sections to be reset, gravel borrow, including grading and compacting and/or placement of concrete base, pavement materials between the reset curb and the existing or proposed pavement, replacement and compaction of sidewalk subgrade, resetting of original curbing to match pre-construction conditions, and all other required Work.	

Item 13 –Remove, Store and Deliver Monument	
Measurement	Per each delivered monument
Payment	Unit price per Each
Schedule of Payment	Completion of Work - 100%
Includes all labor, services, materials, handling, transportation, tools and equipment required to remove, stack and deliver existing rock monument and appurtenances to a location determined by the Owner; transportation; excavation; backfill; restoration of disturbed surfaces and other incidentals necessary to complete the Work.	

Item 14 –Remove, Protect, Store and Reset Bollards	
Measurement	Per Each Bollard Reset
Payment	Unit price per Each
Schedule of Payment	Completion of Work - 100%
Includes all labor, materials, and equipment to remove, store, protect and reinstall existing ornamental bollards at the locations and limits indicated on the Drawings. Provide replacement foundations, hardware and appurtenances removed or disturbed resulting from construction activities, of the type and configuration to match existing bollard conditions and all other Work incidental to the satisfactory completion of the Work.	

Item 15 – Remove and Dispose Bollards	
Measurement	Per each bollard removed and disposed
Payment	Unit price per Each
Schedule of Payment	Completion of Work - 100%
Includes all labor, materials, and equipment to remove and dispose existing ornamental bollards at the locations and limits indicated on the Drawings. Removal of foundations, hardware and appurtenances and all other Work incidental to the satisfactory completion of the Work.	

Item 16 –Removed and Dispose Signs/Sign Post	
Measurement	Actual signs and sign post removed and disposed
Payment	Unit price per each sign post removed and disposed
Schedule of Payment	Completion of Work - 100%
Includes all labor, services, materials, handling, transportation, tools and equipment required to remove and dispose existing signs and sign posts including foundation base; excavation, backfill, compaction, restoration of disturbed surfaces, and other incidentals necessary to complete the Work.	

END OF SITE PREPERATION

START OF SITE IMPROVEMENTS

Item 17 – Roadway Milling and Overlay Pavement	
Measurement	Per Square Yard Measured in Place
Payment	Unit price per Square Yard
Schedule of Payment	Completion of Work - 100%
Includes all labor, services, materials, handling, transportation, tools and equipment associated with existing roadway milling (cold planning) and bituminous pavement installation at the locations and limits indicated on the Drawings including but not limited to: protection of structures; lowering of structures/castings; saw cutting; removal & disposal of excess soils, materials, existing asphalt & sub base material; milling; provision and installation of tack coat; provision and installation of Hot Mix Asphalt Surface Course- Standard Top for roadway leveling required to meet indicated grades; fine grading to sub-grade elevations and compaction; compaction testing; provision & installation of Hot Mix Asphalt Surface Course- Standard Top for roadway overlay pavement section, feather grade to meet surrounding elevation, and ensure smooth transition; adjustment of existing casting to grade including brick & mortar, concrete collars; compaction and material testing and all other Work incidental to the satisfactory completion of the Work. Hot Mix Asphalt for miscellaneous use will not be measured for payment under this item and shall be incidental to Work.	

Item 18 – Full Depth Bituminous Asphalt Pavement	
Measurement	Per Square Yard Measured in Place
Payment	Unit price per Square Yard
Schedule of Payment	Completion of Work – 100%
Includes all labor, equipment, tools, and materials to furnish and install hot mix asphalt for new pavement, including saw cutting neat, straight edge, provide and install gravel sub-base, fine grading and compacting, emulsion, bituminous tack coat, adjusting of roadway castings to final grade, feather grade to meet surrounding elevation, placement and compaction of required depth of hot mix asphalt to meet existing depths, full depth asphalt courses for roadway full depth section, restoring pavement markings and all other incidental Work necessary to furnish and install full depth pavement.	

Item 19-Vertical Granite Curb	
Measurement	Actual length of new curb installed
Payment	Unit price per Linear Foot
Schedule of Payment	Completion of Work – 100%
Work includes all labor, services, material, transportation, tools and equipment associated with installation of new vertical granite curb. Work includes, but not limited to saw cutting of the existing pavement; cutting ends square; trimming exposed and hidden faces; installation of gravel borrow; grading and compaction; provision and placement of concrete base, incidental to the satisfactory completion of the Work.	

Item 20-Concrete Sidewalk	
Measurement	Square yard of concrete sidewalk installed
Payment	Unit price per square yard
Schedule of Payment	Completion of Work - 100%
Includes labor, services, material , transportation, tools and equipment associated with installation of new concrete sidewalks at the locations and limits indicated on the drawings including but not limited to: preparation of subgrade; provision, installation and compaction of backfill; removal and off-Site disposal of unsuitable or excess soil materials; matching of new concrete sidewalk to adjacent existing surfaces to meet and match pre-construction conditions; feather sidewalk grade to meet surrounding sidewalk elevation and ensure smooth transition provision; construction of expansion and control joints; surface finishing and all other Work incidental to the satisfactory completion of the Work.	

Item 21–Brick Banding and Brick Island Pavers	
Measurement	Square yard of concrete sidewalk installed
Payment	Unit price per square yard
Schedule of Payment	Completion of Work - 100%
Includes all labor, service, materials, handling, transportation, tools and equipment required to install brick walk pavers; excavation; backfill; compaction; material testing; concrete slab, weep holes, dowels, leveling course, sheet mix, sand setting bed, polymetric sand infill between joints, provision and installation of gravel base; feather grade to meet surrounding elevation and ensure smooth transition: restoration of disturbed surfaces and other incidentals necessary to complete the Work.	

Item 22– Accessible Curb Ramps	
Measurement	Actual accessible curb ramp and installed
Payment	Unit price per each
Schedule of Payment	Completion of Work - 100%
Includes labor, services, material and equipment associated with installation of all components associated with new accessible curb ramps from the limits of the ramp tie-in to the adjacent surface(s) including, but not limited to: provision of granite transition curbs; flush granite curbs; tactile warnings; saw cutting of the existing pavement where indicated or directed; the removal of the existing concrete and/or pavement; excavation; curb installation; all handling; cutting curb ends square; trimming exposed and hidden faces; cleaning all sections to be set; grading; preparation of subgrade; provision, installation and compaction of backfill and bedding soils; removal and off-Site disposal of unsuitable excess soil materials; concrete; materials as necessary to meet and match adjacent surfaces to ensure smooth transition to proposed or pre-construction conditions, feather sidewalk grade to meet surrounding sidewalk elevation; provision and construction of expansion and control joints; surface finishing and all other Work incidental to the satisfactory completion of the Work.	

Item 23-Concrete Driveway Aprons	
Measurement	Actual concrete driveway apron installed
Payment	Unit price per each
Schedule of Payment	Completion of Work - 100%
Includes labor, services, material and equipment associated with installation of new concrete driveway apron, driveway subgrade; grading; preparation of subgrade; provision, installation and compaction of backfill and bedding soils; removal and off-Site disposal of unsuitable excess soil materials; matching of new concrete driveway to adjacent existing materials as necessary to meet and match pre-construction conditions, feather driveway grade to meet surrounding sidewalk elevation, and ensure smooth transition, provision and construction of expansion and control joints, surface finishing and other required Work.	

Item 24 – Street/Traffic Signs	
Measurement	Actual Signs Installed
Payment	Unit price per each sign installed
Schedule of Payment	Completion of Work - 100%

Includes all labor, services, materials, handling, transportation, tools and equipment to provide and install new signs for post and light pole mounted signs at the locations and limits indicated on the drawings including but not limited to: new bases, post, concrete footings, storage and protection; excavation, gravel, backfill, compaction, concrete base where required; furnishing and installing applicable mounting hardware; break away sleeves (anchor section); restoration of disturbed surfaces and all other required Work

Item 25 –Sign Post	
Measurement	Actual Post Installed
Payment	Unit price per each sign installed
Schedule of Payment	Completion of Work - 100%

Includes all labor, services, materials, handling, transportation, tools and equipment to provide and install new signs for post and light pole mounted signs at the locations and limits indicated on the drawings including but not limited to: new bases, post, concrete footings, storage and protection; excavation, gravel, backfill, compaction, concrete base where required; furnishing and installing applicable mounting hardware; break away sleeves (anchor section); restoration of disturbed surfaces and all other required Work

Item 26 – Pavement Markings	
Measurement	Portion of Work completed and accepted
Payment	Lump Sum
Schedule of Payment	Completion of Work - 100%

Includes labor, services, material, and equipment associated with, but not limited to, the installation of new pavement markings and the provision of pavement markings indicated on the plans; surface cleaning and preparation, symbols, lines & words per the Manual on Uniform Traffic Control Devices (latest edition) and other incidentals necessary to complete the Work.

Item 27– Loam Borrow	
Measurement	Per square yard measured in place
Payment	Unit price per square yard
Schedule of Payment	Completion of Work - 100%

Includes all labor, services, materials, handling, transportation, tools and equipment to provide and install loam borrow at the locations and limits indicated on the Drawings including but not limited to: placement/spreading and rolling/tamping of the materials; excavation and preparation of areas for seeding and plant materials and all other Work incidental to the satisfactory completion of the Work

Item 28- Seeding	
Measurement	Per square yard measured in place
Payment	Unit price per square yard
Schedule of Payment	Completion of Work - 100%
Includes all labor, services, materials, handling, transportation, tools and equipment to provide and install grass seed at the locations and limits indicated on the Drawings including but not limited to: seed spraying, limestone, fertilizers, fine grading, rolling the seeded areas, daily watering, clearing the weed and all else incidental thereto and necessary for healthy grass areas without any bare spots or areas.	

Item 29-Landscape Plantings	
Measurement	Portion of Owner's contingency allowance amount authorized per Paragraph 11.02 of the of the General Conditions.
Payment	Percent of not to exceed contingency allowance amount authorized by Change Order
Schedule of Payment	Monthly based on progress and authorized by Change Order
Includes all labor, services, materials, handling, transportation, tools and equipment required for the placement of owner selected planting/ landscaping, excavation and preparation of areas, mulch, planting media locations for installation of plant materials and all other Work incidental to the satisfactory completion of the Work.	

Item 30-Irrigation System	
Measurement	Portion of Owner's contingency allowance amount authorized per Paragraph 11.02 of the of the General Conditions.
Payment	Percent of not to exceed contingency allowance amount authorized by Change Order
Schedule of Payment	Monthly based on progress and authorized by Change Order
Includes all labor, services, materials, handling, transportation, tools and equipment to provide irrigation design, design calculations, including furnishing and installing sleeves, irrigation piping, valves, boxes, wiring and appurtenances, coordination of irrigation design with owner selected landscaping/plantings, programming of control cabinet of added irrigation zoning, preparation all other Work incidental to the satisfactory completion of the Work.	

Item 31 – Concrete Retaining Wall	
Measurement	Actual retaining wall installed
Payment	Unit price per linear foot of wall installed
Schedule of Payment	Completion of Work - 100%
Includes labor, services, material and equipment associated with installing a new concrete retaining walls, furnishing and installing crushed stone bedding base wrapped in stabilization fabric, drilling; dowels; epoxy; formwork, weep holes, surface preparation and required knockouts; rebar; concrete and encasements; crossing utilities & support of existing utilities; excavation; backfill; compaction; shoring/bracing, dewatering; restoration of disturbed surfaces; material testing; joint sealant; unclassified excavation; removal and off-Site disposal excess soils, and other required Work.	

Item 32-Ornamental Handrail	
Measurement	Actual fence installed
Payment	Per Linear Foot of fence installed
Schedule of Payment	Completion of Work - 100%
Includes labor, services, material and equipment associated with the construction of ornamental handrail indicated on the plans including, but not limited to, furnishing and installing rails, post, pickets, mounting hardware, anchor bolts and other incidentals necessary to complete the Work.	

Item 33-Handrail	
Measurement	Actual handrail installed
Payment	Per Linear Foot of handrail installed
Schedule of Payment	Completion of Work - 100%
Includes labor, services, material and equipment associated with the construction of steel handrail indicated on the plans including, but not limited to, furnishing and installing rails, post, pickets, base plates, grout, mounting hardware, anchor bolts and other incidentals necessary to complete the Work.	

START OF DRAIN AND SEWER ITEMS

Item 34 – 12-inch Class V RCP Item 35- 18-inch PVC Gravity Sewer Pipe	
Measurement	Along the horizontal projection of the centerline of the pipe; measured from inside face of manhole
Payment	Unit price per linear foot
Schedule of Payment	Completion of Work and successfully pass testing - 100%
Includes labor, services, material and equipment associated with furnishing and installing the drain pipe and sewer pipe and removal and disposal of old sewer and drain pipe with the same trench as the new pipe, removal of concrete encasement with pipe, furnishing, handling and installation of materials, pressure testing, couplings, tree trimming, removing and replacing signs, fences and mailboxes pipe connections; pipe bedding, concrete cradles, marking tape, clay dams, wyes, replacement of marked utility services to the property line, rubber sleeve connections and mortar sealing of pipe and structure; testing unclassified excavation; shoring and bracing; dewatering; installation and compaction of backfill and bedding soils; geotextile fabric; material testing; re-connection to existing pipe and or structures (including pipe couplings, coring of new penetrations and plugging abandoned penetrations in existing structures); provision & reconfiguration of brick invert of new & existing manholes, and other required Work.	
Removal and disposal of old drain pipe and sewer pipe outside of the new alignment include in a separate item	

Item 36– Trenchless System	
Measurement	Portion of Work completed and accepted
Payment	Lump Sum
Schedule of Payment	Completion of Work - 100%
Includes labor, services, material and equipment associated with furnishing and installing a trenchless system to construct a new pipeline between proposed SMH-1 and SMH-2, excavation of pits, unclassified excavation; shoring and bracing; dewatering; installation and compaction of backfill and bedding soils pressure testing, couplings, sealing of pipe and structure; testing; material testing; and other required Work.	
Excluded the installation of sewer manhole. Sewer manholes include in a separate item	

Item 37 – 4-foot Diameter Drain Manhole	
Measurement	Actual drain manhole furnished and installed
Payment	Unit price per Each
Schedule of Payment	Monthly based on quantity installed
Includes all labor, services, materials, handling, transportation, tools and equipment to provide and install new drain manholes at the locations and limits indicated on the Drawings, regardless of depth, including but not limited to: anti-floatation slab; pipe connections, mechanical couplings, joint sealant; unclassified excavation; removal and off-Site disposal of existing utility structure; shoring and bracing; bituminous concrete pavement and concrete saw cuts; dewatering; provision, installation and compaction of backfill and bedding soils; within pavement areas the installation and compaction of gravel subbase; geotextile fabric; material testing; provision and installation of brick invert; removal and off-Site disposal of unsuitable/excess soils & materials; and all other Work incidental to the satisfactory completion of the Work.	
*Excludes frame and cover included in separate item. *	

Item 38 – 4-foot Diameter Catch Basin	
Measurement	Actual catch basins furnished and installed
Payment	Unit price per Each
Schedule of Payment	Monthly based on quantity installed
Includes all labor, services, materials, handling, transportation, tools and equipment to provide and install new catch basins at the locations and limits indicated on the Drawings, regardless of depth, including but not limited to: pipe connections, extended bases, mechanical couplings, joint sealant; unclassified excavation; removal and off-Site disposal of existing utility structure; shoring and bracing; bituminous concrete pavement and concrete saw cuts; dewatering; provision, installation and compaction of backfill and bedding soils; within pavement areas the installation and compaction of gravel subbase; geotextile fabric; material testing; provision and installation of brick invert; removal and off-Site disposal of unsuitable/excess soils & materials; and all other Work incidental to the satisfactory completion of the Work.	
*Excludes frame and grate included in separate item. *	

Item 39 – 5-foot Diameter Double Catch Basin	
Measurement	Actual catch basins furnished and installed
Payment	Unit price per Each
Schedule of Payment	Monthly based on quantity installed
Includes all labor, services, materials, handling, transportation, tools and equipment to provide and install new catch basins at the locations and limits indicated on the Drawings, regardless of depth, including but not limited to: pipe connections, extended bases, mechanical couplings, joint sealant; unclassified excavation; removal and off-Site disposal of existing utility structure; shoring and bracing; bituminous concrete pavement and concrete saw cuts; dewatering; provision, installation and compaction of backfill and bedding soils; within pavement areas the installation and compaction of gravel subbase; geotextile fabric; material testing; provision and installation of brick invert; removal and off-Site disposal of unsuitable/excess soils & materials; and all other Work incidental to the satisfactory completion of the Work.	
*Excludes frame and grate included in separate item. *	

Item 40– Water Quality Structure	
Measurement	Actual drain manhole furnished and installed
Payment	Unit price per Each
Schedule of Payment	Monthly based on quantity installed
Includes all labor, services, materials, handling, transportation, tools and equipment to provide and install new water quality structure at the locations and limits indicated on the Drawings, regardless of depth, including but not limited to: anti-floatation slab; pipe connections, mechanical couplings, joint sealant; unclassified excavation; removal and off-Site disposal of existing utility structure; shoring and bracing; bituminous concrete pavement and concrete saw cuts; dewatering; provision, installation and compaction of backfill and bedding soils; within pavement areas the installation and compaction of gravel subbase; geotextile fabric; material testing; removal and off-Site disposal of unsuitable/excess soils & materials; and all other Work incidental to the satisfactory completion of the Work.	
Includes water quality frame and cover	

Item 41 – 5-foot Diameter Sewer Manhole	
Measurement	Actual drain manhole furnished and installed
Payment	Unit price per Each
Schedule of Payment	Monthly based on quantity installed
Includes all labor, services, materials, handling, transportation, tools and equipment to provide and install new drain manholes at the locations and limits indicated on the Drawings, regardless of depth, including but not limited to: anti-floatation slab; pipe connections, mechanical couplings, joint sealant; unclassified excavation; removal and off-Site disposal of existing utility structure; shoring and bracing; bituminous concrete pavement and concrete saw cuts; dewatering; provision, installation and compaction of backfill and bedding soils; within pavement areas the installation and compaction of gravel subbase; geotextile fabric; material testing; provision and installation of brick invert; removal and off-Site disposal of unsuitable/excess soils & materials; and all other Work incidental to the satisfactory completion of the Work.	
*Excludes frame and cover included in separate item. *	

Item 42 –Catch Basin Frame and Grate	
Measurement	Sets installed
Payment	Unit price per set
Schedule of Payment	Work completed for each set - 100%
Includes labor, services, material and equipment associated with furnishing and installing the catch basin frame and grate, including brick & mortar to raise catch basin grate to grade, concrete collars and all related Work.	

Item 43 –Double Catch Basin Frame and Grate	
Measurement	Frame and Grate installed
Payment	Unit price per set
Schedule of Payment	Work completed for each set - 100%
Includes labor, services, material and equipment associated with furnishing and installing the catch basin frame and grate, including brick & mortar to raise catch basin grate to grade, concrete collars and all related Work.	

Item 44 – Manhole Frame and Cover	
Measurement	Frame and Cover installed
Payment	Unit price per set
Schedule of Payment	Monthly based on quantity installed, tested, and accepted
Includes all labor, services, materials, handling, transportation, tools, equipment, and testing associated with furnishing and installing the sewer and drain manhole frame and covers, including brick & mortar to raise manhole cover to grade, or concrete grade rings, anchors, concrete collars and all other Work incidental to the satisfactory completion of the Work.	

END OF DRAIN AND SEWER ITEMS

START OF ELECTRICAL AND COMMUNICATION ITEMS

Item 45- Electrical/Communication/Traffic Hand Holes	
Measurement	Work measured, accepted, and completed in place
Payment	Lump Sum
Schedule of Payment	Monthly based on progress
Includes labor, services, material and equipment associated with furnishing and installing the handhole structures pull boxes to the type, size and location listed on the drawings; regardless of depth including conduit connections; casting, covers, excavation; installation and placement of handholes; bedding; dewatering; backfill; backfill compaction and material testing; connection to structures and all other incidental to the satisfactory completion of the Work.	

Item 46– Electrical/Communication/Traffic Raceway	
Measurement	Work measured, accepted, and completed in place
Payment	Lump Sum
Schedule of Payment	Monthly based on progress
Includes all labor, services, material, and equipment associated with furnishing and installing electrical and communication underground duct bank systems in the configurations and locations shown on the Drawings. Work includes, but not limited to, pavement saw cutting, removal & disposal, temporary pavement, excavation, backfill, compaction, conduit, conduit spacers, ground wire, concrete encasement, reinforcement, warning tape, installation of crushed stone base material, connection to structures and all other incidental to the satisfactory completion of the Work.	

Item 47– Electrical/Communication Conductors	
Measurement	Work measured, accepted, and completed in place
Payment	Lump Sum
Schedule of Payment	Monthly based on progress
Includes all labor, services, material, and equipment associated with furnishing and installing electrical and communication electrical conductors/wiring systems all cable and wiring; ground rods, equipment grounding and bonding; communication cable, fiber, power and communication service connections in the configurations and locations shown on the Drawings. Work includes, but not limited to, pulling string/mule tape, conductors/wiring, termination of conductors all other Work incidental to the satisfactory completion of the Work.	

Item 48– Street Lights and Bases	
Measurement	Street light system installed, tested, and passed
Payment	Unit price per each system installed
Schedule of Payment	Completion of Work - 100%
Includes all labor and equipment to install new street lights, parking lot lighting system and including but not limited to street lighting concrete footings and foundations, anchor bolts, s at the location and limits shown on the Drawings. Work includes, but is not limited to, furnishing and installing applicable mounting hardware, excavation, backfill, compaction, testing and all other Work incidental to the satisfactory completion of the Work.	

END OF ELECTRICAL AND COMMUNICATION ITEMS

START OF TRAFFIC CONTROL ITEMS

Item 49– Traffic Control Signalization	
Measurement	Work measured, accepted, and completed in place
Payment	Lump Sum
Schedule of Payment	Monthly based on progress
Includes all labor, services, material, and equipment associated with furnishing and installing rapid rectangular flashing beacons (RRFBs), traffic signal controller and cabinet mounted on a foundation with concrete workers pad; bollards surrounding pads, signal posts and foundations; mast arm assemblies with anchor bolts and foundations; emergency vehicle preemption components; adaptive signal control components; vehicle signal heads; non-louvered backplates; video detection; pedestrian signal heads and push button assemblies; battery backup system; all traffic control wiring/conductors and all other equipment, materials and incidental costs necessary to provide a complete, fully operational traffic control signal system as specific herein and as shown on the plans., foundations, excavation and backfill, service connections, and all charges therefore.	

END OF TRAFFIC CONTROL ITEMS

Item 50 – Control Density Fill	
Measurement	In place based on weight slips submitted
Payment	Unit price per Cubic Yard
Schedule of Payment	Completion of Work - 100%
Includes all labor, services, materials, handling, transportation, tools and equipment to provide and install control density fill for pipe abandonment, preventative trench settlement or shallow cover pipe installations, utility crossings and other incidental Work, as shown on the Drawings and as specified or as required by field conditions or as directed.	

Item 51 – Excavation of Unsuitable Materials	
Measurement	As measured within pay limits shown on the Drawings
Payment	Unit price per Cubic Yard, measured in place
Schedule of Payment	Monthly based on quantity installed
Includes all labor, services, materials, handling, transportation, tools and equipment to excavate and replace unsuitable material from its original bed, excavation, unclassified excavation, removal, and disposal of the unsuitable materials and replacement as necessary with gravel borrow as backfill material as described in the Specifications or directed by the Owner; and all other Work incidental to the satisfactory completion of the Work. Unsuitable material shall be as defined in Section 31 00 00.	

Item 52– Rock and Boulder Excavation	
Measurement	In place prior to excavation within pay limits shown on the Drawings. Payment depth for rock, which is encountered within excavation and reclamation areas, shall be no less than three feet when removal can be accomplished only by drilling or by use of jack (air or hydraulic) hammers, no blasting shall be allowed. Payment for rock removed, using the same or equal equipment as utilized for normal excavation, shall be limited to the actual depth removed within the limits established by the contract documents. Boulders encountered within the pay limits of excavation, whose volume is one cubic yard or greater, part of which extends outside said limits shall be paid in accordance with the actual volume excavated.
Payment	Unit price per Cubic Yard
Schedule of Payment	Monthly based on quantity installed
Includes all labor, services, materials, handling, transportation, tools and equipment to remove “rock” from its original bed by mechanical means, drilling, barring or wedging, specifically ledge or bed rock and boulders larger than one cubic yard in volume. Also includes excavation, removal, and disposal of the rock and replacement as necessary with gravel backfill material as described in the Specifications or directed by the Owner; and all other Work incidental to the satisfactory completion of the Work.	

Item 53 – Owner’s Contingency Allowance for Traffic Police Details	
Measurement	Portion of Owner’s contingency allowance amount authorized per Paragraph 11.02 of the of the General Conditions. Actual wages and fringes paid to police officers based upon invoices and/or payroll records excluding overtime and Contractor markup and/or administration fees.
Payment	Percent of not to exceed contingency amount based upon direct costs incurred (no markup) for Police Details after confirmation of Police Department payment.
Schedule of Payment	Based on actual hours worked and invoices paid including standard administrative charges levied by the Police Department and excluding mark-up. Monthly based on progress.
Direct cost of Police Details and excluding Contractor markup and/or administration fees. Contractor shall not receive payment for any unused portion of the contingency allowance. Excluded: Charges for Police Details not canceled in accordance with Police Department policies and procedures. Contractor must pay police details immediately upon receipt of Police Detail invoice. Reimbursement shall be made through monthly payment requisition.	

Item 54 – Mobilization/Demobilization	
Measurement	At Project commencement and at Project completion
Payment	Lump sum price, operations and expenses in connection with mobilization and demobilization shall not exceed five percent (5%) of the Contract Price.
Schedule of Payment	50% at Project commencement, 50% at Substantial Completion.
Includes delivery to and removal of equipment from the Project Site, temporary utilities, facilities and controls, obtaining necessary permits including associated fees, insurance and bond costs, signage, development of pre-construction schedules and plans required by the General Conditions, Supplementary Conditions and General Requirements; necessary pre-construction investigations, verifying existing field conditions and documentation, coordination, preparation of Work and operations, movement of workers and equipment, Site clean-up, restoration and closeout and all other Work and operations which must be performed from the time prior to the start of the Work to the final acceptance of Work by the City. Note: Owner will waive fees associated with road opening and trench permits and costs for these permits shall not be included in this item.	

ITEM 55 – Owner’s Contingency Allowance for Materials Escalation Price Adjustment (Statutory)	
Measurement	Portion of Owner’s contingency allowance amount authorized per Paragraph 11.02 of the General Conditions and Supplementary Conditions
Payment	Percent of not to exceed contingency amount authorized by Change Order
Schedule of Payment	Monthly as authorized by Change Order
For price adjustments for materials escalation of Liquid Asphalt, Diesel Fuel, Gasoline, and Portland Cement per statutory requirements in accordance with Section 00 73 73. Contractor shall not receive payment for any unused portion of the contingency allowance.	

ITEM 56 – Owner’s Contingency Allowance for Civic Open Space Improvements	
Measurement	Portion of Owner’s contingency allowance amount authorized per Paragraph 11.02 of the General Conditions and Supplementary Conditions
Payment	Percent of not to exceed contingency amount authorized by Change Order
Schedule of Payment	Monthly as authorized by Change Order
Includes all labor, services, materials, equipment including furnishing and installing, placement of owner selected hardscaping, landscaping, planting media, mulch monuments, preparation of subgrade; provision, compaction of backfill; removal and off-Site disposal of unsuitable or excess soil materials; all other Work incidental to the satisfactory completion of the Work.	

Item 57 – Test Pits	
Measurement	As measured within pay limits shown on the Drawings
Payment	Unit price per Cubic Yard, measured in place
Schedule of Payment	Monthly based on quantity installed
Includes all labor, services, materials, handling, transportation, tools and equipment to excavate and determine existing utility condition. This includes all test pits that are shown on the drawing and any additional test pits requested by the engineer. This items it not to be used by the contractor for test pit without the engineers consent. The excavation includes unsuitable material from its original bed, excavation, unclassified excavation, removal, and disposal of the unsuitable materials and replacement as necessary with gravel borrow as backfill material as described and all other Work incidental to the satisfactory completion of the Work.	

PART 2 - PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01 43 05

QUALIFICATION REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Meet or provide capability to meet the criteria specified below and in individual Specification sections in connection with various portions of the Work of the Contract Documents.

1.02 GENERAL REQUIREMENTS

- A. Contractor shall have been regularly and actively engaged in similar Work as described in the Contract Documents, operating under the same business name and business organization structure, for the last 10 years on at least 5 projects.
- B. Contractor shall have successfully completed at least 5 projects involving construction of similar facilities in the same state as the Project covered by the Contract Documents within the last 10 years. “Similar facilities” means similar in type, character, physical size, and complexity to that required by the Contract Documents.
 - 1. Contractor shall have regularly engaged experienced engineers/design professionals and land surveyors licensed in the state the Project is located performing work similar to that specified.
- C. Contractor shall have:
 - 1. a full-time on-Site superintendent in responsible charge of the Work with at least 10 years’ experience as superintendent on comparable projects;
 - 2. a project manager assigned full-time with at least 10 years’ experience as project manager on comparable projects; and
 - 3. regularly engaged experienced engineers/design professionals licensed in the state the Project is located performing work similar to that specified.
- D. Contractor or its Subcontractors shall have successfully completed:
 - 1. at least 3 projects that included traffic signalization installation within public streets within the last 10 years; and
 - 2. at least 5 projects that included either or a combination of stormwater, water and sewerage utilities within public streets within the last 10 years; and

3. at least 5 projects that included roadway construction, pavement and street repair within public streets within the last 10 years.

1.03 STATUTORY

- A. Any Work involving the removal, containment, or encapsulation of Asbestos or material containing Asbestos may only be performed by a licensed contractor in accordance with the provisions of MGL Chapter 149, Sections 6A-6E, applicable Laws and Regulations, and requirements as may be included in the Specifications and Drawings.
- B. Sheet metal work must be performed by a contractor licensed in accordance with 271 CMR 1.00, et seq. governing licensing, permitting, and sheet metal work in Massachusetts.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies temporary facilities and controls for execution of the Work put into place for use only during the period of construction, that will be removed when no longer required for construction operations. This Section applies to all Specifications and Drawings and provisions of this Section may be supplemented in other sections of Division 01.
- B. Certain provisions required by Laws and Regulations may be referenced. Contractor is responsible to determine and obtain applicable Laws and Regulations and to review and interpret the full text of such Laws and Regulations.
- C. Section Includes

1.02 TEMPORARY CONSTRUCTION FACILITIES

- Barriers
- Protection of Work
- Security
- Safety Facilities
- Access Roads
- Parking
- Field Offices
- Staging Area
- Project Identification
- Progress Cleaning and Waste Removal

1.03 TEMPORARY UTILITIES

1.04 TEMPORARY CONTROLS

- Pest Control
- Dust Control
- Water Control and Dewatering
- Erosion and Sediment Control
- Noise Control
- Pollution Control
- Traffic Regulation

1.05 REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS

1.02 TEMPORARY CONSTRUCTION FACILITIES

A. Barriers

1. Comply with the requirements of Paragraph 6.11. of the Standard General Conditions and Supplementary Conditions, if any.
2. Furnish barriers to prevent unauthorized entry to and clear delineation of construction areas, to allow for Owner's use of Site, and to protect existing facilities and adjacent properties from damage from construction operations as recommended by OSHA and as otherwise required for the protection of life and property during construction.
3. Construct barricades and protective facilities in accordance with local and state regulations. Furnish and install signs, lights, reflectors, and such protection facilities as may be required.
4. Furnish barricades required by governing authorities for public rights of way.
5. Provide protection for plant life designated to remain. Replace damaged plant life.
6. Protect non owned vehicular traffic, stored materials, Site and structures from damage.
7. If required, furnish commercial grade, minimum 8 foot high chain link fence around construction Site. Equip with vehicular gates with locks.

B. Protection of Work

1. Protect Work during working and non-working hours.
2. Provide special protection where specified in Specifications or Drawings and in accordance with manufacturer recommendations.
3. Furnish temporary and removable protection for installed equipment and material. Control activity in immediate Work area to minimize damage.
4. Protect exterior areas of Work from damage. Prohibit traffic from landscaped areas.
5. Buildings and Enclosures
 - a. Furnish protective coverings at walls, projections, jambs, sills, and soffits of openings and protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

- b. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
6. Whenever gale or high winds are forecast, take measures to secure loose material, equipment or other items that could be blown and be damaged or cause damage. Do not leave such loose items unsecured at end of a working day. Particular attention shall be taken with scaffolding and items placed or stored on roofs or within a structure prior to being enclosed.
7. Provide for removal of snow and ice which may impede Work, damage the finishes or materials, be detrimental to workers, or impede trucking, delivery, or moving of materials at the Site, or prevent adequate drainage of the Site or adjoining areas.
8. Comply with the following additional requirements of MGL Chapter 149, Sections 44F(1)(a) and 44G(d).
 - a. Contractor shall furnish and install weather protection to provide for adequate heat in the area so protected during the months of November through March. Per DCAMM, "weather protection," means temporary protection of that Work adversely affected by moisture, wind and cold. Weather protection shall be achieved by covering, enclosing and/or heating working areas such that a minimum temperature of 40 degrees Fahrenheit is maintained at the working surface during the months of November through March in order to permit construction to be carried on during such period in accordance with the Progress Schedule.
 - b. After the building or portion thereof is completely enclosed by either permanent construction or substantial temporary materials having a resistance comparable to the specified permanent construction, the Contractor shall provide heat therein of not less than 55 degrees F. nor more than 75 degrees F. The foregoing provisions do not supersede any specific requirements for methods of construction, curing of materials and the like. Such weather protection shall be consistent with the Progress Schedule, shall permit the continuous progress of the Work necessary to maintain an orderly and efficient sequence of construction operations, shall include one thermometer for every 2,000 square feet of floor space or fraction thereof, shall be subject to the Approval of the Awarding Authority, and shall meet such additional requirements as may be specified by Awarding Authority

C. Security

1. Provide protection to stored items, the Work and Owner's operations from unauthorized entry, vandalism, or theft, and against fire, storms and other losses during working and non-working hours.
 2. Coordinate with Owner's security program.
- D. Safety Facilities
1. Provide first aid and other safety facilities required by Laws and Regulations during working and non-working hours.
- E. Access Roads
1. Construct and maintain temporary roads accessing public thoroughfares to serve construction area. Control dust and water.
 2. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.
 3. Provide for emergency access and maintain throughout the Work Site.
- F. Parking: off-Site at a location determined by Contractor.
1. Do not allow construction vehicle parking on existing pavement or sidewalks.
- G. Field Offices: Not required for the Project.
1. Maintain utilities per Article 1.03 below for the duration of the Project.
- H. Staging Area: Owner is not providing a location for staging area. Determine and secure a location for staging area.
- I. Project Identification: not required for the Project.
- J. Progress Cleaning and Waste Removal
1. Comply with the requirements of Paragraph 6.11. B and C of the Standard General Conditions and Supplementary Conditions, if any.
 2. Maintain areas free of waste materials, debris, and rubbish and maintain the Site in a clean and orderly condition.
 3. Remove debris and rubbish from spaces and other closed or remote spaces before enclosing the space.
 4. Collect and remove waste materials, debris, and rubbish from Site at least weekly and legally dispose off-Site.

1.03 TEMPORARY UTILITIES

- A. Power service not required for the Project.
- B. Telephone service and internet access to field offices: Not required for the Project.
- C. Water service: as specified below.
 - 1. Arrange for, pay for and maintain suitable quality water service as required for duration of Project.
- D. Furnish and maintain required sanitary facilities and enclosures. Do not use existing facilities.
- E. Furnish lighting for construction operations. Furnish lighting for exterior staging and storage areas and for security purposes. Maintain lighting and provide routine repairs.
- F. Furnish heat devices and heat and cooling devices as required to maintain specified conditions for construction operations.
- G. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- H. Fire Protection
 - 1. Provide temporary fire protection equipment and services during construction per NFPA and local fire code and regulations, and fire marshal's requirements.
 - 2. Use Work procedures that minimize fire hazards to the extent practicable and materials that are fire resistant where possible. Collect and remove combustible debris and waste materials from the Site each day. Store fuels, solvents, and other volatile or flammable materials away from the construction and storage areas in well-marked, safe containers in accordance with Laws and Regulations.

1.04 TEMPORARY CONTROLS

- A. Pest Control: Provide methods, means, and facilities to control and prevent spread of pests during construction operations. If required, provide for extermination of pests in accordance with Laws and Regulations. For extensive infestations, obtain the services of a licensed exterminator and coordinate plan with Owner and Engineer.
 - 1. Provide rodent control in accordance with Section 01 57 17

- B. Dust Control: Execute Work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere. Utilize the application of sprinkled water to reduce the emission of air-borne soil particulates from the Project Site.
- C. Water Control and Dewatering: as specified below.
 - 1. Grade Site to drain away from excavations to approved drainage collection facilities. Ensure collected surface drainage water meets permitted criteria for sediment content prior to discharge.
 - 2. Maintain excavations free of water. Furnish, operate and maintain pumping equipment.
 - 3. Dewater excavations and legally dispose of water in a manner that will not cause injury to public and private property.
 - 4. Protect Site from puddling, ponding or running water.
 - 5. Obtain necessary regulatory approvals for the disposal of dewatering flows, including, among others, approval by the Environmental Protection Agency under the National Pollutant Discharge Elimination System (NPDES) program for construction dewatering activities. Submit the completed and approved construction dewatering permit to the Engineer immediately upon receipt.
 - 6. Design, furnish, install, maintain, operate and remove temporary dewatering systems as required to lower and control water levels and hydrostatic pressures in excavations during construction; legally dispose of pumped water; construct, maintain, observe and, except where indicated or required to remain in place, remove dewatering equipment and system at the completion of construction.
 - a. Dewatering may include: lowering the water table, intercepting and collecting seepage which may penetrate the support of excavation, slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; limiting horizontal displacements and stresses in support of excavation to tolerable and allowable levels; preventing displacements of existing structures, utilities, pavements, and sidewalks; improving the excavation and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of any excavation; and disposing of pumped water.

7. Grade Site to drain away from excavations to approved drainage collection facilities. Ensure collected surface drainage water meets permitted criteria for sediment content prior to discharge.
 8. Prepare a Construction Flood Contingency Plan detailing Contractor's means and methods for stabilizing the Work area and emergency notification procedures if the Work area becomes subject to flooding as a result of a storm event or water removal system failure.
- D. Erosion and Sediment Control: as specified below.
1. Comply with:
 - a. MADEP requirements
 - b. MADOT requirements within State rights of way
 - c. Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, prepared by the MassDEP
 2. Plan and execute construction using methods to control surface drainage from cuts and fills, from borrow and waste disposal areas and prevent erosion and sedimentation.
 3. Submit erosion and sediment control plan to Engineer prior to the start of construction.
 4. Install erosion and sediment controls as shown on the Drawings and as required by Laws and Regulations. Install additional erosion and sedimentation control measures as necessary to stabilize the Site. Coordinate temporary erosion controls with permanent erosion controls to the extent practical. Provide and maintain devices to control erosion, siltation, and sedimentation that occur during construction operations. Undertake reasonable precautions and measures to avoid erosion of soil and to prevent silting of drainage ditches, storm sewers, rivers, streams, and lakes.
 5. Employ pollution prevention measures, erosion and sedimentation control before, during, and after soils are exposed. Implement measures prior to soil disturbance or soil storage to the extent possible to ensure that such measures are in place before activity occurs and employ additional measures as the Work progresses. Implement and maintain as necessary until the Site is permanently stabilized.
 6. Perform inspections of disturbed soil areas, material storage areas exposed to precipitation, and erosion control measures with Engineer a minimum of once every 14 days and also within 24 hours after any storm event greater than 0.5 inches of rainfall. Immediately correct deficiencies in the erosion

control measures identified or indicated by failures or erosion by implementing additional measures or different techniques to correct and prevent subsequent erosion at no additional cost to Owner.

7. If silt or debris breaches erosion control, immediately remove and clean silt or debris from drainage ditches and storm sewers and revise erosion control measures as required by the Conservation Commission or the Engineer. Should silt or debris breach erosion controls and reach rivers, streams or lakes, immediately notify local, state or Federal representatives as required and implement required remediation methods at no additional cost to Owner.
8. Limit duration of the exposure of soils on embankments, excavations, and graded areas to a minimum.
9. Provide temporary measures such as berms, dikes and drains to prevent water flow. Install erosion control measures in any ditch, swale or channel before water is allowed to flow in the waterway. Handle water pumped from trenches to minimize discharge of silty water to the maximum extent practicable.
10. Stabilize storm drain outfalls before the discharge points become operational. Install inlet protection immediately upon construction of culverts.
11. Stabilize disturbed areas with temporary and permanent erosion control practices as soon as practicable, but no more than 14 days after construction activity on a particular portion of the Site has temporarily or permanently ceased. Exceptions to this time requirement include: a) where construction activities will resume on the particular portion of the Site within 21 days; and b) where snow cover delays initiation of stabilization measures.
12. Place stockpiled topsoil on the Site away from natural drainages, in piles with side slopes of 50 percent to 70 percent. Install siltation fence around the base of the pile to prevent eroding soil from washing into drainages. Cover topsoil piles which are to remain for a period of 21 days or more with temporary seed and mulch immediately following stockpiling.
13. Conduct pavement sweeping to remove sediment and soil debris accumulation on pavement resulting from construction activity.

E. Noise Control

1. Provide methods, means, and facilities to minimize noise from construction operations.

2. Provide noise attenuation systems capable of meeting the federal and state Department of Environmental Protection Air Quality Control Regulations.
3. Construct sound enclosures or utilize other noise reduction techniques if the equipment does not meet the noise level requirements.
4. Submit a Noise Control plan for:
 - a. Night work: 7 p.m. – 7 a.m.
 - b. Pumping operations and Work which extend beyond regular working hours.
 - c. Any other Work as determined by the Engineer which warrants special noise prevention measures.

F. Pollution Control: as specified below.

1. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
 - a. Water Pollution Control
 - 1) Ensure that sediment, debris, petroleum, chemicals, or other contaminants will not enter existing drainage facilities and channels. Use construction methods that will prevent entrance of pollutants and wastes into existing streams, rivers, lakes, and flowing and dry watercourses.
 - 2) Obtain legal disposal sites and dispose of pollutants and wastes in a legal manner.
 - 3) Respond immediately to emergencies as directed when water quality of existing streams, rivers, lakes and flowing and dry watercourses is threatened. Take corrective action to remove or contain pollutants until a permanent solution is determined.
 - 4) Submit a plan and employ additional protective measures to prevent harm to wetland resource areas as shown on the Drawings.
 - b. Air Pollution Control
 - 1) Equipment and vehicles that exhibit excessive exhausts emissions due to poor engine adjustments or inefficient operation will not be permitted to operate until corrective repairs or adjustments are made.

- 2) Burning of materials from clearing or grubbing operations, combustible construction materials, and rubbish will not be allowed.

G. Traffic Regulation: as specified below.

1. Submit traffic control plans and coordinate with Owner and local agencies. Submit plan for traffic control to Owner for review 14 days in advance of any Work within public right-of-way, street closure or detour.
2. Provide and maintain traffic control and maintenance devices in accordance with Part 6, Temporary Traffic Control, of the "Manual on Uniform Traffic Control Devices for Streets and Highways", published by the U.S. Department of Transportation, Federal Highway Administration and other applicable codes and standards as specified. Operate devices 24 hours per day as required.
 - a. Comply with applicable portions of the "Massachusetts Amendments to the 2009 Manual on Uniform Traffic Control Devices and the Standard Municipal Traffic Code" published by the Massachusetts Department of Transportation Highway Division.
 - b. Comply with relevant provisions of Section 7.00 of the MassDOT Standard Specifications and Supplements, and the following.
 - 1) The intent of posting police details is to ensure public safety and protection of property through appropriate traffic control. Police personnel are not to be employed as watchmen to protect the Contractor's equipment and materials.
 - 2) All uniformed traffic police personnel required for traffic control for construction shall be authorized by City of Quincy Police Department.
 - 3) Payment will be made by Owner for City of Quincy authorized uniformed traffic police only.
 - 4) Submit a forecast weekly traffic police detail schedule, at least 72 hours prior to the start of the Work describing: the nature and location of the Work, the number of police personnel, the estimated number of police hours required for each location, and justification for each uniformed officer being requested. Payment to the police for work under this Contract shall be in accordance with the Massachusetts General Laws, Chapter 149, Section 34B.

- 5) If uniformed police have been arranged to work, and weather or some other situation prohibits the Work, notify the Police Department Detail before 5:30 a.m. on the day of intended Work to cancel the work order. Unless the work order is canceled in time, the Contractor shall be charged at the rate of minimum four hours for each officer included in the detail and shall be fully responsible for payment of all charges thus incurred.
3. Provide for access by emergency vehicles, such as police, fire, and disaster units at all times. Contractor shall be liable for damages resulting from failure to provide such access.
4. During construction hours, traffic flow must be controlled by uniformed traffic police officers or other traffic controllers allowed by Laws and Regulations. The services of traffic controllers shall in no way relieve the Contractor of its responsibilities under the Contract.
 - a. Police details will be direct billed to the Contractor and reimbursed through Item 53 – Owner's Contingency Allowance for Traffic Police Details per Section 01 20 25.
5. Maintain minimum of two moving lane on roadways at all times.
 - a. Where detours are permitted, provide necessary barricades, flashers, flashing arrows and signs in accordance with referenced Manuals and Laws and Regulations.
 - b. Provide gravel borrow and bituminous concrete to maintain temporary passable travel lane ramps, temporary bridging, steel plates, temporary pavement, wood-framed walkways, caution, safety and other necessary signs directing the pedestrian and vehicular traffic towards unblocked and safe areas.
 - c. Except when road closure and road blockage permits are obtained, maintain two lanes of traffic (one in each direction) on Walter Hannon Parkway throughout construction and during non-working hours to the maximum extent possible.
6. Provide safe access/egress to businesses and abutting property owners within the Project area. In areas where the construction activity is in progress, provide directional signs in front of businesses indicating "OPEN FOR BUSINESS" or similar for guidance of customers.
 - a. Certain construction operations such as utility work and roadway/sidewalk reconstruction may restrict access/egress on some roads and to businesses and abutting property owners. Under these circumstances, schedule operations during off-peak hours or

- late evenings with Owner approval so that a particular work activity can be completed in the shortest possible time.
- b. Provide 48 hours' notice to businesses and abutting property owners when access/egress will not be available or restrictions will exist.
 - 7. Exercise particular care to establish and maintain such methods and procedures that will not create hazards.
 - a. Remove or properly cover traffic control, safety devices and/or signs having messages that are irrelevant to normal traffic conditions at the end of each Work period. Keep signs clean at all times and provide that legends are distinctive and unmarred.
 - b. Place excavated material and construction equipment so that vehicular and pedestrian traffic is maintained at all times unless road closure permit is obtained. If the Contractor's operations cause traffic hazards, implement appropriate safety measures immediately.
 - c. In areas of high pedestrian and vehicular traffic volume, remove waste materials and construction equipment from the Work Site on a daily basis. Do not park construction equipment overnight on the Site or the adjacent roads unless permitted by Owner.
 - d. Provide night watchmen where special hazards exist.
 - 8. Post signage clearly stating that any vehicle impeding the progress of construction will be towed at the vehicle owner's expense. Towing charges incurred by Owner for Contractor's failure to post such signs will be borne by the Contractor.

1.05 REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, and facilities before Final Application for Payment inspection.
- B. Remove temporary underground installations and grade Site as indicated. Clean and repair damage caused by installation or use of temporary utilities, facilities, and controls.
- C. Restore existing facilities and areas used during construction to original condition. Restore permanent facilities used during construction to specified condition.

END OF SECTION

SECTION 01 51 40

TEMPORARY SEWAGE BYPASS

PART 1 – GENERAL

1.01 SUMMARY

- A. Provide, operate, and maintain a functional bypass pumping system capable of bypassing each area of Work without leakage or spillage of sewage upon the ground or streets or back up of sewage into any building or onto any property for the duration of the Project.
- B. Design Requirements:
 - 1. Provide a bypass pumping plan designed by a professional engineer registered in the state where Project is located.
 - 2. Provide temporary bypass pumping adequate to handle dry weather and wet weather flows and to protect against surcharging of the existing system upstream of the Work area.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: in accordance with Division 01 General Requirements.

1.04 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
 - 1. Bypass pumping plan for each bypass location, stamped by a professional engineer registered in the state in which the Project is located, prior to implementation and prior to the start of construction
 - 2. Minimum contents of sewage bypass pumping plan:
 - a. Standard Operating Procedure: Describe the normal sequence of events to be followed while pumping and setting up and breaking down pumping equipment. Plan must address strategies and safeguards to ensure that public safety and environmental health is maintained at all times, the possibility of property damage and wetlands impacts, and overall level of inconvenience is minimized. Plan shall include a bypass routing diagram for each Work zone,

estimates of anticipated bypass flows, an emergency response plan, and a list of the equipment that will be used.

- b. Layout drawing showing locations of equipment on Site and how access to the Site is maintained
- c. Equipment lists
- d. Pump curves and motor and engine data demonstrating equipment is sufficiently sized to meet all specified and anticipated operating conditions
- e. Notification form
- f. Emergency Response Plan: Describe the intended means of handling the following situations, including response and clean-up measures, and emergency backup power or backup fuel storage. List equipment to be used and where it will be stored.
 - Break or failure of bypass line (pipe)
 - Failure of bypass pump
 - Overflow
 - Back up into dwelling or onto private property
 - Failure of bypass pumping system to accommodate flow

3. Shop Drawings for equipment and materials including, but not limited to:

- Pumps
- Engines and/or Motors
- Sound Enclosures
- Pipe or hose
- Joints/couplings
- Plugs and/or bladders

4. Statement of Qualifications demonstrating experience of the firm in accordance with Article 1.04 and listing a minimum of 20 successful bypass pumping projects conducted in the last ten years. Provide contact information for no fewer than 5 of these projects which:

- Have been completed in the last 5 years,
- Involved similar equipment to that proposed for this Project, and
- Had duty capacities of not less than 3 mgd.

1.05 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

- B. Qualifications: per Division 01 General Requirements and as follows.
1. Bypass pumping system shall be provided, operated, and maintained by a firm which has been regularly engaged in providing bypass pumping for a minimum of 10 years.

1.06 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.
- B. The Project area consists of active sanitary sewers; therefore, flows and flow data are variable depending on location and conditions. Visit the Work locations prior to start of Work to visually inspect flow conditions as necessary.
- C. Portions of the Project are subjected to infiltration and inflow. Account for infiltration and inflow volume in the planning and conduct of the Work.

PART 2 – PRODUCTS

2.01 BYPASS PUMPING SYSTEM

- A. Godwin Pumps (a Xylem brand)
- B. Griffin Dewatering
- C. Rain for Rent
- D. Or equal

2.02 PUMPS, PIPES & FITTINGS

- A. Provide pumps suitable for use with raw, unscreened sewage and capable of conveying the volume of flow anticipated with a sufficient margin of safety. Provide for 100 percent redundancy (2 pumps the Site for every 1 pump required) if flow cannot be returned to the sewer at any time if pumping system failure occurs.
 1. Redundant pumping: suction and discharge piping with quick connect couplings to facilitate change out of pumps.

PART 3 – EXECUTION

3.01 GENERAL

- A. Maintain flows under all flow conditions. Adequately handle flows, even instantaneous peak flows, without damage or overflow, providing for potential large instantaneous flow contributors connected to the sewer under repair.
- B. Allow for passage of traffic and protect bypass piping at driveway and street crossings.
- C. Coordinate bypassing with low-flow times to the extent possible. Prevent overflows or backups.
- D. If Contractor determines bypass pumping is not required at a location due to lack of flow or determines that a Work item does not require bypass pumping to be performed, and Engineer agrees, protect flows from construction debris and ensure no debris enters the sewer system.
- E. Repair damage to existing pipes and structures to the satisfaction of the Engineer.
- F. Prevent sanitary flow from discharging into salt or fresh water body by means of overflow, bypass pumping, or other methods.
- G. Restore normal service to entire system at end of normal working hours each day.

3.02 SHUTDOWN

- A. Deliver approved notification form by hand to each residence and business whose service will be disrupted a minimum of 48 hours in advance of the intended shutdown (e.g. prior to disconnecting a service on Tuesday, provide notification on the previous Friday.)
 - 1. Notification less than 48 hours is unacceptable. Costs associated with delays caused by the Contractor's failure to meet this requirement shall be considered delays within the Contractor's control and at Contractor's expense.
- B. Leave a notice at the primary entrances to each housing unit and business unit in the Project area (e.g. provide 2 notices at duplexes). Leave notices in a conspicuous location reasonably free from damage. Do not use mailboxes.

3.03 TEMPORARY POWER

- A. Provide fuel and power to run bypass pumps at no additional cost to Owner.

3.04 PIPING

- A. Provide that piping system has adequate water tightness. Perform a leakage test with clean water at Engineer's direction, at no additional cost to Owner.
- B. Lay temporary piping along the general lines of streets or roadways in a manner that causes the minimum amount of disruption and is least likely to be damaged. Use temporary bituminous pavement, cold patch, or other approved material to form a ramp on each side of the pipe or depress the pipe at driveways to allow for property owners to drive over the temporary pipe as directed by the Engineer.

3.05 OPERATION AND MAINTENANCE

- A. Continuously monitor bypassing operations regardless of duration or timing of bypassing. Unattended bypass pumping is prohibited.
- B. Arrange for bypass pumping past working hours with Engineer and provide adequate sound attenuation and an attendant.
- C. Do not allow leaks in bypass pumping systems. Clean and disinfect leaks at no additional cost to Owner.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 01 51 42

TEMPORARY STORMWATER DRAINAGE BYPASS

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. Furnish, install and maintain temporary measures for storm drain bypass, including but not limited to, temporary bypass piping, plugs, and pumping.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: in accordance with Division 01 General Requirements.

1.04 SUBMITTALS

- A. Submit in accordance with the Division 01 General Requirements.
- B. Bypass Pumping Plan for **each** bypass location to Engineer and Owner 2 weeks prior to bypassing stamped by a professional engineer registered in the state where Project is located.
- C. Bypass Pumping Plan must contain at a minimum:
 1. Standard Operating Procedure: Describe the normal sequence of events to be followed while setting up, pumping, and breaking down pumping equipment. Plan must address strategies and safeguards to ensure that public safety and environmental health is constantly maintained, the possibility of property damage and wetlands impacts, and overall level of inconvenience is minimized.
 2. A bypass routing diagram including pump location for **each** Work zone,
 3. Calculations: estimates of anticipated peak flows, pump rates, pump curves, and other relevant design.
 4. List of the equipment that will be used during normal pumping operation.
 5. Emergency Response Plan: Describe the intended means of handling the following situations, include both response and clean-up measures. List equipment to be used and where it will be stored in case of emergency:

- a. Break or failure of bypass line (pipe)
 - b. Failure of bypass pump
 - c. Overflow
 - d. Back up into dwelling or onto private property
 - e. Failure of bypass pumping system to accommodate flow.
- D. Shop Drawings for equipment and materials including, but not limited to:
- 1. Pumps
 - 2. Pipe or hose
 - 3. Joints/couplings
 - 4. Plugs and/or bladders

1.05 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 PUMPS, PIPES & FITTINGS

- A. Pump: suitable for usage with storm drainage and capable of conveying the volume of flow anticipated with a sufficient margin of safety. Provide for 100 percent redundancy (two pumps shall be provided at the Site for every one pump required) if flow cannot be returned to the storm drain at any time if pumping system failure occurs. Redundant pump: include suction and discharge piping and quick connect couplings to facilitate change out of pumps.
- B. Pipe and fittings: constructed of carbon steel, or fused high-density polyethylene pipe or approved equal. Fittings shall be quick-disconnect type.
- C. Lay flat hose: extra heavy duty, highly abrasion resistant and fitted with gasketed couplings. Hose shall be rated for 150 percent of working pressure.
- D. Provide a temporary enclosure for the bypass pumping system for sound attenuation operating outside of regular working hours meeting state and local Laws and Regulations for noise requirements.

PART 3 – EXECUTION

3.01 GENERAL

- A. Adequately bypass flow around the affected section of the Work, even instantaneous peak flows, without damage or overflow. Be aware of potential large instantaneous flow contributors connected to the storm drain under repair.
- B. Allow for passage of traffic. Protect bypass piping at driveway and street crossings.
- C. Maintain roadway drainage system during precipitation events to prevent flooding of public right-of-way and adjacent properties.
 - 1. Protect against surcharging of the existing system upstream during dry weather and wet weather flows.
 - 2. Protect Site from flooding. Provide measures to adequately isolate the Site from backflow of adjacent waterways to provide dry working conditions.
- D. Continuously monitor bypass operations regardless of duration or timing of bypassing.
- E. Coordinate bypassing with low-flow times, to the extent feasible. Ensure no overflows or backups occur.
- F. Temporary damming of waterways is not allowed.
- G. If it is determined that bypass pumping is not required at a location due to lack of flow or that a Work item does not require bypass pumping to be performed, and the decision is agreed upon by the Engineer, provide protection of flows from any construction debris and ensure that no debris enters the storm drain system.
- H. Bypass Pumping
 - 1. Bypass storm drain pumping: a typical manhole to manhole or catch basin to manhole bypass pumping setup.
 - 2. Submit a bypass plan to Engineer prior to implementation of such Work and prior to the start of construction.
- I. Restore normal service to entire system at the end of normal working hours every day or post an attendant on Site.
- J. Repair any damage that occurs to existing pipes and structures to the satisfaction of the Engineer.

- K. Temporary Bypass will be considered incidental to the Work to be performed, unless otherwise indicated.

3.02 FLOW DATA

- A. Active storm drains exist in the entire Project area. Therefore, flows and flow data are variable depending on location, weather conditions and tides. Visiting areas of the Site prior to Work to visually inspect flow conditions is encouraged. Maintain flows as specified under all flow conditions.
- B. Portions of the Project area are subject to groundwater inflow. Account for groundwater infiltration in the planning and conducting the Work.

3.03 TEMPORARY POWER

- A. Provide fuel and/or power to run pumps associated with the bypass at no additional cost to the Owner. Include emergency backup power or backup fuel storage as part of the Bypass Pumping Plan.

3.04 PIPING

- A. Lay temporary piping along the general lines of the street in a manner that causes the minimum amount of disruption and is least likely to be damaged. Make provisions at driveways, provisions to permit property owners to drive over the temporary pipe by use of temporary bituminous pavement, cold patch, or other approved material to form a ramp on each side of the pipe to the satisfaction of the Engineer or by depressing the pipe as directed by the Engineer.

3.05 OPERATION AND MAINTENANCE

- A. Constantly attend the bypass system. Provide an attendant if bypass pumping must continue beyond working hours.

END OF SECTION

SECTION 01 57 17

TEMPORARY RODENT CONTROL

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide temporary rodent control for areas of construction by a licensed rodent exterminator in accordance with this Section.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1.04 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

1. Name, contact information, and license information for rodent exterminator to be retained for the duration of the Project
2. Pre-construction inspection notification
3. Rodent control plan showing number and location of bait stations, property information where bait stations will be located, and any additional actions to be taken to prevent or mitigate rodent activity and presence, including identification of pesticides to be used as well as manufacturer instructions, warnings, and safety data sheets (SDS)
4. Template and completed property owner permission forms for all properties included in rodent control plan. Form should include at a minimum a summary of rodent control activities and bait stations to be included on the property, schedule for rodent control activities, property owner information, and signature of property owner and date.
5. Records of property owner(s) who declined permission to implement rodent control activities.

6. Licensed rodent exterminator's logbook including a diagram with locations of all bait stations, SDS for pesticides being used, and rodent exterminator's license and insurance information. Logbook must be available for inspection upon request by the Owner's Health Department and Inspectional Services.
7. Rodent control reports within 7 days after each treatment that document, at a minimum, the locations of treatments, percentage of bait consumed, and any rebaiting or rodent control related activities.

1.05 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Qualifications of rodent exterminator: per Division 01 General Requirements and as follows.
 1. Licensed and insured in Massachusetts

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

- A. Ensure that the rodent exterminator complies with the following.
 1. Perform a pre-construction baiting and a maintenance baiting program extending for duration of construction activities.
 2. Respond to changes in rodent populations and rodent related complaints associated with the construction activities in addition to rodent control guidelines and measures determined.
 3. Follow minimum steps specified in order to control and/or eliminate the rodent population and performs these steps per street or Work area for Work on multiple non-contiguous streets or Work areas. These steps are provided as guidelines only and do not supersede the judgement and measures deemed necessary by rodent exterminator.
 4. Coordinate with Quincy Health Department and Inspectional Services.

3.02 SITE INSPECTION

- A. At least 45 days prior to commencement of Work, notify public and private property owners within 300 feet of construction activities of investigations 2 days ahead of investigation.
- B. Inspect public and private areas within 300 feet of construction activities. Investigate signs of rodent activity as a basis for the rodent control plan.
- C. In preparation for providing rodent control for public and private premises impacted by related rodent activity within a 300-foot radius of Project limits:
 1. obtain written permission, via the property owner permission form identified in Section 1.04 above, from public and private property owners where bait will be placed, or for other rodent control activities; and
 2. identify property owners who declined permission to implement rodent control activities on their property and reason for declining permission if known. Submit records to the Quincy Health Department and Inspectional Services.

3.03 FIRST SERVICE - PRE-CONSTRUCTION

- A. Provide rodent control for any premises, public and private, impacted by related rodent activity within a 300-foot radius of Project limits per the approved rodent control plan.
- B. Perform sub-surface baiting treatment to sewer and drain lines within a 300-foot radius of construction activities. Make pesticide applications with bait formulations labeled for use in sewers and drains.

3.04 SECOND SERVICE FOLLOW UP / PRE-CONSTRUCTION

- A. At least 7 to 10 days after First Service, re-inspect public and private areas within a 300-foot radius of construction activities. Re-treat active locations.
- B. Perform sub-surface treatment. Rebait / re-treat active sewer and drain lines treated during First Service.

3.05 THIRD SERVICE FOLLOW UP / PRE-CONSTRUCTION

- A. At least 10 to 14 days after Second Service, re-inspect public and private areas within a 300-foot radius of construction activities. Re-treat active locations.
- B. Perform sub-surface treatment. Rebait / re-treat active sewer and drain lines.

3.06 PERIODIC SERVICE / MAINTENANCE DURING CONSTRUCTION

- A. Every 2 weeks after Third Service, re-inspect public and private areas within a 300-foot radius of construction activities. Re-treat active locations.
- B. Perform sub-surface treatment. Rebait / re-treat active sewer and drain lines.

3.07 FINAL SERVICE / POST CONSTRUCTION

- A. At least 20 days after Substantial Completion, rodent exterminator shall retrieve all baits, traps, pesticides and other materials and equipment deployed for rodent control from public and private areas and sewer and drain lines.
- B. Notify Quincy Health Department and Inspectional Services upon completion of final service.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies general requirements for products, materials and equipment. This Section applies to all Specifications and Drawings and provisions of this Section may be supplemented in other sections of Division 01.
- B. Certain provisions required by Laws and Regulations may be referenced. Contractor is responsible to determine and obtain applicable Laws and Regulations and to review and interpret the full text of such Laws and Regulations.
- C. Section Includes

1.02 SOURCE QUALITY CONTROL

- General
- Independent Testing Agency Certification
- Factory Testing

1.03 PRODUCT REQUIREMENTS

- General
- Transportation and Handling
- Storage and Protection

1.04 WARRANTIES

1.02 SOURCE QUALITY CONTROL

- A. General
 - 1. Subject material and equipment furnished under the Contract Documents to a complete factory testing program as specified.
 - 2. Shop Drawings and submittals: reviewed by Engineer before initiating testing program.
 - 3. Perform checks and tests in accordance with manufacturer's recommendations and referenced standards.

4. Evaluate test results and advise Owner immediately of any discrepancy between test results and test limits or the failure of any device or system under test. Include test limits for acceptability applicable to each test on the certified test records.
 5. Record test information, including the evaluation of testing results, on forms approved by Owner and Engineer.
- B. Independent Testing Agency Certification
1. If specified, furnish certificates from an independent testing agency.
 2. Independent testing agency to certify that material and equipment components have been examined and tested and are in conformance with the requirements specified in the Contract Documents.
 3. Take Samples in accordance with the requirements specified in the Contract Documents, as selected by Owner or independent testing agency. Furnish and ship at no additional cost to Owner.
- C. Factory Testing
1. Provide 14 days prior written notice of factory inspections and tests to Owner and Engineer.
 2. If failure to give proper written notice results in material and equipment being assembled or covered before a factory inspection or test, make material and equipment ready for inspection or test and reassemble or recover at no additional cost to Owner.
 3. Owner may inspect any portion of material and equipment furnished at any reasonable time during manufacture and may witness testing of any portion of material and equipment wherever located. Owner and Engineer to witness tests only.
 4. Furnish, set up and operate test equipment and facilities.
 5. If facilities for conducting required tests are unavailable to the manufacturer, conduct tests elsewhere or have them performed by an independent agency approved by Owner.
 6. Protect material and equipment after testing and checking to provide that subsequent testing of other equipment or systems does not disturb, damage or otherwise interfere with functional capability of material and equipment.

7. Assume responsibility for protection of material and equipment and safety of all personnel during factory testing program.
8. Grounds for rejection: failure to withstand tests; failure to meet ratings; failure to meet applicable standards.
9. In the event of failure
 - a. Submit revisions of documents requiring approval for changes required for rectification.
 - b. Obtain Owner's and Engineer's approval before making such changes.
 - c. Provide written details of any changes to be made not requiring approval.
 - d. Notify Owner and Engineer in writing before retesting.
 - e. Furnish new material and equipment which meets requirements of the Specifications if rejected material and equipment cannot be rectified to satisfaction of Owner and Engineer.
 - f. Retest after rectification in presence of Owner or Engineer.
10. Assume responsibility for all costs, including, but not limited to: loss or damage to materials and equipment resulting from testing; retesting; rectification; new material and equipment to replace damaged or non-rectifiable material and equipment; removal, furnishing, transportation, unloading, and installation of replacement material and equipment; and witness of testing by Owner and Engineer including travel, lodging, meals, and payroll.
11. Submit certified test reports which define tests, list results, and are signed by Contractor's representative, and copies of raw data collected during tests. Submission of certified test reports does not relieve Contractor of responsibility for material and equipment meeting requirements of the Contract Documents after installation.

1.03 PRODUCT REQUIREMENTS

- A. General
 1. Products include new material and equipment incorporated into the Work and may also include existing material and equipment required for reuse. This does not include machinery and equipment used for preparation, fabrication, conveying, installation and erection of the Work.
 2. Do not use materials and equipment removed from existing Work Site, except as specifically permitted.

3. Provide complete with accessories, trim, finished, safety guards, and other devices and details need for a complete installation and for the intended use or effect.
 4. Provide standard products which have been produced and used successfully on other similar projects for similar applications. Provide products which are likely to be available to Owner in the future for items required for maintenance and repair or replacement Work.
 5. Furnish interchangeable components of the same manufacturer, for similar components.
- B. Transportation and Handling
1. Transport and handle material and equipment in accordance with manufacturer's instructions.
 2. Notify Engineer and Owner in writing upon acceptance of a shipment.
 3. Promptly inspect shipments to assure that material and equipment comply with requirements, quantities are correct, and material and equipment are undamaged.
 4. Furnish equipment and personnel to handle material and equipment by methods to prevent soiling, disfigurement, or damage.
 5. Uncrate equipment and dispose of packing material properly.
- C. Storage and Protection
1. Store and protect material and equipment in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive material and equipment in weather tight, climate controlled enclosures.
 2. For exterior storage of fabricated material and equipment, place on sloped supports, above ground.
 3. Provide for bonded off Site storage and protection when Site does not permit on Site storage or protection.
 4. Cover material and equipment subject to deterioration with impervious sheet covering. Furnish ventilation to avoid condensation or potential degradation of material and equipment.
 5. Store loose granular materials on solid flat surfaces in a well-drained area. Avoid mixing with foreign matter.

6. Furnish equipment and personnel to store material and equipment by methods to prevent soiling, disfigurement, or damage.
7. Arrange storage of material and equipment to permit access for inspection. Periodically inspect to assure material and equipment are undamaged and are maintained in acceptable conditions.
8. After receipt of material and equipment, assume responsibility for loss and damage including but not limited to breakage, corrosion, weather damage, and distortion.

1.04 WARRANTIES

- A. Provide warranties for equipment and material in accordance with Paragraphs 6.19 and 14.03 of the Standard General and Supplementary Conditions, if any.
- B. Provide extended or special warranties as indicated in individual Specification sections.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies general execution requirements and startup/commissioning and performance testing for closeout of the Work. This Section applies to all Specifications and Drawings and provisions of this Section may be supplemented in other sections of Division 01.
- B. Certain provisions required by Laws and Regulations may be referenced. Contractor is responsible to determine and obtain applicable Laws and Regulations and to review and interpret the full text of such Laws and Regulations.
- C. Section Includes

1.02 OVERALL EXECUTION REQUIREMENTS

- Coordination
- Existing Conditions
- Field Engineering
- Record Documents
- Cutting and Patching
- Electrolytic Corrosion Prevention
- Quality Assurance and Control of Installation
- Manufacturers' Field Services
- Independent Testing

1.03 STARTUP, TESTING, AND COMMISSIONING

- Spare Parts
- Consumables
- Checkout and Starting Systems
- Starting, Adjusting, and Balancing
- Startup and Commissioning/Performance Testing
- Demonstration and Training

1.04 CLOSEOUT REQUIREMENTS

1.02 OVERALL EXECUTION REQUIREMENTS

A. Coordination

1. Conduct preconstruction and pre-installation meetings before commencing certain Work that requires coordination or has special requirements or approvals.
2. Comply with the required Work sequence and coordination as may be specified in Summary of Work and reflect in the Project scheduling.
 - a. Comply with working hours specified in Section 00 73 10.
3. Coordinate Work such that Work is completed with minimum disruption to residents and businesses.
4. Coordinate space requirements and installation of Work. Utilize spaces efficiently to maximize accessibility for other installations, maintenance, and repairs.
 - a. A primary Site restriction is the width of the streets and volume of traffic within the Project Site which may require partial blocking of the streets during construction. Coordinate with the City of Quincy Department of Traffic, Parking, Lighting and Alarm (TPAL), Fire Department and Police Department.
5. Coordinate Work of the various Specifications with interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.
6. Coordinate related Work at the Site in accordance with Article 7 of the Standard General and Supplementary Conditions, if any.
7. Coordinate completion and cleanup of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's partial occupancy.
8. After Owner occupancy of premises, coordinate access to Site for correction of defective Work and/or incomplete Work to minimize disruption of Owner's activities.

B. Existing Conditions

1. Paragraph 4.01 of the Standard General and Supplementary Conditions, if any, covers Availability of Lands.
2. Paragraph 4.02 of the Standard General and Supplementary Conditions, if any, covers Subsurface and Physical Conditions.

3. Pursuant to Paragraph 4.04 of the Standard General and Supplementary Conditions, if any, existence and location of Underground Facilities and other utilities and construction indicated as existing are not guaranteed. Before beginning Work investigate and verify the existence and location of Underground Facilities and other utilities and construction.
 - a. Conduct test pits and other utility research and properly restore utilities interfered with or damaged during construction at no cost to the Owner.
 - b. Engage a professional subsurface utility locator to verify the existence and location of underground utilities prior to starting Work at no cost to the Owner.
 - c. Contact DIGSAFE at www.digsafe.com or by dialing 811.
 4. Paragraph 4.05 of the Standard General and Supplementary Conditions, if any, covers Reference Points.
 5. Paragraph 4.06 of the Standard General and Supplementary Conditions, if any, covers Hazardous Environmental Conditions at Site.
- C. Field Engineering: as specified below.
1. Prior to initiating construction, engage an independent professional land surveyor registered in the state where the Project is located to provide surveys and permanent reference points for all bounds and property markers along the line of the Work that may be disturbed during construction. Submit copies of all ties to the bounds and property markers to the Engineer prior to excavation at the Site(s).
 2. Maintain surveyor's log of control and other survey work. Keep log available for reference.
 3. Verify layout information shown on the Drawings in relation to existing benchmarks before lay out of the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.
 4. Promptly report lost or destroyed reference points, benchmarks, or control points. Promptly report requirements relocate reference and control points due to changes in grades. Promptly replace lost or destroyed bounds or markers and control points based on the original survey control points utilizing the services of a professional land surveyor registered in the state where the Project is located. The cost of replacing markers disturbed by the Contractor's operations shall be at the Contractor's expense.

D. Record Documents

1. Provide record documents in accordance with Paragraph 6.12 of the Standard General and Supplementary Conditions, if any, and in accordance with Section 01 15 30.
2. Store record documents separate from documents used for construction. Record information concurrent with construction progress.
3. Legibly mark each item to record description of actual equipment and material installed and actual construction on the Drawings and approved submittals, including the following.
 - a. Manufacturer's name and equipment and material model and number
 - b. Material and equipment substitutions or alternates utilized
 - c. Approved changes
 - d. Measured depths of foundations
 - e. Measured horizontal and vertical locations of Underground Facilities and appurtenances, referenced to permanent surface improvements
 - f. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work
 - g. Field changes of dimension and detail
 - h. Details not on original Contract Documents or Shop Drawings

E. Cutting and Patching

1. Employ skilled and experienced personnel to perform cutting and patching.
2. Submit written request in advance of cutting or alteration which affects:
 - a. structural integrity of any element of Project;
 - b. integrity of weather exposed or moisture resistant elements;
 - c. efficiency, maintenance, or safety element;
 - d. safety, traffic, or hazard barriers;
 - e. visual qualities of sight exposed elements; and
 - f. work of Owner or separate contractor.

3. Execute cutting, fitting, and patching including excavation and fill to complete Work and to:
 - a. fit materials together, to integrate with other work;
 - b. uncover Work to install ill-timed Work;
 - c. remove and replace defective or non-conforming Work;
 - d. remove Samples of installed Work for testing when requested; and
 - e. provide openings in element of Work for penetration of mechanical and electrical work.
4. Execute Work by methods to avoid damage to other work and which will provide appropriate surfaces to receive patching and finishing.
5. Provide adequate temporary support for Work to be cut.
6. Restore Work with new materials in accordance with requirements of Contract Documents. Use materials identical with original materials where recognized that satisfactory results can be produced.
7. Provide protection from elements for areas which may be exposed by uncovering work.
8. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit. Restore exposed finishes of patched areas; and, where necessary extend finish restoration onto retained adjoining Work in a manner, which will eliminate evidence of patching.
9. Identify any Hazardous Waste, Hazardous Environmental Condition, or hazardous substance exposed during the Work to Owner for decision or remedy in accordance with Paragraph 4.06 of the Standard General and Supplementary Conditions, if any.
10. Cut work by methods least likely to damage Work to be retained and work adjoining. Cut Work with sawing and grinding tools, not with hammering, chopping, or burning tools. Cut masonry and concrete materials with masonry saw or core drill. Do not use pneumatic tools without prior approval. Core drill openings through concrete Work. Adhere to mandatory cutback requirements when saw cutting concrete and roadway openings.
11. Do not cut and patch structural Work in a manner resulting in reduction of load-carrying capacity or load/ deflection ratio.

12. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Maintain supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage and seal voids. For interior work at penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire resistant material, to full thickness of the penetrated element.
13. Do not cut and patch operational or safety-related components that reduce capacities to perform in manner intended. Do not cut and patch Work that reduces visual qualities. Remove and replace unsatisfactory cutting patching as directed by Engineer or Owner.

F. Electrolytic Corrosion Prevention

1. Prevent galvanic action, bimetallic corrosion, anodic or cathodic action, and electrolysis at all electrical grounds and for all galvanic scale (electromotive series or table of oxidation potentials). Do not allow contact of dissimilar metals further apart than 0.35 on the galvanic scale (electromotive series or table of oxidation potentials). The electrode potential of common metals is listed below.

	Electrode Potential Volts (Relative to Hydrogen)
Magnesium	+2.37
Aluminum	+1.70
Zinc+	+0.76
Chromium	+0.56
Iron and Steel	+0.44
Cadmium	+0.40
Nickel	+0.25
Tin	+0.14
Lead	+0.13
Copper	-0.34

2. Unless otherwise indicated, provide dielectric insulators between ferrous and nonferrous pipe and equipment.

G. Quality Assurance and Control of Installation

1. Monitor quality control of Subcontractors, Suppliers, manufacturers, material, equipment, services, Site conditions, and workmanship, to produce Work of specified quality. Conduct field quality control and testing specified.

2. Comply fully with manufacturers' installation instructions, including each step in sequence. If manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
3. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
4. Perform Work using persons qualified to produce workmanship of specified quality.
5. Install field Samples and mockups at the Site as required in Specifications for review. Acceptable Samples and mockups represent a quality level for the Work. Where field Sample or mockup is specified to be removed, clear area after field Sample or mockup has been accepted by Engineer or after Work is complete when mockup is to serve as a control reference.
6. Protect adjacent construction in accordance with Paragraph 6.13 of the Standard General and Supplementary Conditions, if any.

H. Manufacturers' Field Services

1. If required in the Specifications, arrange and pay for material or equipment Suppliers or manufacturers to provide qualified staff personnel (field representative) to perform the following services and services specified. Submit reports of activities, actions taken and test results to Engineer within 10 days of completion.
 - a. Observe Site conditions, conditions of surfaces and installation, quality of workmanship.
 - b. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
 - c. Assist with field assembly as required.
 - d. Furnish, setup, and operate required test equipment and facilities.
 - e. Perform and record results of manufacturer recommended inspections and tests, and tests specified for material and equipment.
 - f. Be responsible for protection of material and equipment and safety of all personnel during testing.
 - g. Perform any other services normally provided by field representative's company.
 - h. Instruct operating personnel in proper use of material and equipment.

- i. Instruct and supervise field repairs before acceptance by Owner.

I. Independent Testing

1. Employ and pay for specified services of an independent firm in accordance with Paragraph 13.03 of the Standard General and Supplementary Conditions to perform inspection and testing as may be specified except where responsibility for a specific inspection or test is expressly allocated to Owner in the Specifications or by Laws and Regulations.
2. Reports will be submitted by the independent firm to Owner, in duplicate indicating observations and results of tests and indicating compliance or noncompliance with Contract Documents.
3. Inspection, testing, and source quality control may occur on or off the Project Site.
4. Cooperate with independent firm. Furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
5. Notify Owner and independent firm 24 hours before expected time for operations requiring services.
6. Make arrangements with independent firm and pay for additional Samples and tests required for Contractor's use.
7. Retesting required because of nonconformance to specified requirements will be performed by the same independent firm if instructed by Owner. Payment for retesting will be charged to Contractor by deducting inspection or testing charges from the Contract Price.
8. Testing or inspecting does not relieve Contractor from performing Work in accordance with requirements of the Contract Documents.

1.03 STARTUP, TESTING, AND COMMISSIONING

A. Spare Parts

1. Provide spare parts required for construction, startup, testing and commissioning of the Work prior to achievement of Substantial Completion, including spare parts for flushing and consumable supplies such as bolts, nuts, gaskets, filters, insulating tape, etc., normally consumed in the startup, commissioning and testing.

2. If spare parts are to be purchased by Owner as specified, Contractor shall have the right to use the spare parts purchased by Owner provided that such spare parts are replaced prior to Substantial Completion at Contractor's expense. Replacement spare parts, replaced by Contractor, shall be new, unused and identical as the original spare part used.

B. Consumables

1. Provide initial fills of consumables including equipment lubricants, resins, chemicals, desiccants, and fuels. Provide subsequent fills if required during Warranty Period if acts or omissions of Contractor cause such consumables to require replacement.
2. Coordinate with Owner for consumables required.

C. Checkout and Starting Systems

1. Coordinate schedule for startup and operation of various equipment and systems with Owner.
 - a. Starting of systems shall be ongoing as facility shutdown is not allowed unless Contractor provides approved temporary bypass pumping.
2. Notify Owner 7 days before startup of each major piece of equipment or system, including a staffing request for Owner's operations and maintenance personnel required to adequately and safely support each specific start-up and operation activity.
3. Verify that each system or piece of equipment item has been assembled, constructed, or completed in accordance with the Contract and capable of functioning as intended.
4. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, magnetic center alignment, belt tension, control sequence, or other conditions which may cause damage.
5. Verify that each piece of equipment or system has successfully completed construction testing and cold commissioning, including hydrostatic testing, loop checks, relay checks, calibration, and continuity checks and that all tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
6. Verify wiring and support components for equipment are complete and tested.

7. Execute start up under supervision of responsible manufacturers' representative or Contractor's personnel in accordance with manufacturers' instructions utilizing Owner's qualified operations and maintenance staff trained by Contractor.
8. When specified in individual Specification Sections, require manufacturer to provide field representative to be present at Site to inspect, check and approve equipment or system installation before start up, and to supervise placing equipment or system in operation.

D. Adjusting and Balancing

1. Supply necessary equipment, material, construction power, and consumables (except for those provided by Owner) needed to startup and fully test the Work and replenish the same until Substantial Completion is achieved. Contractor may utilize Owner's operating spare parts, such use requiring timely replacement at Contractor's expense.
2. Coordinate as required for conduct of independent testing.
3. Perform specified and required adjusting and balancing concurrently to the maximum extent possible on individual equipment and systems and prior to startup and commissioning/performance testing.

E. Startup and Commissioning/Performance Testing

1. Conduct startup and commissioning/performance tests to demonstrate the Work meets the requirements of the Contract Documents, satisfies the Owner's requirements, and is in accordance with Paragraph 14.04. of the Standard General and Supplementary Conditions, if any. Conduct testing in accordance with individual Specifications.
2. Prepare and submit a written startup and commissioning/performance testing procedures no later than 60 days prior to start of testing for review and final test procedures no later than 30 days prior to start of testing. Submit a staffing request for Owner's operations and maintenance personnel.
3. Calibrate test equipment and instrumentation on Site or provide acceptable certificate of calibration conducted within 30 days of testing.
4. Complete functional testing prior to initiating the startup and commissioning/performance testing as specified.

5. Complete specified startup and commissioning/performance tests prior to Substantial Completion. Owner and Engineer will witness Performance Testing. Notify Owner and Engineer in writing at least 7 days prior to starting any startup and commissioning/performance testing. Coordinate for witnessing of tests by required regulatory representatives.
6. Submit written test reports.

F. Demonstration and Training

1. Provide formal demonstration and training of Owner's personnel as specified in individual Specifications.

1.04 CLOSEOUT REQUIREMENTS

- A. Substantial Completion shall have been achieved when the following has been completed and the requirements of Paragraph 14.04 of the Standard General and Supplementary Conditions, if any, have been met.
 1. Work is complete, systems are successfully operating, and final testing has been successfully completed.
 2. A full inventory of the spare parts and special tools purchased by the Owner are replenished and in the custody of the Owner.
 3. The Site has been restored to the satisfaction of the Owner.
 4. An inspection of the Work has been completed by the Engineer and the Owner.
 5. An updated Punch List is provided.
 6. The Contractor's written warranty and guarantee has been submitted as required by Paragraph 6.19.D. of the Standard General and Supplementary Conditions, if any.
 7. A Certificate of Substantial Completion has been provided in accordance with Paragraph 14.04.C. of the Standard General and Supplementary Conditions, if any.
- B. The Contractor shall have sole care, custody, and control of the Work until achievement of Substantial Completion. During the period between Substantial Completion and the date for Final Completion, Contractor shall be given access to correct items on the Punch List and achieve Final Completion.
- C. The date of achieving Substantial Completion is the date set forth in the Certificate of Substantial Completion that is accepted and signed by the Owner.

- D. Final Completion shall have been achieved when the Work is complete, the requirements of Paragraphs 14.06 and 14.07 of the Standard General and Supplementary Conditions, if any, have been met, and when the following is complete.
1. Substantial Completion has been achieved and liquidated damages for failure to meet Substantial Completion Date have been paid.
 2. All Work including Punch List Items has been completed.
 3. Final cleaning has been conducted and Contractor equipment and supplies including waste materials have been removed from the Site and legally disposed of.
 4. A full set of record documents have been submitted as specified in subparagraph 1.02.D above and Contractor's written warranty and guarantee has been resubmitted if adjusted.
 5. Inspections required by Laws and Regulations are complete. Certificates and permits to occupy and operate have been issued if required.
 6. Spare parts, maintenance and extra materials have been delivered in quantities specified to Project Site and stored as directed.
 7. A request for final inspection in accordance with Paragraph 14.06 of the Standard General and Supplementary Conditions, if any, has been submitted to the Engineer and the inspection has been completed and the results accepted by the Owner.
 8. A Final Application for Payment has been submitted to the Engineer identifying total adjusted Contract Price, previous payments, and balance due along with required documentation in accordance with Paragraph 14.07.A. of the Standard General and Supplementary Conditions, if any.

END OF SECTION

SECTION 02 41 14

SELECTIVE SITE DEMOLITION AND RESTORATION

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide Site demolition including clearing, stripping or ordinary excavation of existing bituminous or cement concrete pavements, soils, foundations, bituminous or cement concrete curbs, bituminous or cement concrete sidewalks, grassed areas, demolition, dismantling, replacement and restoration Work, stacking of reusable and disposal of waste and surplus materials and tree protection and removal in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Requirements
 - 1. Section 32 90 00 – Planting
- C. Related Documents
 - 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. MassDOT
 - a. Standard Specifications and Supplements and Construction Details

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.

- B. Closeout and maintenance material submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

- A. Perform selective Site demolition in accordance with MassDOT Section 100.
- B. Comply with General Requirements for temporary construction controls, protections, and waste disposal.
1. Ensure against damage or injury to buildings, occupants, and adjacent property from falling debris or other causes. Avoid damage to adjacent areas, facilities, and appurtenances.
 2. Maintain free and safe passage to and from Site.
 3. Legally dispose of waste, surplus and unsatisfactory materials including bituminous or cement concrete, debris, rails and ties, common excavation, cold planing, and reclamation immediately as it accumulates during clearing, grubbing, stripping, demolition, and other Site preparation. Burying is not allowed.

3.02 SITE DEMOLITION

- A. Clear Site of construction debris and waste materials, including grass, bushes, trees, broken concrete, fencing, pipes, lumber and steel pieces, rags and plastics, within limits of Work as shown on Drawings or as directed.
- B. Strip or excavate existing bituminous or cement concrete pavements, soils, foundations, bituminous or cement concrete curbs, bituminous or cement concrete sidewalks, and grassed areas.

- C. Remove, stack, store and protect field stone masonry wall sections to be reinstalled as necessary to construct drainage improvements or other parts of Work.
- D. Remove and stack fencing, lamp posts, letter boxes, signs, guardrails, bike racks, poles and other usable materials to be reinstalled.
- E. Demolish and remove existing bituminous pavement, bituminous and concrete walkways, curbing, grass borders and landscaping, bushes, shrubs and vegetation as necessary. Remove existing obstructions and debris, cut trees, bushes, root stumps, waste stones, wood, lumber, metal, plastic, and other unsuitable materials, above, at, or below grade that may interfere with or obstruct the Work, whether or not shown on Drawings.
- F. Remove and stockpile top soil, curb stones, utility castings and other materials for reuse as shown or directed by Engineer.
- G. Stockpile recovered materials acceptable to Engineer to be reused on Project and protect against damage or deterioration.
- H. Do not cut, remove, destroy, or trim trees and shrubs unless specifically marked or permitted. Do not remove tree branches using excavating equipment. Provide that required trimming is performed by an arborist licensed in the state where the Project is located.
 - 1. Protect trees or vegetation outside limits of Work area.
 - 2. Tree Removal (4-48 inches in diameter)
 - a. Cut existing trees and expose by excavation, remove or cut, as required, tree stumps and root systems as shown on Drawings and as directed. Remove and legally dispose of tree stumps, roots, organic matter and unsuitable materials.
 - b. Excavation around tree not to exceed width of sidewalk.
 - c. Depth of excavation for stump removal not to exceed 5 feet.
 - d. Depth of excavation for removal of tree root system not to exceed 2 feet.
 - e. Cut clean and remove root system encountered within limits of sidewalk width as determined by Engineer. Paint cut surfaces of remaining detached roots with stump rot. Clean and paint tree roots still attached to trunk with 2 coats of approved chemical root guard.
 - f. Transport and stack existing tree grates in good condition, not needed for Project, or legally dispose of as directed by Engineer.

- I. Protect integrity of remaining structures, appurtenances and equipment during demolition, removal and alteration to existing structures, appurtenances, utility pipes, castings, fences, walkways, posts, stairs and other physical features.
- J. Maintain slopes longitudinally and laterally to ensure proper and continuous drainage. Field adjust sidewalk and roadway gutter grades at driveways and side street intersections to be consistent with existing drainage pattern and provide for an appropriate transition between new and existing side streets and driveway pavement surfaces at intersections.
- K. If cobblestones are encountered, carefully stack excavated cobblestone.
- L. Leave abandoned underground piping in place, plug or cap and fill with flowable control density fill. Remove or cut abandoned underground piping castings a minimum 12 inches below finished surface and area backfilled.
- M. Cut sections of piping to be removed to nearest solid support or provide appropriate new supports and cap remaining ends before backfilling, unless noted on Drawings or directed by Engineer.
- N. Cut openings in existing masonry Work to provide for a suitable bond. Clean, square and plumb openings for installation of new Work. Thoroughly clean cut surfaces of loosened materials.

3.03 SAWCUTS IN EXISTING PAVEMENTS AND SIDEWALKS

- A. Neatly saw cut edges of excavations in existing pavements and sidewalks along either a straight line or design curved line as shown in Drawings. Ragged, uneven edges are not acceptable.
- B. Saw cut existing pavement through its full depth or to elevation of abutting pavement subgrade, whichever is less, at joints between existing and proposed pavements, and at utility trenches through existing remaining pavement. Provide a uniform, vertical surface for pavement joint with existing pavement.
- C. Neatly saw cut edges that become broken, ragged or undermined with minimum disturbance to remaining pavements or sidewalks, prior to placement of abutting pavement.
- D. In areas where existing concrete sidewalk abuts a building, wall or storefront, and sidewalk is to be reconstructed or removed, saw cut existing sidewalk a minimum of 6 inches from building wall or storefront, unless otherwise directed by Engineer.
- E. Spray or paint saw cut surfaces with a uniform thin coat of RS-1 asphalt emulsion immediately before placement of hot mix asphalt material against surface.

3.04 REPAIR, REPLACEMENT AND RESTORATION

- A. Match materials of repair or restoration to existing adjacent surfaces in finish and texture as closely as possible. Make joints between new and existing Work inconspicuous.
- B. Replace or restore items damaged, dislocated or dismantled such as field stone masonry walls, fences, lamp posts, letter boxes, masonry boundary walls, City signs, poles, bollards, curb stones, markers, trees, bushes, grassed areas, walkways, stairs, steps, benches, outside lighting and other amenities and physical features designated to remain, to original condition.
- C. Re-plant trees designated on Drawings in accordance with Section 32 90 00.

3.05 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.06 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 02 41 13.26

EXISTING STRUCTURE REMOVAL

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide removal of existing structures in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Requirements
 - 1. Section 31 00 00 – Earthwork
 - 2. Section 33 31 00 – Sanitary Utility Sewerage Piping
 - 3. Section 33 39 00 – Sanitary Utility Sewerage Structures
 - 4. Section 33 41 00 – Storm Utility Drainage Piping
 - 5. Section 33 49 00 – Storm Utility Drainage Structures

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. MassDOT Standard Specifications and Supplements, except for Compensation sections
 - 2. MassDOT Construction Details
 - 3. Applicable portions of City of Quincy Code of Ordinances and Zoning Ordinances

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 REMOVAL

- A. Remove drainage structures identified in accordance with MassDOT Section 140 and Drawings.
- B. Remove and stack cast frames, covers and grates.
 1. Legally dispose of castings if Owner does not keep, or castings are deemed not serviceable by Engineer.
- C. Plug inlets and outlets and remove masonry and concrete, or provide new piping and pipe connections across footprint of removed structure in accordance with Sections 33 31 00 and 33 41 00.
- D. Fill cavity with control density fill specified in Section 31 00 00.

3.02 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.03 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 02 41 13.27

EXISTING STRUCTURE MODIFICATIONS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide adjustment and remodeling to existing structures/appurtenances in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Requirements
 - 1. Section 31 00 00 – Earthwork
 - 2. Section 33 39 00 – Sanitary Utility Sewerage Structures
 - 3. Section 33 49 00 – Storm Drainage Structures

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. MassDOT Standard Specifications and Supplements, except for Compensation sections
 - 2. MassDOT Construction Details
 - 3. Applicable portions of City of Quincy Code of Ordinances and Zoning Ordinances

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.

- B. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

- A. Adjustment and remodeling of structures identified in accordance with MassDOT Section 220 and Drawings.
- B. Remove and stack cast frames, covers and grates.
1. Legally dispose of castings if Owner does not keep, or castings are deemed not serviceable by Engineer.
- C. The Owner shall assist the Contractor with the available information on the existing public utility structures (sewer and drain manholes, catch basins, etc.) located along the streets and sidewalks.
- D. Similar information on private utility appurtenances/structures (gas, electric, telephone, etc.) shall be obtained by the Contractor from the respective utility companies operating in the area. The Contractor shall coordinate adjustment of private utility appurtenances/structures with the respective utility companies, as needed.
- E. The Contractor shall be fully responsible for the physical location of each of the utility appurtenances. This includes exposing the appurtenances/structures already paved over or discovered during the Contractor's construction operations.
- F. The Contractor shall not pave over any of the utility appurtenances/structures unless specifically directed otherwise, in writing, by the Engineer.
- G. If during the course of the work, a defective casting is encountered, the Contractor shall remove it as directed by the Engineer. A new casting shall be installed by the

Contractor. This shall not include any castings damaged by the Contractor, which shall be repaired or replaced by the Contractor at their expense.

3.02 ADJUSTMENT

- A. The work shall consist of adjusting the elevation of the casting/box where the line or grade requires a change less than or equal to six-inches (6") at the existing structure.
- B. For structures/appurtenances in the roadway itself, the excavated area will be refilled with gravel sub-base with the casting set into a concrete collar.
- C. The new elevation of the structure/appurtenance shall be determined by the Engineer and all necessary work shall be done under this direction.

3.03 REMODELED

- A. The work shall consist of remodeling the cone of the structure where the line or grade requires a change greater than six-inches (6") at the existing structure.
- B. For structures in the roadway itself, the excavated area will be refilled with gravel sub-base with the casting set into a concrete collar, overlain with 3-inch thick bituminous concrete top course.
- C. The new elevation of the structure shall be determined by the Engineer and all necessary work shall be done under this direction.

3.04 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.05 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 03 11 00

CONCRETE FORMING

PART 1 – GENERAL

1.01 SUMMARY

- A. The Work of this section comprises all materials, tools, equipment and labor required for the design, preparation and cleaning, construction, and removal of all concrete formwork, and the installation of all concrete embedments furnished under other sections, necessary for the proper completion of the Work in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Requirements
 - 1. Section 03 30 20 – Concrete Placing, Curing and Finishing

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and Payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American Concrete Institute International (ACI)
 - a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - b. ACI 301 Specifications for Structural Concrete
 - c. ACI 347 Guide to Formwork for Concrete
 - 2. ASTM International (ASTM)
 - a. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
 - b. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data
 - 1. Form Ties
 - 2. Form Release Agent
- C. Manufacturer's Instructions
 - 1. Form Ties
 - 2. Form Release Agent
- D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. General
 - 1. Formwork shall conform dimensionally to the concrete Work as shown on the Drawings. To minimize the number of panel joints, formwork panels shall be of the largest practicable sizes.
 - 2. Undamaged smooth form facing materials such as plywood, hardboard, metal, and plastic, that will produce a smooth form finish, shall be used. Formwork shall not result in fins or offsets exceeding 1/8 inch. If used, aluminum forms with un-oxidized surfaces shall be pretreated with a paste made of calcium hydroxide and water, followed by water rinsing, repeated until hydrogen bubbles do not form.

- B. Form Release Agent
 - 1. Form release agent shall be non-grain raising, non-staining, and shall not leave a residue on the concrete nor adversely affect bonding of materials to be applied.
- C. Form Ties
 - 1. General Requirements:
 - a. Form ties shall be adjustable length, sized to withstand construction loads, and upon removal shall prevent concrete spalling. Ties shall have break back indentation.
 - b. Plastic Cones: Form tie assembly with cone-shaped depressions at the concrete surfaces with break back ties. The portion of the tie remaining embedded in the concrete upon removal shall be equal to the depth of the cone specified.
 - 2. All other work:
 - a. Plastic Cones: 1" diameter x 1" deep (Standard)
 - b. Neoprene Washers: Not required, unless noted otherwise on drawings.

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 TECHNICAL REQUIREMENTS

- A. The Contractor shall design, erect, shore, brace, and maintain formwork in accordance with ACI 301 to support all loads, including construction loads, until the concrete structure can support such loads.

3.02 CONSTRUCTION

- A. Tolerances
 - 1. Tolerances shall be in accordance with ACI 117.
- B. Form Alignment
 - 1. At locations where continuous surfaces are formed in successive units, forms shall be tightly fitted over the hardened concrete surface to obtain

accurate surface alignment and to prevent leakage of mortar and the formation of fins, ridges, and other defects.

C. Chamfered Edges

1. All exposed concrete corners shall be formed with beveled strips to provide 3/4 inch chamfers, unless otherwise shown, specified, or directed by the Engineer.
2. Chamfering by grinding is prohibited.

D. Openings

1. Form openings in concrete where required for other Work. Upon failing to form such openings, provide them in a manner approved by the Engineer at no additional cost to the Owner.
2. Except as otherwise specified, all such openings shall be filled with concrete after the Work to be installed therein is complete.

E. Cleanouts and Access Panels

1. Temporary openings shall be provided to facilitate cleaning and inspection prior to concrete placement, including at the bottom of wall forms. Cleanout openings are not permitted in exposed concrete, concrete exposed to view upon completion of the Work, whether or not it is painted, without the approval of the Engineer.
2. All refuse, sawdust, shavings, etc. shall be removed, and the forms broom cleaned before concrete placement.

F. Form Release Agent

1. Forms shall be coated with the approved form release agent before placement of reinforcing steel. Do not apply form release agent at locations of monolithic construction joints, which are construction joints with all the reinforcement continuous through the joint. Excess agent applied to the forms, and on the reinforcing steel and other surfaces requiring a concrete bond, shall be removed.
2. Forms for unexposed surfaces may be thoroughly wetted in lieu of the approved form release agent immediately before concrete is placed. However, form release agent shall be used in freezing weather.

3.03 INSTALLATION OF EMBEDDED ITEMS

A. General

1. Coordinate the setting of anchor bolts, thimbles, inserts, wall pipe, sleeves, and other embedded items. Before placing concrete, ensure that all items are accurately located and firmly secured against displacement.
 2. All items shall be thoroughly cleaned and free of loose rust, mill scale, dirt, grease, etc. Wood used for removable keys shall be thoroughly dampened before concrete is placed against it.
- B. Electrical Conduit
1. Electrical conduit may be embedded in concrete provided the following conditions are met.
 - a. Outside diameter of conduit shall not exceed 1/3 of concrete thickness.
 - b. Conduit shall not be placed closer than 3 diameters on center.
 - c. Conduit shall not significantly impair the strength of the construction.
 - d. Conduit shall not be embedded in structural concrete slabs less than 4 inches thick.
 - e. Only 2 conduits may cross at any point. The sum of the outside diameter of the crossing conduits shall not exceed 1/3 of the concrete thickness.
 - f. A 1-1/2 inch minimum concrete cover shall be provided for conduits in structural slabs.
 - g. Conduit shall not be located between bottom of reinforcing steel and bottom of slab.
 - h. Conduit is not permitted in beams, girders, and columns without the approval of the Engineer.
 - i. Aluminum conduit shall not be embedded in concrete.
 - j. Conduit shall be installed so that cutting, bending, or displacement of reinforcement from its proper location is not necessary.
 2. Contractor shall notify Engineer of any embedded conduits not installed according the conditions specified herein a minimum of 24 hours prior to concrete placement. Noncompliant conduit placements shall be repositioned or removed to the satisfaction of the engineer and owner's representative.

3.04 REMOVAL

- A. Form Removal

1. Form removal per ACI 347, as modified herein.
2. Forms shall be removed while ensuring the complete safety and serviceability of the structure.
3. Newly unsupported portions of the structure shall not be subjected to heavy construction or material loading. Additional shores or re-shores shall be provided as required to adequately support the members during the construction period.
4. The Contractor shall be responsible for the proper removal of forms, shores, and bracing.
5. Spalling of concrete surfaces shall be prevented.
6. When forms are removed before the specified curing period (as specified in Section 03 30 20) is complete, measures shall be taken to continue curing and to continue providing thermal protection for the concrete.
7. Forms may be removed when the cumulative time during which the temperature of the air surrounding the concrete is above 50 degrees F are as follows
 - a. Walls, columns, sides of beams and girders, and similar parts of the Work not supporting the weight of the concrete: 24 hours.
 - b. Alternatively to the stripping times specified, additional concrete cylinders shall be made using representative concrete, witnessed and approved by the Engineer, and tested at no additional cost to the Owner. Such specimens shall be field cured in accordance with ASTM C31 under conditions that are not more favorable than the most unfavorable conditions for the portions of the concrete that the test specimens represent. The supporting forms and shores may be removed when the concrete strength as tested per ASTM C39 is a minimum of 70 percent of the specified design strength, as determined by the field-cured cylinders according to ACI 301.

B. Tie Holes

1. Filling of form tie holes and concrete finishing are specified in Section 03 30 20.

3.05 CLEANING AND REPAIR OF FORMS

- A. Parts of forms reserved for reuse shall be inspected, cleaned, and repaired. Any parts dented, deformed, or otherwise rendered unfit for reuse shall be discarded.

3.06 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.07 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 03 16 00

CONCRETE SPECIALTIES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide all materials, tools, equipment, and labor necessary for the construction of concrete specialties as specified, as shown on the Drawings, and as necessary for the proper completion of the Work in accordance with this section and applicable reference standards listed in Article 1.03.
 - 2. Epoxy adhesive for installing drilled and epoxy rebar is specified herein.
 - 3. Post-installed expansion anchors and adhesive anchoring systems are specified in Section 05 50 00.
- B. Related Requirements
 - 1. Section 03 30 00 – Cast-In-Place Concrete
 - 2. Section 03 30 20 – Concrete Placing, Curing and Finishing
 - 3. Section 05 50 00 – Metal Fabrications
 - 4. Section 26 05 43 – Underground Ducts and Raceways for Electrical Systems

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American Society for Testing and Materials (ASTM)
 - a. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - b. ASTM A1064 Standard Specification Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
 - c. ASTM C1107 Standard Specification for Packed Dry, Hydraulic-Cement Grout (Non-shrink)

- d. ASTM D4832 Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders
- 2. ICC Evaluation Service (ICC-ES)
 - a. ICC-ES AC308 Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements
- 3. American Concrete Institute (ACI)
 - a. ACI 355.2 Qualification of Post-Installed Mechanical Anchors in Concrete
 - b. ACI 355.4 Qualification of Post-Installed Adhesive Anchors in Concrete

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data
 - 1. Non-Shrink Grout
 - 2. Epoxy Adhesive (for drill and epoxy rebar)
 - a. ICC-ES report for manufacturer's specific product
 - b. Epoxy ultimate bond strength
 - c. Manufacture's chart for embedment to develop yield strength and tensile strength of ASTM A615, grade 60, rebar sizes #3 thru #11.
 - d. Storage requirements
 - e. Gel and cure times as a function of temperature
 - f. Installation temperature requirements for cartridges and base material
 - g. Drilling method (diamond drill bit shall be prohibited)
 - h. Drill bit diameter and depth of hole for rebar sizes
 - i. Hole cleaning procedure and required condition of hole
 - j. Requirements for discarding initial discharge to ensure proper mixing
 - k. Hole filling procedure

1. Time period when anchor cannot be contacted or otherwise disturbed
- C. Design Data and Test Reports
 1. Concrete for duct banks.
 - a. Submittals as required in Section 03 30 00.
- D. Shop Drawings
 1. Reinforcement
- E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Qualifications: per Division 01 General Requirements for anchor installation and as follows.
 1. Anchors shall be installed by qualified personnel trained to install adhesive anchors.
 2. Adhesive anchors shall be installed in strict accordance with the Manufacturer's Printed Installation Instructions (MPII).
 3. Each installer shall have the MPII in their possession at all times.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 GROUT

- A. Grout shall be non-metallic, cementitious non-shrink grout meeting ASTM C1107, grade C. Grout shall be Five Star Grout by U.S. Grout Company, Crystex or Premier by L&M Construction Chemicals, Inc., Sure-Grip High Performance Grout, by Dayton Superior, or approved equal.

2.02 DUCTBANKS

- A. Underground electrical duct banks shall be concrete encased as shown on the Drawings. Concrete shall be as specified in Section 03 30 00, except it shall have a 3/8 inch maximum aggregate size and a minimum 28-day compressive strength of 3,000 pounds per square inch.
- B. Duct banks shall be reinforced as detailed where crossing under roads, driveways, parking areas, all areas subject to vehicular traffic, and whereas shown or specified in the Contract Documents. Reinforcement shall extend a minimum of 4 feet beyond the specified areas.

2.03 EPOXY ADHESIVE

- A. Epoxy adhesive for installation of post-installed reinforcing bars denoted as "Drill and Epoxy" or "Drill & Epoxy" on drawings.
- B. Evaluation Requirements: ICC-ES evaluation report stating product is compliant with 2015 International Building Code and approved for use to resist static, wind and earthquake (Seismic Design Categories A through F) tension and shear loads in cracked and uncracked normal-weight concrete having a compressive strength of 2,500 psi to 8,500 psi. Evaluation reports with a listed renewal date month/year which is prior to the month/year the product is submitted for engineer's review will be rejected.
- C. Epoxy adhesive for anchoring reinforcement to concrete shall be a 2-component solid epoxy based system supplied in manufacturer's standard side-by-side cartridge and dispensed through manufacturer's standard static-mixing nozzle. Epoxy adhesive shall be:
 - 1. Simpson Strong Tie: SET-XP or ET-HP
 - a. SET-XP Compliance Report (ESR-2508)
 - b. ET-HP Compliance Report (ESR-3372)
 - 2. Hilit: HIT-RE 500 V3
 - a. Compliance Report (ESR-3814)
 - 3. Approved equal based
 - a. Compliance Report to be submitted
- D. Epoxy adhesive shall pass the creep test requirements of ICC-ES AC58.
- E. The embedment depth shall be per the manufacturer's requirements and the ultimate strength exceeds the tensile strength of the bar, and the ultimate strength divided by

a minimum factor of safety of 3.75 is at least 40 percent of the yield strength of the bar.

2.04 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 EQUIPMENT PADS

- A. New concrete surfaces upon which equipment pads are to be built shall receive a scratched finish in accordance with Section 03 30 20.
- B. All laitance shall be removed and the surface shall be saturated with water for a minimum of 6 hours. Excess water shall then be removed and the epoxy bonding compound applied as specified in Section 03 30 20.
- C. All equipment pads shall be sized to suit the approved equipment, and reinforcement shall be as shown on the Drawings.
- D. The top surface shall be level within 1/8-inch. All exposed faces shall be formed with smooth forms and shall be smooth and free of sand streaks, bug holes, and honeycomb. All exposed surfaces shall have a smooth, even surface with all exterior corners chamfered. Exposed faces of pads shall receive a sack-rubbed finish as specified in Section 03 30 20.
- E. All anchor bolts, dowels, sleeves, and other fittings required for the equipment shall be built in.

3.02 GROUTING

- A. Grouting is required for structural, mechanical, and electrical items, and shall be in accordance with the manufacturer's recommendations.
- B. Concrete surfaces to receive grout shall be cleaned of all contamination and debris. Surface roughening shall be required if laitance or poor concrete is evident.
- C. Grout placement shall be rapid and continuous such that grout completely fills the space to be grouted, absent of air pockets.
- D. Grout may be placed by gravity or pumped. When practical, grout shall be placed from one side and made to flow to the open side to prevent the formation of air pockets.

3.03 EXISTING CONCRETE

- A. Where equipment pads are to be constructed, grouting is to be performed, and concrete fills are to be placed against existing concrete, the following surface preparation shall be required.
 1. The existing concrete surface shall be cleaned of all contamination and debris, and roughened by steel shot blasting, abrasive sand blasting, or water jetting. Use of scabblers, scarifiers, bush hammers, and pneumatic hammers is not permitted.
 2. The existing concrete surface shall be water-saturated for a minimum of 6 hours, after which the excess water shall be removed immediately prior to placement of new concrete or grout.
 3. In areas where equipment pads are to be constructed and concrete fills are to be placed, apply epoxy-bonding compound (as specified in Section 03 30 20) to prepared concrete surface prior to concrete placement.

3.04 DUCTBANKS

- A. There shall be a minimum of 3 inches of concrete between the outside of a duct and surrounding soil. There shall be not less than 3 inches of concrete between adjacent ducts.
- B. All ductbank concrete placements shall be continuous between manholes and handholes, and between manholes, handholes, and structures.
- C. Where ducts pass through a foundation wall, the concrete encasement shall extend through the wall and be flush with inside face per the details on the Drawings. Watertight construction joints shall be provided.

3.05 EPOXY ADHESIVE

- A. Installation: Per manufacturer's installation instructions and as listed in the product ICC-ES Evaluation Report
- B. Drilled and epoxied rebar shall be installed in concrete having a minimum age of 21 days at time of installation.
- C. All cartridges shall have the expiration date clearly visible. Material past its expiration date shall not be used, and shall be immediately removed from the Site.
- D. Diamond drill bits are not permitted. Hammer drills shall be used. Hole diameter size per manufacturer's installation instructions.

- E. The initial material extruded from each cartridge shall be discarded in accordance with the manufacturer's instructions to ensure that all material is properly mixed.
- F. Depth stop shall be used to ensure correct drilling depth. Drilled holes shall be blown out with air, thoroughly wire brushed with a repeated back and forth movement, blown out, thoroughly wire brushed, and blown out again. Adhesive shall be injected, starting from the bottom of the hole and slowly withdrawn as filling progresses to prevent air pockets.
- G. Rebar shall remain completely undisturbed between the manufacturer's specified gel time and the full cure time. Zero load shall be applied during this time.

3.06 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Manufacturer's Field Services
 - 1. Epoxy Adhesive
 - a. Except where specified to be performed by personnel certified by an applicable program such as the ACI/CRSI Adhesive Anchor Installer Certification program or equivalent, as approved by the Engineer, the Contractor shall furnish the services of a competent manufacturer's field representative who shall be present at the Work Site prior to beginning installation in order to instruct the Contractor and the Engineer on proper installation and inspection procedures. Such instruction shall include a full and complete demonstration.
 - b. Installation of anchors horizontally or upwardly inclined to resist sustained tension loads shall be continuously inspected by the Engineer's special inspector approved for that purpose. The special inspector shall furnish a report to the Engineer that the Work covered by the report has been performed and that the materials and installation procedures conform to the Contract Documents and the Manufacturer's Printed Installation Instructions (MPII).
 - c. Proof loading: performed where required per ACI 355.4.

3.07 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide all materials, tools, equipment, and labor necessary for the fabrication and installation of all reinforcement as shown on the Drawings, as specified, and as necessary for the proper completion of the Work in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American Concrete Institute (ACI)
 - a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - b. ACI SP-66 ACI Detailing Manual
 - 2. American Society for Testing and Materials (ASTM)
 - a. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - 3. American Welding Society (AWS)
 - a. AWS D1.4 Structural Welding Code – Reinforcing Steel
 - 4. Concrete Reinforcing Steel Institute (CRSI)
 - a. CRSI 10MSP Manual of Standard Practice

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data
 - 1. Certified mill reports, including chemical and physical analyses
 - 2. Dowel bar splicers and dowel inserts
- C. Shop Drawings
 - 1. Reinforcement Drawings: Comply with ACI SP-66, and include the following information
 - a. Sizes, dimensions, and locations for reinforcement and supports
 - b. Bending diagrams and schedules
 - c. Splices
 - d. Cover and clearances
 - e. Class designation and details of bar supports
 - f. Pertinent reinforced concrete details with dimensions and elevations
 - g. Items furnished by other trades or under other sections of the Specification that are to be cast in concrete where interference with reinforcement may occur
 - h. Reinforcement shall be shown on wall elevations with required sections, on beam elevations with required sections, on plan views of slabs with required sections. Provide plan details where walls intersect.
- D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Fabricate reinforcement in accordance with ACI 117.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

- B. Deliver reinforcement in bundles with tags indicating size, length, and identification mark.
- C. Store materials off the ground to prevent soiling and to facilitate subsequent inspection and handling.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 STEEL REINFORCEMENT

- A. General: Steel reinforcement shall include all bars, anchorages, stirrups, dowels, ties, tie-wire, chairs and other steel supports, and spacers as noted on the Drawings, specified, and as required for the proper completion of the Work.
- B. Materials
 - 1. Reinforcement bars shall be formed from new billet steel conforming to ASTM A615, Grade 60 except as otherwise specified.
 - 2. Plain wire fabric shall conform to ASTM 1064. Flat sheets shall be used, rolls are not permitted.
- C. Tie Wire
 - 1. 16-gauge minimum
 - 2. FS QQ-W-461 annealed black, except for architectural concrete
- D. Bar Supports
 - 1. Chairs, bolsters, spacers and other supports to properly position reinforcement shall conform to the bar support recommendations of CRSI 10MSP, and shall be of adequate strength and design to prevent displacement of reinforcement and discoloration of concrete.
 - 2. Supports shall be Class 1 - plastic protected.
 - 3. Supports for bottom reinforcement of slabs on soil shall be chairs with integral plates, or precast concrete blocks not less than 4-inches square with a compressive strength equal to that of the surrounding concrete. Precast blocks may only be used to support reinforcement not more than 3-inches from the bottom of the slab.

E. Fabrication

1. Steel reinforcement shall be fabricated to the sizes, shapes and dimensions shown on the Drawings, details and schedules. All bending shall be in accordance with CRSI 10MSP. All steel shall be bent cold and shall not be bent or straightened in a manner that will injure the metal. Bars with kinks or bends not so detailed shall not be used.
2. Bends for stirrups and ties shall be made around a pin having a diameter not less than 4 times the diameter of the bar. Bends for other bars shall be made around a pin having a diameter not less than 6 times the diameter of the bar, except for bars larger than 1-inch, the pin shall be not less than 8 times the diameter of the bar.

F. Dowel Bar Splicers and Dowel Inserts (DBS/DI)

1. Dowel bar splicers shall be a 2-component threaded rebar splice system. The internally threaded component shall be forged from Grade 60 deformed rebar material free of external machining or welding. It shall contain an integral flange with nailing holes and be threaded with Unified National Coarse (UNC) or UN (unified) threads to a depth equal to the nominal diameter of the threads plus 1/4 inch. The externally threaded splice component shall be fabricated from Grade 60 deformed rebar material and supplied with rolled threads corresponding with the internally threaded component. The root diameter of the threads shall provide a minimum cross sectional area equal to the cross sectional area of the nominal bar size. Manufacturer testing shall indicate ultimate tension failure occurring in the nominal bar diameter, not at the mechanical splice.

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Reinforcement

1. Tolerances shall conform to ACI 117.
2. Placement
 - a. Reinforcement shall be accurately positioned both horizontally and vertically, and shall be properly secured and sufficiently rigid to prevent displacement during concrete placement.

- b. Reinforcement shall be securely tied at intersections with tie wire or clips in a manner that will keep all metal away from exposed concrete surfaces.
 3. Splices
 - a. Reinforcement splices shall be as shown on the Drawings. Where not shown, splices shall be located away from areas of maximum stress, and shall be approved by the Engineer.
 - b. Welding shall only be permitted by written approval of the Engineer, and shall be in accordance with AWS D1.4.
 4. All reinforcement within an area of a continuous concrete placement shall be installed, supported, and secured before beginning the concrete placement.
 5. Reinforcement Adjustment
 - a. Adjust to within allowable tolerances to avoid interference with other reinforcement, conduits, or embedded items.
 - b. Reinforcement shall not be moved beyond allowable tolerances without the Engineer's approval.
 - c. Reinforcement shall not be heated, bent or cut without approval Engineer's approval.
- B. Wire Fabric
1. Wire fabric shall be installed in the longest practicable sheet.
 2. Adjoining sheets shall be lapped a minimum of 1-1/2 wire spacing's and securely wired together.
 3. End laps in adjacent sheets shall be offset.
- C. All reinforcement shall be entirely free from flaking rust, loose mill scale, grease, dirt, etc. that might reduce its bond with the concrete.
- D. Concrete cover for reinforcement shall conform to the dimensions shown on the Drawings.
- E. Notify the Engineer at least 24 hours before placing concrete. All reinforcement within the area of 1 day's concrete placement shall be tied in place and observed by the Engineer or Owner's representative, prior to commencing concrete placement.

3.02 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.03 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 03 30 00.01

SITE CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide cast-in-place concrete in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Requirements
 - 1. Section 03 30 20 – Concrete Placing, Curing and Finishing

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American Concrete Institute International (ACI)
 - a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - b. ACI 301 Specifications for Structural Concrete
 - 2. ASTM International (ASTM)
 - a. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
 - b. ASTM C33 Standard Specification for Concrete Aggregates
 - c. ASTM C40 Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
 - d. ASTM C88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
 - e. ASTM C94 Standard Specification for Ready-Mixed Concrete

- f. ASTM C131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- g. ASTM C143 Standard Test Method for Slump of Hydraulic-Cement Concrete
- h. ASTM C150 Standard Specification for Portland Cement
- i. ASTM C173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
- j. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- k. ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete
- l. ASTM C295 Standard Guide for Petrographic Examination of Aggregates for Concrete
- m. ASTM C494 Standard Specification for Chemical Admixtures for Concrete
- n. ASTM C535 Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- o. ASTM C586 Standard Test Method for Potential Alkali Reactivity of Carbonate Rocks as Concrete Aggregates (Rock-Cylinder Method)
- p. ASTM C595 Standard Specification for Blended Hydraulic Cements
- q. ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- r. ASTM C989 Standard Specification for Slag Cement for Use in Concrete and Mortars
- s. ASTM C1105 Standard Test Method for Length Change of Concrete Due to Alkali-Carbonate Rock Reaction
- t. ASTM C1116 Standard Specification for Fiber-Reinforced Concrete

- u. ASTM C1157 Standard Specification for Hydraulic Cement
- v. ASTM C1260 Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
- w. ASTM C1293 Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
- x. ASTM C1567 Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
- y. ASTM C1602 Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
- z. ASTM E329 Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
 - 1. Test Reports
 - a. Provide reports by testing agencies according to ASTM E329.
 - 2. Design Data for Each Concrete Mixture
 - a. Submit for mix designs for each concrete mixture specified in the Concrete Mix Design Schedule, located at the end of this Section. Submitted mix designs shall use the same, or similar, names as indicated in the Concrete Mix Design.
 - b. Submit minimum 14 days before initial placement of concrete.
 - c. Proportions for ingredients, 28-day design compressive strength, water to cementitious materials ratio, admixture dosages, slump, and air content.
 - d. Test data supporting proportions based upon laboratory trial batches or field test records according to ACI 301.

- 1) Field test data used to determine the standard deviation used for establishing the required average design strength shall be from within the previous 12 months, according to ACI 301.
 - 2) Field test data documenting proposed concrete proportions will produce an average compressive strength equal to or greater than the required average compressive strength from within the previous 12 months.
 - 3) Laboratory trial batch data shall be from within the previous 24 months.
3. Cement: Certified mill reports, not older than 90 days.
4. Supplementary cementitious materials: source and test reports for actual material to be used in the Work, not older than 90 days.
- a. Fly ash
 - b. Ground granulated blast-furnace slag
5. Aggregate
- a. Data not older than 90 days, except test data for soundness, abrasion, and alkali reactivity - not older than 1 year.
 - b. Fine and coarse aggregate data, except as specified
 - 1) Sources
 - 2) Specific gravity
 - 3) Sieve analyses according to ASTM C33 (including fineness modulus of fine aggregate)
 - 4) Organic impurities for fine aggregate according to ASTM C40
 - 5) Potential alkali reactivity (not required if a cement containing less than 0.60 percent alkalis is used, according to ASTM C33) according to ASTM C1260, ASTM C1293, or ASTM C1567
 - 6) Soundness according to ASTM C88

- 7) Abrasion for coarse aggregate according to ASTM C131 and ASTM C535
 6. Product Data and Instructions
 - a. Admixtures
 7. Sample Batch Ticket
 - a. Sample blank batch ticket from concrete batch plant
- B. Closeout and maintenance material submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

B. Storage and Protection for Material for On-Site Batching

1. Carefully store cement immediately upon receipt in a weatherproof structure, as airtight as practical to prevent moisture absorption, stacked closely to reduce air circulation, but not against exterior walls. Allow easy access for inspection and shipment identification.
2. Transfer bulk cement to elevated airtight weatherproof bins. Test quality of cement that has been stored for suitability if quality is questionable and do not use without approval.
3. Store aggregates to prevent contamination by foreign materials and in separate piles by size. Build coarse aggregate stockpiles in horizontal layers not exceeding 4-feet in depth to avoid segregation.

PART 2 – PRODUCTS

2.01 SOURCE

- A. Provide concrete supplied from a single commercial ready-mix plant, mixed and delivered according to ASTM C94, except if plant does not exist within a reasonable distance from Site, furnish material for on-Site batching and store as specified.

2.02 CONCRETE MATERIALS

- A. Concrete mixture design
 1. ACI 301, Section 4, Concrete Mixtures.
 2. 28-day design compressive strength: 5,000 pounds per square inch, except as otherwise specified.
 3. Water to cementitious materials ratio: not to exceed 0.40 except as otherwise specified.
 4. Provide designs of required strength, water to cementitious materials ratio, slump, and workability for placing conditions and specified finishes without segregation.
 5. Slump
 - a. ASTM C143.
 - b. Specified Slump Range: 3 inches to 5 inches
 - c. Specified Slump Range (mixes with mid-range water reducer):
2 inches to 4 inches, before admixture is added

Maximum 6 inches, after admixture is added
 - d. Specified Slump range (mixes with high-range water reducer)
2 inches to 4 inches, before admixture is added

Maximum 8 inches, after admixture is added
- B. Cement: ASTM C150, Type II or ASTM C595 IP(MS), is (less than 70)(MS). Do not use ASTM C595 cements that contain ASTM C1157 cement. If equivalent alkali content is greater than 0.60 percent, submit aggregate reactivity testing as specified.
- C. Supplementary cementitious materials
 1. Fly ash (optional)
 - a. ASTM C618, Class F
 - b. Maximum loss of ignition: 3.0 percent

- c. Not less than 15 percent or more than 25 percent of weight of cement plus fly ash
 - d. Maximum available alkalis: 5 percent
2. Ground-granulated blast furnace (GGBF) slag (optional)
 - a. ASTM C989
 - b. Activity classification: Grade 100 or 120
 - c. Not less than 25 percent or more than 50 percent of weight of cementitious material
 3. Fly ash plus GGBF slag
 - a. Maximum 50 percent of total cementitious materials
 - b. Fly ash portion maximum 25 percent of total cementitious materials
 - c. Minimum portland cement: 337 pounds per cubic yard of concrete
- D. Aggregate
1. ASTM C33, as amended. Evidence of a satisfactory service record in lieu of testing for alkali reactivity is not permitted.
 2. Do not use crushed hydraulic cement concrete for aggregate.
 3. Aggregate reactivity testing: according to ASTM C1260. Do not use aggregate having a 14 day expansion greater than 0.10 percent (considered potentially reactive), except if tested according to ASTM C1567, the 14-day expansion is not greater than 0.10 percent, or if tested according to ASTM C1293, the 2-year expansion is not greater than 0.04 percent, or if cement containing less than 0.60 percent alkalis is used according to ASTM C33. In lieu of the above, Alkali-Silica Reactivity (ASR) mitigation may be by substitution of a minimum 25 percent fly ash or 50 percent GGBF slag for cement by weight.
 4. Fine aggregates: Sand or screenings of gravel or crushed stone, well graded from fine to coarse; clean and free from soft particles, clay, loam and organic matter, with the volume removed by sedimentation not more than 3 percent.

- a. Organic impurities testing: according to ASTM C40. Color of the supernatant liquid above the test Sample, not darker than organic plate No. 3.
- b. Grading

<u>U.S. Standard Sieve</u>	<u>Percent Passing</u>
Size 3/8 inch	100
No. 4	95 - 100
No. 8	80 - 100
No. 16	50 - 85
No. 30	25 - 60
No. 50	5 - 30
No. 100	0-10

- c. Not more than 45 percent retained between any 2 consecutive sieves listed above. Fineness modulus, not less than 2.3 nor more than 3.1.
5. Coarse Aggregates: Crushed stone or washed gravel of clean, hard, durable, uncoated particles, free from dust, dirt, or other deleterious substances, and free from thin, flat, or elongated particles.
 - a. Nominal maximum aggregate size for slabs poured on ground, at least 15 inches thick, except where clear spacing between reinforcing bars is less than 2 inches: 1-1/2 inches.
 - b. Nominal maximum aggregate size at all other locations, except as specified otherwise or approved: 3/4 inch.
 - c. Nominal maximum aggregate sizes per grading in Table 2 of ASTM C33: No. 467 (1-1/2 inches), No. 57 (1 inch), No. 67 (3/4 inch), No. 7 (1/2 inch), and No. 8 (3/8 inch).

E. Admixtures

1. Air-entraining admixture
 - a. ASTM C260 and chloride free

- b. Provide air entrainment, except as noted below, according to manufacturer's directions and this Specification to produce the following total entrained air content determined according to ASTM C173 or ASTM C231.

Nominal Maximum Size Coarse Aggregate (inches)	Air Content By Volume (percent plus or minus 1.5)
3/8	7.5
1/2	7.0
3/4	6.0
1	6.0
1-1/2	5.5

- c. Maximum air content for interior concrete slabs to be hard-troweled: 3.0 percent.
2. Mid-range water reducing agents: according to ASTM C494, Type A, and with consideration of the air entraining effect of the water reducing agent.
3. Water reducing-retarding agents: For use when ambient temperature above 70 degrees F, replace water reducing agent in whole or part with water reducing-retarding agent according to ASTM C494, Type D. Use amounts to produce concrete with set time equal to that at 70 degrees F without the retarder.
4. Set accelerator: Non-chloride type conforming to ASTM C494, Type C or E where allowed under Section 03 30 20.
5. High-range water reducing agent: ASTM C494, Type F or G (added in plant or field).

F. Water

1. Meet ASTM C1602.
2. Fresh and free from oil, acid, salt, alkali, sewage, organic matter, and other deleterious substances.
3. The amount of water carried on the aggregate and the effect of admixtures is included in the water content. Provide that water carried on the aggregate is determined periodically by test and the amount of free water on the aggregate subtracted from water added to the mixture.

4. Residual, wash, or other water in drums: Completely discharged prior to concrete batching (drums backed out).
5. Maximum amount of water required to produce a plastic mixture of the strength and water to cementitious materials ratio specified and the required density, uniformity and workability. Consistency of mixture required for the specific placing conditions and methods.
6. Slump adjustment: Not made at wash down, slump rack, or by any other means prior to arrival at point of delivery at the Site.
7. Water added after arrival at Site: Accurately metered and recorded on the batch ticket.

2.03 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Advise testing laboratory and field observers minimum 24 hours in advance of placing concrete to allow for scheduling observation and testing.
- C. Assist testing laboratory and Engineer in obtaining and handling Samples at the Site and other sources of material.
- D. Provide space and electrical power at the Site for facilities to be provided by Contractor's testing agency for proper initial curing and storage of concrete test cylinders to be lab-cured as required by ASTM C31 for 48 hours after casting. For cylinders to be field-cured: per Section 03 30 20.
- E. Contractor's testing agency to store cylinders to be lab-cured at 60 degrees F to 80 degrees F in an environment preventing moisture loss from the specimens such as storage in wooden boxes, and placement in damp sand pits. Shield specimens from direct sunlight and radiant heating devices. Control storage temperature by use of heating and cooling devices as necessary and record temperature with a maximum-minimum thermometer.

3.02 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

END OF SECTION

WOODARD & CURRAN

**SITE CAST IN PLACE CONCRETE
03 30 00.01-11**

CONCRETE MIX DESIGN SCHEDULE

The following table provides a list of concrete mixtures required for the project. The concrete supplier shall submit a concrete mix design for each of the concrete mixtures listed in accordance with “Part 1.05 Submittals” of this specification.

Concrete Mixture	Min Comp Strength (psi)	Max W/C Ratio	Air Entrained	Description of Use
Main Mix Design w/ air	5,000 at 28 days	0.40	Yes	Use for all concrete, unless noted otherwise, including: Haunched slabs, and sidewalks.
Duct Banks	3,000 at 28 days	0.55	Yes	

SECTION 03 30 20

CONCRETE PLACING, CURING, AND FINISHING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide placing, curing and finishing of cast-in-place concrete accordance with this Section and applicable reference standards listed in Article 1.03.
 - 2. Concrete sampling and field testing by an independent technician certified in accordance with the requirements of ACI Concrete Field Testing Technician – Grade 1 certification program, or the requirements of ASTM C1077. Paid for by Contractor.
 - 3. Laboratory testing of concrete cylinders by an independent, accredited and certified testing laboratory. Paid for by Contractor.
- B. Related Requirements
 - 1. Section 03 11 00 – Concrete Forming
 - 2. Section 03 16 00 – Concrete Specialties
 - 3. Section 03 30 00 – Cast-In-Place Concrete

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American Concrete Institute International (ACI)
 - a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - b. ACI 301 Specifications for Structural Concrete
 - c. ACI 306.1 Standard Specification for Cold Weather Concreting
 - d. ACI 308.1 Standard Specification for Curing Concrete
 - e. ACI 350.1 Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures

- f. ACI 306R Cold Weather Concreting
2. ASTM International (ASTM)
 - a. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
 - b. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - c. ASTM C42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 - d. ASTM C143 Standard Test Method for Slump of Hydraulic-Cement Concrete
 - e. ASTM C144 Standard Specification for Aggregate for Masonry Mortar
 - f. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete
 - g. ASTM C172 Standard Practice for Sampling Freshly Mixed Concrete
 - h. ASTM C173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
 - i. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
 - j. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - k. ASTM C404 Standard Specification for Aggregates for Masonry Grout
 - l. ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
 - m. ASTM C881 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
 - n. ASTM C1064 Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
 - o. ASTM C1077 Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
 - p. ASTM C1315 Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

- q. ASTM D2486 Standard Test Methods for Scrub Resistance of Wall Paints
- r. ASTM D4541 Standard Test Methods for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- s. ASTM D4810 Standard Specification for Flexible Cellular Materials made from Polyolefin Plastics
- t. ASTM E1155 Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers
- u. ASTM E1745 Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

B. Definitions

- 1. Construction joint refers to a monolithic construction joint in which the surface between successive placements is prepared to enhance bond and shear transfer and reinforcement is continuous.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data and Manufacturer's Instructions
 - 1. Delivery Tickets
 - a. Provide duplicate delivery tickets at time of delivery for each truckload of concrete delivered
 - b. Serial number of ticket
 - c. Date and Project location
 - d. Name and location of ready mixed concrete plant
 - e. Truck number, time loaded, cubic yardage delivered
 - f. Dispatcher's name
 - g. Mixture design, cement type, and admixtures with brand names
 - h. Types and quantities of cement, fly ash and/or slag (if included in approved mix design) and admixtures. Quantities of water and fine and coarse aggregate including moisture content, and nominal maximum aggregate size

- i. Water added subsequent to plant batching, if any. (Only applicable if total water per mixture design is not added at plant. Addition of water such that the water content of the approved mixture design is exceeded will be strictly prohibited.)
 - j. Concrete temperature upon delivery
 - k. Unloading time and location
 - 2. Evaporation Retardant
 - 3. Cure and Seal Compound
 - 4. Curing Compound
 - 5. Preformed Joint Filler
- C. Source and Field Quality Control Submittals
- 1. Methods to be used to protect concrete placed during cold weather. The Engineer's review shall not constitute approval as the Contractor shall be responsible for the protection of concrete placed during cold weather.
 - 2. Methods to be used to protect concrete placed during hot weather. The Engineer's review shall not constitute approval as the Contractor shall be responsible for the protection of concrete placed during hot weather.
- D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Concrete sampling and testing per Article 3.09.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Protection
 - 1. Provisions shall be made for maintaining new concrete in a continuously moist condition for at least seven days after placement
 - 2. Fresh concrete shall be protected from freezing, premature drying, flowing water, and mechanical injury

3. Concrete shall not be placed while rain, sleet, or snow is falling unless acceptable protection is provided. Precipitation shall not be allowed to enter into the concrete mix or damage concrete surfaces

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 PREFORMED JOINT FILLER

- A. Preformed joint filler: Conform to ASTM D4819, closed cell polyethylene foam isolation joint material, 1/2" thick unless noted otherwise on drawings. Joint filler shall be Deck-O-Foam by W.R. Meadows, or approved equal.

2.02 CURE AND SEAL COMPOUND

- A. Solvent Based Cure and Seal Compound: Conform to ASTM C309, Type 1, and ASTM C1315, Type 1 with minimum 25 percent solids, non-yellowing and non-staining, and UV light resistant. Meeting NHCRP-244.
 1. Certi-Vex Guard Clear, by Vexcon Chemicals or approved equal shall be provided.
 2. Approved Use: Exterior surfaces with surface temperature above 40F and sidewalks.
 3. Limitations: Not permitted for surfaces with a surface temperature less than 40F. Not permitted for surfaces to receive additional concrete fills, chemical hardeners, sealers, waterproofing, and architectural finishes such as concrete stain, paints and coatings, tile, carpet, and floor covering adhesives. Not permitted for surfaces to receive a sack-rubbed finish.

2.03 DISSIPATING CURING COMPOUND

- A. Curing Compound: Conform to ASTM C309, Type 1, Class B resin based curing compound that will normally oxidize and begin to wear off in 30 to 60 days.
 1. 1100 Clear, by W.R. Meadows; L&M Cure W, by L&M Construction Chemicals, Inc.;
 2. Approved Use: Surfaces to receive sack-rubbed finish.

2.04 EVAPORATION RETARDANT

- A. Evaporation Retardant: water based polymer liquid placed on fresh concrete to control the rate of evaporation and extend workability. E-CON as manufactured

by L&M Construction Chemicals, Inc.; SikaFilm by Sika Corporation; MasterKure ER 50 by Master Builders; or approved equal.

2.05 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 CONCRETE PLACEMENT AND JOINTING

- A. Tolerances: Tolerances shall conform to all requirements of ACI 117 except as modified.
- B. Cold Weather Requirements
 1. Cold weather concreting provisions shall be followed during cold weather: when air temperature is expected to fall below 40 degrees F during the protection period. The protection period is defined as the time recommended to prevent concrete from being adversely affected by exposure to cold weather during construction. Protection period shall be 6 days for normal-set concrete, and 4 days for accelerated-set concrete.
 2. When freezing temperatures may occur during periods not defined as cold weather, concrete surfaces shall be protected against freezing for at least the first 24 hours after placing.
 3. Concrete shall not be placed on frozen subgrade. Insulate or heat subgrade to ensure temperature above 32 degrees F when concrete is placed.
 4. All embedment's having a cross sectional area of 1.0 square inch or greater, and including #9 reinforcing bars, shall be at a temperature not less than 10 degrees F at time of concrete placement.
 5. Thermal protection must be provided immediately after concrete placement. Procedures for covering, insulating, housing, and/or heating concrete shall be prearranged. Except when supplemental heat is provided, the R-value of the insulation shall be per the recommendations of chapter 9 of ACI 306R.
 6. Accelerating admixtures shall be approved at the Engineer's discretion, however those containing calcium chloride shall not be permitted
 7. When combustion heaters are used, flue gases shall be vented to the exterior of enclosures
 8. Concrete shall be placed and maintained at the following minimum concrete placement temperatures (measured at concrete surface)

- a. Sections of less than 12-inch minimum dimension: 55 degrees F
- b. Sections of 12 to 36 inches minimum dimension: 50 degrees F
9. The concrete placement temperature shall not be higher than the minimum concrete placement temperature by more than 20 degrees F
10. The minimum concrete temperature as mixed shall be: 5 degrees F higher than the minimum concrete placement temperature when the air temperature is above 30 degrees F; 10 degrees F higher when the air temperature is between 0 and 30 degrees F; and 15 degrees F higher when the air temperature is less than 0 degrees F
11. The temperature shall be monitored at the surface of the concrete, including at corners and edges, which are more vulnerable to freezing. The concrete surface temperature and the corresponding outside air temperature shall be recorded a minimum of twice per each 24 hour period
12. Concrete shall be maintained at the minimum specified temperatures for a protection period of 6 days. When an approved accelerating admixture is used the protection period may be reduced to 4 days.
13. Slabs, regardless of air content, shall not be exposed to freezing temperatures when exposed to rain, snow or other water sources, prior to reaching a compressive strength of 3,500 psi.
14. Concrete shall be cooled gradually at the end of the protection period. The maximum allowable temperature drop at the concrete surface during the first 24 hours after the protection period shall be: 50 degrees F for concrete sections of less than 12 inch minimum dimension; and 40 degrees F for concrete sections of 12 to 36 inch minimum dimension.

C. Hot Weather Requirements

1. The temperature of the concrete when placed shall not exceed 90 degrees F. When the air temperature is 90 degrees F and above, procedures to cool mixture ingredients may be warranted. These include: providing shaded storage for aggregate, frequent sprinkling or fog spraying of coarse aggregate, and using chilled batch water and/or ice. Forms and reinforcement shall be sprinkled with cold water just prior to concrete placement. Newly placed concrete shall be protected from the direct sunlight.
2. Records shall be maintained of: time and location of concrete placement, air temperature, weather conditions (i.e. calm, windy, clear, and/or cloudy), relative humidity, and concrete temperature as delivered and after placement.

3. When the air temperature is 90 degrees F and above: the time between the addition of water to cement or cement to aggregate (whichever occurs first) and the time of concrete placement shall not exceed 60 minutes, except upon approval of the Engineer when all tests for air content, slump and temperature are acceptable.

D. Placing

1. Concrete shall be handled from the truck to the place of final deposit as rapidly as practicable by methods preventing segregation and/or loss of ingredients.
 2. The time between the addition of water to cement, or cement to aggregates (whichever occurs first), and the placement of concrete shall not exceed 90 minutes. When air temperature is 90 degrees F and above, this time shall be reduced to 60 minutes. These times may be exceeded only upon approval of the Engineer, and only if all tests for air content, slump, and temperature are also acceptable.
 3. Water shall be removed from all forms and excavations and the Work shall be kept dry during placement. No water shall be thrown on, allowed to flow over, or rise upon the concrete until it is thoroughly set.
 4. Prior to placement of slabs on soil, the subgrade shall be moist with no free water and no muddy or soft spots.
 5. The concrete shall be directly deposited as close as possible to its final location, and shall be deposited in such manner so as to maintain a homogeneous, plastic, approximately horizontal surface.
 6. Where concrete may contact soil while being placed, free fall shall be limited to a maximum of 3 feet. Concrete that has been contaminated by soil and/or other foreign matter shall be rejected. The accumulation of concrete on the forms and/or on reinforcement above the level of placement shall be avoided. The splashing of concrete upon formwork that is set for a subsequent concrete placement shall be prevented due to the resulting marks on the finished concrete.
 7. Re-tempering of concrete and concrete placement against partially hardened concrete shall not be permitted. A concrete placement, once started, shall be carried out as a continuous operation until the placement of the entire section between construction joints is complete.
- E. Runways: Runways shall be provided for wheeled concrete handling equipment which shall not be wheeled over reinforcement. Runways shall not be supported upon reinforcement that is part of the Work.

F. Chuting

1. Minimum slope shall be 3 horizontal to 1 vertical and maximum slope shall be 2 horizontal to 1 vertical. Between these limits, the slope shall be that which will prevent segregation and ensure continuous flow.
2. A baffle shall be provided at the end of the chute to prevent segregation. If the end of the chute is more than 3 feet above the surface of deposit, a spout shall be used. The spout shall be kept full of concrete with the end kept as near as practical to the surface of deposit.
3. The chute shall be steel or steel lined, and sections shall have the same slope throughout. Aluminum chutes are not permitted.
4. The chute shall be thoroughly flushed with water before and after each use, the water discharged outside the forms.

G. Pumping: The inside diameter of pipes and hoses used to convey the concrete shall be a minimum of three times the maximum size aggregate of the mixture. In order to minimize altering the concrete properties, long vertical sections at the end of the pump line shall be avoided. A horizontal hose run, a hose loop, or a slide gate at the end of the hose may be used to reduce loss of entrained air.

H. Compaction

1. Provide at least one standby vibrator, and at least one for each three in use.
2. Concrete may be deposited in one or multiple layers. Each layer shall be compacted by mechanical internal vibrating equipment supplemented by hand spading, rodding, and tamping as required. The depth of each layer shall not exceed the smaller of 36 inches and the depth that can be properly vibrated with the equipment used. When deposited in multiple layers, the vibrator shall penetrate the previous layer approximately 6 inches. Ensure initial setting of the previous layer does not occur prior to placement of subsequent layer.
3. Vibrators shall be relocated frequently, and over-vibration resulting in segregation shall be prevented. Vibrators shall not be used to move concrete within the forms. Concrete shall be thoroughly consolidated around reinforcement, embedments, and into the corners of the forms.
4. Where internal vibration is impractical, the use of form vibrators will be considered, and will be allowed only with the Engineer's written approval. When allowed, the vibrator shall be placed so that motion is horizontal

I. Construction Joints

1. Construction joints shall be located where shown on the Drawings, or, if not shown, locations shall be approved by the Engineer.
2. Horizontal construction joints: laitance shall be removed immediately after initial set and the surface shall be roughened in an acceptable manner that exposes the aggregate uniformly and doesn't leave laitance or loose aggregate. After the concrete has set to a degree that precludes laitance removal by shovels or scrapers, the Contractor shall remove it, and create a roughened surface, by water jetting or other effective method. The use of pneumatic hammers is not permitted.
3. Vertical construction joints: the surface shall be thoroughly cleaned of laitance by water jetting, or by wire brushing followed by air blasting.
4. Before concrete is placed against set concrete, the surface shall be thoroughly wetted with standing water removed. Horizontal construction joints shall be in a saturated surface dry condition: saturated for a minimum of 6 hours, with standing water removed.
5. Where noted on the Drawings, and as approved by the Engineer where an unplanned interruption within a concrete placement has occurred, epoxy-bonding compound shall be used in accordance with the manufacturer's instructions.
6. Reinforcement shall be continuous at construction joints unless otherwise shown on the Drawings

J. Existing Concrete

1. Where concrete is placed against existing concrete, the following surface preparation shall be required.
 2. The existing concrete surface shall be cleaned of all contamination and debris, and roughened by steel shot blasting, abrasive (sand) blasting, or water jetting (hydrodemolition). Use of scabblers, scarifiers, bush hammers, or pneumatic hammers is not permitted.
 3. The existing concrete surface shall be water-saturated for a minimum of six hours, after which the excess water shall be removed immediately prior to placement of new concrete.
 4. Apply epoxy-bonding compound to prepared concrete surface prior to concrete placement.

3.02 CURING AND PROTECTION

A. Temperature

1. When the ambient temperature falls below 40 degrees F or rises above 95 degrees F, a record shall be kept of concrete temperatures and of protection given to concrete during placement and curing.
2. The temperature of in-place concrete shall be the surface temperature of the concrete. The surface temperature may be determined by placing temperature sensors in contact with concrete surfaces or between concrete surfaces and covers used for curing, such as insulation blankets or plastic sheeting.

B. Curing

1. Provide curing per ACI 308.1 except as modified.
2. During cold weather, as previously defined, the application of water shall not be required. Curing shall be accomplished by the use of curing paper, cure and seal compounds, or other approved methods. Thermal blankets are not an approved curing method and shall be used in conjunction with curing provisions previously stated.
3. Provisions shall be made for maintaining new concrete in a continuously moist condition for a minimum of 7 days. Curing shall commence as soon as possible after final finishing when it will not mar, erode, or stain the concrete surface.
4. Curing shall be accomplished by the use of curing paper, curing compounds (except as noted below), wet methods (ponding, fog spray, damp sand or burlap, sprinkling, soaker hoses) or other methods.
5. Water used for curing shall be no more than 20 degrees F cooler than the concrete surface temperature.
6. The use of a curing compound or cure and seal compound on surfaces to receive applied toppings, chemical hardeners, water repellents, coatings, or a rubbed or bonded finish will not be allowed. Where used, curing compound shall be applied immediately following the disappearance of the surface water sheen after the final finishing pass for slabs, and immediately upon removal of forms for formed concrete. Apply two coats per manufacturer's installation instructions. Apply each coat uniformly with no gaps in coverage. If applied by spray, provide additional spray tank and spray nozzles as required to provide uninterrupted application of product. Cure and seal compounds have high solid content and shall be applied by trays and rollers, if application by spray tanks is not completed in a timely manner and to the satisfaction of the engineer.
7. Soaker hoses shall be used at tops of walls and columns before forms are removed. Wood forms shall be kept continuously wet in hot weather.

3.03 DEFECTIVE CONCRETE

- A. The Engineer may direct the Contractor to remove and replace, at no additional cost to the Owner, concrete Work that is not formed as shown and/or specified in the Contract Documents, or that contains a defective surface.
- B. Upon the Engineer's approval, minor imperfections may be patched as specified herein.

3.04 REPAIR OF SURFACE DEFECTS AND PATCHING

- A. After form removal, all form ties shall be cut off, all fins and irregularities removed, and all defective areas, holes, honeycombs, cavities and irregularities shall be repaired where surface finish defects exceed the finish tolerances of Section 3.05
- B. Exposed patchwork shall match adjacent finish and shall include a sack rubbed finish to blend repair into adjacent surfaces, and cured and protected as specified for concrete.
- C. Filling Form Tie Holes: Tie holes shall be filled solid with non-shrink grout, in the same manner as specified under patching above.

3.05 FINISH OF FORMED SURFACES

- A. General
 1. Concrete surfaces "exposed to view" shall be defined as those exposed to view upon completion of the Work, whether or not a painted finish is specified. Surfaces which will be covered by fill, such as exterior faces of walls, shall not be considered exposed to view.
 2. Surface tolerance classes indicated herein are specified in ACI 117, and include abrupt surface irregularities that are measured within 1-inch of the irregularity, and gradual surface irregularities measured as the maximum gap between the concrete and the near surface of a 5-foot straight-edge, measured between contact points.
- B. Surface Finish – 1.0 (SF-1.0)
 1. SF-1.0 shall be provided for formed surfaces not exposed to view for concrete not containing liquids and/or gases, and not below design groundwater elevation.
 2. Patch voids larger than 1 1/2-inch wide or 1/2-inch deep.
 3. Remove projections larger than 1-inch.

4. Tie holes need not be patched.
 5. Surface tolerance Class D, with formed surface irregularities not more than 1-inch.
- C. Surface Finish – 2.0 (SF-2.0)
1. SF-2.0 shall be provided for formed surfaces not exposed to view for concrete not containing liquids, and/or gases, and below design groundwater elevation.
 2. Patch voids larger than 3/4-inch wide or 1/2-inch deep.
 3. Remove projections larger than 1-inch
 4. Fill Tie holes
 5. Surface tolerance Class D, with formed surface irregularities not more than 1-inch.
- D. Surface Finish – 3.0 (SF3.0)
1. SF-3.0 shall be provided for formed surfaces exposed to view, receiving a sack-rubbed finish, and for concrete not containing liquids, and/or gases.
 2. Patch voids larger than 1/2-inch wide or 1/4-inch deep. For surfaces to receive waterproofing, patch all voids per the waterproofing manufacturer's written installation instructions.
 3. Remove projections larger than 1/8-inch. For surfaces to receive waterproofing, remove all projections per the waterproofing manufacturer's written installation instructions.
 4. Fill tie holes
 5. Surface tolerance Class A, with formed surface irregularities not more than 1/8-inch.
- E. Grout-cleaned rubbed finish (Sack-Rubbed)
1. All interior and exterior concrete surfaces that are exposed to view shall receive a grout-cleaned rubbed finish and shall have a smooth and even surface, free of bug holes, when completed, unless specifically noted otherwise on drawings.
 2. Unless noted otherwise on the Drawings; all interior and exterior concrete surfaces that are exposed to view shall receive a grout-cleaned rubbed

finish and shall have a smooth and even surface, free of bug holes, and even appearance without seams when completed.

3. Rubbed Finish shall be applied using a spray application. Hand application shall not be permitted unless a sample panel of hand-applied rubbed finish is approved by the Engineer and Owner. If the sample panel with hand application is rejected by Owner or Engineer provide spray application.
4. Provide rubbed finish using repair motor products in accordance with the following:
 - a. Mapei Planitop XS
 - b. SpecChem Overcrete
 - c. Engineer Approved Equal
5. Repair mortar used for rubbed finish shall be specifically designed for use on vertical and overhead surfaces. Mortar shall be designed for 1/16-inch to 4-inch thickness on vertical surfaces and 1/16-inch to 2-inch thickness on overhead surfaces. Mortar shall be shrinkage compensated.
6. Color: Light Gray or Concrete Gray
7. Mortar shall meet or exceed ASTM C928, R1
8. Provide surface preparation in accordance with the manufacturer's recommendations. Mechanically profile clean, sound, and stable concrete surfaces to obtain a concrete surface profile (CSP) equal to or greater than #5 per ICRI Guideline #310.2R-2013. Provide manufacturer's priming/bonding products if recommended.
9. Curing: Provide in accordance with the manufacturer's recommendations.
10. After application the concrete maintained in a continuously damp condition for at least three days above 50 degrees F by the periodic application of a fine fog spray, the use of damp fabric covered with polyethylene or other methods.

3.06 FINISHING OF RELATED UNFORMED SURFACES

- A. Tops of exposed walls and similar unformed surfaces shall be struck off smooth and hand steel troweled to produce a smooth hard level surface. Line and elevation shall be pre-established by means of preset wood screeds, which shall be removed during the troweling operation.
- B. After troweling is completed and after the curing period, the surface shall be dry honed to a smooth non-directional surface texture satisfactory to the Engineer.

3.07 FINISH OF SLABS

- A. General
 - 1. The evaporation retardant specified may be used in accordance with manufacturer recommendations to control plastic shrinkage cracking and as an aid in slab finishing operations. Conditions that may warrant its use include: high temperature, low humidity, high winds, and direct sunlight.
 - 2. Loss of bleed water and surface drying shall be allowed to proceed naturally. Means to accelerate drying such as applying dry cement, sand, or other materials shall be prohibited.
- B. Floor Flatness and Floor Levelness
 - 1. Slabs and shall be true to the gradient and elevation shown on the Drawings. Flat Slabs shall be level with a tolerance of 3/8 inch in 10 feet. Sloped slabs shall be true to the gradient shown, within a tolerance of 3/8 inch in 10 feet. Slabs shall be pitched to drains as indicated on the Drawings.
- C. A broom finish shall be provided for all exterior slabs, sidewalks, platforms, ramps, exterior stairs and as specified herein or shown on the Drawings. After floating, and between initial and final set, the surface shall be given a coarse transverse scored texture by drawing a broom across the surface.

3.08 CLEANING CONCRETE

- A. Cleaning during progress of the Work shall not be permitted. Cleaning shall not commence until the structure is entirely completed.
- B. Rust and other stains and discolorations shall be removed with a non-etching cleaning agent used in accordance with the manufacturer's instructions. Cleaning of all surfaces to receive a painted finish is also required.
- C. Rust stains may be removed by applying a bleaching agent such as oxalic acid. Acid etching, sandblasting, or cleaning by other methods may be used as approved by the Engineer.

3.09 FIELD QUALITY CONTROL

- A. General:
 - 1. Provide in accordance with Division 01 General Requirements.
 - 2. During the progress of the Work, an independent, accredited and certified testing laboratory shall conduct concrete testing as specified herein,

including the preparation and testing of concrete cylinders. All testing shall be paid for by the Contractor.

3. Field technicians in charge of sampling concrete; testing for slump, unit weight, air content, and temperature; and making and curing test specimens shall be certified in accordance with the requirements of ACI Concrete Field Testing Technician – Grade 1 certification program, or the requirements of ASTM C1077.
4. Scheduling: Contractor to advise testing laboratory and field technician(s) a minimum 24 hours in advance of placing concrete to allow for scheduling observation and testing.
5. Test Cylinder Storage: Provide space and electrical power at the Site for temperature controlled storage of concrete laboratory test cylinders to be standard cured per Specification 03 30 00. Temperature controlled storage containers to be provided by testing agency.

B. Field Testing and Sampling Procedures

1. Concrete samples shall be taken in accordance with ASTM C172 for slump, entrained air, unit weight, and strength tests.
2. Entrained air content and slump requirements are listed in Specification 03 30 00.
3. Air Content: Test in accordance with ASTM C173 or ASTM C231. Prior to pumping initial delivery of concrete each day, air content and slump shall be verify at point of delivery. Thereafter, pumped concrete shall be sampled and tested for air content at the point of placement, as opposed to at the point of delivery. Upon the Engineer's approval: once the slump loss and the loss of entrained air due to pumping is established, correlated acceptance limits at the point of delivery, where sampling and testing may then be performed, shall be made applicable. When the pump line configuration is changed significantly, sampling and testing shall again be performed at the point of placement until new acceptance limits at the point of delivery may be determined.
4. Slump: Measured in accordance with ASTM C143 at the point of delivery.
5. Temperature shall be measured in accordance with ASTM C1064 at the point of delivery
6. Test Cylinders: Concrete cylinders shall be prepared in accordance with ASTM C31 and be 4 inches diameter by 8 inches tall. Refer to Article 3.09, part D for number of cylinders required.

- a. Lab-Cured (Standard Cured) Cylinders: Filed cured in temperature controlled storage per Specification 03 30 00. Cylinders shall be transported to the testing lab within 48 hours of forming, but not sooner than 8 hours after final set.
- b. Field Cured Cylinders: Cured in the field under conditions that are not more favorable than the most unfavorable conditions for the portions of the concrete that the cylinders represent.

C. Laboratory Testing of Test Cylinders:

1. Cylinders shall be tested for compressive strength in accordance with ASTM C39
2. Test concrete cylinders per Article 3.09, Paragraph D.
3. The compressive strength shall be the average strength of three cylinder breaks per ASTM C39 and tested at 28-days.
4. Test Results: Submit test results to Engineer and concrete supplier within 24 hours of laboratory testing.

D. Field and Laboratory Testing Frequency:

1. Minimum field testing frequency for each day concrete is delivered and placed at the project site shall be as follows.
 - a. Take concrete test cylinders at frequency stated herein from truckload determined by technician, contractor, or engineer
 - b. 1st truck load: Test air content, slump, and temperature.
 - c. 2nd and 3rd truck load: No testing unless noted otherwise.
 - d. 4th truck load: Test air content, slump, and temperature
 - e. 5th and 6th truck load: No testing unless noted otherwise
 - f. 7th truck load: Test air content, slump, and temperature.
 - g. Repeat test frequency for additional truckloads of concrete delivered during each day of concrete placement.
 - h. Concrete temperature shall be tested for each truckload of concrete during cold weather or hot weather as defined within this specification.
 - i. Contractor, Owner's representative, or Engineer shall increase testing frequency as required to verify mix designs, address workability concerns, and to ensure all concrete placed complies with specifications

2. Lab-Cured (Standard Cure) Cylinders:

- a. Lab-cured cylinders are required for all concrete on the project, and shall be in addition to field-cured cylinders, where provided.
 - b. One set of 5 cylinders shall be prepared for each 100 cubic yards, or fraction thereof, of each different mix placed in each single day; or for each 5,000 square foot of slab or wall surface area placed each day.
 - c. Test one cylinder at 7 days, three at 28 days, and reserve one cylinder for 56-days.
 - d. Test 56-day cylinder as needed or requested by Contractor or Engineer.
3. Field-Cured Cylinders:
 - a. Contractor is responsible for taking additional field-cured test cylinders to verify concrete compressive strength prior to backfilling concrete basement walls or early removal of formwork.
 - b. One set of 3 field-cured cylinders shall be prepared for each 100 cubic yards, or fraction thereof, of the concrete placed in each single day.
 - c. Test field cured cylinders at 14 days or as requested by Contractor or Engineer.
- E. Acceptance Criteria and Additional Testing Requirements:
1. Concrete strength shall be evaluated in accordance with ACI 301 Section 1.6.5, "Evaluation of concrete strength tests", and Section 1.6.6, "Acceptance of concrete strength"
 2. Construction will be considered potentially deficient if concrete fails to meet any requirements that affect the strength and durability of the structure, including but not necessarily limited to
 - a. Low strength concrete per ACI 301, Section 1.6.5, "Evaluation of concrete strength tests", and Section 1.6.6, "Acceptance of concrete strength"
 - b. Water-to-cementitious materials ratio higher than that of the specified mix
 - c. Reinforcing steel size, quantity, strength, position or arrangement that does not meet the requirements of the Contract Documents
 - d. Reinforced concrete that differs from the dimensions or locations shown on the Drawings
 - e. Curing that does not meet the requirements of the Contract Documents, including premature formwork removal

- f. Hot or cold weather concreting that doesn't meet the requirements of the Contract Documents
 - g. Mechanical damage from accidents or fire
 - h. Poor construction practices
- F. The Engineer may order load and/or core tests in accordance with ASTM C42. Such testing shall be paid for by the Owner if the concrete is proven to meet the requirements specified.

3.10 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 05 50 00

METAL FABRICATIONS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide the following metal fabrications in accordance with this Section and applicable reference standards listed in Article 1.03.
 - a. Painted Steel Railings
 - b. Miscellaneous steel items
 - c. Expansion Bolts
 - 2. Aluminum Railings are specified in Section 05 52 00.
- B. Products furnished, but not installed under this Section include the following:
 - 1. Loose steel lintels for installation in unit masonry.
- C. Related Requirements
 - 1. Section 03 11 00 – Concrete Forming
 - 2. Section 09 90 00 – Painting and Coating

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American Institute of Steel Construction (AISC)
 - a. AISC 303 Code of Standard Practice for Steel Buildings and Bridges
 - 2. American National Standards Institute (ANSI)
 - a. A14.3 American National Standard for Ladders-Fixed-Safety Requirements
 - 3. American Welding Society (AWS)

- a. AWS D1.1 Structural Welding Code - Steel
- b. AWS D1.2 Structural Welding Code – Aluminum
- c. AWS D1.3 Structural Welding Code – Sheet Metal
- d. AWS D1.6 Structural Welding Code - Stainless Steel
- 4. ASTM International (ASTM)
 - a. ASTM A6 Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
 - b. ASTM A36 Standard Specification for Carbon Structural Steel
 - c. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - d. ASTM A500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - e. ASTM A572 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
 - f. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
 - g. ASTM A992 Standard Specification for Structural Steel Shapes
 - h. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - i. ASTM B211 Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire
 - j. ASTM B308 Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
- 5. ICC Evaluation Services (ICC-ES)
 - a. ICC-ES AC308 Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections and details of metal fabrications and their connections. Show anchorage and accessory items.

1. Details of connections, copes, splices, holes, hardware, finish, and other pertinent information
 2. Anchor bolt embedment Drawings
 3. Indicate welds by standard AWS symbol
- C. Product Data
1. Expansion Bolts
 - a. ICC-ES Compliance Report
 - b. Allowable and ultimate load tables per embedment depths
 - c. Capacity reduction factors for bolt spacing and edge distances
 - d. Installation Instructions including bolt torque
- D. Manufacturer Instructions
- E. Source and Field Quality Control Submittals
- F. Certificates
1. Mill test reports for structural shapes, bolts, nuts, and washers
 2. Welding certifications for welding procedures and personnel
- G. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Carefully unload material and equipment and stack to prevent deformation and damage. Store items on substantial pallets, dunnage, or other supports and spacers, free from the earth and properly drained, preventing splattering with dirt and other foreign matter.
- C. Store material and equipment to permit easy access for inspection and identification. Protect from deterioration and maintain markings.

- D. Provide protective storage for fastener components. Protect fastener components removed from protective storage from dirt and moisture in closed containers at the location of installation. Do not clean or modify fastener components from as-delivered condition. Do not use fastener components accumulating rust or dirt, and remove from the Site.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Make field measurements prior to fabrication to ensure proper fit. Report discrepancies in existing conditions that require detail changes to Engineer prior to fabrication.
- B. Assemble built-up Work in sections in the shop as much as practicable and mark components for field assembly.
- C. Bolt holes (including those for attaching wood blocking and other components): by fabricator and not made or modified by burning.
- D. Gauges
1. For iron sheets and steel: U.S. Standard
 2. For non-ferrous products: Brown & Sharpe
 3. For wire: United States Steel Wire
- E. Weld carbon steel per ANSI/AWS D1.1, with electrodes with a tensile strength of 70 ksi.
- F. Fusion weld aluminum by the inert gas-shielded arc method per ANSI/AWS D1.2. Use alloy rods similar to alloy being welded where appearance match is required. Alloy 4043 rods may be used where appearance is not a factor and anodizing is not required.
- G. Weld stainless steel per AWS D1.6
- H. Steel
1. Comply with AISC 303
 2. Steel mill material tolerances: per ASTM A6

3. Steel W-shapes: ASTM A992 (50 ksi yield strength)
 4. Steel channels and angles: ASTM A992 (50 ksi yield strength) ASTM A572 grade 50, or ASTM A36
 5. Other steel shapes, plates and bars: ASTM A36
 6. Steel pipe: ASTM A53, Grade B
 7. Hollow structural shapes: ASTM A500, Grade B.
- I. Aluminum items: Fabricated from bars, plates, pipes, rolled and extruded shapes conforming to the following alloy designation unless otherwise specified.
1. Standard structural shapes: Rolled 6061-T6 per ASTM B308
 2. Rolled rod and bar: 6061-T6 per ASTM B211
 3. Sheets, Plates, Checkered Plates: 6061-T6 per ASTM B209
 4. Bolts: 2024-T4
 5. Nuts: 6061-T6
 6. Washers: Alclad 2024-T4
- J. Stainless steel items: Type 316 (Type 316L if welded)

2.02 STEEL RAILING

- A. Steel railing: 1-1/2 inch round steel pipe in all welded construction.
- B. Meet all requirements of 521 CMR Massachusetts Architectural Access Board.
- C. Furnish railing in the largest practical sections with the locations and details of field connections indicated on Shop Drawings. Close exposed ends of railing members.
- D. Welds: Continuous at intersections and ground smooth on all exposed areas. Use radius corners only, do not use mitered corners. Where intersections occur, shape and cut pieces to fit with no distortion of the circular shape.
- E. Posts
 1. Schedule 40, single, un-spliced pipe length
 2. Spacing: Maximum 4-feet on center measured along the rail

- F. Rails
1. Schedule 40
 2. Top rails
 - a. Continuous wherever possible with single un-spliced length attached to minimum of 3 posts.
 - b. At platforms and other level runs: 42 inches from the top of rail to floor, tank wall or other horizontal surface unless otherwise specified.
 - c. On stair flights: 42 vertical inches from the top of rail to a line connecting the toes of the treads.
 3. Lower rails
 - a. Where change the change in elevation is greater than 30 inches: provide rail 4 vertical inches from the center of rail to horizontal surface.
 - b. Where the change in elevation is less than 30 inches: provide rail 19 vertical inches top of rail to horizontal surface.
- G. Provide expansion joints at each railing and toe plate, allowing 1/2 inch of joint movement at each location and space at intervals of maximum 24 feet. Provide internal slip sleeve fastened securely to one side and extend a minimum of 2 inches beyond each side of the joint. Locate within 6 inches of posts.
- H. On stairs and ramps: Provide additional (third) rail forming a handrail, bracketed off the vertical posts at a height of 36 inches from the upper surface to a line connecting the toes of the treads. Provide 1 1/2-inch minimum clearance from posts and obstructions.
- I. On ramps: Provide additional (child) rail forming a handrail bracketed off the vertical posts at a height of 19 inches from the surface of the ramp to the top of the handrail.
- J. Completed railing structure and anchorage: Capable of withstanding the loads prescribed by the building code of Project location.
- K. Support wall mounted railing with cast brackets and fasten with stainless steel expansion or toggle bolts.
- L. Railings shall receive shop prime and finish paint as specified in Section 09 90 00 Painting & Coating.

2.03 EXPANSION BOLTS (INTO CONCRETE)

- A. General: Torque controlled expansion anchor suitable for seismic loads and cracked concrete applications.
- B. Material:
 - 1. AISI 316 stainless steel anchor body, nut, washer, and expansion sleeve, unless noted otherwise
- C. Evaluation Requirements: ICC-ES evaluation report stating product is compliant with 2015 International Building Code and approved for use to resist static, wind and earthquake (Seismic Design Categories A through F) tension and shear loads in cracked and uncracked normal-weight concrete having a compressive strength of 2,500 psi to 8,500 psi. Evaluation reports with a listed renewal date month/year which is prior to the month/year the product is submitted for engineer's review will be rejected.
- D. Approved expansions bolts:
 - 1. Simpson Strong-Tie: Strong-Bolt 2
 - a. Compliance Report (ESR-3037)
 - 2. Hilti: Kwik Bolt TZ
 - a. Compliance Report (ESR-1917)
 - 3. Powers: Power-Stud + SD6
 - a. Compliance Report (ESR-2502)

2.04 MISCELLANEOUS STEEL ITEMS

- A. Fabricate and furnish miscellaneous steel items, galvanized angles, relieving angles, plates, channels, and all required fastenings per Drawing details. Miscellaneous steel items shall be galvanized as specified.

2.05 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.06 SOURCE OF QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 DISSIMILAR MATERIAL

- A. Keep aluminum surfaces from direct contact with metals other than stainless steel by painting the dissimilar metal with a coating of zinc chromate paint, or provide non-absorptive tape between dissimilar metals.
- B. Paint aluminum with a coat of bituminous paint where aluminum is embedded in, or comes in contact with, concrete, masonry or by-products of these materials.

3.02 INSTALLATION

- A. Verify elevations of concrete and masonry bearing surfaces and locations of anchor rods, bearing plates, and other embedments. Clean concrete and masonry bearing surfaces of bond reducing materials and roughen surfaces prior to setting plates.
- B. Concrete embedments: Installed under Section 03 11 00
- C. Use stainless steel hardware when anchoring aluminum and in submerged locations.

3.03 BOLTS

- A. Install bolts snug tight except where indicated as slip critical. Install bolt at least flush with the outer face of the nut. Cut off bolts projecting more than 5/8 inch beyond the nut in exposed Work as close to nut as possible and as directed.
- B. All joint surfaces shall be free of loose mill scale, burrs, and foreign material. Enough bolts shall be brought to a snug tight condition to insure that the parts of the joint are properly compacted, i.e., brought into full contact with each other. Snug tight shall be defined as the tightness attained by a few impacts of an impact wrench or the full effort of a worker using an ordinary spud wrench. Following the initial tightening, bolts shall be placed in any remaining holes in the connection and brought to snug tightness. All bolts in the joint shall be tightened an additional 1/3 turn if bolt length is up to and including four bolt diameters, or a 1/2 if longer.
- C. Provide required cutting, fitting, drilling, and tapping. Do not use thermal cutting during installation and erection. Do not make or modify bolt holes by burning.

3.04 EXPANSION BOLTS

- A. Installation: Per manufacturer's installation instructions and as listed in the product ICC-ES Evaluation Report.
- B. Drill Holes:
 - 1. Diameter: Per manufacturer's instructions
 - 2. Embedment: Manufacturer's standard embedment for anchor size, unless noted otherwise on drawings. Depth stop shall be used to ensure correct drilling depth
- C. Installation Torque: Per manufacturer's instructions.

3.05 FIELD TOUCH UP

- A. Where galvanized steel is field cut and locations where galvanized coating is removed: Touch up steel surface with zinc rich paint meeting ASTM A780 and containing a minimum of 65 percent zinc at locations.

3.06 CLEANING

- A. Immediately after installation, round or chamfer sharp edges and grind burrs, jagged edges and surface defects smooth. Remove weld splatter.

3.07 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.08 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 05 52 00

METAL RAILINGS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide aluminum railings in accordance with this Section and applicable reference standards listed in Article 1.03.
2. Painted Steel Railing shall be provided under Specification 05 50 00 Metal Fabrications

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

1. American Welding Society (AWS)
 - a. AWS D1.2 - Structural Welding Code-Aluminum

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with the Division 01 General Requirements.

1. Product Data: manufacturer's specifications, anchor details and installation instructions including paint products and grout. Certification railing installation meets minimum load requirements of the International Building Code and American Society of Civil Engineers Minimum Design Loads for Building and Other Structures.
2. Manufacturer Instructions
3. Shop Drawings: plans, elevations and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation. Take field measurements prior to preparation of Shop

Drawings and fabrication, where possible. Allow for trimming and fitting where taking field measurements before fabrication might delay Work.

- B. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Provide materials smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness for areas exposed to view.

2.02 MATERIALS

- A. Aluminum plates, shapes, extrusions, and bars: alloy 6061-T6 or 6005A-T61.
- B. Brackets, flanges and anchors: cast or formed metal of same type material and finish as supported rails, unless otherwise specified.
- C. Hardware: All bolts, screws, and anchors shall be 316 stainless steel or aluminum.

2.03 GENERAL FABRICATION

- A. Neatly cut intersections or notch to fit, weld sections and grind welds flush. Assemble welded sections of complete railing in as large pieces as possible for powder coating, anodizing, or coating and transporting for assembly at Site. Furnish mechanical expansion fasteners and necessary fittings, including, but not limited to, brackets, sleeves and flanges required for complete installation. Provide sleeves in concrete for posts where removable handrails are indicated.
- B. Furnish materials of size and thickness specified to produce strength and durability in finished product. Work to dimensions shown on Shop Drawings, using proven details of fabrication and support.

- C. Ease exposed edges to a radius of approximately 1/32-inch. Form bent-metal corners to smallest radius possible without causing grain separation or impairing Work.
- D. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
- E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head countersunk screws or bolts.
- F. Provide for anchorage type shown, coordinated with supporting structure, fabricated and spaced for intended use.
- G. Cut, reinforce, drill and tap miscellaneous metal Work indicated to receive finish hardware and similar items.
- H. Fabricate joints exposed to weather to exclude water or provide weep holes where water may accumulate.
- I. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- J. Railing:
 - 1. Railing shall consist of pre-assembled aluminum extrusions and castings of sections 8 feet long or less.
 - 2. Fencing shall have two rails, shall be 42" high, and have welded plated posts. Fencing shall have a 2-1/2" wide handrail top cap, a 1" square picket, a 1-5/8" square U-channel bottom rail, and a maximum of 5" on center picket spacing (maximum 4" between pickets).
 - 3. Fencing shall be capable of supporting a 200 pound concentrated load or a 50 pound per linear foot uniform load applied in any direction.
 - 4. Acceptable level of quality shall be Avon Deck/Porch Railing by SPECRAIL, Industrial Grade by Aluminum Fence Supply, 2-Rail Flat Top by Digger Specialties Inc., 200 Series by Atlantic Aluminum, Fortress by Arcat, or approved equal.
 - 5. Finish: Manufacturer's standard powder coat or anodized finish in black with gloss finish.

2.04 EXTRA MATERIALS

- A. Provide touch-up paint from railing manufacturer to match railing color.

2.05 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project Site.

3.02 INSTALLATION

- A. Take field measurements prior to preparation of Shop Drawings and fabrication without delaying Work or allow for trimming and fitting.
- B. Assemble fabrications shipped to Site with concealed mechanical expansion fasteners.
 1. Perform cutting, drilling and fitting required for installation. Set railing in locations, alignment and elevation, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry or similar construction.
 2. Fit exposed connections together to form tight hairline joints. Weld connections that cannot be shop welded because of shipping size limitations and are not to be left as exposed joints. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade surfaces of exterior units which have been finished after fabrication, and are intended for bolted or screwed field connections.
 3. Comply with AWS D1.2 for procedures of manual-shielded metal-arc welding, appearance and quality of welds, and methods used in correcting welding Work.
 4. Post shall be installed so that there is a minimum of 3" and maximum of 4" clear between edge of post and adjacent vertical surfaces to prevent pinch points.

3.03 TOUCH-UP PAINTING

- A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with galvanizing repair paint. Apply by brush or spray to provide a minimum dry film thickness of 3.0-5.0 mils.

3.04 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 09 90 00

PAINTING AND COATING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide surface preparation and painting in accordance with this Section and applicable reference standards listed in Article 1.03.
 - 2. Provide the following types of painting work per the Paint Schedules attached and on Drawings:
 - a. Painting of exterior steel railings
- B. Related Requirements
 - 1. Section 05 50 00 – Miscellaneous Metals

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. ASTM International (ASTM)
 - a. ASTM A780 Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
 - b. ASTM D6386 Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Products and Hardware Surfaces for Painting
 - 2. International Concrete Repair Institute, (ICRI)
 - a. ICRI Technical Guideline No 310.2 Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair with CSP Chips
 - 3. NACE International, (NACE)
 - a. NACE Publication 6D-173 A Manual for Painter Safety

- b. NACE SP0178 Surface Finishing of Welds Prior to Coating
 - c. NACE No. 6/SSPC-SP13 Surface Preparation of Concrete
 - 4. NSF International (NSF)
 - a. NSF/ANSI 61 Drinking Water System Components – Health Effects
 - 5. Steel Structures Painting Council (SSPC)
 - a. SSPC-Paint 16, Coal Tar Epoxy-Polyamide
 - b. SSPC-Paint 20, Zinc-Rich Coating Inorganic and Organic
 - c. SSPC-SP12/NACE 5 Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultra High-Pressure Jetting Prior to Recoating
 - d. SSPC-SP13/NACE No. 6 Surface Preparation of Concrete
 - e. SSPC-Guide 12 Guide for Illumination of Industrial Painting Projects
 - f. SSPC-VIS-1 Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
- B. Definitions
- 1. Concrete Surface Profiles (CSP) per ICRI Technical Guideline No 310-2. Concrete surface preparation definitions listed below shall be field verified with Concrete Surface Profile Chips.
 - a. CSP 1: Acid Etched
 - b. CSP 2: Grinding
 - c. CSP 3: Light Shotblast
 - d. CSP 4: Light Scarification
 - e. CSP 5: Medium Shotblast
 - f. CSP 6: Medium Scarification
 - g. CSP 7: Heavy Abrasive Blast
 - h. CSP 8: Scabbed
 - i. CSP 9: Heavy Scarification
 - j. CSP 10: Course Planing
 - 2. Surface Preparation of Carbon Steel per SSPC Surface preparation Standards. Definitions below summarize surface preparation requirements

for each level of cleaning. Refer to SSPC standards for complete requirement for each level of surface preparation and cleaning.

- a. Adherent: Mill scale, rust and coating are considered tightly adherent if they cannot be lifting with a dull putty knife.
- b. SSPC-SP1: Solvent Cleaning: The removal of all visible oil, grease, soil, drawing and cutting compounds and other soluble contaminants from surfaces with solvents or commercial cleaners using various methods of cleaning such as wiping, dipping, steam cleaning or vapor degreasing.
- c. SSPC-SP2: Hand Tool Cleaning: The removal of all loose mill scale, loose rust, loose paint and other loose detrimental foreign matter by the use of non-power hand tools.
- d. SSPC-SP3: Power Tool Cleaning: The removal of all loose mill scale, loose rust, loose paint and other loose detrimental foreign matter by the use of power-assisted hand tools.
- e. SSPC-SP5/NACE 1: White Metal Blast Cleaning: The complete removal of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter by compressed air nozzle blasting, centrifugal wheels or other specified methods.
- f. SSPC-SP6/ NACE 3: Commercial Blast Cleaning: The complete removal of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter by compressed air nozzle blasting, centrifugal wheels or other specified methods. Discoloration caused by certain stains shall be limited to no more than 33 percent of each unit area. Unit area is approximately 9 sq in.
- g. SSPC-SP7 / NACE Brush-off Blast Cleaning: A brush-off, blast-cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust and loose coating. Tightly adhered mill scale, rust and coating may remain on the surface.
- h. SSPC-SP10 / NACE 2 Near-White Metal Blast Cleaning: The removal of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter by compressed air nozzle blasting, centrifugal wheels or other specified method. Discoloration caused by certain stains shall be limited to no more than 5 percent of each unit area. Unit area is approximately 9 sq in.
- i. SSPC-SP11 Power Tool Cleaning to Bare Metal: The removal of all visible oil, grease, dirt, mill scale, rust, paint, oxide, corrosion

products, and other foreign matter. Slight residues of rust and paint may be left in the lower portion of pits if the original surface is pitted. Differs from SSPC-SP3 in that it requires more thorough cleaning and a surface profile not less than 1 mil (25 microns).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data
 - 1. Primers
 - 2. Manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.
 - 3. Manufacturer's material data and certificates of performance for proposed substitutions.
 - 4. List each material and cross-reference the specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.
- C. Certificates: From manufacturer that products supplied comply with local Regulations controlling use of volatile organic compounds (VOCs).
- D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Applicator Qualifications: Engage experienced applicators who have completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

- B. Packing, Shipping, Handling, and Unloading
1. Deliver materials to the Site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information.
 - a. Product name or title of material
 - b. Product description (generic classification or binder type)
 - c. Manufacturer's stock number and date of manufacture
 - d. Contents by volume, for pigment and vehicle constituents
 - e. Thinning instructions
 - f. Application instructions
 - g. Color name and number
- C. Storage and Protection
1. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees F. Maintain containers used in storage in a clean condition, free of foreign materials and residue. Protect from freezing.
 2. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and Work areas are protected from fire and health hazards resulting from handling, mixing, and application.
- D. Waste Management and Disposal
1. Remove all unused material from the site, unless the Owner requests portions of unused material to be provided in properly sealed containers for future repair and maintenance of coatings. Transport (extra) material to Owner specified storage facility located at the project site.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Tnemec
- B. Sherwin Williams (S&W)

- C. PPG
- D. Or equal

2.02 PAINT MATERIALS

- A. Provide materials designated by item or area to be painted in Paint Schedules attached and on Drawings. Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers.
- B. Provide primers and undercoat paint produced by the same manufacturer as the finish coats.
- C. Material compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.
- D. Material quality: Manufacturer's best-quality trade sale paint material of the various coating types specified. Ensure paint material containers display manufacturer's product identification.
- E. Colors from the manufacturer's full range of standard colors.

2.03 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Ensure surfaces receiving paint are thoroughly dry before paint is applied. Do not begin to apply paint until unsatisfactory conditions have been corrected.
- B. Coordination of Work: Review other Specifications in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers. Notify the Engineer about anticipated problems using the materials specified over substrates primed by others.

3.02 PREPARATION

A. General Requirements

1. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Following completion of painting operations in each space or area, ensure workers skilled in the trades involved reinstall items..
2. Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
3. Clean and prepare surfaces to be painted according to the manufacturer's instructions for each substrate condition and as specified herein. Use more stringent cleaning and surface preparation if manufacturer's recommendations differ from the requirements specified herein.
 - a. Provide barrier coats over incompatible primers or remove and re-prime. Notify Engineer in writing about anticipated problems using the specified finish-coat material with substrates primed by others.
 - b. Ensure existing painted surfaces are structurally sound, dry, clean, and free of oil, grease, dirt, mildew, form release agents, curing compounds, efflorescence, loose and flaking paint, or other foreign material. Engineer will approve condition of prepared substrate prior to application of coating system. Test old coatings for lifting per coating manufacturer's recommendations.
4. Abrasive Blast Surfaces: Shall be coated before any visible rust forms on the surface. Abrasive blast cleaning shall be performed only when the relative humidity is no higher than 85% and the surface temperature of the steel at its coldest point is at least 5 degrees Fahrenheit above the temperature of the dew point. Material that is abrasive blast-cleaned shall be primed in the same shift, no more than 12-hours after the surfaces have been blast-cleaned.

B. New Uncoated Surfaces:

1. Prepare to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, loose rust, and release agents.
 - a. Ferrous Metals: Prepare metal according as follows:

- 1) Ferrous Metals: Sandblasted clean in accordance with SSPC-SP-6, Commercial Grade, immediately prior to priming.
 2. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods in accordance with ASTM D6386.
- C. Previously Coated Surfaces:
1. Prepare to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, loose rust, and release agents.
 - a. Ferrous metals: SSPC-SP7 Brush-Off Blast Cleaning to remove all dirt, loose rust, and loose coatings.
 2. Coating Compatibility: Check for coating compatibility by applying a test patch of the recommended coating system, covering at least 2-3 square feet. Allow to dry one week before testing adhesion per ASTM D3359. If the coating is incompatible contact engineer and coating manufacturer for recommendations.

3.03 COLOR SELECTION

- A. Colors of finish coats: as indicated or specified or as selected by Owner.

3.04 APPLICATION

- A. General
1. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F and 90 degrees F.
 2. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F and 95 degrees F.
 3. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

4. Priming Abrasive Blast Surfaces: Shall be primed before any visible rust forms on the surface. Abrasive blast cleaning shall be performed only when the relative humidity is no higher than 85% and the surface temperature of the steel at its coldest point is at least 5 degrees Fahrenheit above the temperature of the dew point. Material that is abrasive blast-cleaned shall be primed in the same shift, no more than 12-hours after the surfaces have been blast-cleaned.
5. Carefully mix and prepare paint materials according to manufacturer's directions.
 - a. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 - b. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
6. Use only thinners approved by the paint manufacturer and only within recommended limits
7. Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
 - a. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - b. Paint colors, surface treatments, and finishes as indicated in the Paint Schedules.
 - c. Provide finish coats that are compatible with primers used.
 - d. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.
 - e. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed surfaces/fasteners, receive a dry film thickness equivalent to that of flat surfaces.

- f. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
 - g. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - h. Paint backsides of access panels and removable or hinged covers to match exposed surfaces.
 - i. Sand lightly between each succeeding enamel or varnish coat.
 - j. Omit primer on metal surfaces that have been shop-primed and touch-up painted.
- B. Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
- 1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- C. Apply paints and coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.
- 1. Use brushes best suited for the material applied.
 - 2. Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
 - 3. Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- D. Apply materials no thinner than the manufacturers' recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Ferrous metals indicated on the Drawings to be painted will be provided with a shop primer compatible with the coatings specified. Paint ferrous metals specified in Section 05 50 00 that are not galvanized and indicated to be painted on the Drawings.

3.05 PRIME COATS

- A. Before applying finish coats, apply a prime coat of material as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing. Apply prime coat to previously painted surfaces if finish coats are not compatible with existing coating.

3.06 PIGMENTED (OPAQUE) FINISHES

- A. Completely cover to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

3.07 COMPLETED WORK

- A. Match approved Samples for color, texture, and coverage. Remove, refinish, or repaint Work not complying with specified requirements.

3.08 CLEANING

- A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the Site. Clean up debris resulting from Work and dispose in Project on-site trash receptacles.
- B. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.09 PROTECTION

- A. Protect Work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Engineer.
- B. Provide Wet Paint signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their Work after completing painting operations..
- C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.10 REPAIR

- A. Hot-dip Galvanized Surfaces:
 - 1. Field repair all damaged hot-dip galvanized coatings.
 - 2. Work shall conform to ASTM A780.
- B. Coatings:
 - 1. Repair any damaged shop applied primers and coatings as required to provide the same level of protection as provided by undamaged coating systems.
 - 2. Color and finish of repairs shall match adjacent undamaged coating.

3.11 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Site/Field tests and inspections: May be required by Owner up to 4 times during the period when paint is being applied.
 - 1. Engage the services of an independent testing agency with minimum 5 years of experience to sample the paint material used. Provide that Samples of material delivered to the Project are taken, identified, sealed, and certified in the presence of the Contractor.
 - 2. The independent testing agency shall perform appropriate tests at no additional cost to the Owner for the following characteristics:
 - a. Quantitative materials analysis
 - b. Abrasion resistance
 - c. Apparent reflectivity
 - d. Flexibility
 - e. Washability
 - f. Absorption
 - g. Accelerated weathering
 - h. Dry opacity
 - i. Accelerated yellowness
 - j. Recoating
 - k. Skinning

1. Color retention
- m. Alkali and mildew resistance
3. If test results show material being used does not comply with specified requirements, stop painting, remove noncomplying paint, repaint surfaces coated with rejected paint, and remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are incompatible

3.12 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

3.13 ATTACHMENTS

- A. Paint Schedule.

PAINT SCHEDULE

Number of coats scheduled is as a minimum. Painting and finishing shall conform to applicable Laws and building code regarding fire hazard classifications and volatile organic content of finish materials. Products listed shall not be in-contact with Potable Water and do not comply with NSF/ANSI 61. Provide products by the manufacturers named or approved equal.

Provide paint and coating systems listed below where the Drawings refer to this Specification section or reference any item to be painted or coated, unless a specific paint or coating system is specified elsewhere.

This list is intended to cover all potential conditions that may require painting and not all paint and coating systems listed below may not be included in the Work.

A. Bituminous Coating (SSPC Paint 16)		
Shop Applied & (Field Touch-up)	1. Tnemec: Series 46H-413 Tneme-Tar 2. S-W: Targuard Coal Tar Epoxy 3. PPG: Amercoat 78HB	2 shop coats DFT 8– 10 mils/ct
B. Steel Railings		
Surface Preparation	1. SSPC-SP3 Commercial Blast Cleaning	
Shop Applied Prime Coat	1. Tnemec "Series 27 F.C. Typoxy" 2. S-W: "Macropoxy 646" 3. PPG: "Amercoat 385" 4. Or Equal	DFT 4 – 6 mils DFT 4 – 6 mils DFT 4 – 8 mils

Field Applied Two Finish Coats	1. Tnemec "Series 73 Endura-Shield" 2. S-W: "High Solids Polyurethane" 3. PPG: "Amercoat 450H" 4. Or Equal	DFT 2 – 3 mils DFT 3 – 4 mils DFT 2 – 3 mils
--------------------------------	---	--

END OF SECTION

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide labor, tools, equipment, and materials necessary to furnish and install electrical work as specified and in accordance with the Drawings and applicable reference standards listed in Article 1.03.
2. In general, electrical Work shall include but not be limited to the following.
 - a. Power distribution equipment
 - b. Power outlets and equipment connections
 - c. Wiring devices
 - d. Control wiring not provided by other divisions
 - e. Complete grounding system
 - f. Service Entrance work
 - g. Lighting – Building interior and exterior
 - h. Tele/Data Communications System
 - i. Support material and hardware for raceway and electrical equipment
 - j. Branch circuit wiring
 - k. Underground electrical construction All excavation, backfill, surface restoration, and concrete and rebar work shall be provided by the General Contractor. Manholes, Handholes, conduit, and conduit spacers/supports shall be provided by the Electrical Subcontractor. Manholes and handholes shall be installed by the General Contractor.
 - l. Installation, termination & labeling of all cable and signal wiring for instrumentation and process control equipment.
 - m. Building wall, floor and roof penetrations for raceways

- n. Start up, acceptance testing test reports and instruction of systems operation to the Owner

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards

1. Electrical equipment, materials, installation and workmanship shall comply with all state and local building codes, safety and fire law Regulations at the location of the Work and shall conform the applicable codes and standards of the organizations listed:
 - a. American National Standards Institute, Inc. (ANSI)
 - b. Association of Edison Illuminating Companies (AEIC)
 - c. Institute of Electrical and Electronics Engineers (IEEE C2)
 - d. Insulated Power Cable Engineers Association (IPCEA)
 - e. National Electrical Code (NEC)
 - 1) Massachusetts Amendments
 - f. National Electrical Manufacturers Association (NEMA)
 - g. National Fire Protection Association (NFPA)
 - h. Occupational Safety Health Act (OSHA)
 - i. Underwriters' Laboratories (UL)
 2. Where the Contract requires the Work or any part of the same, to be above the standards required by applicable Laws, ordinances, rules and Regulations and other statutory provisions pertaining to the Work, such Work shall be performed and completed in accordance with the Contract requirements.
 3. Should any changes in the Specifications and Drawings be necessary to conform to the requirements of any of the above mentioned codes or standards, the Contractor shall so notify the Owner's Representative.
- B. Drawings required by Governing Authorities: Prepare any detailed diagrams or Drawings which may be required by the governing authorities.

- C. Permits, Certificates, Inspections, Fees and Utility Costs
1. Obtain and make payments for all permits, licenses, and certificates that are required for the associated Work.
 2. Obtain certificates of approval from the responsible agencies concerned with the Work.
 3. Arrange for timely inspections required for Work under this section.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.
- B. The electrical work shall be coordinated with the Work of other trades to prevent interferences and so that the progress in construction of the building will in no way be retarded.
- C. Coordinate with all local utility companies and make all installations for their services in accordance with all utility company requirements.
- D. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, furnish and install all required supports and wiring to clear the encroachment for a complete installation.
- E. Any Work installed contrary to or without acceptance by the Engineer shall be subject to change as directed by the Engineer, and no extra compensation will be allowed to the Contractor for making these changes.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Furnish manufacturer's product data, test reports, and materials certifications as required.
- C. Follow the procedures specified in Division 01 Section "Submittals" and in addition, the Contractor shall prepare and submit a complete submittal list to the Engineer. The submittal list shall include all submittal items covered in the Division 26 Specification sections.
- D. Shop Drawings shall be submitted to the General Contractor who shall review and approve them prior to submittal to the Engineer for approval. Shop Drawings shall identify the specific equipment and material being supplied; the quantity being supplied; and all accessories, dimensions, descriptions, mounting and connection details, wiring diagrams, elementary control diagrams, equipment

interface diagrams and any other information necessary to determine compliance with the Plans and Specifications. Fabrication and installation shall be in accordance with the approved Shop Drawings.

- E. As-built copies of all Shop Drawings shall be submitted to the Engineer.
- F. Submit copies of reports, permits, and easements necessary for installation, use, and operation.
- G. Submit copies of reports of tests, inspections, and meter readings as specified.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

1.09 WARRANTY

- A. Special Warranty/Extended Correction Period
- B. Compile and assemble the warranties specified in Division 26 into a separate set of vinyl covered three ring binders, tabulated and indexed for easy reference.
- C. Provide complete warranty information for each item. Information to include:
 - 1. Product or equipment list
 - 2. Date of beginning of warranty or bond
 - 3. Duration of warranty or bond
 - 4. Names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services

1.10 DRAWINGS

- A. The Specifications supplement the Drawings and provide information pertaining to the methods and materials to be used in the execution of the Work. When a discrepancy occurs between the two, the stricter of the two shall govern.

- B. All electrical equipment such as junction and pull boxes, panelboards, switches, controls and such other apparatus as may require maintenance and operation from time to time shall be made easily accessible and properly labeled.
- C. The Contractor shall examine all Contracts and reference Drawings, and verify and properly coordinate the placement of outlets. Contractor shall also check all Drawings including mechanical Drawings and Shop Drawings for apparatus for which he must rough-in and to which he must connect.

1.11 RECORD DRAWINGS

- A. Maintain a complete and separate set of prints of Drawings and Specifications at job Site for duration of the Contract. Record Work completed and all changes from original Contract. Drawings shall clearly and accurately include Work installed as a modification or as an addition to the original design.
- B. At completion of Work and prior to final request for payment, submit a complete set of reproducible Record Drawings showing all systems as actually installed.

1.12 JOB CONDITIONS

- A. Existing Conditions
 - 1. Existing Utilities: Locate existing underground utilities in excavation areas. If utilities are indicated to remain, support and protect services during excavation operations.
 - 2. Prior to all Work of this section, carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence.
 - 3. Verify that the electrical installation may be made in complete accordance with all pertinent codes and Regulations and the original design.
- B. Coordination:
 - 1. Coordinate the installation of electrical items with the schedules for Work of other trades to prevent unnecessary delays in the total Work.
 - 2. Coordinate with all local utility companies and make all installations for their services in accordance with all utility company requirements.
 - 3. Any changes shall be done at the Contractor's expense.
 - 4. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, furnish and install all required supports and wiring to clear the encroachment for a complete installation.

5. Any Work installed contrary to or without acceptance by the Engineer shall be subject to change as directed by the Engineer, and no extra compensation will be allowed to the Contractor for making these changes.

C. Accuracy of Data:

1. The Drawings are diagrammatic and functional only, and are not intended to show exact circuit layouts, number of fittings, components and place in satisfactory operational power, lighting, and other electrical systems shown. Install additional circuits, components and material wherever needed to conform to the specific requirements of the equipment whether or not indicated or specified.
2. Information and components called for in the Specification but not shown on Plans or vice versa shall apply and shall be provided as though required expressly by both.
3. The locations of equipment, fixtures, outlets and similar devices shown on the Drawings are approximate only. Field measurements shall take precedence over scaled dimensions from Drawings. Exact locations shall be as accepted by Engineer during construction. Obtain in the field all information relevant to the placing of electrical work and, in case of any interference with other Work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the Work in an acceptable manner.
4. The Drawings and the Specifications are intended to comply with all pertinent codes, Regulations and standards. In the event of discrepancy, the Contractor shall immediately notify the Engineer in writing of said discrepancies and apply for an interpretation and, unless an interpretation is offered in writing by the Engineer prior to the execution of the Contract, the applicable rules and Regulations shall be complied with as a part of the Contract.
5. In case of difference between building codes, Specifications, state Laws, industry standards and the Contract Documents, the most stringent shall govern. Should the Contractor perform any Work that does not comply with the requirements of the applicable building codes, state Laws, and industry standards, he shall bear all cost arising in correcting these deficiencies.
6. Verify size and ratings of motors and other electrically operated devices supplied by others.
7. Check with Engineer before installation of Work for outlets not specified as to location or for Work that interferes with other trades.

1.13 FLASHING, CUTTING, FIREPROOFING AND WATERPROOFING

- A. Flashing around all electrical items penetrating roof or exterior walls shall be the responsibility of the General Contractor.
- B. All cutting of surfaces, including core drilling of walls and slabs, shall be done by the General Contractor.
- C. Patching shall be done by the General Contractor.
- D. The General Contractor shall fireproof, waterproof and seal all openings in slabs and walls.

1.14 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Use all means necessary to protect electrical system materials before, during and after installation and to protect the installed Work and materials of all other trades.
- B. In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Engineer and at no additional cost to the Owner. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the Engineer, at the cost and expense of the Contractor, or shall be replaced by the Contractor at his own expense.
- C. Protect the Work of other trades. Restore any damage caused to other trades to the condition existing prior to damage at no additional cost to the Owner.
- D. Investigate each space in the building through which equipment must pass to reach its final location. If necessary, the manufacture shall be required to ship his material in sections sized to permit passing through such restricted areas in the building.

1.15 WORK PERFORMANCE

- A. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required Work, the following requirements are mandatory:
 - 1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.
 - 2. Electricians must wear personal protective equipment while working on energized systems in accordance with NFPA 70E.

3. Before initiating any Work, a job specific Work plan must be developed by the Contractor and the Owner. The Work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, and safety equipment to be used and exit pathways.
4. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the Owner.

1.16 DEFINITIONS

- A. As used in this Specification, “provide” means “furnish and install”, “furnish” means “to purchase and deliver to the Project Site complete with every necessary appurtenance and support and to store in a secure area in accordance with manufacturer’s instructions”, and “install” means “to unload at the delivery point at the Site or retrieve from storage, move to point of installation and perform every operation necessary to establish secure mounting and correct operation at the proper location in the Project”.
- B. Finished Areas: In general, areas with carpet or tile floors, lay-in or fixed ceiling tile, special architectural ceiling treatment, or tiled, plastered, or paneled walls shall be considered finished areas.
- C. Interior: For the purposes of this Specification, interior is any area within the boundaries of the foundation of any building within the superstructure or other structures not classified as a building.

1.17 TEMPORARY POWER

- A. The Contractor shall furnish, install, maintain, and remove the temporary electrical power and lighting systems, including lamps, and pay for all labor, materials, and equipment required therefor. All such temporary electrical work shall meet the requirements of the National Electrical Code, the local utility company, and OSHA.
- B. The Contractor shall make all necessary arrangements with the local utility company as to where the temporary electric service can be obtained.
- C. The Contractor shall secure and pay for all required permits and back charges for Work performed by others, and other expenses incidental to the installation of the temporary electric service.

1.18 POSTED OPERATING INSTRUCTIONS:

- A. Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

1. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 2. Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 3. Safety precautions.
 4. The procedure in the event of equipment failure.
 5. Other items of instruction as recommended by the manufacturer of each system or item of equipment.
- B. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.19 MANUFACTURER'S NAMEPLATE

- A. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.20 FIELD FABRICATED NAMEPLATES

- A. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the Drawings. Each nameplate inscription shall identify the name of the equipment, function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, black with white letters. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style. All electrical equipment shall be labeled with the following:
1. Panel Name
 2. Fed from "Panel Name" & "CKT #"
 3. Amps
 4. Volts
 5. Phase

1.21 ARC FLASH LABEL

- A. Provide arc flash labels for all electrical equipment with operating voltages greater than 50 volt per NEC 110.16.

1.22 WARNING SIGNS

- A. Exterior warning and caution signs shall be weather resistant, nonfading, preprinted cellulose acetate butyrate signs with 20-gauge, galvanized steel backing, with colors, legend, and size appropriate to the location.
- B. Interior warning and caution signs shall be aluminum signs with preprinted baked enamel finish and punched for fasteners. Colors, legend, and size appropriate to location.

1.23 WIRE AND CABLE MARKERS

- A. Underground line marking tape shall be permanent, bright colored, continuous printed, metal backed, plastic tape compounded for direct burial service not less than 6 inches wide. Printed legend indicative of general type of underground line below.
- B. Wire labels for wires smaller than No. 4. shall be vinyl or vinyl cloth, self-adhesive, wraparound, wire markers with preprinted numbers and letters. Wire sizes No. 4 and larger and multi conductor cables shall be marked with one-piece, nylon locking marker ties equal to Panduit PLM Series.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Materials and equipment shall be listed by UL unless it can be demonstrated that no UL standards exist for a specific item or class of equipment.
- B. All other materials, not specifically described but required for a complete and operable electrical installation, shall be new, first quality of their respective kinds, Specification grade or better, and as selected by the Contractor subject to the acceptance by the Engineer.
- C. All materials and equipment furnished and installed on this Project shall meet the most stringent efficiency standards of the local utility to qualify for the maximum rebate.

2.02 MATERIAL AND CONSTRUCTION REQUIREMENTS

- A. Unless otherwise shown or specified, all enclosures, wiring and other materials and all construction methods shall conform to the following:

1. Indoor, Above Ground, Dry Areas - NEMA 12, General Purpose, with gasketing for applications where atmospheric conditions are normal. Enclosures shall be sheet steel, treated to resist corrosion, prime painted and finished with a gray baked-on enamel. Control stations shall have NEMA 13, oil tight and dust-tight enclosures.
2. Outdoors, Moist Areas and Indoor Below Grade Areas - NEMA 4, watertight. Enclosures shall be cast aluminum or stainless steel. Where indicated on electrical Plans provide NEMA 4X enclosures of stainless steel or reinforced non-metallic (Krydon) construction. All installations shall utilize only stainless steel fasteners/hardware.
3. Indoor-Outdoor, Subject to Submersion in Liquid - NEMA 6, submersible, liquid tight construction. Enclosures shall be cast aluminum.
4. Hazardous Areas - NEMA 7 & 9, explosion-proof construction for Class 1, Division 1, Group D areas. Enclosures shall be cast aluminum.
5. Corrosive Atmospheres - All Work located in corrosive atmospheres, such as atmospheres in the filter area and the chemical feed pump areas shall be of such construction that the corrosive agent cannot enter into and damage the electrical work. All materials in these areas shall be non-corrodible or finished with an inert coating. Stainless steel, or reinforced PVC electrical enclosures and PVC coated rigid conduit and fittings are required. In addition, provide gas tight seals in all conduits passing from or into corrosive areas (similar to Crouse Hinds Type EYS), to minimize migration of corrosive fumes to other building areas.

2.03 INTERCHANGEABILITY

- A. In all design and purchasing, interchangeability of items of equipment, subassemblies, parts, relays and other items is essential. All similar items shall be of the same manufacturer, type, model and dimensions.
- B. For ease of maintenance and parts replacement, to the maximum extent possible, use equipment of a single manufacturer.
- C. The Engineer reserves the right to reject any submittal which contains equipment from various manufacturers if suitable materials can be secured from fewer manufacturers and to require that source of materials be unified to the maximum extent possible.

2.04 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 COORDINATION

- A. Prior to all Work of this section, carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence.
- B. Field verify all locations and dimensions to ensure that the equipment will be properly located, readily accessible, and installed in accordance with all pertinent codes and Regulations, the Contract Documents, and the referenced standards.
- C. The Work shall be carefully laid out in advance, and where cutting, drilling, etc., of floors, walls, ceilings, or other surfaces is necessary for the proper installation, this Work shall be carefully done, and any damage to building, piping, or equipment shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner.
- D. In the event any discrepancies are discovered, immediately notify the Owner's Representative in writing. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 INSTALLATION

- A. Install all equipment and fixtures in complete accordance with the manufacturer's recommendations and all pertinent codes and Regulations.
- B. Thoroughly inspect all items of equipment and any items dented, scratched, or otherwise damaged in any manner shall be replaced or repaired and painted to match original finish. All items so repaired and refinished shall be brought to the attention of the Engineer for inspection and acceptance.
- C. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete or supported from or on other structural components, as they are constructed.
- D. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building and equipment which must be placed in service before further construction can take place.
- E. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
- F. The final routing of raceways shall be determined by structural conditions, interferences with other trades and by terminal locations on apparatus. The

Engineer reserves the right of a reasonable amount of shifting at no extra cost up until time of roughing in the Work.

- G. Where circuits are shown as "home-runs" all necessary fittings and boxes shall be provided for a complete raceway installation.
- H. In general, wiring and raceway systems for security alarm, fire alarm, telephone and intercommunications systems are not indicated on the Drawings but shall be furnished and installed under this section.
- I. Each lighting and each receptacle circuit shall have its own neutral, dedicated to that circuit. A common neutral for more than one signal phase circuit is not allowed.
- J. Surface mounted panel boxed, junction boxes, conduits, etc., shall be supported by spacers to provide a clearance between wall and equipment.
- K. Upon completion of all installation, lamping, and testing, thoroughly inspect all exposed portions of the electrical installation and completely remove all exposed labels, soils, markings and foreign material.

3.03 MARKING AND LABELING

- A. All panelboards, indoor transformers, cabinets, control panels and other specified equipment shall be labeled with engraved laminated plastic plates with engraved letters. Punch tapes with mastic backings are not acceptable.
- B. All starters, disconnect switches and other specified equipment shall be marked with engraved laminated plastic plates and engraved letters. Where individual switches are circuit breakers in power or distribution panel boards do not have cardholders, they shall be marked with $\frac{1}{2}$ " high labels.
- C. All empty conduits shall have labels tied to the pull string at each end of each empty conduit, marked as to identification of each end. Junction boxes with circuits provided for future use shall be labeled with appropriate circuit designation.
- D. All panelboards directories shall be filled out with typewritten identification of each circuit.

3.04 WIRE AND CABLE MARKERS

- A. Tag control circuit conductors at both ends and at junction box splices using wire and cable markers with identification numbers as designated on equipment wiring diagrams. Provide typed listing to identify conductors by number and use.
- B. Identify spare conductors, individually, at both ends and at junction box splices with number between 1 and 999. Do not duplicate numbers.

- C. Identify wire numbers on terminal block marking strips.
- D. Provide permanent plastic name tag indicating load for each feeder for all junction boxes, handholes and manholes. Label all process/control wires to yard equipment in handholes and manholes.

3.05 TEST & SETTINGS

- A. Provide the services of an independent Testing Agency to perform the specified tests outlined in their respective specification sections.
- B. Provide the services of a recognized independent testing agency to perform Commissioning of Electrical Systems as specified in Section 26 08 00 – Commissioning of Electrical Systems.
- C. Provide necessary material, equipment, labor and technical supervision to perform and complete the Electrical Acceptance Tests as required.
- D. Acceptance tests as specified are defined as those tests and inspections required to determine that the equipment involved is acceptable as delivered to the job Site, that the equipment may be energized for final operational tests and is in accordance with the Specifications.
- E. Final acceptance of the equipment and/or workmanship will depend upon performance characteristics as determined by the subject tests, in addition to complete operation tests, on all electrical equipment to show that it will perform the functions for which it was designed.
- F. If the test and inspection data submitted should indicate deficiencies in the operation of the electrical apparatus or in the manufacturer thereof, the Contractor shall promptly implement the necessary adjustments, corrections, modifications and/or replacements necessary to be made to meet the specified requirements.
- G. Upon completion of the remedial Work, the Testing Agency shall repeat all of the tests on components previously found deficient on the first test or any additional test if they be required. It shall be the responsibility and obligation of the Contractor to have all remedial Work accomplished as may be required by second and/or additional tests.

3.06 CLEANING

- A. When Work is complete and has been tested and accepted by Owner, clean all light fixtures, equipment, and exposed surfaces that have been directly affected by this Work. Keep the premises in a neat and orderly condition and at the completion of the Work properly clean up and remove any excess materials from Site.

3.07 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.08 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This Page Intentionally Left Blank

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide low-voltage electrical power conductors and cables in accordance with this Section and applicable reference standards listed in Article 1.03.
 - 2. This section includes wires, cables, and connectors for power, lighting, signal, control, and related systems rated 600 volts and less.
- B. Related Requirements
 - 1. Section 26 05 00 – Common Work Results for Electrical

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. National Fire Protection Association (NFPA)
 - a. NFPA 70 National Electrical Code with Massachusetts amendments
 - 2. Underwriters Laboratories (UL)
 - a. UL 83 Thermoplastic Insulated Wires and Cables
 - b. UL 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors
 - c. UL 854 Service Entrance Cable
 - 3. National Electrical Manufacturers Association (NEMA)
 - a. WC 5 Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

- b. WC 7 Cross-Linked Thermosetting Polyethylene Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
 - c. WC 8 Ethylene Propylene Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
4. Institute of Electrical and Electronic Engineers (IEEE)
- a. Standard 82 Test Procedure for Impulse Voltage Tests on Insulated Conductors

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product data
 - 1. Product data for electrical wires, cables, and connectors
 - 2. Product data for Megger insulation testing instrument
 - 3. Report sheets for Megger testing
- C. Manufacturer Reports
 - 1. Furnish manufacturer's product data, test reports, and materials certifications as required

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Deliver wire and cable properly packaged in factory fabricated type containers, or wound on NEMA specified type wire and cable reels.
- C. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.

1.08 SITE CONDITIONS

- A. Existing conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. General
1. Provide factory-fabricated wires of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper wire selection as determined by Installer to comply with Project's installation requirements, NEC and NEMA standards.
 2. Provide color-coding for phase identification as specified.
 3. Provide factory applied nylon or polyvinyl chloride (PVC) external jackets on wires and cables for pulls in raceways over 100 feet in length, for pulls in raceways with more than three equivalent 90 degree bends, for pulls in conduits underground or under slabs on grade, and where indicated.
- B. Service & Distribution Wiring
1. 98 percent conductivity copper
 2. 600 volt insulation, type XHHW
 3. U.L. listed for underground use in wet locations at 75 degrees C
 4. Use XHHW for #4 and larger and THHN/THWN or XHHW for #6 and smaller
- C. Building Wiring
1. 98 percent conductivity copper
 2. 600 volt insulation, type, THWN/THHN, or XHHW
 3. Stranded conductor: 14 AWG and larger
 4. Minimum branch circuit: 12 AWG
 5. Minimum 10 AWG for 120-volt circuits more than 100 feet long
 6. Minimum 10 AWG for 277-volt circuits more than 230 feet long

D. Control Wiring

1. Control wiring for digital/discrete signal wiring, shall be 600V, minimum 14 AWG, THHN/THWN, copper stranded, unless specifically indicated otherwise.
2. Instrument cable for analog signal wiring (4-20mA DC) shall be shielded, 2-conductor, 300 volt rated, minimum 18 AWG, Belden No. 8760, Alpha Wire, or approved equal. Provide 600 volt rated cable where cable occupies the same enclosure and/or raceway with voltages greater than 300 volt as specified below
3. Single Shielded Pair Instrument Cable
 - a. Tinned copper, XLPE insulated stranded conductors, 18 AWG minimum, twisted pair with overall shield, stranded tinned 18 AWG copper drain wire and overall PVC jacket. Rated for 600 volts minimum and conforming to UL 1581. Cables shall be rated for tray cable (TC) use where installed within a cable tray.
1. Multi-paired Shielded Instrument Cable
 - b. Tinned copper, XLPE insulated stranded conductors, No. 16 AWG minimum, twisted pairs with shield over each pair, stranded tinned No. 18 AWG copper drain wire, and overall PVC outer jacket. Rated for 600 volts minimum and conforming to UL 1581 or UL 13. Cables shall be rated for tray cable “TC” use where installed within a cable tray.

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 WIRE AND CABLE INSTALLATION

- A. Install wire and cables in conduit of size and type indicated on Drawings and Specifications.
- B. Install electrical cables, wires, and connectors in compliance with NEC.
- C. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.

- D. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips, which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.
- E. Conceal cable in finished spaces.
- F. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible.
- G. Size conductors so voltage drop does not exceed 3 percent for branch circuits or 5 percent for feeder/branch circuit combination.
- H. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.
- I. Provide color coded feeder and branch circuit wiring at termination and splice locations. System neutrals: designated in addition to phase conductors. Equipment grounds shall be green.
- J. The number of conductors shown on Drawings is not necessarily the correct number required. As many conductors as are required in each case shall be installed. In general, grounding conductors are not scheduled.
- K. In general, wiring for the following systems shall be installed in separate conduits. Do not mix categories in a single raceway.
 - 1. 120 volt power wiring
 - 2. 120 volt control wiring, including, digital input and output signals
 - 3. 24 volt DC control wiring, including, digital input and output signals
 - 4. 24 volt DC analog control wiring (4-20mA)
 - 5. Communications wiring
 - 6. Special & Emergency Systems
- L. Conductors 600 volts and below shall be color coded in accordance with the following:

CONDUCTOR	120 / 208 COLOR	480 / 277 COLOR
Phase A	Black	Brown
Phase B	Red	Orange

Phase C	Blue	Yellow
Neutral	White	White / Gray
Equipment Grounds	Green	Green

3.02 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Test each electrical circuit after permanent cables are in place with terminators installed, but before cable or wire is connected to equipment or devices to demonstrate that each circuit is free from improper grounds and short circuits.
- C. Megger Test the insulation resistance between phases and from each phase to ground for each of the following feeder and motor branch circuits:
 1. Secondary Service Entrance
 2. Power Distribution Equipment
 3. Transformers
- D. Megger Testing to be witnessed by Engineer. Notify Engineer at least 48 hours in advance of testing.
- E. Measure insulation resistance with a digital Megger insulation testing instrument in accordance with manufacturer's recommendations. Test instruments are to be provided by the Contractor.
- F. If any insulation resistance measures less than 50 megohms, the cable shall be considered faulty with cable failing the insulation test. In moist environments, bag the ends of the cable to prevent a faulty Megger test.
- G. Replace cable which fails insulation tests or fails when tested under full load conditions with new cable for the full length and retest.
- H. The below grade service or feeder splice shall be water immersion Megger tested in the presence of the Engineer. Each splice shall be immersed in a grounded water immersion bath for 24 continuous hours prior to and during the test. Criteria for failure shall be as described for cable above.

3.03 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

3.04 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This Page Intentionally Left Blank

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

- A. Provide grounding and bonding for electrical systems in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Institute of Electrical and Electronic Engineers (IEEE)
 - 1. IEEE 81 Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounded System (Part 1)
 - 2. IEEE 141 Recommended Practice for Electric Power Distribution for Industrial Plants
 - 3. IEEE 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems
- B. National Electrical Code (NEC) with Massachusetts amendments Article 250.
- C. Underwriters Laboratories (UL)
 - 1. UL 467 Electrical Grounding and Bonding Equipment

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product data for grounding equipment and appurtenances.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Provide each electrical grounding system with assembly of materials required for complete installation including wires/cables, connectors, lugs, clamps, ground rods, bonding jumpers and accessories.
- B. Provide electrical grounding conductors for grounding connections matched to power supply wiring materials and sized according to NEC.
- C. Provide electrical connectors, lugs, clamps, bonding jumpers and accessories as recommended by the respective manufacturer for the particular application, unless other indicated.
- D. Ground rods: solid copper clad, 3/4-inch diameter by 10 feet long.
- E. Insulated conductors: green in color.
- F. Ground bus: bare annealed copper bars of rectangular cross section, 1/4-inch x 3-inch x length as required, with 98 percent conductivity, rigidly attached to structure.
- G. Static Grounding Reel
 1. Spring rewind Units with stainless-steel construction.
 2. Provide with clear plastic-coated galvanized carbon steel cable. Cable shall be minimum 25 feet with optional Y-Branch and two (2) Gator Clamps.
 3. Provide unit with minimum 18" long grounding strap for connection to building grounding system.
 4. Acceptable level of quality: equivalent to Hannay Reels, Model SSHGR.

- H. Bonding strap conductor/connectors: soft copper, 0.05 inch thick and 2-inches wide, except as indicated.
- I. Pressure connectors: high conductivity plated units.
- J. Bolted clamps: heavy-duty units listed for application.
- K. Exothermic welded connections: provided in kit form and selected for specific types, sizes, and combinations of conductors and other items to be connected.

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 GROUNDING & BONDING

- A. Ground main service entrance ground bus or lug to neutral of incoming service, to enclosure, to building steel, to ground rods/grounding ring, to rebar in concrete footing, and to main cold water pipe. Install grounding bushings or service conduits. Use exothermic style ground connections to the ground rods and building steel.
- B. Use of conduit system for ground conductor is not allowed.
- C. Provide and install 600 volt insulated bonding conductors throughout the distribution system with connection to bonding (or grounding) terminal on each panel and panel board with connections to other equipment where specifically indicated and noted.
- D. Bonding conductors to be continuous where possible. Where splices are required, provide compression connectors of approved pattern. Insulate connectors to equivalent thickness of conductors.
- E. Provide grounding system for grounded circuit conductors of dry type transformer secondaries in accordance with NEC. Use exothermic style ground connections to building steel. Enclose grounding conductors in schedule 40 PVC conduit.
- F. Provide equipment grounding conductors in all conduits containing power, control, or instrumentation conductors on the load side of the service equipment or on the load side of a separately derived system.
- G. Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except larger sizes specified. Use of metallic conduit systems for equipment grounding as recognized by the NEC are not permitted.

- H. Install grounding bushings on conduits at both primary and secondary entrances to transformers. Ground transformer enclosures to bushings.
- I. Install bonding jumper for flexible metal conduit unless fittings are approved for grounding or otherwise comply with NEC.
 - 1. Size jumper to match over-current device
 - 2. Green insulation
 - 3. Connect to grounding bushing at each end
- J. Ensure entire electrical system is electrically continuous and permanently and effectively grounded, including electrical equipment and motors.
- K. Locate ground rods with a minimum of two rod length from each other and at least the same distance from any other grounding electrode. Connect ground conductors to ground rods by means of exothermic welds except at test wells and as otherwise indicated. Drive rods until tops are 24 inches below finished floor or final grade except as otherwise indicated.
- L. Route grounding electrode conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated.
- M. Ensure that grounding electrode conductor connections to interior piping, structural members, and the like are accessible for periodic inspection during the life of the structure.

3.02 BONDING FOR OTHER TRADES

- A. Signal raceways, water piping, heating piping and metallic air ducts shall be bonded together and to the grounding conductor with No. 8 soft drawn bare solid conductors. Connections to pipes shall be made with cast clamps of like material as the pipes to which attached, to ducting terminated in a secure manner by best practical means, bonding across any flexible or insulated connections.
- B. All bonding conductors shall be installed in a neat manner properly shaped for contour of surface involved and properly supported. At locations remote from the main service entrance panel boards, bond to the largest raceway nearby.

3.03 FIELD TESTING

- A. Perform point-to-point tests to determine resistance between the main grounding system and all major electrical frames, system neutral, and derived neutral points. Perform tests using clamp-on digital ground resistance tester with 2% accuracy or better.

- B. Perform ground fault protection system functional testing for distribution equipment having ground fault protection.
- C. Perform ground continuity and functional tests:
 - 1. From main switchgear to grounding electrode and/or cold water main.
 - 2. Between each main secondary feeder switchboard ground and its termination point (distribution panels, panelboards, motor control centers, UPS systems, electric heater disconnects, chiller starters, and other such equipment) and all feeders shown on single-line diagram.
 - 3. Between each distribution panel to panelboards and between each panelboard to panelboard (excluding branch circuits).
 - 4. Test each branch circuit receptacle for proper polarity and ground using a plug-in test device.
- A. Provide the services of an independent testing agency to perform the specified tests for the following systems.
 - 1. Ground system resistance: Testing company to perform testing according to National Electrical Testing Association (NETA) standards and procedures. Testing results to be submitted on NETA forms and testing data certified by the respective agency. Test results shall indicate recommended action for a sub-par test results. Results shall list recommended test values that should be obtained for new installation.
 - 2. Measure ground resistance without the soil being moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the three-point fall of potential method in accordance with Section 9.03 of IEEE 81. Simple moisture addition is not acceptable.
 - a. Ground/resistance maximum values shall be as follows.
 - 1) Equipment rated 500 kVA and less: 10 ohms.
 - 2) Equipment rated 500 kVA to 1000 Kva: 5 ohms.
 - 3) Equipment rated over 1000 kVA: 3 ohms.
 - 4) Unfenced substations and pad mounted equipment: 5 ohms.
 - 5) Fence Grounds: 10 ohms.

- D. Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values.

3.04 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.05 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

3.06 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 1. Provide the labor, tools, equipment, and materials necessary to furnish and install raceways, boxes, and supporting devices in accordance with the Plans and applicable reference standards listed in Article 1.03.
- B. Types of products specified in this section include
 1. Conduit, Raceways & Fittings
 2. Supporting Devices
 3. Boxes and Fittings
- C. Related Requirements
 1. Section 26 05 00 – Common Work Results for Electrical
 2. Section 26 05 43 – Underground Ducts and Raceways for Electrical Systems

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 1. National Electrical Code (NEC) with Massachusetts amendments
 2. National Electrical Manufacturers Association (NEMA)
 3. Underwriters Laboratories (UL)
 4. Section 800 of the MassDOT Standard Specifications

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Furnish manufacturer's test reports, and material certifications as required.
- C. Product data for cabinets and enclosures.
- D. Shop Drawings for shop fabricated (non-stock items) floor boxes and boxes, enclosures and cabinets
- E. Closeout and maintenance material submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 CONDUIT, RACEWAYS & FITTINGS

- A. Provide conduit with 3/4-inch diameter minimum, except where specifically shown smaller on Drawings.
- B. Conduit, connectors, and fittings shall be approved for the installation of electrical conductors.
- C. Refer to Table 3.01A for approved conduit installation guidelines.
 - 1. Rigid Galvanized Steel Conduit
 - a. Rigid steel conduit (RGS), including couplings, elbows, bends, and nipples, shall conform to the requirements of UL 6 and NEMA C80.1 Steel fittings shall be galvanized by the hot-dip process.

- b. Fittings for rigid steel conduit shall be threaded and shall conform to NEMA FB 1.
 - c. Gaskets shall be solid for fittings sized 1-1/2 inches and less. Conduit fittings with blank covers shall have gaskets except in clean, dry areas or at the lowest point of a conduit run where drainage is required.
 - d. Covers shall have captive screws and be accessible after the Work has been completed.
2. PVC Coated Rigid Metal Conduit
- a. Rigid galvanized metal conduit coated with 40 mils thick polyvinylchloride coating.
 - b. Fittings, elbows, supporting devices and accessories shall include factory applied 20 mils thick polyvinylchloride coating and be manufactured by the same as that of the conduit.
 - c. Use tools as recommended by the manufacturer so as not to damage PVC coating. Where coating is damaged, touch-up with PVC paint in the field after installation.
3. Rigid Plastic Conduit
- a. PVC Schedule 40: Conduit shall be made of polyvinyl chloride compound that shall be homogeneous plastic material free from cracks, holes or foreign inclusions. Conduit shall be rated for use with 90 degree C conductors, UL Listed. Use solvent cement to join conduits as manufactured the same as the conduit manufacturer.
 - b. PVC Schedule 80: Heavy wall PVC conduit that shall be made of polyvinyl chloride compound that shall be homogeneous plastic material free from cracks, holes or foreign inclusions. Conduit shall be rated for use with 90 degree C conductors, UL Listed. Use solvent cement to join conduits as manufactured the same as the conduit manufacturer.
4. Flexible Metallic Conduit
- a. Provide UL1 flexible metallic conduit.
 - b. Provided liquid tight flexible metallic conduit with a protective jacket of PVC extruded over a flexible interlocked galvanized steel

core to protect wiring against moisture, oil, chemicals, and corrosive fumes.

- c. Provide UL 514B fittings for flexible metallic conduit, Type I box connector, electrical, Type III coupling, electrical conduit, flexible steel, or Type IV adapter, electrical conduit.

5. Wireways

- a. Wireways and auxiliary gutters for use in exposed, dry locations shall be a prefabricated channel-shaped sheet metal trough with hinged or removable covers, associated fittings, and supports for housing, and protecting electrical wires and cables in accordance with UL 870.
- b. Straight sections of trough, elbows, tees, crosses, closing plates, connectors, and hanging brackets shall be constructed from sheet steel of commercial quality not less than 16-gage. Sheet metal component parts shall be cleaned, phosphatized, and coated with a corrosion-resistant gray paint.
- c. Straight sections of wireways and auxiliary gutters shall be solid or have knockouts as indicated in both sides and bottom, 3 inches on center.
- d. Straight sections shall not be more than 5-feet long, with covers held closed with screws.

6. Conduit Seals

- a. Provide factory fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Provide a cast in place water stop wall sleeve with a mechanical pipe seal between the conduit and the sleeve. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.
- b. Provide E.Y.S. seal fittings with appropriate potting material where conduits enter or leave a Class 1, Division 1 or 2 environments or a Class 2, Division 1 or 2 environment, and chemical rooms.

2.02 SUPPORTING DEVICES

- A. Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative

treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot dip galvanized unless material is inherently corrosion resistant.

B. Refer to Table 2.02A for approved supporting device installation guidelines.

1. Conduit Supports

- a. Single run hangers: galvanized steel conduit straps or clamps, or cast metal beam clamps. Perforated straps and spring steel clips and clamps will not be permitted.
- b. Group run hangers: minimum 12-gauge galvanized performed U-channel rack with conduit fittings; 25 percent spare capacity
- c. Hanger rods: threaded steel, 3/8-inch diameter, or as identified on Drawings
- d. Vertical run supports: minimum 12-gauge galvanized performed U-channel struts with conduit fittings

2. Equipment and Lighting Supports

- a. 12-gauge galvanized performed U-channel struts with fixture and conduit fittings, as applicable, unless indicated otherwise on Drawings.

3. Corrosive Area Supports

- a. Clamp hangers, pipe straps, and clamp back spacers for use with PVC-coated rigid metal conduit shall have 40 mil gray PVC exterior coating.
- b. Provide nonmetallic PVC material clamp hangers, pipe straps, etc. for use with PVC nonmetallic conduit.
- c. Hanger rods: 20 mil gray PVC exterior coated rod with threaded ends only 3/8-inch and 1/2-inch sizes as required.
- d. Strut support: 20 mil gray PVC exterior coating strut. Standard channel, slotted channel, and back to back channel are acceptable.
- e. Provide stainless steel supports and accessories in lieu of PVC coated supports when indicated in Table 2.02A below.

TABLE 2.02A – Supporting Devices

Location/Equipment	Acceptable Support Type
Exterior	Galvanized Steel U-Channel

2.03 BOXES AND FITTINGS

- A. Boxes must have sufficient volume to accommodate the number of conductors entering the box in accordance with NFPA 70 and UL 514A.
- B. In general, boxes that are exposed to weather, process areas, normally wet locations, and locations exposed in mechanical spaces shall be cast-metal. Boxes in all other finished areas shall be sheet metal. Boxes installed in corrosive areas, such as the chemical feed room, shall be nonmetallic.
- C. Refer to Table 2.03A for approved enclosure types.

1. Sheet Metal Outlet Boxes

- a. Sheet Metal Outlet Boxes: Standard type galvanized steel, minimum four inch square or octagon by 1-1/2 inch deep.
- b. Luminaire and Equipment Supporting boxes: Rated for weight of equipment supported; include 2 inch male fixture studs where required.
- c. Single Wall Type: Minimum size, four inch square by 1-1/2 inch or 2-1/8 inch deep, except as noted. Provide dry wall device covers raised 3/4 inch minimum to insure flush finish mounting.
- d. Ganged Wall Type: Minimum depth three inches except as noted, ganged as required under common plate to contain devices shown. On 277-volt circuits, ganged boxes for switches shall contain only one circuit or equip box with permanent barriers per NEC Art 404-8.

2. Cast Outlet Boxes

- a. Type FS shallow and type FD deep, cast ferroalloy
- b. Provide number of threaded hubs as required.
- c. Use in all exterior, damp and locations exposed in mechanical spaces.
- d. Provide gasketed cover and accessories by box manufacturer for complete weatherproofing. Provide correct box to accept weatherproof covers as specified.

3. Sheet Metal Pull & Junction Boxes

- a. Sheet metal boxes shall be standard type galvanized steel and must conform to UL 50.
 - b. Box dimensions shall be minimum four inch square or octagon by 2 1/2 inch deep.
 - c. Sizes up to 12 by 12 by 6 inches: Provide screw-type or hinged covers.
 - d. Sizes greater than 12 by 12 by 6 inches: Provide hinged covers.
 - e. Boxes shall be sized to accommodate all incoming raceways.
4. Nonmetallic Outlet, Device, and Wiring Boxes
 - a. Conform to NEMA OS 2, Nonmetallic Outlet Boxes, Device Boxes, Covers, and box Supports, and UL 514C, Nonmetallic Outlet Boxes, Flush Device Boxes and Covers. Boxes shall be molded polyvinyl chloride (PVC), or fiberglass units of type, shape, size, and depth to suit location and application.
 - b. Boxes shall be equipped with threaded screw holes for device and cover plate mounting. Each box shall have a molded cover of matching material suitable for the application and location installed.

TABLE 2.03A – Electrical Enclosure Types

Location/Equipment	Acceptable Enclosure Type
Exterior	NEMA 3R

2.04 TRAFFIC SIGNAL PULL BOXES

1. All handholes proposed in the roadway must be installed with heavy-duty frame and cover, capable of sustained loading of H-20 or better in conformance with the Standard Specifications for Highways and Bridges. Where 3-inch interconnect or signal conduit enters a handhole, the bottom of the conduit shall be 3 inches beneath the finished grade. Where 1 ½ inch loop lead-in conduit enters a pull box, the top of the conduit shall be 18 inches below finished grade. The cost to sawcut existing sidewalk, and to repair and/or replace damaged sidewalk and pavement surfaces (cement and bituminous concrete) as a result of handhole or pull box installation shall be considered incidental to these items.
2. The contractor shall excavate at locations of proposed handholes to a depth necessary to locate the existing conduit. The contractor shall then sawcut the existing conduit and provide adequate fittings and adjustments to provide sweeps into the new handhole, at a grade appropriate for the final location of the handhole based on the details provided in

the plans. The handhole shall be installed according to the Standard Specifications for Highways and Bridges and shall be placed at a finished grade level with the pavement or sidewalk surface. Only controlled density fill (CDF) shall be used to backfill locations where electric handholes have been installed. No handholes shall be installed other than shown on the plans, specifically to avoid installation of handholes in gutters which will result in flooding of the electrical appurtenances.

3. All tests and any necessary repairs and replacements required to produce a fault-free traffic control system
4. Materials and methods shall comply with Section 801.40 and 801.61 of the MassDOT Standard Specifications with the exception of excavation. All excavation relative to these items shall be included as part of Item 02890.1. Units shall be precast concrete as shown on MassDOT Standard Drawings SD2.023 and SD2.031. Handhole covers shall be clearly marked "TRAFFIC"

2.05 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 CONDUIT

- A. Uses Permitted
 1. Use liquid tight flexible metal conduit for the final 24 inches of connections to motors or control items subject to movement or vibration.
 2. Use RGS for all exterior aboveground installations unless otherwise noted.
 3. Use PVC coated rigid steel conduit, or as scheduled below, for installation in corrosive areas, and other areas as identified on the Drawings.
 4. Exposed raceways in Manufacturing Areas, Utility Rooms, Mechanical Rooms, Warehouse Areas, etc., shall be Rigid Galvanized Steel below 15 feet.
 5. Use Schedule 40 PVC conduit for exterior direct buried installations. Use Schedule 40 PVC conduit for exterior concrete encased installations. Use Schedule 80 PVC conduit for underground installations under driveways. The transition from underground and from concrete encasement to riser shall be PVC coated rigid steel conduit to a minimum of 12 inches above finished floor and/or finished grade elevation. All elbows shall be prefabricated Rigid Steel to prevent wire burn through. Reference Section 26 05 43 for further requirements.

6. Install conduit seals for conduit penetrations of slabs on grade and exterior walls below grade and where indicated. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal. Provide seals for interior of conduits penetrating exterior or water bearing walls, consisting of gland type sealing bushings or RTV closed cell silicone foam.
7. Refer to Table 3.01A below for approved conduit types.

TABLE 3.01A – Conduit Types

Location/Equipment	Approved Conduit Type
Exterior	Rigid Galvanized Steel

- B. Power, lighting, control, emergency light and power, and special-service systems and all related components shall be installed in accordance with NFPA 70, and shall be enclosed in separate conduit or separate conduit systems as indicated on the Drawings and as specified herein.
- C. Any run of conduit between outlet and outlet, between fitting and fitting, or between outlet and fitting shall contain no more than the equivalent of three 90-degree bends, including those bends located immediately at the outlet or fitting. Field bends shall be made in accordance with the manufacturer's recommendations, which normally require use of a one-size-larger bender than would be required for uncoated conduit. Installed conduit and fittings shall be free of dirt and trash and shall not be deformed or crushed. Empty conduit shall have a pull rope stalled.
- D. Conduit shall be installed with a minimum of 3 inches of free air space separation from mechanical piping.
- E. Conduit in finished areas shall be installed concealed. Conduit passing through masonry or concrete walls shall be installed in sleeves. Conduit shall be securely clamped and supported at least every 10 feet vertically and 8 feet horizontally. Galvanized pipe straps shall be fastened to structure with bolts, screws, and anchors. Wooden masonry plugs shall not be used.
- F. Install exposed conduits, parallel or perpendicular to walls, ceilings, or structural members. Do not run through structural members. Avoid horizontal runs within partitions or sidewalls. Avoid ceiling inserts, lights, or ventilation ducts or outlets. Do not run conduits across pipe shafts or ventilation duct openings and keep conduits a minimum of 6 inches from parallel runs of flues, hot water pipes, or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.
- G. Do not run conduits exposed on exterior surface of buildings. Seal conduits penetrating exterior walls below grade, at grade floors, or below grade floors to

prevent moisture migration. Seal conduit exterior with a mechanical pipe seal. Interior conduit seal shall be a gland type sealing bushing or RTV closed cell silicone foam. Ensure that conduits do not retain water against these seals.

- H. Raceways penetrating fire rated walls, floors, and partitions shall be sealed with a fire rated sealant.
- I. Support conduits with materials specifically made for this purpose. Do not use wire hangers. Do not attach any parts of the raceway system to ventilation ducts. Conduit supports shall be attached to the building. Support conduits on each side of bends and on a spacing not to exceed the following: 6 feet for conduits smaller than 1 1/4-inches and 8 feet for conduits 1 1/4-inches and larger. Support riser conduits at each floor level with clamp hangers. Securely anchor underground conduits to prevent movement during placement of concrete or backfill. Use precast separators and heavy gauge wire ties or other approved fasteners.
- J. Provide E.Y.S. seal fittings with appropriate potting material where conduits enter or leave a Class 1, Division 1 or 2 environments or a Class 2, Division 1 or 2 environment, and chemical rooms.
- K. Conduit connections to boxes and fittings shall be supported not more than 36 inches from the connection point. Conduit bends shall be supported not more than 36 inches from each change in direction. Conduit shall be installed in neat symmetrical lines parallel to the centerlines of the building construction and the building outline. Multiple runs shall be parallel and grouped whenever possible on common supports. Exposed ends of conduit without conductors shall be sealed with watertight caps or plugs.
- L. Bonding wires shall be used in flexible conduit for all circuits. Flexible conduit shall not be considered a ground conductor.
- M. Liquid tight flexible metallic conduits shall be used in wet and oily locations and to complete the connection to motor-driven equipment.
- N. Electrical connections to vibration-isolated equipment shall be made with flexible metallic conduit in a manner that will not impair the function of the equipment.
- O. A polypropylene pull rope with a tensile strength not less than 130 pounds shall be installed in empty conduit.
- P. Electrical conduit may be embedded in concrete according to the provisions of Article 6.3 of ACI 318 Building Code Requirements for Reinforced Concrete, provided the following conditions are met:
 - 1. Outside diameter of conduit shall not exceed 1/3 of concrete thickness. Maximum conduit outside diameter shall not exceed 3 inches when embedded in slab.

2. Conduit shall not be placed closer than three diameters on center. Route conduit to minimize crossing of different conduit runs.
3. Conduit shall not be embedded in structural concrete slabs less than four inches thick.
4. A 1-1/2 inch minimum concrete cover shall be provided for conduits in structural concrete slabs.

Q. Installation of Underground Conduit

1. Minimum of 3/4 inch conduit in or under concrete slab on grade.
2. Where conduits are installed in concrete slabs, on the ground, underground, or exposed to the weather, make all joints liquid tight and gas tight.
3. Bury all underground conduit, except under concrete slabs placed on fill, to a depth of at least 30 inches below finished grade unless otherwise indicated on the Drawings .
4. Slope ducts to drain away from buildings into manholes and/or handholes. Adjust final slopes to coordinate with existing Site utilities.
5. Install on undisturbed soil where possible. Concrete encase conduits as shown on Drawings. Use pit run gravel and sand, placed 8-inch lifts and compacted for backfill.
1. Reference Section 26 05 43 for further requirements.

R. Installation of Rigid Metal Conduit

1. Ends of conduit shall be cut square, reamed and threaded, and joints shall be brought butt-to-butt in the couplings. Joints shall be mechanically tight. Conduit shall be protected against damage and the entrance of water or foreign material during construction.
2. Ninety-degree bends of conduit with a diameter larger than 1 inch shall be made with factory-made elbows. Conduit elbows larger than 2 1/2 inches shall be long radius. Field-made bends and offsets shall be made with an approved hickey or conduit-bending machine. Changes in directions of runs shall be made with symmetrical bends or cast-metal fittings.
3. At connections to sheet metal enclosures and boxes, a sufficient number of threads shall project through to permit the bushing to be drawn tight against the end of the conduit, after which the locknut shall be pulled up sufficiently tight to draw the bushing into firm electrical contact with the box. Conduit shall be fastened to sheet metal boxes and cabinets with two

locknuts where required by NFPA 70 where insulating bushings are used, where bushings cannot be brought into firm contact with the box, and where indicated.

4. Conduit joints shall be made with tapered threads set firmly. Each length of conduit cut in the field shall be reamed before installation. Where conduit is threaded in the field, each threaded end shall consist of at least five full threads. Corrosion-inhibitive compound (cold galvanizing paint) shall be used on all conduit threads or any locations where the original hot galvanized surface has been compromised.
5. Conduit stubbed-up through concrete floors for connections to free-standing equipment except motor-control centers, cubicles, and other such items of equipment shall be provided with a minimum of a 12 inch riser above the floor slab is of sufficient thickness; if not, a floor box shall be provided and set flush with the finished floor. Conduits installed for future use shall be terminated with a coupling and plug set flush with the floor.

3.01 SUPPORTING DEVICES

- A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.
- B. Coordinate with the building structural system and with other electrical installations.
- C. Conform to manufacturer's recommendations for selection and installation of supports.
- D. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
- E. Support parallel runs of horizontal raceways together on trapeze type hangers.
- F. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1 1/2 inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4 inch diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.
- G. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.

- H. Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.
- I. Install sleeves in concrete slabs and walls and all other fire rated floors and walls for raceways and cable installations. For sleeves through fire rated wall or floor construction, apply UL listed fire-stopping sealant in gaps between sleeves and enclosed conduits and cables.

3.02 BOXES AND FITTINGS

- A. Pullboxes shall be furnished and installed where necessary in the conduit system to facilitate conductor installation. Conduit runs longer than 100 feet or with more than three right angle bends shall have a pull box installed at a convenient intermediate location.
- B. Boxes and enclosures shall be securely mounted to the building structure with supporting facilities independent of the conduit entering or leaving the boxes.
- C. Bonding jumpers shall be used around concentric or eccentric knockouts.
- D. Installation of Outlet Boxes
 - 1. Use nonmetallic boxes in corrosive areas such as chemical feed area and as designated on the Plans.
 - 2. Use cast metal boxes in all other locations. Each box with associated covers and fittings shall have a NEMA rating for each location installed.
- E. Installation of Pull and Junction Boxes
 - 1. Use watertight boxes (NEMA 3R) for exterior and wet locations on outdoor structure where moisture is present.
 - 2. Use corrosion resistant watertight boxes (NEMA 4X) for wet locations and corrosion filled areas, such as the chemical feed area, and as identified on the Drawings.

3.03 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.04 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

3.05 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 26 05 43

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

- A. Provide underground ducts and raceways for electrical systems including necessary excavation, backfill and surface restoration in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Provide underground conduit duct banks with manholes and pullboxes for power, and lighting circuits as shown on Drawings.
- C. Related Requirements
 - 1. Section 26 05 00 Common Work Results for Electrical
 - 2. Section 26 05 33 Raceways and Boxes for Electrical Systems
 - 3. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables
 - 4. Section 26 05 26 Grounding and Bonding for Electrical Systems

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American National Standards Institute (ANSI)
 - a. ANSI A14.3, Safety Requirements for Fixed Ladders
 - 2. ASTM International (ASTM)
 - a. ASTM A48 Standard Specification for Gray Iron Castings
 - b. ASTM D570 Standard Test Method for Water Absorption of Plastics
 - 1) Section 5, 6.1, 6.5: Water Absorption

- c. ASTM D635 Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
 - d. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - e. ASTM G154 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials
- 3. Institute of Electrical and Electronic Engineers (IEEE)
 - 4. Insulated Cable Engineers Association (ICEA)
 - 5. National Electrical Code (NEC) with Massachusetts amendments
 - 6. National Electrical Manufacturers Association (NEMA)
 - 7. National Electrical Safety Code (NESC)
 - 8. Occupational Safety and Health Administration (OSHA)
 - 9. MassDOT M5.07.0 Material Specification and Section 801 of the MassDOT Standard Specifications

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.
- B. Coordinate installation with piping and other underground systems and structures and locate clear of interferences. Coordinate manhole and handhole installation with piping, sheet piling and other underground systems and structures and locate clear of interferences.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Shop Drawings
 - 1. Layouts showing the proposed routing of duct banks and the locations of manholes, handholes and areas of reinforcement
 - 2. Profiles of duct banks showing crossings with piping and other underground systems

3. Typical cross sections
 4. Installation procedures
 5. Manufacturer's technical information for manholes, handholes and accessories proposed for use
 6. Drawings showing interior and exterior manhole and handhole dimensions and details of openings, jointing, inserts, reinforcing, size and locations of openings, and accessory locations
 7. Certificate of concrete and steel used in underground pre-cast concrete utility structures, according to ASTM C858
 8. Product Data for nonmetallic conduit and manhole accessories
- C. Record Drawings
1. Layouts showing the actual routing of duct banks including the dimensions and depth of the top of duct bank below grade. Record Drawings for duct banks should also include cross sections of the duct bank indicating the circuit, use, conduit size, orientation and number of conduits.
 2. Locations of manholes, handholes, and areas of reinforcement
- D. Closeout and maintenance material submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 DUCT BANK CONDUIT

- A. Duct: Schedule 40 and Schedule 80 PVC conduit and fittings in accordance with Section 26 05 33.

- B. Rigid steel conduit and fittings in accordance with Section 26 05 33.
- C. Shielded instrumentation and communications cable to be installed in ferrous metal, steel conduit throughout entire run of conduit from end to end.

2.02 MANHOLES

- A. Material and Construction
 - 1. Pre-cast reinforced concrete
 - 2. Minimum interior dimensions as indicated on the Drawings or required by the utility company
 - 3. Duct entrances sized and located to suit duct banks. Duct-bank penetration shall be watertight.
 - 4. Modular sections with tongue-and-groove joints. Joints shall be gasketed and water tight.
 - 5. Nominal inside dimensions as shown
 - 6. Base Section: Shall include sump, grate, and ground rod openings.
 - 7. Sump Covers; ASTM A48; Class 30B galvanized iron.
- B. Frames and Covers
 - 1. Material: Cast iron conforming to ASTM A 48, Class 30A
 - 2. Covers: 42 inch minimum diameter, watertight, sealed type, marked "ELECTRICAL" in raised 2-inch letters
 - 3. Frame shall be grouted on the manhole.
 - 4. Acceptable Manufacturers
 - a. Neenah Foundry Company
 - b. Flockhart Foundry Company
 - c. Campbell Foundry Company
 - d. Or equal
- C. Pulling Irons
 - 1. Material: galvanized steel

2. Cast in the wall opposite to the centerline of each incoming duct bank and 12 inches below centerline of bottom line of ducts.
3. Acceptable level of quality; equivalent to the following.
 - a. Cat. No. DU2T3 by McGraw Edison Company
 - b. Cat. No. 8119 by A.B. Chance Company

D. Cable Racks

1. Cable racks shall adequately support cables with space allowed for future cables. Provide as indicated to support mounting channels and racks. Cast-in Place anchors with minimum rated pullout working capacity of 2000 pounds. Pennsylvania Insert Corp. 5/8-11-INSERT, with 5/8-11 hex head cap screw made from 316 stainless steel.
2. Each rack shall be a vertical assembly of 24-inch cable racks extending from within 6 inches of the manhole roof slab to within 6 inches of the manhole floor.
3. Cable Rack Mounting Channel: Heavy-duty non-metallic stanchions. Underground Devices, Inc., Model C36 or approved equal
4. Cable Racks: Heavy-duty non-metallic racks. 8, 14, 20 inches as indicated.
5. Acceptable level of quality: equivalent to Underground Devices, Inc., Model RA 08, RA14, RA20.

E. Insulators

1. Material: Porcelain
2. Acceptable level of quality; equivalent to the following.
 - a. Cat. No. J 5122 by Joslyn Manufacturing and Supply Company
 - b. Cat. No. 2120 by Hubbard and Company

F. Manhole Steps

1. Material: Extruded aluminum
2. Steps spaced evenly at approximately twelve to sixteen inch centers and shall project evenly from manhole walls
3. Acceptable level of quality; equivalent to the following.

- a. Flockhart Foundry Company
- b. Neenah Foundry Company

2.03 HANDHOLES

- A. The pull/splice box underground enclosures shall be constructed of polymer concrete consisting of sand and aggregate bound together with a polymer resin. Internal reinforcement may be provided by means of steel, fiberglass, or a combination of the two. Handholes for installation in roadways shall concrete reinforced H20 traffic rated.
- B. Enclosure
 - 1. The enclosure must be manufactured with an open or closed bottom and a removable cover. The enclosures shall be green or concrete gray in color.
 - 2. The enclosures shall be designed to be installed flush to grade with the cover fitting flush to the box.
 - 3. The enclosures shall be suitable for installation in either direct or buried native soil, embedded in concrete, or embedded in asphalt surfacing. (A concrete collar is required for installation in asphalt).
 - 4. The enclosures shall be of a stackable design for greater installation flexibility.
 - 5. All covers are to be equipped with a minimum of two stainless steel lockdown mechanisms. All covers shall have a logo recessed into the cover and it shall read ELECTRIC.
 - 6. All enclosure covers will have some type of recessed access point to allow removal of the cover with a hook. The access points will be placed in such a location to allow for the greatest amount of leverage and safety possible.
 - 7. Enclosures shall be designed and suitable for installation and use through a temperature range of minus 40 degrees C (minus 40 degrees F) to 60 degrees C (140 degrees F).
 - 8. A certified copy of all test reports must be signed and stamped by a registered professional engineer and submitted prior to shipment of products.
- C. Material Requirements
 - 1. Permanent deflection of any surface shall not exceed 10 percent of the maximum allowable static design load deflection.

2. The covers shall be skid resistant and have a maximum coefficient of friction of 0.50 on the top surface of the cover. Coatings will not be allowed.
 3. Any point on the covers must be able to withstand a 70 foot-pound impact administered with a 12-pound weight having a "C" tup (ASTM D-2444) without puncturing or splitting. The test shall be performed with the cover resting on a flat, rigid surface such as concrete or a 1 steel plate
 4. Covers shall have molded lettering, ELECTRIC or COMM as applicable
 5. Fastening devices used to secure the cover to the box shall be capable of withstanding a minimum torque of 15 foot-pounds and minimum straight pullout strength of 750 pounds.
 6. The material is tested according to the requirements of ASTM D543, Section 7, Procedure 1, for chemical resistance. The manufacturer is responsible for proof of compliance with the latest version of the ASTM standards
 7. Comply with the following acceptance standards.
 - a. ASTM D570
 - b. ASTM D635
 - c. ASTM D790
 - d. ASTM G154
- D. Acceptable level of quality for handholes: equivalent to Quazite by Hubbell.

2.04 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 GENERAL

- A. Measure, mix and place concrete, and compact as required in Division 03.
- B. Provide no less than 3 inches of concrete between outside of a duct and the earth. Provide no less than 2 inches of concrete between adjacent ducts. Refer to Drawings for spacing requirements. Provide side forms for each duct bank.

- C. Duct line concrete pours to be continuous between manholes or handholes and between manholes or handholes and structures.
- D. Where duct lines pass through concrete walls, concrete envelopes shall be extended through the finished flush with inside surfaces. Watertight construction joints of an approved type shall be provided.
- E. Duct banks shall be reinforced when laid on backfill covering new pipelines, roads, parking lots or any are subject to vehicular traffic. Beneath these areas, install reinforcing bars as shown on the Drawings, extending 10 feet beyond area needing protection.
- F. Duct lines shall be laid in trenches on mats of gravel not less than 6 inches thick and well graded.
- G. Provide red electrical duct banks for safety purposes.
- H. Install raceways to drain away from buildings. Raceways between manholes or handholes shall drain toward the manholes or handholes. Raceway slopes may not be less than 3 inches per 100-feet.
- I. Make raceway entrances to buildings and vaults with hot dipped rigid galvanized steel conduit not less than 10 feet long. Conduits which are not concrete encased for runs below floor slabs in slab-on-grade construction shall be hot dipped rigid galvanized steel conduit. Conduits which are concrete encased for runs below floor slabs in slab-on-grade construction shall be encased under the slab to their respective equipment.
- J. Raceway terminations at manholes shall be with end bells for PVC conduit and insulated throat grounding bushings with lay-in type lugs for metal conduit.

3.02 PROJECT CONDITIONS AND COORDINATION

- A. Coordination with other Underground Utilities
 - 1. Locate existing underground utilities through use of an underground utility piping location services company. Locate existing underground utilities and piping before any excavation begins.
 - 2. Coordinate conduit routing, duct bank and manholes with other new and existing underground utilities. Revise locations and elevations as required to suit field conditions and ensure conduits, duct runs, manholes, and handholes do not interfere with existing and new underground utilities and piping.

3.03 INSTALLATION

- A. Provide excavation and backfilling required for ductbank manhole and handhole installation.
- B. Make duct bank installations and penetrations through foundation walls watertight.
- C. Assemble duct banks using non-magnetic saddles, spacers, and separators. Position separators to provide 3-inch minimum separation between the outer surfaces of the ducts.
- D. Firmly fix ducts in place during pouring of concrete. Carefully spade and vibrate the concrete to insure filling of all spaces between ducts.
- E. Make bends with sweeps of not less than 48-inch radius or 5 degree angle couplings.
- F. Make a transition from non-metallic to PVC coated rigid steel conduit where duct banks enter structures or turn upward for continuation above grade. Terminate the ducts in insulated grounding bushings. Continue ducts inside buildings with steel, metallic conduit.
- G. Where ducts enter manholes and handholes, terminate the ducts in suitable end bells.
- H. Provide expansion/deflection fittings in accordance with the requirements specified in Section 26 05 33.
- I. Do not backfill with material containing large rock, paving materials, cinders, large or sharply angular substances, corrosive material, or other materials that can damage or contribute to corrosion of ducts or cables or prevent adequate compaction of fill.
- J. Slope duct runs for drainage toward manholes and away from buildings with a slope of approximately 3 inches per 100 feet.
- K. After completion of the duct bank and prior to pulling cable, pull a mandrel, not less than 12 inches long and with a cross section approximately 1/4 inch less than the inside cross section of the duct, through each duct. Then pull a rag swab or sponge through to make certain that no particles of earth, sand or gravel have been left in the duct.
- L. Install a bare stranded copper duct bank ground cable in each duct bank envelope. Make ground electrically continuous throughout the entire duct bank system. Connect ground cable to building and station ground grid or to equipment ground buses. In addition, connect ground cable to steel conduit extensions of the

underground duct system. Provide ground clamp and bonding of each steel conduit extension, where necessary to maintain continuity of the ground system. Terminate ground conductor at last manhole or handhole for outlying structures.

- M. Install a warning ribbon approximately 12 inches below finished grade over all underground duct banks. The identifying ribbon shall be a PVC tape, detectable metal backed, 3 inches wide, red color, permanently imprinted with CAUTION BURIED ELECTRIC LINE BELOW in black letters.
- N. Plug and seal all empty spare ducts entering buildings and structures. Seal all ducts in use entering buildings and structures. Seal shall be watertight. Acceptable level of quality: equivalent to O-Z/Gedney Type Dux Duct Sealing Compound.
- O. Install duct banks in conformance with NEC and NESC.
- P. Install manholes and handholes where shown on Drawings. Verify final locations in field.
- Q. Complete installation of manholes and handholes so that structures are watertight. Provide expansion/deflection fitting for each conduit entry into the manholes.
- R. Provide sump opening in manhole floor.
- S. Provide grading rings or brick stacks for manholes when required to adjust manhole cover to proper grade. Stacks shall be a minimum of 12 inches in height, constructed on the roof slab or cone section on which the manhole frame and cover shall be placed. The height of the stack shall be such as is necessary to bring the manhole frame to the proper grade.
- T. Cable Racks
 - 1. Provide cable hooks to support each cable on each rack along the cable run within the manholes.
 - 2. Individually support each cable at each hook on porcelain insulators.
 - 3. In the manhole, securely tie each cable in place at each insulator block to prevent excessive movement of insulators, cables, or fireproof tape. Tie cables with non-metallic 3/4 inch strapping tape as manufactured by 3M or tie down with nylon straps.
- U. Conduits to extend 3 inches above concrete slab surface, unless otherwise indicated. Conduits to be bushed to protect cables and provide means for grounding.
- V. Duct bank conduit spacers: non-metallic, snap together intermediate and bottom pieces, sized for conduit diameter and code spacing. Acceptable level of quality:

equivalent to Carlon Snap-Loc. Separators shall be compatible with the conduit utilized. Stagger conduit joints by rows and layers to provide a duct line having maximum strength. During construction, protect partially completed duct lines from the entrance of debris by conduits plugs. As each section of a duct line is completed, a testing mandrel not less than 12 inches long with a diameter 1/4-inch less than the size of the conduit, shall be drawn through each conduit, after which a brush having the diameter of the duct, and having stiff bristles shall be drawn through until the conduit is clear of all particles of earth, sand and/or gravel; conduit plugs shall then be immediately installed. Provide a plastic pull rope, having a minimum of 3 additional feet at each end, in all spare ducts.

3.04 DUCT BANK INSTALLATION

- A. Bends to have a radius greater than 36 inches or 12 times conduit inside diameter, whichever is greater.
- B. Install duct with minimum slope of 4 inches per 100-feet. Slope duct away from building entrances.
- C. Install no more than equivalent of three 90-degree bends between pull points.
- D. Provide suitable fittings to accommodate expansion and deflection where required.
- E. Use suitable separators and chairs installed not greater than 4-feet on centers. Conduit separation shall be per code, and not less than 3 inches.
- F. Securely anchor duct to prevent movement during concrete placement. Use re-bar holders at spacers and secure with No. 4 re-bar driven into the earth at a minimum of 1-foot.
- G. Connect to manhole wall using No. 6 re-bar dowels. Dowels shall be located at each corner, and 12 inches on center. Insert dowels minimum 3 inches into manhole and 3 feet into duct bank.
- H. Tops of concrete-encased ducts
 1. Not less than 24 inches and not less than shown on the Drawings, below finished grade
 2. Not less than 30 inches and not less than shown on the Drawings, below roads and other paved surfaces
- I. Tops of direct burial ducts and conduits
 1. Not less than 24 inches and not less than shown on the Drawings, below finished grade

2. Not less than 30 inches and not less than shown on the Drawings, below roads and other paved surfaces

3.05 PRE-CAST MANHOLE INSTALLATION

- A. Install and seal pre-cast sections in accordance with manufacturer's instructions.
- B. Install manholes plumb.
- C. Attach cable racks to inserts after manhole installation is complete.
- D. Provide 12 inches minimum 3/4-inch" crushed stone under manholes, and 12 inches gravel fill around manholes.
- E. Conduit/Ductwork penetration shall be grouted and sealed. Penetration shall be watertight.

3.06 CONDUIT WATERPROOFING (USE ONLY WHEN GROUND WATER MAY BE AN ISSUE)

- A. Waterproofing of conduit joints shall conform to the following
 1. Non-metallic PVC Conduit, temperature rated for 90 degrees C. The end of the conduit shall be liberally coated with approved wall weather quickset clear cement before joining. Joint shall be inserted into the coupling, pushing firmly and rotating conduit until it reaches the pre-formed stopping ridge within the coupling.
 2. The entire work area of the joint, plus a minimum distance of 6 inches both ways, shall be thoroughly cleaned (with a solvent if recommended by the respective manufacturers) removing all foreign debris such as dirt, sand and mud prior to the following Work being started.
 3. Pipe insulating putty shall be applied to the entire circumference of the coupling ends to provide a smooth tapered surface.
 4. Apply quick drying, non-sag, rubber-based primer to the conduit joints, extending the primer application the entire length of the proposed tape wrap.
 5. Apply an all-weather, corrosion protection tape to the conduit joint area providing two full half-lap wraps the entire length of the joint; which is considered a minimum distance of 4 inches past the end of the coupling in both directions.

6. Install heat-shrinkable tubing to the conduit joint area. Tubing shall extend a minimum distance of 2 inches past the end of the tape wrap in both directions.

3.07 CABLE PULLING

- A. Inspection, handling, storage, temperature conditioning prior to installation, bending and training limits, pulling limits, and calculation parameters for installation of cables must comply with manufacturer's recommendations. For ease of installation and prevention of cable damage, utilize quadrant blocks located properly along the cable run.
- B. Provide soapstone, graphite, or talc cable lubricant for rubber or plastic jacketed cables.
- C. Lubricants for assisting in the pulling or jacketed cables: specifically recommended by cable manufacturer.
- D. Cable pulling tensions may not exceed the maximum pulling tensions recommended by the cable manufacturer.

3.08 CABLE TERMINATING

- A. Terminations of insulated power and lighting cables shall be protected from accidental contact, deterioration of coverings and moisture by the use of terminating devices and materials. Terminations shall be made using materials and method as indicated or specified or as designed by cable manufacturer and termination kit manufacturer.

3.09 GROUNDING

- A. Ground duct banks with a bare stranded copper ground wire that is run within the duct bank and is bonded and grounded at both ends. Conduit may not be used as the ground conductor.
- B. Manholes shall be grounded with ground rods. A bare stranded copper ground wire from the ground wire loop shall be used to bond together and ground the manhole cover frame, ladder support bracket, concrete inserts, cable racks, duct bank ground conductors, and the shields of any medium voltage cables that are spliced in the manhole.
- C. Install a ground rod for each manhole. Bond exposed metal manhole accessories and concrete reinforcing rods with bare copper wire and connect to ground rod and ductbank ground cable. Provide foam sealant for rod penetration in manhole floor for watertight seal.

- D. Install a bare stranded copper duct bank ground cable in each duct bank envelope. Make ground electrically continuous throughout the entire duct bank system. Connect ground cable to building and station ground grid or to equipment ground buses. In addition, connect ground cable to steel conduit extensions of the underground duct system, manholes, and handholes. Provide ground clamp and bonding of each steel conduit extension, where necessary to maintain continuity of the ground system.

3.10 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.11 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

3.12 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 26 08 00

COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Perform Acceptance Tests for all electrical equipment furnished in accordance with this Section and applicable reference standards listed in Article 1.03.
 - a. The test requirements for equipment shall be as required by applicable standards and manufacturer's recommendations, and in accordance with this Specification. In no case will the absence of test requirements herein be construed as alleviation of acceptance testing.
 - b. The purpose of electrical field acceptance tests is to ensure that all electrical equipment is operational and within industry and manufacturer's tolerances and is installed in accordance with the Specifications and approved Shop Drawings.
 - c. Tests are in addition to factory tests at the Manufacturer's facility, and may not substitute for same.
 - d. Tests are in addition to all other tests specified under other Specifications and shall be coordinated by the Contractor.
 - e. Tests in general shall be conducted after the equipment installation is complete. Tests shall be complete and in order given herein and/or in Specifications for the particular equipment unless otherwise approved by the Engineer.
 - f. Tests are also intended to provide, ensure, or determine the following:
 - 1) Provide initial acceptance tests and recorded data that can be used as a benchmark for future routine maintenance and trouble shooting by plant personnel.
 - 2) Ensure a successful start-up with a minimum of last minute interruptions and problems.
 - 3) Determine the suitability of the equipment and systems for energization and placing into operation.

- 4) Provide assurance that each system component is not only installed satisfactorily but performs, and will continue to perform its function in the system with reasonable reliability throughout the life of the equipment.

B. Related Requirements

1. Division 26: Section 26 05 00 COMMON WORK RESULTS FOR ELECTRICAL

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.
- B. The Field Acceptance Tests will not be measured separately for payment and will be included as part of the lump sum price of the Project.

1.03 REFERENCES

- A. Reference Standards
 1. American National Standards Institute (ANSI)
 2. American Society for Testing and Materials (ASTM)
 3. Association of Edison Illuminating Companies (AEIC)
 4. Canadian Standards Association (CSA)
 5. Institute of Electrical and Electronic Engineers (IEEE)
 6. Insulated Cable Engineers Association (ICEA)
 7. International Electrical Testing Association (NETA)
 8. National Electrical Manufacturer's Association (NEMA)
 9. National Fire Protection Association (NFPA)
 10. Occupational Safety and Health Administration (OSHA)
 11. Underwriters Laboratory (UL)

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. General
 1. Contractor shall submit detailed test procedure including test equipment for all field acceptance testing prior to testing.
 2. Contractor shall submit to the Engineer six copies of all test reports. Format and types of reports, data sheets, forms, etc. shall be submitted for approval.
 3. Each test report shall include as minimum the following:
 - a. Listing of equipment tested including the list of test equipment used and the test equipment's associated calibration dates
 - b. Test method and standards governing the test
 - c. Test results
 - d. Recommendations
 4. Test results shall incorporate inspection reports, instrument calibration curves, plotted test results, and all measurements and data.
 5. All inspections, tests, and calibrations are to be reported in writing. The recorded data form shall have the signatures of the persons conducting the tests and authorized witnesses. The forms shall be designed to serve as the test and inspection checklist for inspection requirements. The test and checkout data shall also include any data taken prior to the adjustments, repairs, drying out, or similar Work prior to final testing and acceptance. As-found and as-left test data shall be recorded and reported in writing.
 6. Copies of Test Data Reports shall be incorporated in each of the related Operations and Maintenance Manuals. The Data Reports shall include those items of equipment contained in the Service Manual. Reports shall be separated by a divider labeled Electrical Field Acceptance Tests. Reports shall contain data for all power conductors and controls including instrumentation conductors and devices for static and dynamic equipment in the Operations and Maintenance Manual. In addition, Operating Tests of the equipment shall be included in this section of the Operations and Maintenance Manual.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Qualifications: per Division 01 General Requirements for testing and as follows.

1. The Contractor shall engage the services of a recognized independent testing agency approved by the Engineer to perform acceptance tests as specified herein.
 - a. The testing firm shall submit proof of the certification by NETS or NICET, and proof of the qualifications for the lead, on-Site technical person when requested.
2. The testing firm shall provide all material, equipment, labor, and technical supervision to perform such tests and inspections.
3. All cost associated with the testing shall be the responsibility of the Contractor, including the expenses of retest because of defects and failure of equipment to meet Specifications.
4. Wiring and equipment which is defective, or which fails to meet Specifications, shall be replaced by the Contractor, unless specific approval for repair is given by the Engineer. The Contractor shall bear the costs for either action.
5. Contractor shall open circuits, place and connect all instruments and equipment needed for the tests, remove same and restore circuits when tests are complete.
6. Coordinate activities, and cooperate with others on Project, to ensure that systems are energized when required, loads applied, and requirements of other Specification Sections are carried out on timely, coordinated basis.
7. Other Specification Sections may require services of one or more manufacturer's representatives, to ensure that equipment supplied has been installed properly and adjusted to proper working order. Advise representative of all applicable tests in this Section, so that Work will be coordinated, and tests combined where feasible.
8. Contractor shall notify the Engineer, in writing; at least 14 calendar days before the test are to take place. The tests shall be conducted in the presence of the Engineer or his representative and shall not be started without his permission.
9. Perform all tests as closely as possible to conditions of actual use.
10. All testing and checkout Work shall be performed with fully qualified personnel skilled in the particular tests being conducted. This is essential for obtaining and properly evaluating data while the tests are in progress and for insuring that important facts and questionable data are reported.
11. It is important that equipment warranties or guarantees not be voided by the Contractor's testing and checkout Work. The tests will normally be

supplemental to and compatible with the manufacturer's installation instructions and recommendations. Where deviations are apparent, the manufacturer's review and approval shall be obtained prior to testing. Reasonable cooperation is to be extended to permit witnessing by the manufacturer's representative if so requested. Where any questionable repairs, modifications, significant adjustments, tests or checks are to be made, the Contractor shall contact the Owner's Representative to determine if the Work should be performed by or with the manufacturer's representative.

12. The Contractor shall ensure that all testing and checkout Work is conducted in a safe manner. Special safety pre-cautions such as the following to be utilized where appropriate:
 - a. Occupational Safety and Health Act (OSHA)
 - b. Accident Prevention Manual for Industrial Operations, National Safety Council
 - c. Applicable state and local safety operating procedures
 - d. Owner safety procedures
 - e. National Fire Protection Association (NFPA 70E)
 - f. American National Standards for Personnel Protection
 - g. Locking procedures
 - h. Barricades
 - i. Maintenance of voice communications
 - j. Erection of warning signs
 - k. Stationing of guards and watchmen
 - l. De-energize and/or isolate equipment prior to testing. Exceptions must be thoroughly reviewed to identify safety hazards and devise adequate safeguards.
13. The sequence of all tests and checks shall be such that the equipment can be energized immediately after the completion of the applicable tests.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Test Equipment

1. Provide all necessary test equipment and tools as specified herein and as recommended by the tested equipment manufacturer.
2. All test equipment shall be in good mechanical and electrical conditions, and shall be calibrated per NETA ATS schedule requirements. Records, which show date and results of instrument calibration or testing, must be kept up-to-date and provided with the test report upon request.
3. The accuracy shall be directly traceable to the National Institute of Standards and Technology.
4. Calibrating standard shall be of higher accuracy than that of the instrument tested.
5. Test equipment shall include but not limited to and shall have operating accuracy equal to, or better than listed.
 - a. Portable multimeters shall be true RMS measuring
 - b. Multimeters shall have the following accuracy limits, or better (for 60 Hz where applicable):
 - 1) AC voltage ranges: 0.75 percent plus or minus 3 last single digits
 - 2) AC current ranges: 0.90 percent plus or minus 3 last single digits, including adapters, transducers
 - 3) DC voltage ranges: 0.25 percent plus or minus 1 last single digit
 - 4) Resistance ranges: 0.50 percent plus or minus 1 last single digit
 - 5) Frequency range: 0.10 percent plus or minus 1 last single digit
 - c. Clamp-on ammeters: AC current plus or minus 3 percent of range plus or minus 1 last single digit
 - d. Dissipation/power factor field equipment
 - 1) Plus or minus 0.1 percent power factor values up to 2.0 percent

- 2) 5 percent of the reading for power factor values above 2
- e. Low-range DC resistance equipment: 1.0 percent of reading, plus or minus 2 last single digits
- f. Transformers turns-ratio test equipment: 0.5 percent or better
- g. Ground electrode test equipment: plus or minus 2.0 percent of range
- h. Insulation (Megger) test sets: 0 - 1000V DC plus or minus 20 percent of reading at mid-scale for equipment 600 volts and less and 0 - 2500 volts DC plus or minus 20 percent of reading at mid-scale for equipment over 600 volts.
- i. Electrical load survey equipment
 - 1) Plus or minus 5 percent total error, including sensors
 - 2) 1 percent resolution
 - 3) Current transformers plus or minus 2 percent of range
 - 4) Voltage transformers plus or minus 0.5 percent of range
- j. Liquid dielectric strength test equipment: plus or minus 2 percent of scale
- k. Infrared scanning equipment: sensitivity of 2 degrees C
- l. Phase shifting equipment: plus or minus 1 degree over entire range
- m. High-current test equipment: plus or minus 2 percent of range
- n. DC high potential test equipment: plus or minus 2 percent of scale
- o. AC high potential test equipment: plus or minus 2 percent of scale
- p. Multi-amp SR-90, or equal, relay test set

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. All tests shall be performed with regard to protecting solid-state devices and electronic components from potential damage. Where applicable, disconnect solid-state devices and electronic components prior to applying testing voltage.
- B. Make up no connections at service entrance, transformers, substations, motors, motor control centers, and switchgear permanently until correct phase rotation of

all equipment is determined and electrical tests have been completed. Install and insulate these connections temporarily, if necessary. Make permanent connections after proper rotation has been established and subsequent to completion of insulation resistance and dielectric tests.

C. Wire and cable insulation resistance tests

1. Low voltage, 600V maximum

- a. Inspect wire and cables for physical damage and proper connection in accordance with approved Shop Drawings.
- b. Check color-coding with Specifications and NEC standards.
- c. Perform continuity test to insure proper connection.
- d. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 1000 volts DC for 1 minute.
- e. Evaluate test results by comparison with wires and cables of the same length and type. Investigate any values less than 50 Megaohms.

D. Grounding Systems

1. Verify that grounding system is in accordance with Specifications and applicable codes.
2. The grounding system shall be tested for continuity of connection and for resistance to flow of current through ground connections.
 - a. The resistance between the main grounding electrode and ground shall be no greater than 5 ohms for 600V systems. For electrical substation grounds the ground resistance shall be no greater than 1 ohm.
 - b. The ground resistance of conduits, equipment cases, and supporting frames shall be only fractionally higher than system ground.
 - c. Method of measurement of ground resistance shall be as specified by NETA-AST and be approved by the Engineer before the start of tests.

E. Circuit Breakers - Low Voltage

1. Circuit breakers are to be checked for possible damage during shipment or storage.
2. Inspect the breaker visually for physical damage.

3. Perform several mechanical ON-OFF operations.
4. Perform circuit continuity check on each pole with the circuit breaker in the closed position.
5. Determine short-time pickup and delay, long-time pickup and delay by primary current injection.
6. Tests solid-state trip devices at multiple setting range of pickup and time delays.
7. Apply 300 percent of breaker rated continuous current to each pole to determine that the circuit breaker will trip on an overload.

F. Power Transformers

1. The field acceptance tests for power transformers shall be performed as specified herein, and as recommended by the transformer manufacturer.
2. Perform visual and mechanical inspection, insulation resistance tests, dielectric absorption tests, turn ratio tests, oil sample tests, AC over potential tests, insulation power factor tests on all windings and bushings, individual exciting current tests on each phase, winding resistance tests, top gas analysis, oil PCB levels, and any special
3. Perform tests and adjustments as applicable, and as recommended by the transformer manufacturer.
4. Test values shall be as recommended by manufacturer and specified by NETA-ATS.
5. The Contractor shall employ the services of the manufacturer and independent testing company to check, set and adjust the operation of the cooling equipment and demonstrate to the Owner that all equipment and alarms are functional and operational.

G. Instrument Transformers

1. Inspect transformers for physical damage and nameplate information for compliance with Drawings and Specifications.
2. Verify proper connection of transformers with system requirements.
3. Verify tightness of all bolted connections and assure that adequate clearances exist between primary circuits to secondary circuit wiring.
4. Verify that all required grounding and shorting connections provide good contact.

5. Verify proper operation of transformer withdrawal mechanism (tip out) and grounding operation when applicable.
6. Electrical Tests - Current transformers
 - a. Perform insulation-resistance tests on current transformer secondary and wiring to-ground winding at 1000 volts DC for 1 minute. Value of test voltage on secondary wiring shall be 1000 volts DC for 1 minute. Do not perform this test with solid-state devices connected.
 - b. Perform a polarity test on each transformer winding, and verify manufacturer's polarity markings.
 - c. Perform a turns-ratio verification test of each current transformer.
 - d. The test data shall include the following:
 - 1) Manufacturer's stated ratio for each tap position
 - 2) Test turns ratio results
 - 3) Percent error per tap position
 - 4) Manufacturer's indicated polarity
 - 5) Test result polarity
 - e. On each set of transformer windings, the turn's ratio shall be determined for all no-loads taps, using the two-voltmeter method for control transformers and the two-ammeter method for current transformers.
 - f. Confirm test switch wiring and operation.
 - 1) A functional test shall be performed on the test switch of the current transformer to ensure that the secondary leads are shorted and that no open circuit conditions exist. A functional test shall also be performed on the control transformers to ensure that no short circuit exists across the secondary leads.
 - 2) All control wiring shall be checked to ensure proper operation of the device being powered.
 - g. Perform other tests specified by the NETA-ATS as required by application.
7. Electrical Tests - Voltage Transformers

- a. Perform insulation-resistance tests on voltage transformers, winding-to-winding and windings-to-ground. Value of test voltage on secondary wiring shall be 500 volts DC for 1 minute. Do not perform this test with solid-state devices connected.
- b. Perform a polarity test on each transformer to verify the polarity marks or H1-X1 relationship as applicable.
- c. Perform ratio test as specified in NETA-ATS.
- d. Perform a dielectric withstand test on the primary windings with the secondary windings connected to ground. The DC dielectric voltage shall be in accordance with Table Switchgear Insulation-Resistance Test Voltage above.

H. Metering and Instrumentation

1. Inspect all devices for physical damage and tightness of electrical connections.
2. Check calibration and accuracy of meters at 25/50/75/100 percent of full scale.
3. Verify all instrument multipliers.

I. Protective Relays

1. Inspect relays for physical damage and compliance with Drawings and Specifications.
2. Standard testing and calibration Specifications
 - a. To demonstrate that the relay will function as designed throughout the entire range of its operations. Acceptance tests shall be performed in accordance with NETA-ATS Protective Relay Testing Specifications:
 - b. Calibrate and set relays in accordance with approved coordination study.
 - c. Use approved relay test set.
3. Perform insulation-resistance test on each circuit-to-frame.
4. Test all relays in place to demonstrate that the relaying system will function as specified. Acceptance tests shall be performed as specified and in accordance with NETA-ATS.
5. Test lockout relays and associated test switch trip links and closing circuit contacts. The lockout relays shall be functionally tested to ensure proper

system operation. Associated equipment shall be checked for proper alignment and contact closure.

6. All relays shall be checked and calibrated under service conditions against portable standards devices connected in series with the relay-undergoing test. For some in-Service testing the test plugs shall be used to connect devices which shall measure the currents and voltage being applied to the relays.
7. Test all electrical interlocks.
 - a. Check all electrical interlocks for loose wiring, proper mechanical alignment, and operation. Also, inspect all contact surfaces to ensure they are clean and not pitted.
 - b. All relays shall be checked and calibrated using the built-in test switch and test plug.
 - 1) Test for correct settings and operation of all relay trips and operation indicating flags and seal in contacts.

J. Operating Tests

1. Mechanical and electrical interlocks
 - a. Mechanical interlocks shall be examined to ensure the interlock is free to operate and that bearing surfaces are free to perform their intended function.
 - b. Checks for correct adjustment of primary disconnect mechanisms in plug-in units. Shall be mechanically interlocked with the door to ensure that the door is held closed with primary disconnect in the ON position.
 - c. Check for padlock provisions on disconnect operating mechanisms.
 - d. Check motor starters equipped with a defeater mechanism to ensure that they can be operated to release the door interlock with the disconnect device in the ON position.
2. Circuit Breaker Operation
 - a. Test trip all medium voltage circuit breakers from all devices in the trip circuit and verify operation of all interlocks.
 - b. Installation and inspection of 480V power circuit breakers shall be in accordance with NEMA Pub. No. SG-3:
 - 1) Perform tests in accordance with NETA-ATS Specification and this Specification.

- c. Test all remote control stations for operation.
 - 1) A functional test shall be performed for all remote pushbutton stations and manual motor starters to ensure their proper operation.
 - 2) Tests shall be as included in the appropriate standards.

3.02 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.03 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

3.04 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This Page Intentionally Left Blank

SECTION 26 21 00

LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide labor, tools, equipment, and materials necessary to provide service entrance Work indicated on Drawings and in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Requirements
 - 1. Section 26 05 00 – Common Work Results for Electrical
 - 2. Section 26 05 43 – Underground Ducts and Raceways for Electrical Systems

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. Institute of Electrical and Electronic Engineers (IEEE)
 - 2. National Electrical Code (NEC), including Articles 230, 250, and 338 with Massachusetts amendments.
 - 3. National Electrical Manufacturers Association (NEMA)
 - 4. Underwriters Laboratories (UL)
 - a. UL 50 Electrical Cabinets and Boxes
 - b. UL 854 Service Entrance Cables
 - c. UL 869 Electrical Service Equipment

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data
 - 1. Furnish manufacturer's product data, test reports, and materials certification as required
 - 2. Submit manufacturer's data on service entrance equipment and accessories
- C. Closeout and maintenance material submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- A. Electric Utility Company: National Grid
- B. Install Work in accordance with Utility Company's rules and regulations.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing conditions: per Division 01 General Requirements.
- A. Provide and install service entrance conduit and conductors for associated service work as indicated on Drawings.
- B. Services: wired for 120/240 volts, single phase, 3-wire connected as indicated on Drawings.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Provide service entrance equipment and accessories; of types, sizes, ratings and electrical characteristics indicated, which comply with utility and manufacturer's standard materials, design and construction.
- B. Conductors
 - 1. Copper conductors with XHHW insulation, 600 volt rated

2. Cable identifications shall indicate the manufacturer's name, wire size, insulation type, voltage, etc.
 3. Spade connectors and lug extensions shall be provided as required to accommodate all service conductors at transformer.
- C. Metering
1. Provide utility meter and meter enclosure for the building service as required by the local utility company.
 2. Coordinate all metering requirements with utility company for a complete installation in accordance with the utility company's Specifications.
- D. Manholes, Handholes and Pullboxes
1. Provide in accordance with Section 26 05 43.

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Provide and install required conduit wire, pullboxes, and accessory items to accomplish the Work involved in providing the electrical service as shown on Drawings.
- B. Coordinate service Work with Owner and utility company to ensure proper timing of installation and connection of equipment.
- C. Obtain permits, pay fees, and provide materials and labor necessary for interfacing with utility equipment to install electric service.
- D. Furnish and install electrical conduits for low voltage cables, and low voltage wire and accessory items necessary to accomplish the Work detailed in Drawings.
- E. Furnish and install utility meter, meter enclosure, and associated metering conduits in accordance with the utility company's requirements.
- F. Terminate conductors at the pole-mounted transformer secondaries by the utility company.

3.02 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.03 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

3.04 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide panelboards in accordance with this Section and applicable reference standards listed in Article 1.03.
 - 2. This section includes power distribution panelboards, and lighting and power panelboards rated 600 volts or less.
- B. Related Requirements
 - 1. Section 26 05 00 – Common Work Results for Electrical
 - 2. Section 26 05 33 – Raceways and Boxes for Electrical Systems
 - 3. Section 26 05 26 – Grounding and Bonding for Electrical Systems

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. National Electrical Manufacturers Association (NEMA)
 - a. NEMA AB 1- Molded Case Circuit Breakers
 - b. NEMA PB 1 – Panelboards
 - c. NEMA PB 1.1 – Instructions for Safe Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less
 - 2. Underwriters Laboratories (UL)
 - a. UL 50 – Enclosures for Electrical Equipment
 - b. UL 67 – Panelboards

- c. UL 489 – Molded – Case Circuit Breakers and Circuit Breaker Enclosures
- 3. CSA Standard C22.2 No. 29-M1989 – Panelboards and Enclosed Panelboards
- 4. CSA Standard C22.2 No. 5-M91 – Molded Case Circuit Breakers
- 5. Federal Specification W-P-115C – Type I Class I
- 6. Federal Specification W-C-375B/Gen – Circuit Breakers, Molded Case, Branch Circuit And Service
- 7. Federal Specification W-C-865C – Fusible Switches
- 8. NFPA 70 – National Electrical Code (NEC) with Massachusetts amendments

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
 - 1. Product data for each type panelboard specified
 - 2. Approval documents to include Drawings containing overall panelboard dimensions, interior mounting dimensions, and wiring gutter dimensions. Location of the main, branches, and solid neutral to be clearly shown and illustrate one line diagrams with applicable voltage systems.
 - 3. Panel schedules for installation in panelboards. Submit final versions after load balancing.
- B. Furnish manufacturer's product data, test reports, and materials certifications as required.
- C. Closeout and maintenance material submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Square D Company
- B. General Electric Co.
- C. Eaton/Cutler Hammer
- D. Siemens
- E. Or equal

2.02 POWER DISTRIBUTION PANELBOARDS

- A. Panelboard Interior
 1. Power Distribution Panelboards shall be rated 600 Vac or 250 Vdc maximum. Continuous main current ratings as indicated on associated schedules not to exceed 1200 amperes maximum. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67.
 2. Provide UL Listed short circuit current ratings (SCCR) as indicated on the associated schedules not to exceed the lowest interrupting capacity rating of any circuit breaker installed with a maximum of 200,000 RMS symmetrical amperes. Main lug and main breaker panelboards shall be suitable for use as Service Equipment when application requirements comply with UL 67 and NEC Articles 230.VI and VII.
 3. The panelboard interior shall have 3 flat bus bars stacked and aligned vertically with glass reinforced polyester insulators laminated between phases. The molded polyester insulators shall support and provide phase isolation to the entire length of bus.
 4. The bussing shall be fully rated with sequentially phased branch distribution. Panelboard bussing rated 100 through 600 amperes shall be aluminum. Bussing rated 800 amperes and above shall be plated copper. Bus bar plating shall run the entire length of the bus bar. The entire

interleaved assembly shall be contained between two (2) U-shaped steel channels, permanently secured to a galvanized steel-mounting pan by fasteners.

5. Interior trim shall be of dead-front construction to shield user from all energized parts. Main circuit breakers through 800 amperes shall be vertically mounted. Main circuit breaker and main lug interiors shall be field convertible for top or bottom incoming feed.
 6. A solidly bonded equipment ground bar shall be provided.
 7. Solid neutral shall be equipped with a full capacity bonding strap for service entrance applications. Gutter-mounted neutral will not be acceptable.
 8. Nameplates shall contain system information and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label, and Short Circuit Current Rating shall be displayed on the interior or in a booklet format. Leveling provisions shall be provided for flush mounted applications.
- B. Group Mounted Circuit Breakers through 1200A
1. Circuit breaker(s) shall be group mounted plug-on with mechanical restraint on a common pan or rail assembly.
 2. The interior shall have three flat bus bars stacked and aligned vertically with glass reinforced polyester insulators laminated between phases. The molded polyester insulators shall support and provide phase isolation to the entire length of bus.
 3. Circuit breakers equipped with line terminal jaws shall not require additional external mounting hardware. Circuit breakers shall be held in mounted position by a self-contained bracket secured to the mounting pan by fasteners. Circuit breakers of different frame sizes shall be capable of being mounted across from each other.
 4. Line-side circuit breaker connections are to be jaw type.
 5. All unused spaces provided, unless otherwise specified, shall be fully equipped for future devices, including all appropriate connectors and mounting hardware.
- C. Electronic Trip Molded Case Standard Function 80% Rated Circuit Breakers
1. All electronic circuit breakers shall have the following time/current response adjustments: Long Time Pickup, Long Time Delay, Short Time

Pickup, Short Time Delay, Ground Fault Pickup, Ground Fault Delay, and Instantaneous settings. Each adjustment shall have discrete settings (fully adjustable) and shall be independent of all other adjustments.

2. Circuit breaker trip system: microprocessor-based true RMS sensing designed with sensing accuracy through the thirteenth harmonic. Sensor ampere ratings: as indicated on the associated schedule or Drawings.
 3. Local visual trip indication for overload, short circuit and ground fault trip occurrences.
 4. Long time pickup indication to signal when loading approaches or exceeds the adjustable ampere rating of the circuit breaker shall be provided.
 5. Furnish thermal magnetic molded case circuit breakers for 250A frames and below.
- D. Thermal Magnetic Molded Case Circuit Breakers
1. Molded case circuit breakers shall have integral thermal and instantaneous magnetic trip in each pole.
 2. Circuit protective devices: molded case circuit breakers. Circuit breakers: standard interrupting. Ampere ratings: as shown on Drawings.
- E. Enclosures
1. Type 3R, 5 and 12
 - a. Enclosures shall be constructed in accordance with UL 50 requirements. Enclosures shall be painted with ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel
 - b. Doors to be gasketed and equipped with a tumbler type vault lock and 2 additional quarter turn fasteners. A clear plastic directory cardholder shall be mounted on the inside of door. All lock assemblies shall be keyed alike. Provide 1 key with each lock
 - c. Maximum enclosure dimensions not to exceed 44 inches wide and 14-1/2 inches deep.

2.03 LIGHTING AND APPLIANCE PANELBOARDS

- A. Provide lighting and appliance panelboards designed for three phase, four wire, solid neutral, 60-hertz service rated for 480/277 volt or 120/208V service as indicated. Where main circuit breakers are indicated on the Drawings, provide main circuit breaker type interiors. Back-fed branch circuit breakers shall not be utilized for main circuit breakers.

- B. Panelboards shall be flush or surface mounted, etc., as indicated by panel schedule; code gauge galvanized steel boxes and enameled steel fronts sized for minimum 6-inch minimum side, top and bottom gutters, or greater as required by NEC.
- C. Each panel to have door in door trim with full length piano hinge to allow for access to wireways.
- D. Each panel to have door provided with cylinder lock and latch allowing for common key access to each panel. Each panel to have fully typed directory indicating outlets, fixtures, devices and locations served by intended circuit. Panelboards for use as service disconnecting means to conform to UL 869.
- E. Mechanical lugs furnished with panelboards shall be cast copper or copper alloys of sizes suitable for the conductors indicated to be connected thereto. Panelboards shall have fully capacity neutral bus, ground bus and bolt-on circuit breakers.
- F. Circuit breakers shall be molded-case, thermal-magnetic, quick-make, quick-break, bolt-in type. Interrupting rating of circuit breakers shall be as indicated. Provide with suitable handle locks where indicated. Where interrupting rating is not indicated, panels for 120/208 volts service shall have breakers with 10,000 ampere RMS minimum interrupting rating at 240 volts, main circuit breakers where indicated shall have 25,000 ampere RMS minimum interrupting rating at 240 volts. Panels for 480/277 volt service shall have breakers with 14,000 ampere RMS minimum interrupting rating at 480 volts.

2.04 ENCLOSURES

- A. Reference Section 26 05 33 for approved enclosure types.

2.05 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 PANELBOARDS

- A. Install panelboards and accessory items according to NEMA PB 1.1 and manufacturers' written installation instructions.
- B. Mount top of trim 6-feet and 2 inches above finished floor, except as indicated.
- C. Circuit directory: typed and reflective of final circuit changes required to balance panel loads. Obtain approval before installing. Number branch circuit devices accordingly to correspond to circuit directory.

- D. After substantial completion, conduct load balancing measurements and circuit changes. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.
- E. Make equipment grounding connections for panelboards as indicated.
- F. Provide ground continuity to main electrical ground bus indicated.
- G. Include the following items performed during electrical tests in accordance with manufacturer's instructions.
 - 1. Ground resistance test on system and equipment ground connections.
 - 2. Test main and subfeed overcurrent protective devices.

3.02 CLEANING

- A. Upon completion of installation, inspect panelboards and transformers. Remove paint splatters and other spots, dirt, and debris. Touch-up scratches and finish marks to match original finish.

3.03 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.04 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

3.05 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This Page Intentionally Left Blank

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.01 SUMMARY

- A. The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install wiring devices in accordance with the plans and as specified herein.
 - 1. Flush Wiring Devices
 - 2. Control Relays
 - 3. Control Stations

1.01 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 specification sections, apply to this section.
- B. Related Sections
 - 1. Division 26: Section 26 05 00 COMMON WORK RESULTS FOR ELECTRICAL
 - 2. Division 26: Section 26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
 - 3. Division 26: Section 26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
 - 4. Division 26: Section 26 05 33 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

1.03 REFERENCES

- A. Reference Standards

1. NATIONAL ELECTRICAL CODE (NEC) WITH MASSACHUSETTS AMENDMENTS
2. UNDERWRITER'S LABORATORIES, INC. (UL)
3. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA) COMPLIANCE

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.04 SUBMITTALS

- A. Furnish manufacturer's product data, test reports, and materials certifications in accordance with Division 01 General Requirements.

1.03 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.04 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 - PRODUCTS

2.01 FLUSH WIRING DEVICES

- A. Wall Switches

1. Wall Switches shall be specifications grade, toggle operated, quiet type alternating current (ac) switches, NEMA heavy duty class, rated at 20 ampere, 120/277 v. Provide matching two pole, 3-way or 4-way switches as indicated. Switches shall be white in color. Comply with UL 20 and NEMA Standards.
2. Where two or more switches are to be installed at the same location, they shall be mounted in one-piece ganged switch boxes, with appropriate gang cover plate.
3. Provide waterproof switches where indicated.

- B. Receptacles

1. Convenience receptacles for interior use shall be specification grade, industrial heavy duty type, 20-ampere, 125-volt ac, 2-pole, 3-wire, back

wiring, metal plaster ears, single, duplex (as indicated) grounded, conforming to NEMA FB 11, NEMA WD 1 and to the 5-20R configuration in NEMA WD 6. Receptacles shall be white in color. Provide waterproof in-use covers where indicated and required.

2. Ground Fault Interrupter (GFI) Receptacles shall be specification grade. Provide 20 ampere, "feed through" type ground fault circuit interrupter, with integral heavy duty NEMA 5 20R duplex receptacles arranged to protect connected downstream receptacles on same circuit. Provide unit designed for installation in a 2 3/4 inch deep outlet box without adapter, grounding type, Class A, Group 1. Receptacles shall be white in color. Provide waterproof in-use covers where indicated and required.
3. Locking receptacles shall conform to NEMA WD 6. One (1) plug shall be furnished with each locking receptacle.
4. Receptacles shall meet the requirements for retention of plugs, overload, temperature, and assembly security in accordance with NEMA WD 1.
5. Special purpose outlets: NEMA heavy duty class, grounding type with matching plug. Coordinate NEMA type with equipment manufacturer.

C. Device Plates

1. Wall plates for flush wall switches and receptacles shall be the appropriate type and size and shall match the wiring devices for which they are intended. Dimensions for openings in wall plates shall be in accordance with NEMA WD 1.
2. Process area: Plates in process areas for receptacles, telephone, etc., shall Galvanized steel, smooth rolled outer edge sized to fit box.
3. Device plates in general areas for receptacles shall be stainless steel.
4. Device Plates in finished spaces (office) shall be impact resistant plastic, white in color.

D. Weatherproof Device Plates

1. Provide weatherproof device plates where indicated and required.
2. Interior and Exterior Wet Locations: Device plates for interior and exterior wet locations shall be die-cast aluminum, gasket, with corrosion resistant screws to match plate cover finish. Provide weatherproof receptacles with vertical "in-use" covers for complete weatherproofing when plug is inserted.

3. Chemical Feed Room: Device plates for installation in the Chemical Feed Room shall be gasketed nonmetallic polyvinyl chloride (PVC), or fiberglass units, for complete weatherproofing and protection against corrosive chemicals. Provide receptacles with vertical “in-use” covers for complete weatherproofing when plug is inserted.

2.02 CONTROL RELAYS

- A. Control Relays: Allen Bradley Bulletin 700-H Series, Square D or equal.
- B. 120V coil as required or as indicated.
- C. Number of poles as indicated or required.
- D. Electrically Held, except as noted.
- E. Enclosure shall be NEMA-3R, except as noted.

2.03 CONTROL STATIONS

- A. All control stations shall be industrial, heavy duty type, with oil-tight construction and clearly marked legend plates. Enclosures shall be provided based upon location in accordance with NEMA requirements and as required for the area classifications as indicated and NEMA rating to meet environmental conditions of installed location.
- B. Enclosures shall be common or grouped mounted for devices in the same location. Devices shall include front mounted nameplates identifying function.
- C. Subject to compliance with requirements, provide control stations by one of the following:
 1. Allen Bradley Company
 2. Appleton Electric Company
 3. Crouse-Hinds Company
 4. Approved equal
- D. Selector Switches
 1. Selector Switches shall be non-illuminated, standard knob operated rated for use at 120VAC. The knob operator insert shall be white in color. Units shall be rotary type with round or oval handles and positioning device to securely hold switch in selected position. Where shown on the Drawings selector switches shall be key type.

2. Provide compatible nameplate for each selector switch identifying intended functions: (I.E. "HAND/OFF/AUTO", LOCAL/OFF/REMOTE", "JOG/OFF/AUTO", ETC.) as indicated on the Contract Drawings.

3. Units shall be 30.5mm selector switches.

E. Pushbuttons

4. Switches shall be non-illuminated momentary or maintained type rated for use at 120 VAC. Switches shall green in color for "START" pushbuttons, and shall be red in color for "STOP" pushbuttons.

5. Provide compatible nameplate for each pushbutton identifying intended functions (I.E. "STOP", "START", ETC.).

6. Emergency stop operators shall be mushroom style, 2-position push-pull type, with number of contacts as indicated on the Contract Drawings. Stations shall be provided with push-pull padlocking attachment and legend plate reading: "Push to Stop, Pull to Start."

7. Units shall be 30.5mm pushbuttons.

2.04 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 - EXECUTION

3.01 WIRING DEVICES

A. Wall Switches and Receptacles

1. Wall switches and receptacles shall be so installed that when device plates are applied, the plates will be aligned vertically to within 1/16-inch.

2. Ground terminal of each flush-mounted receptacle shall be bonded to the outlet box with an approved green bonding jumper.

B. Device Plates

1. Device plates and receptacle cover plates for receptacles and light switches shall be suitably labeled, identifying the circuit number and the panel name; for example: RP1-12.

2. Device plates shall be identified on the inside of the plate by circuit number and panelboard.

C. Control Stations

1. Mount equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.
2. Securely fasten equipment to walls or other surfaces on which they are mounted. Provide independent galvanized steel supports where no wall or other surface exists.
3. Install in conformance with National Electrical Code with Massachusetts amendments.

3.02 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.03 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

3.04 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes:
1. Individually mounted enclosed switches and circuit breakers used for the following:
 - a. Feeder and branch-circuit protection.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Division 26, Section 26 05 00 COMMON WORK RESULTS FOR ELECTRICAL
- C. Division 26, Section 26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Product Data: For each type of switch, circuit breaker, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each switch and circuit breaker.
 1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:

- a. Enclosure types and details.
 - b. Current and voltage ratings.
 - c. Short-circuit current rating.
 - d. UL listing for series rating of installed devices.
 - e. Features, characteristics, ratings, and factory settings of individual over-current protective devices and auxiliary components.
 - f. Time-current curves, including selectable ranges for each type of circuit breaker.
2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
- C. Field Test Reports: Submit written test reports and include the following:
1. Test procedures used.
 2. Test results that comply with requirements.
 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Manufacturer's field service report.
- E. Maintenance Data: For enclosed switches and circuit breakers and for components to include in maintenance manuals specified in Division 01. In addition to requirements specified in Division 01, include the following:
1. Routine maintenance requirements for components.
 2. Manufacturer's written instructions for testing and adjusting switches and circuit breakers.
 3. Time-current curves, including selectable ranges for each type of circuit breaker.

1.06 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA AB 1 and NEMA KS 1.
- C. Comply with UL #98, Enclosed Switches and UL #508, Industrial Control Equipment.

- D. Federal Specification W-S-865- Heavy Duty Switches
- E. Comply with NFPA 70.
- F. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
 - B. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C)
 - C. Altitude: Not exceeding 6600 feet (2000 m)

1.08 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.09 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - B. Square D Co.
 - C. Eaton Corp.; Cutler-Hammer Products
 - D. General Electric Co.; Electrical Distribution & Control Division
 - E. Approved Equal

2.02 ENCLOSURE SWITCHES

- A. Enclosed, Non-fusible Switch: NEMA KS 1, heavy duty type with lockable handle.
- B. Rating: Voltage and number of poles as required for motor or equipment circuits being disconnected. Switches used for service entrance equipment shall bear a UL label and be rated for service entrance equipment.
- C. Enclosed, Fusible Switch, 800A and Smaller: NEMA KS 1, heavy duty type with clips to accommodate specified fuses, lockable handle with two padlocks, and interlocked with cover in closed position.
- D. Double Throw Safety Switches shall be unfused double throw with center OFF position, quick make, quick break mechanism, visible blades in the OFF position and safety handle. Rating, voltage and number of poles as required for the circuits being disconnected

2.03 ENCLOSURE CIRCUIT BREAKERS

- A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable instantaneous, magnetic trip setting for circuit-breaker frame sizes 150 Amp through 400 Amp.
- B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles. Lugs shall be mechanical style suitable for number, size, trip ratings, and material of conductors.
- C. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
- D. The circuit breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. Provisions for padlocking the circuit breaker in the OFF position shall be provided. Enclosures shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and prevent turning the circuit breaker ON when the enclosure cover is open. The cover interlock mechanism shall have an externally operated override but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

2.04 DOUBLE THROW SAFETY SWITCHES

- A. Unfused, double throw with center OFF position, quick make, quick break mechanism, visible blades in the OFF position and safety handle. Rating, voltage and number of poles as required for the circuits being disconnected.

2.05 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
1. Outdoor Locations: NEMA Type 3R
 2. Corrosive Locations: NEMA Type 4X, stainless steel
 3. Wet or Damp Locations: NEMA Type 3R
 4. Reference Section 26 05 33 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS for approved enclosure types for each area of installation.

2.06 FACTORY FINISHES

- A. Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard grey paint applied to factory-assembled and - tested enclosures before shipping.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Mount equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.
- B. Securely fasten equipment to walls or other structural surfaces on which they are mounted. Provide independent galvanized steel supports where no wall or other structural surface exists

- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install in conformance with National Electrical Code with Massachusetts amendments.

3.03 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26.
- B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.
- C. For double throw switches identify source of each service identify source of each service.

3.04 CONNECTIONS

- A. Install equipment grounding connections for switches and circuit breakers with ground continuity to main electrical ground bus.
- B. Install power wiring. Install wiring between switches and circuit breakers, and control and indication devices.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.05 FIELD QUALITY CONTROL

- A. Testing: After installing enclosed switches and circuit breakers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
- B. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
- C. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.06 CLEANING

- A. On completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

3.07 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This Page Intentionally Left Blank

SECTION 26 56 00

EXTERIOR LIGHTING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 1. Provide exterior lighting in accordance with this Section and applicable references listed in Article 1.03.
- B. Related Requirements
 1. Section 26 05 00 – Common Work Results for Electrical
 2. Section 26 05 33 – Raceways and Boxes for Electrical Systems
 3. Section 26 05 26 – Grounding and Bonding for Electrical Systems

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 1. Illuminating Engineering Society (IES)
 2. National Fire Protection Association (NFPA)
 - a. NFPA 70 National Electrical Code (NEC) with Massachusetts amendments
 - b. NFPA 101 Life Safety Code

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.

- B. Shop Drawings: indicate construction details for products which are not manufacturer's standard, when product data does not adequately describe fixture physical characteristics, or upon request by Engineer.
- C. Product data: for each luminaire and lighting unit.
- D. For LED lighting fixtures, submit US DOE LED Lighting Facts label, and IES L70 rated life.
- E. Submit luminaire Shop Drawings in booklet form with a separate sheet for each luminaire type. Indicate on each sheet the proposed luminaire type designation, manufacturer, luminaire lamp, and ballast designation.
- F. Indicate materials, finishes, metal gauges, overall and detail dimensions, sizes of electrical and mechanical connections, fasteners, welds, joints, end conditions, provisions for work of others and similar information.
- G. Include a photometric test report showing photometric candlepower distribution, brightness, coefficients of utilization, and paint reflectance included for all fixtures. Prepare photometric reports for actual fixture, lamp, lens, and ballast combination. Certify data under IES National Bureau of Standards calibrated test conditions. Upon request, submit photometric test of proposed fixture prepared by an independent testing laboratory.
- H. Submittals stating whether or not the fixture, as an assembly, has been UL tested and approved.
- I. Upon request, submit sample products for inspection. Provide luminaires identical with approved samples; retain approved samples at Site for comparison until after all other luminaires have been installed. Upon notification of disapproval, immediately submit new samples meeting requirements.
- J. Upon request by Engineer, provide computerized illumination calculation data for specified exterior areas in digital or isofootcandle format and in detail requested.
- K. Closeout and maintenance material submittals: per Division 01 General Requirements.
 - 1. Provide maintenance and operating instructions for battery powered lighting units. Include technical data sheets and parts ordering information for components used in luminaires.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

- B. Provide products of firms regularly engaged in the manufacture of exterior luminaires or components of similar types and ratings to those specified. Products shall have been in satisfactory use in similar applications for not less than 2 years.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Deliver luminaires and their components to job site, factory assembled and wired to the greatest extent practical, in strict accordance with approved shop drawings, samples, certificates and catalog cuts.
- C. Protect exposed finishes during manufacture, transport, storage and handling; replace damaged materials.
- D. Store luminaires above ground, under cover, in clean, dry areas, tagged or marked with type and Site destination.

1.08 SITE CONDITIONS

- A. Existing conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Provide lighting fixtures as listed on the Lighting, Lamping, and Fixture Schedule on Drawings and as specified meeting the performance and quality standard for that fixture. Provide substitutes equal in all respects including mechanical, electrical, physical, performance, photometric, and quality characteristics except minor variances in construction details, which do not affect overall quality or performance.
- B. Provide required accessories for mounting and operation of each luminaire as indicated.

2.02 LUMINAIRES

- A. Provide weatherproof, heavy duty, outdoor type luminaires designed for efficient light utilization, adequate dissipation of lamp and ballast heat, and safe cleaning and relamping.
- B. Illumination distribution patterns, BUG ratings and cutoff types according to IES and as shown on Drawings.
- C. Incorporate ballasts in luminaire housing, except where otherwise shown on Drawings.

- D. Provide frame-mounted, heat-resistant, borosilicate glass lenses, with prismatic refractors, unless otherwise shown on Drawings. Attach frame to the luminaire housing by hinges or chain. Use heat and aging-resistant, resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- E. Pre-wire internal components to terminal strips at the factory.
- F. Bracket-mounted luminaires shall have leveling provisions and clamp-type adjustable slip-fitters with locking screws.
- G. Materials shall be rustproof. Latches and fittings shall be non-ferrous metal.
- H. Provide manufacturer's standard finish, as scheduled on the drawings. Where indicated on drawings, match finish process and color of pole or support materials.
- I. Luminaires shall carry factory labels, showing complete, specific lamp and ballast information.

2.03 LAMPS

- A. Install the proper lamps in every luminaire installed and every existing luminaire relocated or reinstalled as shown on the drawings.
- B. Lamps shall be general-service, outdoor lighting types.
- C. LED sources shall meet the following requirements:
 1. Operating temperature rating shall be between -40 degrees C (-40 degrees F) and 50 degrees C (120 degrees F).
 2. Correlated Color Temperature (CCT): 4000K.
 3. Color Rendering Index (CRI): ≥ 85 .
 4. The manufacturer shall have performed reliability tests on the LEDs luminaires complying with Illuminating Engineering Society (IES) LM79 for photometric performance and LM80 for lumen maintenance and L70 life.
- D. Mercury vapor lamps shall not be used.

2.04 LED DRIVERS

- A. LED drivers shall meet the following requirements:
 1. Drivers shall have a minimum efficiency of 85%.

2. Starting Temperature: -40 degrees C (-40 degrees F).
3. Input Voltage: 120 to 480 ($\pm 10\%$) volt.
4. Power Supplies: Class I or II output.
5. Surge Protection: The system must survive 250 repetitive strikes of "C Low" (C Low: 6kV/1.2 x 50 μ s, 10kA/8 x 20 μ s) waveforms at 1-minute intervals with less than 10% degradation in clamping voltage. "C Low" waveforms are as defined in IEEE/ASNI C62.41.2-2002, Scenario 1 Location Category C.
6. Power Factor (PF): ≥ 0.90 .
7. Total Harmonic Distortion (THD): $\leq 20\%$.
8. Comply with FCC Title 47 CFR Part 18 Non-consumer RFI/EMI Standards.
9. Drivers shall be reduction of hazardous substances (ROHS)-compliant.

2.05 TIME SWITCH

- A. Digital multi-purpose, 277 volts, 2 channel, 7 day, 365 day advance single and block holiday time switch. Provide switch with battery backup to maintain accurate time for a minimum of 72 hours following power failure. Provide time switch with a manual on-off bypass switch. Housing for the time switch shall be surface mounted, NEMA 1 enclosure conforming to NEMA ICS 6.

2.06 POLES

- A. Provide poles designed for wind loading of 100 miles per hour determined in accordance with AASHTO LTS-2 while supporting luminaires having effective projected areas for fixtures indicated. Poles shall be anchor base type designed for use with underground supply conductors. Anchor bolts shall be steel rod having a minimum yield strength of 50,000 psi; the top 12 inches of the rod shall be galvanized per ASTM A 153.
- B. Aluminum Poles: Provide aluminum poles manufactured of corrosion resistant aluminum alloys conforming to AASHTO LTS-2 for Alloy 6063-T6 or Alloy 6005-T5 for wrought alloys and Alloy 356-T4 (3,5) for cast alloys. Poles shall be seamless extruded or spun seamless type, and primed and painted factory finish. Provide a pole grounding connection designed to prevent electrolysis when used with copper ground wire.
- C. Steel Poles: AASHTO LTS-2. Provide steel poles having minimum 11-gage steel with minimum yield/strength of 48,000 psi and primed and painted factory

finish, color as indicated on the drawings. Provide a pole grounding connection designed to prevent electrolysis when used with copper ground wire.

2.07 FOUNDATIONS FOR POLES

- A. Foundations shall be cast-in-place concrete, having 5000 psi minimum 28-day compressive strength.
- B. Foundations shall support the effective projected area of the specified pole, arm(s), luminaire(s), and accessories, such as shields, banner arms, and banners, under wind conditions previously specified in this section.
- C. Place concrete in spirally-wrapped treated paper forms for round foundations, and construct forms for square foundations.
- D. Rub-finish and round all above-grade concrete edges to approximately 6 mm (0.25-inch) radius.
- E. Anchor bolt assemblies and reinforcing of concrete foundations shall be as shown on the drawings. Anchor bolts shall be in a welded cage or properly positioned by the tiewires to stirrups.
- F. Prior to concrete pour, install electrode per Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

2.08 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Construct luminaire pole bases as indicated on Drawings. Furnish pole bases to Site Subcontractor for installation under Division 02 and coordinate installation.
- B. Provide anchor bases with galvanized steel anchor bolts, threaded at the top end and bent 90 degrees at the bottom end. Provide galvanized nuts, washers, and ornamental covers for anchor bolts. Concrete for anchor bases, polyvinyl chloride (PVC) conduit ells, and ground rods shall be as specified in Section 26 05 00.
- C. Thoroughly compact backfill with compacting arranged to prevent any pressure between conductor, jacket, or sheath and the end of conduit ell. Adjust poles as necessary to provide a permanent vertical position with the bracket arm in proper position for luminaire location.

- D. Ground noncurrent-carrying parts of equipment, including metal poles. Where the copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

3.02 ADJUSTING AND CLEANING

- A. Clean lenses and diffusers at completion of work.
- B. Aim adjustable luminaires and lampholders as indicated or as directed.
- C. Clean paint splatters, dirt, and debris from installed luminaires.
- D. Touch up luminaire and pole finish at completion of work.
- E. Relamp luminaires which have failed lamps at completion of work.

3.03 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Field Tests: Upon completion of installation, conduct an operating test to show that the equipment operates in accordance with the requirements of this Specification.
- C. Insulation Resistance Test: Perform before and after connection of fixtures and equipment.
- D. Ground Resistance Tests: Perform ground continuity test.

3.04 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

3.05 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This Page Intentionally Left Blank

SECTION 31 00 00

EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 1. Excavating, filling, backfilling, stockpiling, bedding, compacting, grading, hauling, disposal of on-Site soils, processing of on-Site soils for reuse, testing of soils, protection and other Work necessary for construction of pipelines, structures, subsurface structures, foundations, pavements, earthen embankments and appurtenant Work in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Requirements
 1. Section 31 10 00 – Earthwork
 2. Section 31 05 19.13 – Geotextiles for Earthwork
 3. Section 31 25 00 – Erosion and Sedimentation Controls
 4. Section 31 50 00 – Excavation Support and Protection
- C. Related Documents
 1. Geotechnical Report, prepared by Northeast Geotechnical, Inc., dated January 31, 2023.
 2. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 1. American Association of State Highway and Transportation Officials (AASHTO)
 - a. AASHTO M85 Standard Specification for Portland Cement

- b. AASHTO M 295 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- c. AASHTO T11 Standard Specification for Materials Finer Than 75-Micrometer (No. 200) Sieve in Mineral Aggregates by Washing
- d. AASHTO T27 Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
- e. AASHTO T96 Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- 2. ASTM International (ASTM)
 - a. ASTM C131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - b. ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
 - c. ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN·m/m³))
 - d. ASTM D1556 Density and Unit Weight of Soil in Place by the Sand-Cone Method
 - e. ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
 - f. ASTM D2167 Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
 - g. ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
 - h. ASTM D2922 Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)
 - i. ASTM D2937 Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method
 - j. ASTM D3017 Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
 - k. ASTM D3740 Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
 - l. ASTM D6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

- m. ASTM E329 Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
 - n. ASTM C131 / AASHTO T-96 (Los Angeles Abrasion Test)
 - 3. MassDOT Standard Specifications and Supplements and Construction Details
- B. Definitions
- 1. Unsuitable material: soft clay or silt, organic clays or silts, peats, debris, concrete, pavement, stones or boulders over 6 inches in diameter, wet or frozen material, and material deemed unsuitable by Owner or Engineer that will not provide suitable foundation or structural support for pipe and associated drainage structures, buildings, or other structures, and is unsuitable for use in backfill.
 - 2. On-Site material: suitable material from on-Site excavation.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.
- 1. Pre-installation conference: conduct at Project Site at least 30 days prior to start of Work.
 - a. Required attendees: Owner and Engineer, Owner's independent testing firm and geotechnical consultant, Contractor's Superintendent, Support of Excavation (SOE) Installer, Dewatering Installer and Contractor's independent testing firm
 - b. Review methods and procedures related to earthmoving including, but not limited to, the following.
 - 1) Work hours
 - 2) Personnel and equipment needed to maintain proposed construction schedule and avoid delays
 - 3) Work procedures
 - 4) Establishing and maintaining Site access
 - 5) Coordination of Work with utility locator service
 - 6) Stockpiling area and temporary access points
 - 7) Site logistics for hauling and stockpiling

- 8) Coordination of Work and equipment movement with support of excavation systems installation
 - 9) Construction phasing, anticipated daily and weekly progress and conformance to construction schedule
 - 10) Methodology for field quality control
2. Make provisions for observations and testing of Work by Owner's independent testing and inspection agency and geotechnical consultant.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data
 1. Provide for each on-Site and borrow soil material or aggregate
 - a. Name of each material Supplier, specific type and source of each material
 - b. Bills of Lading documenting materials source, including Supplier name and relationship to source, location where materials were obtained; including street, town, lot and block, country and state. Include present and past usage of source Site.
 - c. Laboratory results indicating that the soil is not impacted (Refer to Section 02 11 10) or supplier's statement that material is not contaminated and is free of extraneous debris or solid waste, and description of steps taken to confirm
 - d. Product weight shipping tickets certified by Supplier
- C. Samples and Mockups: as specified in Article 1.06.
- D. Certificates
 1. Certification stating materials are virgin materials from a commercial or non-commercial source.
- E. Design Data/Submittals
 1. Materials gradation
- F. Source and Field Quality Control Submittals
 1. Field compaction testing

2. Material testing reports for each on-Site and borrow soil material proposed for fill and backfill in accordance with ASTM D2487
3. Laboratory compaction curve in accordance with ASTM D1557
4. Backfill moisture-density relationships
5. Submit daily field reports documenting earthwork activity and field-testing for each day. At minimum, reports shall include
 - a. Description of day's activities
 - b. Results of in-place density testing including in-place dry density, moisture content, percent compaction, elevation of test and description of soil
 - c. Sketch indicating extent of each day's Work and location of testing
6. Daily records of over-excavated volumes including
 - a. Beginning and end station of over-excavation
 - b. Proposed elevation of subgrade
 - c. Actual elevation of subgrade
 - d. Calculated volume of additional excavation in bank cubic yards (BCY)

G. Qualification Statements

1. Contractor's independent testing agency, qualified for testing specified in ASTM E329 and ASTM D3740.

H. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Qualifications: per Division 01 General Requirements and as follows for geotechnical testing.
 1. Geotechnical testing agency to monitor earthwork: qualified per ASTM 329 and ASTM D3740.
- C. Independent Testing
 1. Minimum of 50 pounds of material in an airtight container to testing laboratory.

D. Samples

1. Each type of soil or aggregate proposed for use on Project, a minimum of 14 days prior to Work.
2. Submit additional material Samples at least every 500 cubic yards throughout course of Work, if requested by Engineer to evaluate consistency of source or process.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Waste Management and Disposal
 1. Legally dispose of excess or unsuitable material.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. General
 1. Obtain approval of Owner and Engineer for changes in material sources.
 2. Identify off-Site sources of materials and testing of materials to verify compliance with Specifications. Material may be inspected by Owner.
- B. Crushed stone: 3/4-inch sized, durable, clean angular rock fragments obtained by breaking and crushing rock material meeting MassDOT M2.01.4 criteria, free of ice, snow, sand, silt, clay, loam, shale, or other deleterious matter.

Sieve analysis by weight

Sieve Size	Percent Passing by Weight
1-inch	100
3/4-inch	90-100
1/2-inch	10- 50

3/8-inch	0- 20
#4	0-5

Sand: clean inert, hard, durable grains of quartz or other hard durable rock, free from loam or clay, surface coatings and deleterious materials.

Sieve analysis by weight

Sieve Size	Percent Passing by Weight
3/8-inch	100
#4	95-100
#16	50-85
#50	10-30
#100	2-10
#200	0-3

- C. Suitable backfill: well-graded granular material. Retain at least 25 percent by weight on #4 sieve and contain less than 35 percent finer than a #200 sieve by weight, predominantly free from organic matter, man-made materials, ice, snow or other deleterious material.
- D. Gravel borrow for trench backfill: hard, durable stone and course sand inert material, free from loam and clay, surface coatings and deleterious material, MassDOT Division III, subsection M1.03.0, Type b. Gradation requirements: AASHTO T11 and T27.

Sieve analysis by weight

Sieve Size	Percent Passing by Weight
1/2 inch	50-85
#4	40-75
#50	8-28
#200	0-10

Type b: maximum stone size = 3-inches in largest dimension

- E. Gravel borrow for roadway subbase: processed gravel for backfill per MassDOT Section M1.03.1, consisting of hard, durable stone and course sand inert material, free from loam and clay, surface coatings and deleterious materials. Coarse aggregate percentage of wear: maximum 50 by ASTM C131 and AASHTO T 96.

Sieve analysis by weight

Sieve Size	Percent Passing by
------------	--------------------

	Weight
3 inch	100
1-1/2 inch	70-100
3/4 inch	50-85
#4	30-60
#200	0-10

- F. Dense graded crushed stone: crusher-run coarse aggregates of crushed stone and fine aggregates of natural sand or stone screenings, uniformly pre-mixed with a predetermined quantity of water per MassDOT M2.01.7.

Sieve analysis by weight

Sieve Size	Percent Passing by Weight
2 inch	100
1-1/2 inch	70-100
3/4 inch	50-85
#4	30-55
#50	8-24
#200	3-10

- G. Refill material: 3/4-inch crushed stone for below grade or rock excavation unless otherwise directed.
- H. Common fill: friable material with no objects greater than 6 inches in diameter, no more than 30 percent by weight finer than No. 200 sieve, free from ice, snow, roots, sod, rubbish, other deleterious or organic matter, and observable contamination. Excavated material from on-Site sources meeting these Specifications may be used for common fill.
- I. Select backfill: as specified for gravel borrow with stones maximum 3 inches in diameter.
- J. Structural fill for on-site work: The Structural Fill should have a plasticity index of less than 6 and should meet the gradation requirements shown below. Structural Fill should be compacted in maximum 9- inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within ± 2 percentage points of the optimum moisture content. Refer to Section 3.2.3 of the LGCI Geotechnical Report for reuse.

Sieve Designation	Percent Passing by Weight
3 inch	100
1 ½ inch	80-100
½ inch	50-100
#4	30-85

#20	15-60
#60	5-35
#200	0-10

- K. Structural Fill for Field Street Work: Shall be off-site structural fill meeting the following gradation requirements in accordance with Section 5.2 of the Northeast Geotechnical, Inc. Geotechnical Report.

Sieve Designation	Percent Finer by Weight
2/3 the loose lift thickness	100
#10	30-95
#40	10-70
#200	0-12

- L. Ordinary fill: Ordinary Fill should have a plasticity index of less than 6 and should meet the gradation requirements shown below. Ordinary Fill should be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within ±2 percentage points of the optimum moisture content.

Sieve Designation	Percent Passing by Weight
6 inches	100
1 inch	50-100
#4	20-100
#20	10-70
#60	5-45
#200	0-20

- M. Drainage stone: 1-1/2-inch crushed stone per MassDOT Section M2.01.1 of durable, clean angular rock fragments obtained by breaking and crushing rock material.

Sieve Size	Percent Passing by Weight
2 inch	100
1-1/2 inch	95 - 100
1 inch	35 - 70
3/4 inch	0 - 25

- N. Controlled density fill (CDF): excavatable and used to limit settlement, lateral movement, undermining, washout and other hazards created by earthwork operations as shown on Drawings and when excavating around structures, utilities, sidewalks, pavements, and other facilities. Batch CDF at concrete plant.
 - 1. Portland cement: AASHTO M85.
 - 2. Fly ash: AASHTO M295. Class F
 - 3. Sand: MassDOT M4.02.02.
 - 4. Water: MassDOT M4.02.04.
 - 5. Air entraining admixture: MassDOT M4.02.05.
 - 6. Compressive strength: 28 day = 30-80 psi, 90 day = 100 psi.
 - 7. Slump: 10 - 12 inches.
- O. Riprap stone: sound, durable rock that will not disintegrate due to exposure to water or weather, angular in shape such as rough, unhewn quarry stone or fragments obtained by blasting, breaking or crushing natural rock. Do not use rounded boulders or cobbles; flat, platy stones; shale or slate rock with its largest length dimension 3 times greater than its shortest dimension.
- P. Riprap gradation: stone size corresponding to inch dimension indicated on Drawings. D_{50} stone size represents 50 percent of stone passing D_{50} dimension sieve screen. D_{20} stone size, 20 percent passing: 1/2 D_{50} dimension. Maximum size limit: D_{100} : twice the D_{50} stone size dimension.

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 GENERAL

- A. Refer to Section 4 of the LGCI Geotechnical Report for subgrade preparation, fill materials, reuse of onsite materials (utilize the Processing Option for this Project), groundwater control procedures, ground vibration monitoring, and temporary excavations for on-site work. If there are inconsistencies between the Geotechnical Report and this specification, the recommendations provided in the Geotechnical Report shall be followed and take precedence.
- B. Refer to the Northeast Geotechnical, Inc. Geotechnical Report for subgrade preparation, fill materials, compaction requirements, etc. for off-site work (i.e. Broad Street, Field Street Extension, and Pedestrian Walkway). If there are

inconsistencies between the Geotechnical Report and this specification, the recommendations provided in the Geotechnical Report shall be followed and take precedence.

3.02 EXAMINATION

A. Verification of Conditions

1. Check and verify governing dimensions and elevations before starting Work. Survey condition of adjoining properties with Engineer. Take digital video recording of any prior settlement or cracking of structures, pavements and other improvements. Provide list of damages, verified and signed by Contractor and Engineer.
2. Coordinate survey. Establish exact elevations at fixed points to act as benchmarks. Identify benchmarks and record existing elevations. Locate datum level used to establish benchmark elevations so it will not be affected by excavation operations.
3. Review geotechnical report and information for the Project. Review available logs of borings and test pits, records of explorations and other pertinent data for the Site. After obtaining Owner's permission, obtain additional subsurface explorations deemed necessary at no expense to the Owner.
4. Verify subsurface utilities have been marked prior to performing excavation or earthwork and provide sufficient notification to the local Dig Safe agency.

3.03 PROTECTION

- A. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost. Remove temporary protection before continuing Work.
- D. Prevent surface water and groundwater from entering excavations, ponding on prepared subgrades, and flooding Project Site and surrounding area.
- E. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Excavation will occur below water level. Complete Work in-the-dry to maintain undisturbed condition of bearing soil.
2. Reroute surface water runoff away from excavated area. Do not allow water to accumulate in excavations to ensure bottoms and sides of excavations remain firm and stable throughout construction operations. Do not use excavated trenches as temporary drainage ditches.
3. Install a dewatering system to keep subgrades dry and convey groundwater away from excavations. Maintain until dewatering is no longer required.
4. Recharge water from excavations on-Site avoiding injury to public health, public and private property, existing Work, Work to be completed or in progress, roads, walks and streets, or causing any interference with the public.
5. Do not place concrete or fill in excavations containing free water.

3.04 GENERAL EXCAVATION

- A. Ensure sequence of excavation operations provides efficient use of excavated materials into embankments and minimum use of borrow.
- B. Dispose of excavated materials including unsatisfactory soil materials, cobbles, boulders, and obstructions and replace with suitable backfill materials. Urban fill may be screened to remove unsatisfactory material, and used requirements of suitable backfill are met.
- C. Remove and legally dispose of pavements, curbing and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, and other materials encountered that are not classified as rock excavation or unauthorized excavation. Legally dispose of surplus materials resulting from excavation not needed for use on Project as determined by Engineer. Obtain necessary permits for legal disposal of surplus material.
- D. Unclassified excavation: excavating to subgrade elevations regardless of surface and subsurface conditions.
- E. Classified excavation: excavating to subgrade elevations. Material excavated: classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Engineer.
 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.

2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions.
 - a. 24 inches outside of concrete forms other than at footings
 - b. 12 inches outside of concrete forms at footings
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments
 - 1) 6 inches beneath bottom of concrete slabs-on-grade
 - 2) 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide
- F. Remove materials encountered to limits shown on Drawings, as specified or required.
- G. Do not perform excavation below normal grade to remove and replace unsuitable materials until approved by Engineer.
- H. Unauthorized excavation: removal of materials beyond indicated subgrade elevations or dimensions without specific direction.
 1. Refilling Unauthorized Excavation
 - a. Trenches: use 3/4-inch crushed stone or compacted structural fill and stabilization fabric as separator material as directed.
 - b. Backfill and compact unauthorized excavations as specified for authorized excavations, of same classification, unless otherwise directed.
 - c. Excavation below normal grade
 - 1) Notify Engineer to observe conditions when excavation has reached required subgrade elevations. Carry excavations deeper and replace excavated material with compacted structural fill or crushed stone if unsuitable materials are encountered at required subgrade elevations as directed.
 2. Excavation Above Normal Grade
 - a. Remove from Site and dispose of legally if unsuitable materials are encountered above normal grade. Do not use unsuitable materials as backfill on any portion of Project unless approved.

- b. Use approved suitable stockpiled material to replace unsuitable material to backfill trenches to dimensions for pipe and structure bedding and backfill as shown on Drawings. Use gravel borrow to complete trench backfills to elevation shown for pipe and structure backfill if suitable stockpile material is not sufficient to backfill trenches to required dimensions.

I. Site Clearing

- 1. Clear site in accordance with Section 024114.

J. Material Storage

- 1. Stockpile and maintain suitable surplus excavated materials for re-use as specified in Section 31 14 13.16.

3.05 EXCAVATION IN ASPHALT PAVEMENT AREAS

- A. Saw cut or mill to full depth through existing pavement for pipe or structure placement prior to excavation. Minimize disturbance of remaining pavement.
- B. Use shoring and bracing where sides of excavation will not stand without undermining pavement.
- C. Remove and legally dispose of existing pavements during course of Work. Avoid mixing existing pavement material with excavation material intended for backfill.

3.06 EXCAVATION FOR TRENCHES

- A. Excavate to widths shown on Drawings.
- B. Produce an evenly graded flat trench bottom at subgrade elevation required for installation of pipe and bedding material.
- C. Load excavated material directly into trucks unless otherwise approved.
- D. Place backfill material directly into trench or excavation. Do not stockpile material to be used as backfill in traffic areas.

3.07 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within tolerance of plus or minus 1 inch. Extend excavations sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and inspections.
 - 1. Excavate footings, foundations, and structures to final grade by hand just before concrete reinforcement placement. Do not disturb bottom of

excavation. Trim bottoms to required lines and grades to leave solid base to receive other Work.

2. Do not excavate to final subgrade level until geotextile and compacted structural fill or crushed stone layer can be placed immediately to avoid softening or deterioration of formation. Leave a minimum depth of 3 feet overlying the final subgrade level in place where geotextile and compacted structural fill or crushed stone layer are not immediately placed.
3. Do not allow trafficking on final subgrade or upper surface of crushed stone layer without prior placement of approved sacrificial haulage layer.

B. Approval of Subgrade

1. Notify Engineer when excavations have reached required subgrade. Remove last 6 inches just prior to inspection.
 2. Clear subgrade of soft, spongy or other material unsuitable for founding. Continue excavation and replace with compacted structural fill as directed if independent inspection and testing agency or geotechnical consultant determines presence of unsatisfactory soil.
 3. Finished subgrade tolerance: plus or minus 1 inch.
 4. Seal subgrade and protect from degradation.
 5. Re-compact exposed surfaces prior to placing compacted structural fill or constructing foundations in accordance with Article 3.11, with a minimum 4 passes with double-drum vibratory roller compactor following excavation to foundation bearing levels in natural soils, using Bomag BW 60S or equivalent. Engineer may waive re-compaction if integrity of subgrade soils is compromised. Do not proof-roll wet or saturated subgrades.
 6. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water or construction activities affecting final subgrade.
 7. Seal formations within 4 hours of inspection with specified geotextile and compacted structural or crushed stone fill.
 8. Install geotextiles in accordance with Section 31 05 19.13.
 9. Protect formations from loosening by traffic or resulting from high groundwater table.
- C. Provide monitoring of geotechnical instrumentation against predefined target performance values.**

3.08 PROCESSING OF ON-SITE URBAN FILL USED FOR BACKFILL

- A. Excavate urban fill where encountered in Work to designated depths and stockpile until processed.
- B. Pass on-Site cohesionless soils excavated from trench through mechanical screen to remove particles larger than 3 inches.
- C. Reuse only processed urban fill containing maximum of 5 percent by dry weight of roots, plants, sod, clay lumps or other organic or cohesive soils.

3.09 ROCK EXCAVATION

- A. Notify Engineer immediately of change in classification. Expose bedrock surface to allow Engineer to perform an elevation survey and take cross-sectional measurements if bedrock is encountered above trench bottom grade or above subgrade elevation.
- B. Perform rock excavation by mechanical methods only. Do not blast.
- C. Remove or partially remove boulders exposed on sides or bottom of excavations as directed. Remove boulders to:
 1. minimum 2 feet outside structure walls;
 2. minimum 12 inches outside footings;
 3. minimum 6 inches below under-slab subgrade;
 4. minimum lateral trench width line limits indicated; and
 5. minimum 12 inches below underside of pipes.
- D. Refill depressions resulting from removal of boulders and rock with approved compacted bedding.
- E. Refill unauthorized rock excavations, or excavations made beyond or below indicated or directed excavation limits, with compacted bedding.
- F. Remove and legally dispose of unused rock and boulders off-Site.
- G. Remove and legally dispose of residual solids to limits shown on Drawings, as specified, or needed to complete Project in accordance with Laws and Regulations.

3.10 SHORING AND BRACING

- A. Provide in accordance with Section 31 50 00.

3.11 BACKFILL AND FILL

- A. General
 - 1. Suspend operations when weather conditions are unsatisfactory for placing backfill and avoid disturbing placed material and approved excavations.
 - 2. Remove and replace excavation or material previously placed that have softened or eroded, soft and yielding material, or other unsuitable or damaged areas with compacted backfill as specified.
 - 3. Do not backfill excavations and trenches until new utilities and structures have been inspected and tested satisfactorily for conformance with Drawings and Specifications unless directed. Place soil material in layers to required elevations as shown on Drawings or specified. Fill, backfill, and compact in accordance with this Section to produce minimum subsequent settlement of material. Provide support for surface treatment or structure to be placed on material. Place material in approximately horizontal layers beginning at lowest area, maintaining drainage. Replace frozen or saturated fill in stockpiles with suitable off-Site fill.
- B. Provide compacted structural fill or backfill for structure, placed beneath the structures' foundations and slabs-on-grade where unsuitable soil has been over excavated below design subgrades, and against below grade walls.
- C. Do not reuse excess excavated on-Site soils as compacted structural fill below foundations.
- D. Ground Surface Preparation
 - 1. Remove asphalt and concrete pavements, granular base course, existing sandy and gravelly fills, existing organic silty clay soils, organic peat, vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface to excavation subgrade prior to placement of fills.
 - 2. When existing ground surface has a density less than specified for a particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.
- E. Placement
 - 1. Place backfill and fill materials in layers of maximum 6 inches in loose depth for material compacted by heavy compaction equipment or hand-operated tampers. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Place backfill and fill materials evenly, adjacent to structures, to required elevations. Prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift.
3. Do not allow heavy machinery within 5 feet of structure during backfilling and compacting.

F. Backfilling Excavations

1. Backfill excavations promptly as Work permits and after completion of the following.
 - a. Inspection and recording locations of underground utilities and structures
 - b. Removal of concrete formwork
 - c. Removal of shoring and bracing, and backfilling of voids with satisfactory materials
 - d. Removal of trash and debris
2. Backfill under existing utility pipes crossed by new utility pipes with CDF. Extend CDF continuously from bedding of new pipe to utility pipe crossed, including a 6-inch thick envelope around existing utility pipes.
3. Backfill with CDF when clearance between proposed structure and existing structure is 18 inches or less and sufficient clearance is not provided to obtain suitable compaction.
4. Backfill with CDF for trenches within impervious surfaces with pipes containing less than 3 feet of cover.
5. Provide that 3/4 inch crushed stone backfill stands at its own angle of repose. Do not haunch or form with common fill.

G. Backfilling Trenches

1. Place pipe and structure bedding, and gravel bedding to extent and dimensions shown on Drawings so pipes and structures have complete and uniform bearing.
2. Grade, compact, and shape pipe and structure bedding so full length of pipe barrel has complete and uniform bearing. Dig bell holes and depressions for joints after bedding has been graded and compacted, at proper clearance for jointing pipes.

3. Carefully hand place and compact additional approved bedding to limits shown on Drawings following inspection and approval of pipe installation by Engineer. Perform hand or mechanical tamping on sides of pipe.
4. Place 6 inches of suitable backfill (having stones maximum 3 inches in diameter) in trenches above pipe crown; 6 inches above crown of highest pipe around structures and up to underside of pavement. Spread in layers of maximum 6 inches in loose thickness and compact in accordance with Article 3.11, and compact each layer by minimum 4 passes using approved vibratory compactor. Avoid disturbance of Work and existing structures. Adjust moisture content of backfill for proper compaction.
5. Bed pipe in 3/4-inch crushed stone pipe and structure bedding as shown on Drawings. Remaining trench backfill: as shown on Drawings.
6. Restore surface of trenches in cross-country runs to pre-existing conditions as shown on Drawings, mounding trench 6 inches above existing grade or as directed.

H. Earthen Embankment Fill

1. Strip organic topsoil, trees, shrubs and roots of other vegetation along length and breadth of areas having fill material placed on top. Fill depressions left by grubbing and stripping with same type material and compact to a density at least equal to surrounding foundation material.
2. Replace unsuitable soil with compacted fill material identified by independent inspection and testing agency or Engineer.
3. Proof roll subgrades as directed prior to placement of fill. Excavate soft areas and replace with appropriate compacted fill.
4. Do not place embankment over porous, wet, frozen, or spongy subgrade or previous embankment surfaces. Excavate and remove unsuitable material prior to placing additional fill.
5. Dewater to maintain groundwater levels a minimum of 1 foot below bottom of excavations or subgrades. Place fill in-the-dry.
6. Bench existing slopes prior to placing horizontal fill layers on existing slopes greater than 6H:1V.
7. Place materials in continuous horizontal layers in loose lift thickness of maximum 8 inches.

8. Compact soil materials in accordance with ASTM D1557, with water content of plus or minus 2 percent moisture content. Remove and replace with drier fill if wet fill cannot be compacted as specified.
9. Uniformly water fill that is too dry for proper compaction with sufficient water to allow compaction to required density.
10. Compact impervious and semi pervious materials with more than 15 percent passing the #200 sieve, with a tamping sheep-foot roller or rubber-tired roller. Scarify surface before placement of next lift if compaction results in smooth surface on top of lift.
11. Remove and replace fill that is disturbed after compaction and re-compact to specified degree of compaction.
12. Place and compact soil material on embankment in a direction parallel to embankment top.

3.12 COMPACTION

- A. Use approved methods that produce required degree of compaction throughout entire depth of material placed without damage to new or existing facilities. Adjust moisture content of soil as required. Remove and replace material that is too wet to compact to required density. Compact each layer as Work progresses.
- B. Place compacted structural fill for support of footings and foundations and against below grade walls in loose lift thicknesses not exceeding 10 inches. Compact to minimum 95 percent maximum dry density in accordance with ASTM D1557.
- C. Place backfill in open areas with self-propelled vibratory rollers, and hand-guided equipment in confined areas. Loose lift thickness: maximum 6 inches.
- D. Perform a minimum 4 systematic passes to compact each lift with specified compaction equipment.
- E. Place backfill and fill soil materials evenly on sides of structures to required elevations, and uniformly along full length of each structure.

Compaction Method	Maximum Stone Size	Maximum Loose Lift Thickness		Minimum Number of Passes	
		Below Pavement	Less Critical Areas	Below Pavement	Less Critical Areas

Hand-operated vibratory plate or light roller in confined areas	4 inches	6 inches	8	4	4
Hand-operated vibratory drum rollers weighing at least 1,000 pounds in confined areas	6 inches	10 inches	12 inches	4	4
Light vibratory drum roller minimum weight at drum 5,000 pounds, minimum compaction force 10,000 pounds	8 inches	6 inches	18 inches	4	4
Medium vibratory drum roller min. weight at drum 10,000 pounds, minimum compaction force 20,000 pounds	8 inches	6 inches	24 inches	6	6

F. Degree of Compaction

Fill and Backfill Location	Minimum Density
Top 3 feet under pavement grade	95 percent of maximum
Below slabs and foundations	95 percent of maximum
Below top 3 feet under pavement grade	92 percent of maximum
Pipe Bedding	92 percent of maximum
Beside structure foundation walls	95 percent of maximum
Maximum density	ASTM D698, modified
Field density tests	ASTM D1556 (sand cone) or ASTM D6938 (nuclear methods)

- G. Disc harrow or dry fill material that is too wet for compaction to specified moisture content and to required density. Remove and replace with drier fill that cannot be dried within 48 hours of placement.

3.13 GRADING

- A. Uniformly grade areas, including adjacent transition areas. Smooth finished surface within specified tolerances. Compact with uniform levels or slopes between points where elevations are shown, or between points where elevations are shown and existing grades.

- B. Grade areas adjacent to structure lines to drain away from structures and prevent ponding.
- C. Finish surfaces: free from irregular surface changes and as follows.
 - 1. Finish lawn or other unpaved areas to receive topsoil to within a maximum 0.10 feet above or below required subgrade elevations.
 - 2. Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than plus or minus 1 inch above or below required subgrade elevation.

3.14 RIPRAP

- A. Place riprap to full depth of $1.5D_{50}$ in one operation without special handwork, measured perpendicular to face of slope to obtain uniform appearance true to line and grade. Place larger stones at bottom of slope. Place stones in close contact with interlocking of face stones and backing stones. Fill openings between stones with smaller stones. Embed, re-orient or discard loose stones or excessively large stones projecting above surface.

3.15 EROSION CONTROL

- A. Provide erosion control measures in accordance with Section 31 25 00.

3.16 PROTECTION

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- B. Scarify surface, re-shape, and compact to required density prior to further construction where completed compacted areas are disturbed by subsequent construction operations or adverse weather. Immediately repair any subsequent settling and provide maintenance for remainder of Work.
- C. Remove soft or unsuitable material and replace with suitable backfill material prior to paving on sub-grade. Bring low sections, holes, or depressions to required grade with approved material. Shape sub-grade to line, grade, and cross section, and thoroughly compact.
- D. Keep roads free of debris. Use watertight vehicles for hauling wet materials over roads and streets. Promptly clean materials dropped or spread by vehicles or when directed by Engineer.

3.17 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

- B. Owner may engage a qualified special inspector to perform the following special inspections in addition to the Contractor's independent testing.
1. Confirm specified fill and backfill are used.
 2. Confirm preparation of Site.
 3. Observe removal of existing unsuitable foundation materials from footing and slab areas and confirm character of material encountered at bearing levels.
 4. Confirm compliance of fill material and maximum lift thickness.
 5. Confirm compliance of in-place density of compacted fill with required frequency.
 6. Observe preparation of footing bearing surfaces.
 7. Confirm suitability of excavated soils for reuse as fill, including reuse of on-Site soils as common fill.
- C. Perform at least 1 test of each soil stratum at foundation subgrades to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on visual comparison of subgrade with tested subgrade when approved.
- D. Engage an independent testing agency to test compaction of soils in place in accordance with ASTM D1556, ASTM D2167, ASTM D2922, and ASTM D2937.
1. Tests
 - a. Paved and structure areas: at subgrade and each compacted fill and backfill layer, at least 1 test for every 2,000 square feet or less of paved area or concrete slab, with minimum 3 tests.
 - b. Foundation walls backfill: at each compacted backfill layer, at least 1 test for every 100 feet or less of wall length, with minimum 2 tests.
 - c. Trench backfill: at each compacted initial and final backfill layer, at least 1 test for every 150 feet less of trench length, with minimum 2 tests.
 2. Scarify and moisten or aerate, or remove and replace soil materials to depth required when testing agency reports subgrades, fills, or backfills have not achieved degree of compaction specified. Re-compact and re-test until specified compaction is obtained.

3. Determine actual in-place densities using field tests as directed.
4. Perform additional Work to obtain proper compaction if in-place densities do not meet specified densities. Retest if directed by Engineer.
5. Tests for Pipe Backfill
 - a. Suitable backfill: compact backfill in maximum loose lifts per table above. Conduct 1 field density test every 50 linear feet for each lift for utility lines.
 - b. Pavement sub-base: minimum 1 field density test of sub base for every 50 linear feet of paved area.

3.18 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 31 05 05

SELECTIVE DEMOLITION FOR EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Perform selective demolition for below-grade portions of buildings as indicated on the Drawings, including but not limited to the utilities, base slab, footings, foundation walls, grade beams, and any additional items associated with the building or contained within the building or inherent to the Work for completion of the Project.
 - 2. Excavating, cutting, filling, backfilling, compacting, grading, and other Work necessary for the completion of the Project
- B. Related Requirements
 - 1. Section 01 74 19 – Construction Waste Management and Disposal
 - 2. Section 02 11 10 Materials Handling and Waste Management
 - 3. Section 02 24 00 Off-Site Transportation and Disposal
 - 4. Section 02 61 05 Removal Disposal of Contaminated Soil Water
- C. Related Documents
 - 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American Association of State Highway and Transportation Officials (AASHTO)
 - 2. ASTM International (ASTM)

- a. ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
 - b. ASTM D1556 Density and Unit Weight of Soil in Place by the Sand-Cone Method
 - c. ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
 - d. ASTM D2974 Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils
 - e. ASTM D2922 Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)
 - f. ASTM D3017 Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
 - g. ASTM D4318 10e1 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
 - h. ASTM D 4832 -16 Standard Test Methods for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders
3. OSHA Title 29, Part 1926, Safety and Health Regulations for Construction
 4. State Department of Transportation Specifications
- B. Definitions
1. Excavation means the excavation, removal, stockpiling, and legal disposal of all materials encountered within the limits indicated or specified other than rock or ledge. Excavated materials shall include, but not be limited to earth materials such as peat, organic or inorganic silts, clay, sand, gravel, concrete, pavements, urban fill materials, cobble and boulders less than 1 cubic yard in volume, soft or disintegrated rock which, in the opinion of the Engineer, can be removed without blasting or drilling; pavement, brick and concrete masonry, and all debris and obstructions to be removed to complete the Project.
 2. Unsuitable materials are defined as topsoil, organic matter, peat, soft clay, organic and inorganic silts, frozen materials, debris, concrete, pavement, stones or boulders over 6 inches in diameter, or any combination thereof having unsuitable in-situ bearing properties and is unsuitable for use in backfill.
 3. On-Site material: suitable material from on-Site excavation.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Samples: as specified in Article 1.06.
- C. Submit name and qualifications of the materials testing laboratory that will conduct field density testing and laboratory soils testing of backfill materials at least 30 days prior to the start of construction.
- D. Certified laboratory data on soils (backfill materials) chemical composition (refer to Section 02 11 10), particle size and gradation for backfill materials proposed.
- E. Name of each supplier and specific type and source of each material.
- F. Supplier's mix design, and any admixture product data, installation instructions and recommendations for use of Controlled Density Fill
- G. Closeout Submittals: per Division 01 General Requirements.
 - 1. Submit a CAD drawing file showing concealed subsurface structures and utilities remaining.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Submit one 50-pound sample for each type of fill material for every 200 cubic yards of material proposed for backfill in air-tight containers for independent testing and analysis prior to delivery to the Site.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.
 - 1. The buildings may contain items of historical significance.
 - 2. The existing irrigation system may be encountered on Site.

3. The Owner assumes no responsibility for actual condition of structures to be demolished. Owner will attempt to maintain conditions existing at time of inspection. However, variations within structure may occur prior to start of demolition Work.

PART 2 – PRODUCTS

- A. Use imported (borrow) crushed stone or gravel as structural fill for earthwork and subgrade preparation within the limit of Work.
- B. Imported crushed stone and gravel fill: Specifications for Granular Fill and gradation and compaction requirements specified below.
- C. Structural fill shall meet Grading “C” and the requirements for plasticity abrasion resistance, and soundness. Gradation “C” is as follows

U.S. Standard Sieve Size	Percent Passing by Weight
1/4-inch	25-60
3/4-inch	45-80
1-1/2 inches	100
#10	15-45
#40	5-25
#100	0-10
#200	0-5

- D. Sample, analyze, and demonstrate fill materials and compacted soils meet gradation and compaction requirements specified.

PART 3 – EXECUTION

3.01 GENERAL

- A. Protect existing trees indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials. Provide temporary guards to protect trees to remain.
- B. Obtain required permits for demolition.
 1. Contact DIGSAFE (www.digsafe.com) by dialing 811 specifying excavation as well as demolition, and obtain authorizations as required.

3.02 EXCAVATION AND BACKFILL

- A. Perform selective demolition Work in a systematic manner. Use such methods as required to complete Work as specified in the Deconstruction and Demolition Plan and applicable Regulations. Demolish portions of irrigation system encountered.
- B. Exercise care to preserve material below and beyond the lines of excavation. Where excavation is carried out below indicated grade or beyond the lines of excavation through error, backfill to indicated grade and compact with structural fill at no additional cost to the Owner.
- C. Have condition of the bottom of the excavation observed by the Engineer prior to placement of overlying materials when excavations have reached prescribed depths.
- D. Erect suitable safety fences around unfilled pits, tunnels, basements and excavated areas within the limits of Work.
- E. Saw-cut asphalt and concrete paved surfaces before removal. Joint cut should be neat and straight.
- F. Upon completion of demolition of below-grade portions of buildings, notify the Owner and Engineer. Filling and backfilling operations shall not commence until a complete record of the plan and vertical limits of demolition has been documented and submitted to Owner.
- G. Stop Work and immediately report conditions to Owner in the event unanticipated hazardous materials are discovered or suspected. Comply with requirements of General Conditions.
- H. Perform Work “in-the-dry.” Use measures to prevent surface water and subsurface or groundwater from flowing into excavations. Perform dewatering in accordance with Division 01 and Division 02.
 1. Perform grading to prevent surface water from flowing into excavations, damaging other structures, or adjacent properties.
 2. Do not allow water to accumulate in excavations or underground void spaces or structures. Provide and maintain pumps and dewatering system components necessary to pump out water from pits, tunnels, underground voids, and convey surface water away from such areas.
 3. Remove accumulated water by pumping or other approved methods.
 4. Visually inspect water disposed of by pumping and dewatering operations, characterize if necessary, treat if necessary, discharge and/or legally disposed of off-Site in accordance with applicable Regulations and permits.

3.03 BACKFILL

- A. Completely fill below grade areas and voids resulting from demolition Work.
- B. Begin backfilling with suitable material immediately after the subsurface has been accepted. Compact each layer of fill to the specified density the same day it is placed.
- C. Moisture condition fill materials to within approximately 3 percent of optimum moisture content, place in a manner to prevent voids, and compact to at least 95 percent relative to ASTM D1557 (modified proctor). Where compaction with large ride-on equipment is used, place fill material in horizontal layers with lifts no thicker than 10 inches (in loose thickness). Where hand compaction equipment is used, place fill material with lifts no thicker than 6 inches in loose thickness. Provided frequent mixing for moisture conditioning (drying) in thin lifts except during wet or cold weather conditions.
- D. Protect fill materials from rain. Replace fill that becomes frozen or saturated in stockpiles with suitable off-Site fill at no additional cost to Owner. Do not place fill over material that is frozen. Remove frozen soil prior to placement of compacted fill.
- E. Composition of mixed fill materials (and associated maximum dry densities) will vary. Measure compaction using conventional methods such as a moisture-density gauge where possible. Ensure fill lifts pass a proof roll observed by Engineer using a loaded dump truck or equipment of similar size and weight as approved by Engineer.
- F. Batch Controlled Density Fill at a ready mix plant and use at a high or very high slump of approximately 10- to 12-inches.
- G. Use Controlled Density Fill where backfill with aggregate structural fill materials cannot be placed or compacted.
- H. Reopen any excavation improperly backfilled, or where settlement occurs, to the depth required, then refill with new materials and compact, and restore the surface to the required grade and condition at no additional cost to the Owner.
- I. When Work is interrupted by heavy rains, do not resume fill operations until accumulated water is pumped out and moisture content and density of previously placed fill are as specified. Protect fill area by grading to drain and providing a smooth surface that will readily shed water. Grade the surface of the areas in such a manner as to prevent ponding of surface runoff water in areas to receive compacted fill.

- J. Remove and replace material that becomes unsuitable due to lack of dewatering or improper dewatering with suitable material as directed and approved at no additional cost to the Owner.
- K. Maintain final surfaces in good condition, with a smooth even surface after backfilling and compaction. Immediately repair subsequent settling at no additional cost to the Owner.

3.04 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Arrange for in-place field density tests to be conducted by a qualified geotechnical testing laboratory and approved by the Owner.
 - 1. Conduct in accordance with ASTM D1556, D2922, or D2167 as the work progresses, to determine the degree of compaction being attained.
 - 2. Perform corrective work based on test results, such as additional compaction, or a decrease in the thickness of layers, at no additional cost to Owner.
 - 3. Frequency of Testing
 - a. For general open fill areas, perform at least 3 in-place density tests per lift of fill per 10,000 square feet of fill area.
 - b. In small excavation/backfill areas, perform at least 1 in-place density test per lift for each 100 linear feet of trench or one per 200 square foot. area.
- C. On-site observations and independent testing may be conducted by Engineer and Owner. Cooperate with Engineer and Owner and assist and support in taking samples of fill materials and conducting in-situ compaction tests.

3.05 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove debris, rubbish, and other materials resulting from demolition operations from Project Site and legally dispose of in accordance with 01 74 19.

3.06 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 31 05 19.13

GEOTEXTILES FOR EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide and install permanent geotextile fabrics in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Documents
 - 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. ASTM International (ASTM)
 - a. ASTM D4354 Standard Practice for Sampling of Geosynthetics and Rolled Erosion Control Products(RECPs) for Testing
 - b. ASTM D4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc-Type Apparatus
 - c. ASTM D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity
 - d. ASTM D4533 Standard Test Method for Trapezoid Tearing Strength of Geotextiles
 - e. ASTM D4595 Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
 - f. ASTM D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

- g. ASTM D4751 Standard Test Methods for Determining Apparent Opening Size of a Geotextile
- h. ASTM D4759 Standard Practice for Determining the Specification Conformance of Geosynthetics
- i. ASTM D4873 Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
- j. ASTM D4884 Standard Test Method for Strength of Sewn or Bonded Seams of Geotextiles
- k. ASTM D5321 Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear
- l. ASTM D6241 Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data: manufacturer's product specifications.
- C. Samples and Mockups: as specified in Article 1.06.
- D. Manufacturer's instructions for storage, handling, and installation of geotextiles
- E. Source and Field Quality Control Submittals: manufacturing quality control certificates for representative rolls for each lot of material delivered.
- F. Qualification statements of manufacturer
- G. Closeout and maintenance material submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Qualifications: per Division 01 General Requirements and as follows.

1. Geotextile manufacturer: well-established firm with minimum 2 years' experience in manufacture of geotextile fabrics.
- C. Samples
 1. Swatch of each geotextile fabrics

1.07 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Deliver and store geotextile materials in protective wrapping to protect materials from ultraviolet (UV) radiation, and other mediums that may reduce physical properties of the material.
- C. Labeling, packaging, and handling: per ASTM D4873.
- D. Submit manufacturing quality control certificates for representative rolls for each lot of material delivered to the Site, signed, and certified by responsible parties employed by manufacturer. Materials delivered without testing certification shall be rejected by the Engineer.
- E. Store geotextiles off ground and out of direct sunlight. Protect from mud, dirt, dust, and moisture. Use unbroken opaque packaging or provide protective cover to prevent exposure of the geotextile to sunlight during storage. Comply with additional storage procedures recommended by the manufacturer at no additional cost to Owner.
- F. Store rolls on a surface that does not cause distortion of roll or wraps or impedes installation.
- G. Do not stack rolls higher than recommended by the manufacturer.
- H. Load, unload, and move rolls with appropriate equipment as recommended by manufacturer.
 1. Move rolls using structural steel insert (pipe) placed within core tube of roll. Attach lifting slings or chains to pipe only to support the roll. Prevent damage by slings and chains through use of a spreader bar. If a forklift is used to move rolls, use a single tooth pipe capable of supporting the roll in cantilever and place through roll core tube. Do not lift rolls by sliding the forks under the roll.
- I. Provide a sufficient quantity of geotextile material on Site prior to start of Work to allow efficient and continuous Work without stoppage resulting from lack of materials.

1.08 SITE CONDITIONS

- A. Existing conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 GEOTEXTILES

- A. Use woven geotextile stabilization fabric as shown on Drawings and directed by the Engineer or Owner in accordance with this Specification.
- B. Furnish stock materials with Minimum Average Roll Values (MARV) that meet or exceed the criteria specified in below. Strength properties specified are for the weaker principle direction.

2.02 SEWING THREAD FOR SEAMING

- A. Type: polyester with chemical and UV light resistance properties, equal to or greater than the fabric itself. Color: contrasting to color of fabric.

2.03 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Provide for sampling and testing of geotextile by manufacturer as specified in the table in Article 2.01 above at a minimum of once every 100,000 square feet of production to demonstrate that material conforms to requirements the table.
- C. Obtain quality control certificate that includes roll number identification, sampling procedures used, and results of quality control testing, including descriptions of test methods used per quality control tests specified in the table in Article 2.01 above.
- D. Require manufacturer to perform additional testing at no additional cost to Owner if geotextile sample fails to meet this Specification including the following.
 1. Sample and test each roll manufactured in same lot or at the same time as the failing roll.
 2. Continue sampling and testing of rolls until a pattern of acceptable tests results is established.
 3. Additional testing of individual rolls may be performed by manufacturer to more closely identify the non-complying rolls and to qualify individual rolls.
- E. Obtain manufacturer notarized certificates indicating the material meets this Specification.

- F. Require geotextile fabric be supplied in rolls and labeled at a minimum according to ASTM D4873 with the following information.
1. Manufacturer's Name
 2. Product Identification (style number)
 3. Roll Number
 4. Roll Weight
 5. Roll Dimensions
 6. Geotextile Type

PART 3 – EXECUTION

3.01 PREPARATION

- A. Prior to installation, Samples of geotextiles will be taken by the Engineer and sent to a laboratory for testing to ensure conformance with this Specification in accordance with ASTM D4354, Procedure A. Cost testing: by Contractor.
1. Sample size: 3 feet by full roll width exclusive of the first 3 feet of the rolls, which will be discarded. Immediately rewrap sampled rolls and return to storage.
 2. One sample will be collected for every 100,000 square feet of material. At a minimum, each lot of material defined as a group of consecutively numbered rolls manufactured from the same production line, will have 1 sample collected and tested for conformance.
- B. At a minimum, the following conformance tests will be performed on each sample of geotextile.
1. Grab strength: ASTM D4632.
 2. Trapezoidal tear strength: ASTM D4533.
 3. CBR puncture: ASTM D6241.
- C. If Sample testing fails, Engineer will implement procedures outlined in ASTM D4759 which describes a method of resampling to define extent of nonconforming material.

3.02 INSTALLATION

- A. Install where shown on Drawings in accordance with manufacturer's instructions.

- B. Provide smooth graded surface, free of large stones, tree roots and limbs, or other debris prior to placement of geotextiles. Notify Engineer when areas are ready for placement of geotextile.
- C. Deployment and Covering
 - 1. Unroll fabric in area to be used, in down-slope direction.
 - 2. Minimize wrinkles and folds in the geotextile. Straighten to smooth out creases or irregularities in the sections. Place geotextile in close contact with adjacent materials. Overlap adjacent fabric sides and ends minimum of 12 inches. Do not allow gaps and tears. Place overlaps so uphill panel is shingled over the downhill panel. Replace damaged geotextile.
 - 3. Begin placement at base of slope and proceed up-slope for overlying stone. Work in direction of fabric overlap for overlying stone placement on flat areas. Ensure fabric overlap remains intact. Install in a relaxed condition and free of tension or stress upon completion. Do not stretch geotextile to fit.
- D. Protection
 - 1. Secure geotextile from wind damage during and after construction.
 - 2. Do not allow construction equipment to travel directly over any in-place geotextiles. Maintain 1-foot minimum cover above fabrics for low ground pressure tracked vehicles (contact pressure 8-psi or less) and 3-foot minimum cover for wheeled vehicles or heavy tracked vehicles (contact pressure above 8-psi).
 - 3. Do not allow more than 14 days to elapse between the day when reinforcing geotextile is unrolled and when a subsequent layer is placed to cover it. do not allow more than 30 days to elapse between the day when the cushioning geotextile is unrolled and when a subsequent layer is placed to cover it. Replace material exposed to sunlight or weather for longer duration.
- E. Patching
 - 1. Patch rips and tears with a minimum 3-foot overlap in each direction from perimeter of damaged area. Heat bond repair patch to underlying geotextile.
 - 2. For damaged areas greater than half the width of fabric roll, cut out entire roll-width of damaged area and place a new section laced over the area with minimum 3-foot overlap at each end. Place up-slope end of patch under existing up-slop fabric and place down-slope end of patch over down-slope fabric.

3.03 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.04 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 31 14 13.16

SOIL STOCKPILING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide labor, equipment and materials associated with soil stockpiling in accordance with this Section.
- B. Related Requirements
 - 1. Section 01 57 13 – Temporary Erosion and Sediment Control
 - 2. Section 31 00 00 – Earthwork
 - 3. Section 31 50 00 – Excavation Support and Protection\
- C. Related Documents
 - 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.04 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.05 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.07 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Provide minimum 6 mil fire retardant polyethylene sheeting.

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 SOIL STOCKPILING

- A. Locate soil stockpiles in area approved by Engineer and/or Owner. Transport soils from generation area to on site stockpile areas along designated transport roadways approved by Engineer, preventing soil spillage, mud and soil tracking, and release of other materials to transport roadway throughout construction.
- B. Arrange location, clearing, removal and salvage of overburden soils, and other Site preparation for temporary stockpiles. Location: approved by Engineer.
- C. Cover soil stockpiles with minimum 6 mil polyethylene sheeting at all times, except during active loading or removal, if directed by Engineer. Keep stockpiles in neat and well drained condition.
- D. Identify stockpiles, including classification of soil or other excavated spoils. Maintain an updated inventory of all stockpiled material.
- E. Do not allow materials from individual stockpiles to intermingle.

3.02 SOIL REUSE

- A. Utilize on-Site soils for backfill before use of imported soil, as directed by Engineer.
- B. Transportation and legal disposal of surplus native soils is allowed.

3.03 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.04 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

3.05 PROTECTION

- A. Protect structures, utilities, facilities and pavements from damage caused by settlement, lateral movement, washout, and other hazards created by stockpiling of soil.

END OF SECTION

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROLS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide and install permanent devices to control erosion, siltation, and sedimentation in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Documents
 - 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. MassDEP – Massachusetts Erosion & Sedimentation Control Guidelines for Urban and Suburban Areas
 - 2. MassDOT Standard Specifications and Supplements and Construction Details
 - a. Section 767 – Mulching, Seed for Erosion Control
 - b. M6.04.2 Straw Mulch
 - 3. Order of Conditions

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data: for permanent erosion control matting.

- C. Manufacturer's Instructions
- D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Permanent Erosion Control Blanket
 - 1. Provide as shown on Drawings or as directed by Engineer in compliance with the Order of Conditions to prevent slope erosion. If sequence of operations is such that only portions of slopes have been completed, preserve those portions by seeding and installation of erosion control blanket when directed, prior to completion of remaining portions of slope.
 - 2. Provide soft pine wood wedges and stakes of biodegradable materials as recommended by manufacturer.
 - 3. Coir log: coconut fiber mats woven into a matrix in compliance with the following.

PROPERTY	Test Method	Parameter
Weight	ASTM D 3776	17.8 oz/SY (600 g/m ²)
Wide width tensile strength Wet		
Machine direction	ASTM D 4595	910 lbs/ft (13.3 kN/m)
Cross direction		870 lbs/foot (12.7 kN/m)
Wide width tensile strength Dry		
Machine direction	ASTM D 4595	1130 lbs/foot (16.5 kN/m)
Cross direction		1040 lbs/foot (15.2 kN/m)
Elongation at failure Wet		
Machine direction	ASTM D 4595	32 percent
Cross direction		26 percent
Open area	Calculated	58 percent
Thickness	ASTM D 177	0.35 inch (9 mm)

Recommended shear stress		4 lbs./sq. ft. (192 N/sq.m.)
Recommended flow		10 fps (3 m/s)
Recommend slope		2:1

- B. Straw mulch: MassDOT M6.04.2, long fibered straw, 100 percent certified weed free, free from foreign matter detrimental to plant life, and in dry condition.
- C. Tackifier: biodegradable and non-toxic bonding adhesive agent during hydraulic seeding or straw mulching to minimize wind and water effects.

PART 3 – EXECUTION

3.01 GENERAL

- A. Prevent erosion of soil and to prevent silting of drainage ditches, storm sewers, rivers, streams, and lakes.
- B. Limit duration of exposure of soils on embankments, excavations, and graded areas.
- C. Install erosion control measures in any ditch, swale or channel before runoff flows to waterways.

3.02 PREPARATION

- A. Protection
 - 1. Provide pollution prevention measures, erosion and sedimentation control, before, during and after soils are exposed. Implement and maintain erosion and sedimentation control measures as necessary until Site is permanently stabilized.
 - 2. Stabilize areas shown on Drawings with permanent erosion control practices immediately, and within 14 days after construction activity on a particular portion of Site has permanently ceased, except where construction activities will resume on the particular portion of Site within 21 days, and where snow cover precludes initiation of stabilization measures.
- B. Conform to grades and cross sections for slopes and ditches shown on Drawings.
- C. Finish to a smooth and even condition. Rake out and remove debris, roots, stones, and lumps.
- D. Loosen soil surface to permit bedding of matting.
- E. Apply seed prior to placement.
- F. Dewater trenches and swales to install materials in the dry.

3.03 INSTALLATION

- A. Install erosion control blanket and straw mulch in accordance with manufacturer's instructions, the following, and as shown on Drawings or directed by Engineer. Submit manufacturer's instructions to Engineer prior to installation. Place immediately following seeding.
- B. Install erosion control blanket onto slopes that have been graded, seeded, completed to required line and where grades are steeper than or equal to 3:1 as shown on Drawings and directed by Engineer.
- C. Place strips lengthwise in direction of flow of water.
- D. Overlap ends at least 6 inches in a shingle fashion.
- E. Turn down up-slope end of each strip of matting and bury to a depth of not less than 6 inches with soil firmly tamped against it.
- F. Engineer may require that any edge exposed to more than normal flow of water be buried in a similar manner.
- G. Build check slots at right angles to direction of flow of water. Space so one check slot or one end occurs within each 50 feet of slope length. Construct by placing a tight fold of matting at least 6 inches vertically into ground, and tamp same as up-slope ends.
- H. When directed by Engineer, spread additional seed over matting, particularly at locations disturbed by building the slots. Press matting onto ground with a light lawn roller or similar means.
- I. Use pine wedges to fasten coir to ground. Metal staples are not allowed. Pound vertically flush to surrounding surface, not protruding above finished grade. Place pine wedges in same locations as recommended by manufacturer for staples.
- J. On grades 4:1 or steeper, place pine wedges in same 3 rows, but spaced 2 feet apart.
- K. On overlapping or butting edges, double pine wedges, with spacing halved. Secure ends of matting and required check slots spaced every foot.
- L. Apply weed free straw mulch in combination with erosion control blanket on side slopes steeper than 3:1.
- M. Place mulch according to MassDOT Section 767. Do not use short fibered material or material so wet or decayed that it cannot be properly spread. Apply tackifier as needed.
- N. Maintain areas mulched or matted, until Project acceptance.

- O. Maintain swales by removing silt that reaches a depth of over one foot, until Project acceptance.

3.04 REPAIR/RESTORATION

- A. Repair matting immediately if any pine anchors become loosened or raised, or if any matting becomes loose, torn, or undermined.

3.05 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Site/Field Tests and Inspections
 - 1. Inspections of disturbed soil areas, material storage areas exposed to precipitation and erosion control measures will be conducted by both Contractor and Engineer a minimum of once every 14 days and also within 24 hours after any storm event greater than 0.5 inches of rainfall. Immediately correct deficiencies identified.
 - 2. Inspect erosion control blanket immediately after each rainfall and at least daily during prolonged rainfall or snowmelt for damage. Make appropriate repairs or replacement until acceptance by Engineer.

3.06 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 31 50 00

EXCAVATION SUPPORT AND PROTECTION

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide excavation support and protection in accordance with this Section and applicable reference standards listed in Article 1.03, including shoring and bracing necessary to protect existing buildings, sidewalks and streets, utilities, all existing improvements, and excavation against movement due to caving, to meet OSHA safety requirements of shoring and bracing, and to cofferdams.
 - a. Installation of shoring and bracing
 - b. Maintenance of shoring and bracing
 - c. Removal of shoring and bracing, as required
 - 2. Shoring and bracing systems include permanent and temporary measures.
- B. Related Requirements
 - 1. Section 31 00 00 – Earthwork
- C. Related Documents
 - 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American Institute of Steel Construction (AISC)
 - a. Steel Construction Manual
 - 2. ASTM International (ASTM)
 - a. ASTM A36 Standard Specification for Carbon Structural Steel

- b. ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength
 - c. ASTM A328 Standard Specification for Steel Sheet Piling
 - d. ASTM A572 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
 - e. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - f. ASTM A690 Standard Specification for High-Strength Low-Alloy Nickel, Copper, Phosphorus Steel H-Piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments
 - g. ASTM A992 Standard Specification for Structural Steel Shapes
- 3. American Welding Society (AWS)
 - a. D1.1 - Structural Welding Code, Steel

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.
- B. Pre-installation Conference
 - 1. Review geotechnical report, existing utilities and subsurface conditions.
 - 2. Review coordination for interruption, shutoff, capping, and continuation of utility services.
 - 3. Review instrumentation and monitoring program, and dewatering program. Confirm coordination with instrumentation and monitoring, and dewatering activities.
 - 4. Review proposed excavations and equipment, monitoring of excavation support and protection system and abandonment or removal of excavation support and protection system.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
 - 1. Do not begin excavation requiring support until submittals are approved.
- B. Product Data
 - 1. Construction details, material descriptions, performance properties, dimensions of individual components and profiles, and calculations for excavation support and protection system for each type of product

C. Shop Drawings

1. Plans, elevations, sections, and details for excavation support and protection system, by professional engineer licensed in the state where Project is located
 2. Arrangement, locations, and details of soldier piles, sheet piling, lagging, tiebacks, bracing, and other components of excavation support and protection system by professional engineer licensed in the state where Project is located
 3. Written plan for excavation support and protection, including sequence of construction of support and protection coordinated with progress of excavation
- D. Calculations and analysis data for excavation support and protection system by professional engineer licensed in the state where Project is located
- E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.
1. Identify locations and depths of capped utilities, abandoned-in-place support and protection systems, and other subsurface structural, electrical, or mechanical conditions on record documents.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Qualifications: per Division 01 General Requirements for Installer and professional engineer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.
- B. Review geotechnical report and determine need to perform additional test borings and conduct other exploratory operations necessary for excavation support and protection.
- C. Verify dimensions and elevations before starting Work. Survey condition of adjoining properties with Engineer. Take photographs, recording any prior settlement or cracking of structures, pavements, and other improvements. Prepare

list of existing damages, verified by dated photographs, signed by Contractor, Engineer and others conducting the investigation.

- D. Survey adjacent structures and improvements, establishing exact elevations at fixed points to act as benchmarks. Identify benchmarks and record existing elevations. Locate datum level where it will not be affected by excavation operations.
- E. Interruption of Existing Utilities
 - 1. Do not interrupt any utility serving facilities without Owner's written permission. Provide temporary utility if required.
 - 2. Provide minimum 5 days' advance notice of proposed interruption of utility.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Provide shoring and bracing materials, in serviceable condition and adequate for intended purpose.
- B. Steel sheet piling and shapes: continuous interlocking type; section modulus, type of section specified, in accordance with ASTM A328, ASTM A572, and ASTM A690, with continuous interlocks.
- C. Provide movable box where shoring system is required, and where sheet piling is not specified.
- D. Bracing members: wood timbers or steel members in accordance with ASTM A36.
- E. Provide bolts in accordance with ASTM A307.
- F. Provide structural steel in accordance with ASTM A36, ASTM A690, and ASTM A992.
- G. Wood lagging: lumber, mixed hardwood, pressure-treated.
- H. Provide reinforcing bars in accordance with ASTM A 615, Grade 60, deformed.

2.02 DESIGN CRITERIA

- A. Provide services by professional engineer licensed in the state where Project is located, including preparation of Shop Drawings.
- B. Design excavation support system in accordance with earth pressures and other criteria indicated, for construction of permanent structures without excessive movement or settlement of adjacent buildings, roadways, structures, or utilities, as shown on Drawings and as specified. Include analysis by professional engineer licensed in the state where Project is located.

- C. Earth support design: coordinated dewatering design incorporating lowest anticipated excavation depths and full differential water head during dewatering.
- D. Consult official records of both surface and subsurface existing utilities and connections to verify existing conditions and limitations as they apply to this Work and its relation to other construction work. Proceed with caution in areas of utility facilities. Excavate by hand, or other methods acceptable to utility owner. Protect existing utilities to remain within and adjacent to Work area in accordance with requirements of authorities having jurisdiction.

2.03 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 GENERAL

- A. Anchor and brace system to resist earth and hydrostatic pressures, including surcharges from surface loads. Support excavation to prevent undermining or disturbance to foundations of existing structures and utilities, or of ongoing or previously completed Work. Shore, support, and protect utilities encountered.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or adjacent occupied or used facilities without approval. Provide alternate routes around closed or obstructed traffic ways if required.
- C. Maintain shoring and bracing while excavation is open.
- D. Check base stability.
- E. Prevent surface water from entering excavations.
- F. Support structures may need to be decontaminated if they are used in areas that are considered impacted and come in contact with these materials.

3.02 STEEL SHEET PILING

- A. Install 1-piece sheet piling lengths and interlock vertical edges to form a continuous barrier before starting excavation.
- B. Place piling using templates and guide frame unless otherwise specified by sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to 60 inches. Align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line, and not more than 1:120 out of vertical alignment.

- C. Cut off sheet piling to be left in place at least 5 feet below finish grade. Indicate location of sheet piling cut off and left in place on record documents.
- D. Remove steel sheet piling following completion of Work where shown on Drawings or directed by Engineer. Obtain approval for steel sheet piling to be left in place.

3.03 BRACING

- A. Locate bracing to clear columns, floor framing construction, and other permanent Work. Install new bracing before removing original brace if moved. Do not place bracing where it will be cast into permanent concrete Work unless approved by Engineer.
- B. Install internal bracing if required to prevent spreading or distortion of braced frames.
- C. Maintain bracing until structural elements are supported by other bracing, or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.04 REPAIR/RESTORATION

- A. Remove excavation support and protection systems in stages to avoid disturbing underlying soils and rock, or damaging structures, pavements, facilities, and utilities.
- B. Fill voids immediately with approved backfill compacted to density specified in accordance with Section 31 00 00.
- C. Repair or replace adjacent Work damaged or displaced by removing excavation support and protection systems.

3.05 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Promptly correct detected bulges, breakage, or other evidence of movement to ensure that excavation support and protection system remains stable.
- C. Promptly repair damages to adjacent facilities caused by installation or faulty performance of excavation support and protection systems.

3.06 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 32 05 23

CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide structural cement concrete and steel reinforcements in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. MassDOT Standard Specifications and Supplements, except for Compensation sections
 - 2. MassDOT Construction Details

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with the Division 01 General Requirements.
 - 1. Product Data
 - 2. Manufacturer Instructions
- B. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 CONCRETE

- A. Provide in accordance with MassDOT Standard Specifications and Supplements Section 901 and MassDOT Construction Details.
- B. Materials and composition of mix: per MassDOT Standard Specifications and Supplements Section M4.02.00 and meet the requirements of 5,000 psi (28 days), 3/4-inch, 610 Cement Concrete.
- C. Source Quality Control: in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Place structural cement concrete and steel reinforcement accordance with Section 901 of the MassDOT Standard Specifications where required for use in the construction of collars, plugs, thrust blocks, concrete steps, curbs, gutters, paved areas, bridging for trenches, conduit encasement, footings, foundation pads, walls, walkways and other miscellaneous items and as shown on the Drawings.

3.02 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Furnish and install tack prime coat, hot mix asphalt pavement base and surface courses, temporary trench paving, permanent trench paving, pavement reclamation, structure protection and adjustments, sidewalks, driveways, hot mix asphalt berm and curb, and miscellaneous patching in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Requirements
 - 1. Section 32 17 23 – Pavement Markings
- C. Related Documents
 - 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American Association of State Highway and Transportation Officials (AASHTO)
 - a. AASHTO M320 Standard Specifications for Performance-Graded Asphalt Binder
 - b. AASHTO T166 Standard Method of Test for Bulk Specific Gravity (Gmb) of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface-Dry Specimens
 - c. AASHTO T209 Standard Method of Test for Theoretical Maximum Specific Gravity (Gmm) and Density of Hot Mix Asphalt (HMA)

- d. AASHTO TP 68 Standard Method of Test for Density of In-Place Hot-Mix Asphalt (HMA) Pavement by Electronic Surface Contact Devices
- 2. MassDOT
 - a. Standard Specifications and Supplements, and Construction Standard Details

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Certificates: manufacturer's certificate verifying conformance.
- C. Mix design: for each grade of pavement used, at least 20 days prior to start of paving.
- D. Source and field quality control submittals
 - 1. Certified weigh slips for each truck load of bituminous material.
- E. Closeout and maintenance material submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Comply with road opening permits.
- C. Establish and control pavement (aggregate or asphalt base course and asphalt surface course) alignments, grades, elevations, and cross sections to match existing and prevent ponding.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 BITUMEN FOR TACK PRIME COAT

- A. Provide in accordance with MassDOT Section 460, M3.11.06.

2.02 HOT POURED RUBBERIZED ASPHALT SEALANT

- A. Provide in accordance with MassDOT Section 460.

2.03 HOT MIX ASPHALT TOP COURSE STANDARD TOP

- A. Provide in accordance with MassDOT Standard Specifications and Supplements Section 460, M3.11.03.

2.04 HOT MIX ASPHALT BINDER COURSE

- A. Provide in accordance with MassDOT Standard Specifications and Supplements Section 460, M3.11.03.

2.05 HOT MIX ASPHALT FOR MISCELLANEOUS WORK

- A. Provide in accordance with MassDOT Section 472.

2.06 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 GENERAL

- A. Minimize area of pavement removed to suitable width for installation of Work. Legally dispose of existing pavements.
- B. Place hot mix asphalt between April 1 and November 15, unless otherwise specified by Owner.
- C. Do not place hot mix asphalt mixture unless breakdown and intermediate rolling can be completed by time material has cooled to 175 degrees F, and provided density of completed pavement attains at least 92.5 percent of maximum theoretical density as determined by AASHTO T209.
- D. Do not place mix on wet or damp surfaces, or when ambient temperature is 40 degrees F and falling, unless otherwise specified by Owner.

- E. When air temperature falls below 50 degrees F, take extra precaution drying aggregates, controlling temperatures of materials, placing, and compacting mixtures.
- F. Use straightedge to check compacted surfaces and obtain Engineer's approval.
- G. Utilize approved dial type thermometer and infrared pistol thermometer for each paving machine. Retain thermometer upon completion of Project.
 - 1. Fahrenheit or Celsius selectable
 - 2. Portable and battery operated
 - 3. Repeatability: plus or minus 5 degrees F.
 - 4. LCD display: to nearest 1 degree.
 - 5. Accuracy: plus or minus 2 percent.
 - 6. Emissivity: present at 0.95.
 - 7. Temperature operation range: 0 degrees F to 750 degrees F.

3.02 INSTALLATION

- A. Place hot mix asphalt base and top courses on roadways, sidewalks and other areas to maintain traffic access and egress to properties abutting Work, and for safe passage of pedestrian and vehicular traffic in accordance with MassDOT Section 460 and Construction Standard Details.
 - 1. Provide minimum compacted thickness depth of hot mix asphalt base course indicated on Drawings or as directed by Engineer to achieve necessary base course grade in support of finish grade pavement elevations.
 - 2. Apply bitumen for prime and tack coat at a rate of 0.07 gallons per square yard over milled areas immediately prior to installation of top course, as shown on Drawings or directed by Engineer. Clean surface of sand and foreign matter, and dry before applying prime coat.
 - 3. Apply bitumen for prime and tack coat at a rate of 0.05 gallons per square yard over hot mix asphalt base course immediately prior to installation of top course, as shown on Drawings or directed by Engineer. Clean surface of sand and foreign matter, and dry before applying prime coat.
 - 4. Provide minimum compacted thickness depth of hot mix asphalt surface course indicated on Drawings or as directed by Engineer to achieve finish grades.

5. Apply hot poured rubberized asphalt sealant to longitudinal and transverse joints.
 6. Remove and replace defective mix not conforming to specified mix formula within stipulated tolerances on basis of testing. Samples of mixture in use will be taken as many times daily as necessary, and mixtures maintained uniform as specified. Owner may suspend further approval of plant mixtures in related Work if mixtures are not uniformly furnished as specified, until necessary changes have been made so mixtures conform to specified requirements.
 7. Irregularities which may develop before completion of rolling, and while material is still workable, may be remedied by loosening surface mixture and removing or adding material as necessary. If irregularities or surface defects remain after final compaction, defective Work will be corrected by minor surface projections, joints, and minor honeycombed surfaces ironed out smoothly to grade, and as directed.
 8. If any soft, imperfect places or spots develop on surface before final acceptance of Work, remove and replace with new materials and compact until edges of new Work seamlessly connect with old Work.
- B. Install hot poured rubberized asphalt sealer on roadway cracks less than or equal to 1-inch width. Clean and dry crack to minimum depth of twice the crack width with a high-pressure air blast prior to placing sealer. Apply sealer according to manufacturer's recommendations.
- C. Install hot mix asphalt by handwork on roadway surfaces in locations where irregularities, inaccessibility or other unavoidable obstacles prevent mechanical spreading and finishing.
- D. Maintain safe passage of vehicular and pedestrian traffic and access and egress.
- E. Set manhole covers and valve boxes flush with finish grade of top course.
- F. Do not permit vehicular traffic or loads on newly completed pavement until adequate stability has been attained and material has cooled sufficiently to prevent distortion or loss of fines. If climate or other conditions warrant, the time-period for opening to traffic may be extended, at discretion of Owner.

3.03 RECLAMATION OF ROADWAY WITH PAVING

- A. Locate and protect existing drainage and utility structures, underground pipes, culverts, conduits and other appurtenances prior to scarifying and pulverizing existing pavement. If upper sections of utilities are removed, immediately cover remaining part of structure with steel plate capable of withstanding 36.5-ton

truckload with impact. Protect, remove or replace existing utility structures and boxes as part of Work.

- B. Reclamation of paving includes scarifying and pulverizing in-place pavement and underlying material, mixing or blending material in depths specified on Drawings, followed by placing Type I-1 binder course in depths specified on Drawings and Type I-1 top course in depths specified on Drawings.
- C. Remove unsuitable material in sub-grade to lines and depths established by Owner and dispose of legally. Replace with gravel borrow in accordance with MassDOT M1.03.0, Type B.
- D. Placement: within limits of Work shown on Drawings.

3.04 TEMPORARY TRENCH PAVEMENT

- A. Comply with the construction method requirements of MassDOT Section 420, MassDOT Section 460 and the Drawings.
- B. Grade gravel base to the depths required for installation of temporary trench pavement and compact gravel base prior to installing pavement.
- C. Install temporary trench pavement over gravel base to the limits and thickness shown on the Drawings. Compact temporary trench pavement in accordance with MassDOT Section 460.
- D. Unless otherwise directed by Owner, temporary trench pavement shall remain in place for one winter season. Maintain temporary pavement and repair settlement or failures until permanent pavement is installed at no additional cost to the Owner.
- E. No more than 1,000 linear feet of unpaved trenches shall be permitted at any time. The Owner reserves the right to further limit the length of unpaved trenches with no additional compensation to the Contractor.
- F. Provide temporary trench paving for each trench excavated, excluding plated areas, at the end of each workday, unless otherwise approved by Owner. Bring any trench excavated and left unpaved at the end of each workday, excluding plated areas, to uniform grade with gravel borrow or gravel base course. Provide that unpaved trench is level and smooth with surrounding pavement to minimize traffic impacts. Unpaved trenches during holidays or over weekends are not be permitted.

3.01 PERMANENT TRENCH PAVEMENT

- A. Comply with the construction method requirements of MassDOT Section 420 and MassDOT Section 460.

- B. Remove temporary trench pavement to the depths and limits shown on the Drawings. Provide neat, straight cuts and square, vertical edges. Seal seams and joints with rubberized asphalt joint sealant.
- C. Clean sand, dirt, debris and other foreign materials from surfaces before applying tack coat. Apply bituminous tack coat to clean, dry vertical edges and existing paved surfaces to bond existing and new pavement.
- D. Provide necessary protection for roadway castings to prevent damage to castings and vehicles and ensure pedestrian safety.
- E. Install hot mix asphalt base and top courses to the limits and lift depths required on the Drawings. Compact each lift in accordance with MassDOT Section 460. Match existing grades and install permanent trench pavement to maintain or improve existing drainage patterns.

3.02 HOT MIX ASPHALT BERM

- A. Replace existing hot-mix asphalt berms damaged by the Work in kind. Provide foundation for hot-mix asphalt berms in accordance with the Drawings or as directed by Engineer, conforming to requirements for type of berm.
- B. Place mixture and compact with machine approved by Owner for type of berm required.

3.03 PAVEMENT MARKINGS

- A. Provide in accordance with Section 32 17 23.

3.04 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.05 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

3.01 MAINTENANCE

- A. Maintain trench width pavement during the 1 year Warranty Period. Refill areas that have settled or are unsatisfactory for traffic.

END OF SECTION

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 32 12 18

UTILITY PROTECTOR RINGS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Furnish and install utility protector rings of varying diameters at utility castings to prevent tire damage and/or vehicular ‘slaloming’ by providing a temporary ramping means for the purpose of transitioning vehicles over the manholes and gate boxes.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American Association of State Highway and Transportation Officials (AASHTO)

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Samples
 - 1. The Contractor shall provide one ring of each anticipated required diameter prior to the commencement of pavement restoration activities.
- C. Product Data
 - 1. Manufacturer’s data recommendations for storage, protection, handling, and installation of the protection rings.
- D. Certificates

1. Certificate of Compliance: Each shipment of protection rings shall be accompanied with the manufacturer's notarized certificate certifying conformations with the Specifications.
- E. Closeout and Maintenance Material Submittals per Division 01 General Requirements and as follows:

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Product labels shall clearly show the manufacturer or supplier name.
- C. Each shipping document shall include a notation certifying that the material is in accordance with the manufacturer's certificate.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 PROTECTOR RING

- A. The protector ring (also known as gate-box / manhole safety ramp) shall be equal to Part No. MSR10, MSR26, MSR 31, etc., as applicable, as supplied by American Highway Products Ltd; <http://www.ahp1.com/safetyramp1.php>, or approved equal.
- B. Protector rings shall be molded of flexible heavy-duty recycled rubber material and shall have the following characteristics:
 1. The rise from the bottom surface to the top shall be two-inches (2").
 2. The weight of the ring shall be 29 lbs. for 10" inner diameter (I.D.) rings, and 55 lbs. for 31" I.D. rings, and within this range for varying ring sizes.
 3. The outside diameter of the rings shall be 29" for 10" I.D. rings and 48" for 28" and 31" I.D. rings.
 4. Density: 0.6 oz. / c.i. ASTM C642
 5. Fabrication: Compression Molded Deposit
 6. Durometer Harness: 66A ASTM D2240
 7. Tensile Strength: 300 psi ASTM D412
 8. Elongation: 90% ASTM D412

9. Brittleness: -40 Deg. Fahrenheit ASTM D746
10. Coefficient of Thermal Expansion: ASTM C531

PART 3 – EXECUTION

3.01 INSTALLATION

- A. The protector rings shall be installed in areas where work is being performed that will expose the tops of utility castings.
- B. Deployment and installation of protector rings shall be performed immediately and on a continuous basis in harmonic unison with the progression of the work.
- C. The Contractor shall maintain the protector rings, and replace any rings deemed not meeting the needs and/or the intent of the field operations where directed by the Engineer at no additional cost to the Owner.
- D. Retrieval and removal of protector rings shall be performed immediately prior to the top course paving operations.

3.02 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.03 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 32 14 00

BRICK UNIT PAVERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide labor, materials, equipment, services and transportation to complete work.
 - 1. Impervious brick pavers on setting bed over Portland cement concrete base over gravel subbase in pedestrian condition.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: as Required by Project Engineer.

1.03 RELATED WORK UNDER OTHER SECTIONS

- A. Section 033000 – Site Cast-in-Place Concrete
- B. Section 310000 – Earthwork
- C. Section 321000 – Paving, Curbing, Signage and Marking
- D. Section 323000 – Site Furnishings
- E. Section 319115 – Planting Soils
- F. Section 260000 – Electrical

1.04 REFERENCES

- A. Comply with applicable requirements of:
 - 1. Commonwealth of Massachusetts, Standard Specifications for Highways and Bridges, Department of Public Works, latest edition, Boston, Massachusetts.
 - 2. ASTM: American Society of Testing Materials.
 - 3. AASHTO: American Association of State Highway and Transportation Officials.

1.05 ABBREVIATIONS

- A. BIA – Brick Institute of America

1.06 SUBMITTALS

- A. Submittals: in accordance with Section 01 33 00 – Submittal Procedures.
- B. Design Data: submit design mixes for:
 - 1. Setting bed
 - 2. Portland cement concrete base
 - 3. Impervious Paver joint materials
- C. Product Data: submit manufacturer's specifications and installation instructions for:
 - 1. Impervious Brick Pavers – Pedestrian Condition
 - 2. Preformed Joint Filler
 - 3. Joint Sealant
 - 4. Backer Rod
- D. Shop Drawings: submit:
 - 1. Layout and detailing of unit pavers indicating sizes, dimensions, layout, finishes, joint locations and types, and relationship to adjacent items. Prepare drawings based on field verified dimensions.
- E. Samples: submit:
 - 1. Impervious Brick Pavers – Pedestrian Condition: Provide five pavers minimum for each paver type and paver color. Paver samples shall be sufficient to show full range of color, edge finish and texture variation to be expected in finished work.
- F. Certificates: submit:
 - 1. Certificate(s) indicating compliance of materials with standards designated.
 - 2. Certificate confirming that manufacturer conducts a test sampling of 24 pavers for every 50,000 pavers manufacturer to determine the pavers are in compliance with the dimensional and water absorption characteristics. The 24 paver samples shall be representative of the color mix in the typical finished package and chosen on a consistent basis from one kiln car.
- G. Installation Instructions. Provide manufacturer's recommended instructions, including installation materials and methods for maintenance of each different type of paver installed.
- H. Maintenance Data. Provide recommended maintenance instructions including

materials and methods recommended for maintenance of each different type of paver installed.

- I. Maintenance Materials. Prior to final acceptance, furnish the Authority with two percent of each different type of color of paving material surface installed.

1.07 QUALITY CONTROL

- A. Design Criteria. Provide clean and durable brick work free of cracked, crumbling or discolored joints and loose bricks.
- B. Mock-ups: Build mock-ups as shown on Drawings
 1. Schedule mock-up construction so that mock-ups can be accepted minimum 30 days prior to application of paving surfaces represented by mock-ups.
 2. After receipt of Engineer's approval of shop drawings and material samples, construct mock-ups on site in location directed by Engineer. Construct mock-up in combination with other site materials mock-ups to provide comprehensive site mock-up.
 3. Mock-ups to establish quality of workmanship and exhibit full range of pre-approved color range selection, paver types, color consistency, size, finishes, paving patterns and detail bands, edge conditions, jointing and relationship to adjacent materials. Engineer shall inspect mock-up. Construct panels with features typical of construction. If original sample is not approved, provide additional panels at no cost to Owner until approved sample is achieved.
 4. Mock-ups shall not be constructed on a location becoming part of the final pavement and shall remain undisturbed until paving is complete. Protect accepted mock-ups from damage until completion and acceptance of the work represented by the mock-ups. Remove panel upon completion and acceptance of project site.
 5. Mock-ups: Provide mock-up of:
 - a. One eight-foot by eight-foot comprehensive mock-up panel of impervious brick in typical paving patterns.
 - b. Provide mock-ups simulating actual design and execution conditions for paving materials, mixing of paving materials, installation sequence, curing, use of temporary protective coating system, sealing procedures, and methods for correction of defective work.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials clearly marked with legible and intact labels, identifying brand names and contents of containers.
- B. Provide manufactured setting materials in containers having identification certifying compliance with referenced standards. Products shall be recommended by paver manufacturer for intended application.
- C. Damaged pavers will be rejected and replaced with new materials at no additional cost to Owner.
- D. Protect finished surfaces adjacent to paving work from soiling, staining, and other damage.

1.09 JOB CONDITIONS

- A. Environmental Conditions. Comply with BIA no. 1A.
- B. Protection
 - 1. Protect adjacent work, surfaces, and equipment from effects of paving installation procedures.

PART 2 - PRODUCTS

2.01 BRICK PAVERS

- A. Provide pavers complying with following requirements:
 - 1. Material. Provide pavers extruded from fire clay and shale and fired to produce units complying with following requirements:
 - a. Project is based on paver modules shown on Drawings and must comply with these modules. Contractor to confirm with brick paver manufacturer that brick are compatible to ensure that paving layouts and coursing between materials will align and result in continuity of pattern.
 - b. Brick Paver Types:
 - 1. Impervious Brick Pavers in Pedestrian Condition: Interstate Brick, 9780 South 5200 West, West Jordan, UT 84081, phone 800/233-8654 or approved equal.

- a. Color: Cast Iron
 - b. Size: Rectangles: Four by eight inches by 2-1/4 inches thick.
 - c. Wire-cut finish, die skim, or struck molded finish
 - d. Edges: Square
- c. Brick Pavers Physical Properties:
- 1. Impervious Brick Pavers – Pedestrian Condition:
 - a. Comply with ASTM C902, Class SX, Type 1
 - b. dimensional tolerance for length is 1/8" and for width and height shall be 1/16".
 - c. Minimum Compressive Strength: 10,000 psi
 - d. Minimum Modulus of Rupture: 1,000 psi
 - e. Maximum Cold Water Absorption: 8%. Absorption test results shall not be achieved through the use of sealers or other products applied to the paver.
 - f. Maximum Saturation Coefficient: .78
 - g. Maximum Abrasion Index: .10

2.02 SETTING BED FOR IMPERVIOUS BRICK PAVERS

A. Sand Asphalt Setting Bed

- 1. Asphalt: conform to ASTM Designation D-946-69A with a penetration at 77 degrees F. 100 gram, 5 seconds of minimum 85 millimeters and a maximum of 100 millimeters.
- 2. Fine aggregate: clean, hard, sand with durable particles and free from adherent coatings, lumps of clay, alkali salts, and organic matters. Aggregate: uniformly graded from "coarse" to "fine" and passing the No.4 sieve and meet with gradation requirements when tested in accordance with the standard method of test for sieve or screen analysis for fine and coarse aggregates ASTM Designation C-136-67.
- 3. Combine dried fine aggregates with hot asphalt cement and heat mix to approximately 300 degrees F at asphalt plant. Appropriate proportion of materials shall be seven percent cement asphalt and ninety-three percent aggregate by weight in approximate ratio of 145 pounds asphalt to 1,855 pounds sand. Determine exact proportions to produce best possible mixture for construction of bituminous setting bed to meet construction requirements.

2.03 PAVER JOINT MATERIALS FOR IMPERVIOUS BRICK PAVERS

- A. Clean, well-graded coarse concrete sand conforming to requirements of ASTM Specification C-33 with the following gradation. Sand from a single source.

Sieve	Percent Passing (by weight)
3/8"	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

2.04 MASTIC ADHESIVE FOR IMPERVIOUS BRICK PAVERS

- A. Mastic Adhesive for use as tack coat beneath pavers: consist of 2 percent neoprene (Grade WM1) modified asphalt with 10 percent fibers and eighty-eight percent asphalt. Melting point shall be 200 degrees F. minimum in accordance with ASTM D36. Penetration at 77 degrees F., 100 gram load for 5 seconds (.1mm) shall be 23 to 27.

2.10 JOINT FILLER FOR IMPERVIOUS BRICK PAVERS

- A. Flexible foam expansion joint filler in conformance to D 5249, Type 2, ASTM D 1752, Sections 5.1 through 5.4, with the compression requirement modified to 10 psi (7.03 g/mm²) minimum and 25 psi (17.58 g/mm²) maximum and as follows:
1. CERAMAR Flexible Foam Expansion Joint Filler, manufactured by W.R. Meadows, Inc., Elgin, IL. or approved equal.

2.11 BACKER ROD FOR IMPERVIOUS BRICK PAVERS

- A. Continuous round rod of 100% closed cell polyethylene foam, complying with requirements of ASTM C-272.

2.12 JOINT SEALANT FOR IMPERVIOUS BRICK PAVERS

- A. Low modulus, high performance, single component, self-leveling sealant, in conformance with ASTM C920, Standard Specification for Elastomeric Joint Sealants, and is classified as Type: S (Single Component), Grade: P (Pourable), Class: 100/50 (+100/- 50% joint movement); Uses T, M, A and O; and be one of the following:
 - 1. Spectrum 900 SL manufactured by Tremco Sealant/Weatherproofing Division of RPM International, Inc,
 - 2. Pecora 300SL Pavement Sealant manufactured by Pecora Corporation, 165 Wambold Road, Harleysville, PA 19438 • 1-800-523-6688
 - 3. Sikasil-728 SL manufactured by Sika Corporation 201 Polito Avenue, Lyndhurst, NJ 07071
- B. Where joint surfaces contain bituminous materials, provide modified sealant compatible with bituminous materials encountered.
- C. Color: to be selected by Owner's Representative.

2.13 EXPANSION DOWELS AND SLEEVES FOR IMPERVIOUS BRICK PAVERS

- A. Stainless steel bars, complying with ASTM A276, Type 304, with smooth end cuts. Provide bar in dimensions and size indicated on Drawings. Provide expansion caps with compatible waxed tube sleeve, which permit at least 1 inch movement.

2.14 PORTLAND CEMENT CONCRETE BASE COURSE FOR IMPERVIOUS BRICK PAVERS

- A. Portland cement concrete materials and products: as specified in Section 03 30 00 – Site Cast- in-Place Concrete.
- B. Portland Cement Paving Mix: Design mix to provide normal weight concrete complying with requirements of Section 03 30 00 - Cast-in-Place Concrete for 4,000 psi compressive strength at 28 days, 3/4 aggregate, 610 pounds per cubic yard cement content and 5% to 7% air- entrained with 2" to 4" maximum slump.
- C. Fibrous Reinforcing Material shall meet ASTM C1116 and as manufactured by Propex Concrete Systems, 6025 Lee Highway, Suite 425, Chattanooga, TN 37422, phone # 800.621.1273 or NyCon Incorporated, 101 Cross Street, Westerly, RI 02891-240, phone # 800 456 9266 or approved equal.

2.15 GRAVEL BASE FOR IMPERVIOUS BRICK PAVERS

- A. Gravel Base: as specified in Section 310000 – Earthwork.

2.16 WATER

- A. Water: Clean and potable, free from impurities detrimental to paving work.

2.17 PROTECTION COURSE

- A. Protection Course. Plywood, type as recommended by manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION

- A. General. Examine work-in-place, upon which work specified in this Section is dependent, for defects which may influence application or installation and performance of work specified in this Section. Do not start installation until unsatisfactory conditions have been corrected.
- B. Examine surfaces to receive pavers and verify following where applicable:
 1. That surfaces are dry, clean, and free of oily or wax films.
 2. That concrete surfaces to receive pavers have proper finishes.
 3. That grounds, anchors, and electrical and mechanical work in or behind pavers have been installed prior to installation of pavers.

3.02 PREPARATION

- A. Coordinate layout and installation of paving with layout and installation of adjacent paving, curbing, walls and other site improvements to ensure proper alignments.

3.03 PREPARATION OF GRAVEL BASE FOR IMPERVIOUS PAVERS

- A. Make corrections to base courses provided under Section 31 00 00 – Earthwork, to bring base courses to the proper sections and elevations for Impervious Unit Paver Installation.
- B. Compact subgrade to achieve a 95% minimum compaction rate consistent throughout subgrade.
- C. Place gravel base in 2" to 3" lifts and as specified in Section 31 00 00 –Earthwork.

- D. Compact to achieve a 95% minimum compaction rate consistent throughout gravel base.
- E. Final surface of gravel base to be left 1/8" higher than adjacent surfaces to allow for settlement.

**3.04 PREPARATION FOR IMPERVIOUS BRICK PAVER
INSTALLATION ON PORTLAND CEMENT CONCRETE BASE**

- A. Formwork; Set forms accurately to maintain specified tolerances. Remove loose material and clean forms immediately before concrete placement.
- B. Fiber Mesh Reinforcing: as specified in Section 03 30 00 – Site Cast-in-Place Concrete. Mix fibrous reinforcement in accordance with manufacturer's instructions including product data and technical brochures.
 - 1. Add fibrous reinforcement to concrete mix at the concrete batch facility.
 - 2. Adding and mixing fibrous reinforcement at the job site will not be allowed.
- C. Concrete: as specified in Section 03 30 00 - Cast-in-Place Concrete for mixing, placing and curing concrete. Use vibrators to consolidate concrete and to prevent honeycombs.
- D. After consolidating and screeding concrete, float and trowel to smooth hard surface and even plane. Check tolerances and make necessary adjustments.
- E. Install PVC weeps at low points and other locations shown on Drawings. Sweep concrete base clean. Fill Weeps with gravel. Install filter fabric over weep holes in concrete base.
- F. Expansion Joints: Provide expansion joints in accordance with BIA No. 14 and No. 18, unless otherwise indicated. Provide expansion joints using galvanized metal keyway sections where concrete placement is interrupted for more than 1/2 hour and at end of placement and in grid pattern not more than 30 feet on center at locations approved by Engineer. Provide shear dowels and expansion caps at not more than 16 inches on center to transfer vertical loads but permit horizontal movement. Extend joint filler full depth of joint and allow 1/2 inch minimum space at top for insertion of backer rod and sealant. Protect top edge of joint filler with metal cap or other temporary protection. Remove protection after concrete has been placed on both sides of joint.
- G. Caulked Construction Joints: Provide caulked construction joints wherever concrete abuts dissimilar material at locations approved by Architect/Engineer. Extend joint

filler full depth of joint and allow 1/2 inch minimum space at top for insertion of backer rod and sealant. Protect top edge of joint filler with metal cap or other temporary protection. Remove protection after concrete has been placed on both sides of joint.

3.05 SAND ASPHALT SETTING BED INSTALLATION FOR IMPERVIOUS BRICK PAVERS

- A. Place two 3/8 inch by one inch control bars directly over base. Adjust bars with wood chucks under control bars to bring 3/4 inch setting bed or proper grade. Set bars parallel to each other approximately eleven feet apart to serve as guides for striking board (12 feet long, 2 inch x 6 inch board). Set depth control bars to bring pavers, when laid, to proper grade. Place some bituminous bed material between parallel depth control bars. Pull bed with striking board over bars several times. After each passage, low porous spots to be showered with fresh bituminous material to produce smooth firm and even setting bed. As soon as this panel is completed advance first bar to next position ready for striking next panel. Carefully fill depressions remaining after removing depth control bars and wood checks. Elevation shall be adjusted so when pavers are placed, top surface of pavers will be at required finished grade.
- B. Roll setting bed with a power roller to 3/4 inch depth while still hot. Final surface of setting bed over gravel base to be left 1/8" higher than adjacent surfaces to allow for settlement.
- C. Apply coating of asphalt mastic adhesive to setting bed using trowel having 1/16 inch serrations.
- D. Final surface of setting bed over gravel base to be left 1/8" higher than adjacent surfaces to allow for settlement.

3.10 IMPERVIOUS BRICK PAVER INSTALLATION

- A. Set pavers on setting bed with uniform joints 1/16" to 1/8" wide in patterns shown on Drawings. Continually check surface of finished line and grade with straight edge. Correct deficiencies. Cut pavers to fit in locations noted. Machine cuts only. Minimum paver size to be no smaller than 1/2 unit size. Final surface of pavers to be left 1/8" higher than adjacent surfaces to allow for settlement.
- B. Sweep dry joint polymeric sand into joints until completely filled and provide a layer of polymeric sand over pavers. Compact pavers using a low amplitude plate compactor capable of at least 5,000 lbf compaction at a frequency of 75 hz to 100 hz. and vibrate until completely filled. Two to three passes minimum. Fog surface with water to compact mix into joints. Repeat process until joints are compacted and

filled. Clean stains immediately. Do not compact within 3 feet of unrestrained edges of the paving units.

- C. Work within 3 feet of the laying face to be left fully compacted with sand-filled joints at end of each day. Cover laying face with plastic sheets overnight.
- D. Protect installed units with plywood panels against uneven settlement and misalignment. If settlement occurs producing mismatch of more than 1/16 inch at interface between pavers and other pavements prior to final acceptance, relay pavers near interface for sufficient distance to provide smooth transition between paving surfaces and satisfactory match between pavers and adjacent surfaces.

3.12 ADJUST AND CLEAN

- A. Remove and replace paver pieces, which are broken, chipped, stained and otherwise damaged. Remove and replace pavers which are misaligned, not to grade and do not match adjoining granite work. Provide new matching units, install and point-up joints to eliminate evidence of replacement. Repair defective and unsatisfactory joints to provide neat, uniform appearance.
- B. Sweep areas of pavers clean of excess sand.
- C. Clean entire paver installation with neutral non-alkaline chemical cleaner free from lye or caustics. Clean paver work to remove stains, dirt and other discoloration or blemishes. Commence cleaning operations following granite construction. Follow manufacturer's instructions for use, handling and application of masonry cleaners. Provide polyethylene covers or other temporary protection of lawn, plants and other non-working areas adjacent to masonry cleaning. Remove coverings immediately following cleaning operations. Collect and remove residual cleaning solutions from site.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConvile Way
Intersection Improvement Project
Quincy, Massachusetts**

This page intentionally left blank

SECTION 32 16 14

GRANITE CURBS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Remove and reset, or provide new granite curbs in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Documents

1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. ASTM International (ASTM)
 - a. ASTM C144 Standard Specification for Aggregate for Masonry Mortar
 - b. ASTM C150 Standard Specification for Portland Cement
 - c. ASTM C207 Standard Specification for Hydrated Lime for Masonry Purposes
 - d. ASTM C615 Standard Specification for Granite Dimension Stone
2. MassDOT Standard Specifications and Supplements, and Construction Standard Details
 - a. MassDOT Supplemental Specifications Section 501
 - b. MassDOT Supplemental Specifications Section 580

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with the Division 01 General Requirements.
- B. Product Data
- C. Certificates: manufacturer's certification that products meet Specification requirements.
- D. Manufacturer Instructions
- E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Storage and Protection
 - 1. Protect curb against staining, chipping, and other damage. Cracked, badly chipped, or stained units will be rejected.
 - 2. Store granite curbing pallets on pavement or other hard, durable surface that will not compact from the weight. Prevent pallet steel strapping from rusting and staining pavement. Remove and replace pavement stained by rusting steel strapping.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 GRANITE CURBS

- A. Type VA-4 in accordance with MassDOT Supplemental Specifications Section 501 and MassDOT Construction Standard Details.

2.02 MORTAR

- A. Provide mortar composed of 1-part Type II portland cement in accordance with ASTM C150, 2-parts sand in accordance with ASTM C144, well graded with no

grain larger than will pass #8 sieve, and 20 percent hydrated lime conforming to ASTM C207, Type S.

2.03 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Verify that earthwork is completed to correct line and grade.
- B. Confirm subgrade is smooth, compacted, and free of frost or excessive moisture.

3.02 REMOVAL AND RESETTING

- A. Remove and reset curbs, curb inlets and curb corners at locations where required in accordance with MassDOT Supplemental Specifications Section 580, and MassDOT Construction Details. Incorporate existing curbs, curb inlets and curb corners before installation of new curb.
- B. Remove existing curb in areas indicating remove, stack and reuse, and reinstall prior to installation of curb delivered to Site.

3.03 INSTALLATION

- A. Install new curbs in accordance with MassDOT Supplemental Specifications Section 501, and Drawings.
- B. Install ends of curbs vertically forming a flush joint when 2 curb stones are placed adjacent to each other.
 1. Maximum joint space; not to exceed 3/4 inches.
 2. Top 6 inches of curb stone: uniform thickness and surface finish.
 3. Radii of curved curb stone: per Drawings.

3.04 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.05 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 1. Provide pavement markings in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Documents
 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 1. Federal Highway Administration (FHWA)
 - a. Manual on Uniform Traffic Control Devices (MUTCD)
 - b. Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FHWA Standard Specifications)
 2. Applicable portions of City of Quincy Code of Ordinances and Zoning Ordinances

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with the Division 01 General Requirements.
 1. Product Data
 2. Manufacturer Instructions

3. Certification that material does not exude fumes which are toxic or injurious to persons or property upon heating to application temperature
- B. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 EPOXY PAINT

- A. Formulate and design 2-component, 100 percent solids paint to provide a simple volumetric mixing ratio (e.g. 2-part component A to 1-part component B) specifically for service as a hot-spray applied binder for glass beads to produce maximum adhesion, refraction, and reflection. Material: epoxy resins and pigments only and meet the following minimum requirements:
 1. Color White after drying at the specified thickness: flat white, free from tint, furnishing good opacity and visibility under both daylight and artificial light, and a match to Chip No. 17925 of Federal Standard 595.
 2. Color Yellow after drying at the specified thickness: match to Chip No. 13538 of Federal Standard 595.
- B. Provide paint well mixed in the manufacturing process and free from defects and imperfections that may adversely affect the serviceability of the finished product. Provide paint that will not liver, thicken, curdle, gel, settle excessively, or otherwise display any objectionable properties after storage and that which will not require mixing of individual components prior to use when stored for a maximum of 12 months.
- C. Composition: per the manufacturer and the following requirements.
 1. White: Titanium Dioxide Rutile 20 plus or minus 2 percent, by weight, ASTM D476 Type III Epoxy Resin 80 plus or minus 2 percent, by weight.

2. Yellow: Titanium Dioxide Rutile 14 plus or minus 3 percent, Organic Yellow 8 plus or minus 2 percent, by weight, ASTM D211 Type III Epoxy Resin 75 plus or minus 2 percent, by weight.
3. Test Epoxy Content (Component A of epoxy resin) per ASTM D1652 and calculate as weight per epoxide equivalent (WPE) for both white and yellow. Determine epoxy content by a pigment free basis. Ensure WPE meets a target value provided by manufacturer within a tolerance of plus or minus 50.
4. Test Amine Value (Component B) per ASTM D2074 to determine total amine value. Meet total amine target value provided by manufacturer within a tolerance of plus or minus 50. Obtain approval from Engineer if manufacturer specifies alternate test method for determining amine value.
5. Do not provide material that exude fumes which are toxic or injurious to persons or property upon heating to application temperature.
6. Abrasion Resistance (ASTM D4060) wear index: maximum 82 when abrasion resistance is tested with a CS-17 wheel under a load of 1,000 grams for 1,000 cycles.
7. Hardness (ASTM D2240) - Type D durometer hardness: minimum 75 and maximum 100 after conditioning material a minimum of 72 hours and maximum 96 hours at 73.4 degrees plus or minus 2 degrees F.
8. Tensile Strength (ASTM D638): The tensile strength of the material shall not be less than 6,000 psi after 72 hours of conditioning at 73.4 degrees plus or minus 2 degrees F.
9. Compressive Strength (ASTM D695): minimum 12,000 psi after 72 hours of conditioning at 73.4 degrees plus or minus 2 degrees F.
10. Conduct infrared spectrophotometer analysis per ASTM D2621, analyzing samples of both Part A and Part B (and of that mixed to proper ratio) by infrared spectrography. Spectrum of each component and final product: reasonable match to spectrum of original formulation from manufacturer.
11. Daylight directional reflectance without glass spheres (ASTM E1347): minimum 84 percent for white and minimum 50 percent for yellow (relative to magnesium oxide).
12. Dry Time for epoxy resin compounds
 - a. Laboratory (per ASTM D711): a no-tracking condition in maximum 30 minutes at 72 degrees F when mixed in proper ratio

and applied to a uniform wet film thickness of 20 mils and immediately dressed with glass beads at proper rate.

- b. Field: a no-tracking condition in a maximum of 30 minutes at 70 degrees F where no visual displacement of epoxy resin striping material is observed when a passenger car has passed over stripe or handwork when viewed at a distance of 50 feet.

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Sweep or air blast dirty pavements. Remove and dispose of dirt piles. Remove oil, grease, and similar adherent matter by washing with a suitable solvent. Wipe excess solvent from pavement and allow time for evaporation before applying pavement marking material.

3.02 INSTALLATION

- A. Minimum pavement surface temperature and the ambient temperature at time of paint application: minimum of 35.6 degrees F.
- B. Heat individual epoxy components to maximum temperature of 140 degrees F and temperatures recommended by epoxy manufacturer's written instructions for use or as stated in the FHWA Standard Specifications.
- C. Monitor the ratio of the 2 components during the application using installed metering devices. Stop application and remedy cause or problem should the ratio fall outside the range of plus or minus 5 percent of the manufacturer's specified mixing ratio for over 30 seconds or when ratio falls outside the range of plus or minus 10 percent.
- D. Reflectorize epoxy pavement markings for night visibility by adding reflective spheres by the double-drop method before paint dries or sets. Evenly disperse Type I reflective spheres followed immediately by Type II reflective spheres on a minimum wet film thickness of 20 mils on existing and new pavements at a minimum rate of 12 pounds per gallon for each type of glass sphere.
- E. Place necessary spotting at appropriate points to provide horizontal control for striping and to determine necessary starting and stopping points. Utilize longitudinal joints, pavement edges and existing markings as horizontal control when approved by Engineer.

- F. Place epoxy reflectorized pavement markings at the width, thickness, and pattern designated in the Drawings. Do not begin marking operations shall until applicable surface preparation work is completed and approved by the Engineer, and the T-47 atmospheric conditions and pavement surface temperature are acceptable to the Engineer.
 - 1. Adjust temperature of mixed epoxy as required for prevailing conditions, including air temperature and pavement temperature to achieve prescribed no-track time. Do not allow speed of applicator truck to exceed the recommended rate for the combination of the truck rate, pressure in the lines, and the tip opening and height of the spray gun to ensure the required thickness.
- G. Remove and replace unsatisfactory markings, resulting from the presence of dirt, oil, grease, scale, moisture, or other foreign substances, and pavement markings rejected by Engineer at no additional cost to Owner.

3.03 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.04 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 32 30 00

SITE IMPROVEMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Labor, materials, services, equipment and appliances for the following:
 - a. Signage and Sign Supports
 - b. Bollards
 - c. Site Features
 - 2. Related Requirements
 - a. Section 31 00 00 – Earthwork

- B. Related Documents

- 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Comply with the requirements and specifications of the City of Quincy
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM D570-Standard Test Method for water absorption of plastics.
 - 2. ASTM D36-06 Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus).
 - 3. ASTM D792-Standard Test method for density and specific gravity (relative density) and density of solid plastics.
 - 4. ASTM D 2240-Standard Test Method for Rubber property – Durometer hardness.

5. ASTM D256, Method-A Standard Test Method for determining the IZOD pendulum impact resistance of plastics.
 6. ASTM D92-Test Method for Flash points
- C. Massachusetts Highway Department
1. Massachusetts Highway Department Standard Specifications for Highways and Bridges, latest edition, hereinafter called the "Standard Specifications."
 2. Massachusetts Highway Department Construction and Traffic Standard Details, latest edition, hereinafter called the "Standard Details".
- D. AASHTO
1. Specifications for Design and Construction of Structural Supports for Highway Signs, Luminaries and Traffic Signals.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data
1. Manufacturer's descriptive data, technical literature, catalog cuts, and installation instructions including dimensional data for each type of pipe, gaskets, hardware, and appurtenances.
 2. Manufacturer's Recommendations: Submit for approval, copies of the manufacturer's printed recommendations for the storage, protection, handling, and installation of the piping, and appurtenances which shall be strictly adhered to by the Contractor.
 3. Material safety data sheets in conformance with 29 CFR 1910 Section 1200(g) accompanying each chemical product delivered for use in pipe installations, including all solvents, solvent cements, glues and other materials that may contain hazardous compounds.
 4. The type, thickness, application procedure, and test for coatings, and non-metallic and metallic linings shall also be included.
- C. Shop Drawings

1. Layout and dimensions of equipment, major components, key alignment locations, and locations of bolt holes and indicate where access points for maintenance and operations are located on the equipment. Show critical field dimensions and actual pipe lengths, diameters, fittings, and appurtenances.
 2. The Contractor shall submit shop drawings of all signs and supports, bollards, and additional site features.
- D. Warranty: Manufacturer's standard warranty.
- E. Manufacturer Instructions
- F. Field Quality Control Submittals
 1. Test results
 2. Logs of inspection and testing
- G. Qualification Statements: as required by Article 1.06.
- H. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

1.07 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

1.08 MAINTENANCE

- A. Extra Materials: Furnish as specified below. Make interchangeable with and same material and workmanship as corresponding original parts.

PART 2 – PRODUCTS

2.01 Signage

- A. Signage Aluminum sign panels shall be fabricated from flat aluminum sheeting, ASTM B209, Alloy 6061-T6 or Alloy 5052-H38.
- B. Sign dimensions shall be per Standard Detail TR.1.1. Sheeting thickness shall be 0.081 inches.
- C. Reflective sheeting shall conform to Sections 828.41 and M9.30.0 of the Standard Specifications.

- D. Signage shall comply with the Manual on Uniform Traffic Control Devices (MUTCD) reference numbers indicated on the Drawings and the Standard Details.
- E. All materials utilized for foundations, sign supports, hardware, and attachments shall conform to the breakaway design except as otherwise indicated on the drawings for bollard-mounted signs. The lengths of the posts shall fit the final designated sign location and accommodate the method of setting.
- F. Hardware required to attach signs to posts shall be aluminum or stainless steel. Stainless hardware shall conform to the requirements of ASTM A320. Nuts shall be of the self-locking type.

2.02 BOLLARDS

- A. Provided in accordance with the Drawings.

2.03 SITE FEATURES

- A. Provided in accordance with the Drawings.

PART 3 – EXECUTION

3.01 SIGNAGE

- A. Signs shall be installed true, plumb, and level, located where shown on the Drawings or as otherwise designated by the Engineer.
- B. Breakaway posts shall be driven a minimum of three feet into firm ground.
- C. Signs shall be mounted in accordance with MA Standard Details TR.1.2 and TR.1.3.

3.02 BOLLARDS

- A. Installed in accordance with the Drawings.

3.03 MISCELLANEOUS ITEMS

- A. Remove, protect, and reinstall all miscellaneous items as shown on the drawings to complete the work including, but not limited to: litter and recycling receptacles, tree grate/well, signage, bench, bollard, bleacher, picnic table, landscape stones, light post, groundwater well, fencing, , and any other items to be removed, relocated & installed in accordance with the drawings.
- B. If any items are damaged during the duration of the work the Contractor must replace with in-kind materials at no additional cost to the Owner.

- C. If any items are scratched or scraped during the work the Contractor must re-paint entire item at no additional cost to the Owner. Paint to match existing paint on item.

3.04 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 32 80 00

IRRIGATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. This design-build portion of the project consists of designing, providing, and installing a complete underground irrigation system. The work includes:
 1. Automatic irrigation system including piping, fittings, sprinklers, and accessories.
 2. Controllers, control wire.
 3. Encasement (Sleeves) for irrigation pipe and wire.
 4. Manual valves.
 5. Pressure-reducing valves.
 6. Automatic control valves.
 7. Automatic drain valves.
 8. Transition fittings.
 9. Miscellaneous piping specialties.
 10. Quick couplers
 11. Utility Boxes for control valves.
 12. Rain Sensor
 13. Reconfiguration of an existing Automatic controller with the addition of new irrigation
 14. All necessary electrical connection work.
 15. Testing.
 16. Excavation and backfilling irrigation work.
 17. Maintenance and warranty.
- B. Related Sections: The following sections contain requirements that relate to this section:
 1. Division 31 – “31 00 00 Earthwork”
 2. Division 32 – “32 90 00 Planting and Seeding”

1.3 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.4 REFERENCE STANDARDS

- A. Materials, equipment, and methods of installation shall comply with the following codes and standards:

1. All local and State codes.
2. National Fire Protection Association, (NFPA): National Electrical Code.
3. American Society for Testing and Materials, (ASTM).
4. National Sanitation Foundation, (NSF).
5. The Irrigation Association, (IA).

1.5 SUBLETTING AND ASSIGNMENT

- A. The Irrigation Contractor shall not assign or sublet any portion of this work without written approval of the Owner of the specific sub-contractor prior to commencement of the work to be sub-contracted. Acceptance by the General contractor of the sub-contractor does not decrease or relieve the responsibility of the Irrigation Contractor.

1.6 ERRORS OR CONFLICTS IN DRAWINGS AND SPECIFICATION

- A. The Irrigation Contractor shall immediately notify the General Contractor representative should he find any errors or conflicts in the drawings and or specifications. General Contractor will render his interpretation or instructions on the items as soon as possible.
- B. Any work undertaken by the Irrigation Contractor with regard to errors or conflicts will be done so at his own risk unless he has received written prior approval from the General Contractor.

1.7 DEFINITIONS

- A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
- B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.
- C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.
- D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.8 PERFORMANCE REQUIREMENTS

- A. Irrigation zone control shall be automatic operation with controller and automatic control valves.
- B. Design 100 percent coverage irrigation system for lawn areas, planting beds and trees within the limits of construction, including irrigation for Walter Hannon Intersection landscaping improvements to be selected by the owner. Design shall include:

comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1. This irrigation system is being installed to provide watering of all lawn areas, trees, planters and planting beds within the limits of construction and within the R.O.W.. Irrigation heads and/or drip irrigation appropriate to the specific area being irrigated shall be used. Drip irrigation and spray heads shall not be in the same irrigation zone. A Geotechnical Report describing the findings of sub-surface investigations is attached to these Specifications for reference.
- C. Minimum Working Pressures: The minimum pressure requirements for piping, valves and specialties unless otherwise indicated shall match the existing water supply system.
- D. Supply shall be from the existing irrigation control cabinet as shown as reference documents to available project info section. The irrigation controls and water supply hot box and located in park two of the General Park.

1.9 SUBMITTALS

- A. General: Submit the following in accordance with the Conditions of Contract and Division 01 Specification Sections.
- B. A complete system design, including diagrammatic layout and specifications compliant with the requirements of this project and these specifications.
- C. Walter Hannon Parkway landscape improvement irrigation to be fed as a separate zone(s).
- D. Product Data: For each type of product indicated. Included rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- E. Wiring Diagrams: For power, signal and control wiring.
- F. Delegated-Design Submittal: For irrigation systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- G. Coordination Drawings: Irrigation systems, drawn to scale, on which components are shown and coordinated with each other, using input from Installers of the items involved. Also include adjustments necessary to avoid plantings and obstructions such as signs and light standards.
- H. Qualification Data: For qualified Installer.
- I. Zoning Chart: Show each irrigation zone and its control valve.
- J. Controller Timing Schedule: Indicate timing settings for each automatic controller zone.
- K. Field quality-control reports.

- L. Operation and Maintenance Data: For sprinklers, controllers and automatic control valves to include in operation and maintenance manuals.
- M. Upon irrigation system acceptance, submit three (3) copies of written operating and maintenance instructions, including winterization procedure. Provide format and contents as directed by the Architect.
- N. Record Drawings:
 - 1. The Subcontractor shall provide and keep up to date a complete set of "As Built" record set of prints which shall be corrected as the work progresses and show every change from the original drawings and specifications and the actual "As Built" dimensions and kinds of equipment. This set of drawings shall be kept on-site and shall be used only as a record set.
 - 2. These drawings shall also serve as progress sheets, and the subcontractor shall make neat and legible annotations thereon as the work proceeds, showing the work as actually installed. These drawings shall be available at all times for inspection and shall be kept in the General Contractor's mobile office on location at all times for inspection.
 - 3. Record drawings shall show the location of all sprinklers, valve boxes, valve markers, controllers, pipe, wire trenches, multiple wire splice boxes and all pertinent material buried and not visible to the eye. Record drawings shall indicate dimensions from two permanent points of easily identifiable nature, if possible, such as sprinkler heads, permanent markers, concrete pads, corner of buildings, large caliper trees, etc.
 - 4. On or before the date of final acceptance, the subcontractor shall deliver the corrected and complete prints to the Engineer to aid him in completing the "As Built" set of drawings. Delivery of the prints will not relieve the subcontractor of the responsibility of furnishing required information that may be omitted from the prints.

1.10 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers that include a certified irrigation designer qualified by The Irrigation Association.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.11 DELIVERY, STORAGE AND HANDLING

- A. Deliver irrigation system components in manufacturer's original undamaged and unopened containers with labels intact and legible.
- B. Deliver plastic piping in bundles, packaged to provide adequate protection of pipe ends.
- C. Store and handle materials to prevent damage and deterioration.
- D. Provide secure, locked storage for valves, and similar components that cannot be immediately replaced, to prevent installation delays.

1.12 PROJECT CONDITIONS

- A. Each bidder shall visit the site of the proposed work and fully acquaint themselves with the conditions related to construction and labor and should fully inform themselves as to the facilities.
- B. Known underground and surface utility lines are indicated on the drawings.
- C. Protect existing trees, plants, lawns and other features designated to remain as part of the final landscape work.
- D. Promptly repair damage to adjacent facilities caused by irrigation system work operations. The cost of repairs shall be at the subcontractor's expense.
- E. Exact locations of piping, sprinkler heads, valves and other components shall be established by the subcontractor in the field at the time of installation.
- F. Cutting and Patching:
 - 1. Cut through concrete and masonry for conduits with core drills. Jack hammers are not permitted.
 - 2. Materials and finishes for patching shall match existing cut surface materials and finish. Exercise special care to provide patching at openings in exterior walls water tight.
 - 3. Methods and materials used for cutting and patching shall be acceptable to the Architect.

1.13 CONDUCT OF WORK

- A. The Irrigation Contractor shall maintain a competent full-time superintendent/representative satisfactory to the General Contractor, on work in progress, with authority to act in all matters pertaining to the work.
- B. As soon as the Irrigation Contractor starts work on the job, the Irrigation Contractor establishes a daily log of activities. This log is to be signed by the Irrigation Contractor's Superintendent and the General Contractor.
- C. The Irrigation Contractor shall coordinate his work with the other trades and in particular the General Contractor and maintenance operations. The Irrigation Contractor shall also coordinate his work with that of his subcontractors.
- D. The Irrigation Contractor shall confine his operations to the area to be improved and to the areas allotted to him by the General Contractor for materials and equipment storage.
- E. During the work, the General Contractor shall erect proper protective devices to warn and or protect players/pedestrian/individuals and maintenance personnel or and from the danger of construction.
- F. The General Contractor assumes no responsibility in the supervision and inspection of the work involved in the execution of this contract beyond insuring, to the Owner's satisfaction, that the plans and specifications are being properly interpreted. This supervision and checking will not relieve the Irrigation Contractor of any responsibility for the performance of his work in accordance with the plans and these specifications.

1.14 WARRANTY

- A. For a period on one (1) year from the date of final acceptance of the irrigation system, the subcontractor shall promptly furnish and install, any parts which prove defective due to faulty product or faulty installation by the subcontractor.
- B. During the warranty period, the subcontractor shall extend to the Owner, any and all warranties that apply to equipment found to be defective in either materials or workmanship, as extended by the manufacturer and/or distributor to the subcontractor. The limits of this equipment warranty shall be expressly stated by the appropriate manufacturer/distributor in writing.

1.15 COORDINATION

- A. Coordinate work of this Section with that of other trades, under this and other Contracts with the Owner, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
- B. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the General Contractor in writing of any which are not. Do not proceed further until corrective work has been completed or waived.
- C. Coordinate the installation of sleeves for irrigation pipe below all paved surfaces in order to provide access to all islands and areas shown to be irrigated.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers:
 - 1. The Toro Company, distributed by Turf Products, LLC, Enfield, CT.
 - 2. Hunter International, Inc., San Marcos, CA.
 - 3. Rain Bird Corporation, Azusa, CA.
- B. All system components shall be from a single manufacturer. Mixing of components is not acceptable.:

2.2 MATERIALS

- A. General
 - 1. Provide only new materials, without flaws or defects and of the highest quality of their specified class and kind.
 - 2. Comply with pipe sizes designed. No substitution of smaller pipes will be permitted. Larger sizes may be used subject to acceptance of the Engineer.
 - 3. Provide pipe continuously and permanently marked with manufacturer's name of trademark, size schedule and type of pipe, working pressure at 73 degrees F. and National Sanitation Foundation (NSF) approval.

B. Pipe, Fittings and Connections

1. Polyvinyl chloride pipe: ASTM D2241, Type 1, Grade 1 rigid, unplasticized PVC, extruded from virgin parent material, conforming to CS256-63. Provide pipe homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, wrinkles and dents.
 - a. All main line pipe and lateral pipe over 2-1/2" in size shall be PVC, SDR 26, Class 160 and shall have an o-ring gasketed connection.
 - b. All lateral piping over 1-1/4" in size shall be PVC, SDR 21, Class 200 and shall have solvent weld connections.
 - c. All piping for sleeves under roadways, sidewalks, etc., shall be Schedule 40, unless otherwise stated on the plans.
 - d. All pipe from the water supply connection through the backflow preventer and to a point five feet outside the buildings shall be copper, Type L, in sizes as indicated on the plans.
2. Polyethylene Pipe: ASTM D2239, Type II – PE 2306 high density, manufactured from virgin parent material. Provide pipe homogeneous throughout and free from visible holes, foreign materials blisters, wrinkles and dents. Polyethylene pipe shall be NSF approved.
 - a. All lateral pipes under 1-1/2" in size shall be polyethylene pipe and shall be SDR 11.5, 100 PSI.
3. Fittings:
 - a. All main line fitting over 2" in size shall be PVC, "o" ring gasketed fittings rated for a minimum of 200 psi. Fittings shall be manufactured in one piece of injection molded PVC, "o" ring gasketed fittings rated for a minimum of 200 psi. Fittings shall be manufactured in one piece of injection molded PVC compound meeting ASTM D1784. Fittings shall be produced in compliance with ASTM D-2241-80. Tapped outlets shall be the same size as valve assembly. Fabricated fittings will not be allowed.
 - b. Fittings for PVC lateral pipe shall be schedule 40 PVC fittings, suitable for solvent weld and threaded connections.
 - c. Fittings for polyethylene pipe shall be PVC insert fittings. Stainless steel clamps shall be used to secure pipe to fittings. On pipe over 1" in size, two stainless steel clamps shall be used for each connection.
 - d. Fittings for electric valve assemblies and swing joint assemblies for quick coupling valves shall be brass, conforming to ASTM B16.15 and WW-P-460. Fittings shall have a minimum pressure rating of 125 psi at 400 degrees F. Fittings shall be of U.S. manufacture.
 - e. Fittings for copper pipe shall be wrot solder joint fittings, ANSI B16.22.

C. Sprinklers, Valves, And Associated Equipment:

1. Rotary sprinklers shall be pop-up type with a pop-up height of 4". Sprinkler shall be constructed of plastic and shall have wiper seal, stainless steel retraction spring, and a factory installed drain check valve capable of checking a minimum of 10 feet of elevation change. Sprinkler shall interchangeable nozzles, adjustable radius, and a variable stator which will not require changing stator when changing nozzles. Part circle sprinklers shall have adjustable arc (40°-360°). Sprinkler shall have stainless steel retraction spring, stainless steel riser, permanent rubber cover and screw on cover with locking screw.

Maximum exposed area of sprinklers shall be 2". Adjustable arc rotary sprinklers shall not be used for full circle rotary sprinklers. Sprinklers shall have five year exchange, non-prorated warranty.

- a. Rotary sprinkler head assembly shall be connected to lateral line piping by installing three-way swing joint riser assembly. Swing joint riser assembly shall have a working pressure rating of 315 PSI at 73 degrees F, O-Ring(s) at each swivel joint, buttress threads at each swivel joint and inlet and outlet sockets conforming to ASTM Standards D 2467 and D 2464 respectively. Body wall thickness of all components shall conform to ASTM D 2464. Assemblies shall be of molded rigid polyvinyl chloride (PVC) Type 1, Cell Classification 12454-B per ASTM Standard D 1784, and shall be manufactured in such a way that both the male and female O-Ring sealing areas are free from mold parting lines. Swing joint riser assemblies shall have socket connection to the lateral piping and male thread into the sprinkler, with either solvent cement riser nipple factory assembled or unitized riser, and shall have a minimum diameter of the size of the sprinkler inlet. Swing joint riser assemblies shall have a three (3) year warranty.
- 2. Spray sprinklers shall be pop-up type. Sprinkler shall be constructed of plastic and shall have wiper seal, stainless steel retraction spring and check-o-matic valve. Sprinklers located in lawn areas shall have a pop-up height of 4". Sprinklers located in plant beds shall have a pop-up height of 12".
 - a. Nozzles shall be matched precipitation with performances as indicated on the drawings. Nozzles shall be of plastic construction with radius adjustment screw and shall have screen. Adjustable arc nozzles shall be used where necessary for proper coverage.
 - b. Spray sprinklers shall be connected to the lateral piping using Funny Pipe.
- 3. Manual Valves:
 - a. A manual gate valve shall be installed on the inlet side of all electric control valves. Manual gate valves shall be of bronze, non-rising stem, screw in bonnet, solid wedge, and red bronze cross handle, rated for 200 psi WOG. Valves shall meet Federal Specification WW-V-54 Class A, Type 1 & MSS SP-80. Valves shall be installed in valve boxes as detailed on the plans. Manual gate valves shall be manufactured by Nibco, Model No. T-113 series or approved equal.
- 4. Electrically activated remote control valve shall be of plastic construction with stainless steel spring, normally closed with manual bleed lever and brass manual flow control stem. Flow control shall be brass and stainless steel with o-ring seal. Valve shall automatic pressure regulating device which works both electrically and manually. Solenoid shall be 24 volt AC with waterproof molded coil. Diaphragm shall be of rubber material. All parts shall be serviceable without removing valve from the line. Electric valves shall be sized as indicated on the plans.
- 5. Valve Access Boxes:
 - a. Valve access boxes shall be tapered enclosures of rigid plastic material comprised of fibrous components, chemically inert and unaffected by moisture corrosion and temperature changes. Provide lid of same material, green in color.
 - 1) Valve access boxes for electric valve assemblies shall be 12" deep with 13" X 18" base dimensions.

D. Quick Coupler Valve:

The manual quick coupler valve shall be connected to the pipe by installing a three -elbow, four-nipple swing joint constructed of bronze fittings. The swing joints shall be 1" with a 10" lay.

E. Controls:

1. The controllers for the irrigation systems shall be solid state type. Controllers shall be capable of automatic, semi-automatic or manual operation. Controller shall have a minimum of 12 stations. The controller shall be housed in the addition mechanical room. Coordinate final location of controls in field with building plumber, CM and owner.
2. Controllers shall have battery backup which will retain program and real time in the event of a power failure and two separate sensor hook-ups. Controller shall have a "Water Budgeting" feature which changes all stations within a program from 25%-200% in 25% increments, and a rain shutdown feature which won't lose time or programs. Controllers shall be maintenance radio ready by way of single-plug connection. Controllers shall have four independent programs, and shall have a self diagnostic electronic circuit breaker that identifies and overrides electrical malfunction of a valve.
Controllers shall be equipped with input and output lightning protection. Subcontractors shall supply batteries for the controller.
3. Irrigation controls shall incorporate a rain sensor to cancel the irrigation program if a preset amount of rain has fallen. Rain sensor shall use a water-absorptive material to measure rainfall, and have a U.V. stabilized thermoplastic switch housing and aluminum mounting bracket. Sensor shall be adjustable from 1/8"-1". Rain sensor to be installed where directed by the Landscape Architect.

F. Electrical Control Wire:

1. Electrical control and common wire from the controller to the electric valves shall be type UF, 600 volt, single strand, solid copper, direct burial, sized at 14 gauge. Conduit from the irrigation controller to a point five feet outside buildings shall be installed by others.

G. Backflow Preventer:

1. Install a backflow preventer as required to ensure proper operation of the irrigation system.
 - a. Backflow preventer shall be reduced pressure type furnished complete with shut off valves, Massachusetts approved. Backflow preventers 2-1/2 inch and smaller shall be Watts #LF009-QT-S. Backflow preventers 3 inch and larger shall be Watts 957-QT. Backflow preventers shall be lead free, all bronze, complete with strainer and soft seated check valve. Size shall be determined by plumber and water demand.

2.3 ACCESSORIES

- A. Drainage fill around valve boxes shall be 1/2" to 3/4" crushed stone.
- B. Trench backfill at field shall conform with details and project specifications.
- C. Fill shall be clean soil free of stones larger than 2" diameter, foreign matter, organic material and debris.
 1. Provide imported fill material as required to complete the work. Obtain rights and pay all costs for imported materials.

2. Suitable excavated materials removed to accommodate the irrigation system work may be used as fill material subject to the Architect's review and acceptance.
- D. Wire connectors for 24 volt control wiring shall be as manufactured by Scotch, Model No. DBY or DBR.
- E. Rain Sensor.
- F. Long-range multi-station remote controller.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine final grades and installation conditions. Do not start irrigation system work until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Layout and stake the location of each pipe run and all sprinkler heads and sprinkler valves. Obtain Architect's acceptance of layout prior to excavating.
- B. All sleeves required for the installation of the irrigation system are to be installed by this Subcontractor. Wires are to be installed in separate sleeves. Coordinate irrigation route and sleeve installation with project site contractor and General Contractor.

3.3 INSTALLATION

- A. Excavation and Backfill:
 1. Excavation shall include all materials encountered.
 2. Excavate trenches of sufficient depth and width to permit proper handling and installation of pipe and fittings.
 3. If the pulling method of pipe installation is used, the pipe "plow" shall be a vibratory type. Starting and finishing holes for pipe pulling shall not exceed a 2'-0" by 3'-0" opening.
 4. Excavate to depths required to provide 2" depth of earth fill or sand bedding for piping when rock or other unsuitable bearing material is encountered.
 5. Fill to match adjacent grade elevations with approved earth fill material. Backfilling will be done by hand placing soil under, around and above pipe so that it is hand tamped to a point 6" above the pipe. Special care shall be taken to insure that this layer is completely free of stones and other deleterious material. The remainder of the trench may be machine filled with appropriate available soil. Machine placed backfill shall be compacted to a suitable density by machine tamping and approved rolling to prevent settlement in trench.
 - a. If within one (1) year from the date of final acceptance, settlement due to improper compaction occurs and an adjustment in pipes, valves and sprinkler heads, turf or paving is necessary to bring the system, turf or paving to the proper level of the

permanent grades, the Contractor, as part of the work under this contract, shall make said adjustments without extra cost to the Owner.

6. Except as indicated, install irrigation mains with a minimum cover of 20" based on finish grades, unless otherwise noted. Install irrigation laterals with a minimum cover of 12" based on finish grades.
7. Excavate trenches and install piping and fill during the same working day. Do not leave open trenches or partially filled trenches open overnight.
8. Contractor shall not sawcut existing paved surfaces. Coordinate sleeves with site contractor.
9. Pipe shall be installed strictly in accordance with the printed recommendations of the manufacturer, including bedding of pipe in the bottom of trench and securely thrusting of any main line fittings at changes in direction of the pipe.
10. All o-ring gasketed piping shall be thrusted in accordance with the manufacturer's recommendations. Thrust blocks of poured-in-place concrete will be used. Concrete shall have a compressive strength of 2500 PSI, 28 day strength. In no case will sakrete, field stone or wood of any form be acceptable for thrusting. Thrust blocks shall bear against undisturbed trench walls.
11. Coordinate irrigation installation with field underdrainage system. Do not disturb under drainage. Any damage to underdrainage shall be documented and repaired by irrigation contractor.

B. Plastic Pipe:

1. Pipe lines shall be installed of the size shown on the drawings and/or specifications and of the materials and workmanship herein specified.
2. All main line piping to be installed in trenches as per the provisions of Section 3.03.A. Lateral piping may either be installed in trenches as above or by pipe pulling. Coordinate with existing underdrainage system.
3. Pipe shall be installed strictly in accordance with the printed recommendations of the manufacturer, including bedding of pipe in the bottom of trench.

C. Sprinklers, Fittings, Valves and Accessories:

1. Install fittings, valves, sprinklers and accessories in accordance with manufacturer's instructions, except as otherwise indicated.
2. Locate sprinklers where indicated on the drawings.
3. A manual gate valve shall be installed on the pressure side of all remote control valves in the system for the purpose of isolating any control valve requiring service and/or repair work. The manual valve to be an integral part of the control valve assembly and installed as detailed on the drawings.
4. Power for controllers shall be taken from a 120 volt circuit located within the building. All wiring inside the buildings shall be installed in electrical conduit. All work required for the power source for the irrigation controller shall be installed by the irrigation contractor, and all control wiring shall be supplied and installed by this contractor. All wiring shall be performed in accordance with all applicable codes.
 - a. Install rain sensors as recommended by the manufacturer. Rain sensor shall be installed so that it is not obstructed from rainfall or where water can be deflected on them. Install all exposed wiring in conduit. Install rain sensor a minimum of 10' above finish grade.
5. All remote control valves connected to main line threaded outlets shall utilize extra heavy brass fittings and brass nipples. Remote control valves shall be mounted in plastic valve boxes installed as per drawings.

6. Install valve access boxes on a suitable base of gravel to provide a level foundation at proper grade and to provide drainage of the access box. Gravel shall extend from the bottom of the valve to 3" below the bottom of the valve box. Valve box locations to be located on "As Built" drawing with measurements from two permanent markers to each valve box.
7. Seal all threaded connections with approved joint compound. Teflon tape shall not be used. Do not over tighten threaded connections.

D. Wire:

1. All wiring is to be installed in the piping trenches wherever possible. Approved wire ties shall be utilized approximately every 20' on wire runs installed in main line trenches or wire trenches.
2. All wires to be spliced to requirements of local and minimum regulations, or to the following specification. All splices shall be made by baring a minimum of 3/4" of copper conductor twisted together, connected and sealed with an approved splice kit. Procedures recommended by manufacturer shall be strictly followed. At splice location, slack shall allow the splice to be raised a minimum of 24" for inspection. Any underground splices not located at control valve sites shall be housed in a valve box for access.
3. Wire shall be installed with at least 1% slack and have expansion loops at end of 250' runs. Wire shall not be yanked, stretched, or excessively pulled during installation. Wire shall be laid on a firm, even bed in the trench which shall support the entire length. The Subcontractor shall take strict precautions to ensure that wires are not cut, scraped, or nicked during installation. Wire shall be laid above and to one side of the main line pipe, never directly over the pipe. Wherever possible, wire shall be laid on the same side of the trench throughout the entire job. All wiring shall be installed with a minimum depth of cover of 18".
4. All wiring shall be installed in accordance with all local, State and National codes.

E. Sleeves:

1. All sleeves for installation of the irrigation system are to be installed by Subcontractor. All wire shall be installed in separate sleeves. Spare sleeves shall be installed at each sleeve location as indicated on the drawings. Spare sleeves shall be installed with PVC caps on each end.

F. Testing:

1. The Subcontractor shall be responsible for all hydraulic pressure testing of main lines and lateral lines. The testing shall be on a continuous basis commencing when the first section of the installation is complete and available for testing. Final testing of the whole system under full operating conditions to be done following complete installation of all main and lateral piping, valves and sprinklers.
2. Prior to testing of the main line pipe, pipe shall be backfilled, thrust blocks poured and set. Testing for main line shall consist of a continuous application of water at a pressure of 150 PSI to the piping for a one hour period without visual evidence of leaks. If a leak is discovered within this period, the Subcontractor shall immediately repair the break and the system then retested for the period described above in this section. Testing of lateral lines shall be done on a zone by zone operating basis with any leaks or breaks repaired when evidenced.

G. Adjusting the System:

1. Adjustment of the sprinklers, remote control valves, and automatic equipment will be done by the Subcontractor upon completion of the installation to provide optimum performance and balance throughout the irrigation system.

H. Service:

1. The Subcontractor shall return to the site during the fall seasons of the warranty period and winterize the system. Drain all water from the system and blow out the system with compressed air. Owner shall be present to observe proper system shut down.
2. The Subcontractor shall return to the site during the spring seasons of the warranty period, start-up the system and demonstrate to the Owner the proper procedures for the system start-up, operation, and maintenance. Owner shall be present to observe proper opening of system.

I. Coordinate tapping into water system with building plumbing contractor and CM. Coordinate backflow preventer and installation of booster pump as required in mechanical room.

3.4 SPARE PARTS

A. Above and beyond the installation requirement, the Subcontractor shall leave with the Owner, the following loose equipment (to match existing materials used on site, materials, if not used, do not need to be provided):

1. (3) Full circle rotary sprinklers - 60' radius.
2. (3) Part circle rotary sprinklers - 60' radius.
3. (2) Part circle rotary sprinklers - 35' radius.
4. (5) 4" pop-up spray sprinklers.
5. (5) 12" pop-up spray sprinklers.
6. (2) Electric valve diaphragm for each size valve.
7. (2) Electric valve solenoids.
8. Lid for valve box of each size
9. DBY electrical connectors
10. DBR electrical connectors
11. 1 Quick Coupler Keys
12. 1 Coupler Hose Swivels
13. 1 Set of tools for repair and maintenance of sprinklers supplied.
14. 1 Set of spare keys for controller cabinets.

3.5 DISPOSAL OF WASTE MATERIALS

- A. Remove from site and legally dispose of excavated material, including soils, rock, trash and debris.
- B. Do not contaminate topsoil with excavated gravel or subsoil. All contaminated topsoil shall be promptly removed and replaced with clean, screened topsoil per specification.

3.6 ACCEPTANCE

- A. Test and demonstrate to the Architect and General Contractor, the satisfactory operation of the system free of leaks.
- B. Instruct the Owner's designated personnel in the operation of the system, including adjustment of sprinklers, controllers and valves.
- C. Upon acceptance, the Owner will assume operation of the system.

3.7 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris, and equipment. Repair damage resulting from irrigation system installation.

END OF SECTION

SECTION 32 90 00

PLANTING AND SEEDING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide loam borrow, topsoil, seeding, and supporting materials in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Requirements
 - 1. Section 31 00 00 – Earthwork

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. MassDOT Standard Specifications and Supplements, except for Compensation sections
 - 2. MassDOT Construction Details
 - 3. ANSI Z60.1 Standard Nursery Stock
 - 4. American Association of Nurserymen (A.A.N.)
 - 5. A.O.A.C.: Association of Official Agricultural Chemists.
 - 6. United States Department of Agriculture (USDA)

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with the Division 01 General Requirements.

1. Product Data
 2. Manufacturer Instructions
- B. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to supply and place planting soils as indicated on the Contract Documents and as specified. Supplying and placement of planting soils shall include, but not be limited to:
1. Sampling and testing of loam borrow.
 2. Sampling and testing of existing on-site topsoil.
 3. Modifying, screening, placing, spreading and grading of loam borrow.
 4. Modifying, screening, placing, spreading and grading of existing, on-site topsoil.
 5. Providing all other sampling, testing, supplying, placing, spreading and grading of planting soils as required by this Section.
- C. Certificates
1. Submit manufacturers or vendors certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.
 2. Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity germination, and weed seed for each grass seed species.
- D. At least 30 days prior to ordering materials, the Contractor shall submit to the Owner's Representative representative samples, certifications, manufacturer's product data and certified test results for materials as specified below for approval in conformance with the requirements of the Division 01 General Requirements. No materials shall be ordered or delivered until the required submittals have been reviewed and approved by the Owner's Representative. Delivered materials shall closely match the approved samples. Approval shall not constitute final acceptance. The Owner's Representative reserves the right to reject, on or after delivery, any material that does not meet these Specifications.
1. Loam Borrow: The Contractor shall provide a one cubic foot representative sample per each 1,000 cubic yard of proposed stockpile of loam borrow for testing. All stockpile sampling shall be per ASTM D 75 and Appendixes for securing samples from stockpiles.

- a. Additionally, the Contractor shall provide 25, one cubic foot representative samples selected from on-site stockpiles of loam borrow for testing or from loam after it has been spread and amended. Samples from on-site stockpiles and from spread and amended loam borrow shall be taken from locations as directed by the Owner's Representative and packaged in the presence of the Owner's Representative.
- b. Testing will be at the Contractor's expense. Contractor shall deliver all samples to testing laboratories via overnight courier and shall have the testing report sent directly to the Owner's Representative. Perform all tests for gradation, organic content, soil chemistry and pH by UMASS Soil and Plant Tissue Laboratory, West Experiment Station, North Pleasant Street, University of Massachusetts, Amherst, MA 01003, (413) 545-2311. Testing reports shall include the following tests and recommendations. Contractor shall deliver samples to testing laboratories and shall have the testing report sent directly to the Owner's Representative from the Soil and plant Tissue Laboratory. Testing reports shall include the following tests and recommendations.
- c. Mechanical gradation (sieve analysis) shall be performed and compared to the USDA Soil Classification System. Sieve analysis shall be by combined hydrometer and wet sieving using sodium hexametaphosphate as a dispersant in compliance with ASTM D 422 after destruction of organic matter by H₂O₂. To facilitate review and approval of sieve analysis, provide a computer generated gradation curve from UMASS Soil & Plant Tissue Laboratory.
- d. Percent of organics shall be determined by the loss on ignition of oven-dried samples. Test samples minus #10 material shall be oven-dried to a constant weight at a temperature of 450 degrees Fahrenheit.
- e. Chemical analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, extractable Aluminum, Lead, Zinc, Cadmium, Copper, Soluble Salts, and pH and buffer pH. A Conductivity Meter shall be used to measure Soluble Salts in 1:2 soil/water (v/v). Except where otherwise noted, nutrient tests shall be for available nutrients.
- f. Soil analysis tests shall show recommendations for soil additives to correct soils deficiencies as necessary, and for additives necessary to accomplish planting work as specified.

3. Peat Moss: Submit a one cubic foot sample and supplier's certification of contents.
4. Limestone: Submit supplier's certification that the limestone being supplied conforms to these Specifications.
5. Acidulant: Submit supplier's certification that the acidulant being supplied conforms to these Specifications.
6. Fertilizer :
 - a. Submit product data of seeding and planting fertilizer and certificates showing composition and analysis. Submit fertilization rates for fertilizer product based upon soil testing, analysis, and recommendations.
 - b. Submit the purchasing receipt showing the total quantity purchased for the project prior to installation.
7. Gypsum: Submit manufacturer's product data and 2 pound sample.
8. All additives needed to amend a specific soil in order to meet these specifications.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Analysis and Standards: Package standard products with manufacturers certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Packing, Shipping, Handling, and Unloading
 1. Do not order or deliver material until submittals are approved.
- C. Package products with manufacturers certified analysis.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.
- B. Locate underground utilities. Perform Work in a manner that will avoid damage.

- C. Plant or install materials during normal planting seasons for each type of landscape work required.

PART 2 – PRODUCTS

2.01 LOAM BORROW

- A. Provide in accordance with MassDOT Standard Specifications and Supplements Section 751 and MassDOT Construction Details.
- B. Type: MassDOT Standard Specifications and Supplements Section M1.05.0.
- C. Furnish sufficient loam borrow to complete loaming operations required for Project and as directed by Engineer. Obtain loam borrow from the following sources and meet requirements specified after testing and addition of necessary soil additives.
 - 1. Naturally well-drained areas that have never been stripped before and have a history of satisfactory vegetative growth. Comply with bylaws and Regulations regarding removal of topsoil.
 - 2. Commercial processing facility specializing in manufacturing of loam.

2.02 TOPSOIL

- A. Use topsoil stockpiled for re-use in landscape work, as specified in 31 10 00 Site Clearing. Provide additional topsoil required to complete landscape work if quantity of stockpiled topsoil is insufficient.
- B. Furnish new topsoil, which is fertile, friable, natural loam surface soil found at a depth of not less than 4 inches from original ground surface, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, debris, and stones larger than 2 inches in any dimension.
- C. Obtain topsoil from local sources or from areas having similar soil characteristics as Site. Obtain topsoil only from naturally, well-drained Sites where topsoil occurs in a depth of not less than 4 inches. Do not obtain from bogs or marshes.

2.03 SEED AND SUPPORTING MATERIAL

- A. Provide seed, limestone, fertilizers, plant materials, water for irrigation and soil conditioners in accordance with MassDOT Standard Specifications and Supplements Section 765.40 and MassDOT Construction Details, and ANSI Z60.1.

2.04 PLANTING TREES, SHRUBS AND GROUNDCOVER

A. Provide in accordance with MassDOT Standard Specifications and Supplements Section 771 and MassDOT Construction Details.

B. Type: per MassDOT Standard Specifications and Supplements Section M6.06.1

2.05 SEEDING

A. Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analyst of North America. Do not use seed that has become wet, moldy, or damaged. All seed mixtures listed are proportions by weight.

1. Germination: not less than 80 percent

2. Purity: not less than 85 percent

3. Weed content: not more than 1 percent

B. Roadside Mixture

1. 50% Creeping Red Fescue

2. 15% Kentucky Bluegrass

3. 2% Red Top Clover

4. 25% Annual Ryegrass

5. 3% Bird's Foot Trefoil, Variety Empire

6. 5% White Clover

C. Lawn Repair Mixture

1. 60% Kentucky Bluegrass

2. 20% Perennial Ryegrass

3. 20% Chewings Fescue

2.06 FERTILIZER

A. Bone meal: commercial, raw or steamed, finely ground; minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: commercial, phosphate mixture, soluble; minimum of 20 percent available phosphoric acid.

- C. Fertilizer: commercial grade complete fertilizer of neutral character, consisting of fast and slow release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition.
 - 1. Nitrogen, phosphorous and potassium in amounts recommended in topsoil analysis reports from a qualified soil testing agency.
 - 2. Minimum 1 pound per 1,000 square feet of actual nitrogen, 4 percent phosphorous and 2 percent potassium by weight.

2.07 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 GENERAL

- A. Avoid damage to utilities, buildings and private property.
- B. Do not disturb property markers.
- C. Immediately report damage to Engineer.
- D. Repair all grassed areas disturbed during performance of the Work. Where existing topsoil remains, provide seed to re-establish grass. Where necessary, provide additional topsoil.
- E. Complete landscape work immediately as portions of Site become available, working within seasonal limitations for each kind work. Notify Engineer before planting if conditions detrimental to plant growth are encountered.
- F. Plant or install materials during normal planting seasons for each type of landscape work required, and as specified in Section 32 72 00.
- G. Use topsoil stockpiled for re-use as specified in Section 31 00 00.

3.02 LOAM BORROW

- A. Place loam borrow at designated locations where plant material is to be installed or re-installed in accordance with MassDOT Section 751 and MassDOT Construction Details and Drawings, or as directed by Engineer.
- B. Protect loam borrow delivered to Site from erosion and spread immediately. Cover material that sits on-Site for more than 24 hours with tarpaulin or other soil erosion system acceptable to Engineer, and surround with silt fence as shown on Drawings.

- C. Do not handle, plant or use loam borrow if wet or frozen. Use moist loam borrow.

3.03 PLANTING TREES, SHRUBS AND GROUNDCOVER

- A. Provide in accordance with MassDOT Standard Specifications and Supplements Section 771 and MassDOT Construction Details.
- B. Type: per MassDOT Standard Specifications and Supplements Section M6.06.1.
- C. Prune injured roots or branches to make clean-cut ends prior to planting, utilizing clean, sharp tools, removing only injured or diseased branching.
- D. Remove planting containers, baskets, and non-biodegradable materials from root balls during planting. Cut natural fiber burlap from around trunk of trees and folded down against root ball prior to backfilling.
- E. Position trees and shrubs at intended locations shown on Drawings and obtain Engineer's approval prior to excavating pits, making necessary adjustments as directed.
- F. Dig planting pits with level bottoms with width twice the diameter of root ball. Rest root ball on undisturbed grade. Backfill each plant pit in layers with thoroughly mixed, prepared soil; 1-part peat moss; 1-part composted cow manure by volume; 3 parts topsoil by volume.
 1. Provide 21-gram planting tablets, acceptable level of quality: equivalent to Agriform.
 - a. 2 tablets per 1-gallon plant
 - b. 3 tablets per 5-gallon plant
 - c. 4 tablets per 15-gallon plant
 - d. Larger plants: 2 tablets per 1/2-inch caliper of trunk
- G. Fill prepared soil around ball of plant halfway, and insert plant tablets. Complete backfill, and water thoroughly.

3.04 FINE GRADING

- A. Clean subgrade of stones greater than 2 inches and all debris immediately prior to dumping and spreading loam borrow, and remove from Site. Do not rake to edges and bury. Obtain Engineer's approval of subgrade conditions prior to spreading loam borrow.
- B. Spread and thoroughly incorporate soil additives into layer of loam borrow by harrowing or other approved methods. Incorporate the following soil additives.

1. Ground limestone or acidulants: as required by soil analysis to achieve required pH specified. Spread limestone at rate required by soil analysis up to maximum limit of 200 pounds per 1,000 square feet. Make a surface application of limestone not in excess of 50 pounds per 1,000 square feet to established planting area during the season after Final Acceptance if recommendations of soil analysis require rates of application greater than 200 pounds per 1,000 square feet.
 2. Fertilize at rate and analysis recommended by soil analysis.
 3. Use biosolid compost, peat moss, sand or other soil amendments as required by soil analysis.
- C. Prepare loam borrow by scarifying, harrowing, or tilling loam to integrate soil additives into top 6 inches of loam after loam borrow and required additives have been spread. Remove large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Remove all stones over 1-inch in diameter from top 6 inches of loam bed from unscreened soils. Remove smaller stones in excessive quantities as directed.
- D. Set sufficient grade stakes for checking finished grades. Set stakes in bottom of swales and at top of slopes. Do not deviate more than one-tenth of foot from indicated elevations. Connect contours and spot elevations with an even slope. Finish grades: smooth and continuous with no abrupt changes at top or bottom of slopes.
- E. Fill depressions caused by settlement or rolling during compaction process with additional loam borrow and regrade surface and roll until finish is smooth and even corresponding to required grades.
- F. Install loam borrow in successive horizontal lifts no thicker than 6 inches in turf areas and 12 inches in plant bed areas to desired compaction as indicated. Install soil at a higher level to anticipate any reduction of loam borrow volume due to compaction, settling, erosion, and decomposition during Warranty Period. Obtain full depths of loam borrow for plant beds by digging holes in loam borrow at same frequency as for compaction testing.
1. Compact loam to specified density.
 2. Maximum dry density for topsoil and loam: determined in accordance with ASTM D698. Achieve the following percentages of minimum to maximum dry densities for fill materials or prepared subgrades.
 - a. Fills within plant beds, tree pits and treeways: minimum 80 percent; maximum 85 percent for areas in top 18 inches of finished grade.

3. Scarify surface area of each lift by raking prior to placing next lift.
- G. Compact each lift to reduce settling, but not enough to prevent movement of water and feeder roots through the soil in addition to range cited above. Loam borrow in each lift: firm underfoot and make only slight heel prints. Loam borrow at completion of installation: firm, even resistance when a soil sampling tube is inserted from lift to lift. Perform percolation tests after placement of each lift to determine if soil has been over compacted using the following percolation test procedure.
 1. Dig a hole in installed soil minimum of 4 inches in diameter. Holes in 6-inch lift in turf areas: 4 inches deep. Holes in 12-inch lifts in plant beds: 8 inches deep. Do not penetrate through lift being tested.
 2. Fill hole with water and let it drain completely. Immediately refill hole with water and measure rate of fall in water level.
 3. Till soil to a depth required to break over compaction if water drains at a rate less than 1-inch per hour.
 4. Perform a minimum of 1 soil percolation test per 10,000 square feet of turf area, and 2,500 square feet of tree and shrub planting area as directed.
- H. Select equipment and phase installation of loam borrow so wheeled equipment does not travel over subsoil, placed fills or ordinary borrow, or already installed soil. Movement of tracked equipment over these soils will be reviewed and considered by Engineer for approval. If Engineer determines that wheeled equipment must travel over already installed soil, provide a written description of sequencing of Work that ensures compacted soil is loosened and uncompacted as Work progresses, or place 1-inch thick steel plate ballast or approved equivalent over length and width of any travel way to cover loam borrow to protect it from compaction.
- I. Grade disturbed areas outside limit of Work, smooth and spread with minimum 4 inches of loam borrow to finished grade.
- J. Maintain stockpiles of existing on-Site topsoil until final placement of existing on-Site topsoil and loam borrow is approved. Provide survey data plotted on a 20-scale plan of the Site prepared by a registered surveyor or civil engineer, showing volume of stockpiles of existing on-Site topsoil. Remove excess, unused existing on-Site topsoil from Site and legally dispose of upon approval.

3.05 SEED AND SUPPORTING MATERIAL

- A. Install and apply seed and supporting materials at the rates of application and in accordance with MassDOT Standard Specifications and Supplements Section 765.40 and the Drawings.

3.06 HYDROSEEDING NEW AREAS

- A. Mix specified seed and pulverized mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.
- B. Apply slurry using an approved machine. Seed and suitable corn fiber mulch may be applied in one operation. Mix materials with water in machine and agitate to keep mixture uniformly suspended. Use spraying equipment that will distribute slurry uniformly at required rates.
- C. Immediately following hydroseeding, mulch areas by means of mulch blower at rate of 1,200 pounds per acre on level grades, 2,000 pounds on slopes if mulch is not part of slurry. Use mulch specified in 2.04.A.
- D. Seed only areas that can be mulched on same day.

3.07 SEEDING NEW AREAS

- A. Sow seed using a spreader or seeding machine. Do not seed when wind velocity exceeds 5 miles per hour. Distribute seed evenly over entire area by sowing equal quantity in 2 directions at right angles to each other.
- B. Do not sow immediately following rain or when ground is too dry.
- C. Seed application rate: 1 pound per 1,000 square feet.
- D. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

3.08 PROTECTION OF SEEDED SLOPES

- A. Protect seeded slopes against erosion with erosion netting or other acceptable methods.
- B. Spread specified mulch after completion of seeding operations to form a continuous blanket not less than 1-1/2 inches' loose measurement over seeded areas.
- C. Anchor mulch by spraying with asphalt emulsion at rate of 10 to 13 gallons per 1,000 square feet. Prevent damage or staining of construction or other plantings adjacent to mulched areas.
- D. Cover seeded slopes with jute matting where grade is 3:1 or greater. Roll matting down over slopes without stretching or pulling.
- E. Lay matting smoothly on soil surface, burying top end of each section in narrow 6-inch trench. Leave 12-inch overlap from top roll over bottom roll. Leave 4-inch overlap over adjacent section.

- F. Staple outside edges and overlaps at 36-inch intervals.
- G. Lightly dress slopes with topsoil to ensure close contact between matting and soil.
- H. Unroll matting in direction of flow in ditches. Overlap ends of strips 6 inches with upstream section on top.

3.09 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Site/Field Tests and Inspections
 - 1. Landscape work to be inspected and approved prior to completion of the Work.
 - 2. Replace rejected Work, and continue specified maintenance until re-inspected by Engineer and accepted. Remove rejected plants and materials promptly from Site.

3.10 CLEANING

- A. Keep pavement, sidewalks, and walkways clean. Maintain protection during installation and maintenance periods.

3.11 MAINTENANCE

- A. Provide maintenance of grass seeded areas immediately after planting.
- B. Maintain grass by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, re-grading, and replanting as required to establish smooth, acceptable lawn areas free of eroded or bare areas.
- C. Maintain grassed areas to establish acceptable lawn areas until final completion, or for a minimum of 180 days after substantial completion, whichever is longer.
- D. Maintain grass by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, re-grading, and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.
- E. If seeded in the fall season and full 180 days of maintenance is not provided, or if not considered acceptable at that time, continue maintenance during the following spring season until acceptable lawn areas are established.
- F. Maintain trees and shrubs until in accordance with Item C of this section.

3.12 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 33 31 11

SANITARY SEWERAGE GRAVITY PIPING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide gravity sewer pipe and appurtenances in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Requirements
 - 1. Section 33 39 13 - Sanitary Utility Sewerage Manholes, Frames, and Covers
- C. Related Documents
 - 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Referenced Standards
 - 1. ASTM International (ASTM)
 - a. ASTM C923 Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
 - b. ASTM C1173 Standard Specification for Flexible Transition Couplings for Underground Piping Systems
 - c. ASTM D1784 Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
 - d. ASTM D2241 Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)

- e. ASTM D3034 Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
 - f. ASTM D3212 Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
 - g. ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
2. American Water Works Association (AWWA)
- a. AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution
3. Uni-Bell PVC Pipe Association (UBPPA)
- a. UNI-B-06 Recommended Low-Pressure Air Testing of Installed Sewer Pipe
 - b. UNI-TR-1 Deflection: The Pipe/Soil Mechanism
 - c. Uni-Bell Handbook of PVC Pipe Design and Construction

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.
- B. Schedule police details and coordinate traffic management for all Work locations with Owner.

1.05 SUBMITTALS

- A. Submit in accordance with the Division 01 General Requirements.
- B. Product data
- C. Shop Drawings: catalog cuts for testing equipment, including go-no-go mandrel and air leakage testing equipment.
- D. Source and field quality control submittals: weekly construction records of installed Work.
- E. Closeout and maintenance material submittals: per Division 01 General Requirements.

1. Record pipe material and classes. Record depth and take ties to location of the following for construction records.
 - a. Building service capped ends, cleanouts, bends, connection points to sewer main
 - b. Repairs to existing pipes
 - c. Pipe stub capped ends
 - d. Chimneys and other pipe appurtenances

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing conditions: per Division 01 General Requirements.
 1. Verify existing pipe material as shown on Drawings.
 2. Notify Owner immediately if Site conditions prevent access to manholes or pipes identified as part of the Work.

PART 2 – PRODUCTS

2.01 PVC GRAVITY SEWER PIPE

- A. Furnish ASTM D3034 with push-on joints per ASTM D3212. Pipe gaskets: ASTM F477 elastomeric seals or nitrile gaskets. Materials: equal or exceed cell class 12454 or 12364 in accordance with ASTM D1784.
- B. Pipe with less than 4-feet of cover or more than 16-feet of cover: ASTM D2241 standard dimension ratio (SDR) 21. Unavailable sizes: SDR 26.
- C. Pipe 4-feet to 16-feet of cover: SDR 35.

2.02 COUPLINGS

- A. Type A solid sleeve coupling: AWWA C219, ROMAC Model No. 501, Smith-Blair Model No. 411, Dresser Style 38, or equal.

- B. Type B neoprene sleeve: ASTM 1173. Acceptable level of quality: of equivalent to Fernco.

Type C neoprene sleeve with stainless steel wrap: ASTM 1173. Acceptable level of quality: equivalent to Fernco Strongback coupling

- C. Type D PVC repair coupling: of same type and class of materials as pipe with single piece gasket. Provide with center stop or friction clamp.

2.03 FITTINGS

- A. Furnish single piece gasket of same type and class of materials as pipe except as otherwise specified. Provide wyes or tee wyes for service connections and manhole inside drop connections.

2.04 INSULATION

- A. Furnish 2-inch thick, 4-feet wide, extruded closed-cell rigid formed polystyrene. Acceptable level of quality: equivalent to Dow Styrofoam Highload 60.

2.05 NON-WOVEN FILTER FABRIC FOR WORKING MAT

- A. Acceptable level of quality: equivalent to TenCate Mirafi 160N.

2.06 SEWER CHIMNEY

- A. Furnish ductile iron tee, 6-inch ductile iron riser pipe, wye, bend, cap, and sonotube.

2.07 DETECTABLE WARNING AND IDENTIFICATION TAPE FOR BURIED UTILITY LINES

- A. Acceptable level of quality: equivalent to Trumbull Manufacturing.
- B. Aluminum core plastic encased tape: 6-inch minimum width, with warning and identification imprinted in bold black letters continuously over the entire tape length.
- C. Warning tape color code: Green - Sanitary Sewer Systems
- D. Color and printing: permanent and unaffected by moisture or soil.
- E. Minimum thickness: 0.003 inches.
1. Minimum strength: 1,500 pounds per square inch lengthwise, and 1,250 pounds per square inch crosswise, with a maximum 350 percent elongation.

2.08 PRECAST CONCRETE MANHOLES CONNECTIONS

- A. Acceptable level of quality of sleeve seal for pipe less than 6 inches in diameter: equivalent to Link-Seal Model S-316 by Thunderline Corp.
- B. Boot type flexible connector with rubber gasket or boot, metal expansion ring and double metal take-up clamps: ASTM C923. Acceptable level of quality: equivalent to Kor-N-Seal.

2.09 CRUSHED STONE

- A. Furnish 3/4-inch crushed stone for sonotube installation.

2.10 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Provide bypass pumping in accordance with Section 01 51 40.

3.02 INSTALLATION

- A. Install PVC pipe in accordance with manufacturer's recommendations. Use laser beam for line and grade unless alternate method are approved.
- B. Secure each length of pipe with bedding before placing next length. Bed pipe as shown on Drawings. Plug open ends whenever Work is suspended.
- C. Provide 30-inch minimum cover over top of pipe before trench is wheel-loaded.
- D. Lay pipe to line and grade shown on Drawings. If grade is not shown, determine elevations of start and finish points for each run of pipe. Lay pipe to a uniform grade between these points. Line and grade may be adjusted by Engineer as required by field conditions.
- E. Lay pipe in the dry. Dewater trench in accordance with Division 01 General Requirements. Do not use installed pipe to remove water from Work area.
- F. Flush pipes and remove debris using method approved by Engineer. Do not use gravity flushing.
- G. Install piping with less than 4-feet of cover or greater than 16-feet of cover complete from manhole to manhole. Do not mix pipe class, splicing or couplings. Use and location of flexible couplings: approved by Engineer.

- H. Use center stop or restrain by friction clamp for Type D PVC repair coupling to prevent movement of coupling during backfilling or alternate method approved by Engineer.
- I. Use nitrile gaskets in contaminated soil areas.
- J. Connections to New Precast Concrete Manholes
 - 1. Use link seal for pipe less than 6 inches in diameter.
 - 2. Use boot type flexible connector for pipe greater than or equal to 6-inch diameter.
- K. Connections to Existing Precast Concrete Manholes
 - 1. Core existing manhole and repair manhole penetration to install flexible connector.
 - 2. Repair manhole brick invert and bench to provide smooth transition from manhole to pipe.
- L. Connections to Existing Non-Precast Concrete Manholes
 - 1. Core existing manhole and provide new boot type flexible connector. Repair manhole penetration to install flexible connector.
 - 2. Minimize size of penetration and provide non-shrink grout surrounding pipe to seal. Provide watertight pipe connection if manhole cannot be cored. Provide damp proofing to repair as specified in Section 33 39 13.
 - 3. Repair manhole brick invert and bench to provide smooth transition from manhole to pipe.
- M. Service Laterals and Fittings
 - 1. Verify location and size of service laterals as shown on Drawings.
 - 2. Provide tee wye or wye fittings on main line pipe and connect existing service connections to main line as shown on Drawings.
 - 3. Provide clean-outs as required by building code and at locations shown on Drawings.
 - 4. Cap and stake ends of new service. Provide oak marker as shown on Drawings. Assist Engineer in measuring pipe installed and obtaining swing ties.

- N. Enclose upright portion of sewer chimney with sonotube filled with 3/4-inch crushed stone. Cut sonotube to 1 foot below elevation of tee wye connecting chimney to service connection pipe. Install as shown on Drawings and as directed.
- O. Vertical Separation from Water and Storm Drain lines
 - 1. Elevation where sewer piping crosses water or storm drain lines: minimum 18 inches below bottom of water or drain line. Provide protection as shown on Drawings and as follows when elevation of sewer piping cannot be buried as specified above.
 - a. Provide adequate structural support to prevent excessive deflection of joints.
 - b. For water pipe, center 1 full length of water pipe at crossing point so joints are equal distance and as far as possible from sewer piping.
- P. Parallel Separation from Water and Storm Drain Lines
 - 1. Lay sewer piping, sewer services and sewer manholes at least 10-feet horizontally, edge to edge, from water and drain lines. When conditions do not permit a horizontal separation of 10-feet, a sewer line may be laid closer to a water or drain line as shown on Drawings, and ensure bottom of water or drain line is at least 18 inches above top of sewer piping wherever possible.

3.03 INSULATION

- A. Install insulation when gravity sewer pipe depth is less than 4-feet or as directed by Engineer.
- B. Provide minimum 4-inch sand layers directly above and below insulation.

3.04 TESTING OF SANITARY SEWERS

- A. Test sanitary sewer pipes after backfilling. Install house service leads on main pipe before testing. Perform tests in presence of Engineer. A maximum of 1,000-feet of pipe may be installed, but not tested.
- B. Leakage test for PVC pipe: low-pressure air test in accordance with UNI-B-06. Conform minimum times for test to the more stringent of the following table or Table 1 of UNI-B-06.
 - 1. Minimum specified time required for a 1.0 PSIG pressure drop for size and length of pipe indicated for Q=0.0015

Pipe Diameter (inches)	Minimum Time (seconds)	Length for Minimum Time (feet)	Time for Longer Length (seconds)	Specification Time for Length (L) Shown (minimum: seconds)							
				100 feet	150 feet	200 feet	250 feet	300 feet	350 feet	400 feet	450 feet
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	9:26	11:52	13:51	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46
48	45:34	50	54.705 L	91:10	136:45	182:21	227:55	273:31	319:06	364:42	410:17
60	56:40	40	85.476 L	142:28	213:41	284:55	356:09	427:23	498:37	569:50	641:04

2. Perform deflection test for PVC pipe within 30 days of completion of installation. Test 100 percent of pipe with go/no-go mandrel with outside dimension to permit no more than a 7.5 percent deflection. Base mandrel dimensions on a base pipe ID from ASTM D3034 SDR 35/SDR 21 or AWWA C900 DR 18 as appropriate, and the following calculation: per UNI-TR-1.

$$\text{Mandrel O.D.} = ((100-7.5)/100) \times \text{base pipe ID}$$

3. Repair or replace pipes not passing test using approved materials and methods and retest.
4. Clean and flush sewer pipe after Work is completed and before final acceptance.

3.05 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.06 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 33 39 13

SANITARY UTILITY SEWERAGE MANHOLES, FRAMES, AND COVERS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 1. Provide concrete sewer manholes and accessory items in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Requirements
 1. Section 01 51 40 – Temporary Sewage Bypass
 2. Section 33 31 11 - Public Sanitary Sewerage Gravity Piping
- C. Related Documents
 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 1. American Association of State Highway and Transportation Officials (AASHTO)
 - a. AASHTO M 81 Standard Specification for Cutback Asphalt (Rapid-Curing Type)
 - b. AASHTO M 82 Standard Specification for Cutback Asphalt (Medium-Curing Type)
 - c. AASHTO M 140 Standard Specification for Emulsified Asphalt
 - d. AASHTO Standard Specifications for Highway Bridges HS-20 Loading
 2. ASTM International (ASTM)

- a. ASTM A48 Standard Specification for Gray Iron Castings
 - b. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - c. ASTM C32 Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale)
 - d. ASTM C33 Standard Specification for Concrete Aggregates
 - e. ASTM C150 Standard Specification for Portland Cement
 - f. ASTM C207-06 Standard Specification for Hydrated Lime for Masonry Purposes
 - g. ASTM C270 Standard Specification for Mortar for Unit Masonry
 - h. ASTM C478 Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
 - i. ASTM C913 Standard Specification for Precast Concrete Water and Wastewater Structures
 - j. ASTM C990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
 - k. ASTM D4101 Standard Specification for Polypropylene Injection and Extrusion Materials
3. Occupational Safety and Health Administration (OSHA)

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product data
- C. Shop Drawings for precast manholes and precast concrete items. Show components, elevations of top of precast sections, base and pipe inverts, location of pipe penetrations and steps for each manhole. Confirm finish grade elevation for each proposed structure.
- D. Design data and submittals
 1. Manufacturer's anti-flootation calculations for each structure, signed and stamped by a professional engineer licensed in the state where Project is located, based on the following criteria.

- a. Groundwater elevation: set at grade above the structure.
- b. Safety factor: 1.1; downward forces from weight of pipe and soils over pipe: 1.1 times buoyant uplift forces.
- c. Structure: considered empty. Do not consider weight of internal water in calculations.
- E. Structural Design Certificate for the precast concrete structure that the design has been prepared and is in compliance with this Section and stamped by a professional engineer licensed in the state where the Project is located
- F. Calculations with modified dimensions or reinforcement showing adequate strength and resistance to buoyant forces
- G. Manufacturer instructions

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Provide complete manhole capable of supporting AASHTO H-20.
- B. Precast concrete: ASTM C913.
- C. Non-shrink grout

2.02 PRECAST CONCRETE MANHOLES

- A. Design: AASHTO H-20 loading.
- B. Precast manhole components: ASTM C478 with manufacturer name and date of manufacture.
- C. Wall section: minimum 5 inches thick.

- D. Base section: precast monolithic construction, including minimum 18-inch riser with shiplap joints and steps.
- E. Manhole riser: precast barrel sections with shiplap joints and steps.
- F. Top section: precast eccentric cone with shiplap joints and steps. Use flat covers as shown on drawings and for structures less than 5 feet deep.
- G. Steps: pattern design copolymer polypropylene with grade 60 steel reinforced rod, minimum outside width of 14-1/2 inches in accordance with OSHA, manufactured from deformed 1/2-inch steel reinforcement rod according to ASTM A615 and encased in polypropylene according to ASTM D4101. Embed steps in concrete extending minimum 5 inches from wall.

2.03 PRECAST CONCRETE DROP MANHOLES

- A. Conform to requirements for manholes and provide inside drop as shown on Drawings.
- B. Riser support bracket: 10-gauge, Type 304, No. 3 finish stainless steel, spaced no greater than 5 feet apart.

2.04 MASONRY INVERTS

- A. Brick: sound, hard, uniformly burned brick, regular and uniform in shape and size, compact texture, acceptable to Engineer. Immediately remove rejected brick and substitute brick acceptable to Engineer. Provide brick and mortar inverts only, not concrete inverts.
 - 1. Sewer invert: ASTM C32, Grade SS.
 - 2. Grade adjustment: ASTM C32, Grade MS.
- B. Mortar: ASTM C270 Type M, by volume, composed of 1-part ASTM C150 Type II portland cement, 1/3-part ASTM C207 Type S lime, and 4-part ASTM C33 sand.

2.05 FRAMES AND COVERS

- A. Material: ASTM A48 Class 35 cast iron.
- B. Manholes 6-feet or more vertical height: minimum 24-inch diameter opening. Manholes 6-feet or less vertical height: minimum 28-inch diameter opening. Minimum weight: 350 pounds according to AASHTO H-20 loading.
- C. Water tight covers: labeled with SEWER in 3-inch raised letters displaying year of contract.

1. Acceptable level of quality for 24-inch diameter opening: equivalent to Model R1643 frame and Type C cover with self-sealing application by Neenah Foundry or Product No. 00211064A01, by East Jordan Iron Works.
2. Acceptable level of quality for 28-inch opening: equivalent to Model R1754-B frame and Type C cover with self-sealing application by Neenah Foundry.
3. Acceptable level of quality for 28-inch diameter opening waterproof locking frames and covers: equivalent to R1755-F1 frame and Type C cover by Neenah Foundry or Product No. 00200632A01 by East Jordan Iron Works.

2.06 ANTI-FLOATATION SLABS

- A. Slabs: integral to manhole base.
- B. Alternate slabs: cast-in-place if approved by Owner and Engineer.
- C. Slab size and reinforcement: as shown on Drawings based on calculations performed by a professional engineer licensed in the state where Project is located.
- D. Include connection hardware specifications in design.

2.07 MISCELLANEOUS

- A. Provide 1 mechanical or magnetic manhole cover lifting tool, selected by Owner.
- B. Damp Proofing
 1. Apply minimum 2 shop coats of bituminous damp proofing using cutback asphalt on exterior surfaces of precast manhole bases, walls, and cones according to AASHTO M 81 or M 82. Asphalt emulsion according to AASHTO M 140 or approved equal, at 5 gallons per 150 square feet minimum per coat, acceptable level of quality: equivalent to Sonneborn Hydrocide 700B.
- C. Joint Sealants
 1. Butyl rubber sealant: 1-inch diameter flexible rope form according to ASTM C990, section 6.2.1A. Acceptable level of quality: equivalent to Kent Seal. Butyl mastic is not acceptable.
 2. Butyl rubber caulking: according to ASTM C990.

2.08 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Provide bypass pumping in accordance with Section 01 51 40.

3.02 INSTALLATION

- A. Place precast bases on compacted bedding material. Plug lifting holes with non-shrink grout and touch up damp proofing.
- B. Provide 2 strips of 1-inch diameter butyl rubber sealant for joints and parge with non-shrink grout.
- C. Setting Frame and Covers
 1. Set cross-country areas 24 inches above finish grade; lawn and landscaped areas at grade, and paved areas 1/4-inch below pavement grade.
 2. Set to final grade only after pavement base course has been applied, or after final grading of gravel roads. Set castings in cement.
 3. Provide minimum 2 bricks, maximum 5 bricks, for grade adjustment.
 4. Install bituminous asphalt collar.
- D. Replace steps out of plumb and horizontal placement.
- E. Pipe to manhole connections: watertight as specified in Section 33 31 11.
- F. Touch up damp proofing prior to backfilling as directed by Engineer, including lifting holes and manhole connections.

3.03 INVERT BRICK WORK

- A. Remove debris from bottom of manhole before invert is constructed.
- B. Moisten bricks. Prevent over-soaking to avoid improper adhesion.
- C. Lay each brick as a header in a full bed and joint of mortar without requiring subsequent grouting, flushing or filling, and thoroughly bond.

- D. Provide brick inverts conforming to size of adjoining pipes. Side inverts: curved. Main inverts: laid out in smooth curves of longest possible radius where direction changes, which is tangent to centerlines of adjoining pipe.

3.04 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Site/Field Tests and Inspections
 1. Conduct manhole inspections prior to leakage tests. Tests: observed by Engineer. If modifications are made after inspection, retest manhole.
 2. Fill pipes and manholes with water in advance of exfiltration test, if necessary. Allow time to soak to minimize effects of absorption.
 3. Exfiltration Test
 - a. Plug pipes into and out of manhole and secure plugs.
 - b. Lower groundwater table (GWT) to below manhole. Maintain GWT at this level throughout test.
 - c. Fill manhole with water to top of cone. Allow time for absorption.
 - d. Refill top of cone.
 - e. Determine volume of leakage in an 8-hour minimum test period and calculate rate.
 - f. Acceptable leakage rate: no more than 1-gallon per vertical foot per 24 hours.
 - g. Engineer reserves the right to require an infiltration test.
 4. Vacuum Test
 - a. Manholes may be vacuum tested in lieu of exfiltration test. Perform vacuum tests prior to backfilling manhole and constructing manhole inverts and benches. Connect pipes prior to test.
 - b. Test Procedure
 - 1) Plug pipe openings and securely brace plugs and pipe.
 - 2) Set tester on top section of manhole and inflate compression band to affect a seal between structure and vacuum base.
 - 3) Connect vacuum pump to outlet port, open valve, start motor and draw a vacuum of 10 inches of Mercury (Hg).
 - 4) Close valve and monitor vacuum gauge.

- 5) Test passes if vacuum holds at 10 inches of Hg, or drops no lower than 9 inches of Hg within the following times.

<u>Depth of Manhole</u>	<u>Time</u>
0 feet to 10 feet	3 minutes
10 feet to 15 feet	3.5 minutes
15 feet to 20 feet	4 minutes
20 feet to 25 feet	4.5 minutes
Greater than 25 feet	5 minutes

- 6) If vacuum drops more than prescribed rate, locate leak, make proper repairs, and retest manhole.
7) If unit fails test after repair, perform water exfiltration test.

3.05 CLEANING

- A. Clean manholes of silt, debris and foreign matter prior to final inspection.

3.06 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 33 41 00

STORM UTILITY DRAINAGE PIPING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide storm drain systems in accordance with this Section, applicable reference standards listed in Article 1.03., and the Drawings.
- B. Related Requirements
 - 1. 31 00 00 Earthwork
- C. Related Documents
 - 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. MassDOT Standard Specifications and Supplements, except for Compensation sections
 - 2. MassDOT Construction Details
 - 3. Applicable portions of City of Quincy Code of Ordinances and Zoning Ordinances
 - 4. American Water Works Association and American National Standards Institute (AWWA/ANSI)
 - a. AWWA/ANSI C905 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. through 48 In.
 - 5. ASTM International (ASTM)

- a. ASTM C76: Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
- b. AASHTO M 170, Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
- c. ASTM C443: Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
- d. ASTM C1173 - Flexible Transition Couplings for Underground Piping Systems
- e. ASTM D2412 – Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
- f. ASTM D3139 - Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals
- g. ASTM D3212 - Joints for Drain & Sewer Plastic Pipes Using Flexible Elastomeric Seals
- h. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- i. AASHTO M294: Corrugated Polyethylene Pipe, 300- to 1200-mm (12- to 48-in.) Diameter
- j. ASTM C1173 Standard Specification for Flexible Transition Couplings for Underground Piping Systems
- k. ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- l. ASTM D4101 Standard Specification for Polypropylene Injection and Extrusion Materials
- m. ASTM D2412 Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with the Division 01 General Requirements.
- B. Product Data
 - 1. Manufacturer's data recommendations for storage, protection, handling, and installation of the pipe, fittings, and appurtenances

C. Certificates

1. Certificate of Compliance: Each shipment of pipe, pipe fittings and appurtenances shall be accompanied with the manufacturer's notarized certificate certifying conformations with the Specifications.

D. Design Data/Submittals

1. Pipe manufacturer's anti-flootation calculations for each pipe material and details, signed and stamped by a licensed Professional Engineer in the state in which the Project is located based on the following criteria:
 - a. Groundwater elevation shall be set at grade above the pipe.
 - b. Factor of safety shall be 1.1; downward forces from the weight of the pipe and soils over pipe shall be 1.1 times the buoyant uplift forces.
 - c. The pipe shall be considered empty. Calculations shall not consider the weight of internal water.

E. Field Quality Control Submittals

1. Test results
2. Logs of inspection and testing

F. Closeout and Maintenance Material Submittals per Division 01 General Requirements and as follows:

1. Record depths and ties to the locations of the following as applicable:
 - a. Pipe stub capped ends
 - b. Locations of plugged pipes
 - c. Manholes and catch basins

G. Test Reports: Submit the test results, Inspection video on DVD, and logs from the Inspection and Testing of Storm Drains.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Packing, Shipping, Handling, and Unloading

1. Provide that each shipment of pipe, pipefittings and appurtenances includes manufacturers' Certificate of Compliance.
 2. Inspect upon delivery and reject pipe immediately that does not conform to the specified requirements or has been damaged beyond repair and immediately remove from Site.
- C. Waste Management and Disposal
1. Remove damaged pipe from the Site and legally dispose of.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.
- B. Notify the Owner immediately if the Site conditions prevent access to manholes or pipes identified as part of the Work.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Provide fittings of same type and class of materials as pipe with single piece gasket, unless otherwise specified.
- B. Source Quality Control: in accordance with Division 01 General Requirements.

2.02 REINFORCED CONCRETE PIPE (RCP)

- A. Reinforced Concrete Pipe must only be used at locations as shown on the drawings.
- B. Reinforced Concrete Pipe (RCP): ASTM C76 /AASHTOM170 Class V pipe; ASTM C443/ AASHTO M198 concrete joint with confined O-ring gasket. RCP shall be sealed on the inside with cement mortar or with gunite by the grout-weld method using a pneumatic machine.
- C. Cement mortar if used shall be applied by trowel and the joint shall be thoroughly filled and finished smoothly with the inside surface of the pipe.

2.03 MISCELLANEOUS

- A. Pipe to Pipe Connection Flexible Couplings: ASTM C1173.
 1. Type A: non-pressure application, elastomeric sleeve or rubber sleeve incorporating stainless steel tension bands and a tightening mechanism to provide a positive seal against both infiltration and exfiltration. Stainless

steel bands: 300 series stainless steel. Coupling: resilient and unaffected by soil conditions, resistant to chemicals, ultraviolet rays, and fungus growth.

- B. Underground Marking Tape: detectable marking tape with aluminum core with minimum 6-inch width and minimum 5 mils thickness with APWA uniform color-coding for quick and easy identification and location. Text or lettering: repeated continuously along length of tape at intervals no greater than 3 feet indicating "Caution Buried Drain Line Below".
- C. Manholes Connections
 - 1. To New Manholes: compression type flexible connector cast into the manhole wall or flexible boot connection per pipe manufacturer recommendations.
 - 2. To Existing Manholes: by coring and installing a boot type flexible connector.
- D. Gasket lubricant: solution of vegetable soap or other solution supplied by the pipe manufacturer.
- E. Anti-flootation system for each pipe material: per the design of the pipe manufacturer and provided where required.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install storm drain piping in accordance with Section 230 of the MassDOT Standard Specifications, and to the lines and grades and at the locations shown on the Drawings. Field verify elevations and slope and make adjustments as necessary
- B. Install in accordance with manufacturer's recommendations. Do not install unsound or damaged pipe or accessories.
- C. Secure each length of pipe with bedding before placing next length. Bed pipe as shown on Drawings. Excavate bell/coupling holes or provide in the base material to receive the bell or coupling so that only the barrel of the pipe receives bearing pressure from the supporting material. Do not permanently support pipe or fittings on blocks, wedges, boards or stones.
- D. When each pipe has been properly bedded, place and compact enough of the backfill material between the pipe and the sides of the trench to hold the pipe in correct alignment.

- E. Close open ends of pipe by suitable temporary bulkheads to prevent entrance of earth and other materials when pipe laying is not in progress.
- F. Take necessary precautions to prevent floatation of the pipe as a result of the water in the trench.
- G. Maintain flows during Work per Division 01 General Requirements.
- H. Assist Engineer as needed to run level checks on pipe slopes, and take ties.
- I. Lay pipe to line and grade shown on the Drawings. Field verify elevations and slope and make adjustments as necessary. If grade is not shown, determine elevations of start and finish points for each run of pipe. Lay pipe to a uniform grade between manholes. Line and grade may be adjusted by the Engineer as required by field conditions. Lay each pipe to form a close joint with the next adjoining pipe and bring the invert continuously to the required line and grade.
- J. Immediately lay pipe as soon as excavation is completed and the bedding material has been brought to the proper grade.
 - 1. Insert circular rubber gasket in the gasket seat provided and apply a thin film of gasket lubricant to the inside surface of the gasket.
 - 2. Clean spigot end of the pipe and enter into the rubber gasket in the bell, using care to keep the joint from contacting the ground.
 - 3. Complete joint shall then be completed by forcing the plain end to the seat of the bell. Pipe which is not furnished with a depth mark shall be marked before assembly to assure that the spigot end is inserted to the full depth of the joint.
- K. Do not lay next length of pipe until the previous length has had sufficient material tamped about it to firmly secure it in place so as to prevent any movement or disturbance.
- L. Do not lay pipe in water or when trench conditions or weather are unsuitable for such Work, except as approved by Engineer. Do not use installed pipe to remove water from Work area.
- M. Lay pipe with the bell ends facing the direction of the laying unless otherwise permitted by the Engineer. Make joints per pipe manufacturer recommendations.
- N. Flush pipes and remove debris per method approved by Engineer. Gravity flushing is not acceptable.
- O. Connections to manholes and catch basins: short length of pipe so that joints are located within 3 feet of inside surface of manholes and catch basins.

- P. Use manufacturer recommended anti-flootation system for each pipe material.
- Q. Reinforced Concrete Pipe Installation
 - 1. Inspect interior of each pipe while being joined to see that the alignment is preserved and to ensure that no dirt or debris has entered the pipe after laying and partial backfilling.
 - 2. Carefully lower pipe fittings and accessories lowered into the trench, piece by piece, by means of derrick, crane, slings and other suitable tools and equipment, in a manner such as to prevent damage to the material. Do not pass chains or slings through the inside bore of any pipe. Do not drop piping materials or dump into trench.

3.02 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Pipe shall be subject to thorough inspection and tests in accordance with the methods prescribed by applicable ASTM specifications. Pipes may be rejected at Site if non-conforming or damaged regardless of prior factory acceptance.
- C. Remove and replaced damaged pipe found or encase in a Class A concrete collar or envelope as directed, at no additional cost to the Owner.
- D. Perform digital video inspection of the interior of pipe and catch basin lateral connections prior to final paving by experienced personnel trained in locating breaks, obstacles and service connections by closed circuit television. Submit a DVD and suitable log to Engineer for review prior to final paving.

3.01 CLEANING

- A. Clean and flush piping after Work is completed and before final acceptance.

3.03 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 33 49 00

STORMWATER STRUCTURES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Remove, provide, excavate, install and backfill new storm drainage catch basins, manholes, stormwater treatment units, inverts, all fittings, castings, pipe connection, brickwork, damp proofing, specialties and accessories which are shown on the drawings specified herein or are otherwise required for proper installation and functioning of the drainage and castings in accordance with this Section and applicable reference standards listed in Article 1.03.
 - 2. Related Requirements
 - a. Section 33 41 00 Storm Utility Drainage Piping
 - b. Section 31 00 00 Earthwork
- B. Related Documents
 - 1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. MassDOT Standard Specifications and Supplements, except for Compensation sections
 - 2. MassDOT Construction Details
 - 3. Applicable portions of City of Quincy Code of Ordinances and Zoning Ordinances
- B. ASTM International (ASTM)

1. ASTM A48: Gray Iron Casting
2. ASTM A48/A48M Standard Specification for Gray Iron Castings
3. ASTM C32: Sewer and Manhole Brick
4. ASTM C923: Manhole Connectors
5. ASTM C139: Concrete Masonry Units for Construction of Catch Basins & Manholes
6. ASTM C144: Aggregate for Masonry Mortar
7. ASTM C150: Portland Cement
8. ASTM C207: Hydrated Lime for Masonry Purposes
9. ASTM C 270, Type S, Mortar Cement
10. ASTM C478: Precast Reinforced Concrete Manhole Sections
11. ASTM A615: Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
12. ASTM C923: Resilient Connectors between RC Manhole Structures and Pipes
13. ASTM C990: Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
 1. ASTM C1244: Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
 2. ASTM D4101: Polypropylene Injection and Extrusion Materials

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with the Division 01 General Requirements.

1. Product Data
 - a. Shop drawings: submit for each precast manhole, catch basin, stormwater treatment units, trench drain, and precast concrete items. Show components to be used, elevations of top of precast sections,

base, intermediate levels and pipe inverts, location of pipe penetrations, cutouts and steps for each manhole. Verify finish grade elevation for each manhole location in the field.

- b. Product Data: Submit manufacturers' product data and installation instructions for frames, covers, grates, precast items, riser bricks, grade rings, manhole sleeves, stormwater treatment unit joint sealants, joint sealants, damp proofing, and appurtenances.

2. Manufacturer Instructions

3. Design Data/Submittals

- a. Manufacturer's anti-flootation calculations for each structure, signed and stamped by a licensed Professional Engineer in the State of Massachusetts based on the following criteria:

- 1) Groundwater elevation shall be set at grade above the structure.
- 2) Factor of safety shall be 1.1; downward forces from the weight of the pipe and soils over pipe shall be 1.1 times the buoyant uplift forces.
- 3) The structure shall be considered empty. Calculations shall not consider the weight of internal water

4. Source and Field Quality Control Submittals

- B. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. General: Manhole sections will be inspected upon delivery; manhole sections which do not conform to specification requirements will be rejected and shall be removed immediately from the site by the Contractor. Furnish labor and facilities necessary to assist the Engineer in inspecting the material.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Packing, Shipping, Handling, and Unloading

1. Handle and place concrete manholes, catch basin units, and stormwater treatment units in accordance with manufacturer's written rigging instructions
2. Provide necessary slings, straps, and other devices for the safe and satisfactory handling and support of the manhole and catch basin sections during lifting, installing, and final positioning using lifting holes

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 CASTINGS

1. Manhole cover: In accordance with Section 201 and 220 of the MassDOT Standard Specifications and Supplements. Provide MassDOT 1977 Standard Frame and Cover. Labeled with "DRAIN" in 3" high raised letters on cover.
2. Catch basins: EJIW or approved equal catch basin square frame or gutter inlet frames and grates with square hole grate per the Drawings.
3. Source Quality Control: in accordance with Division 01 General Requirements.

2.02 CATCH BASINS AND DRAIN MANHOLES

- A. General: Provide precast structures conforming to ASTM C478 and as shown on the Drawings capable of supporting H-20 loading, and HL-93 loading.
- B. Provide in accordance with MassDOT Standard Specifications and Supplements Section 201 and MassDOT Construction Details.
- C. Catch Basins and Manholes shall be constructed of pre-cast reinforced concrete sections unless directed otherwise by the Engineer.
 1. Include crystalline waterproofing additive in concrete prior to casting of riser section.
 2. The wall sections for 4-foot diameter manholes shall be not less than five inches thick. The wall sections for 5-foot and greater diameter manholes shall be not less than six inches thick.
 3. Cone sections: precast sections of similar manufacture of varying heights to meet construction conditions.

4. Cast openings for pipe and materials to be embedded in the walls of the structures during manufacture.
 5. Lift holes: 2 maximum, cast or drilled in any section, provided with suitable rubber or concrete stopper or other approved device for plugging the holes.
 6. Clearly mark date of manufacture and name or trademark of manufacturer on inside of the riser structure.
 7. Precast Bases and Top Slabs: same construction as the precast riser sections of dimensions shown on the Drawings.
 8. Precast concrete base and first riser: monolithic.
 9. Anti-flootation slab: ASTM C139 precast monolithic base unit or cast in place based on manufacturer's recommendation and as approved.
 10. Acceptance of the sections will be on the basis of material tests and inspection of the completed product.
 11. The exterior surface of precast manhole bases and walls shall have two coats of factory applied, UV resistant, black bituminous damp proofing using cutback asphalt (AASHTO M81 or M82) or Asphalt emulsion (AASHTO M140) at 5 gallons per 100 square feet minimum per coat. The coating shall be applied to new manholes regardless of the depth of installation.
- D. Precast Top Slabs and Bases
1. Precast concrete bases and top slabs shall be of the same construction as the precast riser sections.
 2. Precast concrete bases and top slabs shall be of the same construction as the precast riser sections.
 3. Precast concrete base and first riser shall be monolithic.
- E. Joints between precast sections: Watertight, shiplap-type seal with and all weather performed joint sealant made of butyl rubber material in flexible rope form. It shall meet or exceed requirements of AASHTO M198 and ASTM C990 section 6.2.1, Butyl rubber sealants.
1. Exterior joints between precast sections and lift holes shall be grouted with waterproof cement or other approved product prior to backfill or completion of the manhole if above grade
- F. Steps: Manhole sections shall contain manhole steps accurately positioned and imbedded in the concrete. The steps shall be manufactured from deformed $\frac{1}{2}$ " steel

reinforcement rod complying with ASTM A615 and encased in polypropylene complying with ASTM D4101. Include pattern design to prevent lateral slippage off step. 12-inches on center with minimum width of 16-inches and 7-inches from wall for full height of manhole.

- G. Source Quality Control: in accordance with Division 01 General Requirements.

2.03 PIPE CONNECTIONS

- A. Compression Type: The connector shall be the sole element relied on to assure a flexible watertight seal of the pipe to the structure. The connector shall consist of a single rubber gasket, shall be constructed solely of synthetic or natural rubber, shall meet or exceed the requirements of ASTM C923.
- B. Boot Type: The connector shall consist of a rubber gasket or boot, metal expansion ring and double metal take-up clamps. Rubber boots and gasket material shall meet or exceed ASTM C923.

2.04 STORMWATER TREATMENT UNIT

- A. Manufactured by Contech Engineered Solutions, LLC, or equal and shall include the following:
- B. General: Provide precast structures conforming to ASTM C478 and as shown on the Drawings capable of supporting H-20 loading, and HL-93 loading.
- C. The Contractor shall furnish all labor, equipment, and materials necessary to install the water quality unit and appurtenances specified in the Drawings and these specifications.
- D. All components shall be subject to inspection by the engineer at the place of manufacture and/or installation. All components are subject to being rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair where final acceptance of the component is contingent on the discretion of the Engineer.
- E. The manufacturer shall guarantee the water quality unit components against all manufacturer originated defects in materials or workmanship for a period of twelve (12) months from the date the components are delivered to the owner for installation. The manufacturer shall upon its determination repair, correct or replace any manufacturer originated defects advised in writing to the manufacturer within the referenced warranty period.
- F. The water quality unit manufacturer shall submit to the Engineer of Record a "Manufacturer's Performance Certification" certifying that each water quality unit

can achieve a removal efficiency of 80% of total suspended solids. The certification shall be supported by independent third-party research.

- G. Housing unit of stormwater treatment device shall be constructed of pre-cast or cast-in-place concrete, no exceptions. Precast concrete components shall conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:
1. Concrete shall achieve a minimum 28-day compressive strength of 4,000 pounds per square-inch (psi);
 2. Unless otherwise noted, the precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;
 3. Cement shall be Type III Portland Cement conforming to ASTM C 150;
 4. Aggregates shall conform to ASTM C 33;
 5. Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 185, or A 497.
 6. Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990.
 7. Shipping of components shall not be initiated until a minimum compressive strength of 4,000 psi is attained or five (5) calendar days after fabrication has expired, whichever occurs first.
- H. Internal Components and appurtenances shall conform to the following:
1. Screen and support structure shall be manufactured of Type 316 and 316L stainless steel conforming to ASTM F 1267-01;
 2. Hardware shall be manufactured of Type 316 stainless steel conforming to ASTM A 320;
 3. Fiberglass components shall conform to the ASTM D-4097
 4. Access system(s) conform to the following:
 5. Manhole castings shall be designed to withstand AASHTO H-20 loadings and manufactured of cast-iron conforming to ASTM A 48 Class 30.
- I. The water quality unit shall be sized to either achieve an 80 percent average annual reduction in the total suspended solid load. Both methods should be sized using a particle size distribution having a mean particle size (d₅₀) of 125 microns unless otherwise stated.

- J. The water quality unit shall be capable of capturing and retaining 100 percent of pollutants greater than or equal to 2.4 millimeters (mm) regardless of the pollutant's specific gravity (i.e.: floatable and neutrally buoyant materials) for flows up to the device's rated-treatment capacity. The water quality unit shall be designed to retain all previously captured pollutants addressed by this subsection under all flow conditions. The water quality unit shall be capable of capturing and retaining total petroleum hydrocarbons. The water quality unit shall be capable of achieving a removal efficiency of 92 and 78 percent when the device is operating at 25 and 50 percent of its rated-treatment capacity. These removal efficiencies shall be based on independent third-party research for influent oil concentrations representative of storm water runoff (20 ± 5 mg/L). The water quality unit shall be greater than 99 percent effective in controlling dry-weather accidental oil spills.
- K. The water quality unit shall be designed with a sump chamber for the storage of captured sediments and other negatively buoyant pollutants in between maintenance cycles. The boundaries of the sump chamber shall be limited to that which do not degrade the water quality unit's treatment efficiency as captured pollutants accumulate. The sump chamber shall be separate from the treatment processing portion(s) of the water quality unit to minimize the probability of fine particle re-suspension. To not restrict the Owner's ability to maintain the water quality unit, the minimum dimension providing access from the ground surface to the sump chamber shall be 16 inches in diameter.
- L. The water quality unit shall be designed to capture and retain Total Petroleum Hydrocarbons generated by wet-weather flow and dry-weather gross spills and have a capacity listed in Table 1 of the required unit.
- M. The water quality unit shall convey the flow from the peak storm event of the drainage network, in accordance with required hydraulic upstream conditions as defined by the Engineer. If a substitute water quality unit is proposed, supporting documentation shall be submitted that demonstrates equal or better upstream hydraulic conditions compared to that specified herein. This documentation shall be signed and sealed by a Professional Engineer registered in the State of the work. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.
- N. The water quality unit shall have completed field tested following TARP Tier II protocol requirements.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Provide in accordance with Sections 201 and 220 of the MassDOT Standard Specifications and Supplements and the Drawings.

- B. Placement: Set catch basin and manhole frames to finished lines and grades, as specified. Set castings in bituminous concrete collars and underlay with cement concrete. Collars: at least 9 inches deep and extend to a radius of 1 foot beyond the circumference of the frame, as shown on the Drawings.
- C. Adjustments to existing drainage structures: per the Drawings or as directed by Engineer. Refill the excavated area with gravel and set casting into a concrete collar. Engineer will determine the new elevation of the structure.
 - 1. Place so bottom of structure is plumb and pipe invert are at proper elevations. Position tops of structures flush with finished grade.
 - 2. Accurately locate each structure and set accurate templates to required line and grade as shown on the Drawings. Remove and rebuild structures incorrectly and improperly located, oriented or aligned, at no additional cost to Owner.
 - 3. Establish sufficient length of proposed curb or edge of pavement adjacent to the structure prior to construction of the drain inlet and/or catch basin to ensure that the structure is correctly located and oriented.
 - 4. Place foundation course on firm soil of uniform bearing. If soil below the foundation course is classified as unsuitable, remove and replace with per
- D. Joints: Follow manufacturer's instructions for sealing joints between precast sections with material as specified. Point joints inside and out with butyl caulk or waterproofing cement.
- E. Damp Proofing: Touch up in the field prior to backfilling as required by Engineer.
- F. Adjustments to existing drainage structures: per the Drawings or as directed by Engineer. Refill the excavated area with gravel and set casting into a concrete collar. Engineer will determine the new elevation of the structure.
- G. Remodeling: per the Drawings or as directed by the Engineer.
 - 1. Provide remodeling of cone of the structure where line or grade requires a change greater than 6 inches at existing drainage structures or where noted on the Drawings.
 - 2. For structures in the roadway: refill excavated area with gravel and set casting into a concrete collar and overlay with 3-inch thick bituminous concrete top course. Engineer will determine the new elevation of the structure.

- H. Existing frames and grates belonging to the City and not needed for the Work: transported and carefully stacked at the City DPW Yard or otherwise disposed of as directed by Engineer at no additional cost to Owner.
- I. Frames and Covers:
 - 1. Set to final grade as shown on the Drawings; 1/2" below pavement grade. Provide adequate temporary covers to prevent accidental entry until final placement of frame and cover is made.
 - 2. Use two rings of 1-inch diameter butyl rubber sealant between frame and chimney joints. Provide downward force to frame so as to compress the joint, provide a watertight seal, and prevent future settlement. Point compressed joint with butyl rubber caulk sealant.
 - 3. Set manhole frames and covers to final grade only after pavement base course has been applied.
- J. Seal drain pipe connections to catch basin/manhole structures with mortar per M4.02.15 of the MassDOT Standard Specifications and Supplements.
- K. Inverts: As indicated on the drawings.
- L. Steps: Replace steps that are out of plumb and proper horizontal placement.
- M. Material: Material removed from excavation for manholes that remains after the backfilling the finished structure, shall be used wherever possible within the location. If it is not needed or not suitable, it shall be removed and legally disposed of without additional compensation.
- N. Structures shall be backfilled with Controlled Density Fill (See Section 31 00 00, Earthwork) when installed with less than 18 inches horizontal clearance from adjacent structures and/or pipe as directed by the Engineer.
- O. The contractor shall exercise care in the storage and handling of the structures prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be borne by the contractor.
- P. Stormwater Treatment Unit:
 - 1. Shall be installed in accordance with the manufacturer's recommendations and related sections of the contract documents. The manufacturer shall provide the contractor installation instructions and offer on-site guidance during the important stages of the installation as identified by the manufacturer at no additional expense. A minimum of 72 hours' notice

shall be provided to the manufacturer prior to their performance of the services included under this subsection.

2. The contractor shall fill all voids associated with lifting provisions provided by the manufacturer. These voids shall be filled with non-shrinking grout providing a finished surface consistent with adjacent surfaces. The contractor shall trim all protruding lifting provisions flush with the adjacent concrete surface in a manner, which leaves no sharp points or edges.
3. The contractor shall remove all loose material and pooling water from the stormwater treatment unit prior to the transfer of operational responsibility to the Owner.

Q. Trench Drain:

1. Shall be installed in accordance with the manufacturer's recommendations and related sections of the contract documents.
2. Expansion and contraction control joints and reinforcement are recommended to protect the channel and concrete surrounding.
3. The finished level of the concrete surrounding must be approximately 1/8" above the top of the channel edge.

3.02 FIELD QUALITY CONTROL

- A. Do not pave over any of the utility appurtenances/structures unless specifically directed otherwise.
- B. If a defective casting is encountered, remove it as directed by the Engineer and install a new casting. Repair or replace castings damaged by Contractor at no additional cost to Owner.
- C. Provide in accordance with Division 01 General Requirements.

3.03 CLEANING

- A. Use remaining material removed after excavation wherever possible. Remove and legally dispose of unused or unsuitable material at no additional cost to Owner.
- B. Clean and flush precast structures after Work is completed and before Final Acceptance.

3.04 LEAKAGE TESTING

- A. General: Tests shall be observed by Engineer. Manholes must be complete for final test acceptance except for shelf and invert brickwork. Plug pipes and other openings

in the structure walls prior to test. The Contractor shall test precast concrete manholes soon as they are installed, and before backfilling, to demonstrate that the work conforms to these specifications.

B. Vacuum Tests for Manholes:

1. After manhole has been constructed, and before manhole is backfilled, the Contractor shall conduct a Manhole Acceptance Test using the vacuum test procedure in ASTM C1244 except as modified herein.
 - a. Plug lift holes with an approved non-shrink grout.
 - b. Plug pipes entering the manhole, taking care to securely brace the plug from being drawn into the manhole.
2. The test head shall be placed at the inside of the top section and the seal inflated in accordance with the manufacturer's recommendations.
3. Draw a vacuum of 10 inches of mercury and shut off the vacuum pump. With the valves closed, the time shall be measured for the vacuum to drop to 9 inches. The manhole, regardless of diameter, shall pass if the time is greater than:
 - a. 2 min. for 0' to 10' deep manholes
 - b. 2.5 min. for 10' to 15' deep manholes
 - c. 3 min. for 15' to 25' deep manholes
4. If the vacuum drops in excess of the prescribed rate, the Contractor shall locate the leak, make proper repairs, and retest the manhole.
5. If the unit fails the test after repair, the unit shall be water exfiltration tested

C. Exfiltration Test:

1. Plug pipes into and out of manhole and secure plugs.
2. Lower groundwater table (GWT) to below manhole. Maintain GWT at this level throughout test. Provide means of determining GWT level at any time throughout test.
3. Fill manhole with water to bottom of flat slab.
4. Allow a period of time for absorption (determined by Contractor).
5. Refill to bottom of flat slab.

6. Determine volume of leakage in an 8-hour (minimum) test period and calculate rate.
7. Acceptable leakage rate: Not more than 1 gallon per vertical foot of manhole section per 24 hours.
8. If not satisfied with the exfiltration test, the Engineer reserves the right to require an infiltration test.

3.05 REPAIRS

- A. Determine causes of leaks and repair them. Engineer shall reject any manhole with an exfiltration rate exceeding 3 gallons per vertical foot per 24-hours. If exfiltration is less than 3 gallons per vertical foot per 24-hours but more than 1 gallon per vertical foot per 24-hours, repairs may be made by approved methods as directed by the Engineer to bring the leakage within the allowable rate of one gallon per vertical foot per 24-hours. If repairs fail to reduce the leakage rate to less than one gallon per vertical foot per 24-hours after exfiltration test repairs, Engineer shall reject the manhole.
- B. Perform repairs using methods and materials approved by Engineer. Remove and replace or reconstruct if necessary. Remove and replace defective sections if required.

3.06 INSPECTION

- A. Make manhole accessible for inspection by Engineer prior to backfilling. Failure to notify the Engineer prior to backfilling may result in rejection of payment.

3.07 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

0229256.29
Issue Date: February 2023

**Walter Hannon Parkway & General McConville Way
Intersection Improvement Project
Quincy, Massachusetts**

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

SECTION 02303

TRENCHLESS SYSTEM

GENERAL

1.1 SUMMARY

A. Section Includes

1. The Work in this Section includes the requirements for installation of an 18-inch PVC pipeline through the use of a trenchless system selected by the contractor and approved by the engineer.

B. Related Requirements

1. Section 31 00 00 – Earthwork
2. Section 31 50 00 – Excavation Support and Protection

C. Related Documents

1. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.2 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.3 DEFINITIONS

A. Back Reamer: A cutting head attached to the leading end of a drill string to enlarge the pilot bore diameter during or before a pull-back operation to enable the pipeline to be installed.

B. Drill String: The total length of drill rods and pipe, bit, swivel joint etc. in a drill borehole, or a system of rods used with a pilot bit or reamer attached to the drive chuck.

C. Drilling Fluid or Drilling Mud: A mixture of water, bentonite, and/or polymer continuously pumped to the cutting head to facilitate the removal of cuttings, and stabilize the borehole. The fluid also cools the head, and lubricates the installation of the product pipe. In suitable ground conditions, water alone may be used.

D. Entry and Exit Angle: The angle to the ground surface at which the drill string enters or exits, forming the pilot bore.

E. Frac-out: When excessive drilling pressure results in drilling mud propagating vertically toward the ground surface.

F. Horizontal Directional Drilling (HDD) System: A steerable system used for installation of pipe, conduits and cables using a surface-launched drilling rig. The term applies to bores in which a fluid filled pilot bore is drilled while rotating the drill string, and is then enlarged by a back reamer to the size required for the product pipe.

G. Pipe Jacking System (PJS): A pipe jacking process that includes entry pits at either side of the pipe installation. This system includes the use of hydraulic jacking rigs and microtunneling machines.

H. Locator: An electronic instrument used to determine the position and strength of electro-magnetic signals emitted from a transmitter sonde in the pilot head of a horizontal directional drilling system. Commonly referred to as a walkover system.

I. Marsh Funnel: A device used to determine slurry viscosity for trenchless applications. The Marsh funnel test is performed by pouring a slurry sample through a screen at the top of the funnel to trap large particulates. After the funnel is filled, the bottom of the funnel is opened and the slurry is allowed to flow. The flow rate is calculated as the number of seconds required for a quart of slurry to drain out of the funnel.

J. Pilot Bore: The action of creating the first pass of a boring process which later requires back reaming or enlarging.

K. Pull-Back: Part of a horizontal directional drilling process in which the drill string is pulled back through the bore hole to the entry pit, usually installing a product pipe at the same time.

L. Pull Back Force: The tensile load applied to a drill string during the pull-back process.

M. Sonde or Transmitter Housing: Integral unit in the directional drill head which also houses the sonde radio sending unit.

N. Survey Tools: Equipment and instruments used to determine the position of a bore in horizontal directional drilling or jacking locations.

1.4 QUALITY ASSURANCE

A. Qualification and Experience: The Contractor or its trenchless systems subcontractor shall have a minimum of three years successful experience installing pipelines by trenchless methods. Experience shall include at least three installations with 6-inch to 24-inch diameter pipe with drill or jacking operations. The Contractor shall submit evidence of successful completion of at least three trenchless installation projects including the following:

1. Project name
2. Owner's name, contact, address and telephone number

3. Project location
4. Pipe material
5. Pipe diameter
6. Total length of pipe installed by the trenchless system
7. Maximum drive length
8. Depth of pipe
9. Subsurface conditions (soil type and groundwater level)
10. Description of the drilling equipment
11. Description of any problems encountered and how they were resolved
12. Description of any contractor claims and how they were resolved
13. level)
14. Description of the drilling equipment

B. Advance Notice and Inspections: The Contractor shall provide at least 48 hours advance written notice to the Engineer of the planned commencement of drilling activities, including pilot hole launch, pre-reaming, reaming, and pipe pullback. The Contractor shall immediately notify the Engineer in writing, if any significant problems are encountered. All work by the Contractor shall be performed in the presence of the Engineer, unless the Engineer grants prior written approval to perform such work in Engineer's absence.

C. Daily Logs and Records: Daily logs and records shall be maintained by the Contractor, documenting drilling lengths, location of the drill head, drilling fluid pressures and flow rates, drilling fluid losses, inadvertent returns, drilling times required for each pipe joint, instances of retraction and re-drilling of the pilot bore or segments thereof, and other relevant observations. These records shall be maintained and updated daily.

D. Surveying Equipment: Equipment used for tracking the bore path and drill head shall be inspected and calibrated by the equipment manufacturer prior to use. Proof of this inspection and calibration shall be provided to the Engineer prior to the commencement of drilling operations.

E. Equipment: The Contractor shall provide written certification by the manufacturer that the drilling equipment is capable of completing the planned installation.

1.5 CONTRACTOR SUBMITTALS

A. Submittals shall be prepared and submitted in accordance with the requirements in Section 01300.

B. Quality Assurance and Certifications: Submit the following in accordance with Paragraph 1.3 herein.

1. Qualifications for the trenchless system contractor and key personnel,
2. Advanced written notice of the planned commencement of major drilling activities,

3. Daily Logs: Submit complete, legible, written daily logs in accordance with Paragraph 1.3 herein, within one working day of the date to which the records correspond,
4. Manufacturer's certification for the drilling equipment,

C. Shop Drawings: Submit the following shop drawings:

1. Manufacturer's data for tracer wires.
2. Bore Layout: Submit a schematic layout for the trenchless system installation showing the anticipated location of equipment, pipe layout areas, excavations, mud pits, drilling fluid containment areas, and pipe alignment and profile deviations from the Design plans. The bore layout shall be in accordance with the following:
 - a. The bore layout shall be prepared using the design Plans as a background.
 - b. Proposed deviations from the pipeline horizontal alignment shall be shown with dimensions from structures shown on the design topographic mapping. Proposed deviations from the pipeline vertical depth shall be shown with elevation callouts on the trenchless profile in the Plans.
 - c. Pipeline depths shown on the design Plans are intended to provide adequate clearance at the channel crossing to meet permit requirements and avoid frac-out.
 - d. The bore layout profile shall provide a minimum of three feet vertical clearance to existing utilities at crossings unless otherwise shown on the Plans.
 - e. The Contractor's bore layout shall adhere to the traffic control and work limit requirements as shown on the Plans, unless otherwise approved by the Engineer.
 - f. The Contractor shall provide pothole information, including pipe diameter, material and depth to top of pipe for utilities shown on the Plans, which shall be potholed before construction.
3. Bore Plan: Submit a detailed description of methods, equipment, and materials to be used during the trenchless system installation, including the following:
 - a. Description, material information, and detailed sketches of the method proposed to attach the force main pipeline together for pullback operations.
 - b. Proposed schedule and duration of trenchless operation from equipment mobilization to site restoration;

- c. Descriptions of materials anticipated to be used and/or on site for all aspects of the trenchless operation accompanied by Materials Safety Data Sheets (MSDS) and manufacturers' descriptions and warranties;
- d. Descriptions of equipment including manufacturers' specifications, calibrations, drawings, photographs, and descriptions of any modifications to the equipment after manufacture;
- e. Description of surveying equipment and procedures including records of equipment calibration and certifications for all equipment used for tracking of the drill head and bore path. Procedures for operating the tracking and survey tools shall be described, including methods to verify the accuracy of the equipment readings;
- f. Calculations for expected mud and drilling fluid weights used for stabilization of the bore hole;
- g. Methods for disposal of waste materials resulting from the pipeline installation, including drilling fluids, cuttings, waste oil, fuel, and discharge water. The Contractor shall identify the disposal site and submit a letter from the licensed disposal facility indicating willingness and legal authority to accept the described and anticipated waste products;
- h. Containment and cleanup plan for dealing with frac out, including a list of equipment and materials to be on site in the event of a frac out to contain and clean up the site. Include location of vacuum trucks, hose lengths for performing clean up, quantity and description of containment materials, and handling and disposal plan for all materials.
- i. Names and contact information for trenchless foreman and key on-site personnel;
- j. Contingency plans for remediation of potential problems that may be encountered. Contingency plans shall identify the observations that would lead to the discovery of the problem, the methods that would be used to mitigate the problem, and estimated time and cost to mitigate the problem and resume the installation. Potential problems that shall be addressed include but shall not be limited to the following:
 - 1) Obstructions encountered during drilling operations along the route
 - 2) Inadvertent drilling fluid returns (frac-out)
 - a) Emergency contacts for Contractor to respond to a frac out event.
 - b) Emergency contacts for qualified biological monitor to observe containment and clean up operations and to assess impact on sensitive resources in and around the site.
 - c) Listing of sensitive resources from City's MMRP.
 - d) Monitoring plan for trenchless operations and frac out detection.

- e) Protocol for handling a frac-out event.
- f) Proposed BMPs for containing and cleaning up frac-out.
- g) Communication protocol in the event of frac-out detection.
- 3) Loss of circulation
- 4) Deviation from the planned bore path exceeds specified tolerances
- 5) Inability to advance drill stem or pipe
- 6) Drill stem or pipe twisted off or broken off in borehole
- 7) Pipe collapse

D. Record Drawings: Submit record drawings for the bore installation in accordance with the Standard Specifications and Special Provisions. The Contractor shall document variations between the actual horizontal and vertical location of the installed pipeline and the location shown on the Drawings.

E. The Contractor shall provide a detailed schedule with all major construction activities and milestones.

1.6 SUPPORTING DOCUMENTS

A. A soil boring was performed in the project vicinity. See the project geotechnical report in the specifications for the soil boring and map of boring location.

PRODUCTS

2.1 MATERIALS

A. Pipe material for trenchless installation shall be:

1. Fusible polyvinyl chloride (FPVC) pipe
2. Polyvinyl Chloride Pipe

B. Tracer Wire: Tracer wire shall be a single strand No. 10 A.W.G. copper wire with 0.45 mils Type HMW – PE. Three tracer wires (one primary and two spares) shall be installed. The wire shall meet the requirements of ASTM D1351 and ASTM B8. Tracer wire shall be UL listed as direct burial wire at temperatures between -40 degrees and 75 degrees C for circuits not exceeding 600 volts. Tracer wire shall be terminated at gate valves as indicated on the Plans.

2.2 WATER

- A. The Contractor shall obtain permission from the City Water Dept for use of water onsite.
- B. Water required for the installation shall be obtained from the locations identified by the City.

C. The Contractor shall be responsible for conveying, transporting and storing the water required for the installation.

2.3 DRILLING FLUIDS

A. The Contractor shall select mixture proportions to ensure borehole stability, reduce drag on the pipe, and completely fill the annular space between the bore and the pipe to control settlement.

EXECUTION

3.1 GENERAL

A. Prior to commencing drilling or jacking operations, the Contractor shall conduct a site inspection to evaluate potential problems that may be encountered. Potential problems shall be identified in the bore plan.

B. Excavation, backfill and compaction of entry and exit pits shall be in accordance with the Standard Specifications, and as shown on the Plans.

C. The Contractor shall provide containment equipment and materials on-site clean-up drilling fluid returns and frac-outs and shall prevent drilling fluids from leaving the site, reaching bodies of water, or entering the storm drain system.

3.2 PROTECTION OF UNDERGROUND FACILITIES

A. Modify the horizontal and vertical alignment of the bore path to avoid damage to existing facilities, if necessary and as approved by the Engineer.

B. Damage to existing facilities shall be repaired by the Contractor at no additional cost to the City.

3.3 CONSTRUCTION AREA

A. Work Limits: The Contractor shall submit proposed work limits showing trenchless system operations including storage of equipment and materials, parking, pipe layout, and drilling. Various work limit areas shall be identified with time of day, and number of days/duration. Proposed work areas will be reviewed by the Engineer. Only approved work areas can be used.

B. Control of Drilling Fluids: The Contractor shall control operational pressures, drilling speeds and any other operational parameters to minimize and control drilling fluid spillage. This includes spillages or returns at entry and exit locations or intermediate points. The Contractor shall maintain on site mobile spoil containment and removal equipment and materials during HDD operations and shall be capable of quickly containing and removing spoils. The Contractor shall immediately clean up inadvertent returns or spills and notify the Engineer.

C. Combustible Materials: Combustible materials (fuel, oil, lubricants, etc.) shall be stored in a well-ventilated storage facility removed from the immediate vicinity of the drilling area by at least 20 feet.

D. Entry/Exit Areas: The Contractor shall set up temporary workspace areas. Appropriate precautions and measures shall be employed by the Contractor to prevent erosion, surface drainage, and spillage of drilling fluids or other materials that could adversely impact the environment. Hay bales or other suitable materials shall be used to line the work area to minimize erosion and contain any spillages or runoff. The exit area shall have a drilling fluid pit for containing drilling fluids and cuttings. A 6-inch high berm constructed of straw wattles and lined with plastic sheeting shall be used to berm the exit area to minimize drilling fluid runoff.

3.4 FRAC OUT SUPPLIES

A. Before drilling, the Contractor shall mobilize adequate equipment and supplies to contain frac-outs. At a minimum the following must be on site:

1. Forty Sand Bags (20 filled, 20 empty)
2. Two Hand Shovels
3. Push Broom
4. Bucket

B. Before drilling is allowed to begin, the Contractor shall construct a 6-inch high berm around the exit area. The berm shall be constructed out of straw wattles and lined with plastic sheeting to prevent percolation of materials and soil contamination. The berm shall enclose an area no less than ten feet wide and twenty feet long.

3.5 ALIGNMENT STAKING

A. Before drilling the Contractor shall stake the pipeline alignment. There shall be at least one survey point every 25 feet. The Contractor shall survey the ground elevation at each survey point. Each point shall contain the ground elevation, design pipe elevation, and the difference between the two elevations.

3.6 DIRECTIONAL DRILLING

A. Drill Rig Capacity. The capacity of the directional drilling system shall be adequate to install the pipeline as shown on the Plans.

B. Instrumentation and Monitoring: At all times during the pilot bore the Contractor shall provide and maintain instrumentation and monitoring system capable of accurately locating the position of the drill head in the x, y, and z axes within one foot accuracy. The Contractor shall provide and maintain equipment that is capable of monitoring and recording drilling fluid pressures, drilling fluid flow rate, and drill pipe thrust, torque, and pullback loads.

1. Drill Head Locator System: Contractor shall monitor and record x, y, and z coordinates of the drill head relative to an established surface survey bench mark. Deviations between the recorded and design bore path shall be calculated and reported on the daily log. Deviations that exceed the tolerances specified shall be immediately reported to the Engineer.
2. Drill Pipe Thrust and Torque: Drill pipe thrust and torque shall be measured and recorded at least once per drill pipe length or at 30 feet or 30-minute intervals, whichever is more frequent. Loss of circulation or sudden increases in torque or thrust shall be reported to the Engineer immediately. Thrust and torque measurements shall be made during pilot hole drilling, pre-reaming, reaming, and pullback, and shall be written in daily logs. Instances of thrust, torque, or pullback exceeding allowable limits of the pipe or equipment shall be reported immediately to the Engineer.

C. Location of Entry and Exit Pits: The Contractor shall locate entry and exit plans as shown on the plans to establish horizontal and vertical control for the bore and the pipe layout and fabrication areas. It is acceptable to move the entry and exit points to adjust the vertical alignment upon approval of the Engineer. At no point shall the modified vertical alignment be higher than the design alignment without approval of the Engineer.

D. Pilot Hole: The pilot hole shall follow the design path of the bore shown on the Plans unless approved by the Engineer.

1. Horizontal and Vertical Tolerances: Horizontal and vertical deviations shall be less than three feet from the design path centerline at any point, but in any event shall stay within the defined easements and public right-of-way and not cause the proposed pipe to conflict with existing utilities or encroach within the minimum clearances shown on the Plans, including but not limited to: 4-feet minimum horizontal clearance between recycled water mains and potable water mains, 36-inches minimum horizontal clearance to all other utility lines, and 36-inches minimum vertical clearance to crossing utilities. The Contractor shall continuously monitor horizontal and vertical position and record the position at least once per drill stem length, or at 25 feet or 30-minute intervals, whichever is most frequent.
2. Entry and Exit Tolerances: The location of the entry shall be within a 3-foot diameter circular area centered on the entry point coordinates shown below and verified by the Contractor's survey.

E. Damage to the pipe and tracer wire shall be repaired by the Contractor at no additional cost to the Owner. To confirm no damage was inflicted on the pipeline, upon completion the installation, the Contractor shall pull a mandrel through the entire length of the pipeline. If the mandrel cannot pass through the pipeline, it shall be considered collapsed and damaged. The mandrel shall be 95% of the inside diameter for the recycled water pipeline.

F. Obstructions: The Contractor shall notify the Engineer immediately in the event that any obstruction is encountered that prevents further advancement of the drill stem, or pullback of the pre-reamer, reamer or pipe. The Contractor and Engineer will investigate the cause and formulate an appropriate plan on action, which may include substitution of the equipment or methods, retraction and re-drilling of a portion of the bore, or abandonment of the hole. If abandonment is deemed necessary, the Contractor shall recover, to the extent practical, any drill pipe and tools in the bore, and properly abandon the bore, unless otherwise directed in writing by the Engineer. If the bore is abandoned, the Contractor shall pressure-grout the abandoned bore with a lean cement-sand grout mixture, or other approved material. If the bore is abandoned, the Contractor shall begin a second attempt to install the pipeline at an alternate location approved in writing by the Engineer. The Contractor shall take all reasonable actions to complete the installation with minimal delays. The extra costs associated with encountering the obstruction shall be negotiated between the Engineer based on the labor and materials required, and as detailed in documentation provided by Contractor to the Engineer the same day as such work is performed. For purposes of this Contract, an obstruction is defined as any hard object lying completely or partially within the design pathway of the bore and pipeline that prevents further advancement of the drill bit, pre-reamer, reamer or pipe.

END OF SECTION 33 50 00

SECTION 34 41 13- TRAFFIC SIGNALS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. The work shall include the furnishing and installation of all or part of the following items: remove and stack traffic signal, rapid rectangular flashing beacons (RRFBs), traffic signal controller and cabinet mounted on a foundation with concrete workers pad; signal posts and foundations; mast arm assemblies with anchor bolts and foundations; emergency vehicle preemption components; adaptive signal control components; vehicle signal heads; non-louvered backplates; video detection; pedestrian signal heads and push button assemblies; all cable and wiring; ground rods, equipment grounding and bonding; pullboxes; communication cable, power and communication service connections, battery backup system; and all other equipment, materials and incidental costs necessary to provide a complete, fully operational traffic control signal system as specific herein and as shown on the plans.
 - a. LOCATION NO. 1 – Walter J. Hannon Parkway at General McConville Way
Proposed new traffic signal
 - b. LOCATION NO. 2 – Walter J. Hannon Parkway at Parkingway
Remove and stack existing traffic signal
Proposed new Rapid Rectangular Flashing Beacons (RRFBs)
2. Work shall also all incidental materials and labor necessary for operating and controlling the traffic control signal at this location, as shown on the plans 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 the major traffic signal items required at each location is included on the Traffic Signal Layout Plans.
 - Within 30 days following execution of the Contract, the Contractor shall submit shop drawings for a list of equipment, and manufacturer's equipment specifications to the City in accordance with the relevant provisions of Section 815.20.

1.02 PRICE AND PAYMENT PROCEDURES

Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. MassDOT Standard Specifications for Traffic Control Devices (Section 800) and Supplements, except for Compensation sections.
 - 2. MassDOT Construction Details.
 - 3. Applicable portions of City of Quincy Code of Ordinances and Zoning Ordinances.
 - 4. Manual on Uniform Traffic Control Devices (2009 Edition) with Massachusetts amendments.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with the Division 01 General Requirements
 - 1. Product Data
 - a. Within 30 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 of the MassDOT Standard Specifications.
 - b. No work shall be commenced by the Contractor until approval of the shop drawings and manufacturer's data has been received in writing from the Engineer. Approval of these drawings will be general in character and shall not relieve the Contractor from the responsibility of, or the necessity of, furnishing materials and workmanship conforming to the plans and specifications.
 - c. The Contractor shall deliver to the Engineer a certificate of compliance with the manufacturer for all materials purchased from the manufacturer.

PART 2 – PRODUCTS

TRAFFIC SIGNAL SYSTEM

Mast Arm Poles

Mast arm poles, bases and anchor bolts shall be ornamental style and painted Gloss Black. The mast arms shall be constructed in conformance with MassDOT Standard Drawings, the Contract drawings, the latest edition of AASHTO "Standard Drawings for Structural Supports for Highway Signs, Luminaries and Traffic Signals", MassDOT's December 2015 Overhead Signal Structure & Foundation Standard Drawings, and as stated below.

All mast arm poles shall be 16- Flute Tapered Steel poles with Columbia Series cast aluminum split bases. Acceptance of Type 2 mast arm poles will be contingent upon review and approval of shop drawings submitted by the Contractor. Longhand design calculations shall be submitted by the

Contractor with the shop drawings for all Type 2 mast arm poles. The Contractor shall provide a set of calculations, stamped by a Structural Engineer registered in the Commonwealth of Massachusetts, along with plans and specifications for the poles for review by the City. Mast arms shall be designed to withstand a 130-mph wind load.

Pedestals

Shall be two pieces and ornamental style (painted Gloss Black) to match the mast arm poles, per MassDOT Standards as specified on major items list.

Foundations

The top of the concrete base for the control cabinet shall be 18 inches above grade. The top of all other foundations not in sidewalk or paved areas shall be a minimum of 2 inches above grade.

Foundations for traffic signal mast arms and signal posts shall not obstruct a sidewalk or crosswalk so that passage by physically challenged persons is not impaired. ADA/AAB clearance shall be maintained. The top of all foundations in sidewalk areas shall be located flush with finish grade. The top of each mast arm foundation shall not be exposed in the sidewalk.

The Contractor shall construct the foundations as shown on the plans and following the 2015 MassDOT Overhead Signal Structure and Foundation Standard Drawings for the type of soil for each foundation location. In the event that unforeseen soil conditions are encountered that prevent the use of MassDOT standard foundation type, the Contractor is responsible to select and design alternative foundation types. Alternative foundation types could include spread footings, coring and socketing into rock or other foundations previously used to support similar loads, within reason. The Contractor shall submit the alternative foundation type to the Engineer and the City for review. The alternative foundation type shall be stamped by a Structural Engineer registered in the Commonwealth of Massachusetts.

The Contractor shall request written approval from the City before the placement of any concrete for foundations of mast arms, signal posts, and cabinets. Anchor bolts shall be set accurately, and tops shall be formed neatly. The top forming shall extend downward for a minimum of 12 inches on the side of any foundation. The lower portions of all foundations may be poured directly against undisturbed earth or may be formed at the option of the City.

Flashing Operation

Changes from automatic flashing to stop-and-go operation and from stop-and-go to automatic flashing operation shall occur as set forth in Sections 4D.28 through 4D.31 of the MUTCD.

Controller and Cabinet

The controller cabinet shall conform to the NEMA TS 2 Type 1 Standards, Section 7. Cabinet size shall be as indicated on the plans and as shown below.

<u>NEMA TS 2 Cabinet Type</u>	Cabinet Size <u>(Nominal)</u> <u>(HxWxD*)</u>	Back Panel	<u>Mounting</u>	<u>Malfunction Management Unit</u>
6	52" x 44" x 28"	16-Position	Ground	16 Channel

*Approximate cabinet dimensions are provided in inches.

The control cabinet shall be made of aluminum, painted Gloss Black exterior. The cabinet shall contain a second fan for additional cabinet cooling. The cabinet shall also be wired with a normally closed switch connected to a user defined input to the controller for remote monitoring of the control cabinets' door open status. The cabinet shall contain a manual cord. Cabinet shall have a sliding drawer with cover under the lower shelf.

The controller cabinet foundation shall not obstruct a sidewalk or crosswalk so that passage by physically challenged persons is impaired. Anchor bolts shall be internal to the cabinet.

A slide-in/slide-out shelf or swing-out/swing-in shelf appropriate for the size and load of a laptop computer shall be installed in each controller cabinet to allow maintenance personnel to work in the cabinet in a safe, effective, and comfortable manner.

TS 2 Type 1 Controller and Type 6 Cabinet Assemblies:

The traffic controller supplied shall conform to Section 3 "Controller Units" of the NEMA TS 2 Standard. The traffic controller shall be supplied in a TS 2 Type 1 Configuration as required in the list of major traffic signal items included on the plans for the intersection location.

Specifically, the controller unit (CU) shall be supplied as an actuated controller; defined as Type A1 in Subsection 3.2 of the NEMA TS 2 Standard.

The controller shall utilize an interface conforming to Subsection 3.3 of the NEMA TS 2 Standard. The controller unit shall utilize an input/output interface conforming to the requirements of part of Paragraph 3.3.1 for all input/output functions with the Malfunction Management Unit (MMU) and Paragraph 3.3.5 for input/output functions with the Terminal Facilities (TF) and auxiliary devices.

The controller unit shall be a keyboard-entry menu-driven unit manufactured by Siemens/Eagle Signal, Model EPAC3608M60NEMA and conform to the Standard Specifications, with internal time base coordination, emergency preemption, and programmatic capability. The controller shall be complete with a module, including modem card and physical connector, to support closed loop communication. Controller shall contain a communications module with 4 USB and 4 Ethernet ports.

The local system intersection controller shall include all of the following internal functions:

- 1) Software compatibility with the control and data protocol of an Eagle manufactured on-street master, central-office computer and field laptop computer.
- 2) Local time-based scheduler including automatic accommodation for daylight savings time.
- 3) Local coordination control.
- 4) Local preemption control with at least six programmable internal preemption sequences.
- 5) Data uploading and downloading capability.
- 6) Process system and local intersection detector activity and accumulate samples of vehicle counts, occupancy, speed, stops, and delay.
- 7) Perform extensive failure evaluation of the controller, detectors, and communications.
- 8) Provide local control of remotely selected NEMA and special functions.
- 9) Perform local report generation with printer capability if a printer is attached, including intersection status and performance.

- 10) All controllers of the same manufacturer shall always maintain backward and forward compatibility. A controller supplied today, or in the future must be able to run in a closed loop system supplied in the past without any upgrades or modifications required. Likewise, an older controller shall be capable of operating in a current closed loop system.
- 11) Controllers shall be capable of Adaptive Maximums, in accordance with the specifications for Adaptive Signal Control.

The local system intersection controller shall include an internal FSK modem to allow connection to a remote system master. An RS-232C interface shall be provided to allow printing of local reports and database. It shall also be possible to attach a dial-up modem to the RS-232C interface to allow remote control and monitoring of the local controller. A separate addressable RS232 port shall be supplied for use with radios or other external device. All controllers shall also have an Ethernet port and be IP addressable to function in an Ethernet system.

To minimize training and simplify local programming, all local parameter access shall utilize prompting and English language displays, and all codes needed by the user, if any, shall be on the front panel or on the display screen to avoid the need for memorization or the presence of a manual.

The Contractor's attention is directed to Table 2, Required Signal Light Switching Assemblies, Section 815.41 of the MassDOT Standard Specifications. The Contractor shall furnish the appropriate type and number of load switches and flash transfer relays and place unutilized load switches and flash transfer relays 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.

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. In addition to the number of BIU's required for the detector racks, and terminals and facilities, two (2) spare Bus Interface Units shall be supplied with each controller cabinet.

The BIU shall perform the interface function between Port 1 at the controller unit, the malfunction management unit, loop detector rack assembly, and the backpanel terminal and facilities.

As a minimum, two (2) 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.

Note: 2 Spare BIU's shall be provided.

TS 2 Cabinet Power Supply

A separate power supply shall be supplied and installed in the TS 2 cabinet. The unit shall be AC line powered and provide regulated DC power, unregulated AC power, a line frequency reference for the rack mounted loop amplifiers, bus interface units, load switches, and other auxiliary cabinet equipment as required. As a minimum, the power supply shall meet all requirements of Section 5.3.5 of the NEMA TS 2 Standard.

The power supply shall be either shelf mounted or wall mounted utilizing keyhole slots for ease of replacement or installed as part of the rack assembly.

The unit shall contain four LED indicators on the front panel to indicate the four outputs; +12VDC ± @ 2.0 amps, +24VDC ± 2VDC @ 2.0 amps, 12VAC @ 250 milliamps, and 60 Hz line frequency reference. A test point terminal shall also be located on the unit's front panel for +24VDC and logic ground testing.

Malfunction Management Unit

The malfunction management units (MMU) shall be manufactured by *Eberle Design, Inc.* and 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. MMU shall support FYA operation.

The MMU's in either the Type 16 or Type 12 configuration shall be capable of operating in a NEMA TS 2 Type 2 cabinet, a NEMA TS 2 Type 1 cabinet, or a NEMA TS 1 cabinet without loss of functionality. The MMU shall be connected directly to the controller unit to support enhanced MMU monitoring of controller operations.

The MMU shall be a model MMU2-16LEip smart monitor with Ethernet port.

Load Switches

Load switches shall comply with Subsection 6.2 of the NEMA TS 2 Standard. All load switches shall utilize optically isolated encapsulated modular solid-state relays. Discrete components on circuit boards are not acceptable.

Load switch indicator lights shall be LED-type and wired on the input side of the device.

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 a 2-circuict flasher is as balanced as possible within the limitations of the signal phasing.

Flasher

Flashers shall comply with Subsection 6.3 of the NEMA TS 2 standard and be equipped with tow output indicator lights which will show flashing power out to the cabinet assembly.

Suppression

Lightning suppression shall be included in the cabinet for all Signal Outputs, Opticom, and Video Detection devices as needed.

Testing of Grounding System

The Contractor shall perform testing of the equipment grounding system in the presence of the Engineer in accordance with the Standard Specifications. A ground rod shall be installed in each controller cabinet.

Data Base Programming

Each programmable local hardware component (controller, malfunction management unit, and detector amplifier) shall be initially programmed by the Contractor based on information contained on the plans. Three (3) sets of hard copy programming per device shall be supplied and stored in the controller cabinet.

Labels

All time settings, switches, harnesses, relays, terminals and fuses shall be clearly and permanently labeled.

Vehicle Signal Heads

Shall be Eagle Traffic Control Systems Co. Model SG series with the required 12" diameter lens or as specified on the plans and the following requirements and as configured and described on the plans.

Body - One-piece aluminum unit with integral serrations of 5-degree increments in the end sections. Each body provided for mounting terminal blocks and attaching back plates. The body shall be painted Gloss Black.

Doors - One-piece aluminum unit equipped with stainless steel hinge pins. Thumbscrews hold the door against the body. The door shall be painted Gloss Black

Visors - One-piece aluminum, either cap or tunnel as specified on the plans, with slotted mounting hole. The visor shall be painted flat black in, Gloss Black out.

LED - For uniformity and interchangeability, all Red, Yellow and Green signal indications shall be Dialight. LEDs and conforming to the following: All Red and Green 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 Signal Modules" July 1998 or most current version, Institute of Transportation Engineers, (ITE), 525 School St, SW, Suite 410, Washington DC, 20024-2797.

Yellow LED - Shall conform to the above specification with the exception with the exception that the 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 temperature range.

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 MassDOT 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.

Pedestrian Signal Heads, Indications, and Appurtenances

Pedestrian Countdown Signals - Shall be Dialight. One section 16" pedestrian countdown signal.

Body - Shall be Eagle Traffic Control Systems Co. Model SG 16" signal head painted Gloss Black.

Visors - Shall be cut-away pedestrian visors for the 16" pedestrian signal head Gloss Black.

Specifications Checklist for 3 Wire Accessible Pedestrian Signal (APS)

The Audible-Tactile Pedestrian Signal System shall consist of all electronic control equipment, mounting hardware, push buttons and signs, which are designed to provide both a push button with a raised vibrating tactile arrow on the button, along with a variety of audible sounds for different pedestrian signal functions. The pushbuttons shall be painted Gloss Black and have a 9" x 12" count down sign. The APS System must be manufactured by Polara Inc, no equal or substituted products will be allowed.

General Description

1. System shall consist of a Pedestrian Head Controller Unit (PHCU) and Push Button Stations (PBS), as described below.
2. System shall be manufactured by an ISO 9001:2008 or 9001:2015 registered company.
3. System shall meet the requirements of Made in America and/or The Buy American Act.

Design Compliance

1. System shall meet the functionality requirements of MUTCD 2009 – 4E and Massachusetts Amendments to the 2009 MUTCD 2022 -4E.
2. PBS shall meet NEMA TS 2 Section 2.1 Temperature & Humidity (salt-fog) requirements.
3. System shall meet NEMA TS 2 Section 2.1 Transient Voltage Protection requirements.
4. System shall meet NEMA TS 2 Section 2.1 Mechanical Shock and Vibration requirements.
5. System shall meet IEC 61000-4-4, IEC 61000-4-5 Transient Suppression requirements.
6. System shall meet FCC Title 47, Part 15, Class A Electronic Noise requirements.
7. PBS shall meet NEMA 250 – Type 4X Enclosure requirements.
8. System shall meet NEMA TS 4 – Electrical Reliability requirements (applicable portions of Section 8).

Functional Requirements

1. PBS shall be able to be set to vibrate a tactile arrow button during the WALK interval following a button push and/or every time the walk comes up.
2. System shall have the field-selectable function known as LOCATE TONE. This means that during the FLASHING DON'T WALK and the DON'T WALK intervals, the system shall provide a locating tone that emanates from the Pedestrian Push Button Station. The system shall provide at least three different sounds to choose from.
3. System shall have the field selectable function known as, Extended Push Activation. Defined as audible WALK message shall only be activated and audible during the WALK interval if the ped call button is pressed continually beyond a field selectable minimum period of time (from .5 second to 6 seconds). Also, for the following walk phase, the volumes will be increased to play at a settable minimum volume level. System shall have the field selectable function known as, Informational Message. This means that a custom message giving the location of the street to cross and the intersection (or other information) will be vocalized only when the button is pressed for a minimum field selectable time.
4. System shall provide a WAIT message that plays once the button is activated and repeats until the walk cycle initiates. This message must have the field selectable option of OFF or repeating every 4, 6, 8 or 10 second intervals.
5. System shall have standard Travel Direction options that can be selected at the time of installation with either a Bluetooth enabled Apple wireless iProduct or Windows 7, 8, or 10 PC-based Laptop software programs.
6. Device shall have iOS version 8.0 or higher and must support Bluetooth4.0.

7. System shall have at least five field selectable WALK sound options including a cuckoo, a chirp, a MUTCD rapid tick or user-defined custom voice message.
8. System shall provide 3 Ped-clearance sound choices including audible countdown (field selectable). The audible countdown shall represent the time remaining during the pedestrian clearance interval. Timing is automatically adjusted to CLEARANCE INTERVAL timing read from the traffic controller associated ped phase output.
9. PBSs on the same phase within 120 feet of one another shall be wirelessly synchronized. If a pedestrian presses the button on one PBS, its phase partner LED must light, and play the pre-programmed audio. This shall be implemented on pedestrian systems that do not contain button wires.
10. System LOCATE TONE, WALK, and DON'T WALK audible features shall have independent assignable minimum and maximum volume limits. CLEARANCE volume level shall be controlled by WALK volumes setting.
11. System shall utilize an ambient sensing microphone located within the PBS in a UL approved, 100% recyclable, environmental and corrosion protected over mold encapsulate.
12. LOCATE TONE volumes shall be adjustable at +/-2.5dB above or below ambient inputs to customize sound appropriately for the intersection environment.
13. System LOCATE TONE shall have an independent sound adjustment calibrated against ambient that allow sits volume to play above or below the ambient noise level.
14. System shall utilize high quality digital audio technology, utilizing a minimum 16-bit sample at a 48 kHz sample rate. The audio amplifier must have Total Harmonic Distortion + Noise (THD + N) of less than 0.05%, and Signal to Noise Ratio (SNR) of 102 dB.
15. PBS firmware and voice messages shall be upgradeable via a Bluetooth wireless Apple iProduct or PC standard. There shall be no requirement for the IC chips or module hardware to be removed or exchanged in order to complete a firmware update. System shall work with the vendor's Windows 7, 8, or 10 PC-based OS to allow time of day (TOD), week, month & holiday programming, with a minimum of 4 TOD alternate programs.
16. PBS shall be capable of three adjustable pressure settings between 1 and 3lbs to activate a button push.
17. PBS shall include a button push detection Hall Effect Sensor for enhanced reliability and environmental robustness.
18. PBS shall have rear facing speaker projecting sound from front and back, providing 360° omnidirectional sound performance.
19. LOCATE TONE sound adjustment shall include 12 levels below ambient ranging from -2.5 to -30dB in 2.5dB increments.
20. System shall have an event tracking log, accessible via the vendor's Windows 7, 8 & 10 PC-based program to allow downloading of the time stamped event data.
21. System shall operate with the vendor's Windows 7, 8, & 10 PC-based software program to record and upload cumulative ped count & call data.
22. PBS shall contain UL approved, 100% recyclable, environmental and corrosion protected over mold encapsulate that tightly seals sensitive components.
23. PBS shall detect WALK and DON'T WALK from single PHCU Data Input Wire
24. PBS shall detect the condition of a Leaky Load Switch.

Pedestrian Head Controller Unit (PHCU) is the power supply and control unit that provides power and data for the Push Button Stations.

1. PHCU shall be mounted in the ped head and be powered from the 120 VAC, WALK/DON'T WALK ped head lamp indications.
2. PHCU Power Requirements shall be: 120 VAC, 60Hz, (100 ma, typical).
3. PHCU shall have 3 output wires to the PBS (Power, Data, Ground)

4. PHCU shall output one wire containing WALK and DON'T WALK information to the PBS
5. PHCU dimensions shall be: 7.3" L x 3.6" W x 1.3" H.
6. PHCU must be mountable inside all types of ped heads with the exception of older, neon/transformer type, and low profile ped heads.

Pole Mounting Assembly (This equipment is typically mounted on a pole near the start of a crossing. It is commonly referred to as the “Pedestrian Push Button Station” or “PBS”).

1. PBS shall be mounted to a pole by banding or bolting.
2. PBS shall be a single fixture that contains the vibro-tactile 2" ADA-compliant pedestrian push button with directional tactile arrow, a weatherproof speaker, and the appropriate sign for each location.
3. PBS Speaker shall be 8 Ohms, 6 Watt, and weather-proof.
4. PBS Button shall be ADA compliant with raised arrow on the button plunger. Cast Aluminum, Nickel plated and powder coated for color contrast. PBS arrow shall allow for change in orientation to one of four directions.
5. PBS Arrow Button Actuation shall use Hall Effect Sensor technology rated to greater than 20 million operations.
6. PBS Arrow Button Push Force shall have three adjustable pressure settings between 1 and 3lbs.
7. PBS Arrow Button shall pulse and vibrate at 20 Hz with displacement factor based on pounds of force used to actuate.
8. PBS shall include internal Conflict Monitor with microcontroller that independently monitors WALK, and DON'T WALK input signals for conflict condition; disables system operation and logs errors if conflict occurs.
9. PBS firmware and voice messages shall be updatable via Bluetooth. There shall be no requirement for the hardware to be changed out to update.
10. PBS Voltage Transient Protection shall meet applicable NEMA TS 4 requirements.
11. PBS shall meet or exceed NEMA 250 type 4X enclosure requirements.
12. PBS Construction shall be:
 - i. FRAME: Cast Aluminum Powder Coated, and Reinforced Thermoplastic.
 - ii. MESSAGE SIGN: Aluminum, Powder Coated, Ink Markings, or Reflective Vinyl Sheeting
 - iii. PUSH BUTTON: Aluminum, Powder Coated.
13. PBS Message Marking at time of order may specify the Message Sign Markings to be the **International Walking Person** or the **Informational Explanations** for the three (3) distinct pedestrian displays (WALK, DON'T WALK, and PED CLEAR) that a pedestrian would see on an active pedestrian head.

Bluetooth Programming Device (Apple iDevices or PC with Windows 7, 8 or 10)

1. System shall use Bluetooth technology to program firmware and audio voice messages.
2. System shall be password protected through programming interface.
3. System shall be capable of setting all volumes and features through Bluetooth interface.
4. System shall be capable of updating single PBS and all intersection PBSs within Bluetooth iDevice range.

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 by the manufacturer if it exhibits any partial outage before the final inspection or 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.

Backplates

Backplates shall be non-louvered. Backplates shall have a 5-inch border width and a dull flat black color with a retroreflective border. Only backplates that are listed in the latest MassDOT "Approved Equipment List" will be used on this project.

Posts and Bases

All traffic signal posts and bases shall be aluminum painted Gloss Black. Bases shall be ornamental in nature to match mast arms and include a cast iron threaded insert for strength. Signal post foundations in grass areas shall be exposed \pm 2 inches. In sidewalk or paved areas, the top of all signal post foundations shall not be exposed.

Meter Boxes

The meter boxes shall include a by-pass meter switch.

Intersection Wiring

All cable shall meet the requirements of IMSA Specifications or 20-1 and shall be twisted copper conductors. A minimum of five spare conductors shall be installed to all signal heads.

Wiring Diagrams

Five sets of wiring diagrams with both internal and external wiring for the control cabinet and all accessories as actually used in the field 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, pre-empt, phase selector, detectors, etc. All identification on the diagrams shall be as installed, and all field labeling shall be consistent with the diagrams. Before acceptance of the job, four copies of all operation and maintenance manuals and complete, accurate parts lists shall be supplied.

Service Connection

The connection to the existing underground power service stub shown on the plans is approximate only. It shall be the Contractor's responsibility to contact the utility company. The electric company (refer to utility contacts) will furnish the connection and power. The Contractor shall make all necessary arrangements with the electric utility company for the service connections or for any main power cut off when necessary, and bear all charges incurred hereby. The electric company will connect and disconnect power as required. No work shall be done in manholes or on power poles without a representative of the electric company being present. The Contractor will be responsible for coordinating their work with the electric company and be responsible for all charges incidental thereto.

Electric Service

An approved meter socket shall be mounted on the side of the cabinet of the controller. The Contractor shall furnish and install the meter socket and the utility company shall furnish and install the meter. A separately fused, 60 amp, grounded duplex outlet and a light receptacle shall be installed. A separate fused disconnect switch shall be provided with lightning protection. Adequate 120 VAC power terminals shall be provided within the controller cabinet.

Cooling Fan

The thermostatically controlled fan shall be sized and set as to limit the upper interior cabinet temperature to a difference of 30 degrees Fahrenheit above the exterior ambient temperature.

Duplex Convenience Receptacle

The duplex receptacle container within the controller cabinet shall be rated for 120 vac, 15 amp and shall be of the Ground Fault Circuit Interrupter (G.F.C.I.) Type.

Work Light

The work light contained within the controller cabinet shall be toggle switch controlled. This toggle switch shall be mounted on the inside of the cabinet door.

Keys

Two controller cabinet door keys and police door keys shall be supplied for each controller cabinet on the project.

As-built Traffic Layout Plans

It will be the responsibility of the Contractor to provide the Design Engineer with as-built traffic signal layout plans at a scale of 1"-20' indicating all changes made during the construction. The plans shall indicate the final location of all traffic signal equipment installed including detectors, signal posts, mast arms, pedestrian and vehicular signal heads, controller cabinets, conduit, pull boxes, hand holes and service connections. The plans shall also indicate the final as-built timing and sequence, major item list, power-pole number and meter number. Upon receipt of the above as-built information from the Contractor, the Design Engineer will field verify the as-built information and plans prior to the final acceptance of the project.

Miscellaneous Requirements

Because this is often overlooked, the Contractor's attention is drawn to the requirements of the following sections of the MassDOT Standard Specifications: Section 813.60C Splicing, relative to four optional methods of splicing in signal bases, Section 813.40C Ground Electrodes, relative to Requirement 1 - connection to a water piping system, and Section 813.61 Equipment

Grounding.

The Contractor shall make all necessary arrangements with the electric company for the service connections or for any main power cut off when necessary, and bear all charges incurred thereby.

VIDEO DETECTION SYSTEM

The video detection system shall be manufactured by Miovision Technologies Inc., and conform to the following:

The work shall consist of complete furnishing, installation, configuration, integration and testing of an environmentally hardened, purpose-built device to provide end-to-end video detection system, video streaming, video capture and all other material, labor and equipment necessary.

The device provides a permanently mounted IP video camera which can be used to generate that imagery that will support remote video monitoring, actuating traffic signals via video detection and provide traffic video analytics. This work must be performed in accordance with the standard specifications as specified herein.

1. General: Furnish, install, integrate and test all equipment and required components (hardware and software) including cables, power, and all components necessary to provide full and complete functionality in all respects.

2. Functional and Performance Requirements

A. Hardware

- 1. Camera
- 2. Camera Mount
- 3. Video Processing Unit

B. Video Detection

C. Traffic Analytics

D. Video Streaming

E. System Integration

- 1. Communication Service
- 2. Hardware Integration
- 3. Software Integration

F. Software

- 1. Server
- 2. Remote Updates
- 3. Detection Configuration and Monitoring
- 4. User Interface
- 5. Detector Monitoring
- 6. Data Display and Download
- 7. Open Data Support

G. Hardware Testing and Certification

H. Installation

I. Technical Support

J. Intellectual Property

K. Industry References

3. Materials.

Provide equipment that meet the following requirements.

A. Hardware

1. Camera:

- i. Shall provide 360 degrees of visibility from the point of installation.
- ii. Shall be powered via Power over Ethernet (PoE) and be IEEE802.3af compliant.
- iii. Shall support configuration in both spherical “fisheye” configuration and rectangular “quad view”.
- iv. Shall support at least 9-megapixel (MP) capture.
- v. Shall support ability to capture 4K video.
- vi. Shall provide H.264 and MJPEG image conversion.
- vii. Shall support RTSP streaming.
- viii. Shall support maximum aperture ratio of 1:1.9.
- ix. Shall include a clear polycarbonate resin-based dome.
- x. Shall be rated to IP66 (NEMA 4X compliant).

2. Camera Mount:

- i. Shall include all mounting hardware with device.
- ii. Mounting fixture shall be constructed of weatherproof painted aluminum.

- iii. Mounting hardware shall be fully assembled to camera and ready to attach to pole or extension arm.
- iv. Mounting hardware shall support vertical pole installation, horizontal pole installation, or attachment via a threaded fitting.
- v. Mounting fixture shall not exceed 19"x14"x8" in size, 5.5 lb in weight.
- vi. Shall include 40 feet of shielded Ethernet cable for connection to PoE power source and internet access.
- vii. Shall include two-way Ethernet coupler rated to IP68 for connection to cabinet Ethernet cable.
- viii. Shall provide 360 degrees of visibility from the point of installation.

3. Video Processing Unit:

- i. Shall support processing of up to two simultaneous feeds from camera units.
- ii. Shall include a USB 2.0 device ports.
- iii. Shall include 4x10/100/1000 Ethernet ports.
- iv. Shall include PoE on 2x of the above ports.
- v. Shall include onboard processing capabilities to perform video-based vehicle detection and generation of traffic analytics.
- vi. Shall provide 16 NEMA rated, GPIO ports that can be configured for detection actuation.
- vii. Shall support connection to the traffic controller's Port 1/SDLC bus for detection actuation.

B. Video Detection

- 1. Shall support a minimum of 16 detection channels.
- 2. Shall support the option of actuation via SDLC, direct wiring of GPIO, or through NEMA A/B/C cables.
- 3. Shall support real-time detection of vehicles in an unlimited number of configurable detection zones per camera.
- 4. Shall support detection of passenger vehicles, transit vehicles, and cyclists.
- 5. Shall support ability to maintain detection when view of a vehicle is temporarily occluded.
- 6. Shall support remote configuration of detection zones and system settings via Communications Service and Software.
- 7. Shall support output of a constant call on any detection channel if a loss of video signal occurs.
- 8. Shall allow zones to be configurable for presence, pulse, extend and delay outputs.
- 9. Shall ensure not less than 98% detection accuracy in good weather conditions, and not less than 96% accuracy under weather conditions which reduce visibility (eg. Moderate rain/snow/fog).
- 10. Shall support detection of unacceptable interference including interrupted video signal or low visibility conditions.
- 11. Shall default to a safe condition, such as minimum recall, fixed recall or a constant call on each active detection channel, in the event of unacceptable interference with the video signal or low visibility conditions.

12. Shall support directional zones to reduce false detections from objects traveling in other directions.
13. Shall support maintaining of multiple detection zones configurations which may be remotely selected and enabled at any time using Software.

C. Traffic Analytics

1. Shall support generation of on-demand Turning Movement Counts including classification for Car, Single Unit Truck, Motorcycle, Articulated Truck, Light-Goods vehicle, Bus and Bicycles on Road.
2. Shall support generation of on-demand Traffic Volume Counts including classification for Car, Single Unit Truck, Motorcycle, Articulated Truck, Light-Goods vehicle, Bus and Bicycles on Road.
3. Shall support generation of on-demand Crosswalk Traffic Counts including classifications for pedestrians and bicycles.
4. Shall support generation of on demand vehicle gap studies.
5. Shall support 95% guaranteed accuracy on all above-mentioned traffic studies.
6. Shall support export of traffic study data in the Universal Traffic Data Format (UTDF) for easy import into applications such as Synchro.

D. Video Streaming

1. Shall support at least 2 simultaneous and parallel video streams.
2. Shall be Onvif compliant.

E. System Integration

1. Communication Service
 - i. Shall support integration to a traffic signal with 4G LTE Cellular Communication Service.
 - ii. Shall provide real-time transmission of detector actuation data, video content and traffic analytics via Communication Service to Software for display and analysis.
2. Hardware Integration
 - i. Shall be certified as compatible with existing and new Miovision Spectrum Smartlink and Miovision Spectrum Interface devices in traffic signal cabinet.
3. Software Integration
 - i. Shall be certified and proven as compatible with web based Miovision Signals software system currently in use.
 - ii. Shall provide a real-time integration into Miovision Signals which allows overlay of detection data onto signal telemetry data.
 - iii. Shall provide an integration into Miovision Signals of traffic study data and analytics.

F. Software

1. Server
 - i. Software and data storage shall be hosted at a professional cloud hosting facility with redundancy of at least 2 instances, with automatic load balancing and shall scale to support any simultaneous number of connections.
 - ii. Shall support permanent storage of all detection data and traffic analytics in perpetuity.

2. Remote Updates
 - i. The device shall be capable of receiving remote updates via the communications service.
 - ii. The device shall include the ability to extend the functionality of Traffic analytics and vehicle detection to include incident detection and traffic event alerts within the next 12 months.
3. Detection Configuration and Monitoring
 - i. Shall provide a web browser-based user interface for configuration of detection zones remotely.
 - ii. Shall provide a web browser-based user interface for monitoring of detection activity, wherein a detection zone is highlighted on the video overlay display to confirm vehicle detection when a vehicle is detected crossing a detection zone.
4. User Interface
 - i. Shall provide a single user interface containing all Software functionality described herein.
 - ii. Shall provide a secure web-based Graphical User Interface (GUI) using SSL.
 - iii. Shall support an unlimited number of concurrent logins by authenticated users.
 - iv. Shall be fully accessible via desktop, tablet and mobile products on Chrome, Internet Explorer (Edge, 11.0) and Safari.
 - v. Shall support user login via OAuth Login.
 - vi. Shall provide a secure means of verifying account registration via email.
 - vii. Shall provide a secure means of password reset.
 - viii. Shall support the addition and management of user accounts for users that are both inside and outside of the organization at no additional cost.
 - ix. Shall support access to all detection data, traffic analytics data, and vehicle identification data stored on the server.
5. Video Streaming and Recall
 - i. Shall support live video streaming and video recall to modern desktop browsers without any third-party plugins.
 - ii. Shall support live video streaming and video recall on tablet browsers using the HLS protocol.
 - iii. Shall support live video streaming with a latency of no more than 10 seconds at a frame rate of at least 15 fps.
 - iv. Shall support live video streaming with an initial load time of no more than 10 seconds.
 - v. Shall support at least 20 concurrent video streams from a single camera to be viewed in multiple browsers.
 - vi. Shall support at least 40 concurrent video streams from all cameras active in the system, to be viewed in multiple browsers.
6. Detector Monitoring
 - i. Shall support live display of all detector actuations, with latency not to exceed 1 seconds when LTE connection is active.
 - ii. Shall support historical display of all detector actuations on-demand with load latency not to exceed 1 second.
 - iii. Shall support a viewing mode on which all detector actuations is displayed overlaid onto a diagram of the intersection.

7. Data Display and Download
 - i. Shall support display and download of data from all traffic studies and counts.
 - ii. Shall support display and download of all detector actuations real-time and historically.
8. Open Data and Support
 - i. Shall support open data to API via REST interface including JSON to all detector data and traffic analytics.
 - ii. Shall support administrator control of level of data API access including what function calls may be made publicly and what function calls are accessible only through authentication.
 - iii. Shall support Swagger.io documentation of API.

G. Hardware testing and Certification

1. Shall be fully NEMA tested and compliant, including shock, vibration, voltage, and thermal articles 2.2.7-2.2.11 (Please refer “NEMA TS2-2016: Traffic Controller Assemblies with NTCIP Requirements-Version 03.07” for further detail).
2. Shall support NEMA operating temperature specification -34° C to 74° C (-29° F to 165° F).
3. Shall support NEMA storage temperature specification -34° C to 74° C (-29° F to 165° F).
4. Shall support humidity operating requirements of 5% - 95% RH non-condensing.
5. Shall be FCC tested and compliant.
6. Shall be ROHS compliant.

H. Installation

1. Shall include all mounting hardware with device(s).
2. All functionality of Video Processing Unit shall be provided in a single self-contained device.
3. All hardware functionality Video Processing Unit shall operate off a single UL, CSA certificated LPS NEMA rated power supply.

I. Technical Support

1. Vendor shall provide technical support via email and toll-free telephone for all included hardware and software between the hours of 7:00 and 20:00 EST (Eastern Standard Time), Monday to Friday.

J. Intellectual Property

1. Shall include a license to utilize US patent 20080270569 “Method and system for analyzing multimedia content.”

K. Industry References

1. Shall include proof of the device’s use for detection and traffic analytics technology having been used in a minimum of 10 North American municipal, county, or state public traffic agencies.
2. Shall include proof of the device’s successful integration with the similar equipment as is in use at the install location, specifically Miovision Spectrum Smartlink and Miovision Spectrum Interface, in a minimum of 10 North American municipal, county, or state public traffic agencies.

Construction:**1. General:**

- A. Install the device as per the guideline from the manufacturer.
 - B. Install cables as needed at the installation site.
 - C. Install using settings that were approved at equipment mock up or as approved by the City to ensure interoperability and security, including VPN settings, local IP address, port forwarding and Network Address Translation (NAT), and IP-based filtering.
 - D. Integrate and test to meet specifications for integration and as shown on the plans.
2. **Warranty:** The device shall carry a warranty including parts and labor for 5 years from the date of shipment with at least 4 years of warranty remaining at the start of burn-in. Firmware updates, web application, and security updates shall be provided by the vendor for the life of the product.

**UNINTERRUPTED POWER SUPPLY SYSTEM- BATTERY BACKUP SYSTEM (BBS)
FOR TRAFFIC SIGNAL CONTROLS**

General: The BBS shall consist of:

1. UPS with internal power transfer relay and Tap Switching Transformer.
2. Automatic / Manual Bypass Switch assembly external to the UPS.
3. Batteries to provide required backup time.
4. Cabinet to house UPS, Bypass Switch, and batteries.
5. Interconnect cables and Mounting hardware.

UPS Functional Requirements

- The UPS shall be sized for 1100VA / 1100 watts.
- The UPS output in backup mode shall be 120VAC ±2%, sine wave, ≤3% THD, 60Hz ± 0.3 Hz.
- The inverter shall be 48VDC.
- The operating temperature shall be -40°C to +74°C with a maximum load of 70% of the rated output of the inverter.
- The UPS shall be tested and certified to Electrical Standards UL 1778 and CSA 107.3.
- The UPS shall have surge protection compliant with IEEE/ANSI C.62.41 Cat. A & B.
- The UPS shall have a Mean-Time-Before-Failure (MTBF) of 174,955 hours at 25°C.
- The UPS internal power transfer relay default to connecting the Line power to the load in the event of a UPS failure.
- The UPS shall shut the inverter off at 42.5VDC to prevent over-discharge damage to the batteries.
- The UPS shall have AVR (Automatic Voltage Regulation) to allow from input voltages of 88VAC to 175VAC.
- The UPS shall not have user definable transfer set points for Buck and Boost modes.
- The UPS output voltage shall be between 108VAC and 130VAC in AVR mode.

UPS Mechanical Requirements

- The UPS dimensions shall be 3.47" High x 17" Wide x 9" deep.
- The UPS shall have Input and Output terminal blocks rated for #10 AWG wire.
- The UPS shall have AC input and battery flush mount circuit breakers.

UPS User Display

- The UPS shall have a backlit LCD display and display real-time information.
- The UPS shall include a keypad for navigating system information.

UPS Status LED's

- The BBS shall have discrete status LED indications on the front of the inverter/charger.
- Green Output LED. This LED will be ON any time that the output of the UPS is in normal mode. When the UPS output is either in Backup Mode or AVR Modes the LED will flash On and Off.
- Red Fault / Alarm LED. This LED will be Solid On any time that there are any faults in the system or will Flash On and Off any time that there are any alarms in the system.

Local and Remote Communications

- The BBS shall be provided with a web-based-interface for user configuration and management through a web browser. The interface shall be RJ-45.
- The BBS shall provide a local interface to connect a laptop. The interface shall be RS- 232.
- The BBS shall maintain an event log containing a minimum of 200 of the most recent events recorded by the BBS. These events shall be down loadable remotely via Ethernet and automatically reported to the central monitoring software. The Events Log shall be date and time stamped.

Programmable Relay Contacts

- The BBS shall provide the user six (5) programmable dry relay contacts and one (1) 48VDC relay contact. As a minimum, the programmable options shall be On Battery, Low Battery, Timer, Alarm, Fault, and Off. The BBS shall also have three (3) input dry relay contacts. BBS Self-Test, User Alarm, and BBS Shutdown.

Automatic & Manual Bypass Switch

- The Automatic Bypass Transfer Switch shall be a combination automatic/manual bypass switch. Placing the bypass switch in the “Bypass” mode shall transfer the intersection load from the UPS output directly to commercial power. AC commercial power must still be available to the UPS input, allowing the UPS to keep the batteries charged. An Inverter Input breaker shall be provided and located on the Bypass Switch so to shut off commercial power to the UPS input, allowing safely disconnecting and removing the inverter. With the inverter turned off, the batteries can be safely disconnected from the system.

Automatic Generator Transfer Switch

- The BBS shall be equipped with an Automatic Generator Transfer Switch that automatically senses that a generator is connected and switches the load to the generator.

Batteries

- The battery shall be extreme temperature, float type, Gel Cell VRLA (Valve Regulated Lead Acid).
- The individual batteries shall be 12VDC.
- The battery group size shall be Case 31.
- The amp-hour rating shall be 100Ah or 109Ah at the 20-hour rate to 1.75 volts per cell.
- The batteries shall provide 100% runtime capacity out-of-the-box.
- The battery string voltage shall be 48VDC.
- The operating temperature of the batteries shall be -40°C to +71°C.
- The batteries shall have maintenance-free threaded insert terminals.

- The batteries shall have lifting handles.
- The BBS shall include an external battery balancer to automatically balance the battery charger voltage on all batteries in the string to within +/- 100 mV between any two batteries. The Balancer shall allow for any single 12V battery within the battery string to be replaced without replacing all batteries in the string during the battery warranty period.

Cabinet

- The dimensions for the BBS cabinet shall not exceed 50 inches in height, 22 inches in width and 17 inches in depth.
- The Inverter/Charger Unit shall be shelf or rack mounted on a standard EIA19" rack.
- The Automatic Transfer switch shall be mounted on EIA 19" Rail.
- All interconnect wiring shall be provided and shall be UL Style 1015 CSA TEW.
- All external cabinets shall be NEMA 3R rated. The enclosure shall be made of 0.125 (5052-H32) aluminum.
- The external cabinet shall be ventilated through the use of louvered vents, filter, and one thermostatically controlled fan. The filter shall be the re-usable type and matching the dimensions of the louver with both located on the bottom half of the door.
- The cabinet fan shall be DC operated for longer reliability.
The cabinet shall include a 3-point locking system, including a Type 2 Corbin lock and utilize a handle with pad locking capability.

Documentation

Each programmable local hardware component (i.e. controller, malfunction management unit, loop detector amplifier, emergency vehicle preemption phase selector) shall be initially programmed by the Contractor based on information contained on the plans. Five copies of the cabinet wiring diagram, two copies of controller print out bound and covered, two sets of cabinet keys and one controller manual to be left in cabinet. A detector door chart including all detectors information shall be laminated to inside of cabinet door.

Testing Period: Upon completion of all work, the Contractor shall request a final inspection and test of signal equipment in writing at least thirty (30) days prior to the inspection date. The testing date shall be established with mutual agreement among the Contractor and the City. Electrical tests shall be conducted by the Contractor, in the presence of the City. The Contractor shall supply all necessary testing materials and labor for all tests and re-tests. The Contractor shall record the results of all tests and submit them to the City for approval.

Fine Tuning and Adjustment Period: The Contractor shall employ the services of the manufacturer or his authorized representative to instruct City personnel on the use of the system and to provide fine tuning and adjustments to all timing functions programmed within the controller units. Fine tuning and adjustment shall be accomplished at the direction of the City and shall take place over a three (3) day period (8 hours per day). These days may or may not be consecutive.

TRAFFIC SIGNAL PREEMPTION SYSTEM

Preempt System Functional Requirements

The Traffic Signal Preemption System (TSPS) shall be the Glance priority and preemption system manufactured by Applied Information Inc., and conform to the following requirements:

Overall Requirements

- a. When emergency vehicle requests preempt service, the TSPS shall reliably request a preempt from the traffic controller by activating a digital output (which is connected to one of the preempt inputs on the traffic controller) when the circumstance of the emergency vehicle (location, speed, estimated time of arrival, indicator) comply with the rules established by the configuration of the intersection.
- b. The pre-empt activation shall be managed by implementing the following rules/parameters. It shall be possible to have up to 32 rules.
 - i. The approach area of a rule shall be bounded by a left and right direction, and a minimum and maximum distance. A preempt or shall only be activated if the vehicle is within this boundary and approaching the intersection.
 - ii. If enabled, the preempt shall be activated when the estimated time of arrival (ETA) for the vehicle is less than the set parameter.
 - iii. If enabled, the preempt shall be activated when the vehicle is less than the minimum distance to the intersection.
 - iv. If enabled, the preempt shall only be activated if the vehicle has the left turn signal, or right turn signal, active as configured.
 - v. If enabled, the preempt shall be activated early if congestion is detected in front of the emergency vehicle (and congestion will be detected by the emergency vehicle travelling below a threshold speed) so that the early activation of the preempt can help clear the congested traffic out from in front of the emergency vehicle.
 - vi. Each rule shall cause a particular preempt to be activated. Multiple rules can be associated with a particular preempt.
 - vii. If configured, a preempt shall stay active until the vehicle is detected at a safe distance away from the intersection and moving away from the intersection.
 - viii. The preempt shall be released once all active rules that triggered the preempt have become deactivated.
- c. The preempt system shall support eight (8) preempt outputs. All inputs are optically isolated.
- d. The status of preempts shall be indicated by LED's on the front of the in-cabinet preempt unit.
- e. It shall be possible to test each of the preempts by pressing a test button (with an associated selector switch) which will cause each preempt to be triggered. This will allow for the wiring, and operation of the signal controller, to be tested without actually driving a vehicle down each approach.
- f. The system shall be able to support service calls on a first come first serve basis.

Communications Requirements

- a. The preempt system shall support both radio and cellular communications.
- b. The radio system shall operate on unlicensed bands and shall not require user certification.
- c. The radio shall have a range in excess of 2500 feet.
- d. The system latency shall support real time communications on a second-by-second basis from the vehicle to the intersection.
- e. Data paths shall be established (if configured) to operate via radio and via cell network. In this way, the preemption request packets from the vehicle will potentially arrive at the intersection from both communication paths. The intersection shall process the packet that arrives first and ignore the packet that arrives subsequently.
- f. The system shall continue to operate correctly in the event of radio or cellular failure.

Central Configuration Requirements

- a. It shall be possible to configure the parameters required to implement the desired rules on a browser client connected to the central computer.
- b. Setting of left and right direction limits, and distances, shall be accomplished by clicking and dragging of lines on a map of the roads.
- c. Other rule parameters shall be entered on the user interface and saved and/or sent to the intersection as required.
- d. Systems that require the installation of software onto client computers will not be acceptable.

Local Configuration Requirements

- a. It shall be possible to edit the preemption rules at the roadside by connecting a laptop computer to the controller with an Ethernet cable.
- b. The editing of the rules shall be accomplished by using a local web site hosted by the preempt controller, using a browser.
- c. Systems that require the user to load custom configuration software on the laptop for the purpose of editing the preemption rules will not be acceptable.

Intersection Device Requirements

It is a requirement that the TSPS operate independent of the brand/type of intersection controller deployed at the intersection. The TSPS contractor shall install a small field device into each intersection cabinet which connects to the terminal strip in the cabinet (via a wiring harness) and makes the TSPS function independent of controller operation. The TSPS Field Device (TSPSFD) shall conform to the following requirements:

- a. The TSPSFD shall function correctly between -34 degrees C and +74 degrees C.
- b. The maximum size of the TSPSFD shall be 19" x 7.455" by 1.719" (1U), and shall be suitable for placing in the traffic cabinet.
- c. The TSPSFD shall be provided with appropriately rated connects that allows the TSPSFD to be exchanged by unplugging connectors, without tools.
- d. The TSPSFD shall incorporate an integrated GPS and cell modem.
- e. The configuration of the TSPSFD shall be accomplished by accessing the internal web server with a browser. It shall be possible to configure the TSPSFD without any special software.
- f. The TSPSFD shall be powered via a standard 120V input power.
- g. The TSPSFD shall allow for the routing of the controller configuration packets to and from the controller (either by Ethernet or serial communications) for any type of controller. In this way it shall be possible to configure the controller, and utilize the controller specific software to interrogate the controller, and the TSPS shall provide the communications pipe which allows this to be accomplished.
- h. The TSPSFD shall utilize field-initiated communications. This allows for a low-cost cellular data plan to be used, with infrequent polling. However, when an abnormal event occurs and is detected by the TSPSFD, then the TSPSFD will immediately initiate the transfer of a data packet to the TSPS to enable real-time alerting of response personnel to take place.
- i. The TSPSFD shall, within the size limitations above, include a battery and battery charging/monitoring circuit, to allow the TSPS to function correctly even when all power to the intersection has failed. The battery shall continue to power the TSPSFD for a minimum of 5 hours after all power has failed to the intersection.
- j. The TSPSFD shall incorporate an integrated GPS which will allow the TSPSFD to geo-locate itself on the map, without configuration.

- k. The TSPSFD shall operate without requiring a static IP address. The only configuration required at the TSPSFD is to enter the URL of where the TSPS central software is hosted.
- l. In the event that the cell service is interrupted or is not available, the TSPSFD shall store any events that occur in internal memory and forward these events automatically to the TSPS when the cell service is restored. In this way, a complete record of events at the device can be maintained even if cell service is interrupted for a period. The system will store 5000 events.
- m. The TSPSFD shall utilize HTTP and HTTPS protocols, and XML data structures, for communication with the TSPS. In this way the data will be open for future expansion and competition. The use of secret proprietary protocols is not permitted.
- n. The TSPSFD shall be a 1U 19" rack mount device, with all connections on the rear, and LED indicators, power switches and selector switches on the front.
- o. The TSPSFD shall include Ethernet communications via four Ethernet Ports with RJ45 connectors.
- p. The TSPSFD shall use no self-tapping screws.
- q. The TSPSFD shall be powder coated aluminum enclosures.
- r. The TSPSFD shall include weatherproof antennas if installed externally.

In-vehicle Device Requirements

The Traffic Preempt System Vehicle Device (TPSVD) shall conform to the following requirements:

- a. The TPSVD shall function correctly between -34 degrees C and +74 degrees C.
- b. The TPSVD shall be capable of being mounted inside a vehicle either under a seat or strapped under the dashboard. The unit will come with all wiring needed to connect the system to the vehicle.
- c. The TPSVD shall be able to interface to a non-invasive road sensor for environmental measurements via either RS485 or Bluetooth connection.
- d. The TPSVD shall be provided with appropriately rated and keyed connectors that allows the TPSVD to be exchanged by unplugging connectors, without tools.
- e. The TPSVD shall incorporate an integrated Dead Reckoning GPS and cell modem.
- f. The configuration of the TPSVD shall be accomplished by accessing the internal web server with a browser. It shall be possible to configure the TPSVD without any special software.
- g. The TPSVD shall utilize field-initiated communications. This allows for low-cost cellular data plans to be used, with infrequent polling. However, when an abnormal event or significant change in road conditions occurs, then the TPSVD will immediately initiate the transfer of a data packet to the central to enable real-time road condition information to be displayed on the central system.
- h. The TPSVD shall incorporate an integrated GPS which will allow the TPSVD to geolocate itself on the map, without configuration.
- i. The TPSVD shall operate without requiring static IP address. The only configuration required at the TPSVD is to enter the URL of where the TSPS central software is hosted.
- j. In the event that the cell service is interrupted or is not available, the TPSVD shall store any events that occur in internal memory and forward these events automatically to the RCMS when the cell service is restored. In this way, a complete record of events at the device can be maintained even if cell service is interrupted for a period.
- k. The TPSVD shall utilize HTTP and HTTPS protocols, and XML data structures, for communications with the TSPS. In this way the data will be open for future expansion and competition. The use of secret proprietary protocols is not permitted.

- l. The TPSVD shall support Ethernet, cellular and license free radio communication.
- m. The TPSVD shall have the option of being supplied with an enhanced GPS, which provides GPS coordinates based on dead-reckoning even when the GPS signal is shielded from the vehicle such as under an overpass; in a tunnel or in between tall buildings in a city. The dead reckoning system shall include accelerometers, gyroscopes and a distance measure that will provide accuracy of better than 20 feet in 1000 feet, when there is no information from the GPS satellites. The enhanced GPS shall optionally be connected to the vehicle OBD-II port; the J1939 ECU port (for heavy vehicles) or a wheel tick sensor as the project requires. The enhanced GPS shall self-calibrate the wheel tick input.

Installation

All installation work in the cabinets shall be carried out by personnel certified to work in City of Quincy's traffic cabinets.

Hosting and Connectivity and Service

The TSPS contractor, as part of the quote, shall include 5- and 10-year options for Connectivity and Service, as part of the purchase price. The City of Quincy will select the option which best meets the needs of the City.

The Connectivity and Service agreement shall include at a minimum:

- Cellular Connectivity
- Upgrade the cellular modem if the technology is not supported by the cellular networks.
- Telephone and email support
- No cellular overage charges
- Extended warranty on the hardware for the period of the Connectivity and Service Agreement
- Over-the-air software updates
- Over-the-air security updates
- Future Connected Vehicles Service

Commissioning, Training and Documentation

The TSPS contractor shall configure the system and reports and train the City in the correct operation of the TSPS, to enable the City to utilize the TSPS for the objectives outlined above.

ADAPTIVE TRAFFIC CONTROL SIGNAL

The work shall include furnishing and installing an adaptive traffic signal control system required to interface with local intersection controllers; software testing; licenses; system testing; system training; and all other equipment, materials and incidental costs necessary to provide a complete, fully operational adaptive traffic signal control system as specific herein and as shown on the plans. Adaptive operations shall be via edge processing local to the intersection. Remote monitoring and system-level configuration shall be via a cloud-based server. The adaptive system shall be Surtrac by Rapid Flow Technologies to operate with the existing adjacent Surtrac system currently in use on the Walter J. Hannon Parkway corridor.

Adaptive Control

The Contractor shall furnish and install an adaptive traffic signal control system which shall provide adjustments to traffic signal timing on a second-by-second basis based on current vehicle demand on the road for the intersection of Walter J. Hannon Parkway and General McConville Way. This newly signalized intersection will become part of a coordinated adaptive system with three adjacent intersections on Walter J. Hannon Parkway. System operation shall be decentralized such that hardware failures or network outages do not unduly affect operation at other adaptive intersections. The system shall autonomously shift between strategies to facilitate balanced traffic flow, progression bandwidth and critical movement modes based on real-time optimization.

The adaptive system shall optimize phase durations on a second-by-second basis. The system shall utilize vehicle detector data to build a model of current traveler locations and estimate future paths. Real-time, second-by-second, distributed optimization shall be used to optimize performance for each intersection. Based on these optimization plans, projected outflows shall be shared with neighboring intersections to extend the planning horizon for optimization, for coordination and vehicle progression. Real-time models of queues shall be used during second by-second optimization. The system shall not rely on fixed cycle times.

The system algorithm should be capable of automated shifts in strategy to accommodate a variety of traffic scenarios. Operation should be based on real-time optimization based on the current vehicles on the road network. Scenarios shall include minimizing overall network delay, favoring progression on major movements, and considering critical movements to accommodate movements or approaches that require special accommodation due to high traffic demand. The

system shall not omit any phase that has active vehicle or pedestrian demand present, signal phases shall be serviced in sequence based on demand as shown on the contract plans.

The system/local controller firmware shall use a real-time model of current demand to recover and resume normal operation upon the completion of a preemption event. During the time when preemption is active, the system shall continue to collect traffic data and calculate the appropriate actions based on traffic conditions. Once preemption operation has been completed the system/controller shall immediately return to adaptive operation.

In the event that communications are lost to an individual intersection or detection failures compromise adaptive operation, the intersection should failover and revert to conventional time-based control operations as shown on the Plans as a backup mode until the issue can be resolved. Neighboring intersections shall continue in adaptive operation unless detection is compromised to the extent that adaptive operations are ineffective. Reverting intersection control to time-based backup shall be automated based on failure conditions with allowed manual override.

The Contractor shall program the system with varying levels of access privileges for up to 100 users. Access privileges must be adjustable on an intersection-by-intersection basis. The Engineer will provide the listing and privileges that will be assigned to each user.

Adaptive System Expansion

The adaptive system shall have the capability for future expansion.

System Acceptance

System acceptance will be conditional based upon successful system integration of all required elements according to the plans and specifications, the system is fully operational to the satisfaction of the Resident and Design Engineers, testing has been completed, and the system has performed in accordance with the Contract Plans and Specifications without failure throughout the test period.

During the test period, the Contractor shall maintain and make available to the Resident and Design Engineers on a daily basis a log of all activities, including significant events, failures, and failure correction actions.

Field Programming Unit

The Contractor shall furnish a System Field Programming Unit complete with vehicle detection software used for the monitoring of the systems and software for uploading and downloading of controller databases from/to the controllers supplied and installed as part of this project. The Contractor shall program and configure the unit and the application software installed to be fully functional to allow operation and monitoring of the system. The system field programming unit shall consist of one (1) laptop computer and shall meet the following minimum requirements:

- Intel Core i7 processor or better
- 500GB HD minimum
- 16GB of memory (RAM) minimum
- 13" Display or larger
- Graphics card with 512 MB RAM or higher
- 802.11g wireless Ethernet adapter
- 10/100 MB Ethernet adapter
- Windows 64-bit operating system
- 4 years of next-day on-site service
- Carrying case
- Power Supply

The Contractor shall deliver the laptop to the Engineer fully configured to remotely support adaptive and video detection monitoring and control operations.

Adaptive Signal Maintenance Services

Under this Item, the Contractor, through his Vendor, shall provide maintenance services of the Adaptive Signal system for a period of five (5) years. This maintenance period shall begin once the project is accepted by the City. During this period the Contractor shall update the City and, at a minimum, shall provide the following tasks:

- Provide software upgrades for the Adaptive Signal system;
- Monitor the Adaptive Signal system for maximum efficiency, and suggest system adjustments;
- Preserve the Adaptive Signal system to operate as designed or when anomalies occur;
- System performance measures shall be collected and retained based on a daily time schedule; and
- Respond to alarms and communication issues.

SIGNAL INTERCONNECT CABLE – FIBER OPTIC

Fiber – Optic Patch Panel shall provide termination for 24 fibers and be preloaded with 24 ST connector panels. Enclosure shall be 10”H x 12”W x 3”D, 16-gauge powder coated steel. Enclosure shall have key locking double doors. Fiber – Optic cable shall conform to the following IMSA Specifications:

- IMSA Specification No. 70 (for single and multi-mode fiber optic cable)
- IMSA Specification No. 70-1 (for single and multi-mode fiber optic dielectric cable)

- IMSA Specification No. 70-3 (for single and multi-mode fiber optic self-supporting cable)
- IMSA Specification No. 70-5 (for single and multi-mode fiber optic armored cable)

REMOVING AND STACKING EXISTING TRAFFIC SIGNAL EQUIPMENT

Existing traffic signal equipment to be removed within the project limits shall be removed and stacked as shown on the plans. Within the project limits, the existing traffic signal equipment shall be removed and stacked at the intersection of:

- Walter J. Hannon Parkway at Parkingway.

Note: Existing traffic signal equipment on Walter J. Hannon Parkway at Parkingway shall not be removed and stacked until the new traffic signal at the intersection of Walter J. Hannon Parkway at General McConville Way is complete with all equipment in place and the traffic signal in full stop-and-go operation.

All traffic signal equipment to be removed and stacked at a location to be designated by the City. The Contractor shall supply all necessary manpower and equipment to load, transport and unload the equipment per the City's direction. The City shall determine the condition of the material. Copper cable shall be coiled and secured, separated from other cable such as galvanized messenger and span wire, if applicable.

The work shall also include the excavation and backfilling with compacted gravel of the holes resulting from the excavation of the foundations. The replacement, in kind, of any surface material disturbed shall be measured and paid for accordingly under the respective pay items in the contract.

The Contractor shall disassemble posts from pedestals and disassemble housings and cabinets from posts. The Contractor shall be held responsible for any damage or theft of the stacked materials before final removal.

Prior to abandonment in place of existing conduit and handholes, the Contractor shall schedule a field meeting with the City and the Engineer in order to coordinate items to be abandoned in place. Measurement and payment for the removal, stacking and delivery of traffic signal equipment shall be as specified in other pay items included in this Contract.

3 INCH ELECTRICAL CONDUIT TYPE NM – PLASTIC (UL)

The 3-inch Electrical Conduit, Type NM shall be provided as shown on the Plans and as described in other sections of these specifications.

Measurement and payment for this item shall be as specified in other pay items included in this Contract.

TRAFFIC SIGNAL PULL BOXES – SD2.031, ELECTRIC HANDHOLE – SD2.023 (TRAFFIC)

Traffic Signal Pull Boxes – SD2.031 and Electric Handhole- SD2.023 shall be provided as shown in the Plans and as described in other sections of these specifications.

Measurement and payment for this item shall be as specified in other pay items included in this Contract.

RAPID RECTANLGUAR FLASHING BEACONS (RRFBs) (SOLAR)

All work shall be in accordance with Section 800 of the Standard Specifications, the Plans, and the following:

The work shall include furnishing and installing a solar-powered, pedestrian actuated, rectangular rapid flashing beacon (RRFB) system at the following locations shown in the plans. RRFBs are intended to provide supplemental warning to approaching vehicles of the potential for pedestrians to be crossing in an adjacent crosswalk.

Location 2 – Walter J. Hannon Parkway and Parkingway

A RRFB system shall, at a minimum, consist of the following items, which shall be included in the lump sum bid:

- (3) concrete foundations;
- (3) 15' traffic signal posts and pedestals;
- (4) APS pushbutton systems;
- (4) dual rectangular yellow LED beacons in NEMA enclosures with side LED indicators;
- (2) 9"x12" R10-25 (PUSH BUTTON TO TURN ON WARNING LIGHTS) signs;
- (4) 36"x36" W11-2 (Pedestrian Warning) signs;
- (2) 24"x12" W16-7PR and (2) 24"x12" W16-7PL (Diagonal Downward Arrow) signs;
- (3) solar panels;
- (2) NEMA Type 3R or higher enclosures tohouse:
 - Electrical components, including wiring and solid-state circuit boards;
 - On-board user interface;
 - Battery; and
 - Frequency hopping spread spectrum (or other alternate FCC approved) wireless activation unit with a minimum 150' range; and
- All mounting and supporting hardware and wiring necessary to complete a working system.

RRFB controller and LED beacons, APS pushbutton systems, and traffic signal posts and pedestals shall be listed on the Qualified Traffic Control Equipment List. Pedestals shall be cast iron.

All hot dipped galvanized steel signal components including posts, bases, caps and hardware, and control cabinet, shall be powder coated “Gloss Black” as described below.

The light intensity of the LED beacons during daytime conditions shall meet the minimum specifications for Class 1 yellow peak luminous intensity in the Society of Automotive Engineers (SAE) Standard J595 (Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles) dated January, 2005. An automatic signal dimming device shall be included to reduce the brilliance of the LED beacons during nighttime conditions.

All signs shall be MUTCD-compliant. R10-25 signs shall have a black border and legend on a white background. W11-2, W16-7PR, and W16-7PL signs shall have a black border and legend on a fluorescent yellow-green background. All sign sheeting materials shall be per Subsection 828.41.

R10-25 signs may be integrated into the APS pushbutton system as a single unit or mounted separately on Type A aluminum. W11-2, W16-7PR, and W16-7PL signs shall be Type A aluminum

per Subsection 828.42.

Any proprietary software required for the programming and/or operation of the system shall be included at no additional cost.

The solar panels shall be affixed to an aluminum plate and bracket, adjustable at an angle of 45° to 60° and each assembly shall be mounted on a 360° rotatable pole cap mount to facilitate adjustment for maximum solar collection and optimal battery strength. The solar panel assemblies shall be rated for 130 mph wind conditions.

The batteries shall conform to Battery Council International specifications and have a capacity allowing up to 30 days of autonomy without sunlight and varying with ambient temperature and number of activations. The batteries shall be rated for a minimum lifespan of 3 years. Batteries shall be replaceable independently of other components.

The solar panels and battery shall have a minimum operating temperature range of -40° to 122°F (-40° to 50°C).

The Contractor shall provide shop drawings and calculations to confirm solar panel sizing and battery/solar energy storage will meet the functional requirements of the system.

Functional Requirements

The RRFB system shall remain dark until pedestrian actuation.

Upon actuation, all LED beacons shall activate and flash in a rapidly flashing sequence. Each sequence shall last 800 milliseconds and there shall be 75 sequences per minute. The sequence shall be the same for each pair of LED beacons in an enclosure and shall be as follows:

1. The RRFB indication on the left-hand side shall be illuminated for approximately 50 milliseconds.
2. Both RRFB indications shall be dark for approximately 50 milliseconds.
3. The RRFB indication on the right-hand side shall be illuminated for approximately 50 milliseconds.
4. Both RRFB indications shall be dark for approximately 50 milliseconds.
5. The RRFB indication on the left-hand side shall be illuminated for approximately 50 milliseconds.
6. Both RRFB indications shall be dark for approximately 50 milliseconds.
7. The RRFB indication on the right-hand side shall be illuminated for approximately 50 milliseconds.
8. Both RRFB indications shall be dark for approximately 50 milliseconds.
9. The RRFB indication on the left-hand side shall be illuminated for approximately 50 milliseconds.
10. Both RRFB indications shall be dark for approximately 50 milliseconds.
11. Both RRFB indications shall be dark for approximately 250 milliseconds.

The flash rate of each individual RRFB indication, as applied over the full flashing sequence, shall not be between 5 and 30 flashes per second.

All RRFBs within the system shall commence and cease operation simultaneously.

The length of the flashing cycle upon actuation and the minimum allowable time between actuations shall be per the plans. These settings shall be user-programmable through the on-board user interface.

No-fee wireless (Wi-Fi, Bluetooth®, etc.) may be used as an alternative programming method.

Each APS pushbutton shall have a tactile arrow and locator tone. The tactile arrow shall be oriented to point in the direction of the crosswalk. The locator tone shall have a duration of 0.15 seconds or less and shall repeat at 1-second intervals. The locator tone shall be set 2 to 5 dBA above ambient sound, shall automatically adjust intensity, but cap at a maximum volume of 100 dBA. The tone shall be audible whenever the LED modules are not active.

Upon activation of the LED modules, a speech message shall state, "Yellow lights are flashing." This message shall be stated twice. No vibrotactile or percussive indications shall be used.

If a pushbutton is pressed before the minimum time between actuation intervals is met, a speech message shall state, "Wait," and the locator tone shall resume until the LED modules activate.

Construction Methods

No work shall commence until the shop drawings are approved. Layout and design of the RRFB system shall conform to the plans.

Foundation installations shall be per Subsection 801.62. The top of the foundation shall be $\frac{1}{4}$ " to 1" proud of the sidewalk and chamfered at 45 degrees. Gaps between the sidewalk and foundation shall be no larger than $\frac{1}{4}$ " and grouted with preformed joint filler.

The Contractor shall diagnose and replace any part of the pedestrian activated warning system that is found to be defective in workmanship, material, or manner of functioning within six months of final acceptance by the Engineer. This requirement does not supersede the one-year warranty period on materials specified in Subsection 815.20.

Specific Requirements for Equipment Colors and Finishes

All hot dipped galvanized steel signal components including posts, bases, caps and hardware, and control cabinet, shall meet the following criteria.

Powder Coating Requirements for Galvanized Steel

Powder Coating shall be Gloss Black, 65% gloss. The manufacturer shall certify that the powder coating, preparation and pretreatments will be performed to meet the following criteria:

- Powder Coating formulation shall be (TGIC) Polyester
- Finish shall be smooth 65% semi-gloss meeting ASTM B2955
- Coatings shall have a minimum cured thickness of not less than 2.0 Mils (.002 inches)
- Salt Spray Resistance of the final product shall have zero undercutting @ 500 hours of exposure based on test methods that meet or exceed ASTM B-117.
- The finished coating shall pass 2H Pencil hardness testing based on ASTM D-3363
- The finished coating shall have adhesion properties that meet ASTM D-3359/Method B – Rating result shall be not less than 5B. (Note: The owner reserves the right to perform adhesion testing on site using test method A or B)
- Impact Resistance of the finished coating shall meet ASTM D-2794
- Flexibility of the powder coating when fully cured shall meet ASTM D-522 over a $\frac{1}{4}$ " mandrel.
- Abrasive Resistance Qualities shall meet or exceed ASTM D4060 requirements.

Substrate preparation for galvanized metals prior to coating application shall be as follows:

Powder Coated Galvanized Steel surfaces shall be pre-treated with a Phosphate Conversion Coating meeting BS3189/1959, Class C for zinc phosphate using a five-stage process including alkali de-grease, rinse, zinc phosphate (applied by either spray or dip), followed by two rinses.

Substrate preparation for Aluminum components prior to coating application shall be as follows:

Powder Coated Aluminum surfaces shall be pre-treated with a Chromate Conversion Coating. The coating weight shall be 0.1-0.5g/m². Chromate Conversion Coating shall be applied using a five-stage process including alkali de-grease, rinse, chromate conversion followed by two rinses. The treated surfaces shall be powder coated as soon as the pre-treatment is dry.

Quality Control

The powder coating facilities shall be owned and operated by the pole manufacturer to ensure a quality coating system.

END OF SECTION 34 41 13

**DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK**

This Page Intentionally Left Blank



woodardcurran.com